

# **Hotel Water Measurement Initiative (HWMI) v1.1**

**Methodology**

**June 2020**

Hotel Water Measurement Initiative (HWMI) is free resource,  
available to download from:

**[www.sustainablehospitalityalliance.org/hwmi](http://www.sustainablehospitalityalliance.org/hwmi)**

HCMI was first developed when Sustainable Hospitality Alliance was known as International Tourism Partnership (ITP).

*Responsible hospitality for a better world*

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# 1.0 Introduction

## Background

The Sustainable Hospitality Alliance brings together engaged hospitality companies and uses the collective power of the industry to deliver impact globally and at a local scale. We tackle the major challenges affecting our planet and its people, bringing together our members and other partners, to achieve a more sustainable and inclusive world for all.

The Sustainable Hospitality Alliance has set a ground breaking initiative to develop a methodology and calculation tool that enables hotel companies and individual properties to measure and report on water in a consistent way: The Hotel Water Measurement Initiative (HWMI).

Water scarcity is a recognised global problem. With the existing climate change scenario, almost half the world's population is expected to be living in areas of high water stress by 2030<sup>1</sup>. Given that the hotel industry forms part of a rapidly growing tourism sector, often in water scarce regions, the hotel industry needs to take action if it is to mitigate risk going forward.

The Sustainable Hospitality Alliance has been aware of issues surrounding water and scarcity within the hotel industry for several years. In 2012, the Alliance produced the Hotel Carbon Measurement Initiative (HCMI) in collaboration with the World Travel & Tourism Council (WTTC) and supported by KPMG. The purpose of the initiative was to unite hotel industry efforts of calculating carbon impacts by agreeing a standardised methodology and metrics to measure and report on the carbon footprint per occupied room and per area of meeting space per hour. During this initiative, water withdrawn was highlighted as a key focus area and initial assessments to identify the main challenges were undertaken during the scoping stages by the HCMI Water and Waste Sub-group. Recommendations were made at the time but the Alliance and the Working Group felt that establishing HCMI should be the priority and that water should be addressed at a later stage.

Since HCMI, and given the importance of water scarcity, water withdrawal has become an increasing focus area for the Alliance members and their stakeholders, with the general consensus amongst both that without a consistent measurement tool the industry may be hindered in taking effective action towards reducing water withdrawal. As such, the Alliance has set itself and its members a challenge to develop a tool that can be used across the hotel industry consistently and effectively to help achieve this goal.

## Purpose

**HWMI is a methodology to calculate the amount of water used per occupied room (and per guest night, where data are available) and per area of meeting space per hour.**

The purpose of this document is to provide an overview of the methodology and calculation tool developed by the Sustainable Hospitality Alliance and its Working Group, supported by KPMG, to enable hotel companies and individual properties to measure and report on water withdrawal in a consistent way. The methodology has been developed for hotels to use in support of Requests for Proposals (RFPs), as well as corporate reporting. The following documents have been developed as part of this work:

- Hotel Water Measurement Initiative (HWMI) methodology (this document)
- HWMI calculation tool, plus a worked example of the calculation tool for illustration purposes

## Working Group

The Working Group tasked with this initiative comprises the Sustainable Hospitality Alliance and representatives from the following companies;

Accor, Carlson Rezidor, Diamond Resorts, Fairmont Raffles Hotels International, Hilton Worldwide, the Hongkong & Shanghai Hotels, Hyatt Hotels & Resorts, InterContinental Hotels Group, Las Vegas Sands

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<sup>1</sup> United Nations (UN), <https://www.unenvironment.org/news-and-stories/press-release/half-world-face-severe-water-stress-2030-unless-water-use-decoupled>, 2016

Corporation, Mandarin Oriental Hotel Group, Marriott International, MGM Hotels & Resorts, NH Hotel Group, Soneva, Starwood Hotels & Resorts, Taj Hotels, Resorts & Palaces, Whitbread, and Wyndham Worldwide

KPMG has been engaged as a Technical Consultant to support the Working Group, providing technical guidance and assisting the Working Group to develop a practical measurement methodology and tool that helps the hotel industry to calculate water withdrawn.

The Working Group is supported by a panel of experts who have been consulted at strategic points of the methodology development:

Alliance for Water Stewardship  
Carbon Trust  
CDP  
China Water Risk  
Earth Check  
Ecolab  
US EPA  
Griffith University  
Manchester Metropolitan University  
Responsible Tourism Partnership  
Sealed Air  
Stockholm International Water Institute  
The CEO Water Mandate  
Tourism Concern  
Water Footprint Network  
Waterscan  
WBCSD  
World Economic Forum  
World Resources Institute

## Overview of the document

This document is split into the following sections:

- Key information – essential points of note and assumptions necessary to implement the methodology and use the calculation tool accurately
- Overview of the methodology and calculation tool – provides a summary of the methodology and calculation tool
- Methodology development – Appendix A describes the processes undertaken to develop the methodology.
- Water scarcity tools – Appendix B provides an introduction to water scarcity and tools to assess scarcity.

## Who should use this methodology?

The methodology is designed to be applied by any hotel anywhere in the world. The methodology has been designed in partnership with major hotel groups; however, it applies to individual hotels, large and small, regardless of the type of amenities offered.

## Relationship with other water reporting frameworks

We recognise that other water footprint and scarcity tools are available for companies to use. An overview of some of these tools is available in Appendix B of this methodology.

However, HWMI has been designed specifically for use by the hotel industry and is tailored to reflect the operations of hotels. As such, the outputs of the methodology are metrics that are considered useful for the industry and are consistent across all types of hotels.

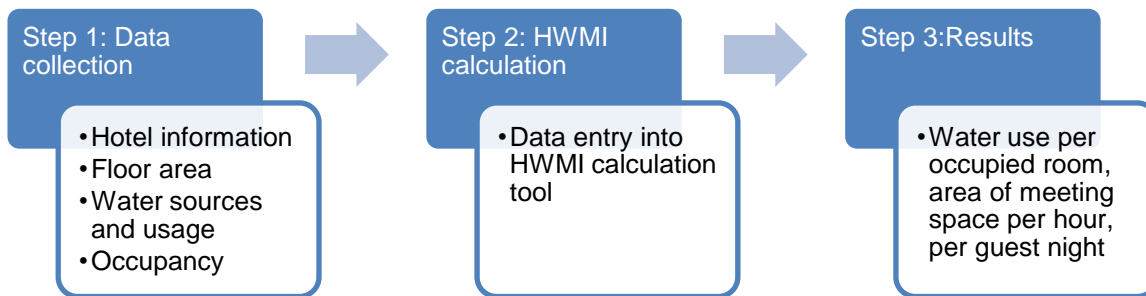
## 2.0 Key information

### Overview

**HWMI is a methodology to calculate the amount of water used per occupied room (and per guest night, where data are available) and per area of meeting space per hour.**

The below diagram provides an overview of how the methodology works and outlines the key inputs and outputs for each stage.

Figure 1: Overview to methodology



#### Step 1

Users of the methodology will need to identify how much water is used and from what sources and calculate water and floor space data. For further details on definitions, boundaries and water sources, please see Tables 1-3.

#### Step 2

Following data collection in Step 1, users will need to use the HWMI calculation tool unless the hotel has its own proprietary system for gathering data. Please see section the Methodology Overview section for a walkthrough of the methodology and calculation.

#### Step 3

The HWMI calculation tool will provide the following outputs:

- Water used per occupied room (and per guest night);
- Water used per area of meeting space per hour; and
- Water used for a specific client event/meeting (if required).

It is envisaged that management will be able to use this information to respond to RFPs and for corporate reporting.

## Definitions

The following definitions are used throughout the methodology:

Table 1: Definitions

Term	Definition
Water footprint	The total volume of freshwater used to produce the goods and services consumed by the individual or community or produced by the business. <i>Source:</i> <a href="http://www.waterfootprint.org">www.waterfootprint.org</a> .
Water withdrawal	<p>It is recognised that there are differences in definitions for water use, consumption and withdrawal between leading water reporting bodies such as Global Reporting Initiative, CERES, World Resources Institute (WRI) and the Carbon Disclosure Project (CDP). For the purposes of this methodology we have used CDP's definition of water withdrawal which is adapted from the Global Reporting Initiative (GRI) definition.</p> <p>The terms water use and withdrawal are used interchangeably throughout this document for ease of reading.</p> <p><b>Water use/withdrawal: The sum of all water drawn into the boundaries of the reporting organisation from all sources (including surface water, groundwater, on-site desalinated water and municipal water supply) for any use over the course of the reporting period. Water withdrawals should include both water that was withdrawn directly by your company and water withdrawn through intermediaries (e.g. water utilities).</b></p>
Guest room	Area accessed by guests of the hotel that is available for individuals to stay overnight for a set period.
Meeting room / space	Area of the hotel to hold meetings / events within the hotel.
All other areas	Any other part of the hotel which is used by guests or staff as part of the service delivery, e.g. back of house, kitchens, pool, spa, lobby, etc.
Blue water	Water that has been sourced from surface or groundwater resources and is either evaporated, incorporated into a product or taken from one body of water and returned to another, or returned at a different time. <i>Source:</i> <a href="http://www.waterfootprint.org">www.waterfootprint.org</a> .
Green water	Water from precipitation that is stored in the root zone of the soil and evaporated, transpired or incorporated by plants. <i>Source:</i> <a href="http://www.waterfootprint.org">www.waterfootprint.org</a> .
Grey water	The amount of fresh water required to assimilate pollutants to meet specific water quality standards. <i>Source:</i> <a href="http://www.waterfootprint.org">www.waterfootprint.org</a> .
Reporting period	This should be a 12 month period defined by hotel management and generally in line with other reporting requirements.

## Reporting boundaries

Table 2 provides an overview of the reporting boundaries for water sources (i.e. what is included in and what is excluded from the water footprint), as agreed by the Working Group. Further detail regarding the background into determining these water sources can be found within Appendix A.

Table 2: Reporting boundaries for water sources

Boundaries	Rationale
<i>Inclusions</i>	
All activities within the hotel premises (i.e. direct building uses and ancillary activities including restaurants, laundry, meeting spaces, , casinos, golf courses, spas, garden space, fitness centres, and back of house).	Consistency with HCMI. Alignment with GRI and Water Footprint Network (WFN). These facilities and the irrigation of grounds may be significant contributors to the total water footprint and are part of the hotel service and operation so should be included.
<b>Other inclusions:</b>	
<b>Water purchased from municipality/suppliers</b>	Outsourced laundry is a material contributor and should be included.
<ul style="list-style-type: none"> <li>• Municipal (mains) water</li> <li>• Delivered water</li> <li>• Recycled water from external sources</li> </ul>	For desalinated water, the output of the desalination process should be included (i.e. the freshwater output). If a hotel is sourcing reclaimed water or other non-potable water from an external source (e.g. recycled water network in San Francisco Bay Area), or is harvesting rain or well water, then it should be counted. These sources (even if non-potable) are extracting from water cycles and therefore should be accounted for.
<b>Water extracted or harvested on-site by the property</b>	
<ul style="list-style-type: none"> <li>• Ground and surface water (e.g. water from wells or boreholes)</li> <li>• Desalinated water</li> <li>• Harvested rainwater</li> </ul>	
<b>Outsourced laundry</b>	
<i>Exclusions</i>	
Private space	Private space is separate from the hotel's operations and should be excluded from the calculations. Private space is defined as areas which are not related to the hotel (e.g. the hotel leases a floor to a third party) and not accessible to hotel guests or conference attendees (e.g. private apartments). On-site staff accommodation is also considered private space. Back of house areas, concessions or public spaces are not considered private space.
The activities of suppliers outside of the hotel's premises (except laundry facilities).	
The guests' travel to and from the hotel, employees' business travel.	
Embedded water in products and food purchased by the hotel.	
Off-site facilities (that guests have access to) that the hotel does not operate (i.e. facilities are operated by a third party, such as an off-site gym).	
On-site staff accommodation.	
Water used at corporate offices.	
Municipal waste water treatment.	
Shared facilities which benefit the hotel which contributes through a service charge (e.g. water fountain in a multi-purpose building).	
Water recycled on site by the property	All other sources of a hotel's indirect water use (i.e. embedded water in purchased products, activities of suppliers other than outsourced laundry, travel, and head office support functions) should be outside of the scope of HWMI to keep the methodology practical. Water recycled by the hotel within its building (e.g. re-using wastewater for landscape irrigation) are excluded on the basis that the total water use for a hotel that recycles water will be lower than a hotel that does not.
Water discharges.	Water used to run cooling towers outside of the hotel and provide the hotel with chilled water is excluded as this information is unlikely to be accessible by hotels. This was agreed by the Working Group during the 2020 HWMI review.
Bottled water.	
District chilled water;	
Make-up water used in district chilled water process.	

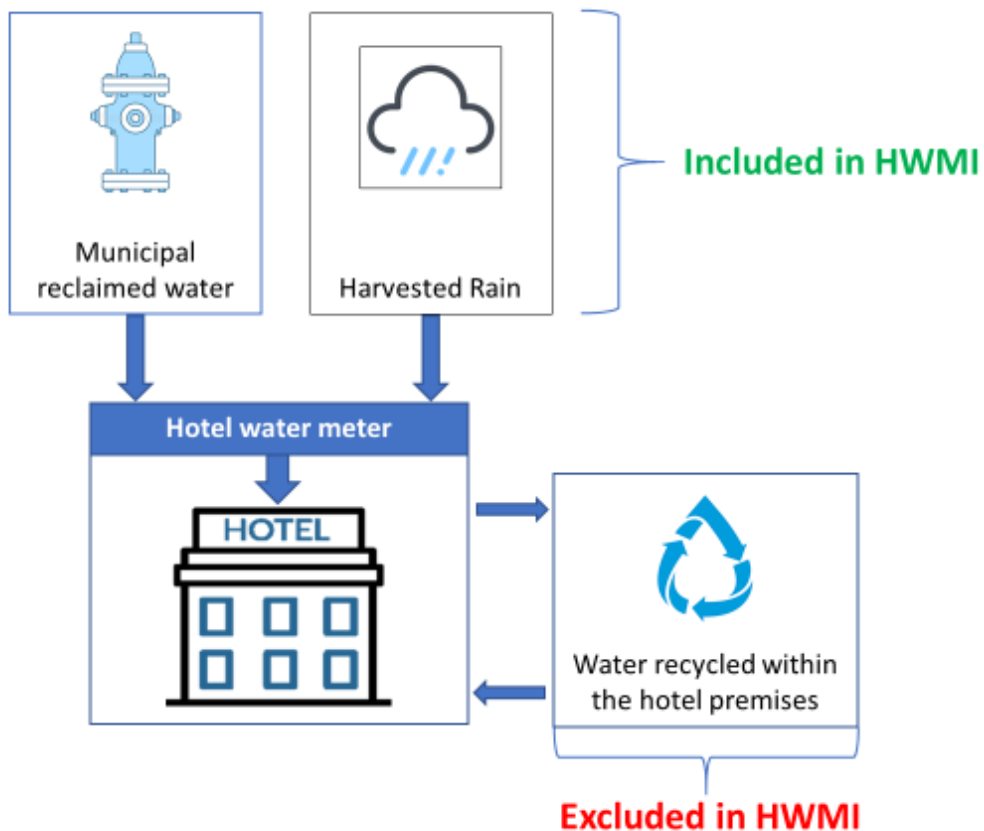
*Understanding how to account for recycled water in HWMI*

The purpose of HWMI is to measure and report the amount of water used by a hotel, which extracts water from the local water cycle. Water coming from these external sources can, in principle, be metered or estimated as it feeds into the hotel water system. Following this logic, hotels should account for their use of recycled water from external sources such as:

- Reclaimed, non potable water from local networks such as the San Francisco Recycled Water Ordinance ([read more here](#))
- Harvested rainwater, regardless of its harvest location (including the hotel's premises)

On the contrary, water recycled by the hotel within its building (after having gone through water meters e.g. re-using the building's wastewater for irrigation) are excluded on the basis that the total water use for a hotel that recycles water will be lower than a hotel that does not.

The figure below will help understanding the reporting boundaries on recycled water





## Water sources

Table 3 outlines which water sources should be included in the HWMI calculation and recommended data sources.

Table 3: Water sources and recommended data sources

Water sources	Recommended data sources
<b>Water purchased from municipality and/or suppliers</b>	
Metered municipal (i.e. mains) water	Invoices or meter readings
Unmetered municipal water	Request estimate from local authority or install a water flow meter
Delivered water	Purchasing records
<b>Water extracted or harvested on-site by the property</b>	
On-site desalinated water	Freshwater output from the desalination process
Recycled water	Freshwater output from the rain harvesting, flow calculations or estimates/extrapolations and reclaimed water from external sources
<b>Water used in outsourced laundry</b>	
Water used in outsourced laundry	See estimation method below

## Assumptions

In order to draft this methodology, a number of key assumptions have been made based on the following sources of information:

- Consultation with the Working Group;
- HCMI Water and Waste Sub-group research findings and recommendations, and;
- HWMI Water Methodologies Review.

As this is the first version of the methodology, the assumptions outlined below reflect certain limitations due to potentially incomplete data capturing processes or specific research. However, they have been based on the most current research available at the time of writing.

### *Apportionment of water withdrawal between guest room use and all other uses*

Water is used in guest rooms for shower/bath and toilet. Other uses of water in a hotel include that associated with pools, kitchens, back of house, public rest rooms etc.

Research by the HCMI Water and Waste Sub-group and benchmark data from our [Environmental Management for Hotels Manual](#)<sup>2</sup> indicate that a significant amount of water is consumed within guest rooms i.e. shower, toilet.

On the basis of this research, HWMI has applied the following split of water use between guest room use and all other uses:

- Guest room use = one third (i.e. 1/3); and
- All other uses = two thirds (i.e. 2/3).

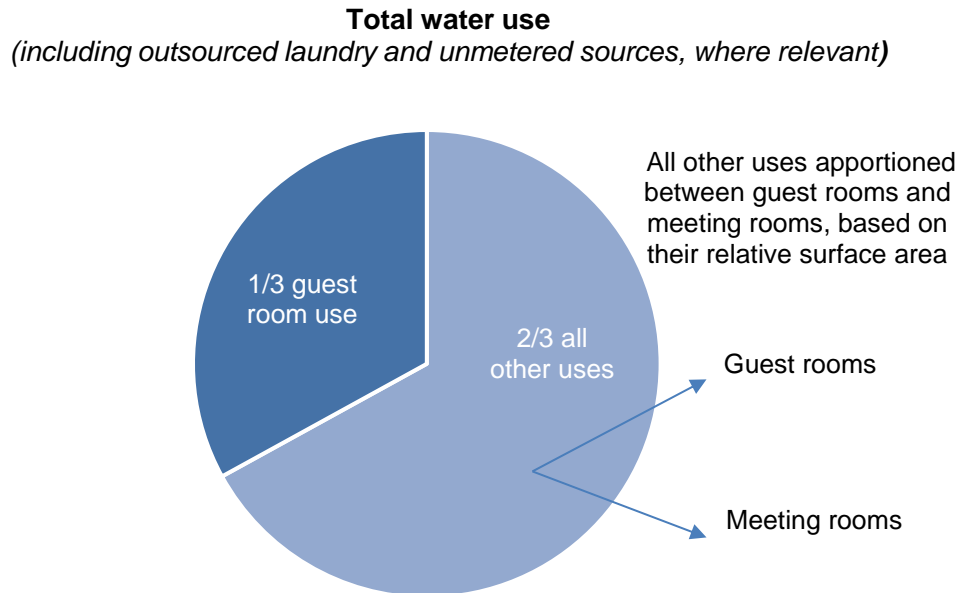
### *Allocation of water withdrawal from 'all other uses' between guest rooms and meeting space*

HWMI apportions water withdrawal from 'all other uses' between guest rooms and meeting space. The Working Group agreed that floor space should be used as the basis of this allocation. Whilst it is acknowledged that the number of guests is a significant driver of water withdrawal, many hotels and hotel

<sup>2</sup> See [Environmental Management for Hotels](#), Chapter 3: Water, page 7, section 3.2.4, Figure 3.2

companies do not currently capture data on the number of guests and meeting / event attendees. See Figure 2 for schematic representation of this apportionment

Figure 2: Apportionment between guest room use and all other uses



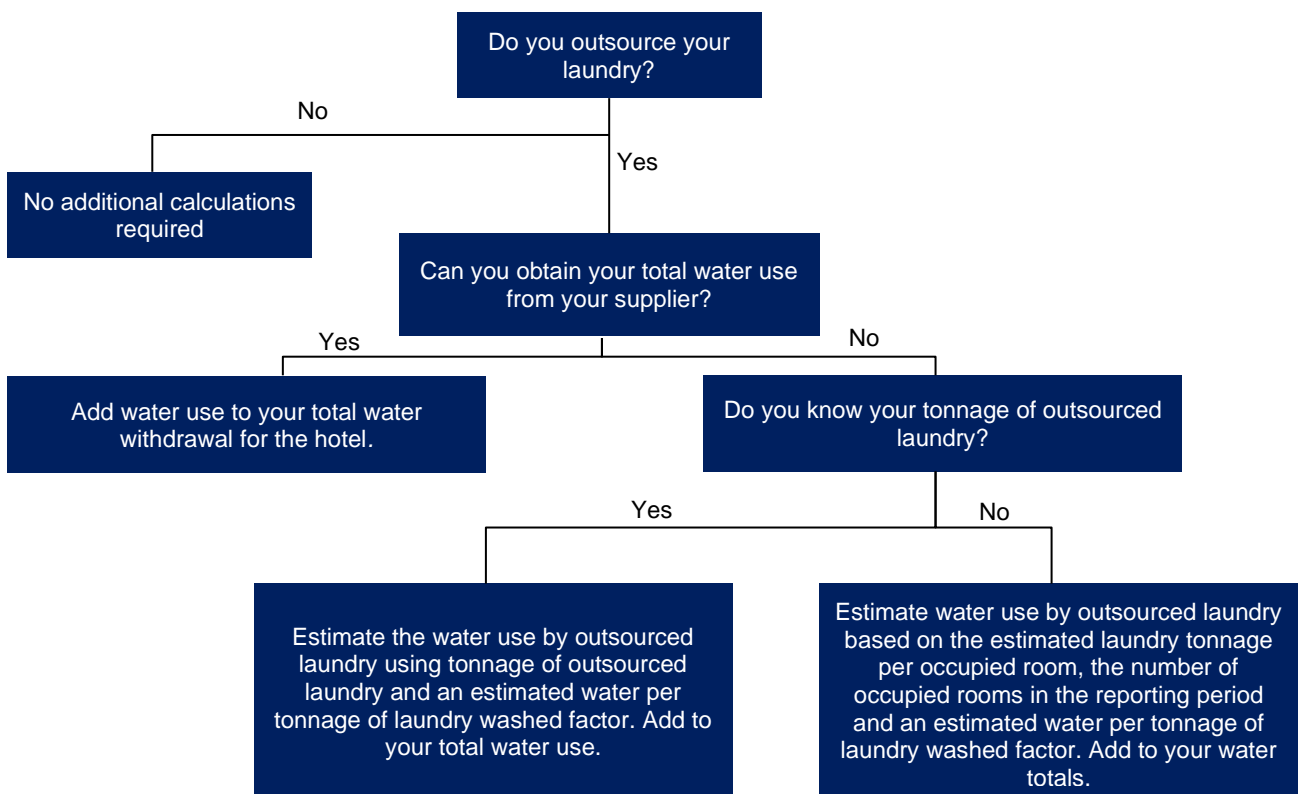
The apportionment outlined above should not be changed by hotels that are able to sub-meter their water usage. Whilst some hotels may be in a position where they have sub-metered data for their water withdrawal, this will not allocate all water used in all areas of the hotel to meeting rooms and guest rooms. It was thus agreed with the Working Group that sub-metered data would be excluded from the methodology to allow for a consistent approach across all HWMI users.

#### *Outsourced laundry*

Water used for laundry can make up a significant portion of a hotel's overall water footprint. Laundry has been a very high profile item in hotels' environmental activities for years and most hotels encourage their guests to re-use towels during their stay. However, many hotels outsource some or all of their laundry activity. Water withdrawal from outsourced laundry operations should be included in a hotel's overall footprint in order to assist with the comparability of different hotels' overall footprints.

Laundry undertaken internally is captured within the methodology. Water used by outsourced laundry should be included in the hotel's water footprint, using the decision tree below.

Figure 3: Outsourced laundry decision tree



Where a hotel outsources its laundry, the laundry supplier may be able to provide the amount of water used.

Where the total water used is not available from the supplier, the total water can be calculated based on an assumption that 20,000L of water is used to wash 1 tonne of laundry; this is based on average figures provided by the HWMI Working Group. If the total tonnage of laundry is unknown, it can be estimated based on an assumption of 0.00512 tonnes (or 0.0056 imperial tons) of laundry per occupied room (*source: [www.laundrytoday.com](http://www.laundrytoday.com)*).

The calculation for outsourced laundry is as follows:

- 20,000L (or 706 cubic feet, 4,399 imperial gallons, 5,283 US gallons) water used per tonne of laundry washed  $\times$  Total tonnes of laundry washed for the reporting year
- If laundry is measured in imperial tons, use the following for water used per ton of laundry (22,046L, 778 cubic feet, 4,849 imperial gallons, 5,823 US gallons).

#### Unmetered ground and surface water

The HWMI Working Group agreed that where unmetered sources of ground and surface water (e.g. rainwater or well water) are used, this is typically for sanitation operations and hotel grounds maintenance (i.e. plant watering). Unmetered sources should be included in the total water footprint where they represent more than 5% of the total water footprint.

As these sources are unmetered, estimation techniques have been developed to calculate their contribution to the total water footprint.

The calculation methodologies outlined in Table 4 should be used to determine the total water consumed by the hotel.

If unmetered water sources represent 5% or less of the total water footprint, a simple percentage uplift can be applied to the total water footprint. Assuming there is no change in the hotel's operations, it is considered acceptable for the same percentage to be used for 3 consecutive years, after which time it should be recalculated to help ensure its accuracy.

Table 4: Unmetered ground and surface water

Source	Methodology (where >5% total footprint)	Methodology (where <5% total footprint)
Sanitation	<p>Estimate the daily water use through the below equation:</p> <ul style="list-style-type: none"> <li>• <i>Number of toilets using unmetered water x * toilet capacity * estimated number of flushes)</i></li> </ul> <p>This estimate should then be extrapolated annually, assuming the hotel is open 365 days of the year.</p> <p>The number of flushes should be based on the specific operations within the hotel. Based on information provided by the HWMI Working Group, an expected range for the number of flushes (per day) is 4-6. Toilet capacity refers to the water used by each flush. If this is unknown, an estimate of 13L (or 0.46 cubic feet, 2.86 imperial gallons, 3.43 US gallons) per flush can be used for the purpose of this methodology. <i>Source: www.waterwise.org.</i></p>	<p>Apply a percentage uplift to total water footprint.</p> <p><i>Note: This calculation assumes no change in the hotels operations during the year. The same percentage can be used for 3 years, after which point it should be recalculated to ensure its accuracy.</i></p>
Ground maintenance/ water features	<p>Determine whether water use due to ground maintenance/water features is material to the total water footprint based on;</p> <ul style="list-style-type: none"> <li>• Garden/grounds size relative to the total hotel footprint (at a ground level only).</li> </ul> <p>Where a hotel has a “small” (&lt;5% of total hotel area) grounds, this water source can be ignored.</p> <p>If the grounds are greater than 5% of the total hotel area, the estimate can be calculated as follows:</p> <ul style="list-style-type: none"> <li>• <i>Hotel area * number of weeks irrigation used * average water use per m<sup>2</sup> (or square foot (sqft)) of grounds per week</i> <ul style="list-style-type: none"> <li>○ <i>If reporting in m<sup>2</sup>, water use per week per m<sup>2</sup> is as follows: 31 Litres/1.09 cubic feet/6,81 imperial gallons/ 8.19 US gallons</i></li> <li>○ <i>If reporting in sqft water use per week per sqft is as follows: 333 Litres/11.78 cubic feet/73.39 imperial gallons/ 88.15 US gallons</i></li> </ul> </li> <li>• <i>(Source: www.irrigation tutorials.com).</i></li> </ul> <p>No distinction is made between blue water and green water.</p>	

### Private space

Private space is areas which are not accessible to hotel guests or meeting attendees (e.g. private apartments, private clubs) and are not related to the hotel (e.g. the hotel leases a floor to a third party). Note back of house is not private space as is part of the hotel service delivery. If water use from such areas is included in the hotel’s water bills, this should be excluded from the water calculations. This is calculated by either:

- Subtracting sub-metered water used by private space (if all water used in the private areas are sub-metered); or
- Subtracting a percentage of total water used based on area apportionment of private space to the total hotel floor area.

### Water saving initiatives

Where a hotel employs water saving initiatives (e.g. low flow fittings, linen reuse programmes, water recycling, harvesting rainwater), this is not accounted for separately; rather the size of the water footprint is likely to be lower compared to similar hotels where no water saving initiatives are implemented. For corporate reporting, narrative can be provided to support the water footprint and intensity metrics calculated using this tool to outline any water saving initiatives that are in place.

## 3.0 Methodology overview

### Introduction

This section of the document provides an overview of the HWMI methodology and calculation tool developed by the Alliance and its Working Group, supported by KPMG. The methodology has been devised to help hotel companies and individual properties to measure and report on water use in a consistent way.

Additional detail regarding the development of this methodology can be found in Appendix A of this document.

### Methodology walkthrough

A walkthrough of the methodology for an example hotel is provided below. The assumptions and boundaries used within the below worked example are outlined in detail in the introduction and methodology development sections of this document.

Individual hotel properties may choose to use the HWMI calculation tool; a simple Excel tool which provides an easy way to perform the calculations. Hotels and hotel companies with their own systems may use the formulae below to adapt their system. Users may refer to the worked example of this calculation available on our website [www.sustainablehospitalityalliance.org/hwmi](http://www.sustainablehospitalityalliance.org/hwmi).

The methodology walkthrough is based on Hotel A. In this example, Table 5 outlines the floor space information required for this calculation.

Table 5: Hotel A floor space

Information	Hotel A
Total hotel floor area (The total hotel's surface is based on its total conditioned area, for consistency with HCMI)	50,000 m <sup>2</sup>
Total number of guests (per year, if available)	120,000
Total number of guest rooms	400
Number of occupied guest rooms (annual)	105,000
Total floor area of guest rooms	35,000 m <sup>2</sup>
Total floor area of meeting rooms	500 m <sup>2</sup>
Total floor area of private space	500 m <sup>2</sup>

### Step 1A – Data requirements

In order to calculate the total water use for Hotel A, data should be gathered as per the water sources listed below:

- Metered water (see Table 3 for details on data collection);
- Unmetered municipal water (see Table 3 for details on data collection);
- Delivered water (see Table 3 for details on data collection);
- Outsourced laundry (see Assumptions section for details on data calculation);
- Ground and surface water (see Table 4 for details on data calculation);
- Recycled water from external sources (see Table 3 for details on data collection);
- Private space (see Assumptions section for details).

Table 6 provides the total water used for each water source by Hotel A, and the relevant calculations.

Table 6: Hotel A water use

Water source	Data source	Calculation	Total (L)
<b>Water purchased from municipality/suppliers</b>			
Metered municipal (mains) water	Invoice/meter readings	Sum for the reporting year	240,000,000
Unmetered municipal water	Email from local authority	Sum for the reporting year	62,000,000
Delivered water	Invoice	Sum for the reporting year	200,000
<b>Water used in outsourced laundry</b>			
Outsourced laundry ( <i>Note: figures are given for illustration. Only one option should be followed for this calculation step, depending on data availability.</i> )	Option A: Total water from supplier	Sum for the reporting year	5,500,000
	Option B: Total tonnage from supplier	Total tonnage * 20,000L (industry average) - 320 tonnes * 20,000L	6,400,000
	Option C: Estimation	Estimated tonnage: 0.00512 tonnes per occupied room: - 105,000 * 0.00512 = 537.6 tonnes - 537.6 * 20,000L	10,752,000
<b>Water extracted or harvested on-site by the property</b>			
On-site desalinated water	Freshwater output from the desalination process	Total output from the desalination process for the reporting year	0
Ground/surface water.	Option A: Total ground/surface water used  If unknown, use option A and B below for estimation		

Estimated ground/surface water (sanitation) <i>(Note: figures are given for illustration. Only one option should be followed for this calculation step, depending on data availability.)</i>	Option B: Number of toilets and known information	No. of unmetered toilets, 10: - Number of flushes per day = 7 - Water used per flush = 8L - $(10 * 7 * 8) * 365$ days	204,400
	Option C: Number of toilets and unknown information	No. of unmetered toilets, 10: - Number of flushes per day = 5 - Water used per flush = 13L - $(10 * 5 * 13) * 365$ days	237,250
Estimated ground/surface water (irrigation)	Estimation	Outside space irrigated * 31L (industry average) * No. of weeks irrigated during reporting year; - Outside space = 1,000m <sup>2</sup> - Weeks irrigated = 8 - $1,000\text{m}^2 * 31\text{L} * 8$ weeks	248,000
<b>Total water use</b>			<b>308,848,000</b>

*Note: For Hotel A we have used Option B for outsourced laundry and Option A for unmetered sources (sanitation).*

#### Step 1B – Private space

Hotel A has 500m<sup>2</sup> of private space. If a hotel has private space and water use associated with this area is included in the hotel bills / metering, it needs to be deducted from the hotel. This can be worked out in the following ways:

- Option A: Sub-meter (i.e. meter reads);
- Option B: Estimation based on the ratio of private space to total hotel floor area (see Assumptions sections for details).

For Hotel A, Option A has been selected (i.e. sub-meter reads), equating to 10,000L. This 10,000L is deducted from the total water use of 308,848,000L, equating to a total of 308,838,000.

#### Step 2 – Guest room use vs all other uses

As detailed in the Assumptions section (page 9), water use associated with guest room use is assumed to account for 1/3 of the total water withdrawn by a hotel. The other 2/3 is all other use. Based on a total water withdrawal of 308,848,000L for Hotel A, this lends to the following split:

- Guest room use = 102,946,000L; and
- All other uses = 205,892,000L.

### Step 3 – Apportionment of all other uses

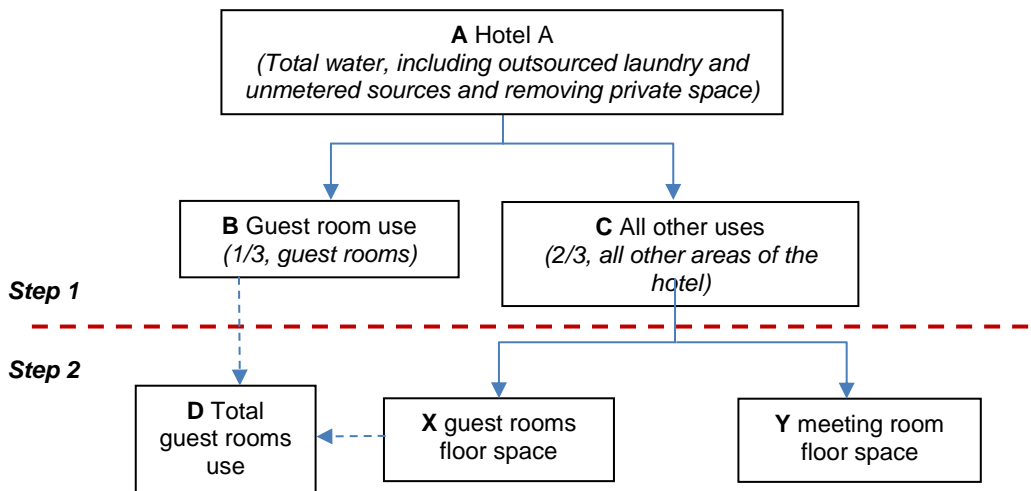
Based on the information in Table 5, the floor space in Hotel A is split between guest rooms and meeting rooms. The total water withdrawal associated with uses other than from guest rooms of Hotel A is 205,892,000L

The 205,892,000L of water needs to be split between guest rooms and meeting rooms based on the ratio of floor space.

Figure 4 below shows how water is apportioned between the relevant uses.

Figure 4: Water withdrawal apportionment

Where: X = guest room floor space; Y = meeting room floor space; A = Total water footprint; B = Guest room use (i.e. 1/3); C = All other uses (i.e. 2/3); and D = Total guest room use.



Step 2.1 to 2.2 within Table 7 below explains how the total water withdrawal has been apportioned for Hotel A.

Table 7: Water withdrawal apportionment

Step	Equation
Step 2.1: Total guest room use	$\left(\frac{C}{X + Y} * X\right) + B = D$ $\left(\frac{205,892,000L}{(35,000 + 500)} * 35,000\right) + 102,946,000L = D$ $305,938,113 L$
Step 2.2: Meeting room use	$\left(\frac{C}{X + Y} * Y\right) = D$ $\left(\frac{205,892,000L}{(35,000 + 500)} * 500\right) = D$ $2,899,887 L$

### Step 4 – Working out water use per occupied room

The total water use of guest rooms within Hotel A is as follows (see Table 7 for details):

- 305,938,113L



Based on a total number of occupied guest rooms of 105,000, the total withdrawal per occupied room (annually and per night), can be calculated as follows:

- Total per occupied room (per night) =  $\frac{305,938,113L}{105,000} = 2,914L$  per occupied room per night.

Should the hotel wish to calculate the total water withdrawal per guest, this can be calculated as follows:

- Total per guest (per night) =  $305,938,113L / 120,000 = 2,549L$  per guest.

#### *Step 5 – Working out water use per area of meeting space*

The total water use of meeting rooms within Hotel A is as follows (see Table 7 for details):

- 2,899,887 L

Based on a total area of 500m<sup>2</sup>, the total use per m<sup>2</sup> of meeting room space (annually and per day, assuming the hotel is open 365 days each year and the meeting rooms are used every day for 10 hours) can be calculated as follows:

- Total per m<sup>2</sup> of meeting space (per hour, based on a 10 hour working day) =  $2,899,887L / 500 / 365 / 10 = 1.59L/m^2$ .

Should it be requested by a client or required for internal reporting, the tool allows the total water withdrawn to be calculated for a specific event/meeting. In order to calculate the water withdrawn by a specific event/meeting, the following information is required:

- Number of guest rooms required for the meeting/event;
- Meeting space occupied for the meeting/event; and
- Hours of meeting/event.

Based on the above information, for a meeting attended by 57 guests at Hotel A that lasts 10 hours in a meeting room 200m<sup>2</sup> in size, the following can be calculated:

- Client guest room water use =  $57 \text{ guests} * 2,916L \text{ per occupied guest room per night} = 166,081L$ ;
- Client meeting water use =  $200m^2 \text{ meeting room} * 10 \text{ hour meeting} * 1.59L/m^2 = 3,178L$ ;
- Total client meeting water use =  $166,081L + 3,178L = 169,259L$

# Appendix A: Methodology development

## Overview of approach

To develop the methodology, the following steps were taken:

- A questionnaire was developed and distributed to members of the Working Group to collect information on current approaches relating to water use measurement, data collection and reporting methods;
- Key principles of existing water measurement methodologies and datasets that could be applied to HWMI were identified through research and analysis;
- The principles of the Global Reporting Initiative (GRI) and World Resources Institute (WRI) were integrated into the overall methodology for the HWMI to provide a robust and aligned framework for the industry; and
- Engagement with key stakeholders and research into relevant data and information sources to define the boundary, scope of activities, and the key metrics that form the basis for the calculation tool.

## Questionnaire

The first step in developing the methodology was collecting information on water metric measurements from the Working Group via a questionnaire. The following steps explain how the results of this questionnaire fed into the overall methodology.

### *Scope and focus*

The questionnaire was designed to collect information on the following areas:

- Water withdrawal measurement;
- Data use and collection; and
- Current methods used and reporting by the Working Group members.

Of the total Working Group members, two thirds responded to the questionnaire. Collectively the respondents are responsible for sustainability at approximately 25,000 hotels, over 80% of which currently measure water withdrawal. The coverage of properties included owned, managed and franchised hotels.

Full details on the questionnaire can be found within Water Measurement Methodology Research Outputs (April 2015, available on request).

### *Key findings*

A detailed description of the findings from the questionnaire can be found within Water Measurement Methodology Research Outputs (April 2015), available on request. A summary of the key findings that fed into the design of the HWMI methodology is outlined below in Table 8.

Table 8: Summary of key findings from the questionnaire

Area	Summary of finding
Metrics and request for information	All respondents measured total water withdrawal and use per occupied room with varying methodologies. Other intensity metrics included: water use by: total square footage; number of rooms; built hotel and turnover.
Reporting boundaries	No respondents measured the water consumed in outsourced laundry at the time of the questionnaire. However, some did include water withdrawn by 'non-core' facilities (i.e. spas, golf courses, etc.).
Internal processes	Internal systems were being used to report water data by respondents. However, issues were raised around the accuracy of data within these systems.
Data accuracy and completeness	Estimations were being used by 78% of respondents to fill data gaps (e.g. extrapolating withdrawal data measured at other hotels or excluding hotels without metered supplies from reporting). Unmetered supplies and other water sources (e.g. grey water or rainwater) were generally either not measured or not used.
Developing and applying HWMI	Data availability and questions over accuracy were the main challenges to developing and applying HWMI presented by respondents. Other challenges included setting boundaries, staff training, and the perceived low value of water.

### *Next steps*

Where necessary, these findings were followed up directly with respondents to clarify any gaps and seek further details on answers provided. Following this, the findings were used to inform the review of a number of current water reporting methods, frameworks, datasets and research.

## **Methods review, research and analysis**

A review of water method calculations, tools, questionnaires, white papers on the subject and relevant global datasets (hereafter referred to as “methods”) was conducted to identify common approaches and themes within existing water measurement methodologies.

The methods review included those identified by the Working Group members within response to the questionnaire in addition to internal insights and tools recommended by CDP, and GRI.

Work conducted by the HCMI was also considered during this stage of the initiative and used to help develop a set of recommendations for the development of a draft HWMI methodology.

### *Scope and focus*

Each method was reviewed for the following points:

- Key principles of the approach;
- Metrics (including intensity metrics) and their definitions;
- How boundaries were determined;
- Suggested reporting periods;
- Apportionment of water use to different areas of a facility or product; and
- Recommended estimation techniques when data is not available.

Further details regarding the specific methods and tools reviewed as part of the research are available on request.

### *Key recommendations*

Based on the results of the research, the following key initial recommendations were identified:

- HWMI should follow the WRI principles of relevance, completeness, consistency, transparency, and accuracy (note: these are closely aligned with the principles set out by the GRI;

- Setting a number of rules and definitions used as part of the methodology for consistency, as per HCMl (e.g. reporting period);
- Development of a hierarchy of data sources where actual metered withdrawal figures are not available; and
- Definition of key water metrics, boundaries and other issues.

In terms of the reporting period, based on the questionnaire findings and research results, it was agreed that the HWMI reporting period should follow the same definition as that of the HCMl. The reporting period is outlined as follows:

- 12-month data set to be defined by each hotel/company;
- From the end of the reporting period, hotels have a maximum of six months to gather data and carry out the footprint calculations;
- After the calculations have been completed, the footprint data is valid for 12 months; and
- Hotels which were closed for part of the reporting period should use the number of days they were open for, instead of the standard 365 days.
- Further details regarding the outcome of the research are available on request.

#### *Next steps*

The results of the research and analysis of current methods led to further discussion within the Working Group on three key areas, listed as follows:

- Metrics (definitions and intensity metric); and
- Boundaries.

## **Metrics and boundaries**

The results of the questionnaire and additional research highlighted that defining key metrics and boundaries was integral to establishing a consistent tool for calculating water withdrawal. Each topic was discussed by the Working Group in separate meetings to establish an agreed upon approach that would be effective at meeting the goal of HWMI.

#### *Metrics*

Defining the metrics used within the methodology is essential to ensuring a consistent approach that could be applied across the hotel industry. Both the metric scope, and the resulting intensity metrics, were discussed and agreed by the Working Group.

The below tables provide a summary of metric scopes and intensity metrics as agreed by the Working Group, and their relevance to the water footprinting calculation.

Table 9: Agreed metric scope

<b>Metric scope</b>	<b>Outcome</b>	<b>Notes</b>
<p>Water footprint:</p> <ul style="list-style-type: none"> <li>Water withdrawn: all water drawn into the boundaries of the organization from all sources (GRI); or</li> <li>Water consumed: amount of water that is used but not returned to its original source (CDP).</li> </ul>	<p>Consistency with the GRI/CDP.</p>	<p>Definitions agreed during Working Group call #4, 22/07/15.</p>
<p>Water sources:</p> <ul style="list-style-type: none"> <li>Water brought into the boundaries of the hotel (including outsourced laundry facilities).</li> </ul>	<p>All water sources drawn into the boundaries of the hotel should be reported.            Outsourced laundry is a material source of water use.            Consistency with HCMI.</p>	<p>Definition agreed during Working Group call #4, 22/07/15.</p>
<p>Harvested rainwater (i.e. rainwater accumulated for use on-site rather than allowed it to run off).</p>	<p>If a hotel is harvesting rain then it should be counted. This source (even if non-potable) is extracting from water cycles and therefore should be accounted for.</p>	<p>Definition agreed with the Alliance members during HWMI update in May 2020</p>
<p>Recycled water (i.e. previously used water that is treated for reuse within the hotel premises).</p>	<p>Recycled water is not taken into account in the calculations.            Hotels would not need to measure the amount of water recycled within their premises, but could chose to do so and disclose this information separately.            Hotels who recycle water would benefit from a lower HWMI footprint as less water would be needed from other sources.</p>	<p>Definition agreed during Working Group call #4, 22/07/15.</p>
<p>Water discharges (i.e. entry to surface water of controlled waters).</p>	<p>Water discharges are excluded.            Water discharges should be considered by hotels in line with local regulations but do not form part of a hotel's water use and could be considered in future refinements to the HWMI methodology.</p>	<p>Definition agreed during Working Group call #4, 22/07/15.</p>
<p>On-site desalination (i.e. freshwater produced with desalination facilities operated by and for the hotel)</p>	<p>On-site desalinated water is included on the basis that:            Many members report under CDP and GRI            Water is a resource which needs to be measured from all sources            Reporting on on-site desalinated water gives a truer picture of a property's water use and will facilitate easier benchmarking            On-site desalination is not always seawater, it is on occasion used for treating poor quality ground water</p>	<p>Definition agreed during Working Group call #10, 04/08/15</p>

Table 10: Agreed intensity metrics

Intensity metric	Rationale	Notes
Water use per occupied room	<p>Consistency with HCMI.</p> <p>Matches the request from GBTA and requirements of meeting planners.</p> <p>Occupied rooms is a more commonly used metric than number of guests (based on questionnaire and methods research, which suggested water use per guest is not always possible).</p>	Metric agreed during Work Group call #4, 22/07/15.
Water footprint per guest night	<p>May be calculated by hotels if requested by stakeholders.</p> <p>Hotel Groups may also use guest nights (instead of occupied rooms) as a metric to benchmark their hotels performance (where the average number of guests per room vary between hotels).</p>	Metric agreed during Work Group call #4, 22/07/15.
Apportionment of total water withdrawal to guest rooms and meeting spaces	<p>HCMI Water and Waste Sub-Working Group suggested that water use is allocated between occupied guest room use, meeting rooms and all other uses. An occupied guest room accounts for 1/3 of total water withdrawal, with all other uses accounting for 2/3. Recommended apportionment method for the HWMI is sourced from the Alliance's Environmental Management for Hotels Manual and is based on:</p> <ul style="list-style-type: none"> <li>• An average water withdrawal per person per day; and</li> <li>• An estimate of kitchen water use for meals prepared for non-guests meeting attendees.</li> </ul>	Metric agreed during Work Group call #5, 08/09/15.

### *Water Use Boundaries*

The findings of the questionnaire and research highlighted the importance of clear boundaries relating to water sources that effectively captured the correct data, and also excluded activities that were not related to the hotel.

The hotel's boundaries in terms of water sources as follows:

- All activities within the hotel premises and outsourced laundry, excluding 'private space' (i.e. areas which are not accessible to hotel guests or conference attendees (e.g. private apartments) and not related to the hotel facilities or service delivery (e.g. the hotel leases a floor to a third party).

The above is consistent with HCMI. Further detail on the specific water inclusions and exclusions can be found in Table 1 within the 'Key information' section of this document.

## HWMI – 2020 update: key changes

In 2020 the HWMI methodology was revised based on Members' recommendations regarding challenges in using HWMI. A brief summary of the changes is captured in the table below.

What	Revised
Clarified categories of water footprint	<p>All activities within the hotel premises (i.e. direct building uses and ancillary activities including restaurants, laundry, meeting spaces, , casinos, golf courses, spas, garden space, fitness centres, and back of house).</p> <p>Other inclusions:</p> <p>1. Water purchased from municipality/suppliers:</p> <ul style="list-style-type: none"> <li>• Municipal (mains) water</li> <li>• Delivered water</li> <li>• Recycled water from external sources</li> </ul> <p>Water extracted or harvested on-site by the property</p> <ul style="list-style-type: none"> <li>• Ground and surface water</li> <li>• Desalinated water</li> <li>• Harvested rainwater</li> </ul> <p>Outsourced laundry.</p>
Instructions on how to input recycle water use	<p>The purpose of HWMI is to measure and report the amount of water used by a hotel, which extracts water from the local water cycle. Water coming from these external sources can, in principle, be metered or estimated as it feeds into the hotel water system. Following this logic, hotels should account for their use of recycled water from external sources such as:</p> <ul style="list-style-type: none"> <li>• Reclaimed, non potable water from local networks such as the San Francisco Recycled Water Ordinance (<a href="#">read more here</a>)</li> <li>• Harvested rainwater, regardless of its harvest location (including the hotel's premises)</li> </ul> <p><b>On the contrary</b>, water recycled by the hotel within its building (after having gone through water meters e.g. re-using the building's wastewater for irrigation) are excluded on the basis that the total water use for a hotel that recycles water will be lower than a hotel that does not.</p>
Remove water used in on-site wastewater treatment owned or operated by the hotel.	N/A
Remove district chilled water from scope.	Water used to run cooling towers outside of the hotel and provide the hotel with chilled water is excluded as this information is unlikely to be accessible by hotels.
Clarifying total water use per floor area (sqm/sqft) of meeting space (hourly).	HWMI apportions water withdrawal from 'all other uses' between guest rooms and meeting space. The Working Group agreed that floor space should be used as the basis of this allocation. Whilst it is acknowledged that the number of guests is a significant driver of water withdrawal, many hotels and hotel companies do not currently capture data on the number of guests and meeting / event attendees.

## Appendix B: Water scarcity

Both the HWMI working group and stakeholder panel recognise the need to assess the level of water scarcity for a given water withdrawal in a given location. A thorough approach to corporate water stewardship requires not only a sound methodology to measure water withdrawal (which HWMI provides), but also an assessment of local water issues in the area the business operates. This is a key step for any hotel to align its water use with its location's environmental capacity and to protect access to clean water for other users, particularly local communities.

Assessing water scarcity risks at local level requires the use of separate indicators. Many HWMI Working Group members already assess water scarcity in the areas where they operate and it is strongly recommended for any hotel using HWMI to complement their approach by measuring scarcity risks. Communicating those risks remains optional but hotels that are able to contextualise their own consumption with local water risks will have a much more credible approach to water management. In addition, they will be able to set a clear business case for taking action to reduce water use by identifying current and future water risks and associated costs (lower guest satisfaction, travellers' shortage during severe droughts, maintenance costs, risks of temporary closure, additional costs from switching to alternative supplies, increased cost of water etc.).

There is a strong expectation and increased scrutiny from stakeholders on how much water is being consumed by hotels in water-scarce areas and we invite all users of the HWMI methodology to go beyond reporting for RFPs and assess their impact on water scarcity. Not only will it make their approach to water stewardship more credible, it will also help them improve their risk analysis and sustainability reporting (e.g. through reporting to [CDP's water program](#)). Tools dedicated to water scarcity risk assessment are listed below.

### *Scarcity tools*

There are various third party tools available that allow properties to understand their water footprint in the context of water scarcity. Based on the results of the methods review, the following tools have been highlighted as the easiest and most pragmatic tools available. However, it should be noted that the examples are provided for reference only; there are other tools available that have not been referenced below, which can still be used to determine water scarcity.

#### *WRI Aqueduct*

The [WRI Aqueduct](#) is embedded into a wider water management tool, [EarthCheck](#), which provides a framework to assist users in understanding and managing their water withdrawal.

The WRI Aqueduct tool was highlighted by the methods review as one of the more effective third-party tools that determine water scarcity and risk. The only input required is the address of the hotel. Based on this information, the tool will then provide an overall water scarcity risk rating. This rating can then be considered alongside the water footprint as a separate indicator.

#### *WWF Water Risk Filter*

The [WWF Water Risk Filter](#) has been developed to help companies assess their water risks and provides mitigation responses at a facility (i.e. hotel) level.

The tool works by providing a high level risk assessment based on the name of a facility, the industry and its location. A detailed assessment can be obtained by completing a questionnaire regarding the specifics of the facility. This detailed assessment includes underlying individual risk indicators relevant to the facility, water scarcity and pollution maps and examples of mitigation responses based on the three highest risks associated with the facility.

#### *The Sustainable Hospitality Alliance Destination Water Risk Index (DWRI)*

The Index provides cutting-edge intelligence on the top twelve most water-scarce priority tourism destinations which can be used by the hotel sector and wider tourism stakeholders when planning their growth strategy and destination management. The DWRI is the result of a collaboration between the Alliance



(project lead), Ecolab (sponsor and data provider) and Greenview (data analysis) to overlay existing water risk and hotel industry databases. The Index seeks to help hotel developers, companies, their properties and wider tourism stakeholders to better understand and address their local water risk and its financial implications in the largest hotel markets in the world.

The destinations with the highest risk water-scarce destinations are located in Indonesia, India, Thailand, China, United Arab Emirates and the Philippines out of almost 70 priority destinations analysed overall.

The Index also reveals the destinations where water is currently undervalued and where predicted pricing premiums will dramatically increase the cost of water for local operators. In some locations the Index demonstrates that water is likely to increase by more than 60 times its current value.

### *Ecolab Water Risk Monetizer*

The [Ecolab Water Risk Monetizer](#) tool helps businesses assess water-related risks in terms of finance. It uses a model developed by Trucost to quantify the potential impacts of water scarcity on a business, expressed as a monetary value. The model uses local information on water scarcity to provide an output specific to the business.

The output of the tool is guidance regarding the full value of water at the business level (if supply and demand were accurately reflected in the cost of water consumption) and the estimated amount and likelihood of revenue that could potentially be lost by the business due to the impact of water scarcity on operations.