AWS INTERNATIONAL WATER STEWARDSHIP STANDARD

GUIDANCE FOR STEP 1: GATHER AND UNDERSTAND: DRAFT DATED 31 AUGUST 2018

[Notes: useful references will be listed under relevant sections. Some illustrative diagrams to be included.
As explained in the 'Introduction to the Guidance', for each Step, the text from the main standard is repeated, with the Guidance text given below each criterion. Paragraph numbers in the guidance text correspond to Indicator numbers.]

This guidance is intended to support implementors and assessors of the AWS Standard with three main audience types in mind:

1. **The implementing organization**. To help the organization to better understand the scope of work required to comply with the standard and reach certification, and to guide the organization on the actions it can undertake directly itself.
2. **Expert advisors**. Typically, the organization will need the support of experts and specialist consultants to undertake some aspects of the standard. These may be technical experts on water management, risk assessment or stakeholder engagement.
3. **Auditors (Conformity Assessment Bodies, CABs)**. To provide additional detail and examples on what the implementing organization should do to demonstrate to achieve compliance.

The current guidance is intended to be applicable to all regions and sectors. It does not include sector or regional specific guidance. It is anticipated these will be developed at a later stage as supplements, depending on need and demand.

Structure

The guidance has three parts:

- The introduction
- Guidance for each Component (and individual criteria and indicators as appropriate)
- Guidance for special subjects requiring more detailed explanation and guidance (for example Catchments, Stakeholder Engagement and Water-related HCVs).

For easier cross-reference, this guidance document includes the text of the standard. This avoids the need of those undertaking practical tasks of data collection and implementation to need to cross-reference between separate documents. The guidance provides additional detail to the criteria and indicators, helping to ensure they are understood, and to promote a consistent approach. Paragraph numbers in the guidance text match the corresponding criterion or indicator. Definitions of words and phrases are given in the Glossary. The Guidance contains no additional requirements for compliance. All requirements are within the Standard.

The use of experts

Understanding how water behaves and moves in the environment, and its associated risks, requires specialist knowledge and experience. It is recommended for an implementing organization to include relevant expertise in water stewardship, risk and stakeholder engagement. The level of external support required depends on the organization. A small organization using only third-party service providers for water and wastewater may have no existing water-related experience beyond paying their bills. On the other extreme, large multi-site organizations with their own private water sources or wastewater facilities may already have significant water management experience and perhaps internal expertise. A good expert will have many years' experience in water management and risk assessment, may already have good local knowledge, and will likely be familiar with relevant regulations and regulatory organizations and existing water issues and concerns of the region.

Guidance on special subjects

The special subjects included with this guidance are:

- Catchments
- Stakeholder Engagement
- Water-related high conservation values (WHCVs)
- Fossil water and desalination water

Evolution of the guidance

Unlike the standard itself, which requires a formal revision and approval process for updates, the guidance will be reviewed and updated on a rolling basis. This makes it a flexible and evolving document to be periodically amended as for the following examples:

- To introduce clarifications, corrections or amendments when necessary
- To introduce additional special subjects, sector guidance and regional guidance as required and requested by members

Step 1: Gather and Understand *Gather data to understand shared water challenges and water risks, impacts and opportunities.*
Intent: Step 1 intends to ensure that the site gathers data on its water use and its catchment context and that the site employs these data to understand its shared water challenges as well as its contributions (both positive and negative) to these challenges to water risks impacts, and opportunities. This data also informs the development of the site's water stewardship strategy and plan (Step 2) and guides the actions (Step 3) necessary to fulfil the site's commitments.

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Gathering data. This does not necessarily require the organization to physically collect all data itself but may also include obtaining existing data and information from other sources and studies. The organization is normally in the best position to collect data from its own site, but for the surrounding catchment, there is more likely to be other sources available. Data gathering can potentially be expensive, so it is recognized it should be realistic, but that the organization should show it has made reasonable efforts to obtain sufficient data for a reliable water stewardship assessment.

Data availability and sources. The availability of publicly accessible data and information on water varies enormously across the world. In developed countries, it is commonly comprehensive. For example, most countries in Europe have detailed geological maps and publicly-funded databases with detailed information (geographically and over time) of such things as geology, surface water bodies, aquifers, water quality, flows and their variability, climate, water withdrawals, and resources availability maps. In addition, there are many thousands of academic studies available on river basins and aquifers, which can be found through an internet search or via an online specialist library. In developing countries, in contrast, there may be relatively little information, especially in more remote areas. However, a good expert can still learn a lot from studying maps, geology, satellite photography, a field visit, and by collecting data (for example, water samples for analyses). Where data cannot be identified to support a standard indicator, the implementing organization will be expected to show they have made a reasonable and proportionate effort.

The value of experts. Experts with local experience will have valuable knowledge and will also know where, or who, to go to for additional information and data. Water resources experts will have experience in 'on-the-ground' assessment to understand the catchment, local water issues, land use impacts and water-related HCV features.

Where to start. The logical starting point for any site is to refer to studies or information it may already have from activities related to water supply and wastewater, permit applications, sustainability reporting, environmental compliance, ISO compliance, etc. A site with its own groundwater sources (boreholes) will often already have relate studies and documentation.

Timescales for data measurement. Water use information needs to be considered on a number of different timescales. A yearly timescale is relevant for a gross water balance of the site and catchment. Longer timescales of years may be relevant for considering long term trends, such as changes in water quality and water scarcity trends linked to groundwater levels and river flows. Periods of weeks or months are relevant for seasonal variability. For example, a catchment may be naturally water abundant for part of the year, but water scarce at other times, due to seasonality of rainfall or snowmelt.

For water abstraction points, it is usual to measure in much shorter timescales such as cubic meters per day (m^3/d), or even liters per second (L/s). Experts can advise on which units are conventional and relevant.

Criteria		Indicators	
1.1	**Gather information to define the <u>site</u>'s physical <u>scope</u> for water stewardship purposes**, including: its operational boundaries; the water sources the <u>site</u> draws from; the locations where the <u>site</u> returns its <u>discharges</u> to; and the <u>catchment</u>(s) that the <u>site</u> affect(s) and is reliant upon.	1.1.1	The physical <u>scope</u> of the <u>site</u> shall be *mapped*, including: • <u>Site</u> boundaries; • Water-related <u>infrastructure</u> owned or managed by the <u>site</u> or its parent company; • Any sources owned or managed by the <u>site</u> or its parent company; • Water service provider (if applicable) and its ultimate water source; • <u>Discharge</u> points and waste water service provider (if applicable) and ultimate <u>receiving water body</u>; • <u>Catchment</u>(s) that the <u>site</u> affect(s) and is reliant upon for water.

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1.1.1

Defining the Physical Scope is fundamental to the water stewardship process. It defines where to collect data, where to assess risk and the geographical scope for stakeholder engagement.

- The **site's boundaries** are the boundaries of land owned or leased by the organization, which may or may not be contiguous.
- **Water sources owned or managed by the organization (private water sources),** typically surface water intakes, or boreholes for groundwater. Individual water sources are potentially the most vulnerable aspect of a site's water supply security. Each water source should be known in terms of its location, design, age, condition and risks.
    - **For surface water**, the source is typically a 'water intake' structure installed on and in the water body, with pumps and filters (to prevent uptake of debris, fish, vegetation, etc.). The type of risks to be assessed and mitigated include: low flow or low water level; freezing; turbidity; vulnerability to pollution from spills in the water body. Surface water sources are particularly vulnerable to pollution which can move very rapidly in open water, especially in flowing rivers. Compared to groundwater sources, the condition of a surface water source is relatively easy to see.
    - **For groundwater**, the source is typically a borehole (also called a water well). Borehole design, construction and maintenance are highly specialist subjects. Many boreholes in use today are decades old. If not properly maintained, their performance will deteriorate through corrosion, clogging and potentially collapse. Even when well maintained, they eventually need replacing, a relatively costly investment. Additional risks to be assessed and mitigated include: contamination from pollution of the aquifer; contamination from spillages at the surface

(for example, by flood waters; falling water levels due to abstraction by others, or drought. For boreholes, the site should have documentation to include: borehole design, protection measures, monitoring program and maintenance program.

- For **water service providers**, identify who they are and the main water bodies they abstract water from (for example, a named river or aquifer). Individual abstraction points are not required. Some suppliers may be reluctant to share information on the basis of security and confidentiality. In this case, the organization should show it has requested information and explain why it could not receive it.
- **Discharge points**. Where the organization discharges water or wastewater (treated or untreated) direct to the environment, the discharge points should be identified and mapped. For **wastewater service providers**, identify who they are, the ultimate destination of their discharges (for example, a receiving water body), and level of treatment (none, primary, secondary or tertiary).
- The **catchment** relevant to the site's water and wastewater may be surface water based, groundwater based or a combination of both. See the 'Catchments' section for detail on how catchments are defined and mapped. Mapping a catchment requires specialist expertise, especially for groundwater.

1.2	**Understand stakeholders of relevance,** their water challenges, and the site's ability to influence beyond its boundaries.	1.2.1	Stakeholders and their water-related challenges shall be *identified.*
		1.2.2	The process used for stakeholder identification will be *documented*. This process shall: • Inclusively cover all major stakeholder groups; • Cover the physical scope identified, upstream and downstream; • Provide evidence of stakeholder consultation on water-related interests and challenges; • Consider stakeholders' willingness, capacity and requirements for engagement; • Identify the degree of stakeholder engagement based on their level of interest.
		1.2.3	Current and potential level of influence between site and stakeholder shall be *identified,* within the catchment and beyond.

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A stakeholder is an individual, group or organization on which the site may have an influence or impact, or which may have an influence or impact on the site. Stakeholders also include people or organizations with an active or passive interest in the site's activities, especially those who may have concerns for social or environmental impacts. Impacts may be physical or non-physical (e.g. regulatory, reputational). See 'Stakeholder Engagement' section for more explanation.

1.2.1 It is recommended to create and maintain a table or database listing each stakeholder along with the additional information requested. Pay particular attention to traditionally disadvantaged and potentially less vocal groups, such as indigenous communities, women, children and the elderly.

Water related challenges of stakeholders may be those related to the site's activities (such as water use and wastewater management), or to more general catchment level influences, such as water scarcity, pollution, flood risk, infrastructure or regulation. The site should identify the water related challenges of stakeholders as a part of the stakeholder engagement program. The type of challenges can vary enormously, depending on geography, climate, and the nature and activities of the stakeholder. Some examples include:

- Unable to obtain sufficient water for their needs, due to physical or regulatory limitations
- Water quality concerns
- Water and/or wastewater prices
- Increasing risk of drought and water scarcity
- Water quality concerns in popular fishing areas (whether for food or sport)
- Concern for bathing water quality (in outdoor natural water bodies)
- Flood risk

1.2.2 Guidance on major stakeholder groups is included in the 'Stakeholder Engagement' section.

Evidence of consultation can include: meetings, public meetings, emails, telephone calls or sending out of a general letter or brochure to invite responses and engagement. The type of contact should be appropriate to the importance or significance of the stakeholder.

For **engagement**, the site should summarize how it engages with identified stakeholders and how often. For important stakeholders, engagement should be at least annual. Depending on the stakeholder, engagement may range from direct to passive, depending on importance or level of interest.

1.2.3 The organization should make a judgement on its potential to influence water stewardship in the catchment. This may be partly based on the findings of the stakeholder engagement process. Factors affecting influence include:

- The economic size and number of employees compared to other organizations in the catchment
- The density of similar organizations within the catchment. For example, one small employer out of many may have relatively little influence compared to a major employer in the catchment.
- The political culture of the region and how open it is to private organizations taking a proactive role in policy development or actions outside its own boundary.

1.3	**Gather water-related data for the site**, including: water governance, water balance water quality, water-related high conservation values, water-related costs, revenues, and shared value creation.	1.3.1	Water stewardship and incident response plans shall be *identified*.
		1.3.2	Site water balance, including inflows, losses, and outflows shall be *mapped*.
		1.3.3	Site water balance, including inflows, losses, and outflows shall be *quantified* including indication of annual variance in water usage rates shall be *quantified*.
		1.3.4	Water quality of the site's water source(s), provided waters, effluent and receiving water bodies shall be *quantified,* including indication of annual high and low variances where this would be a threat to good water quality status for people or environment.
		1.3.5	Potential sources of pollution shall be *identified*, including chemicals used or stored on site.
		1.3.6	On-site water-related High Conservation Values shall be *identified*, including a description of their status.
		1.3.7	Annual water-related costs, revenues, and a description or quantification of the social, environmental, or economic water-related value generated by the site shall be *identified* and used to inform the plan at 5.1.1.

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1.3.1 The organization needs to be aware of water-related emergencies and be prepared to react to them. Water-related issues and risks should be included in its general incident response plans. If there are none, then they should be developed (for water-related issues as a minimum). They may have alternative names (such as water management plan, emergency response strategy).

The documentation should show that the site has reviewed water related risks and has established appropriate monitoring programs, mitigation and response strategies. The risks to consider are wide-ranging, including: failure of water sources, reduction or loss of supply, water scarcity, pollution and flooding. The risk assessment should take into account both risks **to** the site and risks **from** the site to the natural environment, water users and communities.

1.3.2 The water balance is an assessment of water inflows, throughflows and outflows, onsite water storage and changes in storage. Before quantifying, each component should first be identified and mapped, and may include sub-components. For example, 'water inflow' may include multiple sources of water, such as a combination of private borehole and municipal supply.

- Typical water inflows include: Incoming water supply, onsite rainfall, water in incoming products (e.g. water within fruit and vegetables can be a significant component in food factories).
- Typical outflows include: Wastewater, run-off (e.g. from washing facilities), leakage, evaporation, water in manufactured product (e.g. beverages)
- Typical water storage components include: Water storage facilities (open reservoirs, closed tanks), fire-fighting water tanks, water contained in pipework (if significant), water in products stored on site.

1.3.3 The water balance equation must balance (at least approximately), and so is useful for verifying that water volumes and flows are reliably measured and accounted for. For example, if measured outflow seems too small, it can be an indicator of unaccounted for leakage or evaporation.

The water balance equation: (Water outflow) = (Water inflow) + (Change in storage volume)

A basic water balance is commonly done on a one-year timescale. It may also be appropriate to calculate it for shorter timescales: monthly weekly or daily. A monthly timescale can be appropriate when there are significant seasonal variations in water use or availability. Weekly or daily timescales are appropriate when there is significant short-term variability in how water is used operationally.

Some water flows or volumes may be very easy to measure, such as with flow meters or known water tank volumes. Others may have to be estimated, typically by relevant experts. For example, leakage, evaporation and run-off often cannot be measured directly.

1.3.4 Water quality information is important for understanding risks to and from the organization, as well as showing whether the organization's wastewater has negative impact. Maintain records of the quality of all incoming water supplies, outgoing effluent (after treatment where applicable) and of water bodies that receive the effluent.
For its own water sources and wastewater discharges, the organization will usually collect its own samples on a regular basis for laboratory analyses. External service providers, they can usually provide water quality data. If not already publicly available, the organization should request it. It is possible the supplier will claim anything more than their legal compliance obligation is confidential.
Water and wastewater quality data should be used to verify compliance, and to identify any breaches or trends of concern. For example, a drinking water parameter may be within compliance, but gradually increasing over time, indicating future non-compliance and risk.

1.3.5 The organization has a responsibility (usually legal, but also moral) to avoid causing pollution of the natural environment, including water bodies. It is recommended to use an experienced expert to identify actual and potential pollution sources, and the risks they present. In the context of water stewardship, it is especially important to identify pollution sources that present a risk to water bodies and water abstraction points. Examples of pollution sources include:

- Point sources: chemical storage area, waste disposal facilities, leaks of oil or chemicals, workshops (where oils and chemicals are used), electrical transformers (a potential source of oils and PCBs), livestock facilities (where animal waste may concentrate)
- Non-point sources: site drainage channels, the use of agricultural chemicals on land (e.g. fertilizers, pesticides).

Examples of water bodies at risk include:

- Water table aquifers, without protective natural cover, to which surface pollution can rapidly infiltrate
- Water supply boreholes which abstract from ‘at risk’ aquifers
- Surface water bodies which can receive site run-off, drainage discharge (from drains, etc.) or wastewater discharges. Be aware that storms and flood events may transport pollution further than normally expected.

It is recommended to tabulate pollution sources, their nature and their risk, vulnerable water bodies, and to show them on a map.

1.3.6 Water related HCVs (WHCVs) are defined in the Glossary and a special subject section. Each onsite WHCV feature should be listed, with a description of what it is, its status and any water-related risks. Regarding status, it should be reported whether it is in good, poor, deteriorating or improving condition. Specific concerns, such as ‘polluted’ or ‘drying up’ should be mentioned. It is recommended to show each WHCV feature on a map. Photographs of its original and current condition would be valuable.

1.3.7 The site needs to demonstrate it is aware of the costs associated with developing its water stewardship studies and plans, and to maintain them. It should undertake an assessment of what these are, and confirm it has the financial commitment and resources to support them.
Costs can be for such items and actions as: payment for experts, data collection, technical studies, new or replacement infrastructure, risk mitigation actions, stakeholder engagement activities, external communications, staff training.
The financial benefits of outcomes should be taken into account. For example, improved water efficiency will result in some costs savings, for example, from water supply fees (to external supplier) or reduced energy costs (for pumping boreholes).
Where costs are confidential, this will be respected.
Evaluating the water-related value generated by the site to the benefit of the catchment may not be easy or even possible. Often it may be only possible to give a qualitative – not quantitative – assessment. Examples include: improving water quality of a water body through improved wastewater treatment; helping to improve a WHCV and providing benefits to nature and communities (e.g. for recreation and wellbeing). Some organizations may invest in a specific benefit such as installing a public water supply or water treatment system, or for the cleaning up of a polluted water body.

1.4	**Gather data on the site’s indirect water use**, including: its primary inputs; the water use embedded in the production of those primary inputs and,	1.4.1	The embedded water use of primary inputs’, including quantity, quality and level of water risk in catchment(s) of origin, shall be *quantified*
		1.4.2	The embedded water use of outsourced services including quantity, quality and level of water risk in catchment(s) of origin, shall be quantified
		1.4.3	**Advanced indicator** Collaborative efforts to support and undertake reduction of embedded or indirect water use are *quantified*.

 	(where they can be *identified*) the status of the waters at the origin of the inputs; and water used in out-sourced water-related services.		

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Indirect water use is the water used within an organization's supply chain. That is, the water used in the creation, processing and transportation of goods and services supplied to the organization.

There are two principle reasons to assess indirect water use. First, it will help an organization to understand associated risks to its own business or activities. For example, severe drought may impact on the availability or cost of an essential food ingredient. Second, it is an opportunity for the organization to influence the water stewardship approach of its more important suppliers.

The criterion does not require complete mapping of a supply chain, which AWS recognizes to be a complex and costly task, and beyond the capacity of many organizations. Also, smaller organizations will have limited potential to influence much larger suppliers.

Primary inputs should include any externally sourced good or services that account for over 5 percent of the total weight of goods produced by the site, or represent over 5 per cent of the costs. An input below this criterion, but still dependent on significant water use, should be included as a primary input.

1.4.1 Examples of water use in primary inputs include the water used: to grow food ingredients; in the manufacturing of purchased goods, such as packaging, machinery and parts; in mineral extraction;

1.4.2 An example of water use in services is in the production of electricity.

1.4.1 and 1.4.2 As a minimum, the organization should identify its primary inputs and services and undertake an assessment to understand for each one, the following (as far as reasonably feasible), ideally in a table. **This is most important for goods and services that originate from within the same catchment** as the implementing organization:

- Annual water use (for the proportion of the goods the organization receives),
- principal origin of goods (country, region, catchment),
- where water is used,
- what water is used for
- water intensity for the goods/services
- For goods/services originating from the same catchment, the origin of the water (e.g. the water body).

It is important to distinguish total water withdrawal from net water use, the most relevant component. For example, electricity production may use large volumes of water for cooling, but most of this is returned to the local water cycle, with relatively little net impact.

The organization should show it has made a reasonable effort to gather the information, principally for goods/services from within the catchment. The organization is not expected to undertake original studies or measurements, but to seek existing information. Sources of information may include:

- The supplier of the goods or services (who may already have undertaken an assessment of its own water use)

- Water management agencies (e.g. Environmental Protection Agency, water regulators), who may already have good knowledge on the water users in the region or catchment.
- Sector or commodity-specific studies on water use. For example, ‘water footprint’ studies or studies on water use by relevant industry sectors
- An assessment of water-related risk presented by indirect water us within the catchment should be undertaken.

1.4.3 Collaborating partners could be, for example, stakeholders or suppliers.

1.5	**Gather water-related data for the catchment,** including: water governance, water quality, water balance and water-related high conservation values	1.5.1	Water governance initiatives shall be *identified*, including catchment plan(s), water-related public policies, major publicly-led initiatives under way, and relevant goals.
		1.5.2	All applicable water-related legal and regulatory requirements shall be *identified*, including legally-defined and stakeholder-verified customary water rights
		1.5.3	The catchment water-balance or scarcity figures shall be *quantified*, including indication of annual variance.
		1.5.4	Water quality , including physical, chemical, and biological status, of the catchment shall be *identified* with indication of annual high and low variances where this is a water-related challenge that would be a threat to good water quality status for people or environment.
		1.5.5	Water-related high conservation values shall be *identified, including their status*
		1.5.6	Existing and planned water-related infrastructure shall be *identified*, including condition and potential exposure to extreme events.
		1.5.7	**Advanced indicator** Efforts by the site to support and undertake water-related data collection shall be *identified*.

Guidance

1.5.1 Where water governance programs already exist for a catchment or region, it is important to be familiar with them and to work with them. Where catchment water government is poor, the organization has more responsibility and potential to influence improving it.

Developed countries typically have advanced and comprehensive water governance programs, including policy, regulation, enforcement and awareness. These usually take into account the interests of the natural environment and of the demand for public water supply - for homes, industry and agriculture. Often, the interests of nature and humans are integrated, but sometimes not. For example, a regulatory agency whose main purpose is to protect the natural environment may conflict with another whose priority is to maximize the availability of water supplies for economic growth.

In developing countries, water governance programs may be limited. Very often, political priority is given to water supply to support communities and economic growth, such as for agriculture and industry, with lower priority for the natural environment.

For most countries, water management responsibilities are separated into logical and manageable geographic areas, which may be based on river basins, geology, or political boundaries.

More advanced water governance programs may already include a component of stakeholder engagement. For example, this is a principle for catchment water management under the European Union's Water Framework Directive, which requires that representatives of all stakeholder groups (nature, people, industry, agriculture) are consulted and their interests taken into account.

The site should research the initiatives, plans, policies and goals relevant to its catchment. A starting point is the water-related organizations the site already has contact with, such as a municipal water supplier or water resources regulator. An external expert with local knowledge may be able to provide quick and complete advice.

The site should document its findings, the relevant organizations, documents, important plans and policies. Where possible, the site should obtain copies of relevant documents such as catchment management plans.

The site should understand the potential impact of plans and policies on its own operations. Examples of policies with impacts are:

- The water resources of the catchment are judged to be over-allocated. There is a policy to reduce or withdraw some allocations to bring the catchment back into balance.
- There is a plan to significantly increase municipal water supply charges in order to encourage efficiency and raise funds for essential renovation and upgrades of the water supply infrastructure
- There is a plan to apply stricter limits on the quality of wastewater received by municipal treatment plants, so some businesses will have to install their own pre-treatment facility.
- Plans to increase public investment in water supply will reduce the occurrence of supply interruptions, thus creating a beneficial impact

1.5.2 Water-related legal and regulatory requirements include such things as:

- Drinking water quality
- Drinking water pricing
- Water abstraction (applicable to investigation, development and abstraction from private water supply sources)
- Requirements to provide water and sanitary facilities for workers
- Wastewater discharge standards
- Environmental regulations to protect water bodies and conservation areas from pollution

It is important to include any licenses or permits which regulatory conditions for the site (such as permitted water abstraction rates and wastewater discharge quality).

1.5.3 **The water balance of a catchment** is an assessment of water inflows, throughflows and outflows, and water storage within the water body. This equation must balance (at least approximately), and so is useful for verifying that water volumes and flows are reliably measured and accounted for. The assessment will help to identify when there is increasing **water scarcity**. This will occur when outflows are consistently larger than inflows, so that water storage and availability in the catchment are gradually decreasing over time.

A water balance is defined in a basic equation: (Water outflow) = (Water inflow) + (Change in storage volume)

A catchment water balance is commonly done on a one-year timescale. It may also be appropriate to calculate it for shorter timescales, if there is significant seasonal variability in water abstractions and water storage of the main water bodies (see water scarcity comments below).

- Surface water catchment:
    - Typical water inflows:
        - Precipitation (rain or snow) – the principal input for most catchments, and often the only one significant enough to count
        - Flow from irrigation canal bringing water from other catchments
        - Flow from a river. (A standard river basin catchment includes the river's source and tributaries. However, river inflow is relevant for larger river basins in which the organization's defined physical scope is only a sub-section of the full catchment due to its disproportionate size).
        - Wastewater discharges, where most of the water originates from a separate catchment
    - Typical outflows:
        - Where the main river leaves the catchment (to a downstream catchment or the sea)
        - Water abstractions
        - Evaporation from open water bodies
        - Losses from the river bed as recharge to groundwater
    - Storage components
        - The volume of water in the river, lake or reservoir. Where there is flow (rivers and most lakes), it is the volume at a moment in time, not the volume that flows through it.
- Groundwater catchment
    - Typical inflows
        - For a water table aquifer, infiltration of precipitation across most of the catchment
        - For non-water table aquifers (confined aquifer), infiltration of precipitation at the recharge zone (the limited zone where the geological unit that forms the aquifer is at or near the land surface).
        - Downward or horizontal infiltration from surface water bodies
        - Subsurface flow from one aquifer to another
    - Typical outflows
        - Water abstractions from wells and boreholes
        - Natural outflows to springs
        - Sub-surface flow to other aquifers or to sea.

        - Effluent flow to river beds (this is what ensures rivers keep flowing during long periods without rain).
        - Up-flow to groundwater discharge zones (creating, for example, salt pans in desert areas)
    - Storage components
        - The total volume of water stored in the pores and fine cracks (fissures) in the rock. To calculate, you take the volume of saturated rock and multiply it by its porosity (the percentage of open pore space to solid rock). For water table aquifers, the water volume will change as the water table moves up and down.
        - Some geological units contain large cave systems (known as karstic aquifers) which may contain large volumes of water, behaving a bit like underground rivers. These are relatively rare compared to 'conventional' aquifers.
- Other considerations
    - Combining surface water and groundwater
        - Depending on local conditions, geology and how water is used, a catchment water balance could be based on surface water only, or groundwater only. However, it many cases, it is necessary to combine the two where there is significant surface-groundwater interaction (See 'Catchments' section) or when a site uses, or interacts with, both surface and groundwater.
    - Fossil water aquifers. Some aquifers contain fresh water originating from recharge thousands of years ago under wetter conditions. These are common in what are now arid areas, such as North Africa and the Middle East. During the last ice age, these regions had much wetter climates. The water contained in such aquifers is considered 'fossil water'. When abstracted, it will not be replenished under present day conditions. Therefore, if water is abstracted, there will be minimal, if any inflows, to balance it, and storage will gradually decline.
- Special considerations for agriculture
    - **Soil water**. For arable agriculture, a significant component of water storage is in the soil, and therefore needs to be included in the catchment water balance. Non-irrigated crops obtain 100% of their water requirements from soil water. Water from precipitation, run-off (and irrigation when applied) infiltrates the soil where it is absorbed and stored between the soil particles. Not all precipitation is absorbed by the soil. Some of it continues downwards to recharge underling groundwater. Some larger plants, such as trees may have roots that extend deep enough to tap water from an underlying aquifer.
    - **Evapotranspiration**. Water losses from arable fields consist of transpiration (where water sucked up by the plant eventually transpires from the leaf surfaces), and evaporation, direct from the soil surface, especially when conditions are hot and dry. Together these are termed 'evapotranspiration' and form a significant component of water outflow in agriculture.

1.5.4 Knowledge of catchment water quality will help an organization to understand any risks it may face, and its own potential to impact on catchment water quality.

Potential risks to the organization are most important where it has its own water sources. For example, an increasing level of salinity or of a specific parameter, such as nitrate, may eventually impact on the organization's water quality compliance. It could also mean the organization must introduce or increase investment in water treatment.

Where an organization is applying chemicals to land (e.g. in agriculture) or has its own wastewater discharge facility, it may have the potential to contribute to water quality concerns in the catchment. For example, elevated nitrate concentrations in aquifers are often the result of fertilizer use.
Water abstractions can also impact on aquifer water quality. For example, high rates of pumping can cause salty water to be pulled into an aquifer along coastal areas (saline intrusion).
An initial assessment of catchment water quality will help define a baseline, but also help identify whether the organization may already be contributing to problems.
Water quality data for the catchment may be obtained from various sources. In some cases, there may already be comprehensive data available, for example from regulators, environment agencies and academic studies. Other stakeholders may also have data to share. Where existing data are limited, the organization should consider collecting its own samples for analysis from a relevant range of locations across the catchment.
The organization should report on its findings and review the potential risks to and from it. Where appropriate, actions should be included in the water stewardship plan.

1.5.5 Promoting the healthy status of WHCV features is one of the four AWS Standard Outcomes. Research should be undertaken to identify WHCV features within the catchment. Relevant stakeholders to engage with include: environment agencies, conservation NGOs, wildlife groups, fishing clubs and larger landowners. Identified HCVs should be listed, with description of what they are, their status and any water-related risks. Regarding status, it should be reported whether they are in good, poor, deteriorating or improving condition. Specific concerns, such as ‘polluted’ or ‘drying up’ should be mentioned. It is recommended to show them on a map. Photographs of its original and current condition would be valuable.

1.5.6 For organizations relying on municipal water supply, the status of the infrastructure may be a critical risk. If the organization uses only private water sources, the status of catchment infrastructure remains relevant to understanding the water challenges of stakeholders.
In many locations, public water supply infrastructure is decades old, built with obsolete materials and methods, and subject to leaks and failure. It is highly costly to repair and replace (potentially many millions of dollars). For this reason, many governments and authorities cannot afford a comprehensive upgrade and instead aim to invest just enough to keep ahead of the worst failings. It is important to recognize this limitation and to some extent accept it. However, it is important to be aware if infrastructure is in a particularly poor condition with limited plans for improvement. In this case, a business reliant on public supply will be at increasing risk of supply interruptions and limitations, and at greater risk of contaminated supply.

The most useful information will likely be available from water management and public water supply and wastewater agencies, for whom ownership, maintenance and infrastructure upgrade planning will be part of their responsibilities. Some authorities or supply agencies may not be willing to share information that could show them in a bad light. The site should summarize what information it is able to obtain, including on the current condition of infrastructure, its ability to meet community demands, and planned upgrades. An absence of information is itself a risk.

1.5.7 An organization will normally collect water-related data onsite, especially if it operates its own water sources and/or wastewater treatment facilities. A site may also collect data beyond its boundaries related to monitoring risk to itself, or its impacts to others. This may include:

- sampling water quality upstream of its water sources (surface or groundwater), s
- sampling water quality downstream of a wastewater discharge point
- Measuring water levels in offsite monitoring wells in order to monitor the impact of the sites groundwater abstractions.

Data collection may be linked to regulatory requirements or permit conditions, or they may be voluntary as part of a risk management program.
Joint data collection consists of the mutual sharing of water-related data collected by the site with authorities, other water users or researchers.

1.6	**Understand current and future shared water challenges in the catchment**, by linking the water challenges	1.6.1	Shared water challenges shall be *identified*, prioritized, and justified from the information gathered.
		1.6.2	Future water issues shall be *identified*, including anticipated impacts and trends
		1.6.3	Initiatives to address shared water challenges and future trends shall be *identified, including how the site may participate*
		1.6.4	**Advanced indicator** Potential social impacts from the site shall be *identified*, resulting in a social impact assessment with a particular focus on water.

GUIDANCE

Shared water challenges are those shared by the site and one or more of its relevant stakeholders (as should be identified in Indicator 1.1. Shared challenges provide an opportunity for collective action in the catchment and to guide the water stewardship plan.

1.6.1 The identified shared challenges should be listed and prioritized in terms of their significance and urgency. Recommendations are not given on how to prioritize due the very large number of possible circumstances, but reasonable judgements should be made, with justification. For example:

- A concern for complete loss of water supply is more significant than concern for a 10% rise in water charges
- Occasional interruption of water supply experienced now, is more urgent than concern for reduced supply in the future.

1.6.2 Where water challenges are identified, it is necessary to understand what is causing them, or expected to cause future problems, in order to develop appropriate mitigation actions, or to know whether *collective* action is appropriate. . For example:

- What is the cause of a decline in water levels in a borehole? It could be due to (i) high extraction by nearby users, (ii) a general decline in water levels across the catchment, or (iii) because the borehole is becoming clogged. The first two can be addressed by collective action, the third, not.
- [another example?]

As a starting point, it is important to first be aware of any existing public sector efforts or plans to address them so as to avoid duplication or conflicting actions.

1.6.3 Initiatives should be relevant to the findings of 1.6.2

1.6.4 The development of a Social Impact Assessment (SIA) or Environmental and Social Impact Assessment (ESIA) may be a mandatory component of the site's authorization for development and operation. Where this is not mandatory, or where it does not address water impacts, then an additional assessment of water-related social impacts is valuable, and will help a site to better understand the risks it presents to others, and their mitigation. Examples of water-related social impacts, which may be positive or negative, include:

- The site's water use is restricting the availability of water to local communities and/or small farmers
- The site's wastewater discharge presents a water quality risk to downstream water users
- The site's irrigation activities has a positive impact on nearby farmers, whereby excess water is helping to wet their soils and recharge aquifers
- The site's proactive programs on data collection and addressing shared challenges are providing a net benefit to the community

The site should undertake an assessment of its impacts (positive and negative) and plan action as appropriate. For negative impacts, it should develop a plan to remove or mitigate them. For positive impacts, it may wish to communicate this with stakeholders, for both reputation and to set a good example to others.

The site should provide documentation on its assessment and associated plans.

1.7	**Understand and prioritize the <u>site</u>'s <u>water risks</u> and opportunities**	1.71	<u>Water risks</u> faced by the <u>site</u> shall be *identified* and prioritized. Likelihood and severity of <u>impact</u> within a given timeframe, including potential costs and value depletion shall be noted.
		1.7.2	<u>Water-related</u> opportunities shall be *identified*, assessed, and prioritized, including potential savings and value creation.

1.7.1 Understanding water risks to the site is one of the most important parts of the business case for water stewardship. For a site to know the risks, and then to remove, reduce or mitigate them, will help protect it from unexpected costs and impacts. It is also important for ensuring business continuity and protecting the employment of site workers. Risks fall within three main types: physical, regulatory and reputational.

The findings of this criterion will be mostly based on the information gathering and research of the previous criteria in Step 1.

There are many potential risks, with generally greater risks for sites with their own water sources. Examples include:

Physical risks for municipal supply:

- Sudden infrastructure failure, such as breaks or leaks, leading to interruption of supply
- Increasing charges
- Contamination outbreak in supply (e.g. from pollution in reservoir, or leaky pipework)
- Regular supply interruptions (more common in developing countries with under investment in water infrastructure)
- Vulnerable to extreme natural events (e.g. earthquake, freezing pipes and breakages due to extreme cold)
- Drought restrictions

Physical risks for private supply

- Failed water sources, through poor condition and poor maintenance

- Restrictions on permitted abstractions during drought
- Contamination of water source
- Failure of water treatment system

Regulatory risks

- Breaking conditions of abstraction permits
- Causing pollution of water bodies
- Failing quality conditions of wastewater discharge permit

Reputational risks

- Public awareness of any regulatory breach
- Real or perceived cause of negative impacts on other water users and/or the natural water environment
- Perception that the site uses too much water

1.7.2 Examples of water-related opportunities:

- Reducing water-related risk will boost the sustainability of the business, protect jobs, and increase the confidence of customers and investors.
- Reducing water use will probably provide costs savings (although these may not be significant due to the typically low cost of water supply and abstraction permits).
- Addressing shared water challenges will help achieve long term security of water needs for the site and its stakeholders across the catchment.
- Any positive impacts in the catchment and with stakeholders should create positive reputational benefits.

1.8 	**Understand best practice towards AWS outcomes:** the site determining sectorial best practices having a	1.8.1	Relevant sector best practice for water efficiency shall be *quantified*, including rationale for data source .
		1.8.2	Relevant sector best practice for water quality shall be *quantified*, including rationale for data source

	local, regional, or national relevance.	1.8.3	Relevant sector best practice for site maintenance of water-related high conservation values shall be *quantified*, including rationale for data source
This section to be completed			