



NSW Department Of Education

Waitara Public School

Hydraulic Infrastructure & Services and Water Cycle Management Report

February 2018

Table of contents

1.	Introduction.....	1
1.1	Purpose of this report.....	1
1.2	Scope and limitations.....	1
1.3	Design approach.....	2
1.4	Reference Documents	2
1.5	Definitions	2
2.	Methodology.....	3
2.1	Integrated Water Management Analysis.....	4
2.2	Equivalent Persons	4
2.3	Domestic Water Demands	4
2.4	Fire Services Water Consumption	5
3.	Conclusions.....	6
3.1	Recycled Water Usage from Authority Recycled Water Main	6
3.2	Rainwater Tank Size.....	6
3.3	Grey Water and Black Water Treatment.....	6
4.	Infrastructure and Services	7
4.1	Existing site conditions:.....	7

Table index

Table 1	Reference Documents	2
Table 2	Domestic Water Demands.....	4
Table 3	Water Consumption of Wet Fire Services Maintenance Testing	5

Figure index

Figure 1	Rainwater Re-use Concept.....	2
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1. Introduction

1.1 Purpose of this report

The proposed new building for Waitara Public School will be located on a site that is approximately 21,000m² of previously developed site that will be in use at the time of construction. This project will redevelop the current school site with the provision of a new multistorey school building and provision of new landscaping features.

This report sets out integrated water management strategies proposed for the new building in Waitara Public School to achieve efficient use of water across the site. It also outlines available infrastructure and services of the site.

1.2 Scope and limitations

This report: has been prepared by GHD for NSW Department Of Education and may only be used and relied on by NSW Department Of Education for the purpose agreed between GHD and the NSW Department Of Education .

GHD otherwise disclaims responsibility to any person other than NSW Department Of Education arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by NSW Department Of Education and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report, which were caused by errors, or omissions in that information.

GHD has not been involved in the preparation of the Environmental Impact Statement (EIS) and has had no contribution to, or review of the EIS. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of the EIS.

1.3 Design approach

The overarching design approach for the water cycle management is to re-use collected rainwater as much as possible, with the intention to use domestic water from the Authority when the tank empties.

Below is a simple concept of the rainwater re-use scheme.

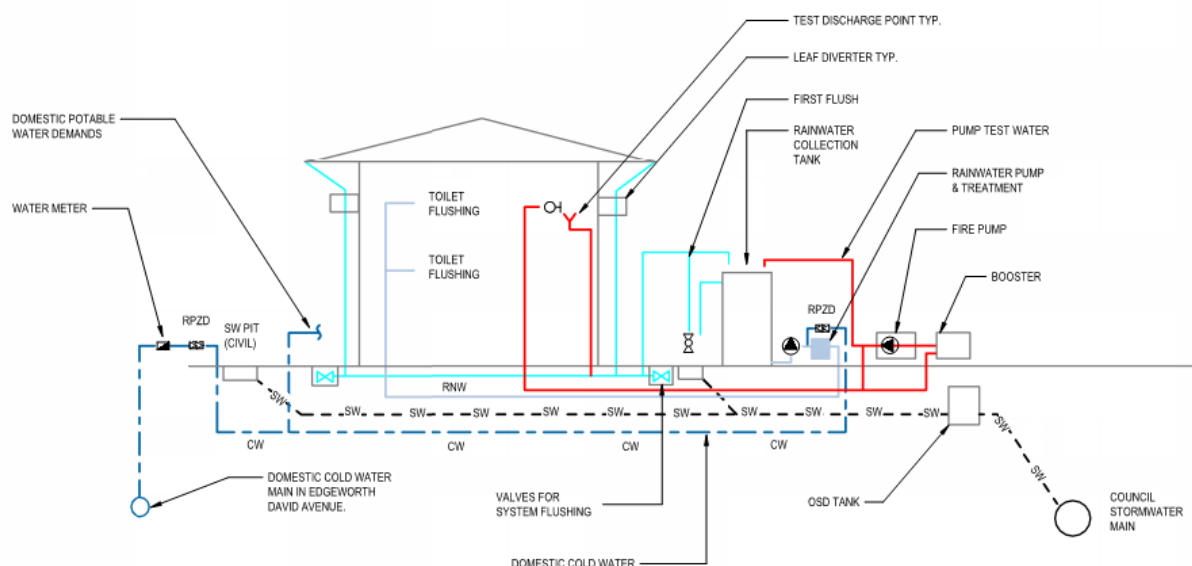


Figure 1 Rainwater Re-use Concept

1.4 Reference Documents

In preparation of this report, the documents listed in Table 1 have been the primary source of information used.

Table 1 Reference Documents

Abbreviation	Document Name	Revision
AS 2419.1	Fire hydrant installations Part 1: System design, installation and commissioning	2005
AS 1851	Routine service of fire protection systems and equipment	2012
AS 2441	Installation of fire hose reels	2005
AS/NZS 3500	Plumbing and Drainage	2015
HB-230	Rainwater Tanks	2006

1.5 Definitions

1.5.1 General

Definitions of terms and abbreviations used in this report are based on definitions given in relevant code or regulations' glossary of terms or dictionary, unless defined in the section below where these definitions shall take precedence.

1.5.2 Abbreviations

AS:	Australian Standard
BCA:	Building Code of Australia, NCC Volume 1
CO ₂ -e:	Carbon Dioxide Equivalents in kilograms
EFSG:	Education Facilities standards and guidelines
GBCA:	Green Building Council of Australia
IWM:	Integrated Water Management
NCC:	National Construction Code
NZS:	New Zealand Standard
OSD:	On-site Stormwater Detention tank
PVC:	Polyvinyl chloride
RPZ:	Reduced pressure zone
STW:	Stormwater
SWC:	Sydney Water Corporation
UNO:	Unless Notified Otherwise

1.5.3 Terms

Above ground: This term shall apply to all areas where components are not buried. This term does not mean areas above finished ground level. Areas covered by this term shall include; tunnels, sumps, etc.

Equivalent Person: ¹

Water: Means a standard unit of demand for water based on the average usage of water by a typical person in a residential setting over the long term for drinking, cooking, bathing, washing and cleaning, flushing, irrigation and all other purposes and taking into account the system losses incurred in delivering the water to the person.

Sewage: Means a standard unit of sewage generation based on the average generation by a typical person in a residential setting over the long-term by toilet use, cooking, bathing, washing and cleaning, and all other activities and taking into account the infiltration into the reticulation that occurs in transporting the sewage to the treatment plant.

Hose Tap: The terms “Hose Tap” and “Hose Cock” are interchangeable and refer to the same item of plumbing. “Hose Tap” is the preferred term.

2. Methodology

2.1 Integrated Water Management Analysis

2.1.1 Analysis

The site analysis is based on time step of every day over 7-year period from 1 January 2008 to 31 December 2015. 7 years of Waitara, daily weather data, sourced from the Australian Bureau of Meteorology, was used in the analysis rather than climate averages based on the last 100 years so as to most accurately adjust for recent trending weather patterns due to climate change.

Water consumption has been calculated on expected water usage based on:

- Sanitary fixture type and fixture water demand;
- Expected populations (based on Equivalent Persons) of the building taking into account weekends and public holidays; and
- 100% occupancy rates during weekdays for 1000 EP;

Daily water demand based on student numbers was calculated. As there is no alternative recycled water main available for use, a comparison between standard water demand and low flow fixtures in combination with using water from the Authority's domestic Water Main was undertaken. Irrigation services are excluded for this site, rainwater tank is to be used for flushing purposes only.

2.1.2 Standard Demand

To assist in determining the effect integrated water management strategies have on the water usage, a standard demand scenario has been developed. Details of the configuration of a standard demand and the proposed demands detailed in sections 2.3 and 2.4 of this report.

2.2 Equivalent Persons

Domestic water demands used in this report are based on Equivalent Persons unit which the average usage of water and sewage produced by a typical person in a residential setting (refer to section 1.5.3 for further information).

2.3 Domestic Water Demands

Table 2 details the domestic water demands used in the analysis.

Table 2 Domestic Water Demands

Demand Type	Standard Demand	Proposed Building Demand
Ablutions	16.7 L/EP/Day	13.7 L/EP/Day
Toilet (WC)	25 L/EP/Day	Provided by treated rainwater and recycled water
Leakage and Wash down	2.6 L/EP/Day	2.0 L/EP/Day

Toilet (WC) demand is based on 6/3 L dual flush toilet suites in the standard demand and 4.5/3 L flush toilet suites in the proposed building.

Ablutions demands are based on:

- Shower roses with a 9 L/min demand for the standard demand;
- Shower roses with a 6.5 L/min demand for the Proposed Building;
- Shower times of 5 minutes in both cases;
- The population showering is less than 1% of the total population; and
- Allowance of 5 L/EP/Day for hand washing and basin use.

Leakage and wash down allowance is based on 5% of domestic water use.

2.4 Fire Services Water Consumption

The volume of water consumed for the wet fire services is based on the commissioning requirements of AS 2419.1, AS 2118.1 and AS 2118.6 and maintenance testing requirements of AS 1851. Table 3 details the values used in the Integrated Water Management analysis.

Table 3 Water Consumption of Wet Fire Services Maintenance Testing

Test	Unit	Litres	Test Frequency	Justification
Fire Hydrants (all)	L/FH/Test	150	Annual	AS 1851 Table 4.4.3, item 3.2. Allowance to observe water at each hydrant.
Fire Hose Reel	L/FHR/Test	5	6 monthly	AS 1851 Table 9.4.1, item 10.1. Allowance to observe water at each FHR.
Fire Hydrant Flow and Pressure Testing	L/Test	6,000	Annual	AS 1851 Table 4.4.3, item 3.7. Allowance for fire hydrant flow and pressure testing. 10L/s per operational hydrant for 5 minutes.
Fire pump flow test	L/Test	6,000	Monthly	AS 1851 Table 3.4.1, item 3.7. Allowance for pump flow and pressure testing. 10L/s per operational hydrant for 10 minutes.
Fire Brigade Boost Assembly Flow and Pressure Testing	L/Test	21000	5 yearly	AS 1851 Table 4.4.4, item 4.2. Allowance for fire brigade booster assembly boost test. 20L/s Hydrants and 15L/s SPR for 10 minutes.

3. Conclusions

3.1 Cold Water Usage from Authority Water Main

The site of the proposed building for Waitara only has frontage to a Sydney Water domestic water main and no alternative water sources i.e. recycled water. It is proposed to use the domestic water main to top-up the rainwater re-use system in times of prolonged dry weather.

Using domestic water as a top up for rainwater will reduce the demand of domestic water for toilet flushing by 58%.

3.2 Rainwater Tank Size

Based on the rainfall patterns, the available surface area to capture rainwater and the estimated demands, it is recommended that a 20m³ storage tank be used in the proposed building.

The volume of 20m³ will provide 58% of water that is required for toilet flushing without excessive capital cost.

3.3 Grey Water and Black Water Treatment

It is recommended that grey water and black water treatment systems should not be used as the capital cost, ongoing operational and maintenance cost, occupational health and safety issues, energy consumption and low contribution that these systems make to the overall water efficiency of the building do not justify such systems.

4. Infrastructure and Services

4.1 Existing site conditions:

4.1.1 Domestic Cold Water

Waitara Public School has frontage to an existing DN100 CICL Sydney Water Corporation (SWC) main located in Edgeworth David Avenue. An existing DN150 CICL (Cast iron cement lined) SWC water main is also located in Myra St. The school appears to be connected to the existing DN100 CICL SWC water main located in Edgeworth David Avenue (opposite street side). An existing DN40 SWC water meter is installed next to the main entrance of Edgeworth David Avenue. A second DN40 SWC water meter is installed facing Edgeworth David Avenue further west of the main water meter.

The Waitara School has a large site with a number of buildings located on the site; thus an upgrade in pipe size is required to accommodate the new building. The new building shall have a new DN50 water connection; as a result the pipe work downstream from the new connection to the Sydney Water main, including the water meter, shall all be upgraded to DN50 pipe work. The main meter located next to the main entrance shall also be upgraded from a DN40 meter to a DN50 meter to accommodate the change. Upon suitable notification and application, Sydney Water shall indicate the suitability of the existing water meter for the additional building.

The Waitara school shall have a new back flow prevention device installed directly downstream of the existing Sydney Water master water meter facing Edgeworth David avenue next to the main entrance. Additional downstream backflow prevention shall be provided for zones and individual hazards such as:

- Fire services and equipment
- Mechanical plant and equipment;
- Recycled water system top-up; and
- Irrigation plant and equipment.

4.1.2 Sanitary Drainage and Plumbing

The school has frontage to a DN 225 VC (vitrified clay) sewer main located in Myra Street.

Upon suitable notification and application, Sydney Water shall indicate the suitability of the existing sewer connection with respect to the expected increase in discharge.

4.1.3 Gas Service

Waitara Public School has frontage to a DN110, 210kPa gas main located in Myra St.

The contractor is required to make an application to the supply authority for additional demand. The supply authority will advise if the current gas meter and regulator is adequate and will upgrade the existing connection at their own cost (if required).

A new gas connection shall be made downstream of the existing gas meter to service the new building with natural gas for hot water generation.

GHD

Level 15

133 Castlereagh Street

T: 61 2 9239 7100 F: 61 2 9239 7199 E: sydmal@ghd.com

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	S.Bugeja	A. Fisher	A.Fisher*	Mike Dean	M.Dean	20.09.17
B	S.Bugeja	A. Fisher	A.Fisher*	M Dean		2/12/17

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