Appendix E
Prioritisation Framework

A methodology for prioritising stormwater management in the Wellington region

Quality statement

Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
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1	05/5/22	Revised draft for general reference	Jess Grinter (Stantec)	Justine Bennett (GHD)		

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1. Summary

In 2019, Wellington Water commissioned the development of a Stormwater Management Strategy for the Wellington

City stormwater network catchment as required by the global stormwater consent (Stage 1, issued 2015) and Schedule N of the region's Natural Resources Plan. This was to be the first in a series of three strategies to cover the majority of the greater Wellington region's stormwater network managed by Wellington Water. All three strategies have since been developed over the subsequent three years (to 2022).

A key element of each Stormwater Management Strategy is the prioritisation of sub-catchments within the relevant network catchment (Wellington City, Porirua City, and Hutt City / Upper Hutt City) for future stormwater management, based on a range of aspects including catchment character and related risks to stormwater quality and quantity. The purpose of this exercise was to introduce an objective and robust tool to support decision-making with regards to stormwater management within the client councils (Wellington City Council, Porirua City Council, Hutt City Council, and Upper Hutt City Council) and Wellington Water.

An approach for prioritising sub-catchments for stormwater management was designed in order to meet the requirements of Schedule N, but also to provide an objective and robust tool for decision makers in each client council (Wellington City Council, Porirua City Council, Hutt City Council, and Upper Hutt City Council) and Wellington Water to utilise in the allocation of funding for stormwater network upgrades, water quality improvement projects, and other initiatives over the long term. The methodology for the development of the tool, described in this document, reflects an approach which is well-aligned with industry best practice for Multi-Criteria Analysis (MCA) processes. The tool was developed in consultation with Wellington Water and GWRC, with client councils in mind as primary users of the final application.

2. Contributors

The development of this methodology between March 2021 and April 2022 has been an extensive process, gathering feedback from a multitude of technical and practical perspectives, all of which has enabled the development of an appropriate and robust approach. The authors wish to thank the below-mentioned contributors for their time, patience, and valuable inputs throughout the process:

Geospatial data analysis / automation:

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Key technical contributors:

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- Greater Wellington Regional Council (Jude Chittock, Rubie McLintock, Rachel Pawson, and Alastair Smaill)
- Connect Water team (Alistair Allan, Sheryl Paine, Alicia Taylor)

3. Introduction

The intent of this document is to provide a replicable methodology for the application of the prioritisation framework in catchments across the Greater Wellington region. It is intended as a tool for Wellington Water and its client councils to use to inform policy, funding, and asset management decisions in relation to the stormwater network and associated receiving environments. The tool is intended to provide an objective insight into complex issues, and in many ways, it simplifies those issues to allow for a more holistic, catchment-focused overview. It is designed to support wider processes and discussions regarding stormwater management, including those with external stakeholders such as mana whenua.

The tool does not account for peripheral or contextual factors such as local or national political issues and influence; community pressures; availability of funding; state of emergency situations (such as the aftermath of a large flood event), and additional inputs to the stormwater system which are managed through separate consenting and regulatory processes such as wastewater overflows and flood risk. 'Priority' may be determined through the consideration of a much wider range of factors by decision-makers. The prioritisation matrix is simply a tool to provide an objective starting point.

This framework was initially applied to the Wellington City, Porirua and Hutt valley/Wainuiomata stormwater network catchments. Unless otherwise indicated, catchment-scale information presented in this document is related to the Wellington City catchment (e.g. priority scoring, thresholds for criteria). This is intended as an illustrative example, and it is intended that the methodology will be marginally adapted to each of the other catchments in the region depending on available data and catchment characteristics. The underlying methods and assumptions applied shall be remain unchanged, and any peripheral variations to method to account for local context shall be captured in Stormwater Management Strategies developed for each of the three catchments.. It is intended that consistency between catchments will be maintained as far as practicable, to ensure that prioritisation outputs are comparable across the region.

The prioritisation framework is built upon previous work completed in support of the Stage 1 Global Stormwater Consent application (granted in 2018). Significant effort was invested in 2017 to prioritise sub-catchments across the entire Greater Wellington region, on the basis of the existing state of the aquatic environment and external pressures on the environment at that time (e.g. development, removal of vegetation, presence of other discharges). The level of quantitative data available to assess water quality in each sub-catchment was also assessed at that time, and gaps in knowledge were identified and then used to inform the development of a Stormwater Monitoring Plan. The SMP was finalised in February 2020, and monitoring began in June 2020. As a result, by July 2021 Wellington Water had collected over 12 months of water quality data for the sites specified in the SMP and the Stage 1 consent.

This monitoring information provides a more robust platform on which to base any assessment of stormwater quality than was previously available in 2017. Given that only one year of data is available, we have taken a cautious approach in using it to assess the current state of receiving water quality in each sub-catchment. The data will be applied only to validate the priority status scores (for ecological priority) assigned in 2017, for example to check whether there has been any noticeable change as indicated by the latest monitoring data. The data itself has not yet been directly applied within the prioritisation matrix, but the option is available for it to be included in future once a larger dataset is available. In addition to the use of the monitoring data, an extensive review of available data from a wide range of other sources both internal to WWL and WCC and external has also been conducted.

4. Development of an agreed methodology for prioritisation

The prioritisation framework was developed iteratively, following the process illustrated in Figure 1 below. The process built upon the work already completed to support the Stage 1 stormwater consent application in 2017, and drew from similar methodologies such as those employed for Multi-Criteria Analysis processes (as mentioned below). A description is provided for each of the steps below.

The prioritisation approach developed was based on common industry practice using a typical MCA-style assessment, whereby a series of variables are scored according to applied judgements and scoring thresholds. Where necessary a weighting can be applied to allow the prioritisation to reflect the over-arching vision and objectives of a management strategy.

MCA type approaches are commonly used in business case development, assessment of alternatives and best practicable option (BPO) assessments, and in policy development and decision-making.

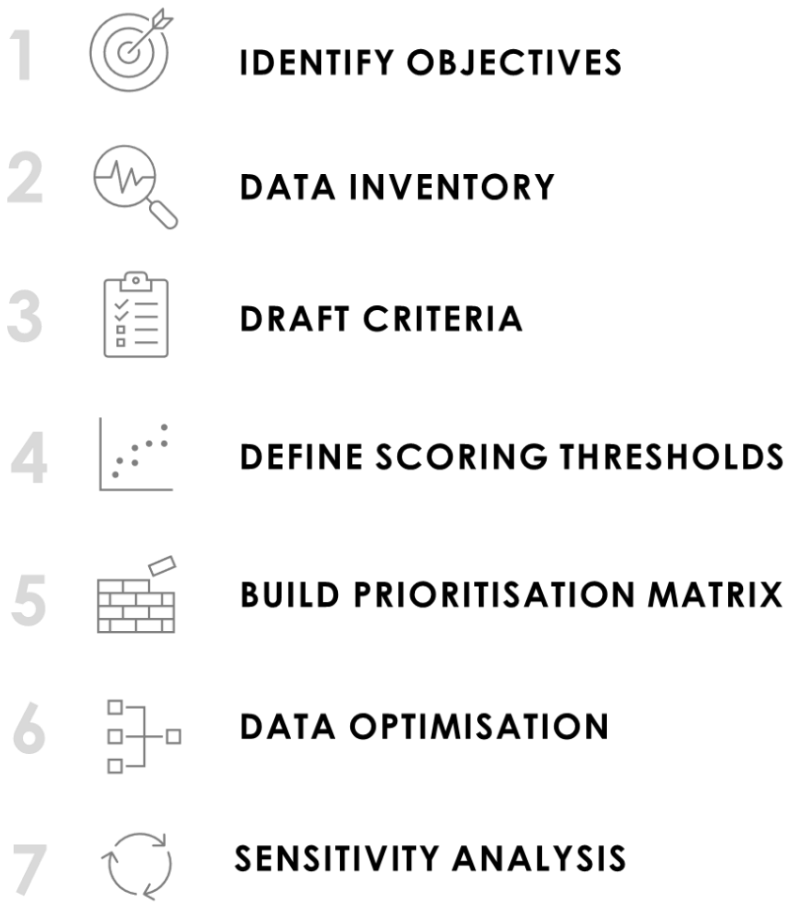

Figure 1 - Catchment prioritisation process

Step 1: Identify objectives

Given that the prioritisation framework needed to provide outcomes which would meet the requirements of Schedule N (for the SMS), it was important to identify the objectives of the overall SMS as a first step. This would then serve as a guide for the range of criteria to be considered.

Ultimately, for the Wellington City SMS, relevant objectives from the NRP were adopted as the objectives for the Strategy. Several alternatives were considered prior to this final decision, including:

- Three Waters Strategy
- WWL Statement of Intent 2020-23, particularly the organisation's service goals and outcomes
- WCC Long Term Plan 2015 – 2025

- Wellington Urban Growth Plan 2015

Given the focus of the SMS on meeting the requirements of Schedule N< it was decided that it was most appropriate for the SMS to be directly aligned with NRP objectives. The relevant objectives are outlined in detail in the SMS, but in summary they included (paraphrased):

- Maintenance or improvement of groundwater and surface water quality, and marine water quality within the Coastal Marine Area (**Objective 23**)
- Rivers, lakes, natural wetlands and coastal water are suitable for contact recreation and Māori customary use, including by maintaining water quality, or improving water quality (in significant contact freshwater bodies, sites with significant mana whenua values as defined in the NRP, and all other rivers, lakes and natural wetlands) to meet the secondary contact objectives stipulated in the NRP (**Objective 24)**
- Safeguarding biodiversity, aquatic ecosystem health and mahinga kai in freshwater bodies and the coastal marine area. This includes managing water quality, flows, water levels and aquatic and coastal habitats to maintain current condition (where NRP objectives (Tables 3.4, 3.5, 3.6 3.7 or 3.8 of the NRP) are already met), or to meaningfully improve the fresh water body or coastal marine area where those objectives are not already met. Restoration of aquatic ecosystem health and mahinga kai is encouraged. (**Objective 25**)

Once these objectives were identified, this enabled the identification of relevant criteria to prioritise catchments, and inform data requirements.

Step 2: Data inventory

An initial gap analysis was undertaken in 2019 to ascertain the types of data which were available to Wellington Water either through existing sources (e.g. GWRC web server connections; internal databases) or through new sources which would require some preparation/data processing to render the information useful for the prioritisation framework (e.g. publicly available data from external agencies such as Waka Kotahi – New Zealand Transport Agency).

Data sources were originally grouped according to three "wellbeings" (reflecting Wellington Water's service goals): environment, socio-cultural, and economic/services. Each individual source was assigned a variable name, and the scope defined (including primary source, temporal and spatial distribution of data points where relevant, and initial description of how the data would be applied). This process continued intermittently through 2020 as more information became available from various other parallel projects including the Stormwater Monitoring Programme and the initiation of Te Whanganui-a-Tara Whaitua Committee by GWRC.

During this stage, the spatial extent of the target catchments for analysis were also reviewed and where necessary adjusted to reflect contemporary conditions. The sub-catchments within the Wellington City stormwater network were previously delineated in 2015 (for the 2017 Stage 2 consent application). For consistency with the existing consent, those catchments were used as the basis for the SMS prioritisation framework. However, some aggregation and realignment was required to reflect the network with greater accuracy given information that had been obtained since 2015.

A Request for Information (RFI) was developed for Wellington Water, requesting internal data which were not available through public portals, or were related to internal reporting processes such as the Long Term Plan, and network infrastructure status. Wellington Water provided information that was readily available at the time, however some gaps remained. Where a gap was identified, a best-possible alternative (proxy dataset) was established.

As the data were obtained, each source was classified according to:

- Whether the data were available for digital use
- The source of the data (confirmed, with a link to online geodatabase/web service where data was presented geospatially)
- Whether data had been processed and was ready for incorporation into the prioritisation matrix and GIS platform
- Whether WWL input was required to obtain/check/finalise data
- Whether each dataset provided full coverage of the nine WCC sub-catchments
- Priority of the dataset – 'Required' (essential; highest priority), 'Assess' (available but needing further quality assurance check, and/or analysis to see if the data would be useful), or 'Optional' (nice to have; lowest priority)

Quality assurance

Once data was obtained and classified as above, it was then assessed according to the following criteria (where relevant, depending on data type):

- Creation date / date last updated and/or frequency of data maintenance; data more than 5 years old was carefully considered (whether it was still relevant or now obsolete given purpose of SMS)
- Primary or secondary source (e.g. water quality measurements directly from WWL, or aggregated at regional level by GWRC or MfE; published and peer reviewed source)
- Presence of any duplicate data entries or suspected data entry errors
- Spatial coverage – spatial boundaries used are consistent and match those required for the catchment characterisation (e.g. Korokoro/North Harbour catchment boundaries are quite erratic and seemed to vary from source to source). Data is spread evenly across all sub-catchments (not weighted towards some more than others).
- For data which were recorded in more than one source; results are consistent with other well-known/applied sources or local knowledge (e.g. SLUR sites from GWRC database match with known HAIL sites (from local knowledge))
- Incorporation of latest regulatory requirements/references (e.g. NPS-FM and/or NES-FW definitions for wetlands; pNRP)
- Checking whether any assumptions had been applied to create a dataset, which could bias/influence results of the prioritisation process.

Geographic Information Systems (GIS) integration

All data collated and verified through Step 2 above were loaded onto an online platform via ArcGIS Online, where they could be reviewed in layers over the sub-catchment boundaries. Where data were available via a web server (e.g. publicly available data from GWRC), a link to that server was established so that data used as part of the prioritisation process would be continually updated and 'live'. It is Wellington Water's intention that this repository is developed into an online tool to aid in communication and engagement both internally (to inform decision making) and externally with key stakeholders. It is anticipated that this tool will also negate the need for the use of 'static' maps in the SMS documents that would potentially become obsolete within short periods of time.

Step 3: Draft criteria

The best available data sources were used to inform the development of draft criteria for the prioritisation of subcatchments, on completion of Step 2 above. These datasets were used to assign scores for a set of criteria, typically each comprised of a single variable. Each criterion was analysed independently (i.e. there were no 'composite' criteria derived from multiple variables) to maintain as transparent and straightforward a process as possible.

The criteria were grouped using categories to organise the information and demonstrate the range of criteria used, covering multiple aspects for analysis. These categories also reflect typical 'best practice' approaches for MCA analysis of environmental options and issues. The criteria used to prioritise for stormwater management across the Wellington region are listed in Table 1 below (Section 4.4).

Step 4: Define scoring thresholds

Once the draft criteria were identified, it was necessary to examine the range of data values available for each criterion at a catchment scale. Appropriate thresholds were then defined to inform scoring, on the basis of the maximum range of data observed in the catchment. All criteria had five possible scores (from 1 to 5).

During multiple consultative discussions with Wellington Water personnel and technical advisors it became apparent that the task of defining thresholds could be highly subjective. As such, it was identified fairly early in the process that this task needed to be completed in as objective a way as possible, such as with the use of statistics as described below. Data availability sometimes varied between sub-catchments; therefore a percentile-based approach to defining thresholds was necessary to avoid over- or under-valuing criteria in catchments where the range of available data was greater, or severely limited.

Given the five possible scores for each criterion, five percentiles were used to define the thresholds for assigning scores.

In most cases, the 10th percentile data value became the threshold for the lowest score, 25th percentile for a score of 2, 50th percentile for score of 3, and so on, with a score of 5 being assigned where values fell within ~90th percentile of the dataset or higher. Table 1 below demonstrates the thresholds assigned for Wellington City catchment and their related percentiles (where relevant).

It was also determined that scoring on the basis of proportional metrics would be most appropriate, to avoid any bias towards catchments which were 'outliers' (e.g. very large inner city catchments with high population density, or conversely small coastal catchments with sparse population and predominantly rural land use). This bias can arise due to the variability in catchment characteristics such as catchment area; land use; degree of urbanisation; population; physical form and function, and others. For example, instead of scoring each catchment on the number of square metres of impervious surface, scores were assigned on the basis of the percentage of the total catchment with impervious surface.

Table 1 Criteria and scoring thresholds applied to prioritise sub-catchments for stormwater management in Wellington City

			Scoring Method			
Criteria	**Definition**	**Function**	**Input**	**Threshold(s)**	**Score**	**Data source**
Asset Management						
pipe_condition	Proportion of overall network that is graded as moderate to worse condition Both stormwater and wastewater network infrastructure is assessed	To assess the degree to which historic under-investment and poor asset condition contributes to increased opportunities for contaminants to enter in or become concentrated in the stormwater system Potential for overflows from wastewater to stormwater network via leaking wastewater pipes	% of the network that is within 5 years (Grade 4) to 10 years (Grade 3) of the expected 'end of life' given pipe materials and installation date	≥30% of pipes are Grade 3 or 4	5	Wellington Water asset condition database, with a grade assigned on the basis of years of pipe 'life' left (given recorded installation date and pipe material). This is a proxy for pipe condition grade, as formal grades have only been assigned to a limited proportion of the catchment. In most subcatchments, at least 80% of the network has installation date and pipe material data available.
				30 ≥ 20% of pipes are Grade 3 or 4	4	
				20 ≥ 15% of pipes are Grade 3 or 4	3	
				15 ≥ 9% of pipes are Grade 3 or 4	2	
				<9% of pipes are Grade 3 or 4	1	
growth	Predicted degree of growth and associated change in land use in future	Catchments with greater predicted growth (indicated by observed and predicted household numbers) will have a higher risk of reduced stormwater quality (if appropriate controls are not implemented, or the right controls are not implemented well) and increased pressure on existing stormwater assets.	The percentage change in total household numbers per catchment between 2018 (observed) and 2050 (predicted)	Forecast growth (2050 – 2018) > 44%	5	Population growth studies completed by Wellington Water in 2021
				forecast growth change 41% < Δ ≤ 44%	4	
				Forecast growth 34% < Δ ≤ 41%	3	
				Forecast growth 24% < Δ ≤ 34%	2	
				Forecast growth ≤ 24%	1	
Natural environment (contaminant effects)						
Eco_priority	Catchments assigned highest priority for management under the	Based on the previous assessment variables - higher priority catchments are likely to require	Priority score assigned to the catchment in	'High'	5	Stage 1 global stormwater consent application, 2017 (AEE)
	global Stage 1 SW consent,	more intervention and investment to manage the effects of	Stage 1 AEE (2017) for	'Moderate'	3	

	based on environmental pressures and state assessed in 2017	stormwater discharges and poor discharge quality.	ecological priority	'Low'	1	
%natural	Proportion of stormwater network which is comprised of open channel and natural channel	Catchments with a low proportion of open/natural channels are more degraded, therefore ongoing discharge of stormwater contaminants will exacerbate the degradation (objectives of NPS FW are at risk of not being met and RE resilience is lower)	Proportion (%) of stormwater network comprised of open and/or natural channel (and corresponding condition – extent of degradation)	<10% (Most degraded condition; Low natural value, very highly modified)	5	Length of natural watercourses denoted as Class 1, 2 or 3 in the NRP (GWRC geospatial data) Open channel as indicated in Wellington Water's stormwater infrastructure geospatial layer
				>10 ≤ 25% (More degraded; medium natural value, highly modified)	4	
				>25 ≤ 50% (degraded; medium natural value, moderately modified)	3	
				>50 ≤ 75% (less degraded; high natural value, low modification)	2	
				> 75% (least degraded; high natural value, very low modification)	1	
monitoring	Score assigned to each catchment to denote a need for increased monitoring (temporal and/or spatial coverage) in that catchment, as part of 2017 AEE and 2020 SMP.	Catchments with higher priority score were typically most lacking in monitoring data/knowledge of existing stormwater issues; therefore greater risk that there could be 'unidentified' stormwater quality issues in the catchment, or poor knowledge of other existing values.	Monitoring score (and associated priority for collecting more information)	≥26 (highest priority)	5	Stage 1 global stormwater consent application, 2017 (AEE) and Stormwater Monitoring Plan, 2020 (Table B1).
				≥22 < 26 (moderate priority)	3	
				<22 (lowest priority)	1	
Land use (contaminant generation)						
SLUR_sites	Proportion of total catchment area which has land cover or land use (including HAIL sites) that is known to contribute greater contaminant loads to stormwater (e.g.	Catchments with high proportion of impervious area, SLUR site area, and/or high volume roads will be exposed to greater loads of contaminants through	Proportion (%) of catchment area covered by sites with 'verified history of HAIL', or 'confirmed contamination' (as per GWRC database), and level of associated risk of contamination entering stormwater	>25% (very high risk)	5	GWRC SLUR sites – geospatial database (only sites with 'verified history of HAIL' or 'confirmed contamination' were included.
				>10 ≤ 20% (high risk)	4	
				>5 ≤ 10% (moderate risk)	3	
				>2 ≤ 5% (lowmoderate risk)	2	
				<2% (lowest risk)	1	

	metals, hydrocarbons, sediment, persistent pollutants)	stormwater runoff, and therefore be at greater risk of poor stormwater quality	from those areas.			
impervious_surface			Proportion (%) of catchment area with impervious surfaces (degree of imperviousness)	>30% (high to completely impervious)	5	Two datasets combined: 1. Geospatial layer generated in 2016 using a predictive model (applying assumed proportions for different property types/land use) primarily covering large hardstand areas, driveways etc on private properties by excluding roof areas and roads. 2. Land Information New Zealand (LINZ) building roof areas and roads generated using LiDAR (Light Detecting and Ranging) imagery, 2021
				>20 ≤ 30% (highly impervious)	4	
				>10 ≤ 20% (moderately impervious)	3	
				>5 ≤ 10% (lowmoderate imperviousness)	2	
				<5% (low imperviousness)	1	
high_volume_roads			Proportion (%) of gazetted roads within the catchment classified as 'Arterial', 'Primary Collector' or 'High Volume' in ONRC database (km); and associated risk of contamination from roads	>50% (highest risk)	5	Waka Kotahi One Network Road Classification (ONRC) class – linear geospatial dataset (2022)
				>40 ≤ 50% (med-high risk)	4	
				>30 ≤ 40% (medium risk)	3	
				>25 ≤ 30% (low-med risk)	2	
				<25% (lowest risk)	1	
Social values						
bathing_rec	Presence of known contact recreation sites in the receiving environment(s) of a catchment	Catchments with known contact recreation sites are at greater risk of poor stormwater quality leading to a health risk for people engaging in recreation.	Presence or absence GWRC bathing monitoring sites located in the receiving environment	Bathing monitoring sites are present in catchment receiving environment	5	GWRC RWQE monitoring locations (from GIS web service)
				Bathing monitoring sites are absent from catchment receiving environment	1	
complaints	Frequency and nature	Catchments with a	Number of complaints	>38 complaints	5	Wellington Water CRM info for 2020/21

	of public complaints received in relation to stormwater quality/management issues in each catchment, in 2020/2021	greater number of major complaints will either have more ongoing issues (indicating an existing problem with stormwater management) and/or a more engaged community. Greater risk of reputational damage to Wellington Water and client councils, negative media coverage, risk to public health etc. Ongoing problems also indicate greater risk of further contamination/exacerbation of poor condition in catchment receiving environment.	relating to stormwater network, classified by Wellington Water as Priority P1 (Urgent – mains burst, or other risk) Or P2 (Non-urgent; large leak/other risk, large tap fully open)	≤38 complaints	4	(supplied by Wellington Wateron 14/7/21 and updated in April 2022 to include all 2021 data); scoring on the basis of stormwater related complaints and complaint priority.
				≤35 complaints	3	
				≤30 complaints	2	
				≤28 complaints	1	

Cultural values						
MW_value	Number of sites of significant value to mana whenua identified in the catchment (as part of SMP)	Catchments with more sites identified have greater perceived cultural value; these catchments would therefore be at greater potential risk of degradation of those values if stormwater management is not carried out effectively	Number of sites of significance to mana whenua identified within the catchment	>2 sites (highest mana whenua values)	5	Stormwater Monitoring Plan, 2020 – Tables 2-4 to 2-10. This information was not available for Karori catchment, so it has not been scored for this criterion.
				>0 ≤ 2 sites (low to moderate mana whenua values)	3	
				0 sites (mana whenua values not yet identified)	1	
Shellfish			Presence or absence of sites known to be used for shellfish gathering in the receiving environment of the catchment	Sites are present in the catchment	5	Shellfish survey, GWRC 2006
				Sites have not been identified in the catchment	1	

Step 5: Build prioritisation matrix

Scores assigned for each criterion were carried through to a 'dashboard' (the primary matrix) where they were then summed for each catchment. The catchments were then ranked from one to nine (1-9) on the basis of their total scores; with one (1) being the catchment at highest risk (and therefore requiring most attention for management) and nine (9) being the catchment at lowest risk.

The matrix was developed in a Microsoft Excel spreadsheet format, as it is a universal format that is widely accessible and fairly easy to use.

Step 6: Data optimisation

Several iterations of the prioritisation matrix were developed, primarily as the thresholds described in Section 4.4 were refined. This process continued over multiple months, and as a result, new or updated datasets subsequently became available. The understanding of the purpose and function of the Stormwater Management Strategies also evolved within the project team during this period, and additional projects to develop strategies for Porirua City and Hutt City / Upper Hutt City were also initiated, which further expanded the technical team and brought a more regional perspective to the work. In March 2022 it was identified that new or updated data were available for five of the 12 criteria. This became apparent after several gaps were identified, with inconsistencies between network catchments (for example, the dataset used to score for pipe condition had excellent spatial coverage in Upper Hutt City, but very poor coverage in Porirua City). Some optimisation was required to maintain consistency. The final criteria, source data and scoring thresholds are shown in Table 1 above. However, the main changes to establish those criteria included:

- The 'Growth' criterion was originally informed by a qualitative assessment of the status of each sub-catchment as described in the District Spatial Plan for Wellington City (and equivalent plans for the other three local authorities). This was highly subjective, although used the best approach available at the time. During 2021 Wellington Water initiated a study to model future population growth across the region, to 2050. The final outputs from that study became available in early 2022. This enabled the scoring for growth to be based on modelled estimates of household numbers at suburban scale, in 2018 and out to 2050. Scores were then assigned based on percent change in household numbers within each sub-catchment between 2018 and 2050.
- The 'Pipe Condition' criterion was originally based upon Wellington Water's asset condition grading scores, which are derived from a mixture of information about pipe installation date, materials, and CCTV inspections. However, as mentioned above, the portions of the stormwater network where condition grading had been completed were highly variable between catchments. This meant that in some cases, scoring could not be completed due to missing data. In Wellington City, only 23% of the stormwater network had been graded. To work around this issue, catchments were instead scored on the remaining pipe 'life' (calculated based on expected life of pipe materials, and actual age of pipes as of 2022). Those pipes which had less time remaining to their expected 'end of life' presented a greater risk to the integrity of the stormwater network, and tis ability to convey stormwater.
- The 'Impervious Surface' criterion originally utilised a modelled dataset produced for Wellington City Council, depicting estimated impervious surfaces throughout Wellington City. However, the original model excluded building roof areas and roads. It was decided that better coverage could be achieved by combining this dataset (spatially) with new data available from Land Information New Zealand, which derives roof areas and road footprints from LiDAR.
- The 'High Volume Roads' and 'Complaints' source datasets were updated to include 2021 data.

Step 7: Sensitivity Analysis

The sensitivity of the prioritisation matrix was continuously checked and tested throughout the process described above (Steps 1-6). Much of the work to fine-tune the thresholds for scoring of criteria was initiated when thresholds appeared to be too coarse (i.e. all catchments scoring the same value) or too sensitive (over- or under-representing certain catchments). Each iteration of the matrix was checked to see whether scores matched with the technical team's understanding of the catchments in 'reality'; for example, if a catchment such as Owhiro Bay was known to have large areas of open space and a lower population, was this reflected in the final scores?

At various stages, the option of applying a weighting to some or all criteria was discussed. The over-representation of certain categories was of particular concern, and it was debated whether that issue should be remedied by applying a

weighting. For example, there are three criteria for Asset Management, but only two for Social Values. However, when weighting was trialled (for example, applying a weighting to raise the scores for social values criteria, but not for asset management criteria), the final ranking of catchments did not noticeably change unless an 'extreme' weighting was applied. Given the purpose of this framework, the intended use of the matrix, and the 'coarseness' of some of the data (for example, regional scale trends rather than individual properties) it was eventually decided that weighting was not appropriate and would serve to further obfuscate a framework that was already fairly complex.

5. Concluding Statement

The development of this methodology and the prioritisation matrix itself has created many opportunities for discussion of the governance framework in which stormwater is managed across the Wellington region, and the roles of various entities in delivering outcomes for stormwater under the Natural Resources Plan, the NPS-FM and the RMA. It has brought to light issues such as the need for over-arching consenting strategies, particularly to achieve coordination between global stormwater and wastewater consents. It has also highlighted the influence of political, social and cultural contexts on decision-making for stormwater management and the allocation of funding and resources to certain catchments which may not actually present the highest risk to stormwater quality and receiving environments, at the cost of those catchments with far more serious issues.

These discussions have been valuable, and in some cases have led to the identification of further projects to be completed to supplement the stormwater management strategies. It is intended that the prioritisation matrix will continue to be refined over the next few years as more information is gathered and also with the evolution of Wellington Water's global stormwater consent from Stage 1 to Stage 2 and beyond.