CODE OF PRACTICE

EUROBODALLA SHIRE COUNCIL

Good Government, better living

Code Title: **DESIGN GUIDELINES FOR RAINWATER TANKS WHERE AN EXISTING RETICULATED WATER SUPPLY EXISTS**

Reason for Code: The introduction of mandatory rainwater tanks on all new developments and major additions, and a rainwater tank rebate scheme for retrofitting tanks on existing developments, were introduced to meet the goals of the adopted option of the Integrated Water Cycle Management Strategy (IWCMS). This has created the need for a document that explains the specific details required for Council approval and compliance. The document will address the use of rainwater as an alternative water source in urban areas, design and construction requirements for rainwater tanks and associated infrastructure, and the documentation required.

There are two reasons why rainwater tanks are being encouraged for use in urban areas:

1. they reduce water demand; and
2. they reduce stormwater discharges.

Introduction: Through the development of the IWCMS, modelling has demonstrated that the introduction of 10 kilolitre (kL) rainwater tanks would provide considerable environmental and social benefits by reducing the demand on Council's water supply and the impacts of urban stormwater discharges.

The use of rainwater tanks as an alternative water source where a reticulated potable water supply exists requires careful consideration by the consent authority. NSW Department of Health (DOH) and the Committee on Uniformity of Plumbing and Drainage Regulations in NSW (CUPDR) have provided advice and guidelines for the use and installation of rainwater tanks in urban areas through circulars and the NSW Code of Practice for Plumbing and Drainage.

This Code of Practice outlines:

1. recommended uses of rainwater;
2. design and installation requirements to ensure that:
   (a) systems meet their intended purposes;
   (b) they do not generate undue risk of damage to property or infrastructure or create hazardous situations; and
   (c) negative social impacts are minimised;
3. documentation requirements for Council approval and compliance; and
4. maintenance and operation responsibilities and recommendations.

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Details: The Code details include:

Sustainable Water Supply

Whilst the provision of rainwater tanks does not provide all the answers to the supplementation of water supply, it will go a long way to support Council's intent - to provide a sustainable water supply to those areas of the community that are serviced by reticulated water.

Rainwater is a valuable natural resource that should be better utilised by urban communities. The widespread use of rainwater collection systems is a highly efficient means of capturing and storing water for domestic and commercial use, and provide numerous potential benefits to the community and the environment, such as:
1. reduced demand for water from local river systems, thereby making more water available for other downstream users and assisting in maintaining natural flow regimes;
2. reduced effects of urban stormwater discharges on local waterways;
3. reduced water bills;
4. reduced frequency of Shire water restrictions; and
5. increased awareness of water conservation and sustainable water use.

Objectives for Rainwater Tank Installation

These are:

- to satisfy ecologically sustainable development principles;
- to provide maximum cost benefit to the owner;
- to provide maximum water conservation benefit to Eurobodalla's reticulated water supply;
- to minimise the risk to public health from the use of rainwater;
- to ensure that excess water is dealt with in an appropriate manner;
- to ensure tanks and stands are of structurally sound construction and do not create hazards;
- to provide stormwater management benefit; and
- to ensure that tank design and location does not impact on the amenity of the locality - including noise nuisance, overshadowing, visual aspect and heritage values.

Use of Non-Potable Water From Rainwater Tanks

Clause 1: Recommended Uses

The NSW State Government, through the CUPDR has issued the following advice regarding rainwater use in areas with a reticulated water supply, and should be considered when installing a rainwater tank:

"A rainwater collection system can provide water for a number of uses including the following:

- *Toilet/urinal flushing;*
- *Clothes washing machines;*
- *Hot water systems;*
- *Garden irrigation;*
- *Car washing and similar outdoor use;*
- *Filling ornamental ponds;*
- *Filling of swimming pools and spas;*
- *Fire fighting (subject to the requirements of AS 2419.1, 2118 and 2441).*

Some consumers in single domestic premises may also wish to use rainwater for all domestic purposes including drinking, cooking and bathing.

Should consumers wish to use rainwater for all domestic purposes, it is particularly important that they are made aware of the advice in NSW Health Guideline GL2007_009 of June 2007, which in part states:

"A properly maintained rainwater tank can provide good quality drinking water. NSW Health strongly advises householders, councils and developers to ensure that an adequate system of cleaning and maintenance is in place where rainwater is used for drinking.

People who choose to use rainwater for drinking and cooking should be aware of potential risks associated with microbiological and chemical contamination. Rainwater tanks in urban areas can be contaminated with air borne contaminants from heavy traffic, smelters and heavy industry.

Rainwater tanks can also be contaminated from roof or plumbing materials or with bacteria from bird or animal droppings.

In urban areas, NSW Health recommends that people use the public water supply for drinking and cooking because it is filtered, disinfected and generally fluoridated. The quality of public water supplies is regularly monitored.

Premises that serve the public or employees and use rainwater for drinking and/or cooking should comply with NSW Health's Private Water Supply Guidelines."".

Requirements of Design

Clause 2: Tanks

2.1 All tank construction is required to comply with relevant Australian/New Zealand Standards that apply to tanks and their associated fixtures and fittings (See Appendix 1).

Rainwater tanks are available in a range of suitable materials including galvanised, aquaplate or zincalume steel; fibreglass; plastic; and concrete.

2.2 For new developments, tank capacity is to be as determined by BASIX or any other water conservation/stormwater management policy that applies to the development. For relocatable homes that are to be installed on land other than a caravan park, given BASIX does not apply to these dwellings, a minimum 10kL tank is required to be installed and connected to, at a minimum, all toilets, washing machines and external taps.

For retrofitting of tanks on existing buildings, the property owner should select the most appropriate tank size based on the anticipated use of the tank, roof area and space available.

Advice on appropriate tank sizes can be found in HB 230-2006 – Rainwater Tank Design and Installation Handbook.

2.3 All tanks and associated structures, including stands, shall be installed in accordance with manufacturers/designers specifications and are required to act independently of all other structures. Tanks and associated structures shall not rest on footings of buildings or rely on walls (including retaining walls) for support unless integrated with the building design and approved by a structural engineer. Council may require certification from a structural engineer of the stability of a tank.

Clause 3: Tank set-up

3.1 The tank is to be enclosed and inlets screened, so as to prevent the entry of foreign matter and to prevent mosquito breeding.

3.2 Tanks being used to provide internal supply must ensure a reliable back up supply for the connected fixtures is available from the mains water system. This should be done by one of the following ways:
(a) with an indirect connection via an automatic mains water topup
(b) with a direct connection via an automatic mains water/rain water diversion valve
(c) With a dual feed system to toilets and/or washing machines.

3.3 The tank capacity is to include:
(a) a minimum storage volume;
(b) a rainwater storage volume; and
(c) an airspace for additional stormwater management (See Figure 1).

3.4 For a mains water topup system, the minimum storage volume is to be supplied by mains water. Mains top up should not occur until the tank is at least 80% empty. The minimum storage volume to be provided should consider the intended use of the tank water and maximum anticipated tank demand and the top up rate (refer Clause 3.6) to ensure reliability of supply and pump protection.

3.5 The mains top up is to be restricted to an indirect connection. The indirect connection shall be by means of a visible "Air Gap", in accordance with the provisions of the National Plumbing Code, AS/NZS 3500 Part 1 2003 - Minimum Air Gap Requirements (see figure 2).

3.6 The maximum size of a potable water supply pipe used for "topping up" shall be 20mm diameter and requires a flow restrictor. For single residential developments, the flow rate should be restricted to, if possible, 2 litres per minute. If this is not possible, flow rates of 4 or 6 litres per minute will be permitted.

For new dual occupancy or multi occupancy developments where the tank services more than one dwelling, the flow rate should be restricted to a maximum of 2 litres/minute times the total number of dwellings connected to the development.

Ensuring reliability of supply and pump protection through selection of appropriate minimum storage volume, topup rate and use of water from the tank if choosing to install tanks smaller than 10kL or for uses greater than those recommended in Clause 1 of this document are the responsibility of the owner. Guidance on the selection of appropriate minimum storage volumes, tank sizes and topup rates in these instances is included in Appendix 2.

3.7 Automatic three way diversion valves/bypass systems shall have WaterMark certification in accordance with the Standards listed in AS 5200.000 or authorisation under the Plumbing Code of Australia.

Clause 4: Inlet Pipes

4.1 Water from roof areas only is to be directed to the system. The proportion of roof area directed into tanks for new buildings is to be in accordance with BASIX requirements or any other planning or building control that applies to the development. For relocatable homes that

are to be installed on land other than a caravan park, given BASIX does not apply to these dwellings, then a minimum of 90% of the roof area of the home and all associated structures is to be captured and directed into the tank.

For retrofitting of tanks on existing buildings, as much of the roof area as possible should be captured.

Wherever possible all sections of inlet pipe should flow into the top of the tank. If it is necessary to include rising sections the design will require a method of bleeding off trapped water (see item B figure 3) to prevent the formation of stagnant water in pipes between storm events. In systems with rising sections, pipework from downpipe to tank is to be a minimum of 100mm diameter class 12 and be capable of resisting pressure heads imposed by the system. Where one or more downpipes enter a main line, the main line is to be increased to a minimum 100mm diameter, unless otherwise specified by a hydraulic engineer as resisting pressure heads imposed by the system. An approved proprietary screened downpipe rainhead device (eg Leaf Eater or similar) shall be installed on each downpipe. Recommended screen mesh to be 4 to 6mm and designed to be self-cleaning. Figures 3 and 4 show typical arrangements and requirements of inlet piping for above and below ground tanks.

4.2 Inflow to the rainwater reuse tanks is to include the provision of a first flush device with a capacity of 0.2 litres per square meter (20L/100m^2) of roof area. The outlet of the first flush device is to be directed to a landscaped area via an irrigator hose and drip irrigator or an absorption pit, which are to be located a minimum of 2 metres from any buildings, tanks or property boundaries. The first flush device must be accessible for routine maintenance and cleaning purposes.

The basic design features and required sizes of a floating ball first flush system and absorption pit are shown in Figure 5 and Table 1.

Clause 5: Overflow Water

Overflow pipes from tanks shall be 100mm minimum diameter and designed in accordance with AS3500.1 2003. Tanks with 90mm diameter outlets can be modified with uni seal rubber grommets. The outlet should divert excess water away from tank foundations, buildings or other structures. Provisions should be included for vector proofing. This can be done with a flap if 100mm gauze is not available. Wherever possible, the overflow is to be piped to the kerb and gutter by gravity feed. Where this is not possible, a plan prepared by a suitably qualified person, detailing an alternative treatment method, is to be submitted to Council for consideration.

For below ground tanks, the tank overflow must discharge to a surcharge pit prior to the nominated discharge point (see Figure 4). The top of this surcharge pit must be a minimum of 150mm below the invert of the tank overflow outlet pipe. If this cannot be achieved, a reflux valve is to be installed as close to the tank as possible, and a rainhead device or similar is to be installed on each downpipe to avoid surcharge into roof gutters.

For retrofitting tanks on existing buildings, overflow from the tank is to be directed into the existing stormwater disposal system, unless otherwise approved by Council.

Clause 6: Reticulation

The conceptual layout for the arrangement of pipework and ancillary devices from the water meter and the rainwater tank to the dwelling for rainwater tank systems with a mains water topup or automatic diversion valve are depicted in figures 6, 7 & 8. For information on dual feed systems, see AS/NZS 3500.1:2003 Figure 14.1.

Clause 7: Backflow Prevention

Backflow prevention is required to prevent cross contamination and to protect the Council mains water supply. Details of required backflow prevention is to be in accordance with the NSW Code of Practice for Plumbing and Drainage.

For systems that have an indirect connection with the mains supply via a mains water topup only (Figure 6), a dual check valve and strainer are required at the property boundary (containment protection) for all tank installations. For above ground tanks, provided the water meter at the property boundary has a dual check valve, no further backflow prevention is required. For below ground tanks, a further dual check valve and strainer must be provided on the topup system (see Figure 2).

Systems that have a direct connection with the mains water supply (Figures 7 & 8) require containment protection (at the property boundary water meter) and zone protection (at the connection point of rainwater and mains water supply). The level of protection required is dependent on whether the tank is above ground or below ground. All tanks require, at a minimum, a non testable dual check valve for zone protection. For containment protection, above ground tanks require a dual check valve, whilst tanks that are either fully or partially buried require a non testable *vented* dual check valve at the water meter.

A dual check valve and strainer may already be fitted as part of the water meter. For properties with 20 or 25mm meters that don't already have a dual check valve, where one is required, Council will replace the meter free of charge. Any backflow prevention required for containment protection beyond a dual check valve, including a vented dual check valve, must be installed on the property side of the meter at the cost of the property owner. Any backflow prevention required for containment protection for properties with water meters 32mm or above must be installed on the property side of the meter, at the cost of the property owner. All backflow prevention required for zone protection must be installed at the cost of the property owner.

If testable backflow prevention devices are used, they shall be fitted, maintained and tested in accordance with AS/NZS 3500.1:2003 Section 4 at the cost of the property owner. All testable backflow prevention devices must be registered with Council.

Clause 8: Pumps

Pumps must not create a noise problem and must be housed so that they cannot be heard in a habitable room of any other residence.

A habitable room means any room other than a garage, storage area, bathroom, laundry, toilet or pantry in a dwelling, whether or not the windows or doors are open or closed. Approved systems are obligated to meet the requirements of the Protection of Environmental Operations (Noise Control) Regulation 2000.

Documentation Requirements

Clause 9: New Dwellings

Approval of a Development Application (DA) for a dwelling will require information to be lodged for the installation of a rainwater tank. In assessing the suitability of an installation, Council will take into account aesthetic considerations with regard to location, material of construction, and colour scheme. It is suggested that colour schemes should be compatible with that of the main dwelling or trim.

Plans to be submitted with a development application

9.1 A concept plan for the rainwater reuse system is to be provided which shows:

- Site layout;
- Ground levels;
- Tank location and size;
- Hatching to show roof areas connected to the rainwater tank;
- Downpipe locations;
- First flush pit size and disposal; and
- Surcharge pit locations and spot heights for overflow.

An example concept plan is shown in Figure 9.

9.2 A separate plan, based on that above, showing only property boundaries, ground levels and the building location (see Figure 10), such that all "Works as Executed" details can be added and included in the occupation certificate application.

Plans to be submitted with application for an occupation certificate

9.3 A Works as Executed schematic plan showing the tank location, stormwater drainage and non-potable cold water reticulation to the building and tank. The blank concept plan submitted with the development application can be used for completion of this plan

9.4 A completed Works as Executed standard tank detail as provided as Figures 11 and 12 of this document.

Clause 10: Existing Dwellings

For retrofitting rainwater tanks on existing dwellings, a development application is not required provided the proposed rainwater tank satisfies the criteria for Exempt Development as set out in *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (See Appendix 3).

For installations where the tank is connected to internal uses such as toilets or washing machines or requires an indirect or direct connection with the mains supply, a permit application for plumbing and drainage works for the tank installation, and a schematic plan showing all the details of the proposed tank installation, must be submitted to Council before installation can begin. A "Works as Executed"

schematic plan and tank detail, as per Clauses 9.3 and 9.4 above, are to be submitted on completion of the installation.

Installation Requirements

Clause 11: Construction standards

11.1 All works are required to comply with the Building Code of Australia and relevant Australian Standards. It should be noted that installations in bushfire prone areas are required to comply with AS3959.

11.2 All electrical work is to be carried out by a licensed electrician.

11.3 All plumbing work is to be carried out by a licensed plumber.

11.4 Installation and materials shall be in accordance with AS/NZS 3500.

11.5 Marking and labelling of rainwater services shall be in accordance with the following:

Above ground distribution pipes shall be continuously marked "RAINWATER" in accordance with AS1345. Alternatively, pipes can be clearly labeled "RAINWATER" with adhesive pipe markers made in accordance with AS1345.

Below ground rainwater pipes shall be continuously marked "RAINWATER" in accordance with AS1345. Alternatively, identification tape/pipe sleeve continuously marked "RAINWATER" made in accordance with AS2648 can be used.

Every rainwater tank outlet and all taps, valves and rainwater tank apertures shall be identified as "RAINWATER" with a sign complying with AS1319 or a green coloured indicator with the letters "RW". Alternatively, a permanent sign, at the front of the premises and visible to all visitors, may be displayed advising that rainwater is in use.

Identification tape marked "RAINWATER" shall be at least 75mm wide. The identification tape shall be installed on top of the rainwater pipeline installed within the trench, running longitudinally, and fastened to the pipe at not more than three metre intervals.

Separation between above ground rainwater services and any parallel potable water supply must be a minimum of 100mm.

Below ground rainwater services must be separated by a minimum of 300mm from any parallel potable water supply pipe.

Work as executed drawings are to be submitted to Council upon completion as per Clause 9.3, 9.4 and 10, and will form part of Council's documentation process for the registration of rainwater tank systems.

Maintenance Requirements

In order to ensure consistent water quality and reliability of supply, it is essential for regular maintenance to be carried out. **Maintenance and operation of a rainwater tank and all associated infrastructure such as downpipes, roof and roof gutters, first flush devices, topup systems and pumps, and the quality of the water supplied from a tank, are the responsibility of the owner, not Council.** The primary focus of maintenance procedures should be to keep all components clean and to minimise the risk of contamination/rubbish either entering or remaining in rainwater tanks. A maintenance program should consider the rainwater catchment (roof area and gutters), downpipes, inlet screens and first flush/bypass devices, tank structure, tank desludging and tank cleaning. Particular care with monitoring and maintenance is needed if intending to drink water supplied from a rainwater tank.

Recommended monitoring and maintenance procedures and schedules and preventative measures and corrective actions are attached in Appendix 4. Routine monitoring and maintenance should be undertaken by the property owner in accordance with this maintenance schedule and the documents referenced below.

Useful References

Further information on tank installation and use, potential health risks associated with rainwater tanks, and recommended tank maintenance can be obtained from the following sources:

Rainwater Tanks brochure produced by NSW Health. http://www.health.nsw.gov.au/publichealth/environment/water/rainwater.asp

Guidance on use of rainwater tanks, May 2004, published by the National Environmental Health Forum. http://enhealth.nphp.gov.au/council/pubs/documents/rainwater_tanks.pdf

Rainwater Tank Design and Installation Handbook published by Standards Australia. www.arid.asn.au

Definitions and Acronyms

Above ground rainwater tank	A tank collecting roofwater only that is either fully above ground or at least half the tank is above ground and the view of and access to the inlet pipe, air gap and overflow pipe are unobstructed.
Backflow prevention	Prevention of the reverse flow of water from a potentially polluted source into the drinking water supply system.
BASIX	Building and Sustainability Index – a web-based design tool introduced by the NSW State Government that is compulsory for residential developments in NSW. It ensures new residential dwelling design meets the NSW Government's targets for reductions in water consumption and greenhouse gas emissions.
Below ground rainwater tank	A tank collecting roofwater only that is either fully or paritally underneath the ground, or the view of and access to any one of the air gap, inlet pipe, or overflow pipe is obscured by the ground or something similar eg. rockery or garden bed.
Direct Connection	Occurs where a pipe containing water from Council's reticulated supply is directly connected into a tank or pipe containing water from a rainwater tank
Double check valve	A testable device to prevent backflow which incorporates two independently operating force loaded non return valves and incorporates specific test points for in-service testing.
Dual check valve	A non-testable device to prevent backflow which incorporates two independently operating force loaded non return valves. Not to be confused with a double check valve, which is a testable device.
First flush device	Device that diverts the initial runoff from any rain event away from the tank to minimise the amount of pollutants accumulated on the roof from entering the tank.
Indirect connection	Indirect connection occurs between a rainwater tank and the Council water supply when the outlet of a pipe containing drinking water from the Council reticulated supply is separated from the water in a rainwater tank by a visible air gap.
IWCMS	Integrated Water Cycle Management Strategy – Council document that defines Council's recommended options for providing water supply, sewerage and stormwater services for the next 30 years.
kL	Kilolitre (1,000 litres)
Potable water	Water suitable for drinking.
Rainwater	Water collected from the roof of a building only.
Reticulated water supply	Water supplied to properties from Council infrastructure.

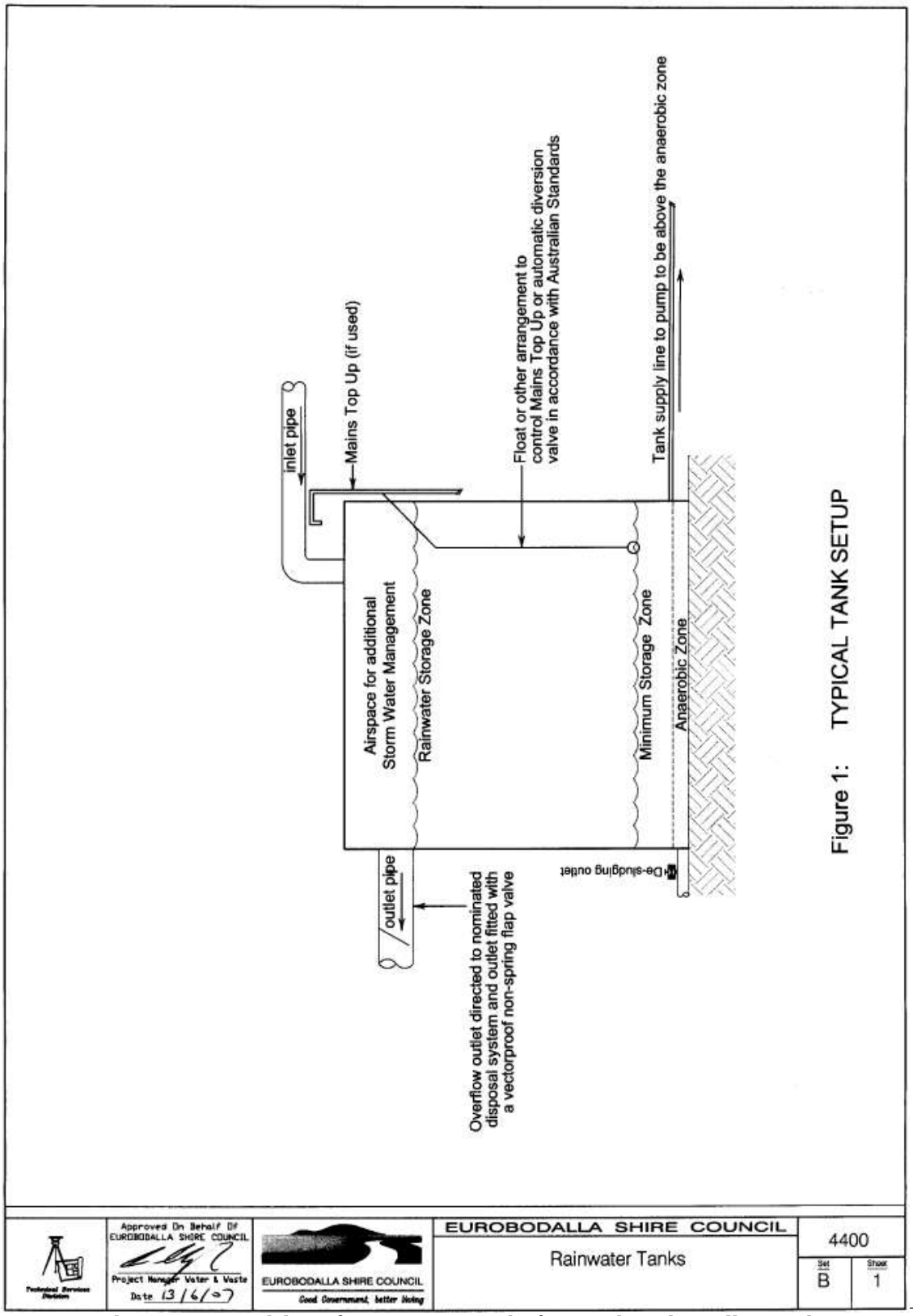
Top up system System by which the minimum storage volume in a tank is maintained by the slow filling of the tank from Council's reticulated water supply. It is designed to minimise effects on the reticulated system and allow for a reasonable re-supply into the tank over a period of several hours.

Vented Dual Check Valve A non-testable dual check valve with a ventilation valve which can be force-loaded to the open position when the supply pressure is both at atmospheric and 20% less than the downstream pressure.

Visible air gap

The unobstructed vertical distance between the lowest opening of a water service pipe or fixed outlet supplying water to a fixture or receptacle and the highest possible water level of such fixture or receptacle.

Figures and Drawings



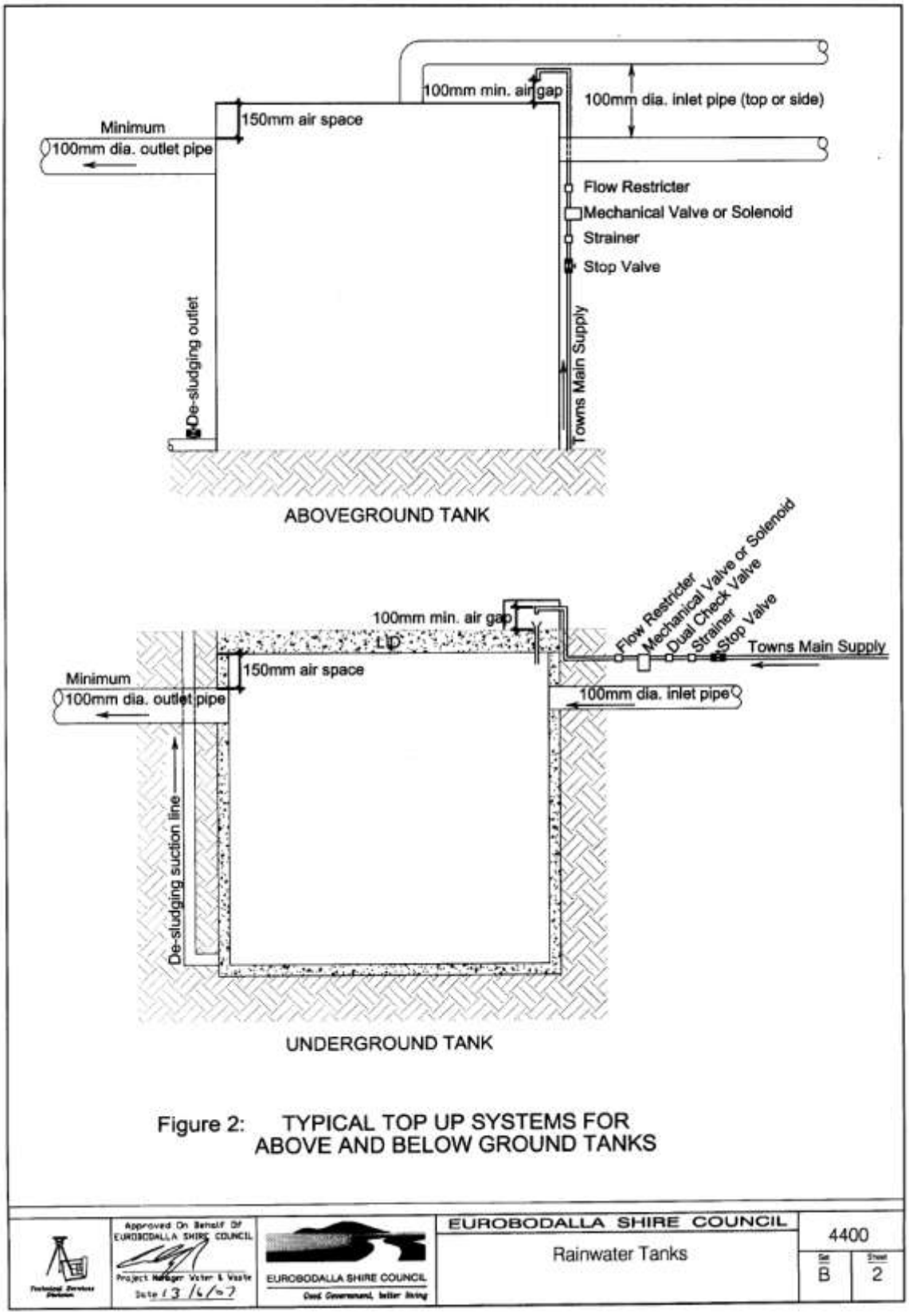
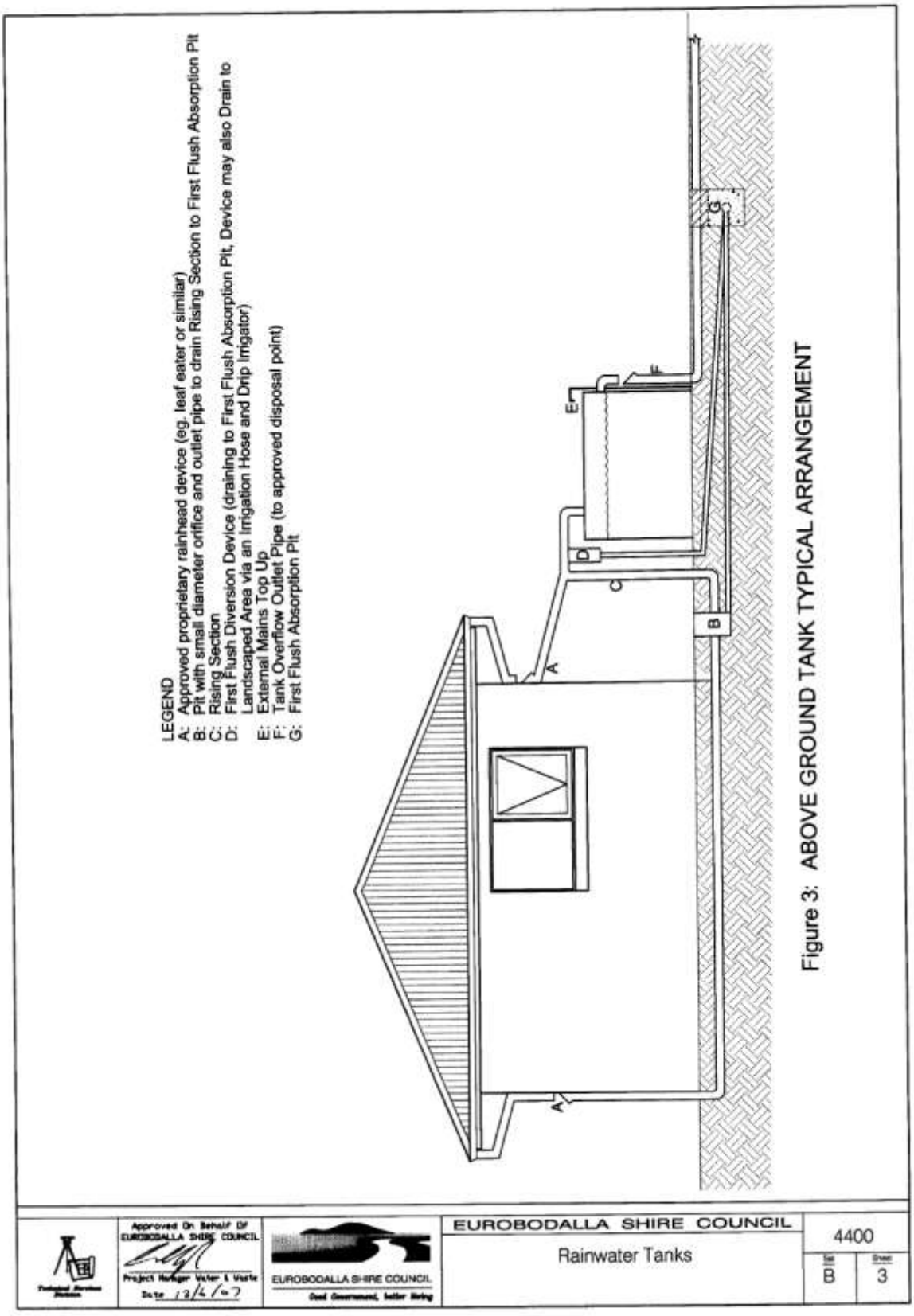


Figure 2: TYPICAL TOP UP SYSTEMS FOR ABOVE AND BELOW GROUND TANKS


LEGEND
A: Approved proprietary rainhead device (eg. leaf eater or similar)
B: Pit with small diameter orifice and outlet pipe to drain Rising Section to First Flush Absorption Pit
C: Rising Section
D: First Flush Diversion Device (draining to First Flush Absorption Pit, Device may also Drain to Landscaped Area via an Irrigation Hose and Drip Irrigator)
E: External Mains Top Up
F: Tank Overflow Outlet Pipe (to approved disposal point)
G: First Flush Absorption Pit
Figure 3: ABOVE GROUND TANK TYPICAL ARRANGEMENT
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Project Manager Water & Waste
Date 13/4/07
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Sheet 3

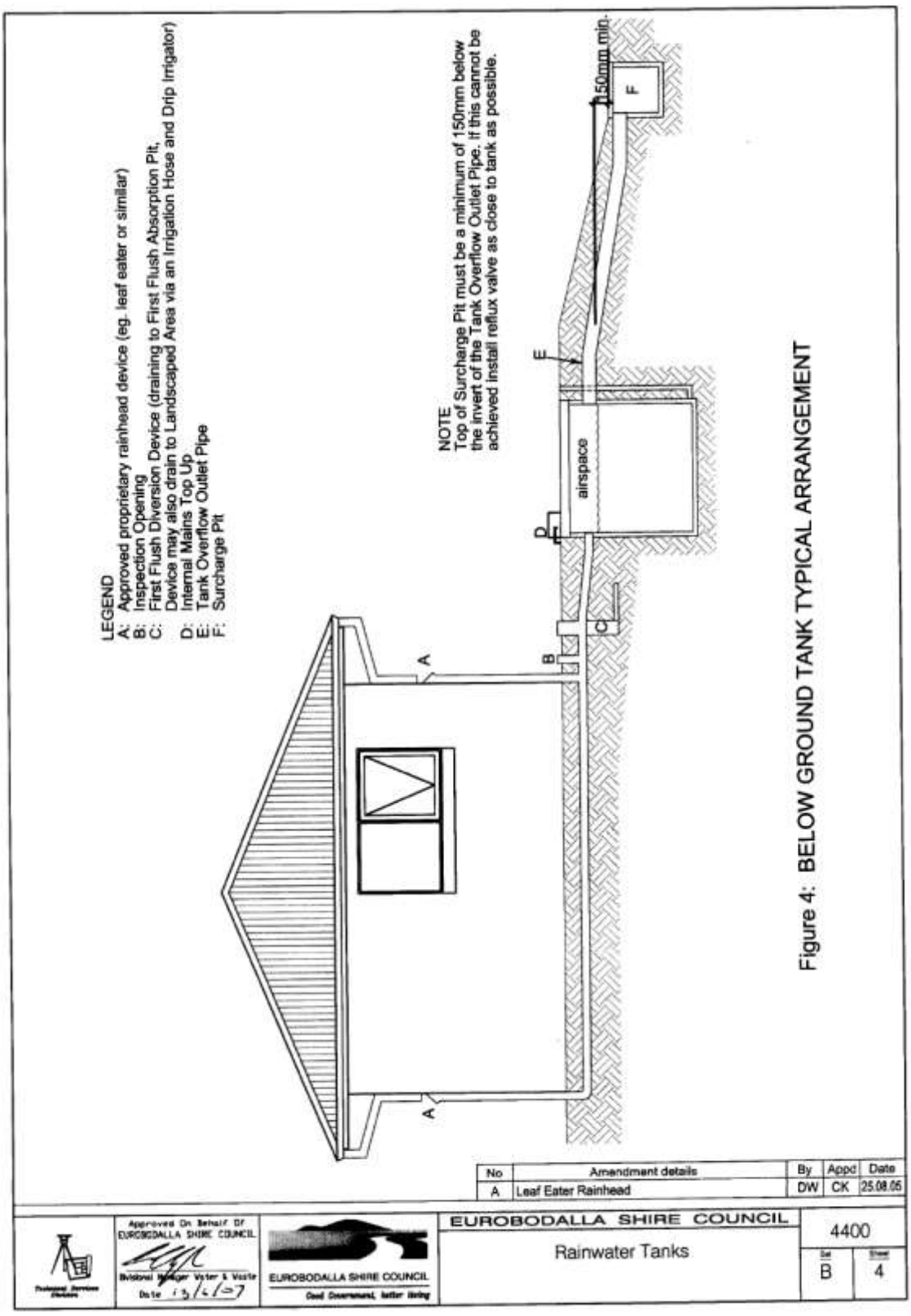
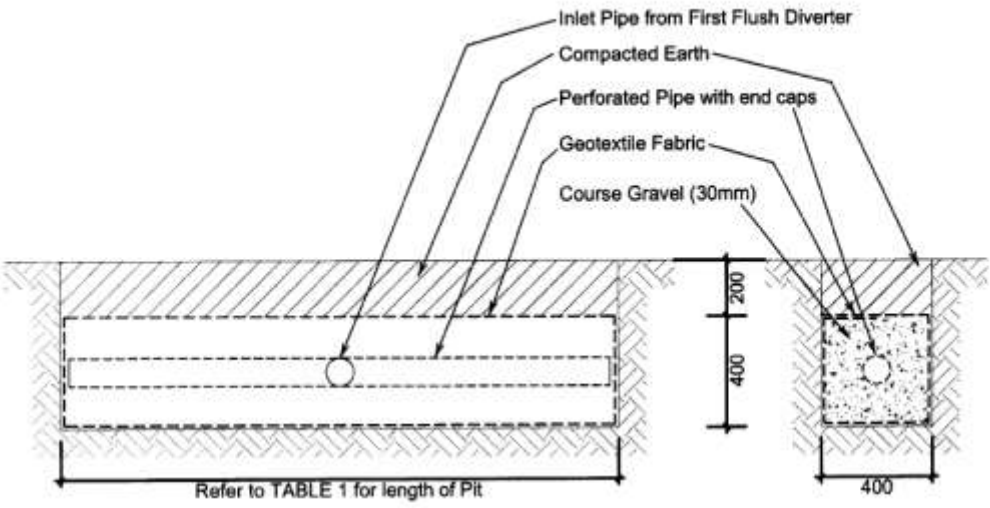


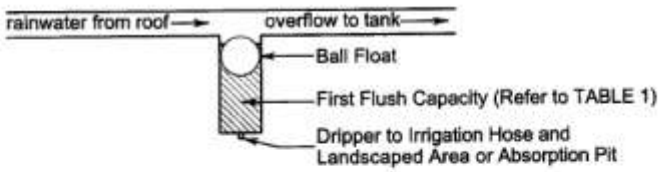
Figure 4: BELOW GROUND TANK TYPICAL ARRANGEMENT



ABSORPTION PIT DETAILS FOR FIRST FLUSH DISPOSAL
NOTE: Not for Tank Overflow Disposal

ROOF AREA (m2)	FIRST FLUSH DEVICE CAPACITY (litres)	ABSORPTION PIT LENGTH (meters)
100	20	0.4
150	30	0.6
200	40	0.8
250	50	1.0
300	60	1.2
350	70	1.4

TABLE 1



TYPICAL FIRST FLUSH
DIVERSION DEVICE

Figure 5: FIRST FLUSH DEVICE and ABSORPTION PIT DETAILS

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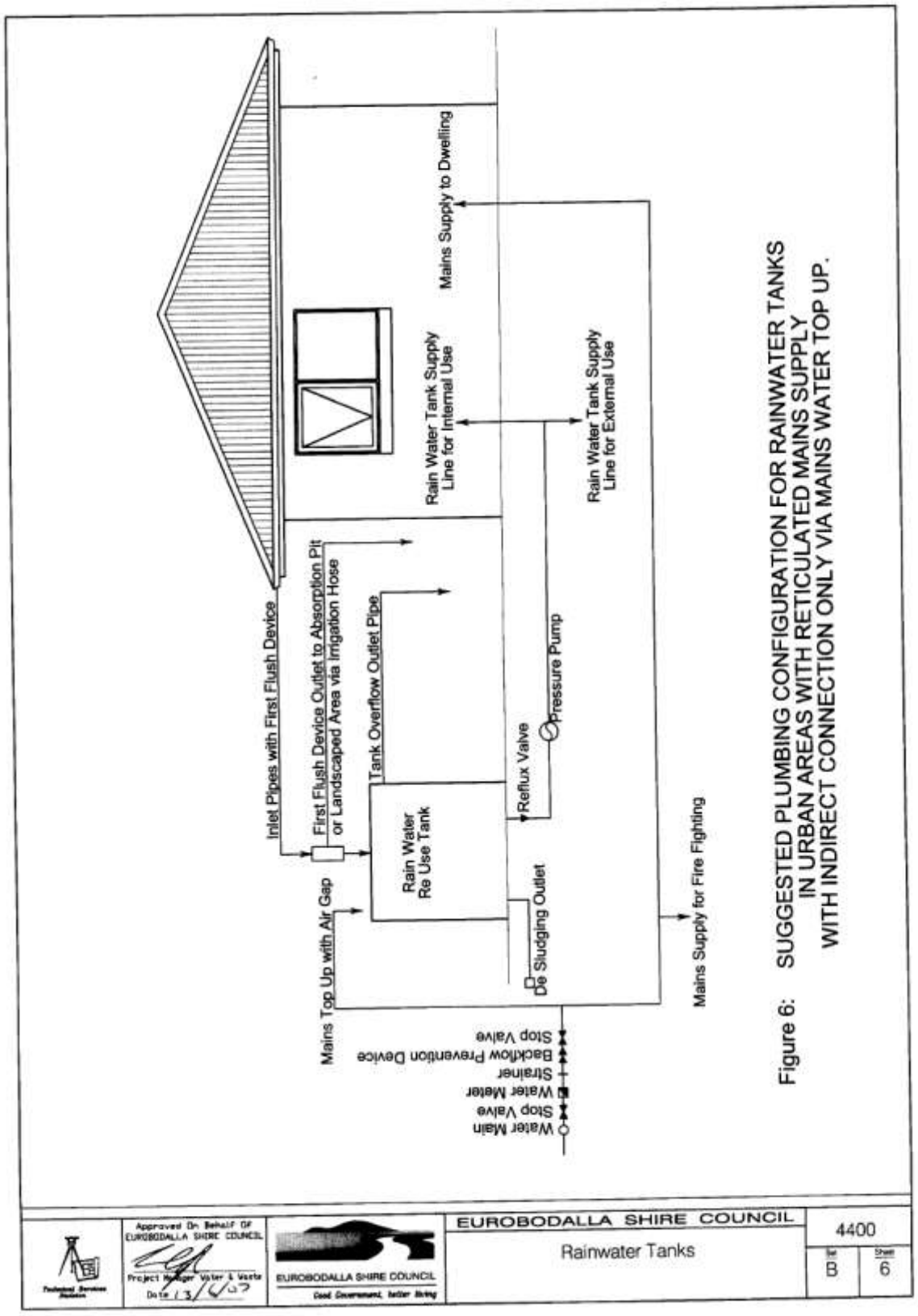
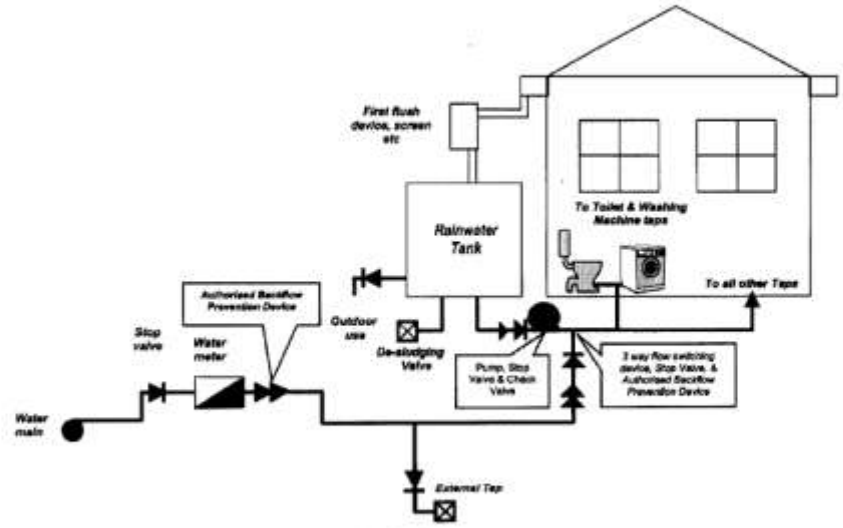
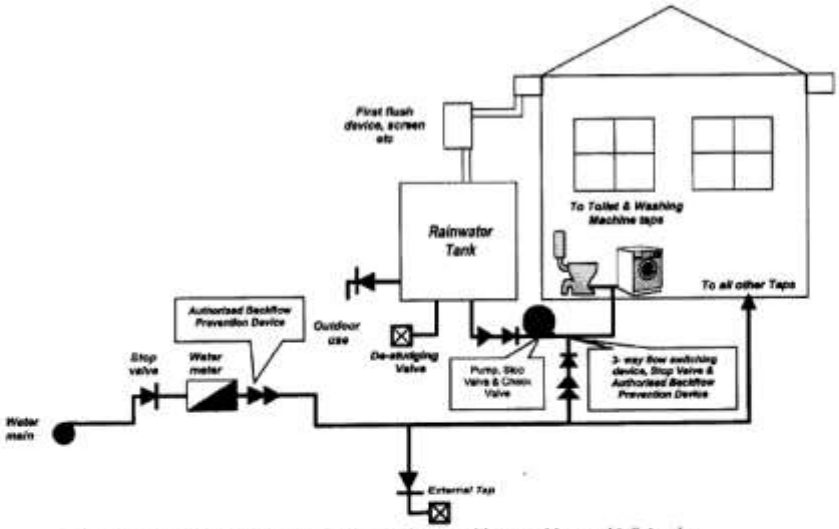


Figure 6: SUGGESTED PLUMBING CONFIGURATION FOR RAINWATER TANKS IN URBAN AREAS WITH RETICULATED MAINS SUPPLY WITH INDIRECT CONNECTION ONLY VIA MAINS WATER TOP UP.



Example 1a - Providing rainwater for all outlets for all purposes
NOTE: NSW Health do not recommend rainwater supple to the whole house when reticulacated water supply is available.



Example 1b- Providing rainwater for the garden, washing machine and toilet only.

Figure 7: SUGGESTED PLUMBING CONFIGURATIONS FOR RAINWATER TANKS WITH A DIRECT CONNECTION TO THE MAINS WATER SUPPLY

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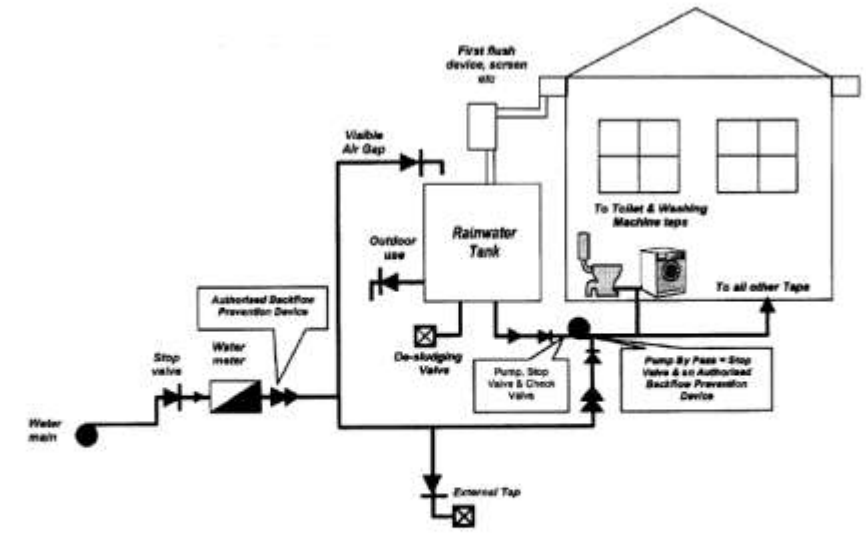
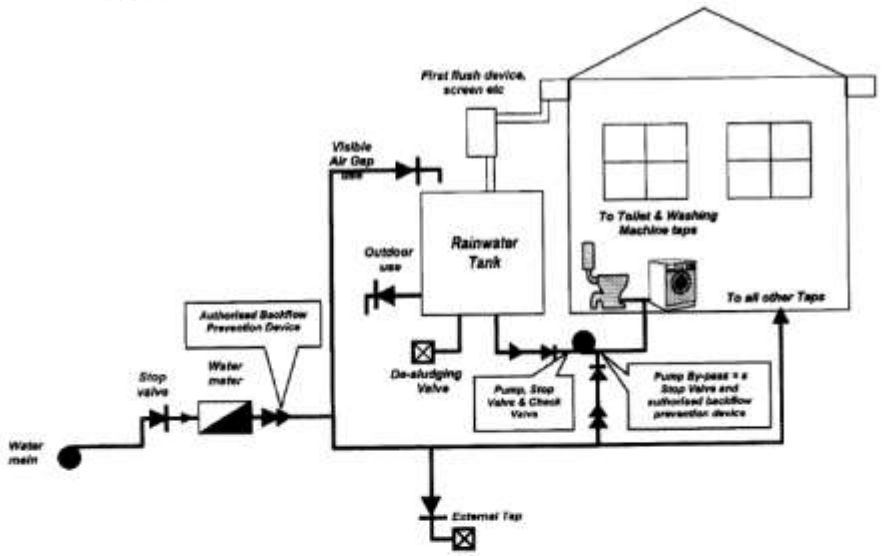


Example 1c - Providing rainwater for all outlets for all purposes
NOTE: NSW Health do not recommend rainwater supple to the whole house when reticulacated water supply is available.



Example 1d- Providing rainwater for the garden, washing machine and toilet only.

Figure 8: SUGGESTED PLUMBING CONFIGURATIONS FOR RAINWATER TANKS WITH AN AIR GAP AND DIRECT CONNECTION TO THE MAINS WATER SUPPLY VIA A PUMP BYPASS

	Approved On Behalf Of EUROBODALLA SHIRE COUNCIL Date 13/6/07	EUROBODALLA SHIRE COUNCIL Good Government, better living	EUROBODALLA SHIRE COUNCIL Rainwater Tanks	4400 Size B Sheet 8

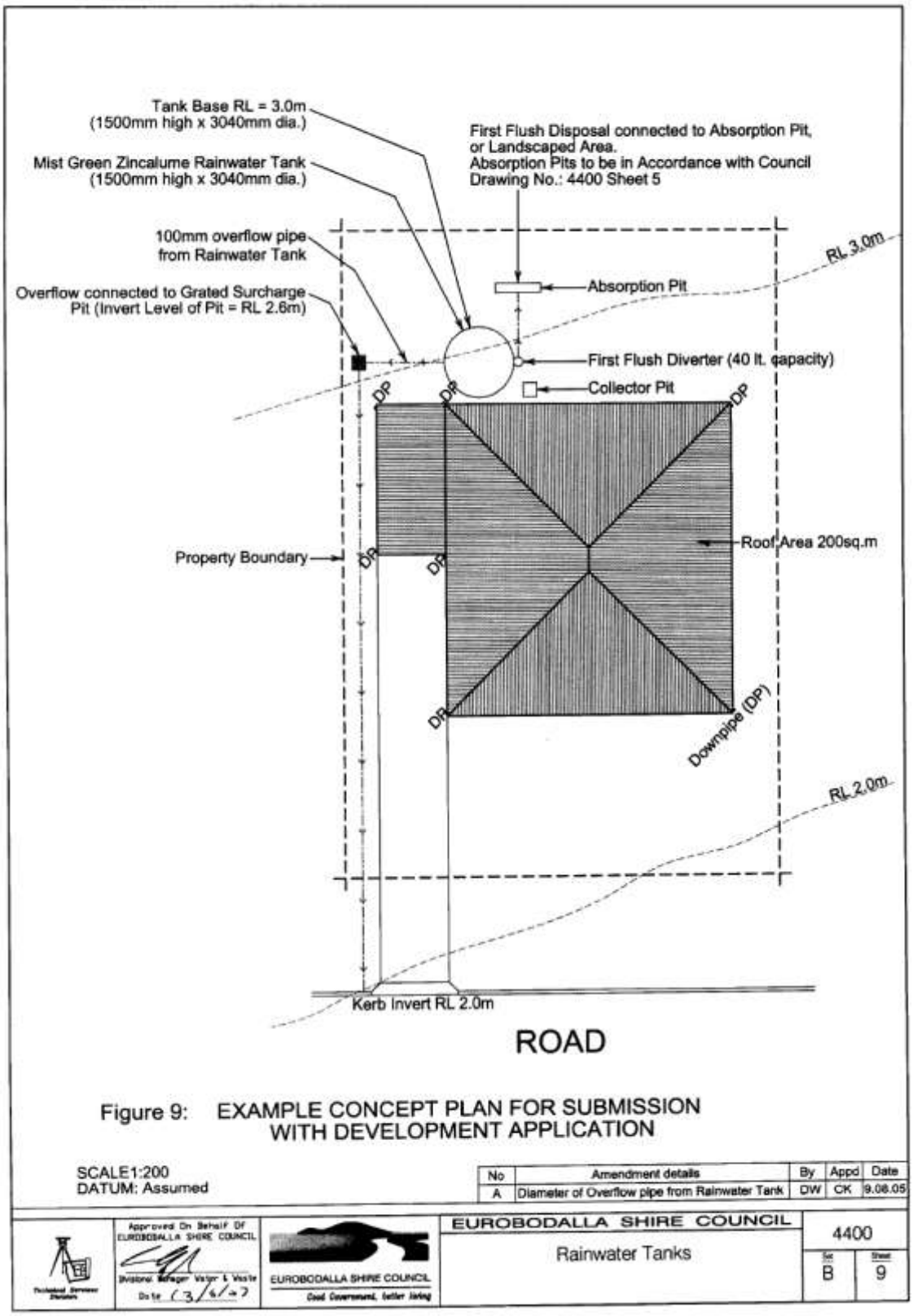


Figure 9: EXAMPLE CONCEPT PLAN FOR SUBMISSION WITH DEVELOPMENT APPLICATION

SCALE1:200
DATUM: Assumed

No	Amendment details	By	Appd	Date
A	Diameter of Overflow pipe from Rainwater Tank	DW	CK	9.08.05

Approved On Behalf Of EUROBODALLA SHIRE COUNCIL
Divisional Manager Water & Waste
Date 13/6/07

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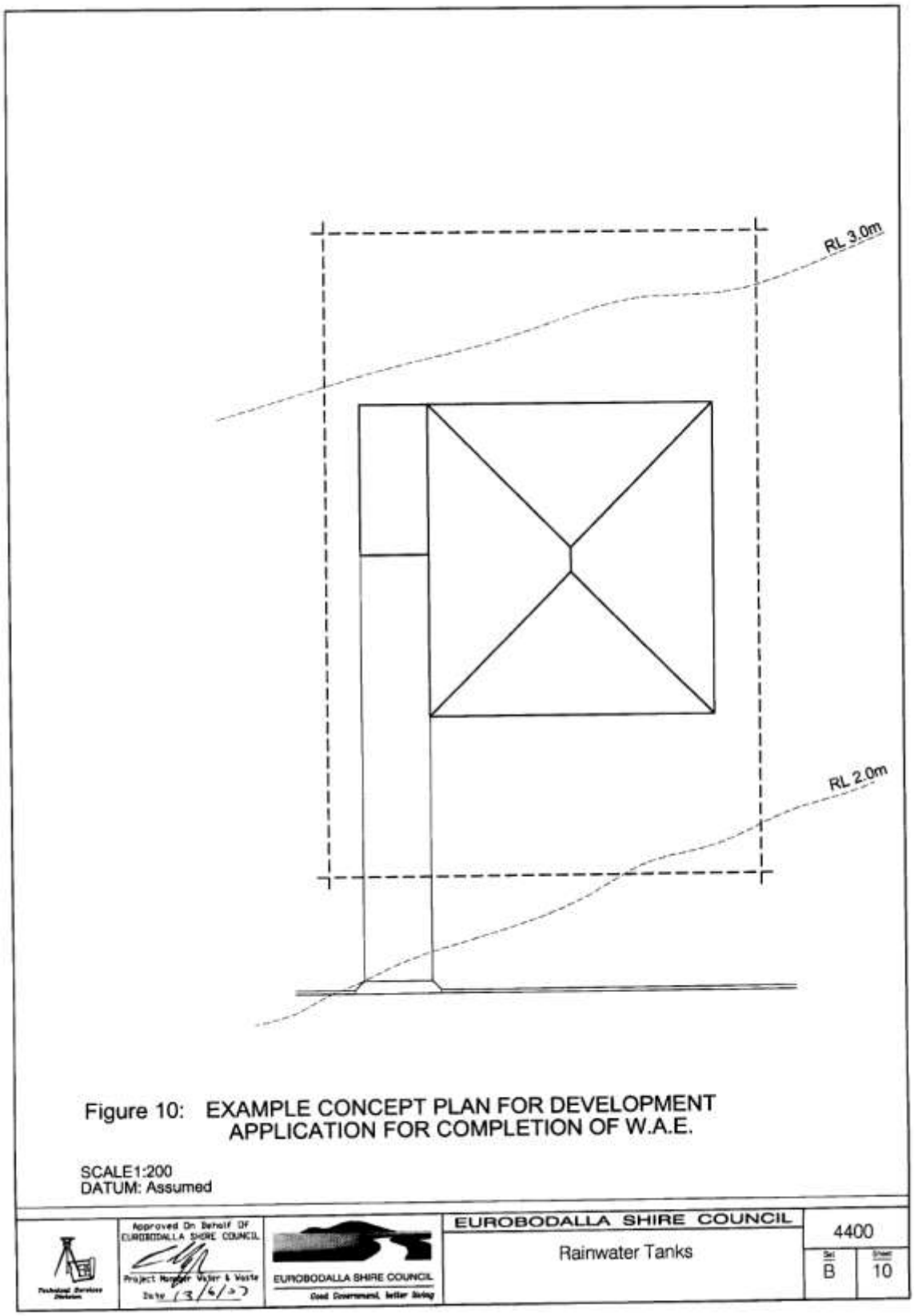
Rainwater Tanks

4400
Size B
Sheet 9


RL 3.0m
RL 2.0m
Figure 10: EXAMPLE CONCEPT PLAN FOR DEVELOPMENT APPLICATION FOR COMPLETION OF W.A.E.
SCALE1:200
DATUM: Assumed
Approved On Behalf OF EUROBODALLA SHIRE COUNCIL
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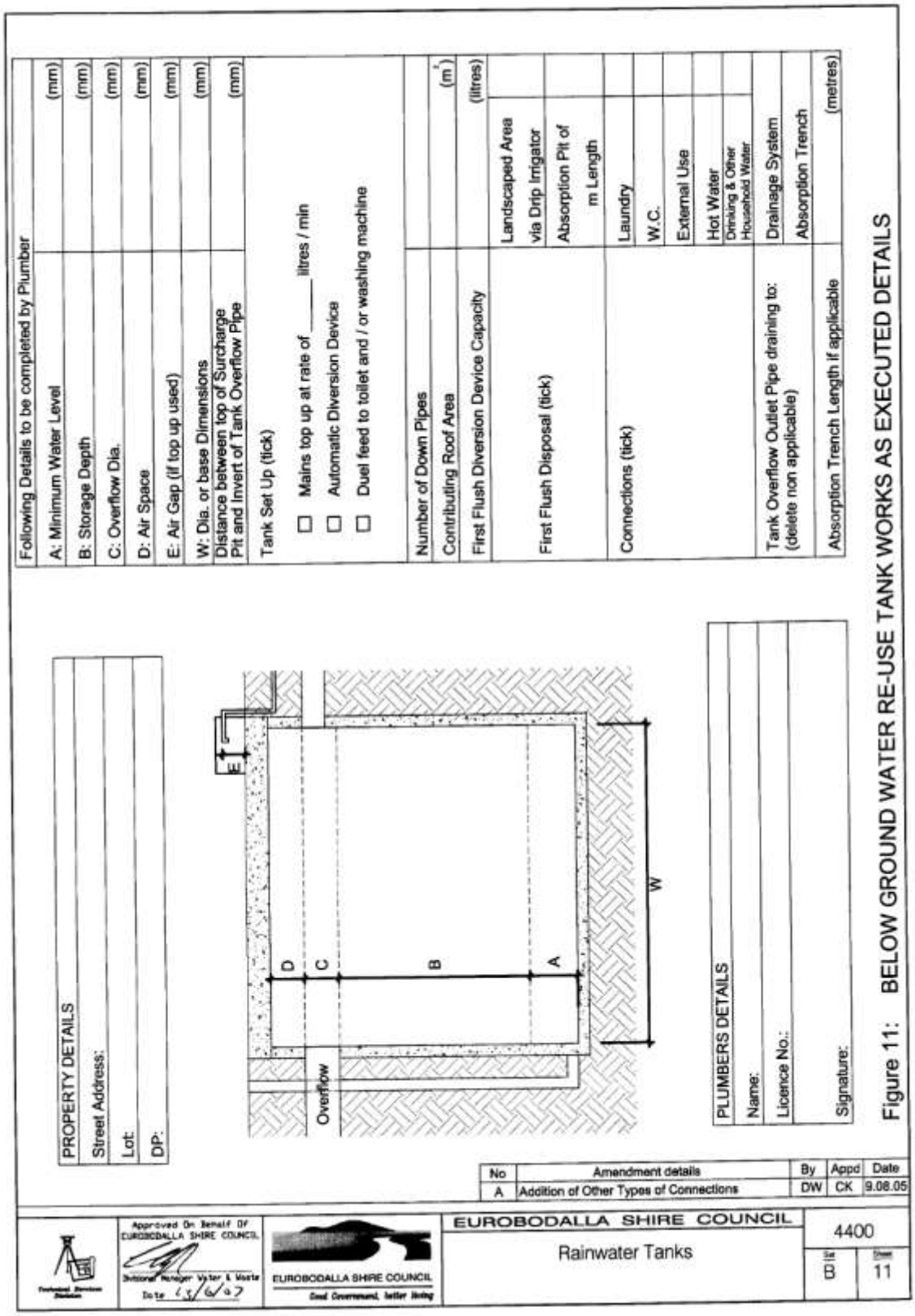
Rainwater Tanks
4400
B
10


Following Details to be completed by Plumber
A: Minimum Water Level (mm)
B: Storage Depth (mm)
C: Overflow Dia. (mm)
D: Air Space (mm)
E: Air Gap (if top up used) (mm)
W: Dia. or base Dimensions (mm)
Distance between top of Surcharge Pit and Invert of Tank Overflow Pipe (mm)
Tank Set Up (tick)
☐ Mains top up at rate of ____ litres / min
☐ Automatic Diversion Device
☐ Duel feed to toilet and / or washing machine
Number of Down Pipes
Contributing Roof Area (m²)
First Flush Diversion Device Capacity (litres)
First Flush Disposal (tick)
Landscaped Area via Drip Irrigator
Absorption Pit of m Length
Connections (tick)
Laundry
W.C.
External Use
Hot Water
Drinking & Other Household Water
Tank Overflow Outlet Pipe draining to: (delete non applicable)
Drainage System
Absorption Trench
Absorption Trench Length if applicable (metres)
PROPERTY DETAILS
Street Address:
Lot:
DP:
PLUMBERS DETAILS
Name:
Licence No.:
Signature:
E
D
C
B
A
W
Overflow
Figure 11: BELOW GROUND WATER RE-USE TANK WORKS AS EXECUTED DETAILS
No
Amendment details
By
Appd
Date
A
Addition of Other Types of Connections
DW
CK
9.08.05
Approved On Behalf Of EUROBODALLA SHIRE COUNCIL
Date 15/6/07
EUROBODALLA SHIRE COUNCIL
EUROBODALLA SHIRE COUNCIL
Rainwater Tanks
4400
B
11

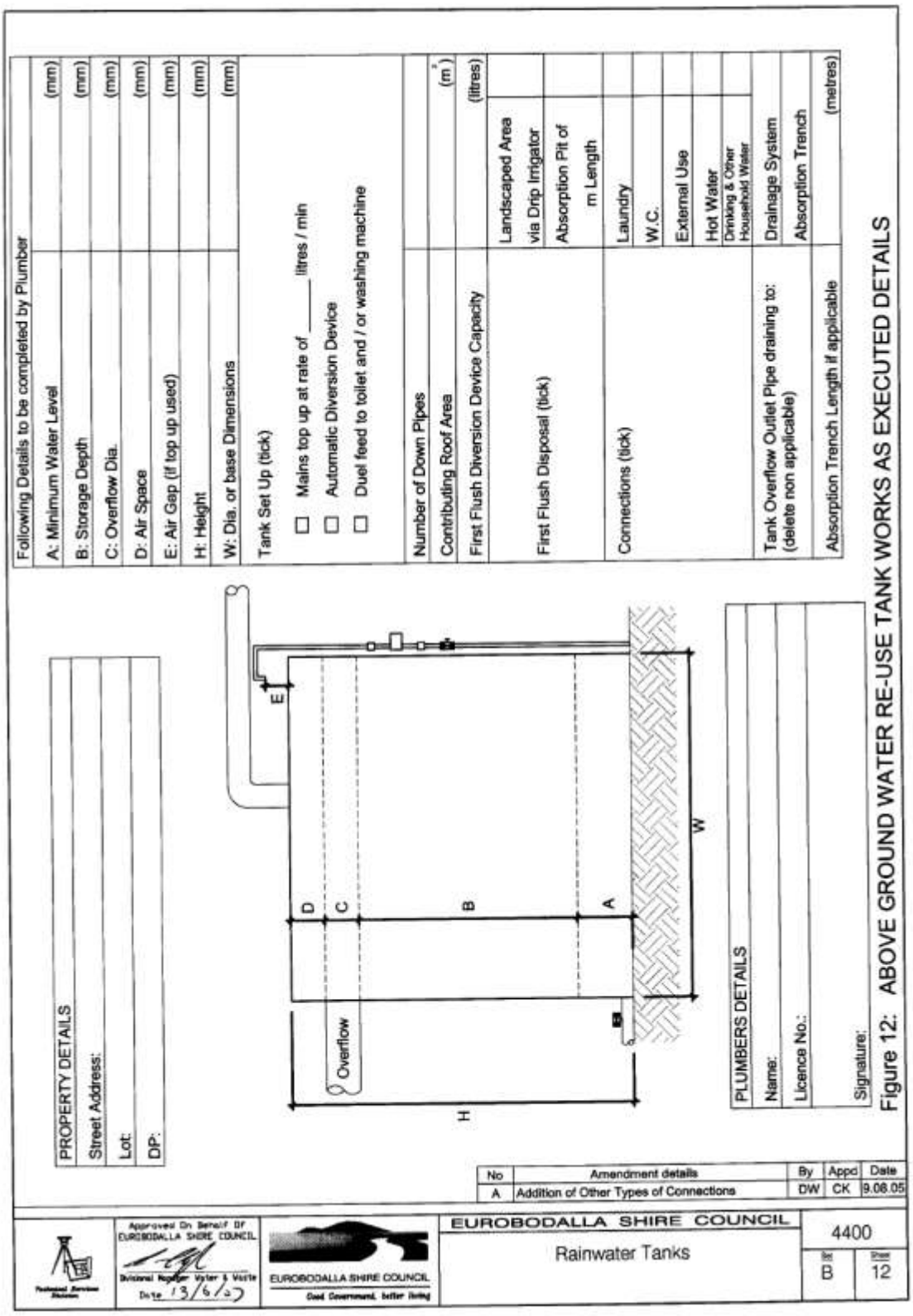


Figure 12: ABOVE GROUND WATER RE-USE TANK WORKS AS EXECUTED DETAILS

Appendix 1

Australian and NSW Standards that apply to tanks and their associated fixtures and fittings:

- AS 2070 - 1999, "Plastics materials for food container use".
- AS/NZS 2179-1994, "Specifications for rainwater goods, accessories and fasteners".
- AS 3500.1-2003, "National plumbing and drainage - Water Supply".
- AS 3500.3-1998, "National plumbing and drainage – Stormwater drainage
- AS 3855-1994, "Suitability of plumbing and water distribution systems products for contact with potable water".
- AS 4020 - 2005, "Testing of products for use in contact with drinking water".
- HB 230 – 2006, "Rainwater Tank Design and Installation Handbook".
- NSW Code of Practice for Plumbing and Drainage 3rd Edition 2006

Appendix 2

Guidance for calculating appropriate minimum storage volumes (and tank sizes) and topup rates for tank retrofits or tanks with high water demand.

The following table and example calculation are provided to be used as a guide only to assist in determining household rainwater demand and therefore appropriate tank sizes and minimum storage volumes and topup rates required in small rainwater tanks and/or tanks with high water demand during dry periods. Note that it is a guide only, and excessive use of water or faulty/leaky fixtures and appliances can still lead to a tank running dry, therefore causing pump damage. It is the responsibility of the tank/property owner to ensure the reliability of supply and pump protection at all times.

Typical water use of various household fixtures and appliances

Household Fixture/Appliance	Average Typical Water Use
Single flush toilet	11 litres/flush
Dual flush toilet	4 litres/flush
Old top loading or inefficient 1 to 2 star rated washing machine	180 litres/load
4 star or higher rated washing machine	70 litres/load
Garden tap	17 litres/minute (1000 litres/hour)
Shower – non-efficient	20 litres/minute
Shower – 3 star rated water efficient	9 litres/minute
Internal taps (kitchen and bathroom)	17 litres/minute
Dishwasher – old	50 litres/load
Dishwasher – new 1 to 3 star rated water efficient	18 litres/load
Dishwasher – new 4 to 5 star rated water efficient	11 litres/load

There are two ways to calculate appropriate minimum storage volumes (and tank sizes) and topup rates to ensure reliability of supply during dry periods.

The first is to determine the maximum anticipated possible demand over a short period (ie if all internal uses from the tank were to be used while maximum external use was occurring), and ensuring the tank supply from the minimum storage volume and the topup system during this period is adequate.

The second (and safest) is to determine the total anticipated maximum daily water demand from the tank, and ensure that the minimum storage volume is equal or greater to the demand, thereby making the topup rate inconsequential. Example calculations are provided below.

Example calculations:

1. A 3,000 litre tank is intended to be connected for garden watering and toilet use only. A 20% minimum storage volume is desired, giving a minimum storage volume of 600 litres (0.2 * 3,000).

The highest anticipated water demand from the tank over a short period is as follows:

The property only has a small lawn and vegetable garden, and requires no more than 30 minutes watering a day during dry periods from one tap = water use of 500 litres.
Three people live in the house, and it has two single flush toilets, with a maximum expected flush rate of 6 flushes per hour = water use of 66 litres.
Therefore, assuming these were both to occur at the same time, the total worst case water demand from the tank for any period would be 566 litres over that particular hour that garden watering and toilet flushing were both occurring, which is less than the 600 litre minimum storage volume.

Therefore, even during dry periods, the minimum storage volume (and tank size) chosen would easily be adequate to ensure reliability of supply from the tank during peak demand, regardless of the topup rate. *This is provided the minimum storage volume was full at the start of this period and no extensive demand was placed on the tank (by garden watering or leaks) until the tank had completed the topup process*.

2. For the same size tank and house, the tank is also connected to a top loading washing machine, and it is also anticipated a higher external use of 2 taps at 20 minutes each.

   The highest anticipated water demand from the tank over the same short period is as follows:

   680 litres for garden watering.
   66 litres for toilet flushing.
   2 loads of washing over an hour = 360 litres.

   Therefore, assuming these were all to occur at the same time, the total worst case water demand from the tank would be 1,106 litres over that particular hour.

During dry periods with the minimum storage volume full, in one hour, the tank has the capacity to provide the minimum storage volume plus the topup water provided during that period ie. 600 litres + (2 litres/minute * 60 minutes) = 720 litres. Therefore, unless household habits were changed and washing was not done whilst watering the garden, the tank is likely to run dry. Therefore, a higher topup rate or minimum storage volume (and therefore tank size) should be used.

For example, to provide 1,200 litres in an hour, the same tank would need a topup rate of 10 litres/minute ie 600 litres + (10 litres/minute * 60 minutes) = 1,200 litres.

Alternatively, a 5,000 litre tank could be used, with a minimum storage volume of 1,000 litres, and a topup rate of 3 litres/minute, would give 1000 litres + (3 litres/minutes * 60 minutes) = 1,180 litres.

Therefore, even during dry periods, the 2nd two options would be adequate to ensure reliability of supply from the tank. *This is provided the minimum storage volume was full at the start of this period and no extensive demand was placed on the tank (by garden watering, clothes washing or leaks) until the tank had completed the topup process*.

A summary of the results of this calculation is as follows:

Maximum Anticipated Tank Demand	Maximum Tank Supply During Dry Periods		
	3,000 litre tank with 2 L/min topup rate	3,000 litre tank with 10 L/min topup rate	5,000 litre tank with 3 L/min topup rate
1,106 litre/hour	720 litres	1,200 litres	1,180 litres

Alternatively, the safest way to ensure complete reliability is to ensure that the minimum storage volume is equal to or greater than the total anticipated daily demand from the tank.

The total daily demand could be calculated as follows:

- 680 litres for garden watering.
- Assume 6 flushes per person per day = 198 litres.
- 2 loads of washing = 360 litres.
- Therefore total water demand from the tank would be 1,238 litres/day.

Therefore, a minimum storage volume of approximately 1,300 litres would be adequate to ensure reliability of supply, regardless of the topup rate. Therefore, a minimum tank size of 6,500 litres would be needed.

Appendix 3

Excerpt from State Environmental Planning Policy (Exempt and Complying Development Codes) 2008)

Subdivision 32 Rainwater tanks (above ground)

2.63 Specified development

The construction or installation of a rainwater tank above ground is development specified for this code if it is not constructed or installed on land in a foreshore area.

2.64 Development standards

(1) The standards specified for that development are that the development must:
- (a) if it is on land other than land in Zone RU1, RU2, RU3 or RU4:
  - (i) for an educational establishment—not have a capacity of more than 25,000 L, and
  - (ii) in any other case—not have a capacity more than 10,000 L, and
  - (iii) be located at least 450mm from each lot boundary, and
- (b) if it is on land in Zone RU1, RU2, RU3 or RU4—be located at least 10m from each lot boundary, and
- (c) be located behind the building line of any road frontage, and
- (d) not rest on the footings of an existing building for support, and
- (e) not require cut and fill of more than 1m below or above ground level (existing), and
- (f) be fitted with a first-flush device that causes initial run-off rainwater to bypass the tank, and
- (g) have a sign affixed to it stating the water in it is rainwater, and
- (h) be constructed or installed to prevent mosquitoes breeding in it, and
- (i) have its overflow connected to an existing stormwater drainage system that does not discharge to an adjoining property, or cause a nuisance to adjoining owners, and
- (j) be located at least 1m from any registered easement, sewer main or water main, and
- (k) if it is constructed or installed on or in, or in relation to, a heritage item or a draft heritage item—be located in the rear yard.

(2) Pumps attached to the development must be housed in a soundproof enclosure.

(3) If reticulated water is provided to the lot, the development must not be interconnected with any system supplying drinking water to the lot unless it complies with the relevant water authority's requirements.

(4) In this clause:

educational establishment means a building or place used for education (including teaching) and includes a pre-school, a school, a tertiary institution that provides formal education (such as a university or TAFE establishment) and an art gallery or museum that is not used to sell the items displayed in it (whether or not the building or place is also used for accommodation for staff or students).

Subdivision 33 Rainwater tanks (below ground)

2.65 Specified development

The construction or installation of a rainwater tank below ground is development specified for this code if it is constructed or installed on land in Zone RU1, RU2, RU3 or RU4.

2.66 Development standards

(1) The standards specified for that development are that the development must:
(a) be fitted with a first-flush device that causes initial run-off rainwater to bypass the tank, and
(b) have a sign affixed to it stating the water in it is rainwater, and
(c) be constructed or installed to prevent mosquitoes breeding in it, and
(d) have its overflow connected to an existing stormwater drainage system that does not discharge to an adjoining property, or cause a nuisance to adjoining owners, and
(e) if it is constructed or installed on or in, or in relation to, a heritage item or a draft heritage item—be located in the rear yard.

(2) Pumps attached to the development must be housed in a soundproof enclosure.

(3) If reticulated water is provided to the lot, the development must not be interconnected with any system supplying drinking water to the lot unless it complies with the relevant water authority's requirements.

Appendix 4

Recommended monitoring and maintenance schedules and activities extracted from Chapters 5 & 6 of *Guidance on use of rainwater tanks,* May 2004, published by the National Environmental Health Forum.

"In a similar fashion to all drinking water supplies, rainwater systems need to be monitored. Monitoring of domestic rainwater consists of a range of visual inspections rather than laboratory testing of rainwater quality. The recommended regime of inspections and associated maintenance is not particularly onerous, but is necessary for quality assurance. A proactive approach will prevent development of problems that can lead to deterioration of water quality. Tables 2 and 3 provide an overview of monitoring requirements and corrective actions.

Once a rainwater tank is installed, it is recommended that the following components of the roof catchment and tank be inspected at least every six months:

- *Gutters – generally will need cleaning as well as inspection. If inspection finds large amounts of leaf material or other debris, then inspection and cleaning frequency may need to be increased.*
- *Roof – check for the presence of accumulated debris including leaf and other plant material. Accumulated material should be cleared. If tree growth has led to overhanging branches these should be pruned.*
- *Tank inlets, insect-proofing and leaf filters – if necessary these should be cleaned and repaired.*
- *Tank and tank roof – check structural integrity of the tank including the roof and access cover. Any holes or gaps should be repaired.*
- *Internal inspection – check for evidence of access by animals, birds or insects including the presence of mosquito larvae. If present, identify and close access points. If there is any evidence of algal growth (green), find and close points of light entry.*
- *Pipework – check for structural integrity. Sections of pipework that are not selfdraining should be drained.*

In addition to six-monthly inspections, tanks should be inspected every 2–3 years for the presence of accumulated sediments. If the bottom of the tank is covered with sediment, the tank should be cleaned."

TABLE 2: SOURCES OF POTENTIAL HEALTH HAZARDS AND PREVENTIVE MEASURES

HEALTH HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Faecal contamination from birds and small animals	Overhanging branches on roof	Prune tree branches	Check tree growth every six months	Prune branches
	Animal access to tank	Protect all inlets, overflows and other openings to prevent entry by small animals and birds	Check access covers are kept closed. Check inlets, overflows and other openings every six months	Repair gaps. Secure access cover. If animal access suspected disinfect tank using chlorine
		Maintain integrity of tank roof and body to prevent access points	Check structural integrity of tank	If a dead animal is found, empty and clean tank. If this has to be delayed, remove remains and disinfect with chlorine
Faecal contamination from humans (above-ground tanks)	Human access to tank	Prevent access. Ensure tank is roofed and access hatches are secured	Check access covers are secured, particularly in hot weather	Secure access cover
Faecal contamination from humans and livestock (below-ground tanks)	Surface water ingress into tank	Ensure tank is protected from overground flows and tank walls are intact	Check structure annually and that surface water does not enter during storm events	Repair or increase barrier to surface water flow. Repair or line inside of tank
Mosquitoes	Access to stored water	Protect all inlets, overflows and other openings with mosquito-proof mesh	Inspect water for presence of larvae at least every six months (in northern areas of Australia this should be done more often)	Repair screening of inlets and openings to prevent access and if larvae are present, to prevent escape of mosquitoes Treat tanks with a small amount of kerosene or medicinal paraffin

HEALTH HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Lead contamination	Lead based paints and primers on roofs	Do not collect rainwater from roofs painted with products containing high lead concentrations (for example, pre 1970s paint) When painting roof, check suitability with paint retailer		
	Lead flashing on roofs	Paint existing material or use pre-coated products	Inspect roof and gutters every six months	Paint if large amounts of uncoated flashing present
	Increased corrosion of metals due to low pH from long periods of contact between rainwater and leaves	Keep gutters clean. Install leaf protection devices on gutters	Inspect gutters every six months	Clean gutters. If large amounts of leaves are detected on regular inspections clean more often
	Resuspension of accumulated sediment	Regularly clean tank to remove accumulated sediment Reduce amount of sediment by keeping roof catchments and gutters reasonably clean. Protect inlet to tank using a leaf filter. Install a first flush diverter	Inspect tank every 2–3 years Inspect roof and gutters and inlet filter every six months	Clean tank if required Clean roof, gutters and inlet filter as necessary. Ensure filter is in place

HEALTH HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Other contamination from roof materials	Preservative-treated wood Bitumen based materials	Do not collect rainwater from roofs covered with exposed treated wood Do not collect rainwater from roofs with bitumen-based products	Inspect roof before installing tank	If treated wood present it could be sealed or covered to prevent exposure to rainwater
Chemical contaminants from tanks, pipework etc.	Inappropriate material that does not comply with Aust. or Aust/New Zealand Standards relating to food grade products or products for use in contact with potable water	Use only approved materials	Check suitability of product with retailer or supplier	Remove or replace product
Dangerous plants	Overhanging branches (check identity of suspect plants with horticulturist)	Prune tree branches	Check tree growth every six months	Prune or remove plant

TABLE 3: SOURCES OF AESTHETIC HAZARDS AND PREVENTIVE MEASURES

AESTHETIC HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Sulfide/rotten egg/sewage odours	Anaerobic growth in accumulated sediment at the bottom of tanks	Regularly clean tank to remove accumulated sediment	Inspect tank every 2–3 years	Clean tank if required. If cleaning not practical (for example, in the middle of summer) disinfect tank with chlorine and flush chlorinated water through all pipework
	Slimes and stagnant water in pipe work	Avoid u-bends or underground pipework that can hold stagnant water. Install drainage points on pipe work		
Musty or vegetable type taste and odours (no light penetration)	Accumulated material on roofs and gutters. Possibly including pollen	Remove overhanging branches from trees. Keep gutters clean. Install leaf protection devices on gutters	Inspect gutters at least every six months	Clean gutters. If large amounts of leaves (or pollen) are detected on regular inspections clean more often
Coloured water	Accumulated damp leaves in gutter	Keep gutters clean. Install leaf protection devices on gutters	Inspect gutters at least every six months	Clean gutters. If large amounts of leaves are detected on regular inspections clean more often
Coloured water, particularly after rain (tiled roof)	Coloured coating from tiles washed into tanks. Re-suspension from sediments when fresh intake	Use colour-through tiles	Inspect water after rainfall	Remove sediment by cleaning the tank

AESTHETIC HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Musty, vegetable or fishy type taste and odours (light penetration)	Algal growth due to light penetration into tank or pipe work	Make sure tank is completely roofed and is impervious to light	Inspect water every six months	Repair roof
		Ensure pipework, including inlets to tanks, are impervious to light (white pipes can allow light penetration)		Paint pipework with dark colour
Bitter taste (concrete tanks) Metallic taste (galvanised tanks) Plastic taste (plastic tanks)	New tank	Use water from first fill for non-potable purposes. Taste will diminish in subsequent fills	Water quality/taste will improve with tank age	Use water from first fill of new tanks, or water collected from newly painted roofs for non-potable purposes. Problem will diminish with time.
Detergent taste or water frothing	Newly painted roof	Do not collected water from first 2–3 rain events after painting	Water quality/taste will improve with paint age	Use water from first fill of new tanks, or water collected from newly painted roofs for non-potable purposes. Problem will diminish with time.
Hydrocarbon or preservative taste	Deposits from wood combustion heater flue	Install flue in accord with Australian Standards. Operate heater correctly Use appropriate fuel (not preservative treated)	Check flue installation. Check operation of heater and choice of fuel	Repair flue. Discard inappropriate fuel

AESTHETIC HAZARD	CAUSE	PREVENTIVE MEASURE	MONITORING	CORRECTIVE ACTION
Insects/ water boatmen etc.	Access to stored water	Protect all inlets, overflows and other openings with insect proof mesh	Inspect water for presence of insects and/or larvae every six months	Repair screening of inlets and openings to prevent further access Use simple coarse filter to remove remaining insects
Small white flakes in water	Microbial growth	Keep gutters clean. Growth encouraged by nutrients contained in plant and soil material accumulated in gutters or at the bottom of tanks Install leaf protection devices on gutters	Inspect gutters at least every six months Inspect tank every 2–3 years	Clean gutters and tank if necessary Disinfect tank using chlorine
Slime on the inside of tanks	Microbial growth	All containers that continuously hold water will develop biofilms on surfaces below the water level	None required	None required. These are naturally occurring and not harmful to the general population
White deposits on the surface of metal tanks (slimy or waxy feel)	'White rust'. A corrosion product containing zinc-rich oxide	Not required	None required	None required, the deposits are not harmful. Physical removal could damage the surface of the tank and increase the potential for corrosion