

# RAINTANKS IN AN URBAN SETTING RADICAL, REAL OR REVOLUTION?

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## ABSTRACT

Raintanks are becoming real in the urban setting. Some people see them as radical; a few see raintanks as simply too hard, or revolution. The majority see raintanks as sensible resource management.

Raintanks are one very effective method of avoiding the stormwater effects from impervious surfaces, particularly roof areas. Installing raintanks in the urban environment are now starting to occur, but not yet commonplace.

This paper outlines the evolution of raintank policy and installations in North Shore City. It particularly highlights the need for a cooperative, integrated approach across Council, because such a policy involves substantial change management. The paper also examines the reaction to raintanks from regular contact with those in the development community, and whether reactions are objective, plus responses from detractors.

Technical and non-technical issues, problems and similar matters encountered with development consents are also covered.

## KEYWORDS

**Raintanks, cause and effect, hydrological neutrality, urban, urbanisation, District Plan, green fields, trends.**

## 1 RRAINTANK APPROVAL POLICY – BACKGROUND

### 1.1 CAUSE AND EFFECT

Cause and effect drives policy. Observing the cause and effect associated with urbanisation proves that there is significant hydrological alteration of catchments. Urbanisation results in:

- (a) Greater stormwater runoff. There are limitations within most catchments to handle the extra runoff from the modified paved and hardened landscape.
- (b) Degradation of the environment, particularly the land/water environment in the lower catchment areas. The degradation is gradual and cumulative, although there can be severe impacts if rainstorms occur during the development.

### 1.2 EARLIER POLICY AND LEGISLATION

The 1970's – 1990's Urban Growth Strategies and policies did not envisage the trends which have emerged since the 1990's i.e.

- Significant, increased amounts of impervious surfaces within individual sections. These impervious surfaces cumulatively affect the bigger catchment, particularly the resulting stormwater runoff.
- Very large houses
- Multiple cars per household, up to 5 cars. As cars become cheaper, people purchase additional cars. These cars demand more hard pavements.
- Public transport has not evolved, whilst travel by private motor vehicles has increased.

- The desire for maximum capitalisation within a section, whilst at the same time preferring to ignore the effects, or a negligible effort to ‘avoid, remedy or mitigate’.
- Permissive, rather than regulation-orientated Councils.
- The complexity of consenting, and the associated managerial demands on regulators (Territorial and Regional Councils)

These matters were not foreseen when formulating District Plans. Neither were water resource management issues i.e. water conservation, water demand management, holistic water policies. These have not been factored into District Plans.

Stormwater practitioners in particular see raintanks as an effective tool to manage catchments, to offset many of the effects described previously in this text.

### 1.3 HYDROLOGICAL NEUTRALITY

The concept of hydrological neutrality is appropriate in sensitive ecological catchments and where protection of streams and natural water systems is required.

Councils Stormwater Disposal Policy which emphasises hydrological neutrality was adopted in August 2004. The policy (i) – (iv) is:

- (i) No increase in runoff flow rates above pre-development levels for 50% and 10% (50% and 5% AEP for commercial areas) AEP storms
- (ii) Minimal (generally less than 5% increase) in overall stormwater volumes above pre-development levels through on-site use.
- (iii) No decrease in the time of concentration below pre-development levels.
- (iv) Base flows in streams are maintained at pre-development levels.

‘Pre-development levels’ refer to levels that existed immediately prior to a subdivision, land use or building consent application being lodged and any physical work being undertaken on site.

Hydrological neutrality is very difficult to achieve in:

- (a) ‘Brown fields’ catchments
- (b) Certain commercial or industrial sites where the activity is a low water consumer. However high volume water industries (eg automotive) can reduce stormwater runoff volumes considerably and achieve a good degree of neutrality.

In those situations with considerable pavements, hydrological neutrality is not achievable.

### 1.4 IMPLEMENTING STORMWATER POLICY – CHANGE MANAGEMENT

Adopting and implementing a policy involves significant organisational change and behaviour. Aligning different disciplines within a big organisation is not an easy task. Change management involves many different disciplines developing an understanding of the stormwater management objectives and principles of both the regional and local Council. Coordination is required. The historic stormwater practices are easily taken for granted, or reverted to, but historic discharge practices are not always suitable, or are unsustainable.

Most important are Council Consenting areas, namely the following disciplines:

- Subdivision Officers and Engineers
- Planners
- Managers and Administration staff

- Development Engineers
- Building Officers
- Plumbing and Drainage Officers
- Building / Plumbing and Drainage Inspectors
- Monitoring and Compliance staff.

Councils policy also required that private building certifiers (who manage some building consent activity) must also adhere to the Councils requirements, and exercise the Outfall Protection requirements of the Building Code E1 7.0.

Change management in any organisation, and across a range of disciplines is radical.

## 1.5 RESPONSE TO POLICY

Everyone agrees that 'something must be done' to alleviate problems and address environmental problems, however not all are prepared to accept personal responsibility or source control.

Detractors to raintanks cite the following:

- There is a cost, generally between \$2000 - \$10 000, plus ongoing maintenance of the system
- A pump is a nuisance, makes a noise
- The raintank is an imposition within the site
- In order to avoid source control methods, respondents suggest that Council undertake a project elsewhere to address the problems, but respondents generally do not have enough technical knowledge to validate their assertions. Nor are respondents prepared to pay the true cost.

What must be appreciated is that there is a cost to protect the environment, individuals should be prepared to exercise personal and community responsibility, and that source control is generally a very effective method of avoiding effects.

## 2 TECHNICAL ISSUES

### 2.1 DESIGN CONSIDERATIONS / DESIGN CAPACITY

Raintank systems require design considerations at the earliest stage of a development i.e. position tank in cool south facing area, close to plumbing arrangements, e.g. under decks, ensure good access for operations and maintenance etc.

Unfortunately most drainage situations are considered as an after thought, and therefore raintanks can be difficult (or impossible) to integrate. After-thought design results in sub-standard outcomes.

As a very general guide, the following raintank sizes are being adopted:

- A 3m<sup>3</sup> tank for 150m<sup>2</sup> house in areas where detention (i.e. stormwater pond) is part of the Council infrastructure
- Up to 7.5m<sup>3</sup> tank per 150m<sup>2</sup> house where no off-site mitigation system exists

### 2.2 LIFECYCLE AND INTER RELATIONSHIP OF VARIOUS CONSENTS

Many developments will be subject to a series of resource consents, not just a building consent. Project Management of consents is necessary, but consents are often not seen in a project management context.

## **2.3 PLUMBING AND DRAINAGE**

The plumbing associated with raintank involves hydraulic plumbing design, understanding of polyethylene systems and correct workmanship, pumping systems, valves, and backflow prevention systems to eliminate any cross connection to the reticulated 'town water' supply. These technical areas are not taken seriously enough. A system diagram i.e. schematic should be included in the building consent documentation.

## **2.4 SATISFACTORY COMPLETION AND PRODUCER STATEMENT 4 (P.S. 4)**

Council often accepts a Producer Statement 4 from a suitably qualified Engineer as a means of ensuring that the system is satisfactory and complete. However the PS 4 is not proving to be a guarantee of a satisfactory outcome.

## **2.5 FIELD INSTALLATIONS**

The private building sector interprets consent requirements in many different ways. Sometimes the drainage related systems are treated as an afterthought. This compromises good outcomes. Often the cheapest arrangement will be chosen, resulting in less efficient systems, noisier type pumps etc.

## **2.6 MAINTENANCE AND OPERATION (AFTERCARE) OF RAIN TANK SYSTEMS**

The maintenance and operation is an implicit condition of a building consent. Whether systems are effectively systems maintained and operated is unknown. This is an area which requires some monitoring by Councils.

Under the Building Act 2004, consent authorities must take into account whether the maintenance arrangements are reasonable. This is stated in the Purpose and Principles of the Act. Therefore the maintenance aspects must be assessed as part of consenting.

# **3 NON-TECHNICAL ISSUES**

## **3.1 TANKS IN LIVING COURTS / AMENITY AREAS IN SECTIONS**

Many planning rules require that living courts be unobstructed. Hence raintanks over a certain size and height, generally 1 metre, may trigger a resource consent.

## **3.2 SALE AND PURCHASE AGREEMENTS – NON DISCLOSURE**

Problems arise when purchasers of sections are not advised of raintanks requirements being a condition of subdivision, or that Council requires a rainwater harvesting tank with water re-use to achieve hydrological neutrality

## **3.3 TRENDS / LIFESTYLES**

Trends frequently lean towards a convenient but unbalanced approach i.e. maximum footprint, whilst at the same time ignoring the runoff effects of the impervious footprint. Maximum footprint / minimum mitigation is generally pursued, placing great demands on stormwater engineers.

### **3.4 ACHIEVING PLANNING AND POLICY OBJECTIVES**

Building consents are the critical meeting points to ensure implementation of most Council Objectives and Policies, and in fact the majority of urban initiatives. This is not well understood.

## **4 ASPECTS OF LEGISLATION**

### **4.1 BUILDING ACT 2004**

The purpose and principles of the Act are pertinent in terms of sustainable management and water management for buildings. A raintank with associated recycling of water provides an acceptable solution in terms of the building code.

### **4.2 PROJECT INFORMATION MEMORANDUMS (PIMS) FOR BUILDING CONSENT**

A PIM prepared by the Consent Authority must be obtained prior to obtaining a building consent under s.34 and s.35 of the Building Act 2004. PIM's highlight Council-related issues, special requirements, advise of limitations relating to Council Infrastructure, and also meeting other aspects of law.

S.35(d) of the Act covers stormwater utility systems.

### **4.3 DISTRICT PLAN - DISCRETIONARY ACTIVITIES**

With discretionary activities in District Plans, Council can consider all the effects arising from the development proposal.

Hence in discretionary cases, Council can request raintanks as a condition in order to reduce adverse effects elsewhere. An example of a condition to reduce discharges would be: harvesting rainwater and using the collected water solely for landscape irrigation and car washing, in lieu of using the City's drinking water supply for those purposes.

## **5 CONCLUSIONS**

Raintanks are seen by the majority of customers encountered in a Council environment as mildly radical, but realistic for a moderate to high rainfall climate. Some have difficulty in accepting raintanks because utilising raintanks as a method of stormwater management is not the traditional development approach in towns or cities. However in today's world there is a real need for sustainable management thinking and practice, rather than convenience and gratification.

Managing stormwater in a sustainable way continues to be challenging, particularly in everyday consenting situations. Consents are in reality the meeting points of most objectives, policies and goals. And the critical time for their implementation. Serious assessment of building consents in particular is important.

In a consumer-orientated world that desires convenience and resources at the cheapest price, raintanks are revolution. Like many natural resources, water continues to be undervalued until times of crisis.

Implementing raintank-friendly policies in a large organisation with many ‘players’ could also be considered revolution.

## **REFERENCES**

Building Act 2004, Public Act 2004 No. 72, NZ Government, Wellington NZ

Approved Document for New Zealand Building Code Clause E1 Surface Water, Building Industry Authority 2001, Wellington NZ