BEAM
建築環保評估協會

BEAM Society Limited

28th BEAM Pro Training & Examination

Water Use Aspects

John A. Herbert

Director BEAM Society Limited
Chairman BEAM Technical Review Panel
Chairman BEAM Water Use Aspects
Member BEAM Technical Review Committee
Member HKGBC Faculty
Member HKGBC
BEAM Professional

24 April 2015

IMPORTANT: 9 March 2015 WSD re-named the Quality Water Recognition Scheme For Buildings (QWRSFB) to

Quality Water Supply Schemes For Buildings – Fresh Water And Flushing Water (QWSSFBFWFW)

Henceforth any reference to QWRS or QWRSFB shall mean QWSSFBFWFW

Abbreviations

BEAM	Building Environmental Assessment Method
BD	Buildings Department
GBP	General Building Plans
FA	Final Assessment
LCP	Landscape Master Plan
MCM	Million Cubic Metres
OP	Occupation Permit
PA	Provisional Assessment
PR	Prerequisite, BEAM minimum requirement
QWSSFBFWFW	Quality Water Supply Scheme for Buildings - Fresh Water and Flushing Water (WSD)
RH	Rainwater Harvesting
WELS	Water Efficiency Labelling Scheme (by WSD)
WSD	Water Supplies Dept
WU	Water Use

Green Building Principle

1. Better Than Code

Code means lease requirement, engineering conditions, government, Building Department, FSD, and WSD, legislative, statutory, regulatory, requirements, any mandatory Code of Practice requirements, etc.

Bibliography (refer separate PDF)

Whilst every care has been taken preparing this bibliography, with links, organisations may have change the location, or remove material without prior notice; this document was updated on 18 April 2015.

1. Guidelines For Drinking Water Quality, WHO, 2008 - link
2. ISO 5667 Water Quality Sampling (Purchase) - link
3. GB 3838-83 Environmental Quality Standard for Surface Water, PRC
4. WSD ACQWS Fresh Water Plumbing Maintenance Guide, WSD - link
5. WSD ACQWS Paper No. 5. - Raw Water Quality Monitoring in Hong Kong - link
6. WSD ACQWS Paper No. 14 - Treated Effluent Reuse at Ngong Ping - link
7. WSD Annual Report, WSD - link
8. Hong Kong Waterworks Standards for Plumbing Installations in Buildings, WSD, Feb 2013 - link
9. Water Infrastructure. Water-Efficient Plumbing Fixtures Reduce Water Consumption and Wastewater Flows, USGAO. Report to Congressional Requester, GA RCED-00-23, August 2000.- link
10. Sustainable retail premises: an environmental guide to design, refurbishment and management of retail premises, Prior (purchase) - link
11. PNAP APP-004 Water Supply and Wells (formerly PNAP 17) - link
12. PNAP APP-105 Water Seepage (formerly PNAP 230) - link
13. PNAP APP-099 Flushing Volume for Flushing Cisterns (formerly PNAP 220) - link
14. PNAP APP-006 Shops and Department Stores - Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 5 (formerly PNAP 41) - link
15. Greywater and Rainwater Systems: Recommended UK Requirements, 13034/1 Report, March 1997, BSRIA - link
16. The Building Services Research and Information Association, Final Report 13034/1, March 1997
17. Water and Energy Conservation of Rainwater Collection Systems on Building Roofs, Advances in Building Technology, Vol. 2. Elsevier. 2002. pp 1281-1288 by Yang H X, Chow W H, Burnett J.
18. Cap 102 - Waterworks Regulations - link
19. Cap 123 - Building Regulations - link
20. Cap 358 - Water Pollution Control Ordinance - link
21. Handbook on Plumbing Installation, WSD - link
22. Study On Green Roof Application In Hong Kong, ArchSD - link
23. Dongjiang Water Quality (April 2009 - March 2010) - link
24. Water Quality comparison with GB 3838-83, WSD - link
25. Quality Water System Scheme for Buildings – Fresh Water and Flushing Water (QWSSRB-FWFW), WSD - link
26. Voluntary Water Efficiency Labelling Scheme (WELS) , WSD - link
27. Code of Practice for Water-cooled Air Conditioning System, EMSD, Jan 2008 - link
28. Good Operation and Maintenance Practice of Fresh Water Cooling Towers for Air conditioning Systems, EMSD, Nov. 2011- link
29. Prevention of Legionnaires' Disease Code of Practice, 2012, EMSD - link
30. Guidelines for Carbon Audit, 2010, EPD - link
31. WSD Circular Letters - link

BEAM

What is the difference?

Intent

“

realign how we use water, redefining ‘waste’ in building operations, and raising awareness to ensure water is respected as a precious resource.

Intent

“Promote through recognition lower impacts, and environmentally positive features “green features” for the whole lifecycle of the built environment.

encourage ‘Green’ features

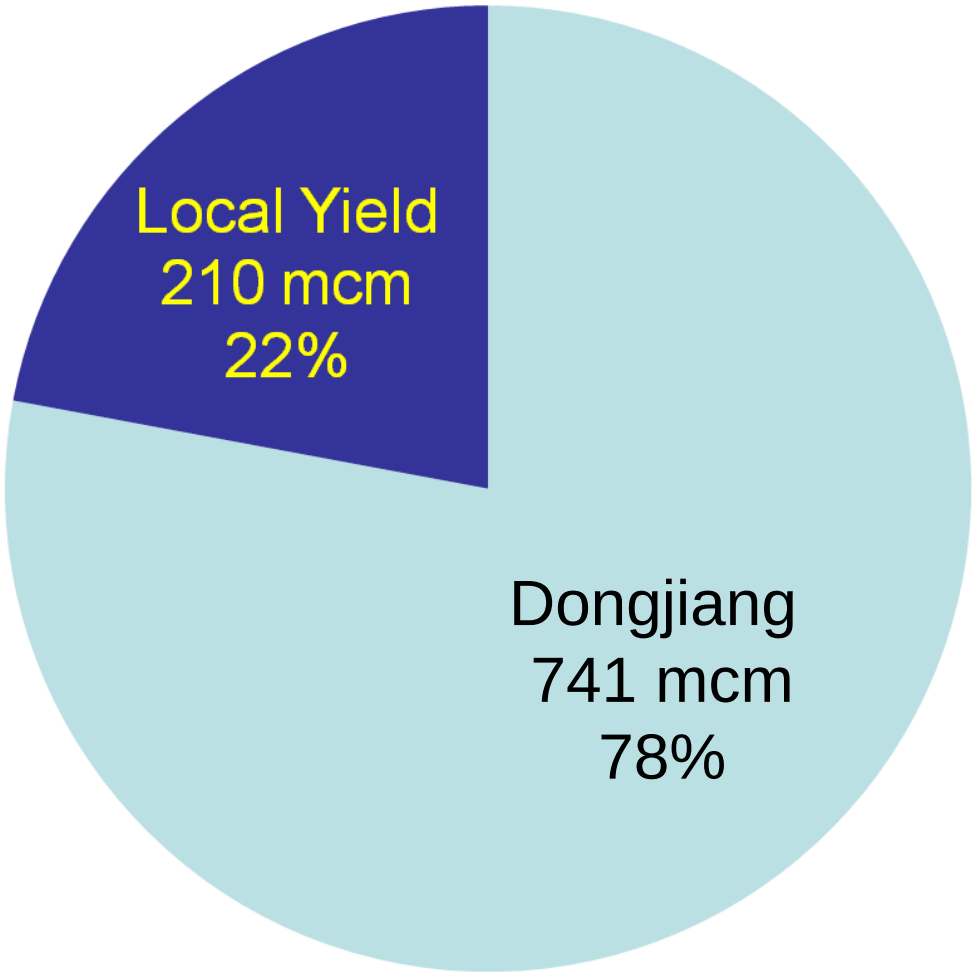
1. Water Efficient Conservation
2. Rainwater Harvesting
3. Greywater
4. Recycling Water
5. Efficient Irrigation Systems
6. Sewerage Reduction
7. Water System & Tank Maintenance
8. Innovation

Hong Kong's Water History

1957	Seawater toilet flushing in Shek Kip Mei & Lei Cheng Uk Estate
1959	Completion of Tai Lam Chung Reservoir
1960	Supply Agreement - Shenzhen Reservoir
1963	Completion of Shek Pik Reservoir
1964	Severe Rationing (4 hours of supply every 4 days)
1965	Completion of Lower Shing Mun Reservoir
1965	Supply Agreement - Dongjiang 68.2 mcm/year of
1973	Completion of Plover Cove Reservoir & Extension
1978	Completion of High Island Reservoir Scheme
1982	**Rationing Ends**
1989	Supply Agreement - Dongjiang Maximum 1,100 mcm/year
2003	Aqueduct for delivery of Dongjiang water commissioned
2006	Supply Agreement - flexible - Dongjiang water

BEAM

Hong Kong Annual Water Consumption 951 mcm 2007



The Standard 英文虎報 Friday, July 30, 2010

Workers race to recover 2,600 toxic barrels

Authorities were yesterday scrambling to recover 3,000 barrels full of hazardous chemicals that were washed into a major river in the northeast of the country by flooding.

A total of 7,000 barrels were swept into the Songhua River in Jilin province on Wednesday following heavy rains, but most were reported to be empty.

However, 2,500 barrels containing 510 tonnes of combustible, colorless chemicals and 500 loaded with solvents were washed into the river from two chemical plants near the city of Jilin, Xinhua News Agency reported.

Workers have been recovering the barrels, with city officials saying at least 400 were collected yesterday.

The city's water supplies were also restored after being cut off on Wednesday due to the incident, leaving 4.3 million people dependent on bottled water.

Teams from Jilin's environmental protection agency and its water bureau fanned out in the city to test water sources and check for leaks in the barrels.

"Some residents are worried, but we have yet to find any leaks in the barrels of chemicals, so they should not be worried about their water quality," said a Jilin Water Bureau official.

The Songhua has had environmental problems before. In 2005 carcinogenic chemicals, including benzene, spilled into the river, forcing the city of Harbin to sever water supplies to 3.8 million people for five days.

Floods this year have killed at least 928 people, left 477 missing and caused widespread damage and massive economic damage, the State Flood Control and Drought Prevention office reported.

More heavy rains were forecast for the southeast, southwest and northeast parts of the country through tomorrow.

Also in Jilin province, about 30,000 residents were trapped and left without power in their homes after torrential rains drenched Kouqian town.

Flooding has hit areas all over China. Thousands of workers sandbagged riverbanks and checked reservoirs in preparation for potential floods expected to flow from the swollen Yangtze and Han rivers, said an official with the Yangtze Water Resources Commission.

■ Four people have been arrested in connection with a chemical pipeline explosion that rocked Nanjing, Jiangsu province, as the death toll rose to 13.

More than 300 others were injured in Wednesday's blast, which was on the grounds of an abandoned plastics factory as workers were demolishing the facility. It happened when a pipeline carrying ethylene gas was damaged by workers using diggers to bring down buildings and salvage parts to resell.

The leaking gas was ignited when a nearby motorist started a car engine, investigators said.

Three building contractors and a factory official responsible for site safety were arrested.

The blast leveled or heavily damaged buildings within 100 metres and blew out windows or caused other damage to buildings up to 300m away.

AGENCIES

Barrels litter the Songhua River in Jilin as workers start the clean-up, collecting up to 400 containers yesterday. AFP, XINHUA

The Jilin town of Kouqian took a severe pounding from torrential rain. XINHUA

Sai Wan saga taken to Ombudsman

Pollution forces cities to find new water sources

Tai Lake a headache that won't go away

Alice Yan in Wuxi

Three years ago, after an algal bloom in nearby Tai Lake forced the affluent city of Wuxi (無錫), Jiangsu (江蘇) province, to cut water supplies to its two million residents, the humiliated city and provincial governments vowed to clean up the lake.

It hasn't worked.

What is worse, the country's third-largest fresh water lake has been abandoned by most cities in the area as the chief source of drinking water.

"It's such a tragedy that nearly all the (nearby) cities have given up Tai as a water source and people living by the lake have to find water elsewhere," said environmental whistle-blower Wu Lihong (吳立紅), who was jailed for three years for his activism. The sheer difficulty of cleaning up the accumulated contamination of the lake, and the mutual finger pointing by the three major jurisdictions involved – Jiangsu, Zhejiang (浙江) province and Shanghai – accounted for Tai Lake being nearly deserted, said Wu, whose decade-long crusade has earned him the unofficial title of "Tai Lake Warrior".

In some parts of the lake, the pollution is even worse than what sparked the water crisis in 2007. A Ministry of Environmental Protection report released on Monday said Tai is so seriously contaminated that sixty algal outbreaks were found in 91 tests from April to June this year.

A fisherman in Zhoutie, a town on the northwestern shore of the lake in Yixing (宜興), said he dared not open his windows at home, about 100 metres from the lake, because the stench from the algae was so strong.

He said he was one of 14 villagers who had been paid by the local government since 2008 to remove algae from the lake.

"There's so much of it that it's impossible for us to get rid of it," he said.

However, most residents of cities ago, this year's algal bloom has not been reported by mainland media, simply because the water is now of little use for the six major cities bordering the lake.

Wuxi switched to drawing water from the Yangtze River after building a new treatment plant for three billion yuan (HK$3.44 billion) in 2008.

Yixing, a city of one million, has diversified its drinking water portfolio, now relying on the Yangtze, a smaller lake and a renovated reservoir.

Changzhou (常州), another lake-side city, has built a second water supply plant near the Yangtze River, and Huzhou (湖州) in neighbouring Zhejiang relies on a reservoir.

Jiuxing (九興), also in Zhejiang, still pipes water from Tai Lake but has been looking for a backup water source for a decade.

Many residents in the scenic lake city Suzhou (蘇州) also turn to the Yangtze and a smaller nearby lake. Some Suzhou residents still use tap water from Tai Lake, because "the part [of the lake] supplying Suzhou is the cleanest one", Wu said.

The veteran environmentalist calls the pollution "a regional problem" that should entail efforts from all parties concerned. While Jiangsu, Zhejiang and Shanghai are among the country's most affluent areas, the lack of co-ordination among them has stalled the clean-up campaign.

"They quarrelled among themselves, blaming each other as the polluting source," said Wu. "I think they gave up Tai as a water source because they thought the problem was too difficult to be resolved."

This collective inertia left Tai Lake in a precarious situation, both in an environmental and a political sense. On the mainland, where green issues have increasingly become a major cause of public furore and mass action, the glaring disregard of a major pollution problem could have unwelcome results.

tention and fraud, charges widely believed to be linked to his decade-long crusade against industrial pollution in the lake. His sentencing, which earned international attention, came amid a crackdown on activists ahead of a politically sensitive Communist Party gathering.

Continuing his campaign after regaining freedom, Wu said the main culprit to blame for the contamination is thousands of polluting factories still operating around the lake.

Ma Jun (馬軍), director of the Beijing-based Institute of Public and Environmental Affairs, echoed his view, saying the government's first priority should be to stop factories from discharging untreated waste water into the lake.

"Industrial pollution has not only brought blue-green algae, which grows in a nutrient-rich environment with nitrogen and phosphorous, but also toxic materials that will affect the water quality for a long time," Ma said.

The institute says more than 80 per cent of Tai Lake is rated "inferior grade V", the worst category of water – unfit even for irrigation – and about 15 per cent is rated "grade V", unfit for human contact and suitable only for irrigation. The 3,100-square kilometre lake's water quality has not improved

lation and industries around t
It's difficult to overhaul the
lem," said Ma, who also exp
concern that giving up Tai La
source of drinking water wou
to the nearby cities losing their
tive to fight pollution.

In 2008, Jiangsu, Zhejian
Shanghai agreed to spend up
billion yuan on cleaning up T
over the next decade. The offi
fang Daily said about 600,000
of algae were fished out of t
during the summer of 2008.

However, Dr Lin Weiqing (
chief engineer at the Shanghai
emy of Environmental Scienc
weak enforcement was still a
lem, partly because there w
enough staff to oversee thous
enterprises around the lake.

"Many small factories are n
to treat their waste water to
dard level," Lin said. "What's
on many occasions they ch
their waste water directly and
to the lake."

Jiangsu officials claimed p
in curbing lake pollution last y
residents remain dubious.

A man from Changzhou
had not swum in the lake for a
years, ever since the water qua
gan to deteriorate.

"Look, it's so dirty and s
think exposure to the water wi
my body because of toxic mat
he said.

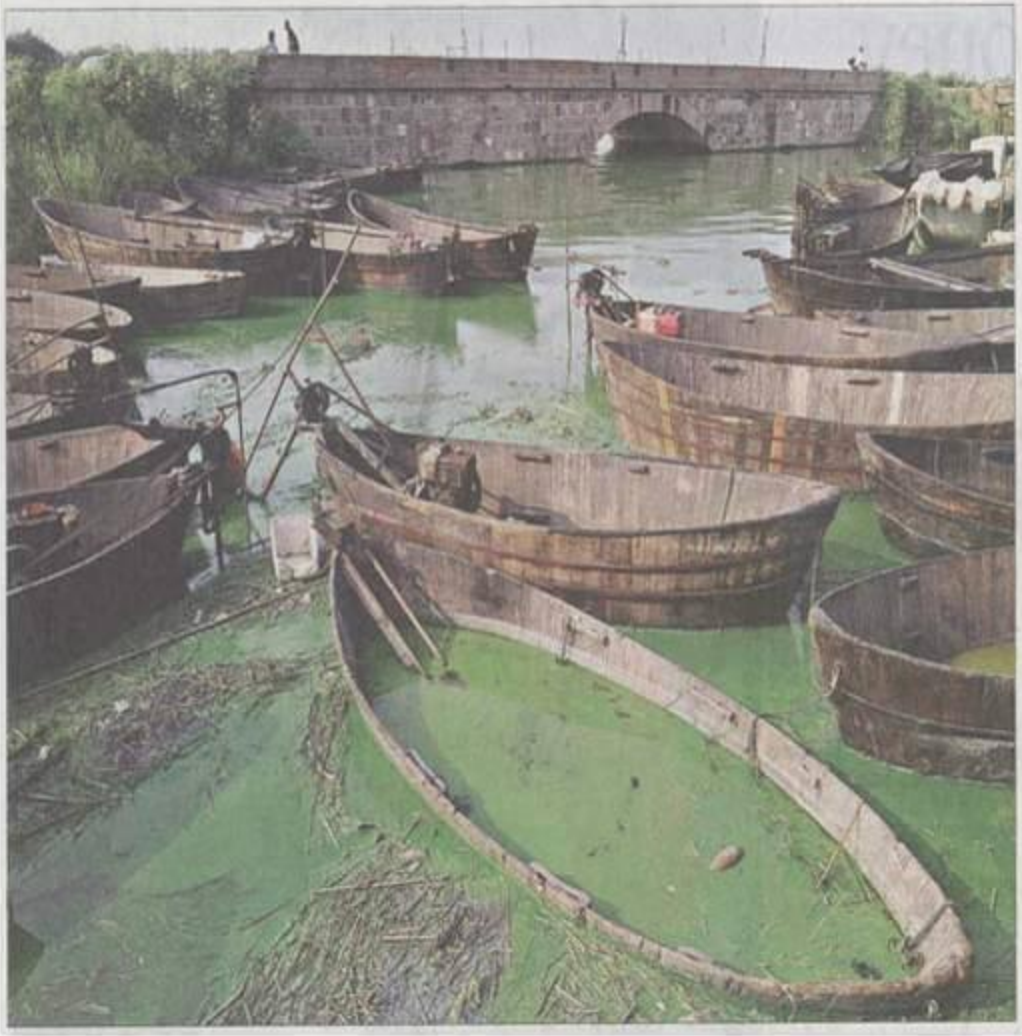
There was "no hope" that
would ever be clean again, b
because the only way to so
problems was to shut down fa
on its shores, and that was sca
governments keen to pursu
nomic growth would never d

Ma said turning to the Y
River was not a solution, bec
too, was being polluted upstre

"A lot of polluting factories
cated along the Yangtze Riv
said. "Those cities will find th
have avoided Tai's pollution

25%

of the mainland's surface water is unfit for industrial use



Pollution horror. Algae slime clogs part of Chaohu (巢湖) Lake at Hefei (合肥) in Anhui (安徽) province. A quarter of the mainland's surface water is so polluted it is unfit for industrial use. Less than half of supplies were drinkable, the Ministry of Environmental Protection said. Chaohu Lake is the fifth largest freshwater lake on the mainland.

Photo: Reuters

Dongjiang River

Rapid urbanisation in Southern China means an expanded population increasing the demand for limited water resources

South China Morning Post 南華早報
INSIGHT & OPINION
TUE Nov 5, 2013 Updated: 3:46pm

Report: 22 MARCH 2013

News | Business | Comment | Lifestyle | Sport | Property | Magazines | Multimedia

Home › Comment › Insight & Opinion

Trending Xi Jinping Edward Snowden Lamma ferry disaster Occupy Central

Water Supply in Hong Kong

COMMENT • INSIGHT & OPINION

Hong Kong's unsustainable water policies

Mayling Chan says complacency has led Hong Kong to rely too much on water from the Dongjiang - itself facing increasing stresses - while failing to push for better conservation measures and seek alternative sources

Mayling Chan

PUBLISHED : Friday, 22 March, 2013, 12:00am
UPDATED : Friday, 22 March, 2013, 4:02am

Hong Kong's unsustainable water policies

Interdependence is a human condition while total dependence is not sustainable in the long run. The Dongjiang, or East River, is part of the

SHARE

3 | 3
Like | +1
1 | 6
Share | Tweet
0 | 2
Comments
Email | Print

RELATED TOPICS

Water Supply in Hong Kong

Most Popular

VIEWED | SHARED | COMMENTED

1 Government's caution in awarding TV licences is justified
2 Bangladesh plays key role in China's rebalancing in Southeast Asia
3 China's export strength does not lie in the yuan
4 Is Legco's challenge to Exco on TV licences probe really worth it?
5 The coming war over talent, the world's most valuable currency

We recommend

BEAM

Dongjiang River Basin

Upstream Zone

- unfair distribution of burden
  ⇨ intra-basin disparity

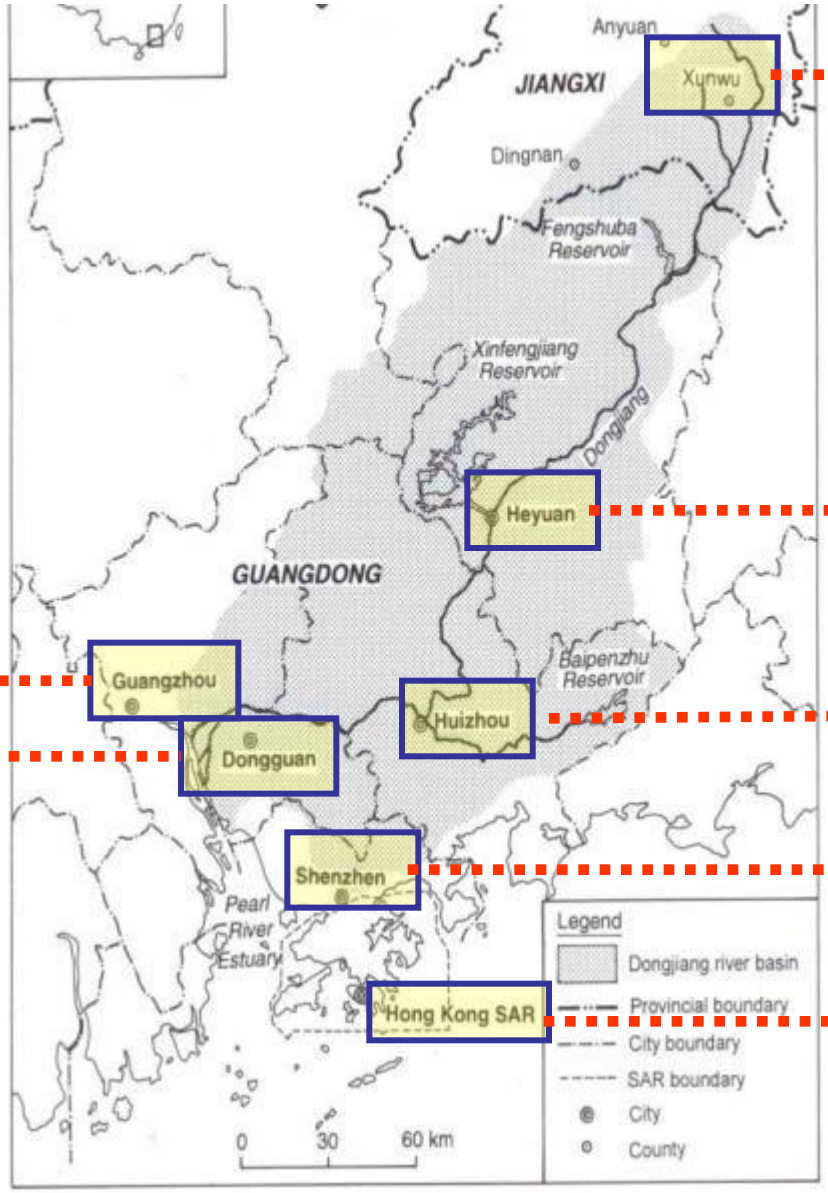
- development restricted
  ⇨ underdeveloped

- priorities
  ⇨ “ecological compensation”
  ⇨ supportive policies

BEAM

Dongjiang River Basin

per capita
GDP
US$ 2008



215

1,501

9,206

3,711

5,901

10,211

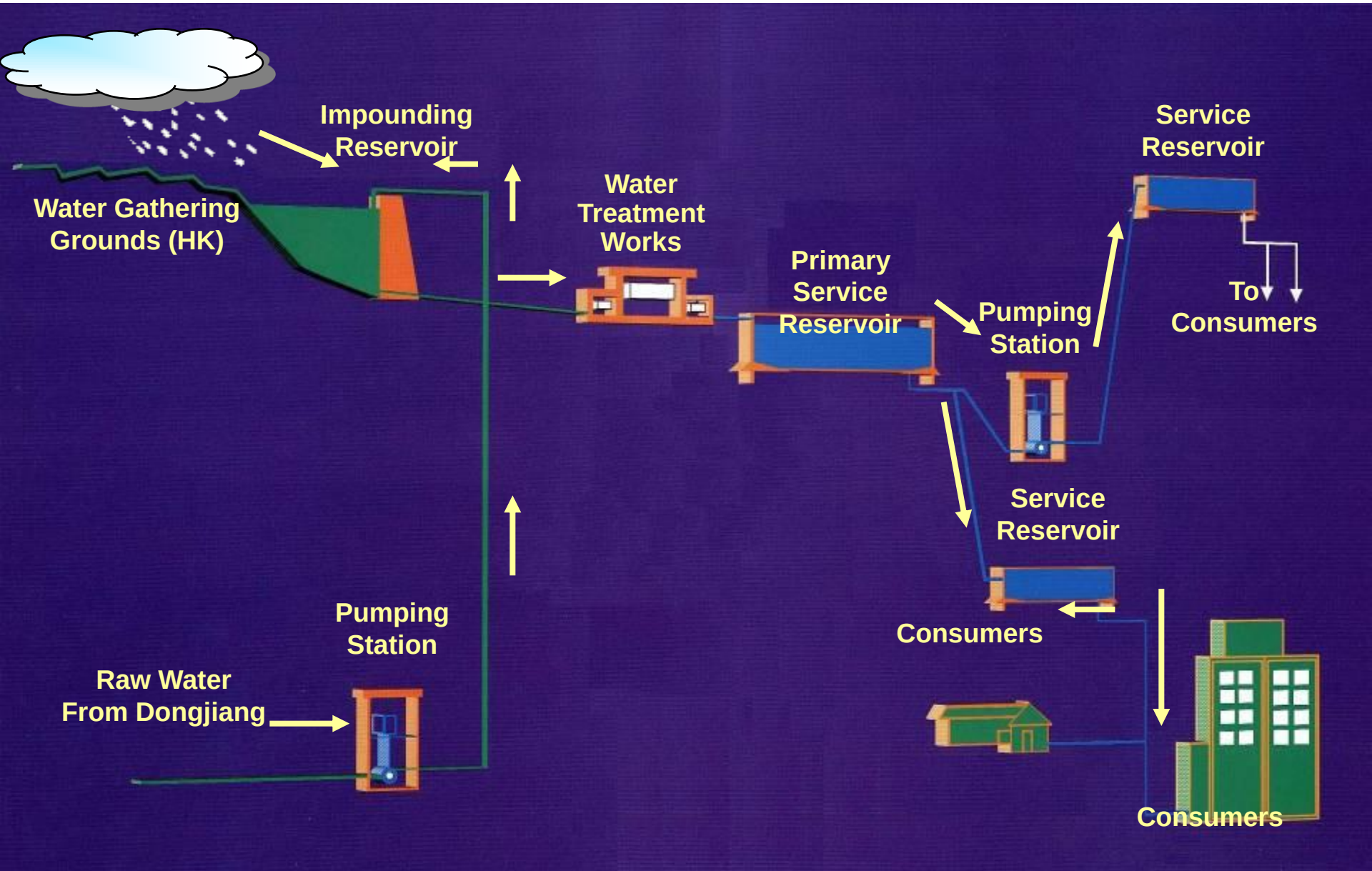
29,900


東深供水
專用輸水管道
Dongshen Water Supply
Dedicated Aqueducts
Dongjiang
Linhu
Pumping Station
Taiyuan
Pumping Station
Qiling
Pumping Station
Tangjia Jinhu
Pumping Station
Shenzhen
Shuiku
SHENZHEN
HONG KONG
HUIYANG
BOLUO
LONGGUAN

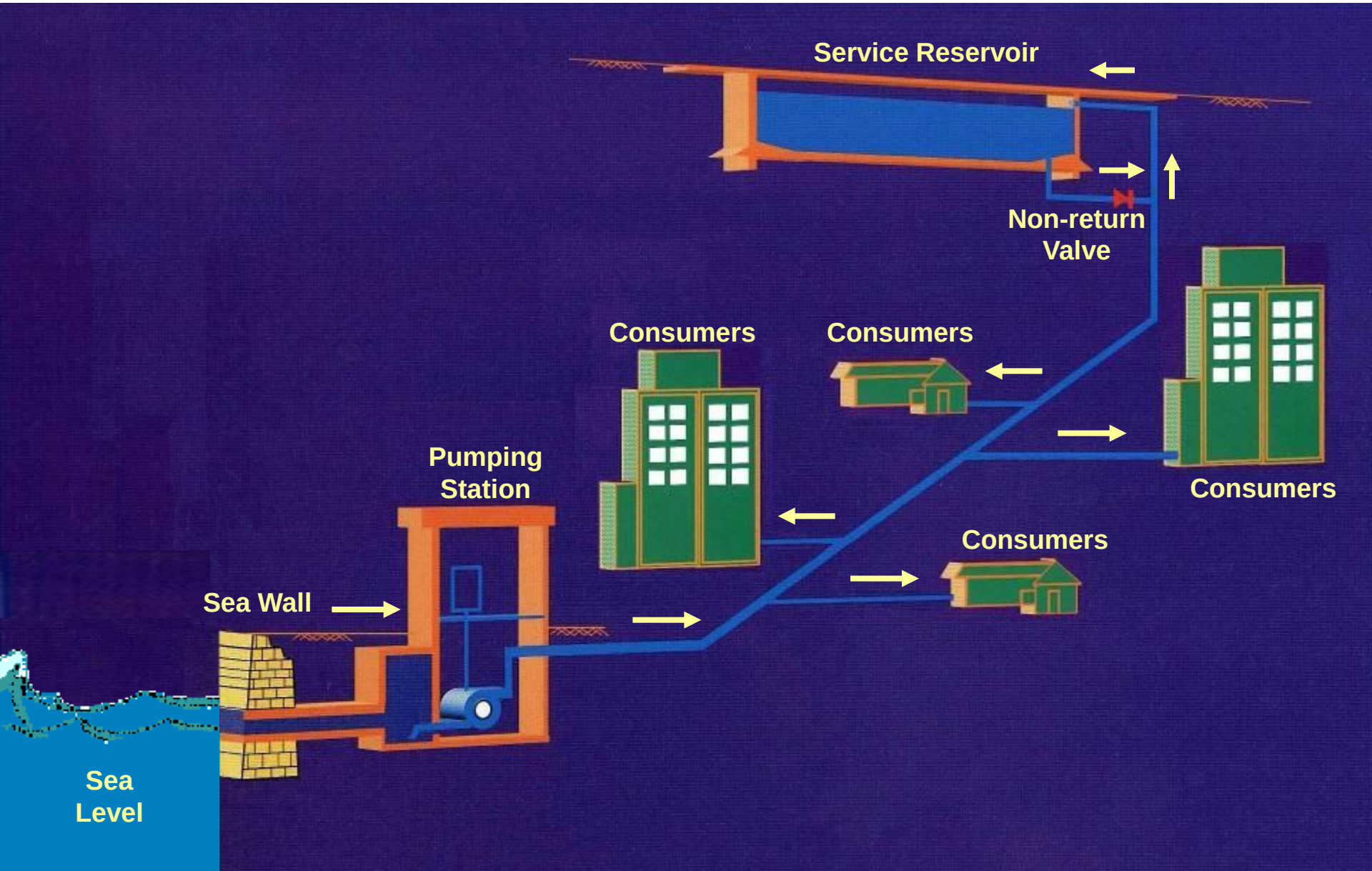
香港的主要供水系統
Principal Water Supply System in Hong Kong

G09-378.cdr

Hong Kong Water Supply System



Hong Kong Sea Water Supply System



BEAM Water Use Summary

	NB	EB
Pre-requisite	**2**	**3**
Possible Credits Points	**9**	**7**
Possible Bonus Points	**1**	**2**

Credit Summary NB:

WU P1	Water Quality Survey
WU P2	Minimum Water Saving Performance
WU 1	Annual Water Use
WU 2	Monitoring and Control
WU 3	Water Efficient Irrigation
WU 4	Water Recycling
WU 5	Water Efficient Appliances
WU 6	Effluent Discharge to Foul Sewers

Credit Summary EB:

WU P1	Water Quality Survey
WU P2	Minimum Water Saving Performance
WU P3	Water Conservation Plan
WU 1	Annual Water Use
WU 2	Monitoring and Controls
WU 3	Water Use for Irrigation
WU 4	Water Recycling
WU 5	Water Audit (BONUS)
WU 6	Effluent Discharge to Foul Sewers

BEAM Water Use Summary

NB Credit Summary

WU P1	Water Quality Survey
WU P2	Minimum Water Saving Performance
WU 1	Annual Water Use
WU 2	Monitoring and Control
WU 3	Water Efficient Irrigation
WU 4	Water Recycling
WU 5	Water Efficient Appliances
WU 6	Effluent Discharge to Foul Sewers

BI Credit Summary

WU 1	Water Quality Survey
WU 2	Annual Water Use
WU 3	Effluent Discharge to Foul Sewers
WU 4	No Bottled Water

WU Common Problem

Applicants fail to support WU submission with any description of green strategy

Describe your strategy

WU Common Problem

Applicants submit too early before Contract Documents (spec. and drawings) are finished.

WU Common Problem

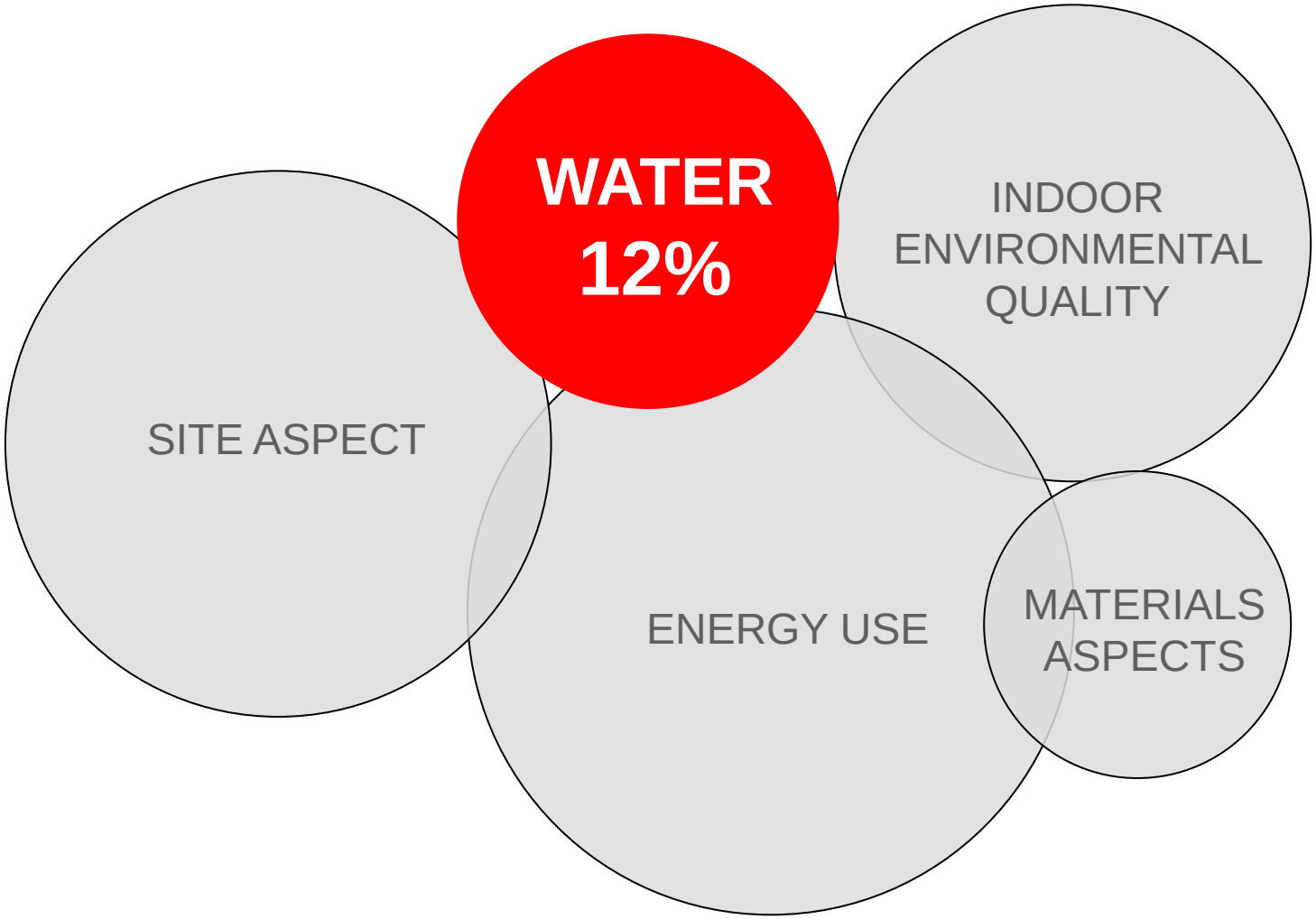
Green Building Intent
Recognise those firms that exceed CODE requirements (not merely complying with code)

WU Possible Strategies

1. Consumption - Lower flow duration
2. Consumption - Lower flow rate
3. Provide alternate water source
4. Recycle Greywater
5. Eliminate (design out)

New Buildings (NB)

Category Weighting WU NB

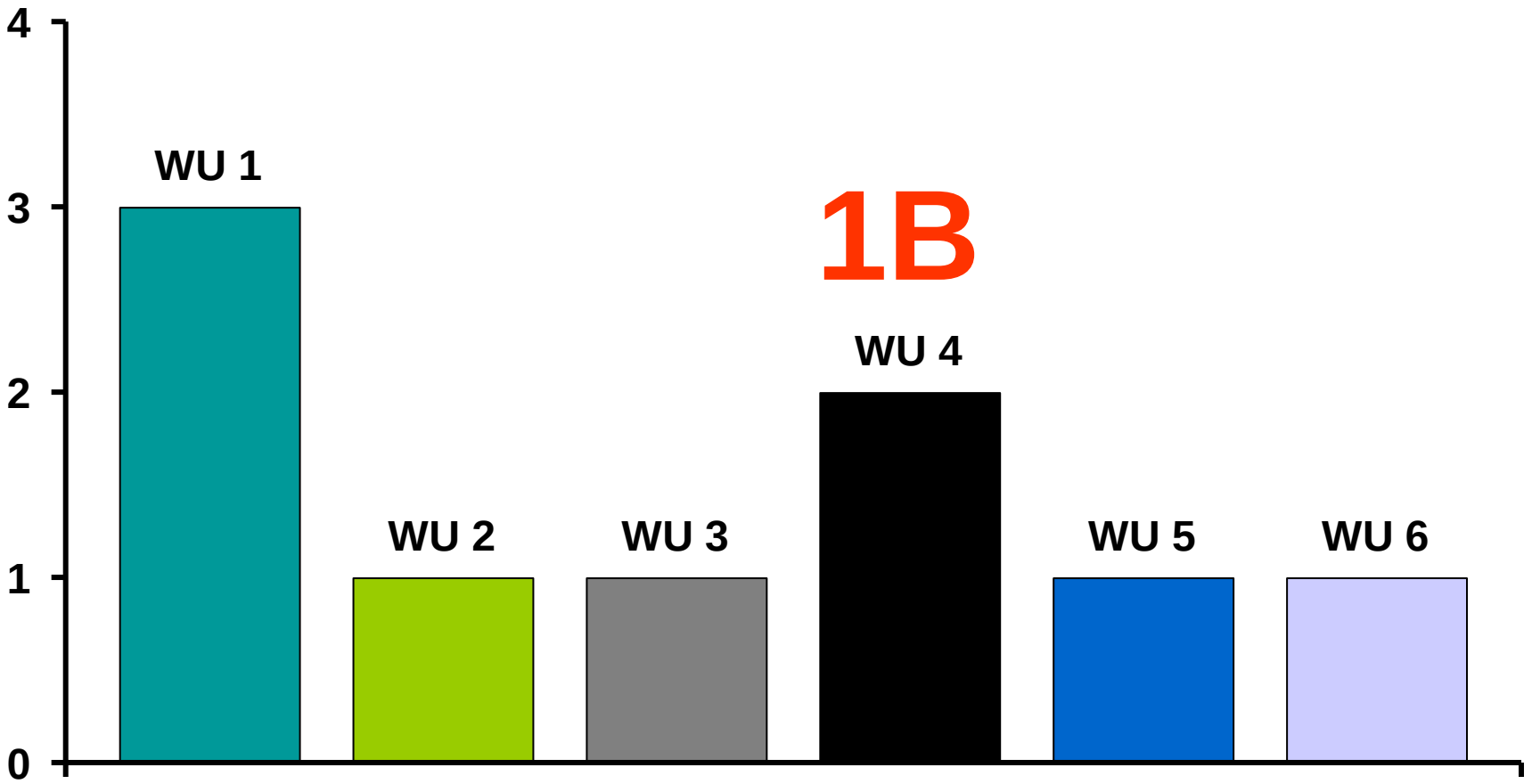


Water Use Summary NB

5	Water Use (Wu)			9+1B
Wu P1	Water Quality Survey	Demonstrate that the quality of potable water meets the referenced drinking water quality standards at all points of use.	None.	Required
Wu P2	Minimum Water Saving Performance	Demonstrate that the use of water efficient devices leads to an estimated aggregate annual saving of 10%.	None.	Required
Wu 1	Annual Water Use	1 credit for demonstrating that the use of water efficient devices leads to an estimated aggregate annual saving of 20%. 2 credits for demonstrating an estimated annual saving of 25%. 3 credits for demonstrating an estimated annual saving of 30%.	None.	3
Wu 2	Monitoring and Control	1 credit for installation of devices to monitor water leakage from the fresh water distribution systems without embedded plumbing pipework.	None.	1
Wu 3	Water Efficient Irrigation	1 credit for the use of an irrigation system which does not require the use of municipal fresh water after a period of establishment is complete. Alternatively, 1 credit for demonstrating highly efficient irrigation technology and/or the use of harvested rainwater and/or recycled grey water to reduce fresh water consumption for irrigation by 50% or more in comparison with conventional irrigation of water intensive planting.	Where soft landscaping and planting coverage is less than 50% of the area of the building footprint.	1
Wu 4	Water Recycling	1 credit for harvesting of rainwater which will lead to a reduction of 5% or more in the consumption of fresh water. 1 credit where recycled grey water will lead to a reduction of 5% or more in the consumption of fresh water. 1 BONUS credit where harvesting and/or recycling leads to a reduction of 10% or more in the consumption of fresh water.	None.	1 1 1B
Wu 5	Water Efficient Appliances	1 credit for installing water efficient appliances that have Water Efficiency Labeling Scheme Grade 2 or above.	Buildings in which facilities and/or devices are not installed by the developer.	1
Wu 6	Effluent Discharge to Foul Sewers	1 credit for demonstrating an estimated reduction in annual sewage volumes by 20% or more.	None.	1

BEAM

Credit Distribution WU NB



WU NB

WU P1	**Water Quality Survey**
WU P2	**Minimum Water Saving Performance**
WU 1	**Annual Water Use**
WU 2	**Monitoring and Controls**
WU 3	**Water Efficient Irrigation**
WU 4	**Water Recycling**
WU 5	**Water Efficient Appliances**
WU 6	**Effluent Discharge to Foul Sewers**

BEAM

WUP1 Water Quality Survey

Rationale

1. Provide quality potable water for all building users
2. Benchmark QWSSFB parameters
3. Reduce resources plastic bottle (fossil fuel)
4. Reduce process, transportation emissions

Requirement

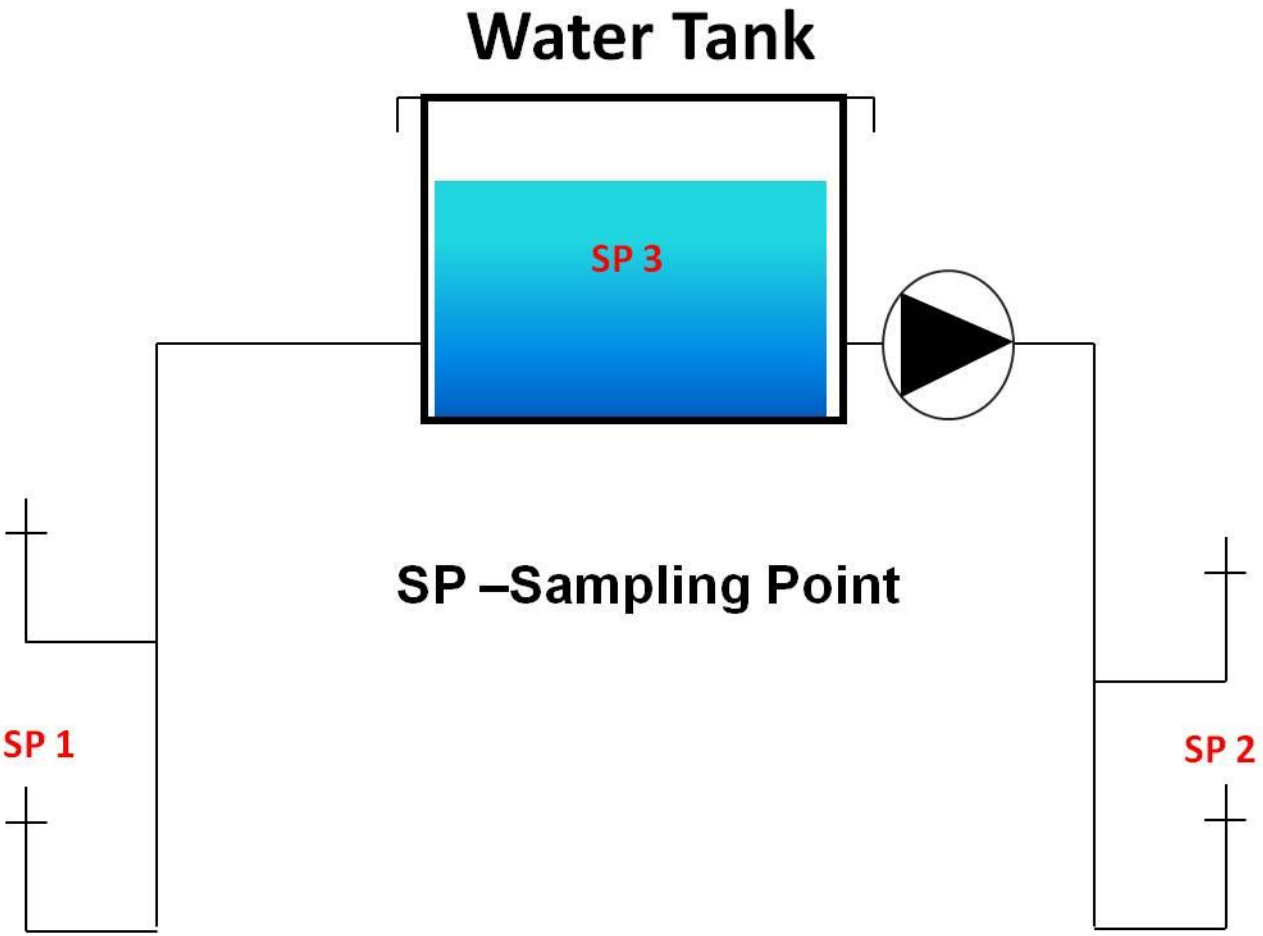
1. Water Sampling
2. Locations (all tanks and farthest outlets in the distribution system)
3. Schematic and layout drawings c/w sample points highlights
4. Method statements, sample handling, etc.
5. Laboratory reports

WU P1 Intent

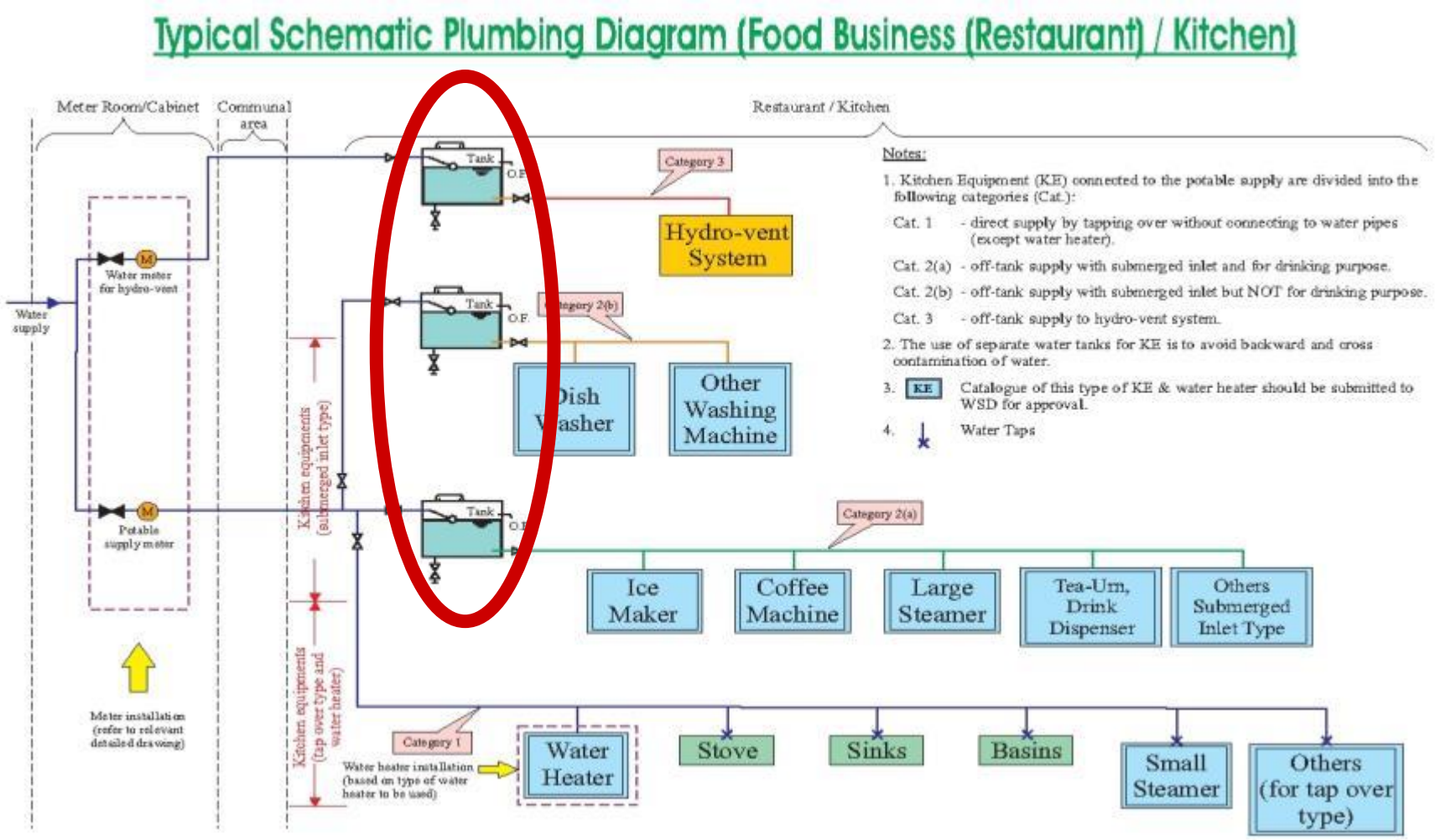
dirt enters the plumbing system during construction

Photo copyright: John A. Herbert

WUP1 Concept



WUP1 Concept



Source: http://www.wsd.gov.hk/filemanager/en/share/pdf/restaurant_e.pdf

BEAM

WUP1 Common Mistakes

1. Missed buildings, separate buildings need testing
2. Missed sample locations
3. Incorrect quality test parameters
4. Schematic and layout drawings without sample points highlighted
5. Incorrect sample handling and transportation
6. One test for multiple buildings

WUP1 Common Mistakes

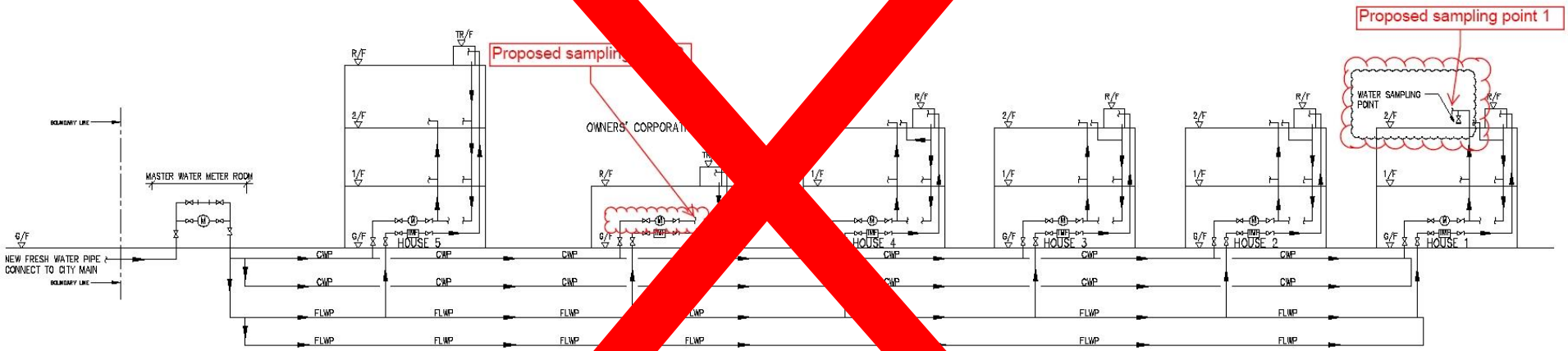
7. Concept drawing provided no pipe sizes, pump duties, etc. WSD standard schematic and layout drawings required.
8. Potable water tank sampling locations omitted
9. Misunderstanding intent BEAM criteria not WSD code requirement

WUP1 Common Mistakes

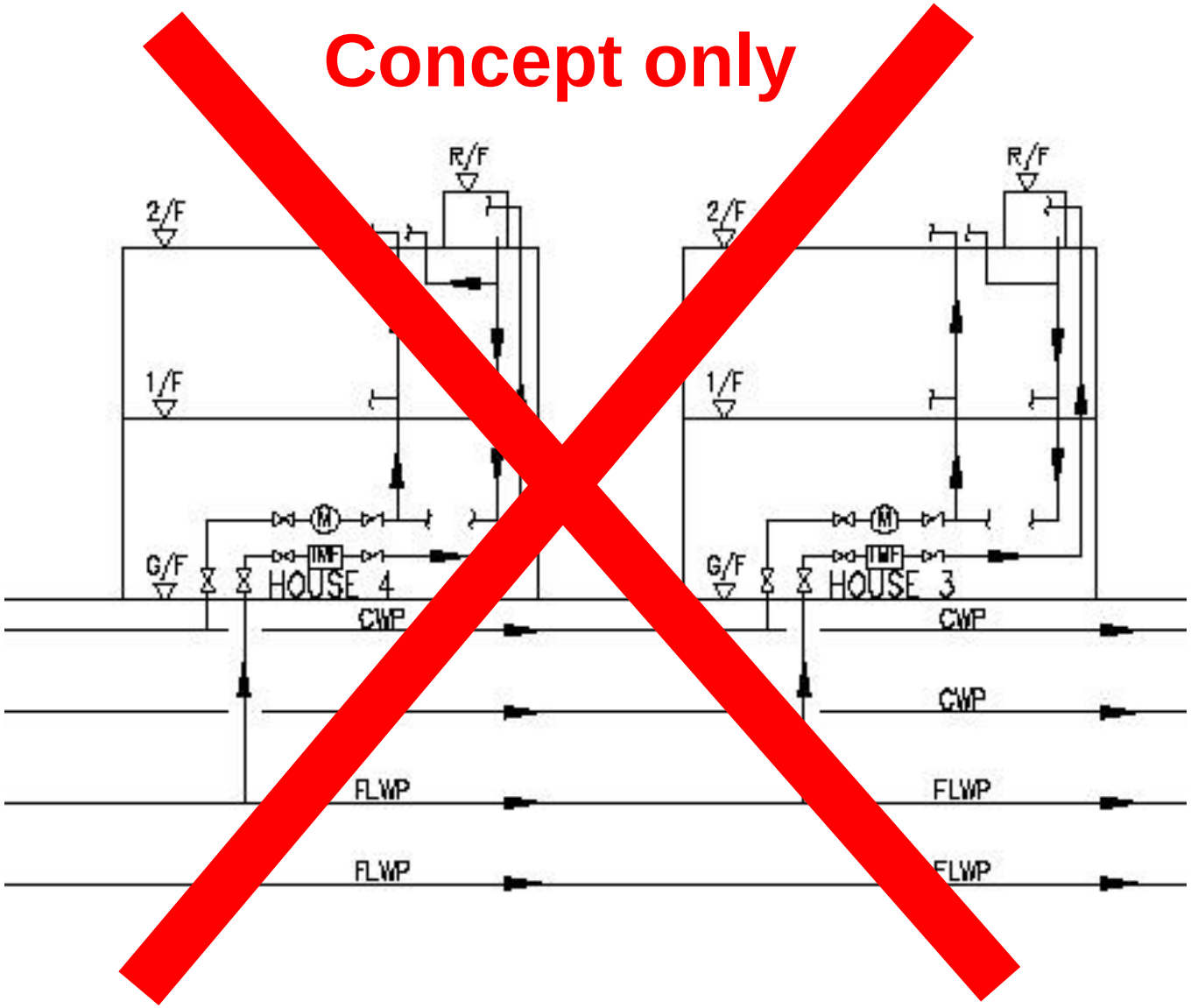
10. Direct feed systems not tested, all systems to be tested.

WUP1 Common Mistakes

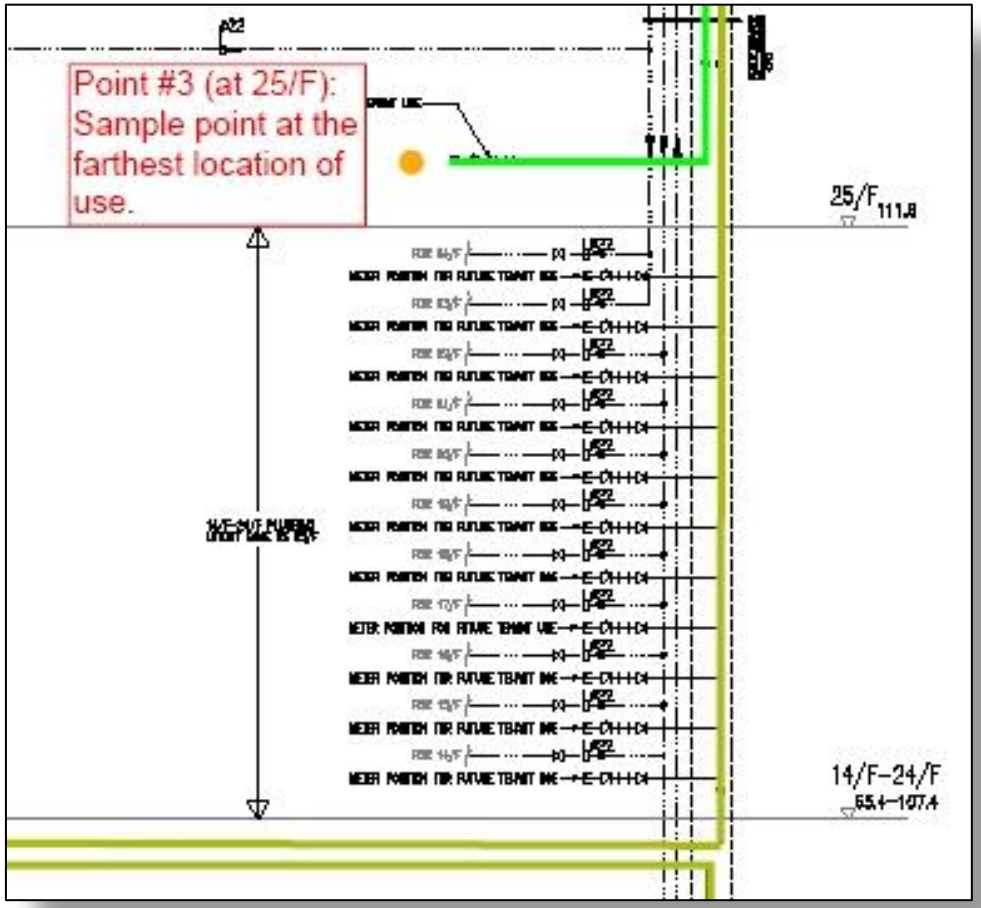
Does not meet intent
6 buildings, but only 2 samples



WUP1 Common Mistakes



WUP1 Submission



Better Example

1. pipe route and sample locations clearly highlighted
2. Levels/mpd clearly indicated
3. Clear notation

WUP2 Water Saving Performance

Rationale

1. Reduce potable water consumption by 10% or more
2. Minimize adverse environmental impact
3. Reduce waste water
4. Reduce sewerage
5. Encourage proven technology

Requirement

1. Describe your strategy
2. Flow rate calculation at working pressure
3. Schematic and Layout drawings
4. Catalogue/cut sheets
5. Use baseline data provided in BEAM manual
6. Records, Cx data, delivery notes, record photographs, etc.

WUP2 Concept WELS

- WSD
- Voluntary scheme
- Water fixture / appliance label
- Rating 1 is best

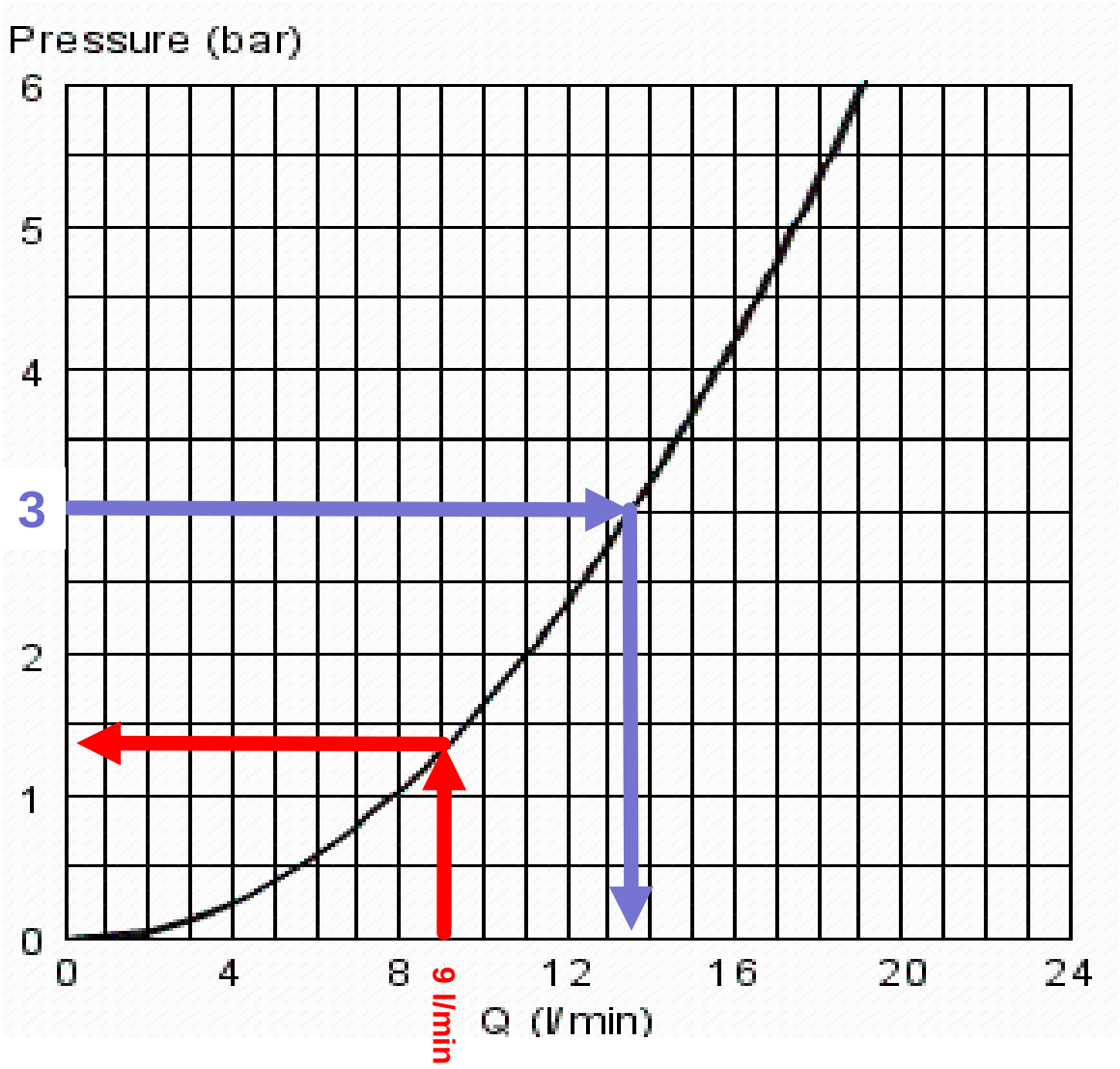
WUP2 Concept

Lower duration IR sensor

Lower flow rate

Lower flow rate

WUP2 Concept Flow Rate



WUP2 Concept Pressure

1. Pipeline flow limiter
2. Flow controller (WSD term)
3. Constant flow regulator

Does it match actual pressure?

WUP2 Calculation format

Device	duration (seconds)	Daily use per occupant	Working Pressure (bar)	water flow rate @ working pressure		daily consumption per person	
				(L/min)	(L/min)	(L)	(L)
				Baseline	Built	Baseline	Built
Tap 45	10.00	5.00	3.00	6.00	4.00	5.00	3.33
Tap 46	15.00	1.00	3.00	8.00	4.50	2.00	1.13
Tap 47	10.00	5.00	1.00	6.00	2.50	5.00	2.08
Tap 48	15.00	1.00	1.00	8.00	3.00	2.00	0.75
					daily consumption per person	14.00	7.29
					occupants	30.00	30.00
					Operating days	365.00	365.00
					annual consumption (litres)	153,300.00	79,843.75
					annual consumption saved (litres)		73,456.25
					percentage water saved		**48%**

Same for baseline & built case

BEAM

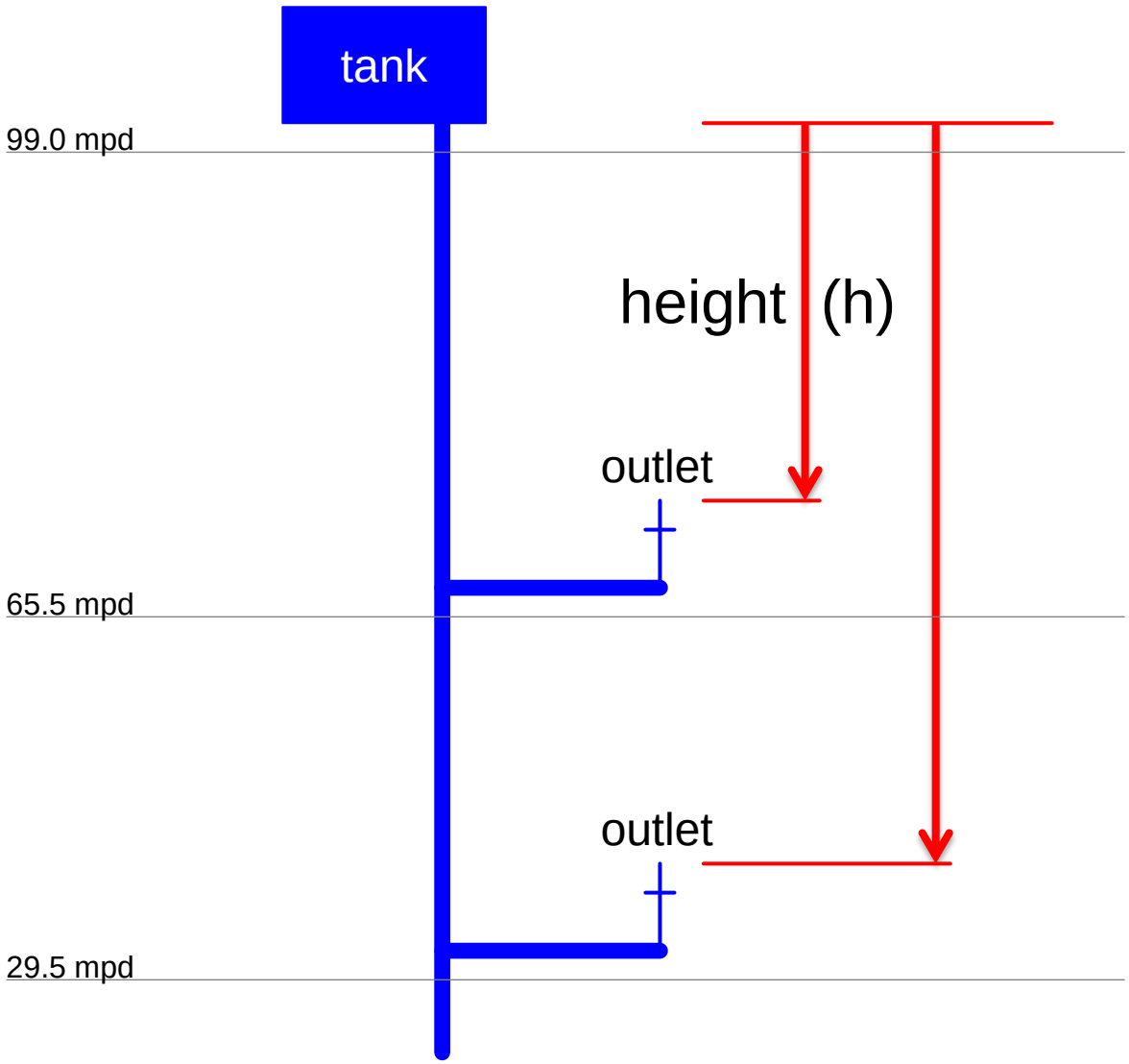
WUP2 ICAC Headquarters

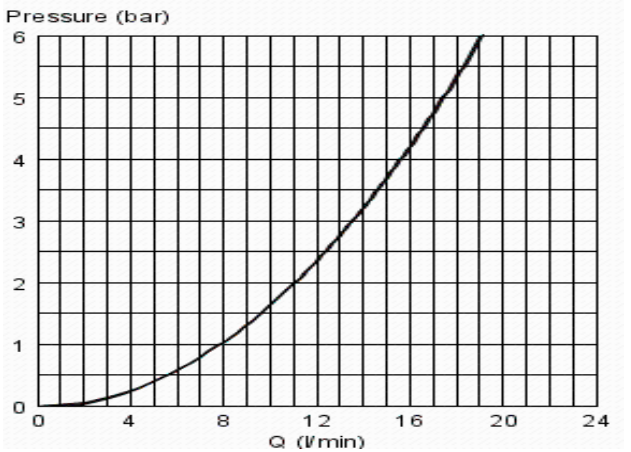
water tap c/w infrared sensor

Urinal c/w infrared sensor

Dual Flush WC

WUP2 Common Mistakes





$$P = \rho g h$$

h	bar	flow rate l/min
32.5	3.25	14
68.5	6.85	20

BEAM

WUP2 Common Mistakes

1. Incorrect water pressure calculations (floor by floor)
2. Incorrect water consumption calculations
3. Missing authority for assumptions
4. Missing catalogues (sample for PA is accepted)

WUP2 Common Mistakes

5. Schematic plumbing drawing (VPLD) with no mpd level identified
6. Incomplete drawings (50% missing), no pipe sizes, pump duties, tank sizes, etc.
7. Incorrect occupancy (used BD information from GBP)

WUP2 Common Mistakes

8. An ‘average water’ pressure or average per zone, used for determining water flow rate (not acceptable)
9. Concept sketches – Plumbing schematic (VPLD) and layout drawings that meet WSD standard ARE required!

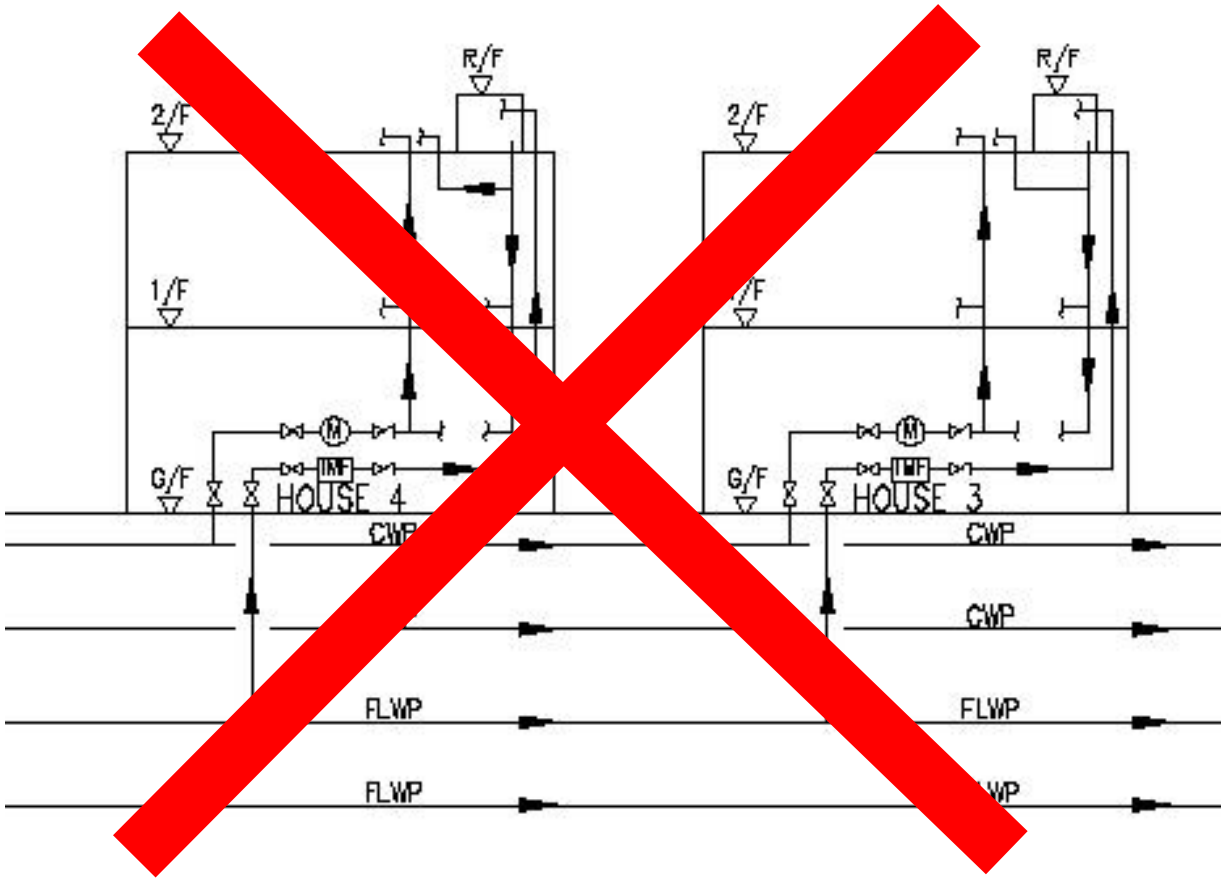
WUP2 Common Mistakes

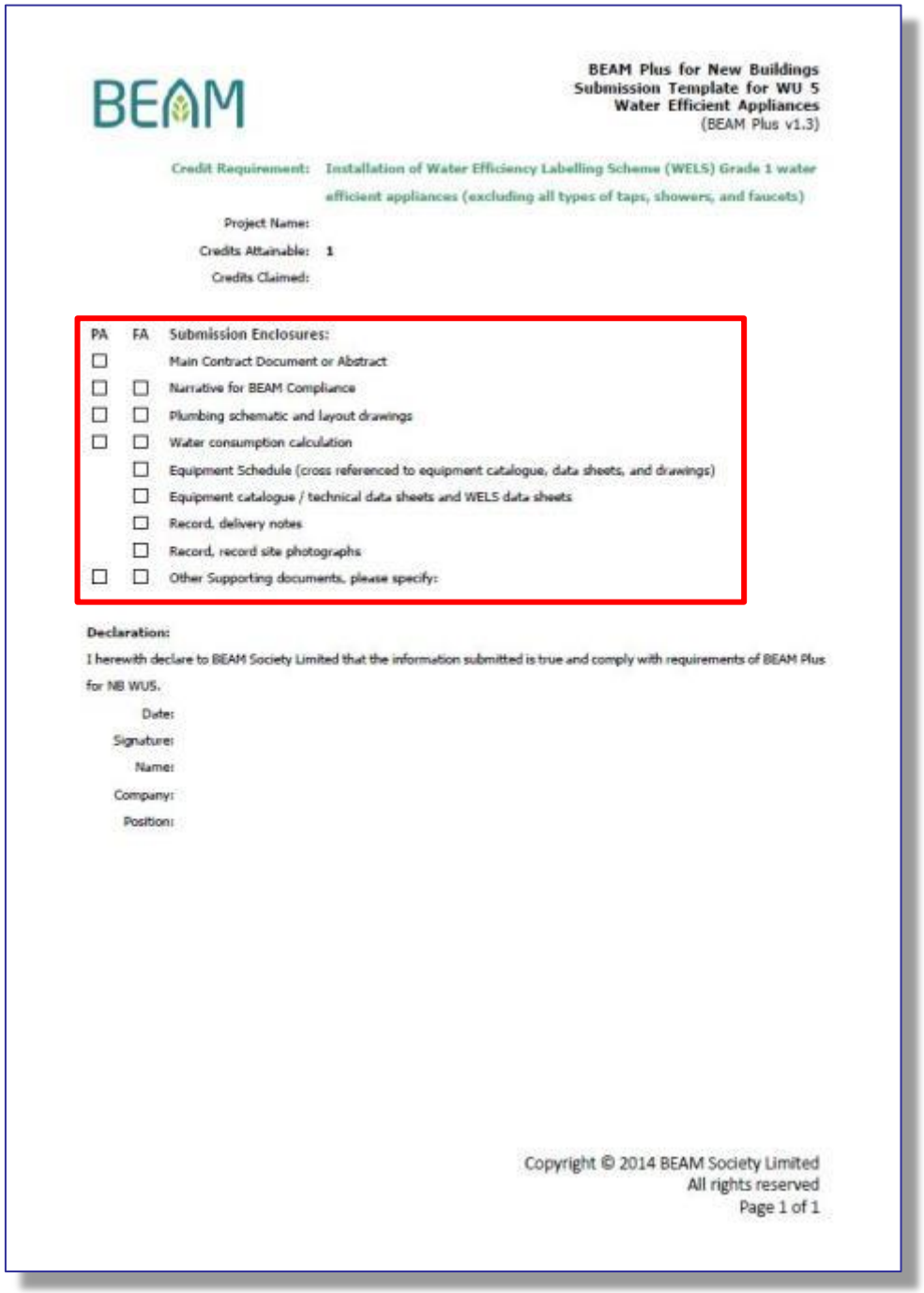
10. No duties (pressure) for proposed PRV’s provided
11. RC tank not indicated on GBP
12. For developments where no flushing water DO NOT include the potable water used for flushing.

WUP2 Common Mistakes

13. Do not include potable water used by appliances e.g. washing machines (already covered under WU5)
14. Submitting catalogue without cross referencing and highlight the make/model with submission data
15. No support for assumptions

WUP2 Common Mistakes





BEAM

BEAM Plus for New Buildings
Submission Template for WU 5
Water Efficient Appliances
(BEAM Plus v1.3)

Credit Requirement: Installation of Water Efficiency Labelling Scheme (WELS) Grade 1 water efficient appliances (excluding all types of taps, showers, and faucets)

Project Name:

Credits Attainable: 1

Credits Claimed:

PA	FA	Submission Enclosures:
☐		Main Contract Document or Abstract
☐	☐	Narrative for BEAM Compliance
☐	☐	Plumbing schematic and layout drawings
☐	☐	Water consumption calculation
	☐	Equipment Schedule (cross referenced to equipment catalogue, data sheets, and drawings)
	☐	Equipment catalogue / technical data sheets and WELS data sheets
	☐	Record, delivery notes
	☐	Record, record site photographs
☐	☐	Other Supporting documents, please specify:

Declaration:

I herewith declare to BEAM Society Limited that the information submitted is true and comply with requirements of BEAM Plus for NB WU5.

Date:

Signature:

Name:

Company:

Position:

Draft Template

BEAM

Draft Template

PA	FA	Submission Enclosures:
☐		Main Contract Document or Abstract
☐	☐	Narrative for BEAM Compliance
☐	☐	Plumbing schematic and layout drawings
☐	☐	Water consumption calculation
	☐	Equipment Schedule (cross referenced to equipment catalogue, data sheets, and drawings)
	☐	Equipment catalogue / technical data sheets and WELS data sheets
	☐	Record, delivery notes
	☐	Record, record site photographs
☐	☐	Other Supporting documents, please specify:

WU1 Annual Water Use

Rationale

1. Encouraging further annual water saving, 20%, 25% or 30% earns 1, 2, or 3 credits respectively;
2. Reducing Carbon emissions
3. Lowering environmental impact
4. Raising water efficiency awareness

Requirement

1. Joint WUP2 & WU1 Submission accepted.
2. Complete WU1 submission template to claim credit

WU1 Common Mistakes

1. No Submission Template provided to earn credit

WU2 Monitoring and Control

Rationale

1. Water Seepage PNAP APP105
2. Encourage design with no embedded piping, exposed pipe leakage is self evident.
3. Early leakage detection can minimise waste water and property damage

Requirement

1. Strategy
2. Schematic and layout drawings water and detection system
3. Coverage all concealed piping including: Meter rooms, pipe ducts, risers, under floor, plant rooms, etc.
4. Record, log book, BMS output, photographs, etc.

WU2 Submission

1. Exposed/surface mounted piping means any leakage is self evident
2. Underground piping is excluded from Assessment

WU2 Common Mistakes

1. Coverage - all concealed piping including plant rooms, ceiling voids, raised floor voids, pipe ducts, water meter rooms, risers, and all other areas with concealed water pipework (within project boundary)

WU3 Water Efficient Irrigation

THREE (alternative) Paths:

1. No municipal potable water used for irrigation after establishment period or;
2. Highly efficient irrigation technology and/or;
3. Irrigation, 50% or more, sourced from Greywater and or Rainwater harvesting source(s)

WU3 Water Efficient Irrigation - ALL

Rationale

1. Integrated planning
2. Avoid potable water use for landscape area
3. Encourage smarter species selection
4. Minimise environmental impacts

Requirement

1. Achieve Credit Intent

WU3 Water Efficient Irrigation - 1

Rationale

1. Avoid municipal potable water use landscape irrigation
2. Seek other sources e.g. well water;
3. Encourage selection of better/local species

Requirement

1. Description of irrigation strategy
2. Planting and species information
3. Contract drawings, Landscape Master Plan (LMP) with landscaped areas colour coded

WU 3 -1 Concept Species

1. Consider drought tolerant tree species, for example:
   - Acacia baileyana (NSW provenance)
   - Acacia melanoxylon (Victorian provenance)
   - Casuarina cunninghamiana Brachychiton acerifolia (Flame Tree very similar in appearance to the Delonix regia in HK)
   - Eucalyptus camaldulensis (Inland provenance)
   - Eucalyptus citriodora Eucalyptus sideroxylon (Inland provenance)

BEAM

WU 3 -1 Concept

1. Consider sourcing water from well, avoiding municipal water usage

WU3 -1 Common Mistakes

1. No material to justify claim
2. Coverage must be all landscape areas within project boundary.
3. For well water, provide 100% of irrigation requirement

WU3 Water Efficient Irrigation - 2

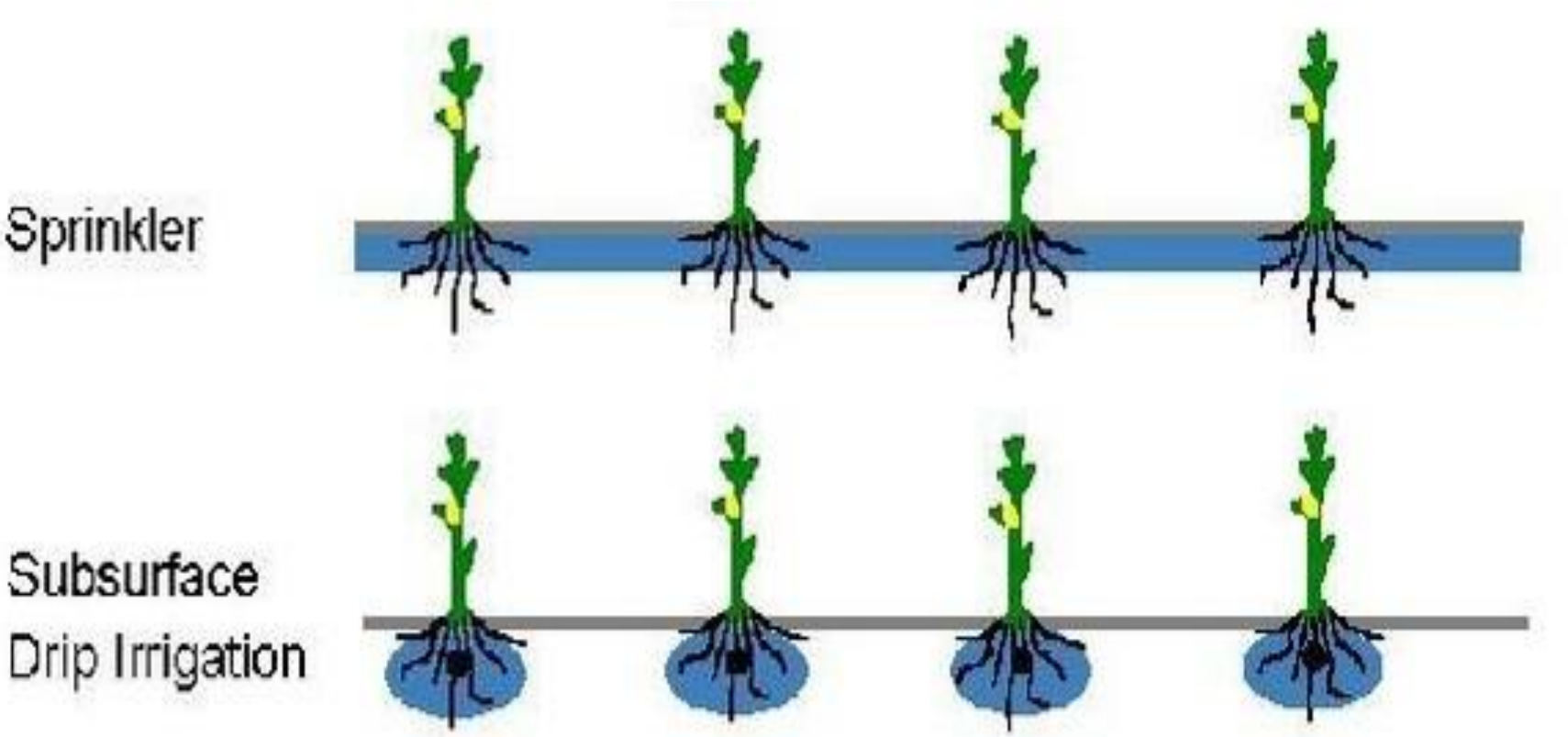
Rationale

1. Encourage efficient irrigation systems
2. Reduce waste and lower environmental impact

Requirement

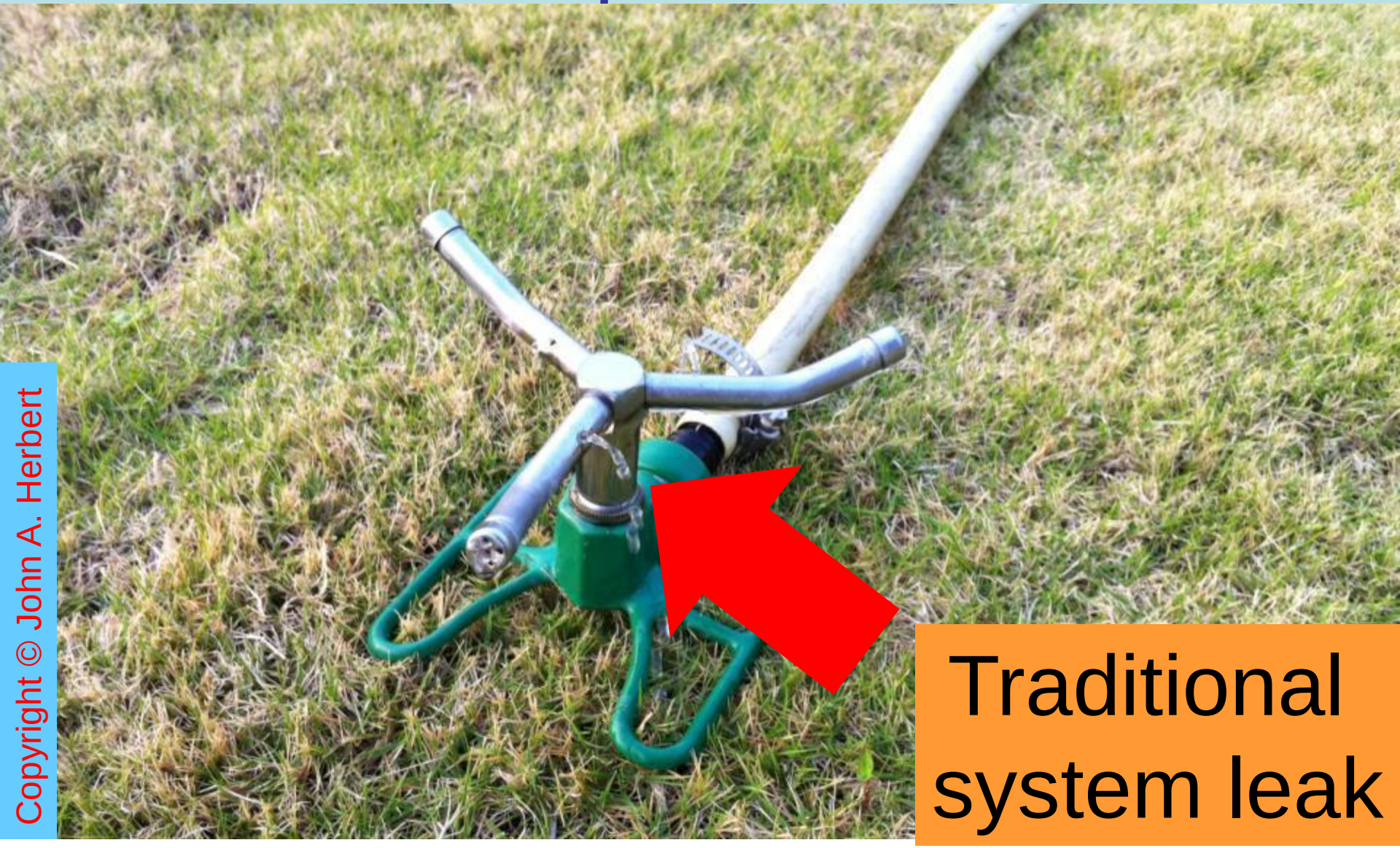
1. Highly efficient irrigation technology (drip type)
2. Calculations
3. 100% landscape coverage
4. Schematic and layout drawings
5. Catalogue/Technical data sheets
6. Records, Cx data, site installation photographs, lob book, meter readings

WU3 -2 Concept



Source: http://www.xavier.edu/green/Drip-Irrigation.cfm

WU3 -2 Concept



Traditional system leak

BEAM

WU3 -2 Case

Green Roof

- **100% coverage**
- **subterranean drip irrigation**
- **manufactured with recycled material**

BEAM

WU3 -2 Common Mistakes

1. Coverage - all within project boundary required
2. Concept drawings, not Contract drawings provided
3. Little detail provided, no LMP submitted

WU3 Water Efficient Irrigation - 3

Rationale

1. Encourage alternative water source for irrigation
2. Raise awareness for recycled water

Requirement

1. Greywater/Rainwater harvesting installation Strategy
2. Landscape Coverage 100%
3. Schematic and layout drawings
4. Calculations
5. Catalogue
6. Records, log book, Cx data, installed photographs

WU3 -3 Submission

1. Fully detailed design required (tender stage documents);
2. Any combination of catchment area(s) with the project boundary is accepted.
3. No requirement to use every roof as catchment

WU3 -3 Submission

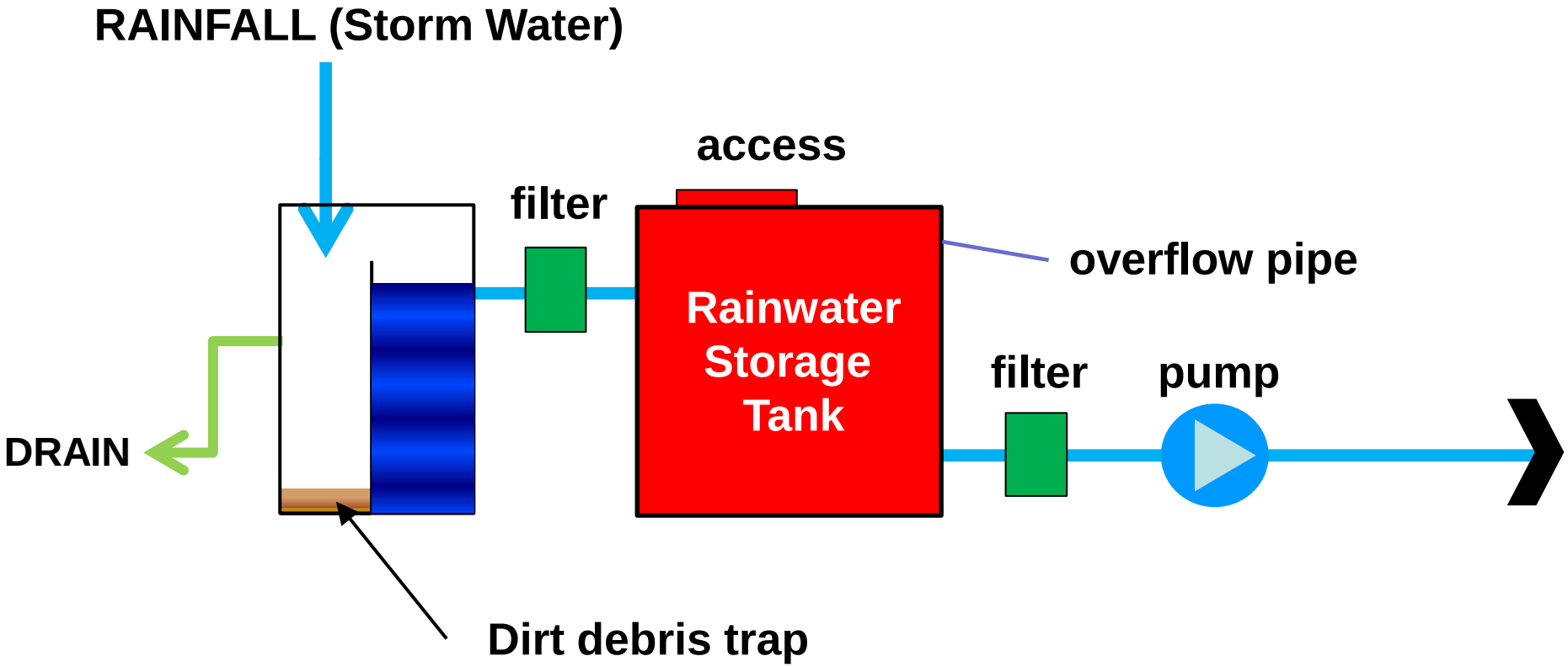
4. Landscaping irrigation demand methodology{1}

1. The Landscape Coefficient Method and Water Use Classification of Landscaping Species by University of California Cooperative Extension and California Department of Water Resources.

WU3 -3 Concept

1. RH First Flush After dry weather debris, dirt, leaves, etc. accumulate on the catchment area
2. To prevent blocking equipment, filters, etc. the initial volume (with debris) is directed to sewerage not RH storage tank.

WU3 -3 Concept



(Not design, Water treatment omitted for clarity)

WU3 -3 Concept

1. The RH simulation by calculation deduct the First Flush loss
2. The water volume discharged (lost) estimated approx. 20-25 litres[1] per event.

[1] http://www.who.int/water_sanitation_health/gdwqrevision/rainwater.pdf

WU3 -3 Concept

Rainwater Harvesting Formula

$$V = (A \times D \times K) - F$$

where:

A: Collection Area (sqm)

D: Rainfall (m)

K: Surface Collection Coefficient (0.5 - 0.9)

F: First Flush (e.g. 25 litres per event)

Baseline Irrigation demand = 7 litres/sqm/day

WU3 -3 Concept

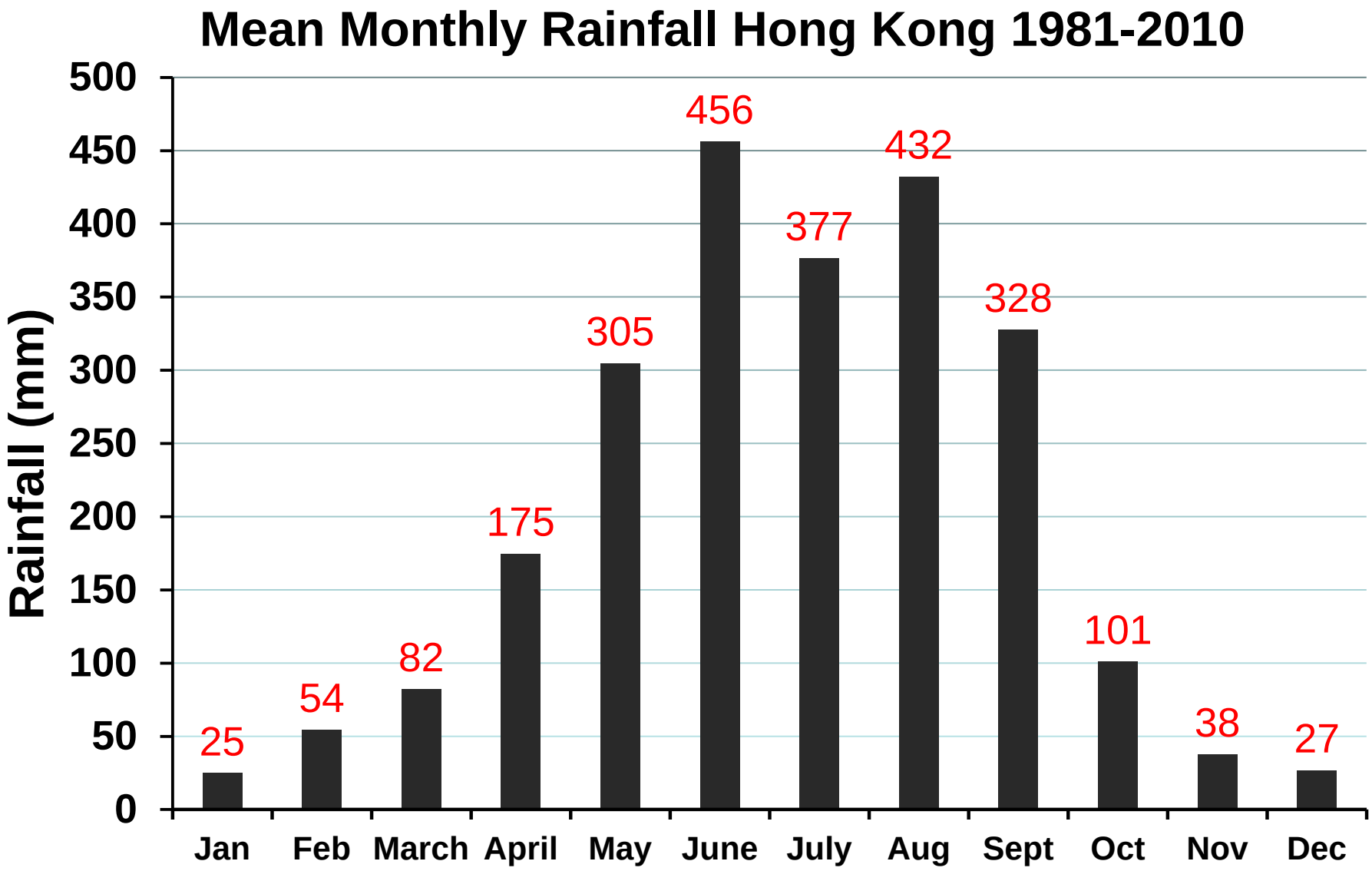
Surface Collection Coefficient (K) Values

Absorption/evaporation allowance - there is little data published, for BEAM simulation purposes the following values can be used. variation to be justified with Authority cited.

Catchment Surface	Collection Coefficient (k)
Aluminium/metal sheeting	0.90
Ceramic tile/Slate	0.80
Cement tile	0.7 – 0.8
Clay tile	0.6 – 0.7

BEAM

WU3 -3 Concept

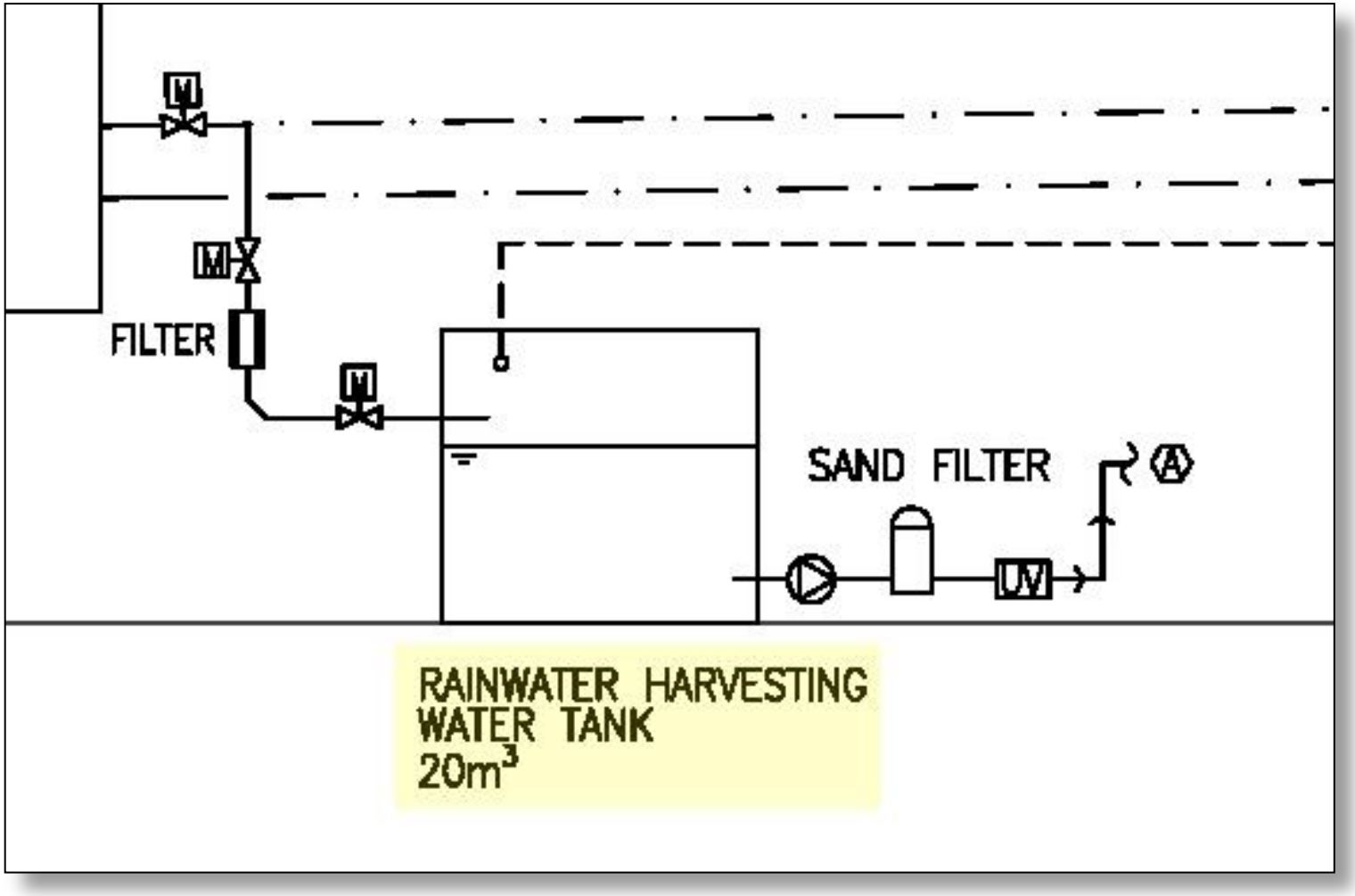


http://www.hko.gov.hk/cis/normal/1981_2010/normals_e.htm#table2

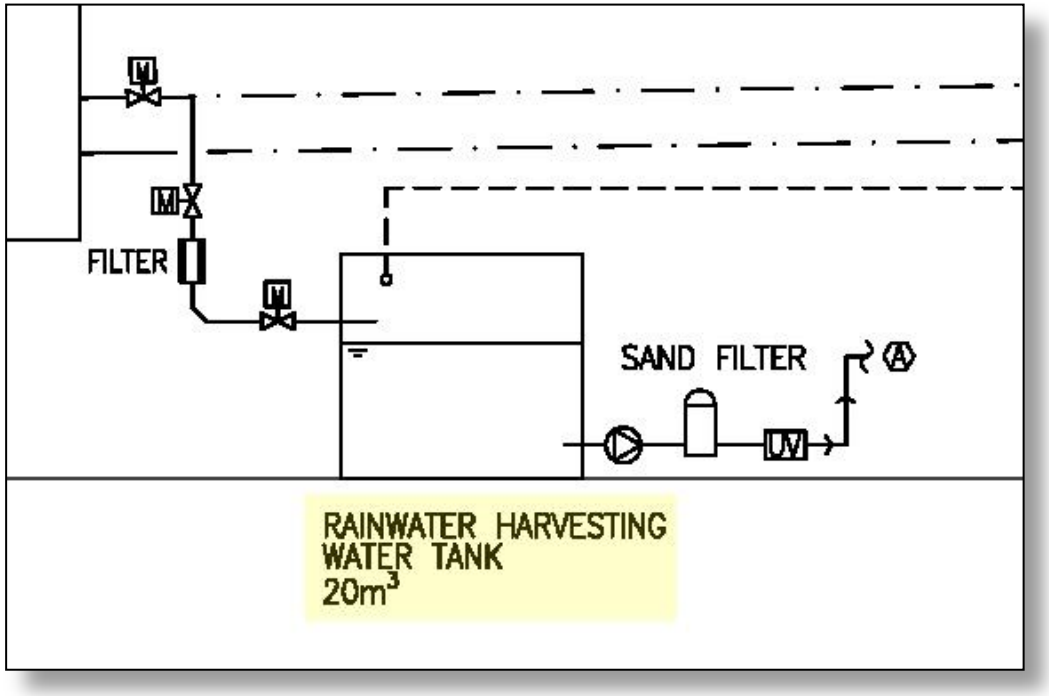
BEAM

WU3 -3 Submission

RH submission - any problem?



WU3 -3 Submission



Poor example

1. No pipe or valve sizes
2. No equipment details for pumps, filters, etc.
3. Concept ONLY
4. No metering for record keeping (NOT BEAM requirement)

WU3 -3 Submission

Simple Example month by month

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	total
Roof Area (sqm)	900	900	900	900	900	900	900	900	900	900	900	900	
Roof Factor (K)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
rainfall (mm/hr/sqm)	24.7	54.4	82.2	174.7	304.7	456.1	376.5	432.2	327.6	100.9	37.6	26.8	
days	31	28	31	30	31	30	31	31	30	31	30	31	
Duration (hours)	46	89	101	99	106	111	85	97	78	46	38	40	
monthly rain (m/sqm/hr)	0.0247	0.0544	0.0822	0.1747	0.3047	0.4561	0.3765	0.4322	0.3276	0.1009	0.0376	0.0268	
sub total (l/month)	1,278	5,447	9,340	19,457	36,335	56,955	36,003	47,164	28,747	5,222	1,607	1,206	
First Flush Loss	500	500	500	500	500	500	500	500	500	500	500	500	
total (l/month)	778	4,947	8,840	18,957	35,835	56,455	35,503	46,664	28,247	4,722	1,107	706	242,762
Planting area (sqm)	200	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
requirement (l/sqm/d)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
irrigation (l/month)	43,400	39,200	43,400	42,000	43,400	42,000	43,400	43,400	42,000	43,400	42,000	43,400	511,000
													47.5%


Rainwater Harvesting System

WU3 -3 Common Mistakes

1. Coverage all within project boundary to be included
2. Concept drawings not accepted
3. Incorrect RH calculation
4. Drawings without equipment data, no pipe sizes, tank sizes, pump duties, filter information, etc.

WU3 -3 Common Mistakes

5. Incorrect RH formulae
6. Incorrect rainfall data
7. Small/undersized RH tank storage capacity
8. No pipe sizes on drawings;
9. Only schematic (VPLD) drawing provided;

WU3 -3 Common Mistakes

10. ‘Vertical surfaces’ not counted as catchment under BEAM;
11. No equipment schedule for filters etc. provided
12. No detail for irrigation water consumption and irrigation system planned

WU4 Water Recycling

Rationale

1. Encourage alternative water sources
2. Reduce municipal potable water consumption
3. Maximise use before discharged to sewer system

Requirement

1. Strategy narrative
2. Calculations
3. GBP, schematic and layout drawings
4. Equipment schedules
5. Catalogues
6. Records, log book, meter readings, CX data, site photographs, etc.

WU4 Concept

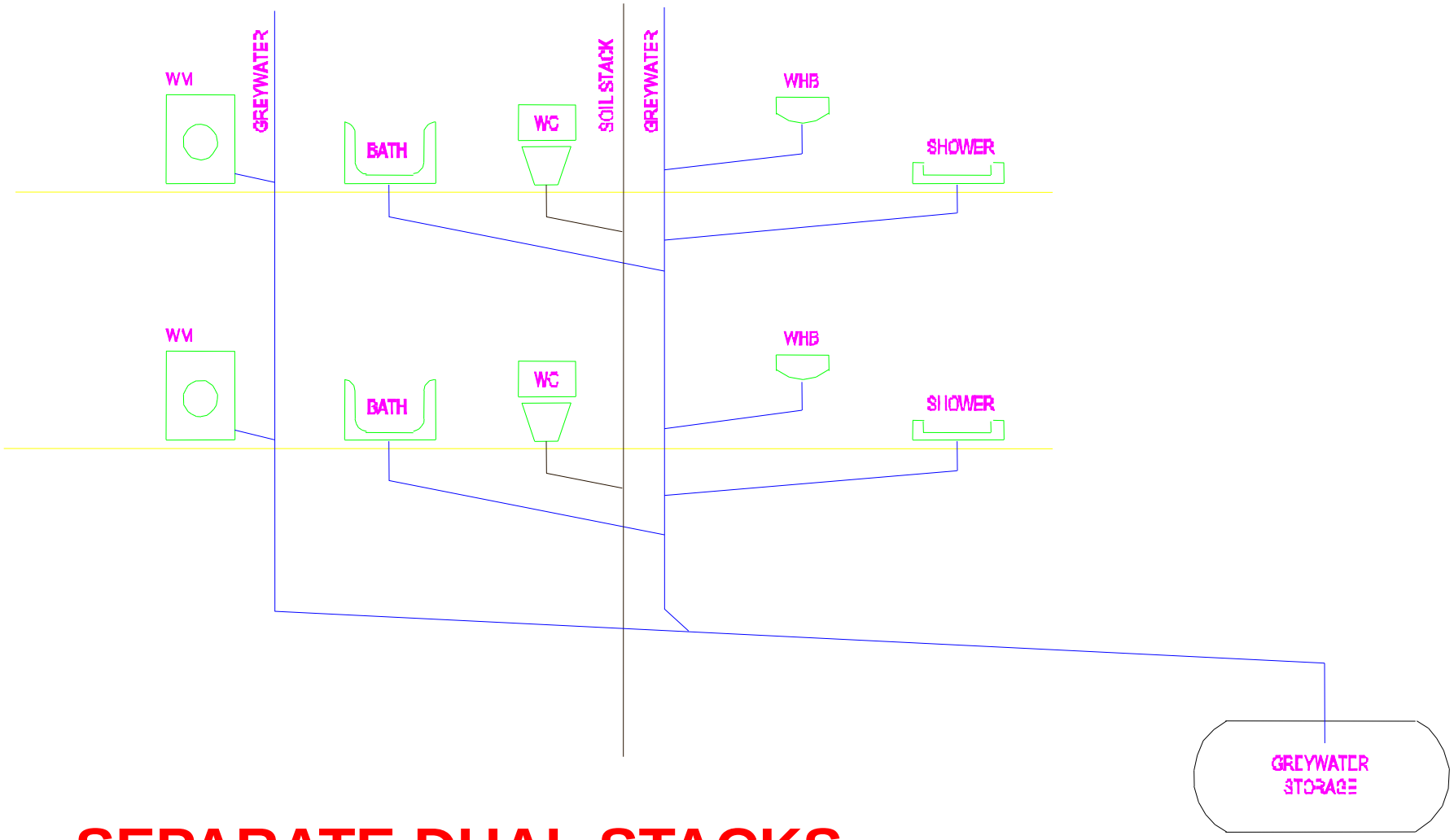
1. Rainwater Harvesting portion has already covered under WU3 -3

Wu4 Greywater

Greywater is waste water from:

- Wash basins;
- Sinks, except kitchen;
- Showers;
- Baths;
- Washing machine rinse cycle;
- Condensate from AC systems;

WU4 Greywater



SEPARATE DUAL STACKS

WU4 Greywater

Precautions:

- greywater may contain chlorine, sodium and phosphorous from detergents
- AVOID untreated direct application
- Untreated greywater cant be stored due to bacteria growth

WU4 Greywater

Possible Applications (and standard):

1. Toilet flushing
2. Irrigation
3. Make-up for water features
4. Make-up for cooling towers
5. Cleansing water

WU4 Submission

1. Greywater treatment equipment requires significant plant space, CAPex and OPex.
2. Schematic and layout drawings, equipment schedules, etc. to be provided.
3. GBP highlighting plant area

WU4 Submission

4. Calculations to justify claimed water usage reductions
5. Data using flow rates submitted under WUP2

greywater treatment

WU4 Common Mistakes

1. Condensate collecting from the Air Conditioning system alone is not a Greywater installation.
2. Greywater treatment equipment requires significant plant space, details (schematic and layout to be provided.
3. Conceptual type/block type diagram/sketch rejected.

WU5 Water Efficient Appliances

Rationale

1. Encourage reduced water consumption
2. Promote WELS labelling and labelled appliances
3. Lower environmental impact

Requirement

1. Strategy narrative
2. Schematic and layout drawings
3. WELS labelled catalogue
4. Calculation (appliances w/o WELS label)
5. Records, delivery notes, site installation photographs

WU5 Common Mistakes

1. Including taps/showers/WC as Appliances
2. Inadequate justification for non-WELS appliances (i.e. 20% better than 80% of the same type on the Hong Kong market)
3. Number of appliances does not match number of residential units;

WU6 Effluent Discharge Reduction

Rationale

1. Encourage lower burden on municipal waste system
2. Reduce impacts from sewerage discharge
3. Lower environmental impact

Requirement

1. Strategy (text)
2. Schematic (VPLD) and layout drawings (BD standard)
3. Calculation (only WC and urinals considered)
4. Catalogues
5. Records, delivery notes, As fitted drawings, record photographs, etc.

WU6 Submission

Water Closet

Dual Flush Operation

WU6 Submission

Urinal

Reduced Flush Volume

Operated by IR Sensor

WU6 Common Mistakes

1. Calculations, often incorrect provision for male/female ratio
2. Only WC and urinals
3. Sewerage volume assessed under this credit.

IA Innovation

Twin Water Tanks

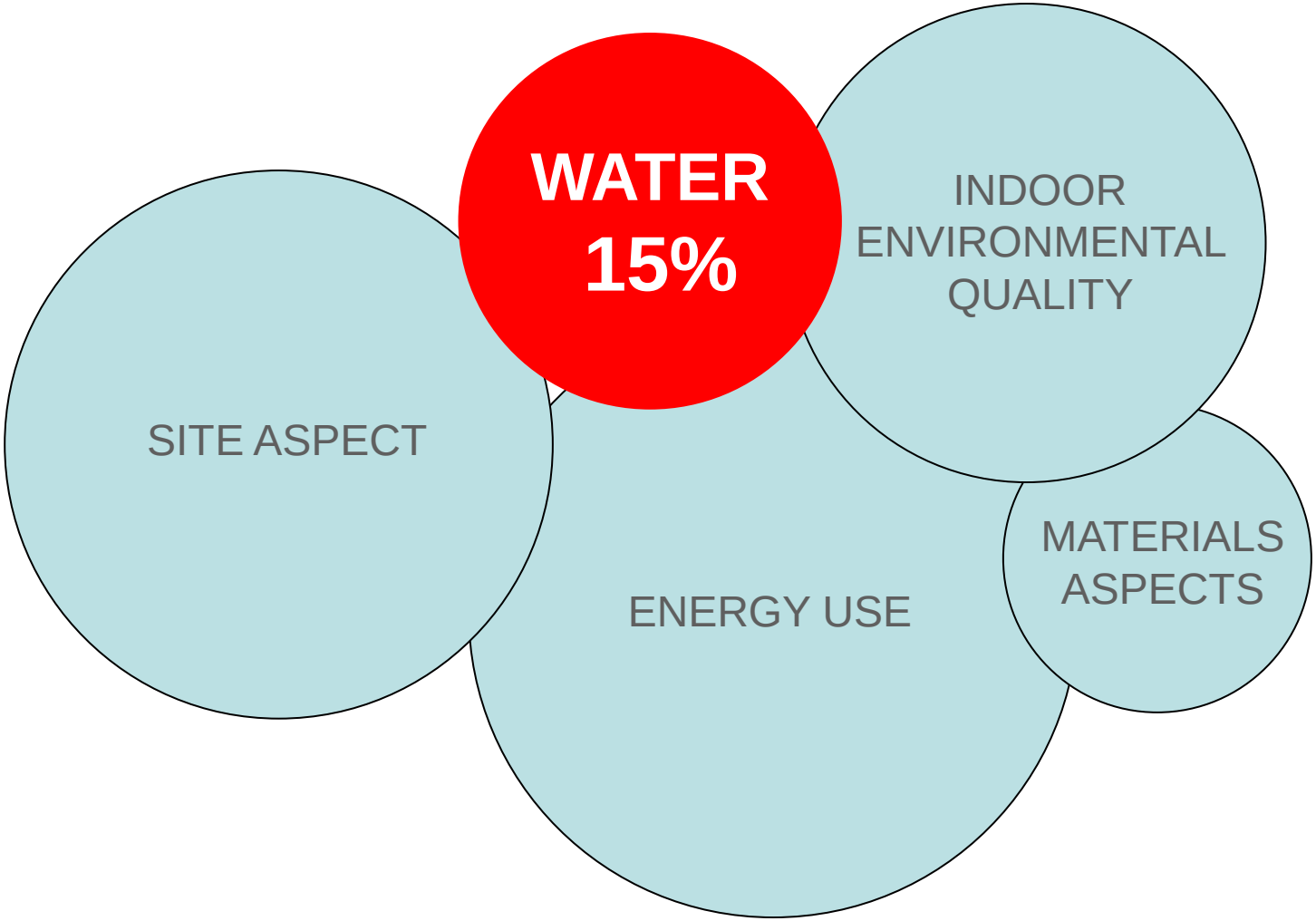
SUBJECT TO TRC REVIEW

Performance Enhancement (PE) can be awarded for Twin tank installation - refer to WSD website for details.

Source: WSD
http://www.wsd.gov.hk/en/plumbing_and_engineering/tts/index.html

Existing Buildings (EB)

Category Weighting WU EB



BEAM

WU EB

WU P1	**Water Quality Survey**
WU P2	**Minimum Water Saving Performance**
WU P3	**Water Conservation Plan**
WU 1	**Annual Water Use**
WU 2	**Monitoring and Controls**
WU 3	**Water Use for Irrigation**
WU 4	**Water Recycling**
WU 5	**Water Audit**
WU 6	**Effluent Discharge to Foul Sewers**

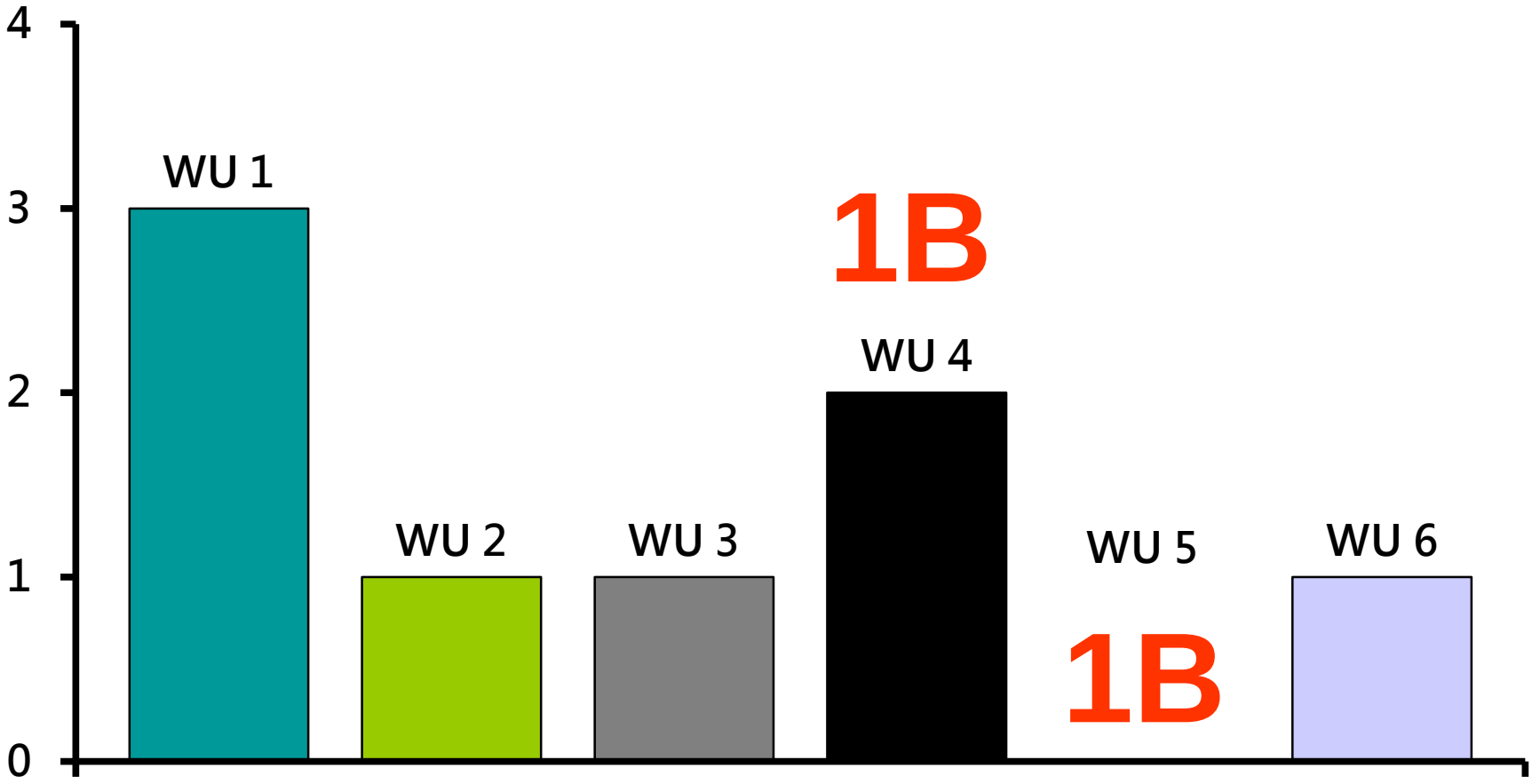
BEAM

WU EB

WU P1	Water Quality Survey
WU P2	Minimum Water Saving Performance
WU P3	**Water Conservation Plan**
WU 1	Annual Water Use
WU 2	Monitoring and Controls
WU 3	Water Use for Irrigation
WU 4	Water Recycling
WU 5	**Water Audit**
WU 6	Effluent Discharge to Foul Sewers

BEAM

Credit Distribution: WU EB



EBWUP3 Water Conservation Plan

Rationale

1. Reduce water consumption
2. Promote continuous development
3. Encourage active management for water resources

Requirement

1. List responsible person
2. Report
3. Director signature

EBWUP3 Suggested Content

1. Organization chart
2. Communication channels (staff, building users, etc.)
3. Water monitoring (sub meters)
4. Water Consumption
5. Action Schedule to reduce water consumption
6. Quantification of water savings
7. Building owner director endorsement
8. Prepared by E&M engineer

EBWUP3 Common Mistake

1. No endorsement by director

EBWU5 Water Audit (BONUS)

Rationale

1. Raise awareness
2. Encourage reduced water consumption and improved maintenance

Requirement

1. List Responsible person
2. Written Audit report

EBWU5 Suggested Content

1. Objective, reduction of all types of water consumption, raising awareness
2. Scope, Overview and detail of the scope of work, including exclusions i.e. tenants areas
3. Operations, Overview and details of the building operation

EBWU5 Suggested Content

4. Maintenance, Overview and details of maintenance activities, deferred maintenance
5. Drawings, AS FITTED schematic and layout drawings
6. Records, Inventory, records for all areas of water use, regular monitoring, consumption, O&M, etc.

EBWU5 Common Mistakes

1. No director signature

BEAM Interiors (BI)

WU BI Summary

6	WATER USE (WU)		6
WU 1	WATER QUALITY SURVEY	1 credit for providing quality of potable water that meets the drinking water quality standards at all points of use.	1
WU 2	ANNUAL WATER USE	1 credit for demonstrating that the use of water efficient devices leads to an estimated aggregate annual water saving of 30% when compared with BEAM Plus baseline data herein. 2 credits for demonstrating an estimated annual water saving of 40% when compared with BEAM Plus baseline data herein *Alternative:* 1 credit for sensor type water taps were installed in the common area. 1 additional credit for Applicant can demonstrate that the water taps mixer taps, and shower heads (where provided) in the host building are Voluntary Water Efficiency Labelling Scheme (WELS) Grade 1 labelled or having the equivalent or lower flow rate.	2
WU 3	EFFLUENT DISCHARGE TO FOUL SEWERS	1 credit for provided water efficient technology in the flushing system. *Alternative:* 1 credit for at least one water efficient flushing system is installed in the host building.	1
WU 4	NO BOTTLED WATER	2 credits for replacing bottled water services with drinking water fountains or equal;	2

BEAM

WU BI

WU 1	**Water Quality Survey**
WU 2	**Annual Water Use**
WU 3	**Effluent Discharge to Foul Sewers**
WU 4	**No Bottled Water <NEW>**

Subject to random on site checking

BI WU4 No Bottled Water

Rationale

1. Raise awareness
2. Reduce water bottles usage
3. Reduce plastic waste
4. Encourage water coolers with potable water

Requirement

1. List Responsible person
2. Layout plan with equipment indicated
3. Catalogue
4. Record photographs

Examination

15% Framework + Innovation

25% SA Site Aspects

10% MA Materials Aspects

25% EU Energy Use

15% IEQ Indoor Environmental Quality

10% WU Water Use

BEAM

Acknowledgment

Photographs and materials generously donated by:

Water Services Department

Prof. Carlos Lo, Polytechnic University

Mr. John Herbert, Kelcroft E&M Limited

Ms. Luciana Wong, LNS


Green = good?


Q&A

BEAM

Thank you

BEAM Society Limited
建築環保評估協會有限公司

1/F Jockey Club Environmental Building,
77 Tat Chee Road, Kowloon, Hong Kong
香港九龍塘達之路77號賽馬會環保樓1樓

T +852 3610 5700
F +852 3996 9108
www.beamsociety.org.hk