VARIATION 2 – ADDITIONAL HOUSING CAPACITY

SUBMISSION FORM 5

CLAUSE 6 OF FIRST SCHEDULE, RESOURCE MANAGEMENT ACT 1991

SECOND GENERATION DISTRICT PLAN

This is a submission on Variation 2 to the Second Generation Dunedin City District Plan (2GP). Your submission must be lodged with the Dunedin City Council by midnight on 4 March 2021. **All parts of the form must be completed.**

Privacy

Please note that submissions are public. Your name, organisation, contact details and submission will be included in papers that are available to the media and the public, including publication on the DCC website, and will be used for processes associated with Variation 2. This information may also be used for statistical and reporting purposes. If you would like a copy of the personal information we hold about you, or to have the information corrected, please contact us at dcc@dcc.govt.nz or 03 477 4000.

Make your submission

Online: www.dunedin.govt.nz/2GP-variation-2 | **Email:** districtplansubmissions@dcc.govt.nz

Post to: Submission on Variation 2, Dunedin City Council, PO Box 5045, Dunedin 9054

Deliver to: Customer Services Agency, Dunedin City Council, Ground Floor, 50 The Octagon, Dunedin

Submitter details (You must supply a postal and/or electronic address for service)

First name: Tom & Loretta Richardson

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Trade competition

Please note: If you are a person who could gain an advantage in trade competition through your submission, your right to make a submission may be limited by clause 6(4), Schedule 1 of the Resource Management Act.

I could gain an advantage in trade competition through this submission: ○ Yes ◉ No

If you answered yes, you could gain an advantage in trade competition through this submission, please select an answer:

○ Yes ○ No My submission relates to an effect that I am directly affected by and that:

a. adversely affects the environment; and

b. does not relate to trade competition or the effects of trade competition.

Submission

Submissions on Variation 2 can only be made on the provisions or mapping which are proposed to change, or alternatives that are clearly within the scope of the 'purpose of the proposals', as stated in the Section 32 report. Submissions on other aspects of the 2GP are not allowed as part of this process.

You must indicate which parts of the variation your submission relates to. You can do this by either:

- making a submission on the Variation Change ID (in which case we will treat your submission as applying to all changes related to that change topic or alternatives within the scope of the purpose of that proposal); **or**
- on specific provisions that are being amended.

The specific aspects of Variation 2 that my submission relates to are:

Variation 2 change ID (please see accompanying Variation 2 – Summary of Changes document or find the list on www.dunedin.govt.nz/2GP-variation-2)

Refer attached document.

For example: D2

Provision name and number, or address and map layer name (where submitting on a specific proposed amendment):

Refer attached document.

For example: Rule 15.5.2 Density or zoning of 123 street name.

My submission seeks the following decision from the Council: (Please give precise details, such as what you would like us to retain or remove, or suggest amended wording.)

- ◯ Accept the change
- ◯ Accept the change with amendments outlined below
- ◯ Reject the change
- ◯ If the change is not rejected, amend as outlined below

Refer attached document.

Reasons for my views (you may attach supporting documents):
If you wish to make multiple submissions, you can use the submission table on page 3 or attach additional pages.

Refer attached document.

Hearings

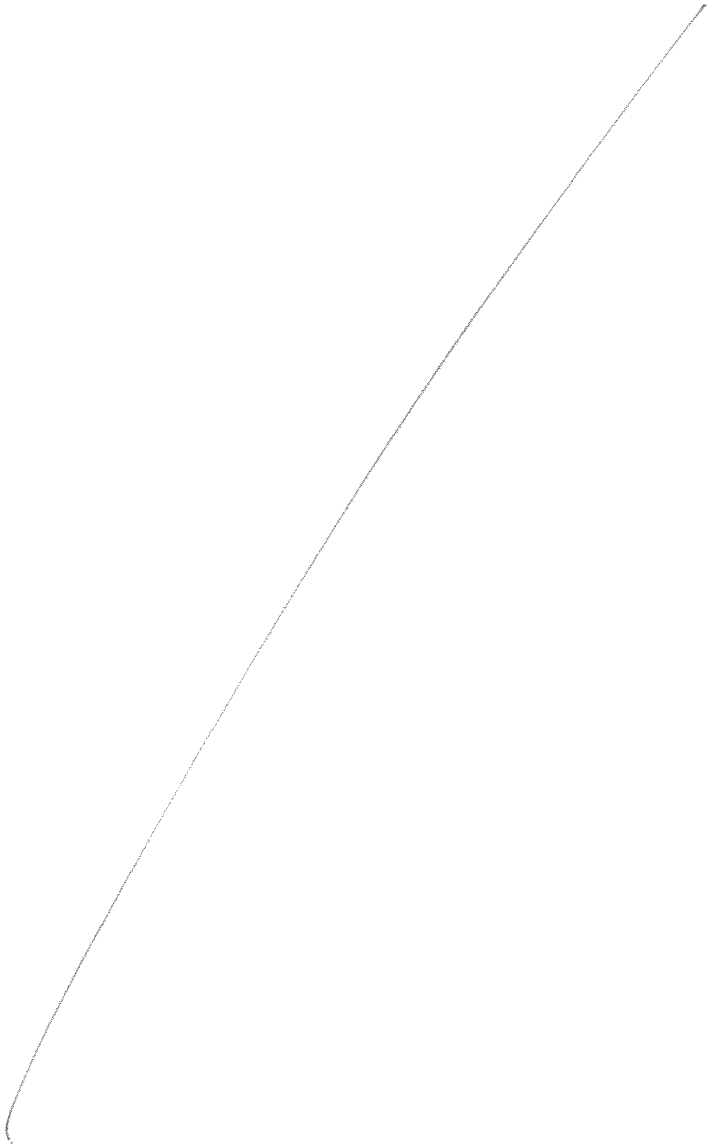
Do you wish to speak in support of your submission at a hearing: ◉ Yes ◯ No

If others make a similar submission, would you consider presenting a joint case at a hearing: ◉ Yes ◯ No

Signature:  **Date:** 04/03/21

Multiple Submissions Table

Variation 2 change ID or provision name and number or address and map layer name	Decision Sought a. Accept the change b. Accept the change with amendments outlined c. Reject the change d. If the change is not rejected, amend as outlined	Reasons for my views



Variation 2 change ID:

Relating to all change ID's that relate to NDMA05.

Relating to all residential zone density policy changes.

Relating to service connections and transportation changes.

Provision name and number, or address and map layer name:

Relating to NDMA05.

Relating to all residential zone density policy changes.

Relating to service connections and transportation changes.

My submission seeks the following decision from the Council:

Regarding the proposed NDMA05 region, our views are as follows.

NMDA/Infrastructure Provisions General

The submitter has a number of concerns relating to NDMA overlay regions and infrastructure controls. In general, these relate to the following-

(i) Inadequate (incomplete) research has been undertaken by Council's 3-Water departments, particularly in regard to stormwater modelling, resulting in a knowledge gap. It appears that this is being resolved through a precautionary approach that could result in infrastructure being installed where it may not be required.

(ii) The imposition of these elements of Variation 2 will have a very real detrimental effect on the feasibility, and therefore the rate, of residential development. This is directly contrary to the purpose of Variation 2.

(iii) The National Policy Statement on Urban Development 2020 requires the provision of adequate infrastructure by the Local Authority to enable residential capacity. Passing the obligation to provide this infrastructure onto landowners and developers (except where the infrastructure is related to new greenfields land) is not appropriate. One of the largest bottlenecks to housing development is the cost of infrastructure, and accordingly if Council wishes to realise a greater level of housing then the City must be prepared to invest in the necessary supporting infrastructure (passing the costs on will not resolve the bottleneck).

(iv) Council has a development contributions policy and a rating program that generates increased income as new residential sites are created. Both of these income sources provide funding that is intended to be spent on City infrastructure (development contributions for network upgrades, rating income for maintenance). While income from these sources is being collected by Council it is inappropriate (and a form of double-dipping) for network infrastructure upgrades to be imposed as conditions of development.

(v) Council has access to funding from national government for infrastructure improvement projects. The Otago Daily Times has recorded (05/08/2020; https://www.odt.co.nz/news/dunedin/water-reform-south-could-get-more-60m) that Dunedin City is able to secure $7.92 million directly (plus a share of the wider $20.6million regional allocation) for water reforms. It is the submitter's view that this funding source, and others like that this might be available, should be Council's priority method for resolving the existing infrastructure network constraints.

(vi) The proposed infrastructure provisions are overly complex, without adequate definition and will be problematic to implement (particularly where NDMA regions contain multiple land ownerships). These provisions are likely to delay, if not obstruct altogether, many residential developments from being advanced.

(vii) Rule 15.4.X. appears to seek to remove the permitted baseline assessment, as provided for in the RMA, from Council's consideration of stormwater matters. This is a fundamentally flawed position, which seeks to construct a rule in a lower-level regulation to override that of a higher-level regulation. Recent consent decisions, made independently and in accordance with the RMA, have clearly found that the permitted baseline assessment is an appropriate test in respect of stormwater management (in the same way as this applies to the consideration of other effects). This proposed Rule must be rejected.

Proposed Adjustments to Variation 2-

(i) Reject the proposed infrastructure controls from all new development and subdivision activities, until such time as Council's knowledge in respect of the areas of constraint is complete.

(ii) Reject the proposed infrastructure controls from all new development and subdivision activities, except where the infrastructure relates to new greenfields land (and i above is satisfied).

(iii) Reject the proposed infrastructure controls from all new greenfields land regions, until the stormwater management plan provisions can be amended into a workable arrangement.

(iv) Reject Rule 15.4.X.

NDMA/Infrastructure on existing residential land

The submission land is already residential land (as rezoned by the 2GP and agreed by recent mediation).

The submitter feels that it is both inappropriate and unreasonable to impose NDMA/infrastructure controls onto any property in which the zoning format is not proposed to be changed to enable a greater yield of development. Reasons for this view include (in addition to the general discussion above)-

(i) There remains a question over the quality and completeness of Council's infrastructure modelling, with particular regard to the stormwater network. It appears that Council's 3-Waters department has taken a precautionary approach to infrastructure, whereby it is simply easier to require all new developments to meet the new infrastructure standards, despite some of these areas not

necessarily being subject to an infrastructure constraint. If this is the case then this will lead to the installation of infrastructure, proposed to occur at the cost of the landowner/developer, that serves no purpose. This is inappropriate and contrary to the outcomes sought by Variation 2. If Council's infrastructure modelling knowledge is incomplete, it is essential that this is resolved before any new infrastructure controls are implemented.

(ii) The imposition of new development controls, which will inevitably result in additional development costs, where there is little anticipated return in respect of site yield, is directly contrary to the purpose of Variation 2 (which is ultimately to enable development so that houses can be built).

(iii) The NPS-UD requires Local Authorities to provide the infrastructure necessary to support residential capacity. If there are elements of the public infrastructure network that cannot support development of the City's existing residential land, then the Local Authority is required to upgrade these elements. This is not an obligation that can appropriately be passed on to landowners/developers.

(iv) The land enjoys a particular set of existing use rights at present. The zoning is not proposed to change, so there will be no beneficial offsetting for the landowner of the negative impact of the new infrastructure requirements.

Proposed Adjustments to Variation 2-

(i) PREFERRED: Reject the NDMA overlay and all proposed infrastructure controls from the submission land.

(ii) ALTERNATIVE A: Insert a provision that exempts any development and/or subdivision within the submission land from the requirements of the NDMA/infrastructure control provisions while the density of the development and/or subdivision is consistent with the current zone density expectations (e.g. 500m² in the GR1 Zone). This would maintain the status quo until such time as a developer proposed a density of residential activity that exceeds the current zone allowance.

(iii) ALTERNATIVE B: Restructure the NDMA/infrastructure control provisions into a form that recognises that there are existing-use-rights associated with the land and re-design the new controls in such a manner as to minimise development cost increases (for instance, specify nominally-sized rooftop water detention tanks on each developed site – these can be cost effective if implemented by way of a standardised method).

(iv) ALTERNATIVE C: Rezone the submission land to a residential zone that provides for a greater development density than the current zone, which might then justify the application of an NDMA overlay and/or a greater degree of infrastructure control. Then re-design the stormwater management plan provisions to result in a workable arrangement.

NDMA/Infrastructure requirements on general subdivision

There are a number of proposed Policies and Rules that, if implemented, will trigger the need for network infrastructure upgrades. Several of these are discussed below-

Policy 9.2.1.1.X requires new infrastructure to be installed ahead of development in areas that are outside the wastewater serviced area. The submitter would like to clarify if the zone density applicable to these areas has been used to calculate residential capacity for the City? If so, then the responsibility for the provision of adequate network infrastructure may rightly fall on Council's shoulders as directed by the NPS-UD 2020. Further to this, where Council accepts that it has an obligation to upgrade infrastructure to satisfy the requirements of the NPS-UD, how is this envisaged to occur? How quickly can landowners anticipate that Council would undertake these upgrades following a notice of development intent?

Policy 9.2.1.1A is somewhat similar to the above, however this imposes wastewater requirements on land within wastewater service areas. Again, if the network infrastructure is not adequate to support development in accordance with the zone density, the submitter considers that it is Council's responsibility to resolve this prior to development occurring. Perhaps a form of notice by a landowner to Council of a development intent could trigger a Council upgrade program? Presumably these upgrade works would then need to be undertaken relatively promptly.

Policy 9.2.1.BB requires specified new development mapped areas to provide communal wastewater detention systems. The submitter is agreeable to this provided that the specified areas have been correctly assessed by Council in respect of infrastructure requirements.

Policy 9.2.1.Z requires development that contravenes the impermeable surfaces rules to demonstrate that the effects of stormwater will be no more than minor. The submitter seeks to clarify that each of the activities referenced (i.e. multi-unit development, supported living facilities, subdivision, and development) only trigger the policy when they propose to breach the impermeable surfaces rules. The policy appears to read this way, however an alternative interpretation might be that the policy applies to multi-unit development, supported living facilities, and subdivision all in general, and only to development that breaches the impermeable surfaces rules. If the former interpretation is correct, then the submitter is supportive of this policy. If the latter is correct, then the submitter seeks a correction of this policy to the former of the two interpretations noted.

Further to the above, the submitter suggests that the two parts of proposed Policy 9.2.1.Z consider limiting the assessment of effects to a nominated distance from the point of development discharge. Perhaps to a distance 2.0km downstream of the activity site. Any assessment of stormwater impacts further downstream generally becomes particularly difficult to assess with any reliability. Also, ultimately all stormwater flows will end up in a river, lake, harbour or Ocean, which if the second part of the policy is read literally, would always trigger the need for an assessment under this part. The submitter does not believe that this is the actual intent of the policy.

Policy 9.2.1.Y requires all subdivision in a new NDMA area to install an on-site stormwater management system. The submitter has several concerns about this policy. Primarily, there are some fundamental differences between the types of NDMA areas (as described in detail above). Complex on-site stormwater management systems should only be required where i)

the land in question is a new greenfields site, and ii) Council's stormwater modelling can clearly show that development of the site (without stormwater controls) is likely to lead to unacceptable adverse effects downstream. Where proposed NDMA regions occur that don't meet the above criteria, the requirement for stormwater infrastructure should be removed, or at the very least simplified to a standardised 'roof detention tank per site' approach, which is an approach that a number of other Local Authorities have adopted.

Policy 9.2.1.X is unclear in what it is trying to achieve. This is probably unnecessary and could be deleted.

Policy 9.2.1.AA is sensible. The submitter supports this policy. However, it is worth noting that where significant infrastructure costs are likely to be incurred by one landowner, which then benefit adjacent landowners, there may very well be a reluctance for one party to start the development process. It is notoriously difficult for agreement on infrastructure costs to be reached between two or more private developers. This situation can lead to land not being developed at a rate that the City would like to see. The submitter suggests that Council consider whether a development contributions clawback arrangement could be an effective method of enabling development where the first developer would otherwise be subject to a large proportion of the infrastructure costs.

Policy 9.2.1.3 is sensible. The submitter supports this policy.

Policy 9.2.1.4 requires future subdivision and development activities to ensure that the City's water supply system has sufficient capacity to service the development (either in its present form or by way of an upgrade to be installed ahead of development). The submitter would like to clarify if the zone density applicable to these areas has been used to calculate residential capacity for the City? If so, then the responsibility for the provision of adequate network infrastructure may rightly fall on Council's shoulders as directed by the NPS-UD 2020. Further to this, where Council accepts that it has an obligation to upgrade infrastructure to satisfy the requirements of the NPS-UD, how is this envisaged to occur? How quickly can landowners anticipate that Council would undertake these upgrades following a notice of development intent?

Policy 9.2.1.4A is somewhat similar to the above, however this imposes water supply requirements on land that is outside the public water supply areas. Again, if the network infrastructure is not adequate to support development in accordance with the zone density, the submitter considers that it is Council's responsibility to resolve this prior to development occurring. Perhaps a form of notice by a landowner to Council of a development intent could trigger a Council upgrade program? Presumably these upgrade works would then need to be undertaken relatively promptly.

Rules 9.5.3, 9.6.2, 9.7.4, 12.X, 15.11.3, 15.11.4, 15.11.5 and 15.12.3 (including all sub-rules) contain the assessment matters relating to subdivision and development activities. The policies discussed above are implemented through these assessment matter rules. The submitter seeks amendment of all of these rules, in particular where new infrastructure requirements are proposed, to address and resolve the concerns noted above. Please note that this submission is concerned with all proposed infrastructure requirements contained

in the notified version of Variation 2, regardless of whether they are specifically mentioned above. These will be further discussed with the submitter's pre-hearing evidence, although it is the submitters hope that many of the concerns at hand can be resolved through engagement with Council staff through the upcoming months.

Rule 9.9 is a special case. This rule sets out the special information requirements for stormwater management plans. The submitter supports in principle the inclusion of guidance around stormwater management plans in the district plan as the design of these plans has been the subject of much discussion between consultants and Council staff over the last 12 or 18 months. The submitter is, however, concerned that certain elements of the rule are unreasonable, incorrect and/or insufficiently defined. Particular concerns relate to the following elements-

(i) Rule 9.9.X.1 is sensible, provided that this is adjusted to recognise any changes that result from policy considerations in respect of the NDMA categories described earlier.

(ii) Rule 9.9.X.2 should be adjusted so that Part 1 is removed, Part 2 is restricted to only certain categories of NDMA's, Part 4 is removed, and Part 5 is removed. Essentially, a stormwater management plan in an existing residential zone should only be required where the impermeable surfaces rules are breached. This relates to the permitted baseline assessment that has been recently established by an independent commissioner hearing (January 2021).

(iii) Rule 9.9.X.3.1 should be adjusted to read "*be prepared by a suitably qualified and experienced engineer, surveyor or other land development professional*".

(iv) Rule 9.9.X.3.2 is sensible. The submitter supports this.

(v) Rule 9.9.X.3.3 is problematic. In reality this will be difficult to achieve as agreement between adjoining landowners is often overly complicated. Inevitably there is one owner (the developer) who is seeking consent from the other owners, with those other owners having a vested interest to negotiate a position that better suits their own future activities. The rule might be a good idea in principle, but in reality, this will simply obstruct (and possibly fatally prevent) development from being advanced. There needs to be an additional component to this rule that provides either-

   a. The ability for the initial developer to proceed with a stormwater solution on his/her land only, in the event that other owners do not agree to an overall NDMA solution, or
   b. The ability for Council to i) compulsorily acquire land for infrastructure from other landowners, and ii) implement a cost-sharing arrangement between the NDMA landowners using specially designed development contribution charges (allowing clawback of infrastructure costs by Council).

   This rule also needs to be adjusted to be applicable to only those NDMA areas that comprise greenfields sites and which have well-understood stormwater constraints.

(vi) Rule 9.9.X.3.4 requires some additional refinement, particularly in regard to the definition of terms. We suggest-

   a. Part 1 should be adjusted to require the calculation of pre-development flows at a 10% AEP for the critical storm duration of the development site (i.e. not the critical storm duration of the broader catchment). The critical

storm duration of the development site will be equal to the time of concentration (ToC) across the development site. Where the stormwater management plan relates to a greenfields NDMA site, then the critical storm duration of the broader catchment should also be assessed.

b. Part 2 should be adjusted in the same way as the Part 1 suggestions above.
c. Part 3 can have the last 3 words (i.e. '…or water levels') removed.
d. Part 5 should be amended to insert the words '…or a reasonable alternative if justification is provided…' after the words '… in the underlying zone…'. Also, the final sentence referring to a NDMA area can be removed.
e. Part 9 and 11 require significantly more information. Please provide details of the types/methods of treatment anticipated and the expected degree of success that each type/method can provide. Several examples would be immensely helpful here.

(vii) Rule 9.9.Y.1 should be amended to refer to only those NDMA areas that do not have existing residential connection rights (at the development density presently allowed).

(viii) Rule 9.9.Y.2 should be amended to replace the words 'chartered engineer' with 'suitably qualified and experienced engineer or other land development professional'.

(ix) Rule 9.9.Y.3 should be adjusted in the same way as noted above for stormwater assessments, in a manner that enables development if the various owners of the NDMA cannot reach an agreement.

The submitter also seeks consideration of an alternative stormwater management method. Attached are several standardised approaches that are employed by other Local Authority's within New Zealand. These work on an average approach, where all development (subdivision and housing) is required to install a detention tank for stormwater. The advantage of this approach is that it-

1. Removes expensive assessment costs.
2. Removes development delays.
3. Means that all houses are able to contribute to stormwater improvements (not just on new subdivision).
4. Builds consistency into the building consent and resource consent processes.
5. Supports the use of detention tanks in a manner that is relatively cheap and easy to implement.
6. Allows for larger tanks where there are larger levels of impermeable surfaces.
7. Establishes an approach that can be easily understood by many players in the housing market, including architects, builders, plumbers, landowners, etc.

The submitter believes that the application of a suitable chart-based method for stormwater detention, on all but the new greenfields development sites, will provide a significantly more effective stormwater management approach than the case-by-case assessment approach promoted by Variation 2. It is considered that the proposed alternative option will not diminish development rates (in fact the certainty provided by a chart-based approach will likely have a positive impact on development rates), whereas the method notified in Variation 2 is anticipated to add a notable cost and delay to new developments and will therefore negatively impact the feasibility and speed of house construction.

Rule 15.4.X appears to seek to remove the permitted baseline assessment, as provided for in the RMA, from Council's consideration of stormwater matters. This is a fundamentally flawed position, which seeks to construct a rule in a lower-level regulation to override that of a higher-level regulation. Recent consent decisions, made independently and in accordance with the RMA, have clearly found that the permitted baseline assessment is an appropriate test in respect of stormwater management (in the same way as this applies to the consideration of other effects). This proposed Rule must be rejected.

It is commonly understood that the development of land for housing in Dunedin City is significantly constrained by poor quality and under-sized network infrastructure. It is critical that Council understand and appreciate that passing the responsibility for upgrading this infrastructure onto landowners and developers through the proposed infrastructure provisions in Variation 2 (except in regard to the new greensfields sites) will not address this problem – it will instead make residential development less likely to occur. If Council is truly wanting more houses to be built, Council must resolve the infrastructure constraints that exist in its network through an enhanced investment program. In this regard, the two principal elements of Variation 2 (increased residential capacity and additional infrastructure requirements) are in many ways competing with each other.

Proposed Adjustments to Variation 2-

(i) Amendments as required to give effect to the discussion matters above.

Regarding all of the residential density policy provisions, including reduction of the GR1 Zone minimum site size to 400m², the provision for duplex construction and the new provisions for ancillary residential units, the submitter supports these proposed provisions.

Regarding miscellaneous provisions relating to service connections and transportation, we submit the following.

Variation 2 proposes new rules relating to service connections on subdivision sites. These provisions ae contained in Rule 9.3.7, and particularly Rules 9.3.7.X, 9.3.7.Y, 9.3.7.Z and 9.3.7.AA.

It is the opinion of the submitter that there is insufficient allowance within these service connection provisions for viable alternative supply options. Several examples include:

- Telecommunications using 'off-the-grid' sources (cell phone, radio link, satellite link, etc.).
- Electricity using 'off-the-grid' sources (wind, solar, generator, etc.).
- Water supply by rooftop collection in areas that cannot be efficiently serviced from a reticulated source.
- Foul drainage via septic tank (or secondary-treatment septic tank) in areas that cannot be efficiently serviced from a reticulated sewage system.
- Stormwater to ground in areas where there are subsurface gravel layers that can accommodate site discharge flows.

There are likely to be a number of other forms of alternative solution as well, which are just as capable of providing acceptable servicing outcomes.

The submitter seeks the inclusion within Rule 9.3.7 of suitable alternative servicing arrangements, where these are recognised as being acceptable (certainly all of the examples above, plus other forms of servicing that may be appropriate). Some of these options may require the applicant to demonstrate that the alternative solution will achieve a particular standard. Furthermore, it should be recognised that a number of these alternative solutions are better implemented at the time of building (rather than the time of subdivision). Accordingly, the inclusion of a provision that recognises the use of a consent notice to require installation of service connections as part of the building process is also sought by the submitter.

Variation 2 proposes several new transportation policies and rule adjustments. The submitter is concerned about Policy 6.2.3.Y and Rules 6.11.2.7 and 6.11.2.8. In particular, the submitter feels that there is no justification by Council to impose the expectation that any private access serving more than 12 sites should be designed and vested as a legal road. It is the submitter's consideration that private access serving an unlimited number of sites is entirely reasonable, and that a legal road should only be required when the other assessment matters trigger this (e.g. for reasons of network connectivity and/or safe and efficient operation of the transport network).

There are likely to be many situations in which it will be difficult for Council to impose these proposed rules, a common example being infill subdivision that occurs along existing private accessways (a situation that exists within the submission land). The allowance in the rules for '…unless the location or design of the subdivision makes this inappropriate' is not satisfactorily as there is no guidance as to how Council's discretion in this regard will be applied.

If a developer chooses to construct a private road, and purchasers choose to buy sites on that basis, this would seem like a perfectly reasonable outcome (and with no risk to Council).

It may be that Council's reasoning for an inclusion of a 12-site maximum is that there is a perception that the formation width requirement for 7+ sites (Rule 6.6.3.9.a.ii requires a minimum formed width of 3.5m) is inadequate. The submitter agrees with this perception, and proposes that a better solution to this, rather than requiring accessways that serve more than 12 sites to become legal road, would be to insert a new driveway width standard for 13+ sites (another row under Rule 6.6.3.9.a) that requires the formed width of the accessway to be a minimum of 5.5m. A further rule could be added to ensure that the accessway is fitted with a turning circle that can accommodate a rubbish collection vehicle (with easements to be granted to DCC for rubbish collection purposes). The legal width for the new accessway category could be set marginally wider, say 6.5m, than the required formed width (1.0m wider, consistent with the existing accessway width categories). This suggested alternative is expected to meet the outcomes sought by Council in the proposed Variation 2 changes while also minimising the volume of land set aside for roading purposes, thereby achieving a greater capacity for new residential housing.

Reasons for my views:

We believe that the residential capacity interests of the City can be well served by the changes described above. Further supporting information will be supplied to Council prior to the Variation 2 hearings, although we would also welcome the opportunity to engage with Council planners to discuss this submission ahead of the hearings should this be considered potentially fruitful.

HCC 05: Rainwater Reuse and Detention System

1. INTRODUCTION

This practice note[1] has been developed to provide general information on the minimum design and sizing requirements for Rainwater Reuse and Detention Systems which are used in residential and non-residential applications for on-site stormwater management. Refer to Section 2 for residential applications and Section 3 for non-residential applications.

1.1 What is a Rainwater Reuse and Detention System?

Rainwater Reuse and Detention Tanks are tanks which combine the benefits from both rainwater harvesting and detention into a single tank. Figure 1 shows a schematic of a Rainwater Reuse and Detention System. These tanks are applicable in an urban environment where there is a public water supply available for potable use and to supplement the tank water. The harvested water from these tanks should be used primarily for toilet flushing and laundry supply but can also be used for other non-potable purposes such as garden watering and car washing.

Rainwater Reuse and Detention Tanks comprise two sections, above and below a small diameter orifice part way up the side of the tank. The volume below the orifice is used to store rainfall collected from roof areas for non-potable use within the building, while the volume above the orifice is used for detention and the orifice allows the slow-release of roof run-off during and after rainfall events.

Hamilton City Council recommends a minimum volume of **5,000 litres** or **5m^3** for the reuse portion of the tank, unless the roof area is less than 60m^2 and the building is single level, in this case Hamilton City Council recommends a **3,000 litre** or **3m^3** volume.

1.2 When should Rainwater Reuse and Detention Tanks be used?

Rainwater Reuse and Detention Tanks may be used as an on-site stormwater mitigation method in accordance with council's Drainage Disposal Hierarchy[2].

The requirement for onsite stormwater flow attenuation (detention) will depend on whether or not there is an approved downstream detention device, such as a stormwater pond or wetland, designed to accept runoff from the site. If onsite flow attenuation is required, detention can only be considered if onsite soakage has been found not to be appropriate for the particular site conditions. Site suitability for soakage will need to be assessed for every new building consent application. Detention is one of the options that can be used to manage stormwater if soakage is not an option.

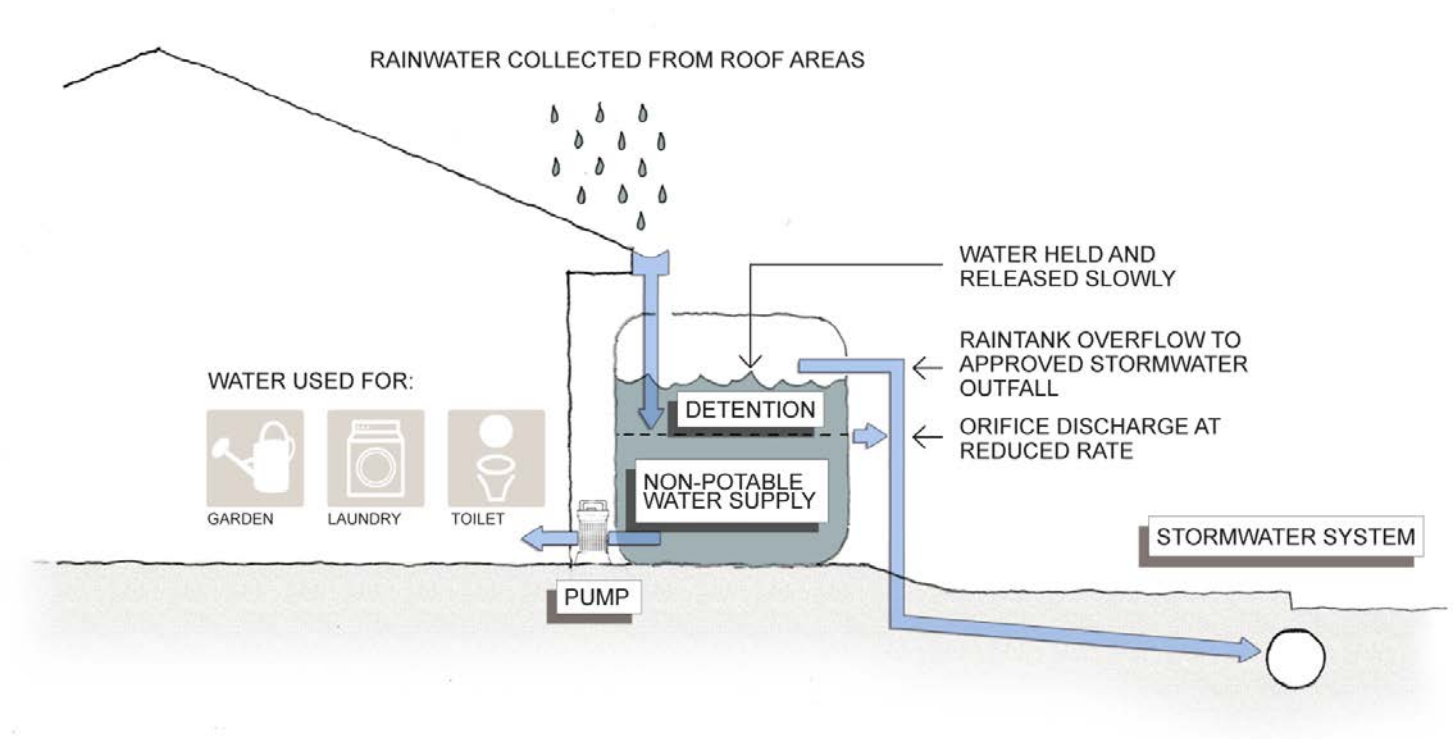


Figure 1: Schematic of a Rainwater Reuse and Detention System

1.3 Advantages of Rainwater Reuse and Detention Tanks

Rainwater Reuse and Detention Tanks provide the following benefits:

- ***Reduces the use of potable water from the public water supply system.***
- ***Reduces the annual volume of water which runs off from your site.***
- ***Reduces peak flows from storm events up to a 10 year event.***
- ***Captures the first flush of runoff and thereby improves water quality.***

[1] Three Waters Management Practice Notes are Hamilton City Council controlled documents and will be subject to ongoing review. The latest version can be downloaded from the Hamilton City Council website: http://www.hamilton.govt.nz/our-council/council-publications/manuals/Pages/Three-Waters-Management-Practice-Notes.aspx

[2] Refer Practice Note – HCC 01: Overview for details of the drainage hierarchy.

2. RESIDENTIAL APPLICATIONS

2.1 Minimum Design Requirements

The following information is intended as a guide only. All rainwater reuse and detention tanks within Hamilton City require specific design by a suitably qualified person and approval from Hamilton City Council's Building Control Unit.

The Rainwater Reuse and Detention Tank must meet the following minimum design requirements:

- **Tank volume**: The tank should be sized according to the roof area draining to the tank and the design procedure in Section 2.5 below. A minimum rainwater reuse volume of **5,000L** (**5m^3**) is recommended unless the roof area is less than 60m^2 and the building is single level then **3,000L** (**3m^3**) is recommended. If water reuse is plumbed to the laundry as well as to the toilet(s) and irrigation, the reuse volume can be halved where a Reuse and Detention Tank is being used, so **2,500L** (**2.5m^3**) unless the roof area is less than 60m^2 and the building is single level then **1,500L** (**1.5m^3**). Retention for reuse is generally not suitable for roof areas less than 50m^2.

  The required detention volume will depend on the area that requires mitigation and the proportion of the impervious area that is able to be drained via the tank.

  Onsite residential detention systems within Hamilton City shall be designed to manage peak flows from the 10 year ARI rainfall event and discharge it at 80% of the pre-development 2 year ARI rate.

- **Catchment**: The whole roof area should be connected where practicable. Only roof water should be drained to the rain tank.

- **Offset mitigation**: It is possible for a tank to provide mitigation for some area (up to 15%) that does not drain to it. This is called offset mitigation and results in a slightly larger tank and slightly smaller orifice to compensate for the area not draining to the tank.

- **Tank use**: The tank is connected via a pump to all toilets, irrigation and ideally to the laundry, and may be connected to the outside taps.

- **Backup water supply**: A backup water supply must be provided from the potable water supply for those occasions when the tank approaches empty.

- **Backflow prevention:** Some form of backflow prevention is required to ensure provision is made to protect the potable water supply from cross contamination. Council's preferred option is to plumb the mains water supply into the top of the tank with a registered air gap (minimum 25mm). Alternatively a testable backflow device (testable double check valve) can be provided at the water mains side of the reuse tank.

- **Contamination:** The tank may be above or below ground (above ground is preferable) but if it is below ground then it must be clearly identified as 'contaminated'. Water from non-roof areas must be prevented from getting into the reuse tank, including the provision of backflow prevention methods to ensure no stormwater surcharges back into the reuse tank from the public stormwater network.

- **Pipework:** Pipes supplying non-potable water must be coloured (lilac) and clearly marked. All taps connected to the non-potable water source must be clearly marked as not for drinking (see symbol). These taps are generally outdoor garden taps but it also applies for indoor taps such as the laundry cold water tap. The taps should also be colour coded with either a lilac ring or lilac powder coated.

- **Access**: Suitable access must be provided to the tank, the pump, and any screens or filters and the for maintenance and regular inspections. The location of these items must be clearly identified.

- **Orifice location:** A small diameter orifice should be positioned part way up the tank to provide the detention part of the tank. The location of the orifice is to be determined using the methodology outlined in Section 2.5 Step 7 below.

- **Dead storage zone:** A dead storage volume is required at the bottom of the tank for sediment build-up. The lowest outlet for reuse purposes should be located a minimum of 100mm above the bottom of the tank to allow for sediment accumulation.

- It is advisable to provide some or all of the following:
  - Some form of leaf guards on your gutters.
  - Insect screens.
  - A first flush diverter which diverts the most 'contaminated' roof runoff.
  - A tank vacuum type overflow which helps to remove sediment build up from the bottom of your tank.
  - A filter at the pump.
  - An inlet system which prevents sediment from being stirred up when the tank is nearly empty.

- Figures 2 and 3 show typical components for above ground and below ground Rainwater Reuse and Detention Systems.

Refer to NZ Building Code E1 Surface Water, G12 Water Supplies and F8 Signs, and NZS 5807: Part 2 for additional requirements.

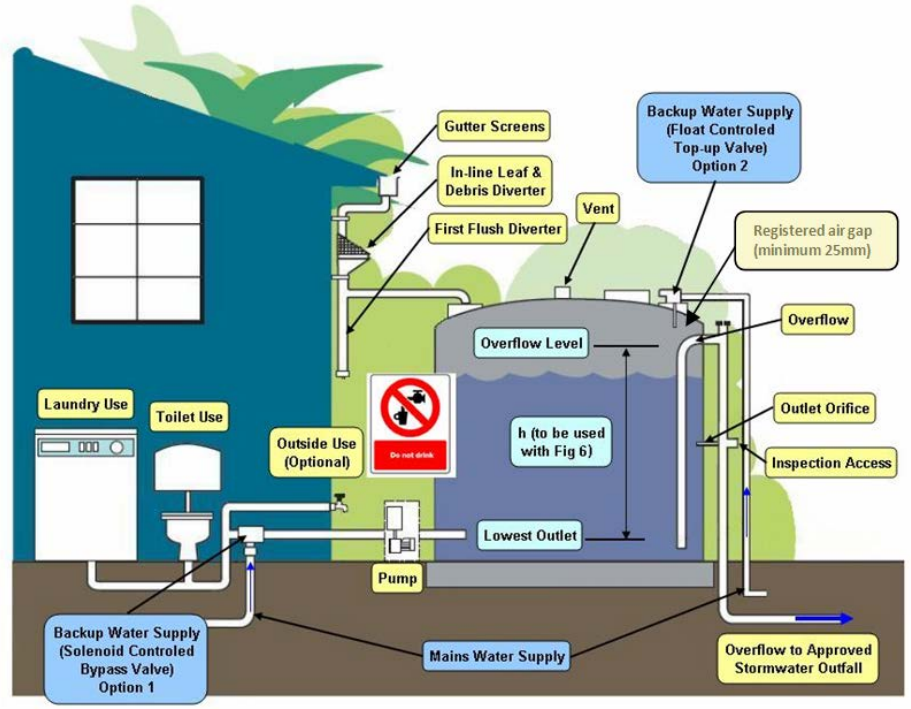


Figure 2: Above ground Rainwater Reuse and Detention System - typical components

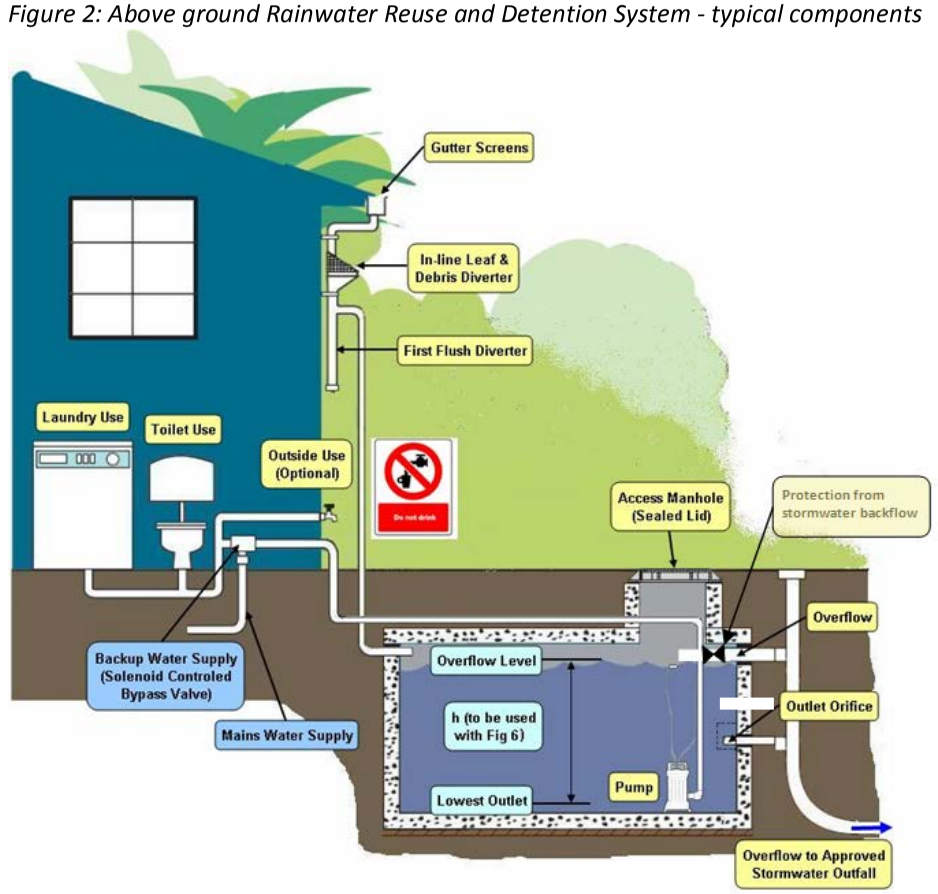


Figure 3: Below ground Rainwater Reuse and Detention System - typical components

2.2 Procedure for calculating Rainwater Reuse and Detention System tank sizing and configuration

This procedure should be used for residential applications. It refers to the three areas of the tank, the temporary volume which buffers storm flows, the permanent reuse volume and the dead storage volume of the tank.

This procedure should be used for residential applications that comply with the following conditions:

- Maximum impervious area to be mitigated of 600m^2.
- Offset mitigation area no greater than 15% of the total impervious area draining to the detention tank.
- Only roof water should be drained to the Rainwater Reuse and Detention System.
- Pre-development site assumed to be undeveloped (greenfields) – with a runoff coefficient C = 0.30.
- Outlet of tank located above the level of the stormwater reticulation into which it will discharge, with no back water effects.

Should site conditions or design requirements not comply with the above conditions, specific design of the detention system will be required. Refer to HCC06 Detention Tank Practice Note for the general methodology to be followed in these circumstances.

Step 1: Determine the total roof area of the building (A_r)
Measure the total roof area which shall be connected to the tank, including the eaves. Note it is advantageous to maximise the roof area connected to the tank as this increases the water captured for re-use and also minimises the over-attenuation required impervious bypassing the tank.

Step 2: Check Offset Mitigation limit (Ai)
Measure the areas of concrete driveway, pathways and other impervious areas (Ai) and compare to the total roof area connected to the tank. If Ai/Ar > 15%, specific design incorporating onsite detention of runoff from the additional impervious surfaces is required.

Step 3: Determine the Detention Volume (DV)
Based on the values measured above the required Detention Volume should be sized according to the chart in Figure 4.

Step 4: Determine the Reuse Volume (RV)
The minimum Reuse Volume for Residential Zones is **5,000L or 5m^3** unless the dwelling is less than 60m^2 and single level then the Reuse Volume is **3,000L** or **3m^3**. Or if laundry is plumbed for water reuse as well as toilet(s) and irrigation, then you can halve the minimum Reuse Volume to **2,500L** or **2.5m^3** unless the dwelling is less than 60m^2 and single level then it is **1,500L** or **1.5m^3**.

Step 5: Determine the Minimum Total Tank Volume (Vt)
As shown on Figure 5 the Minimum Total Tank Volume (Vt) is the sum of the Detention Volume (DV) determined in Step 3 and the Reuse Volume (RV) determined in Step 4.

Vt = DV + RV

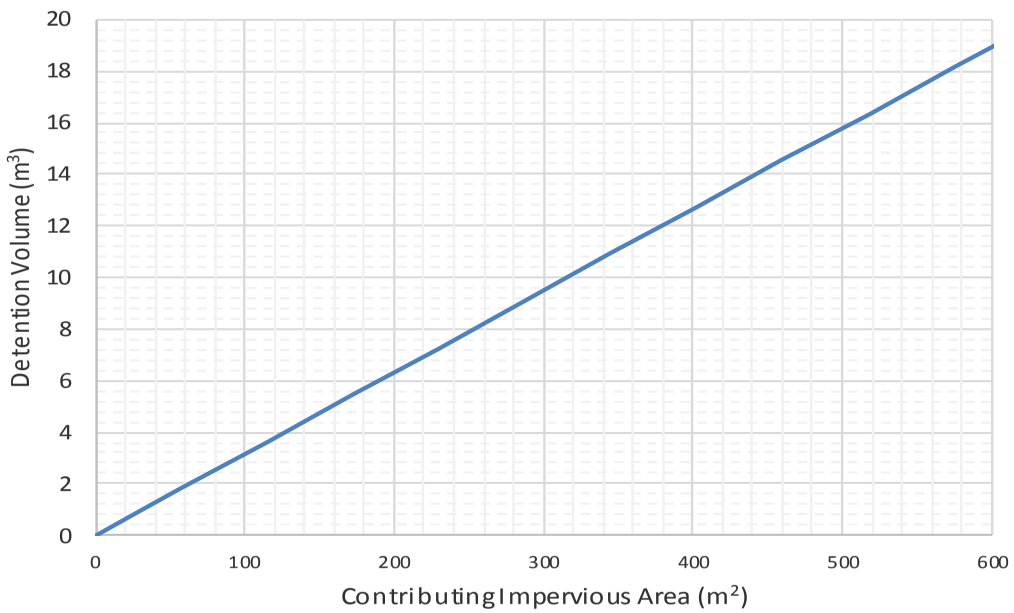


Figure 4: Detention Volume selection chart

Step 6: Select the desired tank make and model.
Select the desired tank make and model using the total tank volume (Vt) determined in Step 5 and other desired criteria. Once the tank make and model has been chosen, obtain the tank dimensions from the manufacturer's specifications.

Step 7: Determine the tank configuration
Using the chosen tank dimensions – Total Height (H) and Tank Plan Area (PA), and the required tank volumes – Detention Volume (DV), Reuse Volume (RV) from Steps 3 and 4, determine the required configuration for the Rainwater Reuse and Detention Tank. Refer to Figure 5 for an illustration of the tank configuration.

Dead Storage Height h_3 = Minimum 100mm above the base of the tank for sediment accumulation

Reuse Height h_2 = Reuse Volume (RV) / Tank Plan Area (PA)

Detention Height h_1 = Detention Volume (DV) / Tank Plan Area (PA)

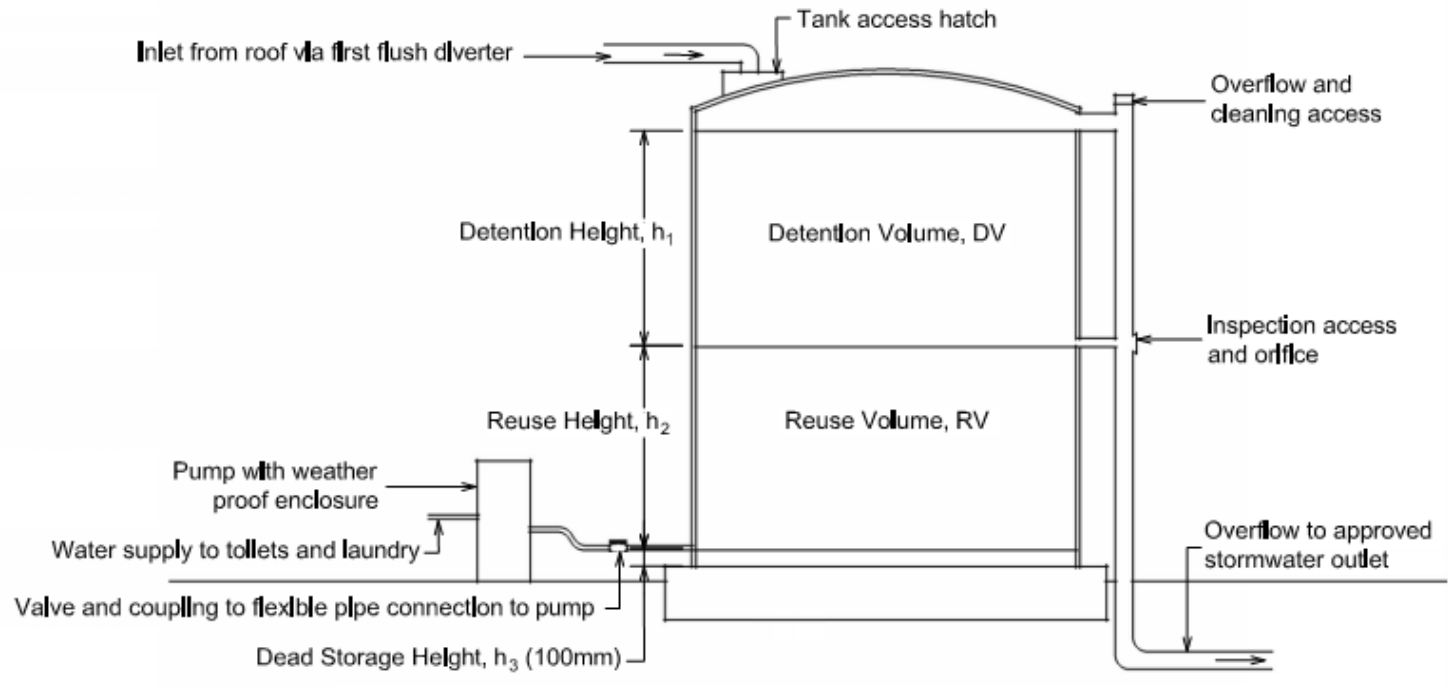


Figure 5: Schematic of Rainwater Reuse and Detention tank configuration

Step 8: Determine the size of the orifice

The size of the orifice is related to the roof area and the adopted Detention Height, h_1 and should be designed as per the chart in Figure 6 below. For maintenance reasons the minimum size of the orifice should be 10mm.

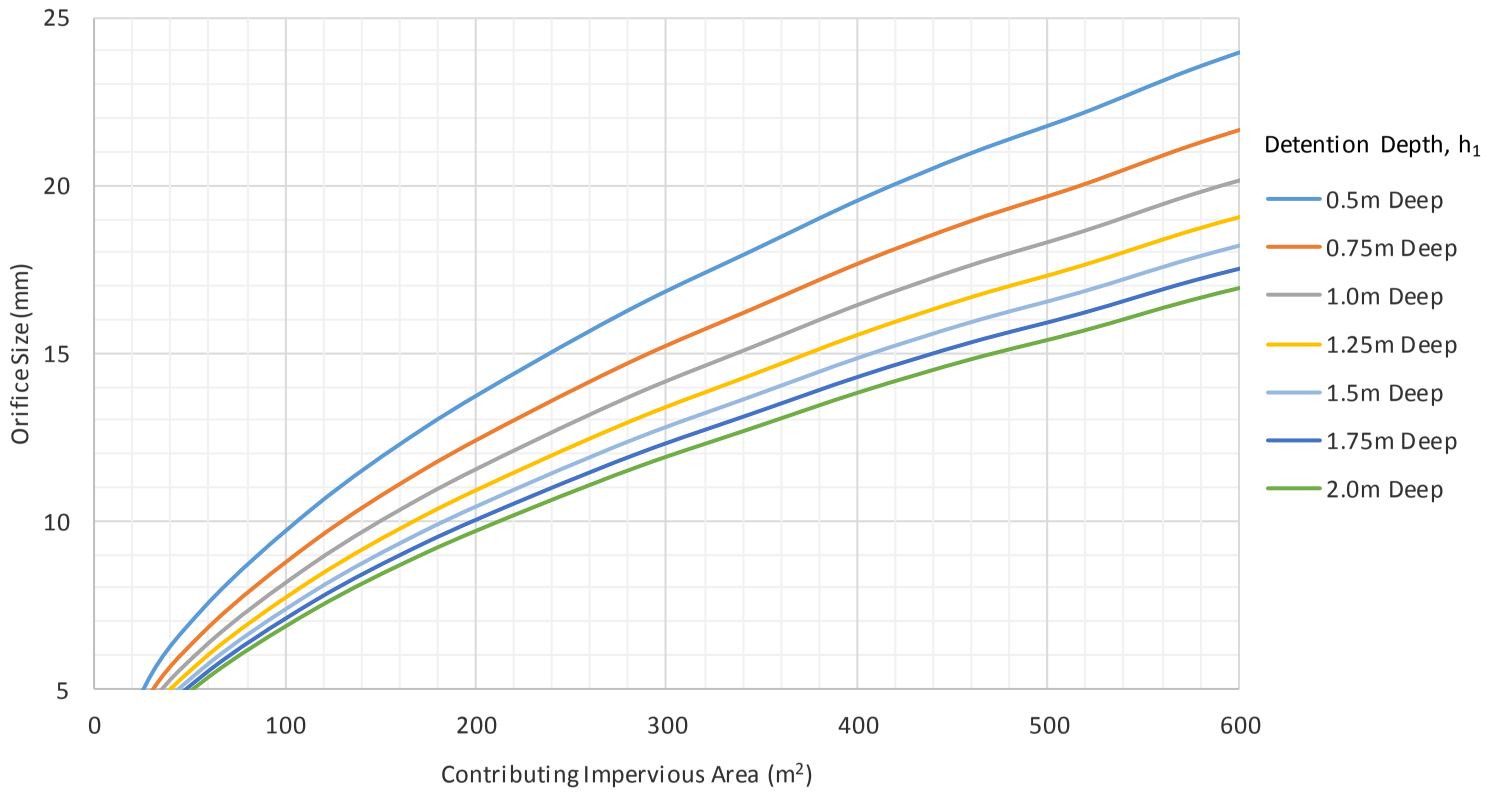


Figure 6: Orifice Sizing Chart

3. NON-RESIDENTIAL APPLICATIONS

This section provides general information on the minimum design and sizing requirements for Rainwater Reuse and Detention System tanks which are used in non-residential applications for on-site stormwater management.

3.1 Reuse Volume for non-residential applications

Refer to Practice Note HCC02 Rainwater Reuse System (Rain tanks) for details on sizing the Reuse Volume for Non-Residential Applications.

3.2 Detention Volume for non-residential applications

Refer to Practice Note HCC06 Detention Tanks for details on sizing the Detention Volume for Non-Residential Applications.

4. SUMMARY OF PLANNING REQUIREMENTS

Your rainwater reuse and detention system must be consented either as part of the whole site's building consent or as a separate building consent.

For details on building consents please contact Hamilton City Council's Building Control Unit phone (07) 838 6699.

The detention component of your rainwater reuse and detention system is required to be designed by a suitably qualified person based on the guidance provided in this practice note, council's Infrastructure Technical Specification and other base practice guidance. As-laid plans, authorised by a registered drain layer, are required for your rainwater reuse and detention system and shall be provided to council.

Wellington Water

Managing Stormwater Runoff

The use of approved solutions for hydraulic neutrality

Version 3

Our water, our future.

V1	*June2019*	*Approved Solution #1*
V2	*June2020*	*Amended layout and minor text changes*
V3	*August 2020*	*Approved Solution #2*

Executive Summary

Purpose of this document

This document has been written for anyone thinking about developing their land by explaining some of the concepts behind managing stormwater runoff. This document explains the impact the development may have on stormwater runoff and consequently flooding, why Wellington Water care, and what we are doing about it. There is a focus on smaller residential developments, 10 properties or less, or backyard add-ons by providing an approved solution to manage the change in stormwater runoff. Specifically this document explains:

- Why managing stormwater runoff is important
- Hydraulic neutrality – what it means and what we are trying to achieve
- What residential developers need to consider to manage stormwater runoff (from a flooding perspective)

Appended to this document are approved solutions to assist in managing the effects of stormwater runoff in residential developments. The approved solutions provide simple solutions where developers need to achieve hydraulic neutrality.

Wellington Water will accept the use of approved solutions as evidence of compliance with hydraulic neutrality where hydraulic neutrality is required for residential development and where the requirement does not refer to specific methods or specific outcomes. Approved solutions in this document contain design specifications and are not endorsements of specific products. The use of approved solutions is not mandatory. If another solution or variation is proposed, you may need to provide hydraulic and/or engineering calculations from a suitably qualified person that demonstrate compliance with the required hydraulic neutrality. This document will be reviewed every five years.

The objective is for all of us to think more widely about the impact our development has on the environment and in particular how we are altering the natural drainage characteristics of our catchment. We need to act appropriately to ensure these changes do not impact negatively on our neighbours and downstream users by increasing their flood risk. Ultimately we need to think about smarter, more adaptable solutions to manage the risk of flooding that reduces the need for costly infrastructure upgrades, while providing greater resilience within a changing climate. We believe the best solutions will come from multiple approaches, managing runoff at the source and throughout its journey as it drains to the sea.

Flooding in Porirua, 5 May 2016.

Why we need to consider stormwater runoff

Development contributes to the increased impervious area of catchments. Through the building of houses, driveways, roads and decks, we change the natural hydrological cycle. Rainfall that used to directly infiltrate through the soils or slowly drain overland now runs off the land much faster across sealed surfaces and through the piped stormwater network. In hydrological terms both the volume of water and the peak flow have increased as a direct result of development.

Water quality may also be adversely affected by developments, and water sensitive design should be considered. Specifically this document explains flooding aspects of development. Other literature should be consulted for best practice approaches for water sensitive design.

Why do we care?

Most catchments have people and properties that are at risk of flooding. This has economic, environmental and social impacts.

What does this mean?

The stormwater network includes the primary network: stormwater sumps (these are the grates you see in roads which convey runoff to the piped stormwater network); stormwater pipes; and open channels. This network is effective at managing runoff from low to medium intensity rainfall events. However, the primary network does not have the capacity to transfer runoff from heavy rainfall events. It is usually impractical to put all this floodwater under the ground.

During heavy rainfall events we rely on overland flowpaths. We refer to these as the secondary network. The secondary network includes natural drainage paths based on the topography of the land and built paths like many of our roads. The drainage paths convey runoff so that flood waters do not enter buildings. If the primary or secondary networks block, for whatever reason, we can get flooding. This may be minor 'nuisance' flooding or major flooding that impacts our livelihoods.

Ponding areas are also part of the stormwater network. These areas may be natural or the result of changed topography which formed basins or bunds. It is important to manage these ponding areas as they often provide storage during flooding and attenuation (the slow release of runoff back into the network).

Wellington Water uses a number of approaches to manage flood risk. This includes:

- developing hydraulic models to identify high risk areas and overland flowpaths
- installation of stormwater pipes where it makes sense to do so
- creating flood storage in low risk areas.

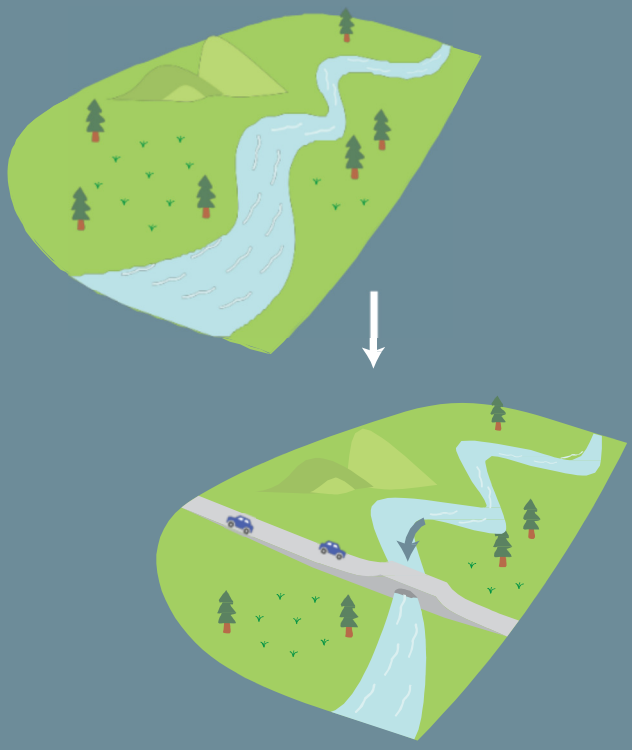
Increasing the size of the piped stormwater network may be an option in high value areas, such as hospitals or the central business district. In other areas the costs associated with upgrading the stormwater network will often outweigh the benefits. A more cost-effective alternative is attenuating runoff at the source. This means storing rainfall close to where it lands, and slowly releasing it back into the stormwater network after the flood peak has passed.

In addition, the effects of climate change may lead to reduced effectiveness of our primary networks. The smart way to combat reduced effectiveness and unpredictability is to combine several approaches (big and small) to create an adaptable, resilient solution.

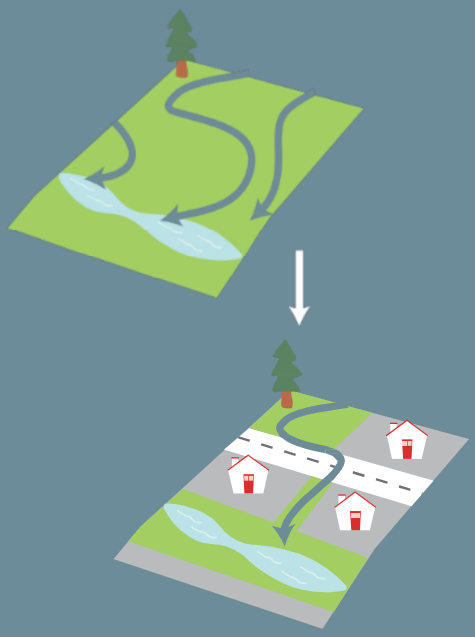
We need to think about smarter, more adaptable solutions when growing our cities.

Development may impact the natural hydrological cycle in four ways

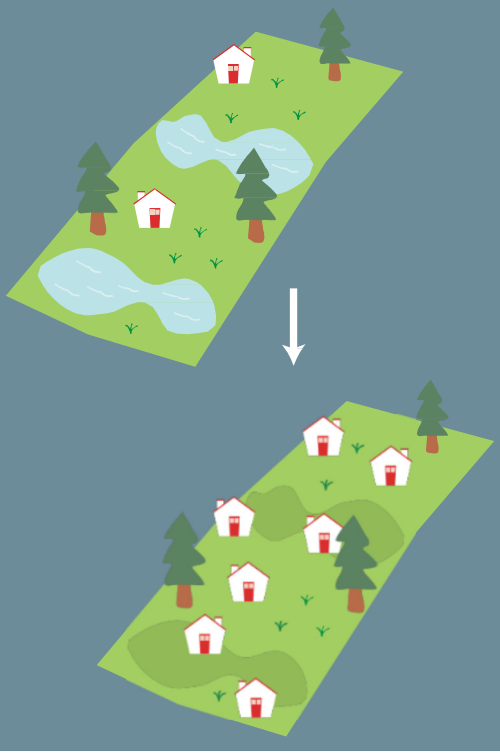
1 Changes to Primary Flow



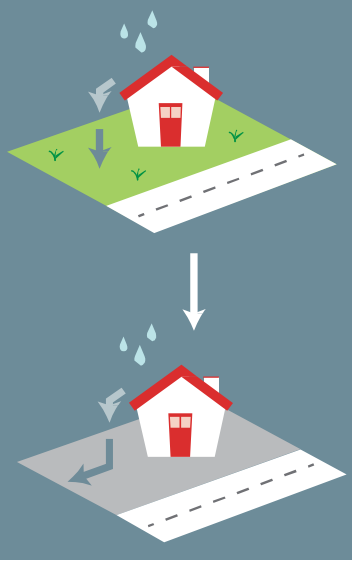
2 Changes to Overland Flow



3 Loss of Natural Ponding Areas



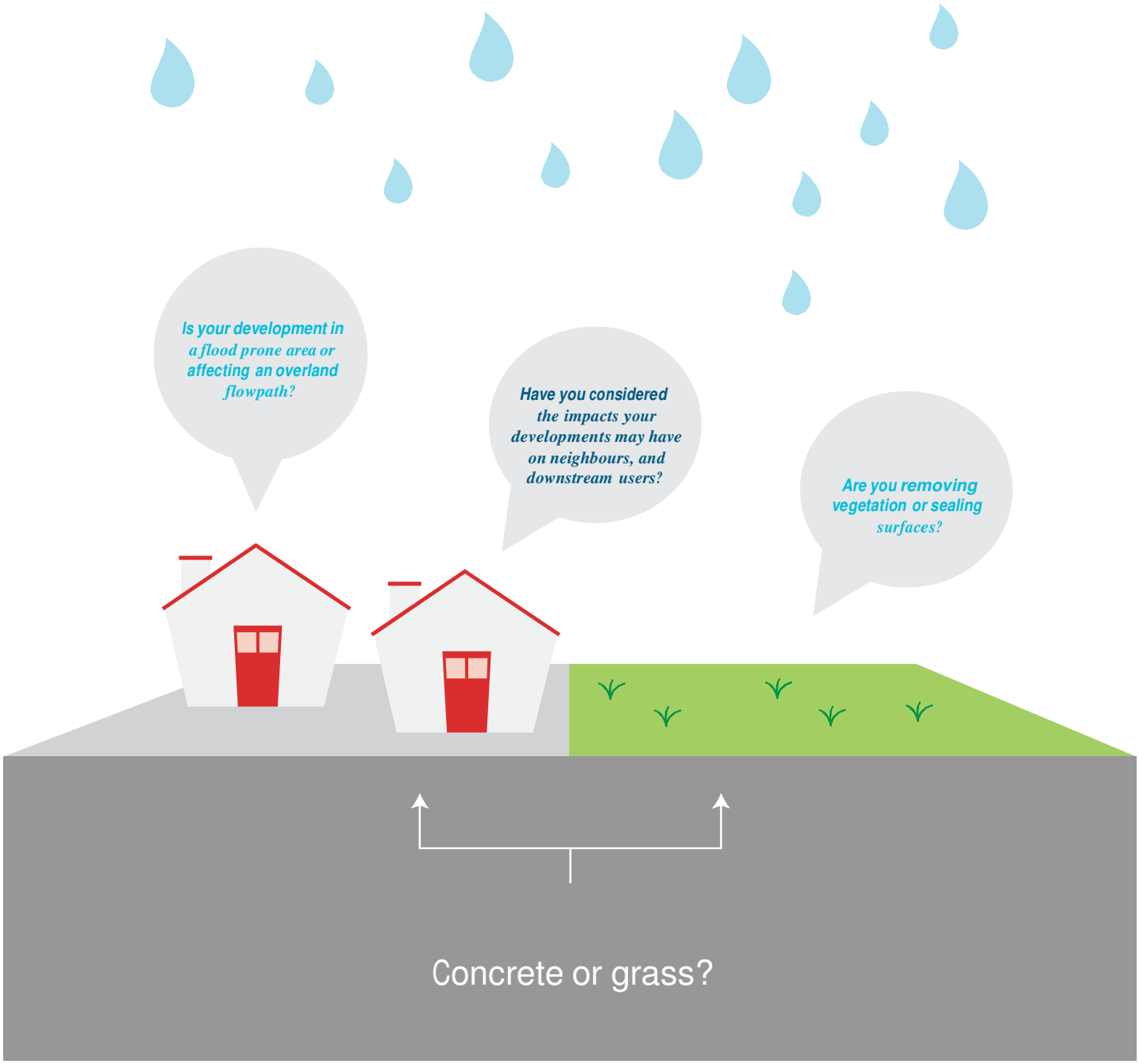
4 Increased Impervious Areas



Your Residential Development

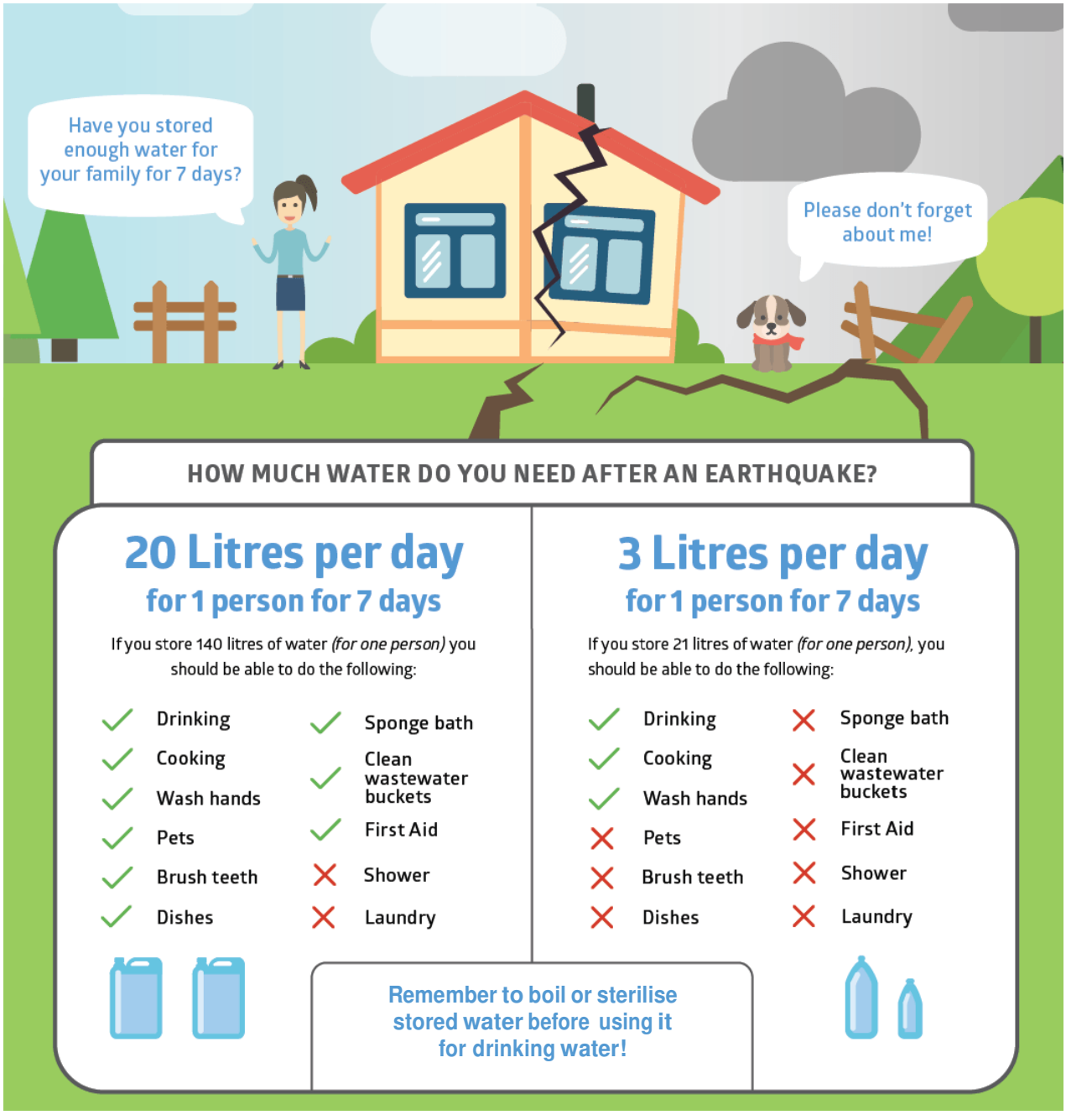
Considerations when designing a new residential development

It is important to understand where, what, and how your development could affect the immediate area and wider region. Under the Resource Management Act you have an obligation to 'avoid, remedy, or mitigate any adverse effects of activities on the environment'. Therefore you have a requirement to ensure your development does not cause flooding to others. If you are required to lodge a Resource Consent application, you will need to outline the adverse effects your development may cause and what you are doing to manage it.



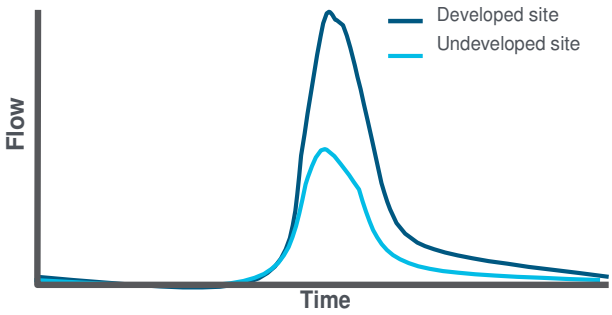
Emergency water supply

Many of the approved solutions include a requirement for a portion of the storage attenuation to be reserved to provide you with an emergency water supply following a major earthquake. We are all encouraged to store 20 litres of water per person per day for seven days. That is 140 litres for one person or 560 litres for a family of four. Following this seven day period community stations will be established to provide a centralised source of drinking water as it may take more than 100 days before the water supply network is repaired. The water held in storage is not treated so remember to boil or sterilise it before using it for drinking water.

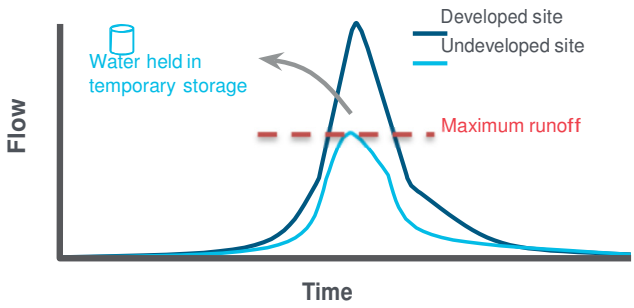


To manage the additional runoff directly attributed to your development, you need to ensure the maximum peak flow off your land is no greater than what it was pre-development. This is our definition of hydraulic neutrality. The figure (below) helps to explain this.

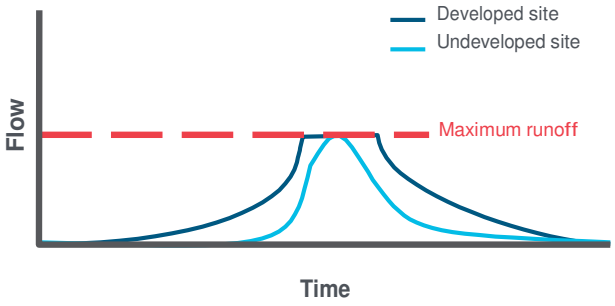
1. Increased sealed surfaces as a result of development mean that water is unable to infiltrate into soil or drain slowly overland. This results in a higher peak flow and greater volume of runoff.



2. The increased difference in peak flow can be captured and held in temporary storage devices to be used in other applications or slowly released back into the stormwater network.



3. This method can bring peak flow rates during significant rainfall events to a level much closer to that of undeveloped sites. Our goal is to meet the definition of hydraulic neutrality.

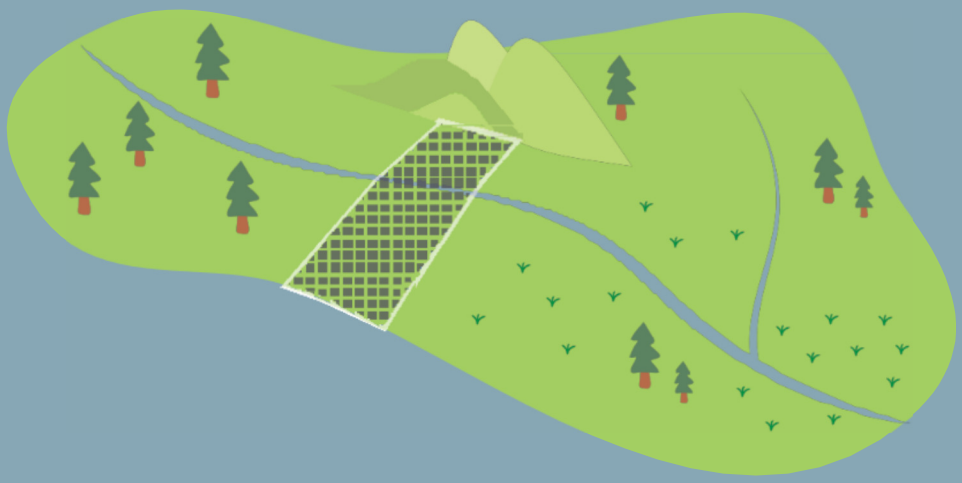


We define hydraulic neutrality as capturing post-development peak runoff so that it does not exceed the pre-development peak flow rate.

If a property is hydraulically neutral then the peak flow rate from the site will be the same, or less than, what it was prior to development. A hydraulically neutral development will not cause additional stress to the stormwater network and will not increase flooding. Your storage attenuation solution should be effective for both small and large flood events, including floods occurring once in 10-years (10% annual exceedance probability (AEP)) through to once in 100-years incorporating climate change predictions (1% AEP with climate change).

How to achieve hydraulic neutrality

Hydrological Modelling



Approved Solutions

01

Approved Solution #1

Approved Solution #1

Approved Solution 1 requires the diversion and attenuation of roof runoff into a rainwater tank. The required size of the rainwater tank is based on your house roof area (Table 1-1).

Table 1-1: Sizing your rainwater tank

House roof area	Rainwater tank capacity
> 40m² to < 100m²	2,000 litre
≥ 100m² to < 200m²	3,000 litre
≥200m²	5,000 litre

Rainwater tanks will help store, slow and reduce peak runoff from a development, acting to control runoff at the source and to reduce the flood peak.

Rainwater tanks

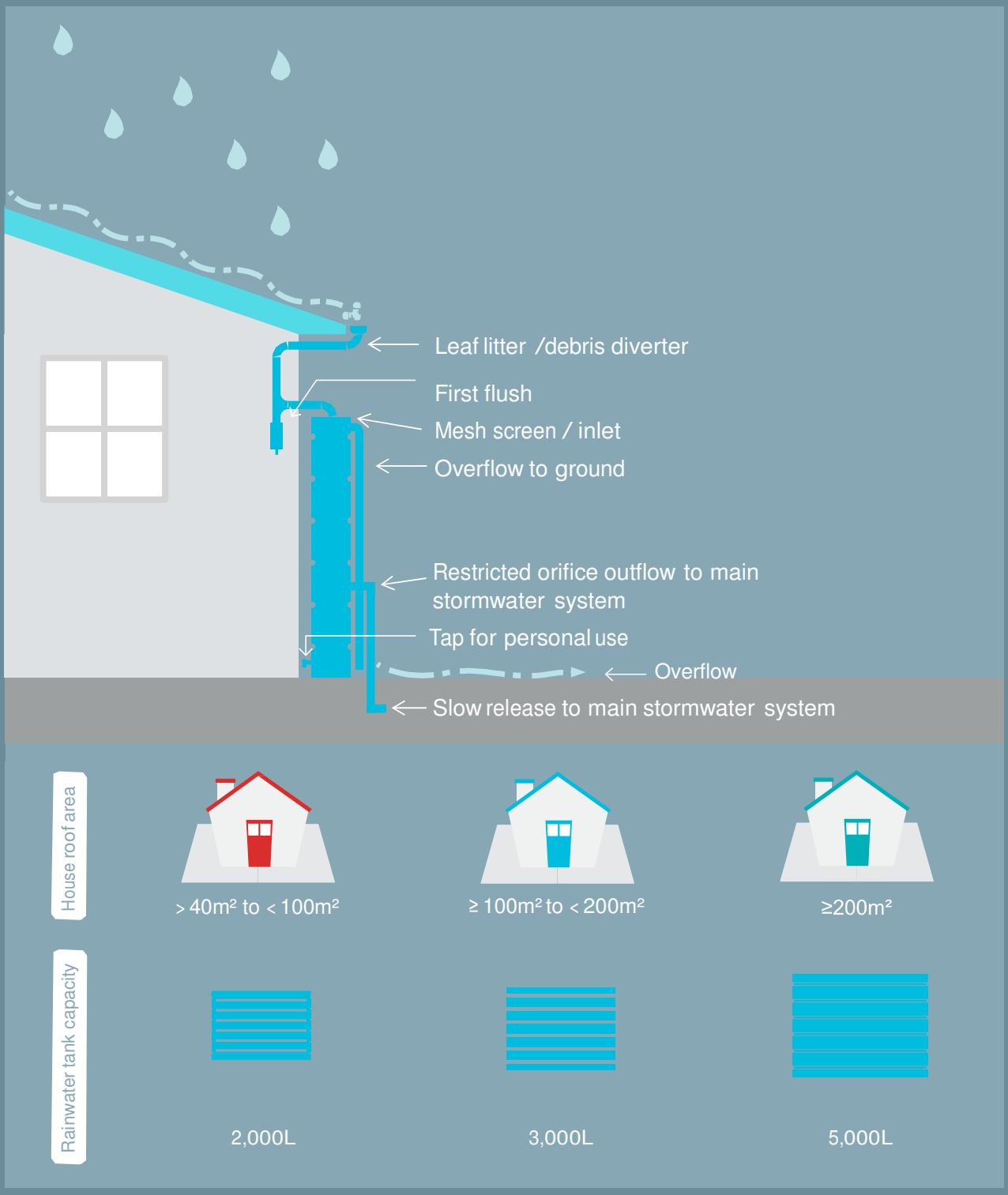
The purpose of rainwater tanks is to temporarily store runoff from your roof, slowly releasing this water back into the stormwater network over a longer duration. Water will flow out from the tank via an orifice and outlet pipe and an overflow pipe should the tank reach its capacity. During a storm the peak runoff from your house will be significantly reduced as water is stored in your tank.

Approved Solution #1 requirements and limitations

The basic requirements of all set-ups will be the same:

1. This solution is only applicable to lot sizes where the total impervious area is less than 400m². Runoff from no less than 80% of all new roof areas must be diverted to, and attenuated by, your rainwater tank.
2. Runoff from no less than 80% of all new roof areas must be diverted to, and attenuated by, your rainwater tank.
3. You must have a leaf litter/debris diverter (or equivalent product) between your roof gutter and downpipe(s), or on the downpipe to your tank.
4. Your overflow pipe must not be connected to the main stormwater system. The overflow should discharge to the ground surface and be directed to an appropriate and visible overland flow path that flows to an acceptable outfall or public system. This is to provide a visible indicator if your primary outlet is blocked.
5. A portion of the water in the tank (15-25% depending on tank volume) is reserved for you. This water is not treated so you shouldn't drink it directly from the tank but it can be used for the garden, washing property, cars, or as your emergency water supply. The pressure will be low, though this may be sufficient for garden use, otherwise a small pump can be added to the system.
6. These tanks must be above ground to allow you to access the lower portion of water in an emergency, for ease of maintenance and inspection and for the tank to drain to the stormwater network. In addition the bottom of the tank must not be more than 0.5m above ground to avoid the need for Building Consent.
7. This solution is acceptable for developments of 1- 10 resident buildings. It may be considered as part of a wider solution to managing stormwater runoff in developments greater than 10 buildings, though full hydrological analyses of the development will be necessary. This is to ensure that stormwater detention devices are appropriately sized for the specific conditions of the local area and will consider the total impervious area within the development such as driveways, roads and footpaths.
8. Rainwater tanks must be installed in accordance with the manufacturer's specifications.
9. During installation you'll need to install an outlet to slowly release runoff back into the stormwater network. The diameter of the outlet and its height above the ground has been carefully sized to maximise the storage within your tank, while minimising the rate of flow back into the stormwater network. As such the tank dimensions, outlet diameters and height of the outlets stated in Table 1-2 must be adhered to. Any variation to this setup will mean your solution to managing stormwater runoff does not fall within Acceptable Solution #1.
10. You may choose to have multiple downpipes entering the tank conveying discharge directly from the roof, or alternatively the downpipes may be brought together in a junction underground with a single larger pipe conveying runoff to the tank.

Approved Solution #1 – Rainwater tanks



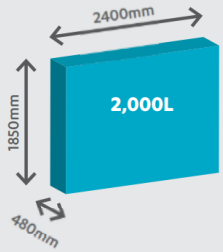
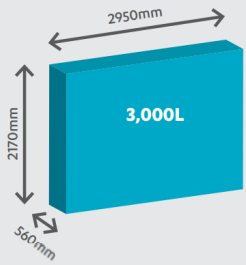
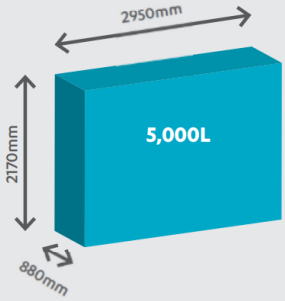
Your rainwater tank when installed to the requirements of Approved Solution #1 does not require a building consent, though the drainage works associated with your development are likely to require a consent. Your tank and connections will need to be shown on as-builts provided to your council.

Rainwater tanks do not address increased runoff from sealed surfaces on your property. When you're developing your property we'd love you to consider this and minimise sealed surfaces where possible.

Wind and Seismic Restraint

It is important to ensure your tank is appropriately restrained to withstand very high winds and seismic activity. Please consult your tank manufacture for specific details regarding how to safely site and secure your tank. This may include a requirement to have a flat and level concrete foundation and restraining brackets or posts.

Table 1-2: Required tank setup

Tank Dimensions			
Orifice Nominal Diameter (mm)	15	15	15
Orifice Height above Base of Tank* (mm)	490	430	430
Minimum Overflow Nominal Diameter (mm)†	90	90	90
Overflow Height above Base of Tank* (mm)	1770	2095	2095

*Measured to the centre of the orifice

† The diameter of the overflow outlet may need to be larger to provide equivalent capacity to that of all inflows.

Emergency water supply

The lower portion of your rainwater tank is reserved for personal use and to provide you with an emergency water supply following a major earthquake. Your rainwater tank should have enough water to meet your immediate requirements (depending on how your tank is used). A 2,000L tank will meet the emergency water supply requirements for 2 people for 7 days. The 3,000L tank will meet the emergency water supply requirements for 4 people for 7 days, and the 5,000L tank will meet the emergency water supply requirements for 7 people for 7 days. This will be topped up after every rainfall event, so in an emergency may save you a trip or two to your community station.

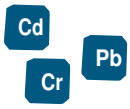
Tank Setup

If you decide to install a rainwater tank as your stormwater management solution, the following considerations are standard tank setup requirements. It is recommended you follow the instructions of your tank manufacturer in regard to your rainwater tank site setup and connections to your gutter system and downpipes. As a minimum you should:

Have a flat and level site, free from rocks, stones or anything else that may damage the tank base. You'll also want the site to be well compacted. If a sand base is used, a retaining cover must be provided to prevent sand from washing away after installation.

Ensure your tank is secured as per the seismic requirements of the manufacturer so that it won't topple over in an earthquake or under high winds.

Ensure the overflow capacity equals or exceeds the inflow capacity (from your downpipes).



Avoid any lead, chromium or cadmium products in any of your roof materials, soldering, flashings paint or any other part of your roof. Uncoated metal roofs can also pose a problem. Your roof should be painted with product suitable for drinking water supply.

It is strongly recommended that you have a first flush diverter to divert the initial flow of contaminant-laden water from your roof away from your tank.

Consider whether a screen over your inlet/ outlet pipe is necessary to keep insects, birds, and other organic matter out of your tank.

Install a leaf litter / debris diverter (or equivalent product) between your roof gutter and downpipe(s) or on your downpipe, to divert debris away from your tank.

Put a bend in the top downpipe to minimise light, and consequently reducing the likelihood of algae growth.

Tank Maintenance

Your rainwater tank system will require some maintenance to prevent blockages and to keep the tank operating efficiently and the water clean. Please see your tank manufacturer for their specific maintenance instructions. For optimal performance and clean usable water it's likely that you'll be required to:

Clean your roof of animal droppings, pollen, ash and other organic matter. It is recommended you inspect your roof six-monthly, though depending on your location this may need to be done more frequently.

Remove leaf litter and debris from your gutters regularly. It is recommended you inspect your gutters every six months, though if you have a lot of trees around your property you will need to do this more frequently. You may want to consider trimming back any overhanging vegetation.

Wash out leaf litter/ debris diverters and first flush diverts every few months. This should take only 10 minutes.

Inspect and maintain any mesh screens, orifice outlets and filters annually. Likewise inspect and repair any seals, pipes and valves annually.

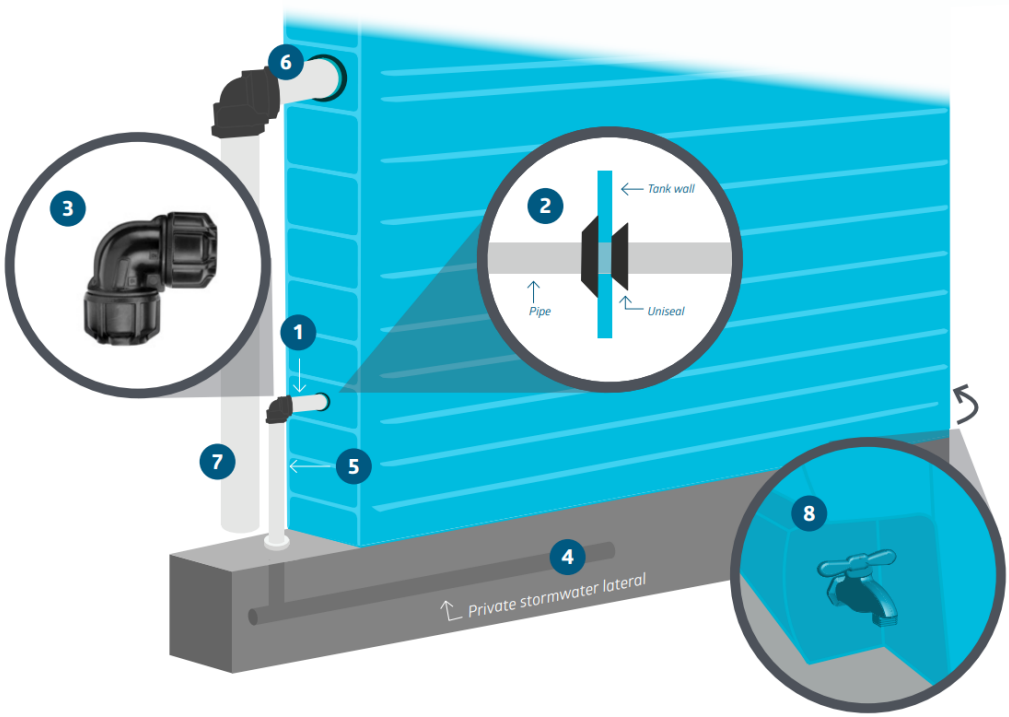
Clean your tank by draining it and remove any sediment and debris from the rainwater tank floor every 2-3 years. There are a number of rainwater tank cleaning and servicing companies that can assist you with this task if necessary.

The tank design and its function as an attenuation device will be recorded on the Council Property file. Altering the tank from its intended use may result in a fine or restoration of its intended function.

Rainwater tanks typically have a warranty period of 10-20 years.

Technical Specifications

The installation of your tank to the required setup is a fairly straight forward process. However, it is recommended that you work with your plumber to install the pipe network correctly. The following diagram details the setup requirements.



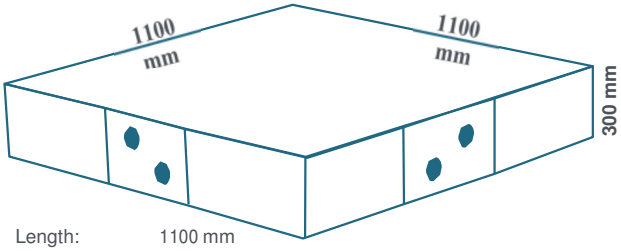
1. A short 20mm diameter pipe is inserted into the tank end at the required height (see Table 1-2). The pipe is held secure to the tank using a Uniseal or similar product. For a 20mm diameter pipe it is recommended to use a 31.7mm holesaw size to drill your outlet.
2. Your pipe should protrude into your tank slightly. Approximately 5-10cm is appropriate.
3. This pipe must be connected to an elbow bend that is easily removable or has an access cap to allow you to clear any blockages from the orifice. A Philmac 20mm x 20mm elbow fitting or similar would be appropriate.
4. A longer 20mm diameter pipe connects the downstream end of the elbow fitting to the private stormwater lateral network that conveys runoff from your property to your council's main stormwater network, or to an acceptable and appropriately sized soakage device.
5. This pipe should be appropriately fastened so that there is no risk of it becoming dislodged.
6. Depending on the rainwater tank purchased it may already come with an overflow orifice, or you may need to drill it yourself. You must ensure that the size of the overflow orifice provides equivalent capacity to that of all inflows. Similar to the 20mm diameter pipe, drill the overflow orifice hole to the required size, insert a Uniseal or similar produce, and connect your overflow outlet pipe. This pipe should pass through an elbow bend before discharging to an appropriate and visible overland flowpath draining to an acceptable outfall.
7. This pipe should be appropriately fastened so that there is no risk of it becoming dislodged.
8. Your personal use outlet can be fitted with a hose to allow use of the stored water, or to drain the tank for cleaning and maintenance purposes. The outlet must be closed off when it is not being used so that water is attenuated within the tank.

02

Approved Solution #2

Approved Solution #2

Approved solution #2 requires the diversion and attenuation of roof runoff into modular storage tanks. The number of modular storage tanks and the required orifice size at the outlet is based on your house roof area (Table 2-1).

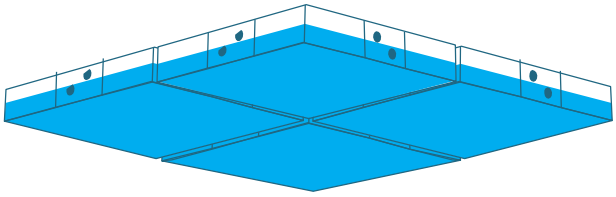


Length: 1100 mm
Breadth 1100 mm
Height: 300 mm

Modular storage tanks

Similarly to rainwater tanks, modular tanks are used to store stormwater runoff from your development and release it slowly to the stormwater network.

Typically modular tanks can be installed under any hard ground surface such as driveways, paved areas, and decks and as such are a great option for sites with limited space, high stormwater network invert levels, curb discharge or rocky ground, or where there is a preference for stormwater infrastructure to be hidden from view.



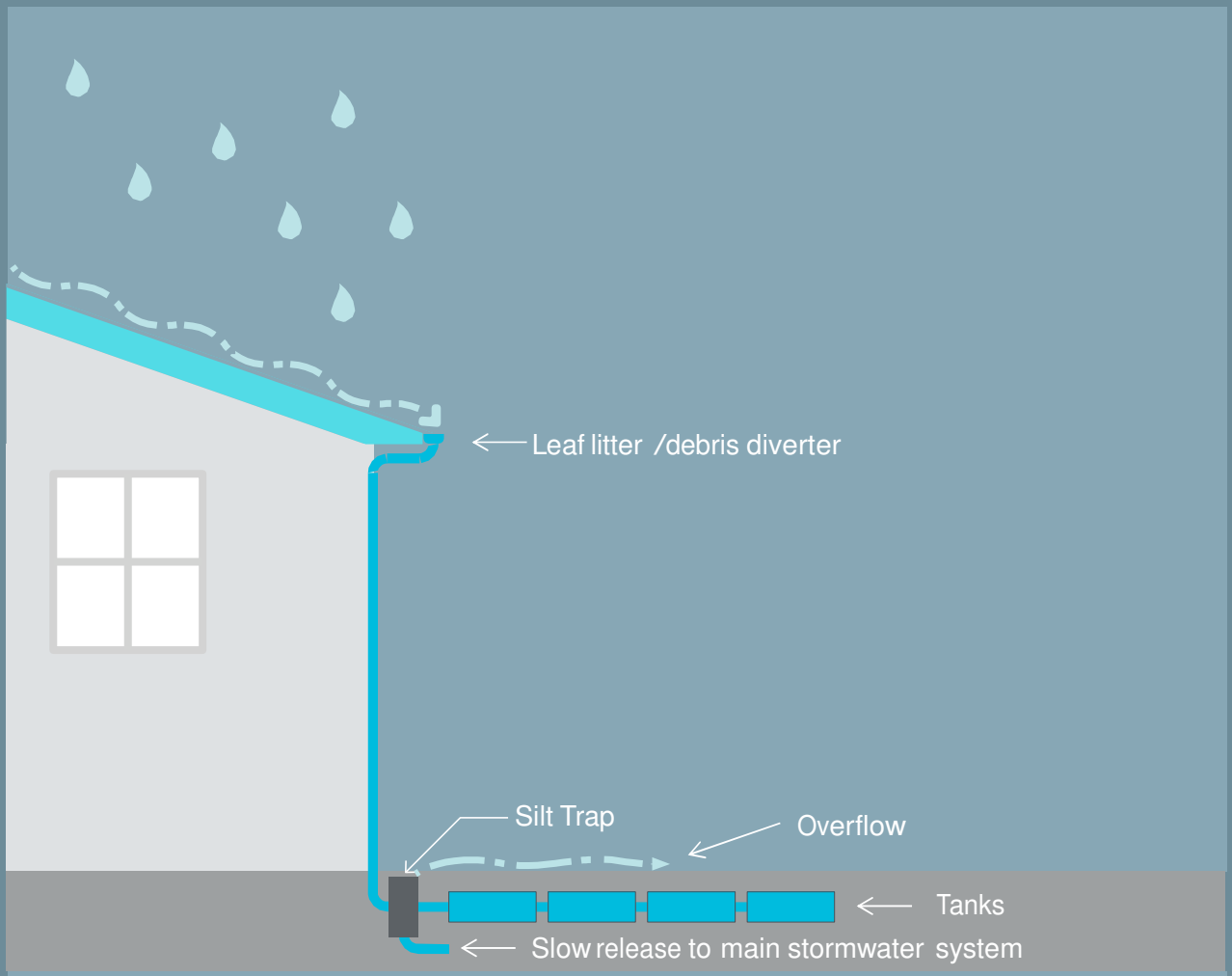
This solution is for modular tanks with a capacity of 350 litres – additional tanks are added to build up the storage capacity to the volume required to achieve hydraulic neutrality. The tanks lock together using connector pipes that allow stormwater to flow between tanks. Water will flow out of the tanks via an orifice and outlet pipe that will be connected to the stormwater network.

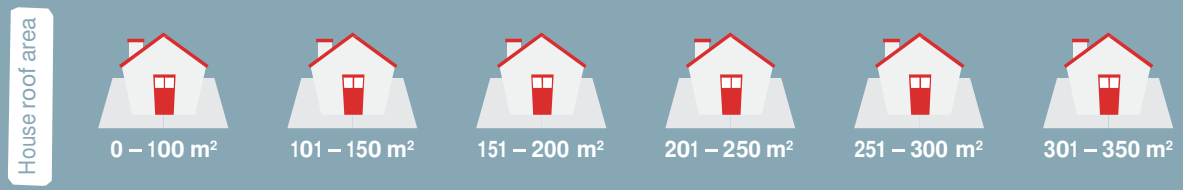
Approved Solution #2 requirements and limitations

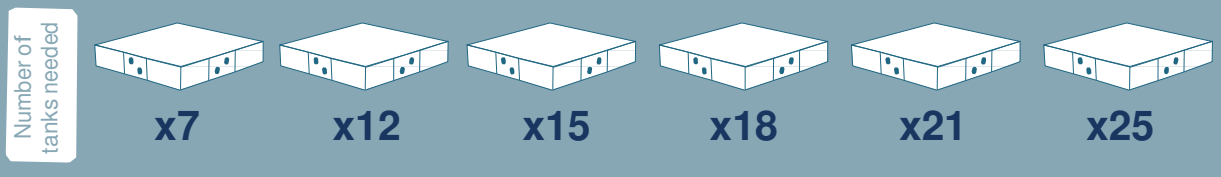
The basic requirements of all set-ups will be the same:

1. This solution is only applicable to lot sizes where the total impervious area is less than 350 m^2. Tanks can be used for larger sites; however modelling will need to be undertaken to determine the number of tanks and orifice size needed.
2. Runoff from no less than 80% of all new roof areas must be diverted to, and attenuated by the tanks.
3. You must have a leaf litter/debris diverter (or equivalent product) between your roof gutter and downpipes(s), or on the downpipe to your tanks.
4. A silt trap must be installed at the inlet to the tanks. This will reduce sediment build up within the tanks and allow for easy maintenance.
5. Overflow from the tanks should discharge via an appropriate and visible overland flow path to an acceptable outfall or public system. The overflow pipe must not be connected to the main stormwater system. This is to provide a visible indicator if your primary outlet is blocked.
6. This solution is acceptable for developments of 1 – 10 residential buildings. It may be considered as part of a wider solution to managing stormwater runoff in developments greater than 10 buildings, though full hydrological analyses of the development will be necessary. This is to ensure that stormwater detention devices are appropriately sized for the specific conditions of the local area and will consider the total impervious area within the development such as driveways, roads and footpaths.
7. The tanks must be installed in accordance with the manufacturer's specifications.
8. The orifice sizes specified in Table 2-1 have been calculated to ensure that stormwater discharges to the stormwater network at pre-development flow rates. As such, they must be adhered to. Any variation will mean that your solution does not fall within Approved Solution #2.
9. The outlet of the tanks must be free of backwater effects during a flood event and therefore must be at an elevation above the 100 year flood level at the point of connection to the public stormwater network. Please consult Wellington Water for details of the elevation of the stormwater network outside your property.

Approved Solution #2 – Stormwater Tanks







Modular storage tanks do not address increased runoff from sealed surfaces on your property. When you are developing your property we'd love you to consider this and minimise sealed surfaces where possible.

Wind and Seismic Restraint

As the tanks are located underground, or underneath structures such as decks, wind and seismic restraints are not required. Modular tanks are considered to be less prone to damage from these events than free standing tanks.

Table 2-1: Sizing your modular tank system

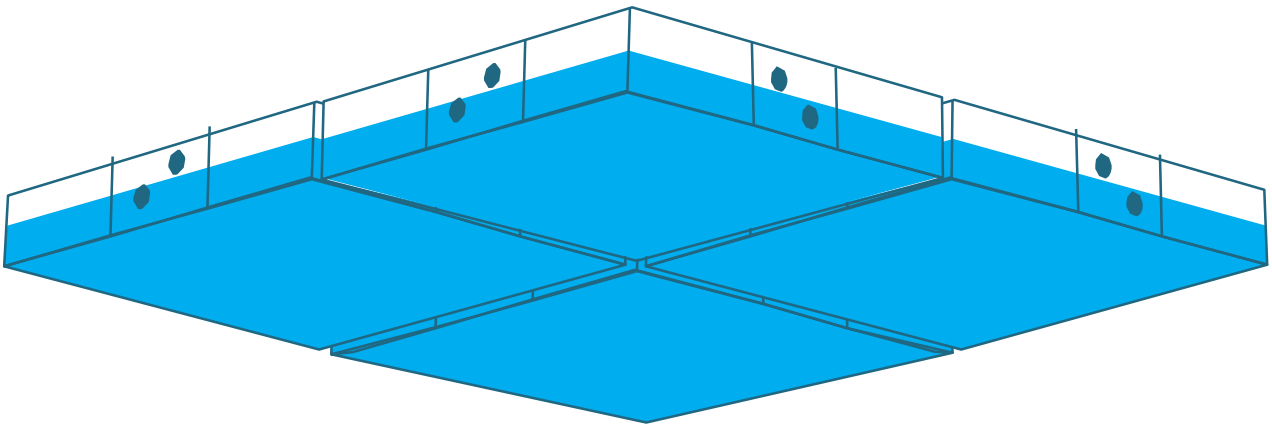
House roof area	Number of tanks needed	Orifice size
0 – 100 m^2	7	35 mm
101 – 150 m^2	12	41 mm
151 – 200 m^2	15	48 mm
201 – 250 m^2	18	54 mm
251 – 300 m^2	21	60 mm
301 – 350 m^2	25	64 mm

Emergency water supply

Additional tanks can be added to provide water retention for emergency water supply. Any tanks used for retention should be installed in such a way that the emergency water does not discharge to the stormwater network, and is regularly flushed. Please consult the manufacturer on the best way to achieve this for your set up. It is important that any tanks for emergency water supply are installed additional to the number of tanks required in Table 2-1.

We are all encouraged to store 20 litres of water per person per day for seven days. That is 140 litres for one person or 560 litres for a family of four. Two 350 litre modular tanks meet this requirement.

Following this seven day period community stations will be established to provide a centralised source of drinking water as it may take more than 100 days before the water supply network is repaired. Your tanks should have enough water to meet your immediate requirements. Your tanks will be topped up after every rainfall event, so in an emergency they may save you a trip or two to your community station.



Tanks Setup

If you decide to install modular storage tanks as your stormwater solution, the following considerations are standard set up requirements.

Have a flat and level site, free from rocks, stones or anything else that might damage the base of the tanks. You'll also want the site to be well compacted.

Ensure the overflow capacity equals or exceeds the inflow capacity (from your downpipes).

If you're adding tanks to use for emergency water supply then avoid any lead, chromium or cadmium products in any of your roof materials, soldering, flashings paint or any other part of your roof. Uncoated metal roofs can also pose a problem. Your roof should be painted with product suitable for drinking water supply.

You must install a leaf litter/debris diverter to divert debris away from your tanks, to prevent blockages.

A screen should be installed over your emergency overflow outlet/silt trap to reduce the likelihood of debris entering the silt trap and tanks.

The tanks must be installed by an approved installer

Maintenance

Your tanks will require some maintenance to prevent blockages and to ensure the water is clean. Please refer to the manufacturer's specific maintenance instructions. For optimal performance and clean useable water, it is likely that you'll be required to:

Clean your roof of animal droppings, pollen, ash and other organic matter. It is recommended you inspect your roof six-monthly, though depending on your location this may need to be done more frequently.

Remove leaf litter and debris from your gutters regularly. It is recommended you inspect your gutters every six months, though if you have lots of trees around your property you will need to do this more frequently. You may want to consider trimming back any overhanging vegetation or installing gutter-guards.

Wash out leaf litter/ debris diverters every few months. This should only take 10 minutes.

Inspect and maintain any mesh screens and filters annually. Likewise inspect and repair any seals, pipes and valves annually.

The silt trap should be inspected annually and vacuumed out when needed (usually no more than once every 10 years).

The tank installation and its function as an attenuation device will be recorded on the council property file. Altering the tanks from its intended use may result in a fine or restoration of its intended function.

Wellington Water

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