Contents	Authors& co-authors	Reviewers	Comments
		Aberra GEYID Cagatay GÜLER Guy HOWARD (sect 3) Philip CALLAN (all) Jennifer YAP	
Section 0 Introduction and overview of the document: Scope Global document definition Definition per section, Targeted readers In context of guidelines Principles such as cost benefits	Jeni Colbourne Jamie Bartram		
Section 1 - What is the problem Leader: Jeni COLBOURNE			This section should be made of short introductions with principles and nothing listed but rather explanatory texts
Chapter 1: Hazards.	Jeni Colbourne David Drury Dilorom Fayzieva Susanne Herbst Enrique Calderon Martin		This would include: - identifying hazards - identifying the consequence - likelihood (exposures routes) - including a simplified matrix and the matrix table 4.2 in the GDWQ It will also include the table (page 49) (criteria for

Contents	Authors& co-authors	Reviewers	Comments
	Exner Laura Achene		confirmation of biological... involved in waterborne outbreaks...)
Chapter 2: People (Target groups and actors)	Jeni Colbourne David Drury		Introduction in reference to sect 3 on WSP and target audience

Section 2: Roles and responsibilities Leader: David CUNLIFFE	David Cunliffe Emmanuel Briand Yves Chartier	Kumar Jyoti Nath	It is proposed that this section remains as a stand alone section.

Chapter 3: building types	Susanne Surman John Lee David Drury	Emmanuel Briand Yves Chartier	What are specific risks associated to specific buildings

Section 3: Water Safety Plan Leader: Benedikt SCHAEFER			Comments Introduction and WSP definition
Chapter 1 - Team building (stakeholders)	Emmanuel Briand Jeni Colbourne		WSP team + extend
Chapter 2 - Understanding the water system	Emmanuel Briand Jeni Colbourne Benedikt Schaefer Thomas Rapp Oliver Schmoll	Dan Deere Michele Giddings David Drury	This includes a detailed description of water systems and the analysis of water use patterns and description of the installation system
Chapter 3 - Identification of Hazards	Jeni Colbourne Dilorom Fayzieva Martin Exner Philippe Hartemann Benedikt Schaefer Thomas Rapp Oliver Schmoll	David Drury	Brief description of RA and hazard analysis + examples
Chapter 4 - Risk Assessment	Jeni Colbourne Dilorom Fayzieva Martin Exner Philippe Hartemann Benedikt Schaefer	Emmanuel Briand John Lee David Drury	This would be the main part

	Thomas Rapp Oliver Schmoll		
Chapter 5 - Risk Management	Benedikt Schaefer Thomas Rapp Olive Schmoll Luciano Cocagna	Michele Giddings John Lee David Drury	Contribution to adapt based on what was developed above for existing buildings
Table: Main hazardous situations and risk events in water systems inside buildings	enedik Schaefer Luciano Cocagna Oliver Schmoll Emmanuel Briand Thomas Kistemann Bob Tanner Jeni Colbourne John Lee Susannne Surman Enrique Calderon	Michele Giddings John Lee David Drury	Contribution to adapt based on what was developed above for existing buildings. This would include commissioning.

Section 4 - Supporting Environment Leader: David CUNLIFFE			
Chapter 1 - Independent (technical) inspection Surveillance - different approaches including certification, audit, testing	Siegfried Hauswirth Luca Lucentini Luciano Cocagna Kumar Jyoti Nath Lucia Bonabona Masaki Itoh Emanuele Ferreti	Bob Tanner Emmanuel Briand John Lee Roger Goossens David Drury	
Chapter 2 - Disease surveillance / Outbreak	Susanne Surman John Lee Paul Hunter	Martin Exner Yves Chartier Kumar Jyoti Nath David Drury	
Chapter 3 - Policy framework / public interest	Jeni Colbourne Martin Exner Philippe Hartemann Enrique Calderon John Lee Susanne Surman Emmanuel Briand	Benedikt Schaefer Kumar Jyoti Nath David Drury	Regulations (includes examples from countries) technical rules, standards

Chapter 4 - capacity building, including training	David Cunliffe Bob Tanner Emmanuel Briand	Benedikt Schaefer David Drury	

Unbalanced case studies spread as examples over the text matching the respective chapter	Paul HUNTER Benedikt SCHAEFER Irmgard FEUERPFEIL John LEE Susanne SURMAN Thomas KISTEMANN Thomas RAPP et al.	David DRURY Fanus VENTER Kumar Jyoti NATH Luca LUCENTINI Lucia BONADONNA Martin EXNER Susanne HERBST et al.

Annex 'Model' building WSPs (2 pages) – several of them each covering: System assessment Control measures +monitoring + verification Management plan – incl. normal, incident and emergency + supporting measures incl. training and capacity building	Susanne Surman Bob Tanner Emmanuel Briand Fanus Venter Martin Exner Ina Wienand	Benedikt Schaefer Dan Deere Oliver Schmoll Philippe Hartemann Thomas Rapp Roger Goossens David Drury	

Glossary	David DRURY Jamie BARTRAM Emmanuel BRIAND John LEE Thomas RAPP Bob TANNER Yves Chartier		

・ ランキング制度に関するＷＨＯの意見

厚生労働科学研究費による貯水槽水道の管理レベル向上策研究の、成果の一つとして、管理者が自主的な管理を行おうとする誘導策として、ランキング制度の導入を考えており、その原案についてＷＨＯの意見を聴取した。

「評価者が評価していることを相手方に知られないようにすること」

WHOとしては、このランキング手法が有効であることを認識してはいるが、
客観的な判断を行うためには、評価者が評価していることを相手方に知られないようにすることが重要であると指摘された。
この、評価者が評価していることを相手方に知られないようにするという点について、たとえばレストラン評価をおこなっているミシュランは、料理の提供者に知られることなく評価を行なっている。
評価する者と被評価者とがまったく独立していることが、信頼性を確保するための要件であるとWHOから指摘された。
この点に関しては、評価に要する費用を被評価者から負担させ、被評価者の申し込みによって評価するというわれわれが考えているランキング制度においては、この指摘どおりに実施することは困難である。
そのため別の方法で評価の信頼性を確保することが必要である。
つまり、評価基準を明確化し、評価結果が信頼できるものとなるよう、精度管理を徹底することが必要となる。
次に
「評価の見直しを定期的に行うこと。」

建築物内の水の安全性については、何らかの原因でその安全性が脅かされる可能性がある。
たとえば今日は良くても明日は汚染されていることも想定しなければならない。
つまり、安全性についての評価は常に変動することを想定しなければならないとの指摘を受けた。
この点については、現在年に一回の評価で、評価結果の有効期限を一年としているが、その評価結果発行に関しての注意書きなどで、注意喚起することが必要である。

WHOの" In Building Water Supply"　の考え方を以下に紹介する。
WHOの研究では、貯水槽水道のリスクのなかで、特に病原菌や化学物質による人の健康影響に重きを置いていることが特徴的である。

WHOの報告書の構成を以下に述べる

第一部　問題の所在
第1章　危険なものの特定
第2章　だれを危険から守るか
第3章　建築物の種類ごとのリスク

第二部　関係者の役割と責任

第三部　水安全計画

第1章　計画策定チームの結成

第2章　水供給システムの理解

第3章　危険なものの特定

第4章　リスクアセスメント

第5章　リスクマネージメント

第四部　関連事項

第1章　独立した監査・検査

第2章　疾病発生調査

第3章　政策の枠組み

第4章　人材育成

ここに見られるように、水供給の全体についての水安全計画に基づき、建築物ないでの水安全計画を策定し、貯水槽水道システム内でのリスクを明らかにし、独立した検査・監査を行うことにより、貯水槽水道の管理レベルを向上させようとしている。
ただＷＨＯの報告書は、想定される読者として、特に途上国において政策決定に携わる担当者を念頭においている。これは、途上国の国民に責任を持たせて管理の徹底を図る方式が円滑にはとりえない国が多く存在するためである。しかしながら日本においては、貯水槽水道の本来の管理責任者である貯水槽水道の設置者に管理させる方策を検討してきた。
そのためまず設置者に、貯水槽水道の管理計画を策定させ、設置者・管理者に管理を行わせることとした。
またどのような管理を行ったらよいかの知識の少ない設置者であっても、適切な管理を行うことができるよう、設置者の立場に立った管理手法をわかり易く示した管理マニュアルを策定し、これを公表した。

また、設置者が自ら管理をおこなう誘引策として、優良な管理を行っている貯水槽水道を認定し、有料であることの表示システムとして、貯水槽水道のランキング（格付け）制度の導入策を検討した。
ＷＨＯの報告書では、ランキング制度については触れられてはいないが、システムを評価しランキングを行うということに関しては、ＷＨＯの報告書においては、第三部水安全計画第４章　リスクアセスメント、第四部第１章　独立した監査・検査の部分が関係している。

以下にＷＨＯ報告書の関連部分を紹介する。

WHO報告書　第三部　水安全計画

第４章リスクアセスメント

Chapter 4 – Assess and prioritize risks

Risk assessment is a process by which, for each supply step in a building, hazards and hazardous events identified are evaluated to decide whether any of these events present a significant risk and need action. The assessment should identify and consider the effectiveness of existing control measures.

In the risk assessment process, an important question that needs to be answered is, in how far hazards are or need to be managed such that they are under control at any time and at any point in the supply system, and thus water safety in the building is not compromised. To do this, a required information input to risk assessment is a thorough review of existing control measures , recorded against each of the identified hazards and hazardous events

If the control measures are either not existent or not effective, the risk assessment process will identify significant risks and point to system modifications required to achieve water quality targets set. An ultimate outcome of risk assessment therefore is a plan of action that documents necessary additional or improved control measures, including timelines and responsibilities for their implementation. Thus, a risk assessment process is required to prioritise the range of possible events identified (Davison et al, XXX).

Risk assessment should take into account the number and vulnerability of exposed persons and the type of exposure

Risk assessment and prioritisation methods range from relatively simple team decision approaches, through semi-quantitative, matrix-based approaches to full quantitative risk assessments. Which method is best in a given situation will depend on the complexity of the building water system assessed. For example, the method of choice for a small or simple structured building which is dealt with by small WSP team may be a simple team decision; risk assessments for more complex buildings with a range of different water uses, usages and technologies which involve a range of experts from different disciplines may benefit from semi-quantitative methods. In either case, the

WSP needs to decide on a consistent risk assessment methodology upfront (Davison et al XXX).

Regardless of which method is preferred, any decision taken in the risk assessment process at the time needs to be documented such that WSP team members including water system managers can understand their decision at a later stage (e.g. in a re-assessment in periodic review) or that decisions are sufficiently transparent for external reviews (e.g. in audits).

Examples of both team decision processes as well as the use of semi-quantitative matrixes are given in Boxes XX and YY below.

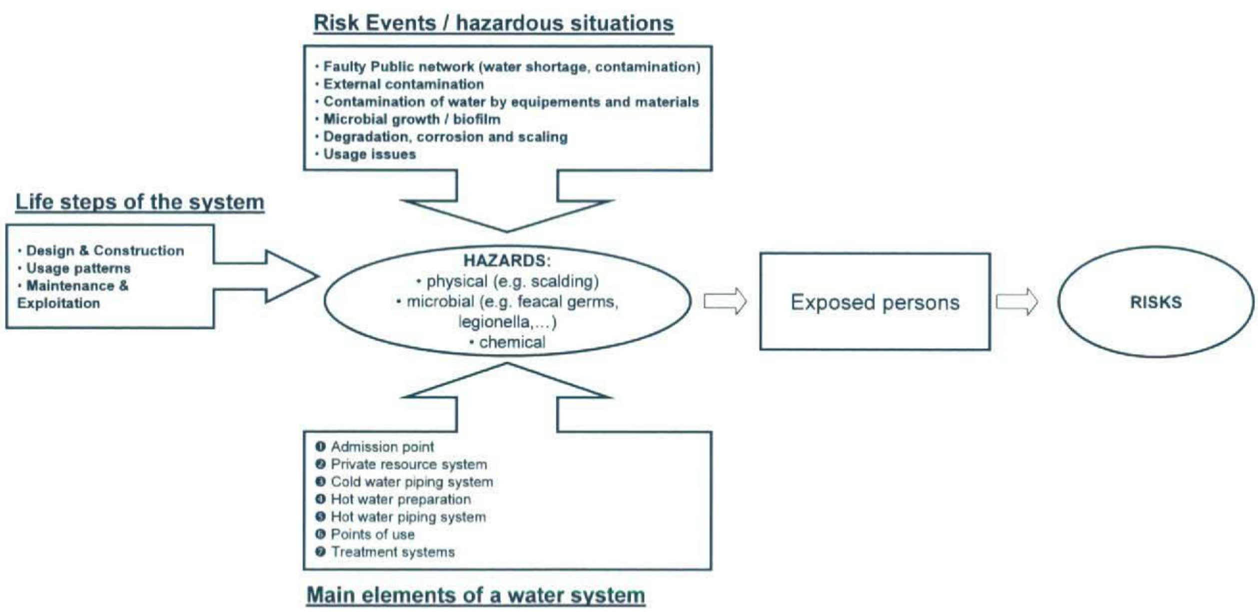

Figure xx : information to be taken into consideration in the risk assessment process

A risk assessment can be applied at the time of planning or constructing a system, or for an already existing system. The preventive approach to include risk assessment with planning and construction is always preferable. Modifying existing systems including retrofitting additional monitoring and control measures is typically more expensive. In extreme cases when harm has been caused decision making processes can be subject to political and legal influence and time constraints.

Table xx provides examples for the risk assessment process. This table is by no mean exhaustive, and some risk events may appear or be specific of some local situations.

リスクアセスメントの例　Example for the risk assessment

The WSP team identified the following hazards after the investigations of the water system in a school building for 600 pupils including a gymnasium with two shower rooms (40 showers in total):

1) One distribution pipe within the building is made of lead. This pipe delivers water to three bathrooms and one small kitchen.
2) One small leakage in a pipe in the basement was identified
3) Hot water is prepared centralized in the main building at a temperature of 60°C. There is no circulation system for the hot water installed. The hot water pipes supplying water to the showers in the gymnasium are not insulated properly. Cold water pipes are in close contact to the hot water pipes.

The WSP team prepared the following table for the risk assessment and for the decision about additional control measures:

	1)	2)	3)
Hazard or Hazardous Event	Lead pipe	Leaking pipe	temperature loss from heater to shower; maximum water temperature at shower at 48°C
Hazard Type	Chemical Contamination by lead	Chemical and microbial contamination Technical failure	Microbial contamination (Legionella)
Current Control Measure	no		Thermostatically controlled water heating
Basis for Risk	Daily consumption of lead	A break-down of the water supply is not	It is very likely that there are long

Assessment	contaminated water at the taps in the bathrooms and in the small kitchen by children is likely	very likely in the near future.	stagnation periods of the warm water supplying the showers. A decrease of the temperature below 60°C will occur and the potential for the growth of Legionellae is very high. Also the cold water pipes have a risk to be contaminated with Legionella.
Risk	Significant	Uncertain	Significant
Further Investigations	Water analysis for lead	Check integrity of distribution system Check material compatibility Check corrosion	• Temperature profiling of the system • Check water heaters • Check system usage • Water analysis for Legionella
New / Modified Control Measures	a) **Short term**: Information to the teachers and pupils, that water can only be drunk at certain taps.	Replace with appropriate material	a) Short term: Close showers b) Long term: Install a warm water circulation

	Labelling of the taps that deliver lead contaminated water b) **Long term**: Replace all lead pipes		system, proper thermal insulation of warm and cold water pipes

第４部　関連事項-

第１章　独立した監査・検査
Chapter 1 - Independent inspection and surveillance

Introduction
独立した監査・検査が重要であること

Independent inspection and surveillance of drinking water systems is essential for ensuring that systems are well designed and are managed and operated in a manner that protects public health. Independent inspections and surveillance can be undertaken during construction or major renovations of buildings or can be applied to existing buildings.

Independent technical inspections are often required as part of construction or renovation of buildings. For example, engineering inspections and inspection and certification of plumbing systems can be required under building and plumbing codes. These inspections should include assessments of public health impacts of drinking water systems and associated devices. Public health agencies should also be consulted as early as possible during design and construction to assess the suitability of water systems including the selection, installation and monitoring of control measures. Public health agencies should also assess WSPs developed for new buildings and new or renovated water systems. Wherever possible approval of WSPs should be required before commissioning of water systems particularly in buildings where potential health risks can be high (e.g. hospitals).

Independent technical inspections of existing buildings can be undertaken by auditors or specialists with expertise in areas such as water safety plans, plumbing, water treatment, operation of water devices (e.g. water cooled air-conditioning, swimming pools, spas), infection control and occupational health and safety. Technical inspections can be commissioned by building managers to provide assurance that systems are being operated in a manner that protects public health and are consistent with regulatory requirements. Remedial action or improvements identified by such independent inspections should be implemented and the outcomes of both the inspections and the responses. In some circumstances independent inspections may be included as part of accreditation activities. For example, accreditation of facilities such as hospitals or hotels can include independent inspection of drinking water systems and water safety plans. Independent inspections can also be a regulatory requirement. Outcomes of these inspections should be documented within WSPs.

Surveillance is one of the five key components of the Framework for Safe Drinking-water (WHO, 2004) and is necessary to verify that water safety plans are well designed and correctly implemented. Surveillance is a specific and ongoing activity that should be undertaken by public health agencies to assess and review the safety of drinking water systems. As well as serving as a measure of compliance with regulatory requirements surveillance contributes to protection of public health by promoting ongoing improvement. Surveillance can contribute to the early detection of risk factors related to water quality, thus allowing appropriate remedial actions to prevent realisation of negative public health impacts. Ensuring timely implementation of corrective action and targeted improvement can prevent waterborne disease.

Surveillance programs

Effective planning and development of surveillance programs should be based on a consideration of relative risk. This requires an analysis of the types of buildings to be included in surveillance programs together with information on building characteristics and risk factors associated with building occupiers and users. Characteristics to be considered include:

- building types (hotels, apartments, hospitals, aged care facilities, hospice, clinics, schools, child care, recreation centres etc);
- size and location of buildings and numbers of people potentially exposed;

- vulnerability of occupiers or users of buildings (residents, workers, patients, elderly or very young people etc);
- type and size of water systems (drinking water supplies, hot water systems, water cooled air-conditioning systems, swimming pools, spas etc);
- expertise of building operators and employees;
- availability of specialist service providers;
- geographical and climatic conditions (e.g. temperature, humidity, climate variability)

Surveillance can be undertaken or coordinated by central public health authorities in conjunction with regional and local offices or with environmental health departments within local government. Programs should be based on practical considerations taking into account the capability of surveillance agencies. Greater attention should be focussed on buildings that present higher potential risks.

In designing programs consideration should be given to whether surveillance is to be undertaken directly by public health agencies or third parties (e.g. specialist auditors) certified or approved by these agencies or a combination of both. Where third parties are used the public health agency needs to retain responsibility for the implementation of surveillance programs. Directions should be provided on the frequency of inspections and audits as well as the procedures to be applied. Public health agencies should receive and assess third party reports and communicate assessments with building managers and operators.

Surveillance

Surveillance of drinking water systems in buildings can involve audits, direct assessment or a combination of these two approaches. The principal difference is that direct assessment includes testing of water quality. Both approaches require the surveillance agency to have an understanding of drinking water systems and application of WSPs as well as the capability to undertake audits and respond to significant water incidents. In addition direct assessments require the surveillance agency to have expertise in identification of appropriate monitoring locations and parameters and collection of samples, have access to testing facilities and be able to interpret results and to provide reports to building managers and operators.

Audits

Audits are on-site assessments, from intake to tap, of the whole drinking water system, including sources, transmission infrastructure, treatment processes, storage, distribution systems, maintenance and monitoring programs and water uses within the building. Audit should embrace all water systems existing within the building, such as cold, hot and warm water treatment and distribution systems, water cooled air-conditioning systems, swimming pools, hydrotherapy pools and spa pools. The objective is to evaluate the ability of building management to produce and deliver safe drinking water as well as water of quality suitable for other specific uses within a building (e.g. in clinics, dental surgeries).

Audit based approaches rely on data and information being provided by building operators or managers. This will include descriptions of water systems and end-uses, results of operational monitoring performed to check that control measures are working effectively; results of monitoring at point of delivery to assess compliance with water quality requirements, evaluation of consumer satisfaction and complaints. Information should also be provided on independent inspections, internal audits, previous surveillance audits and implementation of remedial action and improvement programs.

Audits will normally focus on the design and implementation of WSPs. This will normally include:

- a detailed review of building water systems to examine whether all systems and end-uses are included and accurately described in WSPs;
- ensuring that WSPs include consideration of all appropriate regulations, codes, guidelines and accreditation requirements;
- examining records to ensure that system management is being carried out as described in the WSP;
- assessing whether operational monitoring parameters have been kept within operational limits, that compliance was maintained and that where necessary, appropriate action was been taken to respond to non-compliance;

- ensuring that verification programmes have been implemented, that results demonstrate effectiveness of WSPs and appropriate action was been taken to respond to non-compliance;
- examining maintenance records
- assessing whether systems have been operated by appropriate personnel or appropriate service providers;
- ensuring that regulatory requirements have been met;
- examining reports of independent inspections and internal audits;
- ensuring that all actions and results have been documented and reported in accord with the requirements of the WSP;
- assessment of incident plans, contingency measures and communication and reporting protocols;
- assessment of supporting programmes and of strategies for improving and updating the WSP.

Audits may involve interviewing building management, operators and other technical people involved in water system management. A final report should be completed at the end of the audit to formally notify the building operator or manager of the findings. The report may be used for future compliance actions and inspections and should summarize the findings of the survey, remedial action and recommended improvements together with timelines for implementing actions and improvements.

The frequency of audits will vary based on the level of risk. Large buildings should be audited every three to five years although buildings with higher risk devices such as water-cooled air conditioning systems or more sensitive users such as hospitals and aged care facilities should be audited on an annual basis. Special audits may be conducted for buildings that are closed for extended periods and re-opened (e.g. schools and seasonal hotels).

Targeted audits should be conducted following substantial changes to the source, the distribution or storage system or treatment process or in response to significant incidents.

Audits conducted in response to significant incidents detected by building operators should focus on verifying that the:

- incident was investigated promptly and appropriately;
- incident was reported to appropriate authorities in a timely fashion;
- cause of was determined and corrected;
- incident and corrective action were documented to appropriate authorities;
- WSP was reassessed and amended where necessary to avoid the occurrence of a similar situation.

Direct assessment

Direct assessment involves the collection and analysis of water quality by the surveillance agency. It does not replace requirements for audits and should not be used to reduce the frequency of audits. Results should always be reported to building managers and operators and should be complementary to verification testing.

Incidents, emergencies and outbreaks

Additional inspections will be required in the event of incidents, emergencies (including natural disasters) and waterborne outbreaks. This will involve inspection of WSPs and of associated water systems. Investigations will normally require immediate collection of water samples. Wherever possible, while not causing unnecessary delays, samples should be collected before remedial action is implemented. This is important in trying to establish the cause of outbreaks.

The types of systems inspected will depend on the nature of the incident or outbreak. For example, investigations of waterborne gastroenteritis will be different from investigations of waterborne legionellosis.

Following an outbreak a further inspection will be required to ensure that any required remedial action has been implemented and that WSPs have been amended to minimise the likelihood of recurrence. The effectiveness of remedial action and amended WSPs should be verified by water quality testing.

Supporting programs

It is important that surveillance should incorporate complementary health promotion and educational components. It should be seen as an activity to maintain or improve public health standards in a collaborative approach. While regulations should allow provide for penalties and sanctions these should only be imposed as a last resort.

Building owners and operators should be aware of the standards required by surveillance agencies, the purpose of audits and inspections, how audits will be performed, what features will be examined and information that will be required from building operators during an audit.

Reporting and communication

Proper reporting and feedback are essential elements of a successful surveillance programme and should support the development of effective remedial strategies. Outcomes of surveillance should always be reported to building managers and operators. Where surveillance programmes are coordinated by central authorities but conducted by a mixture of national, regional and local agencies annual reports should be prepared by the central authority and distributed to all agencies.

Agencies responsible for surveillance should also develop strategies for disseminating and explaining outcomes of surveillance with occupiers and users of buildings.

Use of information

Information gained from surveillance programs should be collated and assessed. It can provide an invaluable source of data on effective management of water systems as well as identifying recurrent causes of problems. Analysis of collated data may identify common factors associated with potential water contamination, such as inadequate or ineffective treatment processes, structural conditions (e.g. impacts of water main breaks, faulty valves or hydrants), hydraulic capacity (e.g low pressure complaints, unusual rusty or coloured water occurrence), leakage (e.g. pro capita water demand), water quality deficiencies due to cross contaminations or to unintended uses.

Collated information can also be used to review relative health risks presented by different types of buildings and circumstances and used to refine surveillance programs.