CERTIFICATION REPORT

Alliance for Water Stewardship (AWS)

Audit Number: AO-000431

WSAS WATER STEWARDSHIP ASSURANCE SERVICES

SITE DETAILS

Site: **TSMC Tainan Multisite: Fab 14B P5&6, Fab 14 P7 & Fab 6**

Address: 8, Li-Hsin Rd. 6, Hsinchu Science Park, 300-77, Hsinchu, TAIWAN

AWS Group Reference Number: AWS-G-000006

Site Structure: Multi Site

CERTIFICATION DETAILS

Certification status:

Date of certification decision: -4714-Dec-31

Validity of certificate: -4714-Dec-31

AUDIT DETAILS

Audited Service(s): AWS Standard v2.0 (2019)

Audit Type(s): Re-Certification Audit

Audit Start Date: 2022-Nov-14

Lead Auditor: Ian Jiang (TUV Rheinland)

Audit team participants:

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Vito C.C. Lin

Site Participants:

Wu Bo Cheng, Corporate Sustainability

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Liu Yu Zhi, Corporate Sustainability

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Yi Ze Fu, Corporate Sustainability

Xiao Qian Cheng, Corporate Sustainability

Li Zi Ying, Corporate Sustainability

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ADDITIONAL INFO

Summary of Audit Findings: A total of six findings were raised during the certification audit, zero major non-conformities, zero minor non-conformities, six observations.

Therefore, no corrective action was required.

Advance indicators were also assessed during audit, and the total score is 123 points. The audit team recommends re-certification of Taiwan Semiconductor Manufacturing Company (TSMC), Tainan Multisite: Fab 14B P5&6, Fab 14 P7 & Fab 6 at Platinum level.

Scope of Assessment: The scope of services covers the recertification audit for assessing conformity of Taiwan Semiconductor Manufacturing Company (TSMC), Tainan Multisite: Fab 14B P5&6, Fab 14 P7 & Fab 6 against the AWS International Water Stewardship Standard Version 2.

TSMC is a world leading company in semiconductor manufacturing sector. They created the semiconductor Dedicated IC Foundry business model when it was founded in 1987. TSMC served about 535 customers and manufactured more than 12,302 products for various applications covering a variety of end markets including smartphones, high performance computing, the Internet of Things (IoT), automotive, and digital consumer electronics.

Three sites were 100% owned by TSMC and located in TSP in Tainan City of Taiwan. Fab 6 is an 8-inch wafer manufacturing fab and operated for 20 years. Fab 14B P5&6 and Fab 14 P7 are 12-inch wafer manufacturing fabs, operated respectively since 2014 and 2015. For each site one unique code was allocated by audit team, and their locations are listed in below:
Site 1 - Fab 14 B P5&6: 17, Nan-Ke 9th Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan
Site 2 - Fab 14 B P7: 1, Sanbaozhu Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan
Site 3 - Fab 6: 1, Nan-Ke North Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan

All three sites were located in the TSP, which is a sub science park under the Southern Taiwan Science Park (STSP). All sites were located in the Yanshuei River Catchment.

The audit was conducted onsite on 14th~18th November 2022 on behalf of WSAS. During the audit, the lead auditor performed remotely, and local auditor presented onsite. The audit included site visit covered three sites' facilities and activities, the water-related facility of STSP, the interview with external and internal stakeholders. The audit also verified the findings in the previous audit.

SCORE

123.00

FINDINGS

NUMBER OF FINDINGS PER LEVEL

Observation	6

FINDING DETAILS

Finding No:	TNR-003270
Checklist Item No:	1.1.1
Status:	Open
Finding level:	Observation
Checklist item:	The physical scope of the site shall be mapped, considering the regulatory landscape and zone of stakeholder interests, including: - Site boundaries; - Water-related infrastructure, including piping network, owned or managed by the site or its parent organization; - Any water sources providing water to the site that are owned or managed by the site or its parent organization; - Water service provider (if applicable) and its ultimate water source; - Discharge points and waste water service provider (if applicable) and ultimate receiving water body or bodies; - Catchment(s) that the site affect(s) and is reliant upon for water.
Findings:	TSMC plans to use recycled water instead of tap water. After the recycled water is introduced, it should timely collect the water quantity, quality and other water related information of the source (sewage treatment plant).

Finding No:	TNR-003272
Checklist Item No:	1.3.4
Status:	Open
Finding level:	Observation
Checklist item:	Water quality of the site's water source(s), provided waters, effluent and receiving water bodies shall be quantified. Where there is a water-related challenge that would be a threat to good water quality status for people or environment, an indication of annual, and where appropriate, seasonal, high and low variances shall be quantified.
Findings:	It is recommended to keep a documented record of the interpretation process of the rainwater testing report.

Finding No:	TNR-003271
Checklist Item No:	1.5.2
Status:	Open
Finding level:	Observation
Checklist item:	Applicable water-related legal and regulatory requirements shall be identified, including legally-defined and/or stakeholder-verified customary water rights.
Findings:	When purchasing water trucks as emergency water sources, it is necessary to confirm the legitimacy of water rights acquisition and use of water sources.

Finding No:	TNR-003838
Checklist Item No:	1.5.8
Status:	Open
Finding level:	Observation
Checklist item:	Advanced Indicator Efforts by the site to support and undertake catchment level water-related data collection shall be identified.
Findings:	It is recommended to inquire about the water quality test results of external agencies in the water basin, and confirm the water quality according to the test frequency of the agency, so as to facilitate the timely adoption of corresponding measures.

Finding No:	TNR-003273
Checklist Item No:	2.2.1
Status:	Open
Finding level:	Observation
Checklist item:	The system to maintain compliance obligations for water and wastewater management shall be identified, including: - Identification of responsible persons/positions within facility organizational structure - Process for submissions to regulatory agencies.
Findings:	It is suggested that after passing of regulation of Tax on Water Consumption in the future, the related content should be added to the TSM SYSTEM to ensure compliance with regulations and further cost analysis.

Finding No:	TNR-003274
Checklist Item No:	4.1.2
Status:	Open
Finding level:	Observation
Checklist item:	Value creation resulting from the water stewardship plan shall be evaluated.
Findings:	After having confirmed the standard for charging of sewage disposal in Tainan Science Park, it could be had a discount for good sewage water quality from the plant (e.g. Ammonia nitrogen), it is suggested that the potential benefit could be evaluated.

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Report Details

Report	Value
Report prepared by	Ian Jiang
Report approved by	Mia Antoni-Naidoo
Report approved on (Date)	2 May 2023

Surveillance

Proposed date for next audit
2023-Nov-20

Stakeholder Announcements

Date of publication	Location
14/10/2022	TUV site: https://www.tuv.com/content-media-files/greater-china/about-us/downloads/aws-stakeholder-announcement-tuvgd-taiwan-semiconductor-manufacturing-company-ltd.pdf
14/10/2022	AWS site: https://a4ws.org/wp-content/uploads/2022/10/AWS-000174-176-TSMC-Tainan-2022-Stakeholder-Announcement.pdf
14/10/2022	The stakeholder announcement was posted on the site and Southern Taiwan Science Park (STSP).
25/10/2022	WSAS Website: https://watersas.org/wp-content/uploads/2022/10/Stakeholder-Announcement-_TUV-Rheinland-TSMC-Tainan.pdf

Catchment Information

layout of Tsengwen River Catchment

1.1.1-2.JPG

layout of Yanshuei River Catchment

1.1.-1.JPG

Catchment Information

All three sites were located in the TSP, which is a sub science park under the Southern Taiwan Science Park (STSP). All sites were located in the Yanshuei River Catchment. Each site has installed its own WWT system as per the water permit issued by TSP Bureau, to ensure the effluent achieving the discharge water pollution control standard. The effluent will be discharged to the TSP WWT Plant through its own discharge point as per the water permit. Through its two discharge points, TSP WWT Plant discharged its effluent to Dajhou Drainage System which was located in the Yanshuei River. Currently in Yanshuei catchment there was no reservoir which contributed as major water resource.

Each site drawn the city water from the water pipe network in TSP. TSP's water supply mainly comes from the Tsengwen River Catchment, which located at the upper stream of Yanshuei River. Namely, the Tsengwen River Catchment is also included in the physical scope. In Tsengwen River Catchment, there were four major reservoirs namely Tsengwen Reservoir,Wusanto Reservoir, Jingmian Reservoir and Nanhwa Reservoir.There were respectively five water supply plants directly drawing water from above-mentioned reservoirs, namely Tainan Water Supply plant, Tsengwen Water Supply Plant, Wusanto Water Supply Plant, Nanhwa Water Supply Plant, and Nanxi Water Supply Plant which were all owned by Taiwan Water Corporation.

Client Description and Site Details

Client/Site Background

TSMC created the semiconductor Dedicated IC Foundry business model when it was founded in 1987. TSMC served about 535 customers and manufactured more than 12,302 products for various applications covering a variety of end markets including smartphones, high performance computing, the Internet of Things (IoT), automotive, and digital consumer electronics.Annual capacity of the manufacturing facilities managed by TSMC and its subsidiaries exceeded 13 million 12-inch equivalent wafers in 2021.

Three sites were 100% owned by TSMC and located in TSP in Tainan City of Taiwan, planning to apply the multi-site certification under AWS version 2. Fab 6 is an 8-inch wafer manufacturing fab and operated for 20 years. Fab 14B P5&6 and Fab 14 P7 are 12-inch wafer manufacturing fabs, operated respectively since 2014 and 2015. For each site one unique code was allocated by audit team, and their locations are listed in below:
Site 1 - Fab 14 B P5&6: 17, Nan-Ke 9th Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan
Site 2 - Fab 14 B P7: 1, Sanbaozhu Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan
Site 3 - Fab 6: 1, Nan-Ke North Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan

Summary of Shared Water Challenges

Summary of Shared Water Challenges

All three sites were faced with follow shared water challenges:
1. There is trend shown the continuous water resource shortage in Tsengwen reservoir, which now served as the major source. This was mainly resulted from the seasonal variation of rainfall especially the rainfall shortage during March to May every year, and may result the insufficient water supply in future.
2. The water pollution in Yanshuei River, currently Yanshuei River is the main waterway in Yanshuei catchment but cannot serve as the water source due to the water pollution issue.
3. Concerns on the water quality and water cost on the regenerated water from the societies and communities.
4. Low sewage pipeline connection rate (60% in June 2022)

To address these two shared water challenges, TSMC has initiated series of programmes cooperating with the related stakeholders:
1.Cooperated with authority, TSMC integrated its internal and external resources to develop regenerated water technology since 2015; as per the negotiation with Tainan Municipal Government and TSP Bureau, all three sites are committed to use the regenerated water in the manufacturing process from 2021. In 2022, volume of used regenerated water is about 10 thousand tons.
2. Currently three sites have met the wastewater discharge standard as regulated by TSP Bureau. To decrease the impact on TSP WWT Plant and improve the water quality of Yanshuei River, TSMC proposed a long-term target to continuously improve the discharge water quality to meet effluent water quality standards for WWT Plant discharge till 2025. As per Taiwan's regulation, the effluent water quality standard for WWT Plant is more stringent than the effluent standard set by TSP Bureau.
3. Currently the societies are worried about the water quality and water cost of the regenerated water and the will to use this water supply in future is relatively low. From the perspective of social responsibility, all three sites have committed to firstly use the regenerated water plant since 2021, and the comitted volume will be increased continously.
4. The government has continued to build relevant sewage treatment facilities and promoted the improvement of sewage pipeline connection. The improvement plans are published and being implemented.

0.1	**General Requirements for Single Sites, Multi-Sites and Groups**	
0.1.1	*Eligibility Criteria*	
0.1.1.1	*The site(s) occupy one catchment OR an exception has been granted.*	Yes
0.1.1.2	*The scope of the proposed certification shall be under the control of a single management system.*	Yes
0.1.1.3	*The scope of the proposed certification shall be homogeneous with respect to primary production system, water management, product or service range, and the main market structures.*	Yes
0.2	**Requirements for Multisite Operations**	
0.2.1	*Multisite Management Requirements*	
0.2.1.1	*The Multisite operation shall nominate an "AWS Group Representative".*	Yes
Comment	Corporate ESH Division will take the role as the Group Representative for AWS management.	
0.2.1.2	*The name and location of each site within the proposed scope for certification of the Multisite operation shall be clearly defined.*	Yes
Comment	Taiwan Semiconductor Manufacturing Company Limited (TSMC) Site 1 - Fab 14 B P5&6: 17, Nan-Ke 9th Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan Site 2 - Fab 14 B P7: 1, Sanbaozhu Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan Site 3 - Fab 6: 1, Nan-Ke North Rd., Shanhua Dist., Tainan Science Park, Tainan, Taiwan	
0.2.1.3	*Where a new site has been added to the multisite certificate, an onsite audit of the site was conducted prior to it being added to the certificate register.*	Yes
Comment	No new site was added in this audit.	
0.2.1.4	*All AWS claims made by the client are managed through the "AWS Group Representative".*	Yes
Comment	Yes	

1	STEP 1: GATHER AND UNDERSTAND	
1.1	*Gather information to define the site's physical scope for water stewardship purposes, including: its operational boundaries; the water sources from which the site draws; the locations to which the site returns its discharges; and the catchment(s) that the site affect(s) and upon which it is reliant.*	
1.1.1	*The physical scope of the site shall be mapped, considering the regulatory landscape and zone of stakeholder interests, including:* *- Site boundaries;* *- Water-related infrastructure, including piping network, owned or managed by the site or its parent organization;* *- Any water sources providing water to the site that are owned or managed by the site or its parent organization;* *- Water service provider (if applicable) and its ultimate water source;* *- Discharge points and waste water service provider (if applicable) and ultimate receiving water body or bodies;* *- Catchment(s) that the site affect(s) and is reliant upon for water.*	Obs.
Comment	The physical scope of two sites were mapped, including: 1, site boundary of each site located in the Southern Taiwan Science Park (STSP), in which it indicated the layout of the tap water inlet point, discharge point, the WWT facilities, the Central Utility Plant 2, The Catchment where the sites located was identified refer to the official platform (https://gic.wra.gov.tw/gis/gicmap) provided by Taiwan Water Resource Agency (WRA). All sites are located in the Yanshuei River Catchment. The upper catchment of Yanshuei River, namely the Tsengwen River Catchment is also included in the physical scope. 3. In Tsengwen River Catchment, there were four major reservoirs namely Tsengwen Reservoir,Wusanto Reservoir, Jingmian Reservoir and Nanhwa Reservoir. There were respectively five water supply plants directly drawing water from above-mentioned reservoirs, namely Tainan Water Supply plant, Tsengwen Water Supply Plant, Wusanto Water Supply Plant, Nanhwa Water Supply Plant, and Nanxi Water Supply Plant which were all owned by Taiwan Water Corporation. Each site drawn the city water from the water pipe network in TSP. 4. After the treatment of the site, the wastewater is discharged into the STSP's wastewater treatment plant. Through two discharge points, CTSP WWT Plant discharged its effluent to Dajhou Drainage System and fianlly flows to Yanshuei River.	
1.2	*Understand relevant stakeholders, their water related challenges, and the site's ability to influence beyond its boundaries.*	
1.2.1	*Stakeholders and their water-related challenges shall be identified. The process used for stakeholder identification shall be identified. This process shall:* *- Inclusively cover all relevant stakeholder groups including vulnerable, women, minority, and Indigenous people;* *- Consider the physical scope identified, including stakeholders, representative of the site's ultimate water source and ultimate receiving water body or bodies;* *- Provide evidence of stakeholder consultation on water-related interests and challenges;* *- Note that the ability and/or willingness of stakeholders to participate may vary across the relevant stakeholder groups;* *- Identify the degree of stakeholder engagement based on their level of interest and influence.*	Yes

Comment	1. In the list of stakeholders in the CSR report, a total of 8 categories of stakeholders are identified. 2. Stakeholder coverage -Government, STSP authority, Infrastructure owner, NGO, Industrial Association, Supplier, Communities, Scholar 3. Stakeholder management procedure is listed in the Management Procedure (A-RMS-01-02-007, ver 12)	
1.2.2	*Current and potential degree of influence between site and stakeholder shall be identified, within the catchment and considering the site's ultimate water source and ultimate receiving water body for wastewater.*	Yes
Comment	The potential degree of influence between site and stakeholder was identified together with the stakeholder identification process.	
1.3	*Gather water-related data for the site, including: water balance; water quality, Important Water-Related Areas, water governance, WASH; water-related costs, revenues, and shared value creation.*	
1.3.1	*Existing water-related incident response plans shall be identified.*	Yes
Comment	TSMC has developed several emergency response plans covering different scenarios, which indicated the procedure to cope with emergency situation. The SOPs include following: F-CQC-01-03-001 effluent quality treatment process A-RMS-08-03-283 water shortage response measures. A-RMS-08-02-037 notification time limit for environmental protection incidents A-RMS-08-03-210 environmental protection incident notification process F-JWT-04-03-001 rainwater shutoff valve self-inspection management were setup and implemented	
1.3.2	*Site water balance, including inflows, losses, storage, and outflows shall be identified and mapped*	Yes
Comment	TSMC draws a water balance chart every month, including inflows, losses, storage, and outflows. Sampling water balance diagram, the input part includes tap water, rainwater, OAC (air conditioning condensate); the output includes: sewage discharge; Water reuse, process water treatment recycling, evaporation (cooling tower and scrubber), and irrigation consumption.	
1.3.3	*Site water balance, inflows, losses, storage, and outflows, including indication of annual variance in water usage rates, shall be quantified. Where there is a water-related challenge that would be a threat to good water balance for people or environment, an indication of annual high and low variances shall be quantified.*	Yes
Comment	TSMC draws a water balance chart every month, including inflows, losses, storage, and outflows. So the variances within the year can be quantified.	
1.3.4	*Water quality of the site's water source(s), provided waters, effluent and receiving water bodies shall be quantified. Where there is a water-related challenge that would be a threat to good water quality status for people or environment, an indication of annual, and where appropriate, seasonal, high and low variances shall be quantified.*	Obs.

Comment	1. The water quality for TSMC to entering the production is comparably high, including TOC 2ppm, turbidity 2NTU, and conductivity 500um. The water quality of the reservoir and water purification plant is tracked monthly according to the website provided by the upstream water purification plant. After the plant receives the water supply from the water purification plant, further water purification projects will be carried out to meet water quality requirements. 2. The water quality inspection of the discharged water is outsourced twice a month. The joint wastewater treatment plant requires that the inlet water quality including pH 5~10, F- < 15ppm, SS < 300ppm, NH3-N< 50 ppm, TMAH< 20 ppm, COD < 500ppm. During the audit, both sites can meet the requirements and no circumstances exceeding the water quality standards were found.	
1.3.5	*Potential sources of pollution shall be identified and if applicable, mapped, including chemicals used or stored on site.*	Yes
Comment	The site has established a map of site use and storage of chemicals (potential pollution sources). The potential sources of pollution are the pollution of rainwater discharge outlets caused by chemical and oil leakage, rainwater discharge outlets, chemical unloading areas, discharge water outlets and diesel storage tank. These locations have been identified and marked on the map.	
1.3.6	*On-site Important Water-Related Areas shall be identified and mapped, including a description of their status including Indigenous cultural values.*	Yes
Comment	The site was originally a sugar cane field and an ammunition factory before its establishment, so it was no IWRA on the site. Currently, it developed some artificial IWAR with CTSP to restore the biological environment of the site. The IWRA in the site includes artificial website, ecological pond, artificial firefly habitat and native flower breed area.	
1.3.7	*Annual water-related costs, revenues, and a description or quantification of the social, cultural, environmental, or economic water-related value generated by the site shall be identified and used to inform the evaluation of the plan in 4.1.2.*	Yes
Comment	TSMC has established a water production cost analysis table. According to the analysis results, the water-related cost includes cost of ultrapure water, cost of wastewater treatment, cost of recycling water respectively. The cost of analyzing the cost includes chemicals, equipment maintenance, tap water fees, wastewater treatment fees of the joint wastewater treatment plant, labor costs, and operating electricity costs.	
1.3.8	*Levels of access and adequacy of WASH at the site shall be identified.*	Yes
Comment	TSMC provides employees with sufficient and safe drinking water, which is tested every two months. The testing reports show the result meet related standard. Clean toilets are provided, (in compliance with WBCSD standards and occupational safety and health facilities rules), and warm water for washing in winter. In order to prevent COVID-19, the factory provides hand washing facilities to protect the health of employees and avoid contact. Special toilets are set up for the disabled that are better than the regulations.	
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 the status of the waters at the origin of the inputs (where they can be identified); and water used in out-sourced water-related services.*	
1.4.1	*The embedded water use of primary inputs, including quantity, quality and level of water risk within the site's catchment, shall be identified.*	Yes

Comment	TSMC provided product water footprint verification report issued in 2021, and the inventory covers direct supplier and other suppliers data. The verification was implemented in according to LCR database for the inventory and data. TSMC assessed the location of the supplier in the AQUEDUCT database to determine its risk. At present, the main suppliers, which located in Taiwan, Korea, Japan and USA, are all in low-risk areas. As indicated in the AQUEDUCT database.	
1.4.2	*The embedded water use of outsourced services shall be identified, and where those services originate within the site's catchment, quantified.*	Yes
Comment	The identification of water used by outsourced manufacturers currently includes cleanroom cloth cleaning, parts cleaning and wafer reclaim. Currently, such manufacturers are not located in the same catchment as the tsmc sites. The transportation service outsourcing supplier's vehicle washing water data in the catchment has been collected during the verification.	
1.4.3	*Advanced Indicator* *The embedded water use of primary inputs in catchment(s) of origin shall be quantified.*	Yes
Comment	In the WFP report, TSMC developed the inventory results which covers direct supplier and other supplier's data. The raw data included the location of these supplier and hence the embedded water use of primary inputs in catchments of origin had been quantified.	
Score	7	
1.5	*Gather water-related data for the catchment, including water governance, water balance, water quality, Important Water-Related Areas, infrastructure, and WASH*	
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 to help inform site of possible opportunities for water stewardship collective action.*	Yes
Comment	TSMC has collected the water-related plan including water supply, effluent discharge and pipeline installation from Economic bureau and STSP authority. TSMC also obtained the analysis report of the Water Conservancy Department on the reclaim water introduction project. CTSP provides guidance to tsmc to promote water conservation and carry out water conservation consultation in the process.	
1.5.2	*Applicable water-related legal and regulatory requirements shall be identified, including legally-defined and/or stakeholder-verified customary water rights.*	Yes
Comment	The list of water-related laws and regulations is identified by TSMC group based on national regulations and customer requirement. TSMC developed a legal & other requirements collection system to collect the new issued laws&regulation.	
1.5.3	*The catchment water-balance, and where applicable, scarcity, shall be quantified, including indication of annual, and where appropriate, seasonal, variance.*	Yes
Comment	TSMC has collected the water-related analysis report from Economic bureau and STSP authority, the information includes precipitation, storage and demand. The overall conclusion is that the water recourse is sufficient, but there is a great difference between dry season and wet season.	
1.5.4	*Water quality, including physical, chemical, and biological status, of the catchment shall be identified, and where possible, quantified. Where there is a water-related challenge that would be a threat to good water quality status for people or environment, an indication of annual, and where appropriate, seasonal, high and low variances shall be identified.*	Yes

Comment	The water quality information of Tseingwen and Yanshuei River is available on the public webpage. tsmc routinely conducts monthly water quality understanding. Liyutan Reservoir and Deji Reservoir are now in slightly Eutrophication status. The main maintenance work of the reservoir is dredging the silt, and the water quality is maintained in a stable state, with an average water conductivity (500us/cm), NTU (2 NTU), TOC (2ppm). At present, no specific area in the catchment is facing challenges due to changes in water quality and quantity.	
1.5.5	*Important Water-Related Areas shall be identified, and where appropriate, mapped,and their status assessed including any threats to people or the natural environment, using scientific information and through stakeholder engagement.*	Yes
Comment	The identification of important water-related areas is currently carried out by TSMC, and the list of the IWRA is established. For Tsengwen River Catchment, it includes the upstream reservoir water source protection zone, and the habitat of wild bird. For Yanshuei River Catchment, it contains the wetland and mangrove ecosystem, and habitat of migratory bird. The status are evaluated as per public information, and all of the result are level five.	
1.5.6	*Existing and planned water-related infrastructure shall be identified, including condition and potential exposure to extreme events.*	Yes
Comment	After communication with STSP, TSMC obtained the existing and planned water-related infrastructure.	
1.5.7	*The adequacy of available WASH services within the catchment shall be identified.*	Yes
Comment	1, Statistic on Tap water supply penetration rate and WWP Plant distribution rate published by authority; 2, Statistic on Human health facility Popularization rate;	
1.5.8	*Advanced Indicator* *Efforts by the site to support and undertake catchment level water-related data collection shall be identified.*	Yes
Comment	TSMC set up underground water monitoring wells in the upstream and downstream respectively (autonomous, non-environmental assessment requirements), which is voluntary. In 2022, it was detected that the result meet the related standard. The testing result was shared with the STSP.	
Score	6	
1.5.9	*Advanced Indicator* *The adequacy of WASH provision within the catchments of origin of primary inputs shall be identified.*	Yes
Comment	Tsmc provided product water footprint verification report issued in 2021, and the inventory covers direct supplier and other suppliers data. The verification was implemented in according to LCR database for the inventory and data. Through the WFP, the TSMC determined the location of raw material suppliers, after checking the EPI(environmental performance index) of the origin region, the WASH of all suppliers were sufficient. The current analysis is based on the average WASH adequacy of the country/area (Taiwan, Japan, South Korea, and the United States).	
Score	4	
1.6	*Understand current and future shared water challenges in the catchment, by linking the water challenges identified by stakeholders with the site's water challenges.*	
1.6.1	*Shared water challenges shall be identified and prioritized from the information gathered.*	Yes

Comment	TSMC identified seven Shared Water Challenges, include internal and external challenges. The external shared water challenges are water shortage and water effluent. The water shortage challenges were prioritized as: Climate change, abnormal water supply Regional water consumption is increasing year by year Water leakage in the water pipeline The water effluent challenges were prioritized as: Receiving water pollution Water pollution discharge.	
1.6.2	*Initiatives to address shared water challenges shall be identified.*	Yes
Comment	TSMC has identified the initiatives to address shared water challenges. They prepared a table which maps the challenges, the corresponding area of focus and the Initiatives which go with them.	
1.6.3	*Advanced Indicator* *Future water issues shall be identified, including anticipated impacts and trends*	Yes
Comment	In the tsmc 2021 CSR report, there is a complete analysis of the trend of short-term droughts in the future. The content includes that the use of water in the future may be affected by risks such as typhoons, floods, and droughts. Therefore, the efficiency of water resources should be actively improved.	
Score	3	
1.6.4	*Advanced Indicator* *Potential water-related social impacts from the site shall be identified, resulting in a social impact assessment with a particular focus on water.*	Yes
Comment	TSMC has provided a Research Report which done by Industrial Technology Research Institute in 2021. It describes the social impacts from the site.	
Score	4	
1.7	*Understand the site's water risks and opportunities: Assess and prioritize the water risks and opportunities affecting the site based upon the status of the site, existing risk management plans and/or the issues and future risk trends identified in 1.6.*	
1.7.1	*Water risks faced by the site shall be identified, and prioritized, including likelihood and severity of impact within a given timeframe, potential costs and business impact.*	Yes
Comment	TSMC identify 20 water related risks within their sites. Within conformity assessment sites, there are two risks identified as high-risk (≥6). The internal shared water challenges are: Drought caused insufficient water supply. Effluent water increases may cause degradation of the river water.	
1.7.2	*Water-related opportunities shall be identified, including how the site may participate, assessment and prioritization of potential savings, and business opportunities.*	Yes
Comment	Water Resources Improvement Identification Sheet, which covered two main opportunities. To use the alternative water resource (reclaimed water) as the first priority, and the second is improving water efficiency.	
1.8	*Understand best practice towards achieving AWS outcomes: Determining sectoral best practices having a local/catchment, regional, or national relevance.*	
1.8.1	*Relevant catchment best practice for water governance shall be identified.*	Yes

Comment	Collect and compare the water management best practice standards of Micron, AUO, Winbond, Silicon, GLOBALFOUNDRIES, intel (same industry), including water resource risk management, expansion of diversified water resources, and industry water saving guidance, etc. Best practices for water governance identified at Tainan plants include: (1) water risk management (2) expansion of diversified water resources (3) reduction of water pollution concentration.
1.8.2	*Relevant sector and/or catchment best practice for water balance (either through water efficiency or less total water use) shall be identified.* ✓ Yes
Comment	TSMC corresponds to the water-saving practices of related industries, including AUO, GLOBALFOUNDRIES, Intel and other companies. By comparing the wafer unit consumption standards recognized by the Global Semiconductor Association, it is confirmed that the "Taiwan Semiconductor Standard" is superior to the global standard. TSMC also actively holds corporate/academic/official seminars to exchange and share implementation practices in various aspects such as green factories and green buildings.
1.8.3	*Relevant sector and/or catchment best practice for water quality shall be identified, including rationale for data source.* ✓ Yes
Comment	TSMC and related industries such as UMC, World Advanced, AUO, and Hejing Technology conduct benchmark tests on water quality standards. TSMC meets the acceptance criteria for waste water from the Science Park Sewage Treatment Plant and can be discharged to the sewage treatment plant. Water pollution prevention technologies developed by TSMC include: Effectively strengthen source management and achieve diversification Wastewater discharge monitoring Wastewater quality improvement
1.8.4	*Relevant catchment best practice for site maintenance of Important Water-Related Areas shall be identified.* ✓ Yes
Comment	TSMC has identified the following best practises for IWRA: 1, Regular monitoring on IWRA's biodiversity and water quality; 2, Sites' community engagement on IWRA related activities; 3, The current preparation direction is to compare the environmental performance of CSR reports by TSMC, Micron, Winbond, AUO and other companies, and compare the best practice including river water quality monitoring, flood detention basin construction areas, IWRA hydrological maintenance and monitoring, and water-saving volunteers' hydrological and water quality experience sharing, and the maintenance of the aboriginal cultural preservation area.
1.8.5	*Relevant sector and/or catchment best practice for site provision of equitable and adequate WASH services shall be identified.* ✓ Yes
Comment	TSMC uses the World Business Council for Sustainable Development (WBCSD) WASH Self-Assessment Tool to assess the level of WASH provided through 6 categories of questions and answers.

2	STEP 2: COMMIT & PLAN - Commit to be a responsible water steward and develop a Water Stewardship Plan	
2.1	*Commit to water stewardship by having the senior-most manager in charge of water at the site, or if necessary, a suitable individual within the organization head office, sign and publicly disclose a commitment to water stewardship, the implementation of the AWS Standard and achieving its five outcomes, and the allocation of required resources.*	
2.1.1	*A signed and publicly disclosed site statement OR organizational document shall be identified. The statement or document shall include the following commitments:* *- That the site will implement and disclose progress on water stewardship program(s) to achieve improvements in AWS water stewardship outcomes* *- That the site implementation will be aligned to and in support of existing catchment sustainability plans* *- That the site's stakeholders will be engaged in an open and transparent way* *- That the site will allocate resources to implement the Standard.*	Yes
Comment	TSMC's environmental policy was signed by CEO, and the policy included the related AWS commitment. In addition, TSMC also published the AWS disclosure report on the TSMC ESG website, which was signed by each factory managers. 1, TSMC's Environment Policy signed by CEO (Mr.Feng) in Sep. 2022 and published on TSMC's website; 2, The AWS Report signed by Corporate EHS Director and published on TSMC's website;	
2.1.2	*Advanced Indicator* *A statement that explicitly covers all requirements set out in Indicator 2.1.1 and is signed by the organization's senior-most executive or governance body and publicly disclosed shall be identified.*	Yes
Comment	1.TSMC Environmental Policy was signed by CEO, Mr. Liu, in May 2022 and published on TSMC's website. 2.The AWS report was signed by Corporate ESH Division Director, Mr. Fung, on 09.30.2022 and published on TSMC's website. The statement covers all requirements set out in Indicator 2.1.1.	
Score	1	
2.2	*Develop and document a process to achieve and maintain legal and regulatory compliance.*	
2.2.1	*The system to maintain compliance obligations for water and wastewater management shall be identified, including:* *- Identification of responsible persons/positions within facility organizational structure* *- Process for submissions to regulatory agencies.*	Yes
Comment	TSMC Tainan announced the AWS water management organization chart. The chart identifies the person in charge/position in the relevant facility organization, and the associated job responsibilities. They also established a series of procedure to collect the laws and regulation and ensure the compliance. 1.A-RMS-02-02-004 (ver. 19) Environmental protection management procedure, has established relevant regulations on water pollution regulations, 2.A-RMS-01-02-012-22 (ver. 25) regulated the ESH organization, responsibilities, and ESH CHOP management procedure, 3. A-RMS-01-02-007 (ver 14) 14001/45001 TOSHMS management	
2.3	*Create a water stewardship strategy and plan including addressing risks (to and from the site), shared catchment water challenges, and opportunities.*	
2.3.1	*A water stewardship strategy shall be identified that defines the overarching mission, vision, and goals of the organization towards good water stewardship in line with this AWS Standard.*	Yes

Comment	The TSMC group has established a water stewardship strategy that included the overarching mission, vision, and goals of the organization, which included in the ESG report. The Tainan site shares the same strategy. "Sustainable Water Resources Management Goal" has been set by TSMC Tainan, include: Good management system Governance and water management support Excellent water quality Healthy water environment Safe drinking water and sanitary environment Sustainable water balance
2.3.2	*A water stewardship plan shall be identified, including for each target:* *- How it will be measured and monitored* *- Actions to achieve and maintain (or exceed) it* *- Planned timeframes to achieve it* *- Financial budgets allocated for actions* *- Positions of persons responsible for actions and achieving targets* *- Where available, note the link between each target and the achievement of best practice to help address shared water challenges and the AWS outcomes.* Yes
Comment	Sustainable water management related action plans are established as per the sustainable water management goal, which specifies targets, required actions, measurement, status, effectiveness evaluation, accountable and deadline, etc. The Water Stewardship Plan is associated with five main outcomes of AWS, including good water governance, sustainable water balance, good water quality status, IWRA and WASH, For example, the action plans related to water consumption included the introduction of reclaimed water and increase the rate of reclaimed water usage. the actions related to good water efficiency included: 1. Maintenance of the WWTP. 2. Maintain the wastewater comprehensive parameters' target.
2.3.3	*Advanced Indicator* *The site's partnership/water stewardship activities with other sites within the same catchment (which may or may not be under the same organisational ownership) shall be identified and described.* N/A
Comment	The facility does not perform this indicator.
2.3.4	*Advanced Indicator* *The site's partnership/water stewardship activities with other sites in another catchment(s) (either under same corporate structure or with another corporate site) shall be identified.* Yes
Comment	There were 3 sessions of collaboration related to different river catchment in 2022, including the Science Park Factory Affairs Technology Seminar, AEEPA (including on-site visits), and the Factory Affairs and Environmental Laboratory Workshop (discussing wastewater issues).
Score	4
2.3.5	*Advanced Indicator* *Stakeholder consensus shall be sought on the site's water stewardship plan. Consensus should be achieved on at least one target. A list of targets that have consensus and in which stakeholders are involved shall be identified.* Yes
Comment	The facility has communicated STSP and consent to introduce domestic reclaimed water as a water source. At the end of 2022, the reclaimed water consumption will achieve 20 thousand ton per day. In 2022, Water Reclamation Plants in Yongkang has be built, but Anping plant couldn't completed because the project delayed.. TMSC would continue to plan and adjust the schedule in 2022.
Score	7

2.4	*Demonstrate the site's responsiveness and resilience to respond to water risks*
2.4.1	*A plan to mitigate or adapt to identified water risks developed in co-ordination with relevant public-sector and infrastructure agencies shall be identified.*  Yes
Comment	Taiwan is relatively short of water, and TSMC belongs to an industry with high water intensity. To respond this issue, TSMC coped with the STSP on the introduction of reclaim water. They will progressive introduced the reclaim water from municipal domestic WWTP as one of the water source, aiming to reduced the consumption of fresh water. As per TSMC Group's plan, from 2022 all three sites will start to use the reclaim water, and the wastewater of site 3 (Fab6) will be discharged to the regenerated water plant in STSP instead of the WWTP of STSP.
2.4.2	*Advanced Indicator* *A plan to mitigate or adapt to water risks associated with climate change projections developed in co-ordination with relevant public-sector and infrastructure agencies shall be identified.*  Yes
Comment	1. According to the 500-year rainfall analysis results of Zengwen River dam failure (guided by external consultants), a flood control drill was drawn up and the base was raised by 2 meters. 2. In response to the water truck, test the water truck when the water rationing is 5% (i.e. the water condition is orange), and implement the water truck for water-carring when the water rationing is 7.5%.
Score	6

3	STEP 3: IMPLEMENT - Implement the site's stewardship plan and improve impacts

3.1 *Implement plan to participate positively in catchment governance.*

3.1.1 *Evidence that the site has supported good catchment governance shall be identified.* Yes

Comment: The topics of cooperation and communication with the competent authority include review of water measures permission, water use plan (undergoing water consumption revision with the STSP, drought and water saving discussion meetings, legal explanation meetings, billing test results explanation, and plant counselling visits and water-saving performance review.

3.1.2 *Measures identified to respect the water rights of others including Indigenous peoples, that are not part of 3.2 shall be implemented.* Yes

Comment: The site only used municipal water supplied by STSP, and the water consumption volume was within the water consumption plan. In addition, there is no indigenous people in the catchment area. Therefore, the water rights are respected under legal and regulatory mechanisms.

3.1.3 *Advanced Indicator*
Evidence of improvements in water governance capacity from a site-selected baseline date shall be identified. Yes

Comment:
1. FAB 6 has been used as a benchmark for comparison since 2010 (process water recycled). The water plan of EIA regulated that the process recycling efficiency must reach more than 85%, and FAB 6 has reached the requetion in recent years.
2.The Online Water Map has merged the water level information/water quality monitoring platform
3. The eLearing System has planned related courses for all employees.
4.The Icourse System has planned related courses for factory affairs
5. The setting of dedicated wastewater and sewage treatment specialists to the regulations (the regulations required 3 persons, and 4 persons have certificates), and the Tripitaka Library will put relevant teaching materials into the database.
6. The factory affairs quarterly published the improvement of water recycling technology and provides reference for each factory.

Score: 2

3.1.4 *Advanced Indicator*
Evidence from a representative range of stakeholders showing consensus that the site is seen as positively contributing to the good water governance of the catchment shall be identified. Yes

Comment: TSMC won the award of Annual Office Green Procurement Among Domestic Enterprises in 2020, and Model Environmental Protection Specialist and Technical Personnel in 2021, as well as completed ISO 14046 verification.

Score: 2

3.2 *Implement system to comply with water-related legal and regulatory requirements and respect water rights.*

3.2.1 *A process to verify full legal and regulatory compliance shall be implemented.* Yes

Comment The site has established a procedure to ensure the operation meet the provisions of relevant laws, regulations and other requirements. They also established a laws & regulations list to collect the latest applicable laws and regulations. Internal and external audits were conducted the ensure the legal and regulatory compliance, and the audit activities includes:
1. Suppliers will be audited annually by Corporate ESH
2. All factories are internally audited by ISEP on a quarterly basis
3. The audit results are shared in the quarterly Technical Board meeting
4. The external audit is verified by third-party.

3.2.2 *Where water rights are part of legal and regulatory requirements, measures identified to respect the water rights of others including Indigenous peoples, shall be implemented.* Yes

Comment The average daily water consumption and wastewater discharge of TSMC Tainan plants are less than the approved amount. No indigenous people in the catchment area. The water rights of others, including residents and aboriginal peoples, are strictly observed.

3.3 *Implement plan to achieve site water balance targets.*

3.3.1 *Status of progress towards meeting water balance targets set in the water stewardship plan shall be identified.* Yes

Comment The 2020 Corporate Social Responsibility Report proposes targets for 2020/2021/2030. The 2030 target includes a 30% reduction in water consumption per unit of product and a 30% or more replacement rate for reclaimed water. The comprehensive index of water pollution is 50% higher than the discharge water standard.

TSMC Tainan plan continues to manage water resources to increase revenue and reduce expenses in parallel to ensure sustainable production. To this end, relevant water-saving measures have been implemented, such as improving the C/T&MAU makeup drainage conductivity setting, using secondary water for the Central Scrubber make-up water, recycling the Central Scrubber drainage, recycling CO2 Water from AWD to DIR, and increasing the RO water production rate of the recycling system.

The site tracks the progress of these projects regularly.

3.3.2 *Where water scarcity is a shared water challenge, annual targets to improve the site's water use efficiency, or if practical and applicable, reduce volumetric total use shall be implemented.* Yes

Comment The 2020 Corporate Social Responsibility Report proposes targets for 2020/2021/2030. The 2030 target includes a 30% reduction in water consumption per unit of product and a 30% or more replacement rate for reclaimed water. The comprehensive index of water pollution is 50% higher than the discharge water standard.
As per the CSR Report, that the target for 2022 is to reduce by 16%.
The site tracks the progress of action plans related to water balance regularly.

3.3.3 *Legally-binding documentation, if applicable, for the re-allocation of water to social, cultural or environmental needs shall be identified.* Yes

Comment 1. The water use plan applied water consumption was 6,000 CMD in FAB 6.
2. The 2021 ESG report mentioned the target of reclaimed water supply, which was expected to replace 60% of tap water in 2030; it is expected to provide 2 tons of reclaimed water per day in 2024

3.3.4 *Advanced Indicator*
The total volume of water voluntarily re-allocated (from site water savings) for social, cultural and environmental needs shall be quantified. N/A

Comment The facility does not perform this indicator.

3.4	*Implement plan to achieve site water quality targets*	
3.4.1	*Status of progress towards meeting water quality targets set in the water stewardship plan shall be identified.*	Yes
Comment	The site established sustainable water stewardship goals for each factory, which has been updated to 2022, including manage water resource risks (reduce unit water consumption), develop diverse water sources (replacement of water resources with reclaim water), develop preventive measures (water pollution composite indicators and TMAH concentration of discharge wastewater) TSMC's Tainan plant took ammonia nitrogen, Cu+, TMAH, COD, and TUa as KPIs, and implements several projects to achieve short, medium and long-term goals. The site tracks the progress of the several projects regularly.	
3.4.2	*Where water quality is a shared water challenge, continual improvement to achieve best practice for the site's effluent shall be identified and where applicable, quantified.*	Yes
Comment	TSMC Tainan plant faces water quality management challenges, increasingly stringent laws and regulations (tightening and new control standards). TSMC's Tainan plant took ammonia nitrogen, Cu+, TMAH, COD, and TUa as KPIs, and implements several projects to achieve short, medium and long-term goals, to cope with the challenges.	
3.5	*Implement plan to maintain or improve the site's and/or catchment's Important Water-Related Areas.*	
3.5.1	*Practices set in the water stewardship plan to maintain and/or enhance the site's Important Water-Related Areas shall be implemented.*	Yes
Comment	The STSP was originally a sugarcane field, and it was no IWRA within the site. TSMC is aware of the ecological environment and biodiversity within the site, and they perform the activities included establishing green belts, protecting and regenerating the diversity of native species and biological growth. TSMC also breeding the firefly within the site as it is a key indicator species of the ecological environment. The program started in 2015, and the amount of firefly increased about 57% in 2022 while compared with 2021. TSMC also commissioned consultants to implement ecological surveys for IWRA within the site every three years.	
3.5.2	*Advanced Indicator* *Evidence of completed restoration of non-functioning or severely degraded Important Water-Related Areas including where appropriate cultural values from a site-selected baseline date shall be identified. Restored areas may be outside of the site, but within the catchment.*	Yes
Comment	TSMC also breeding the firefly within the site as it is a key indicator species of the ecological environment. The program started in 2015, and the amount of firefly increased from near zero to over 1600 during 7 years.	
Score	6	
3.5.3	*Advanced Indicator* *Evidence from a representative range of stakeholders showing consensus that the site is seen as positively contributing to the healthy status of Important Water-Related Areas in the catchment shall be identified.*	Yes

Comment	1.The goal was to complete the environmental education of 30 elementary schools in the catchment since 2013(25 schools have been completed in 2021, 5 are under planning, and the completion rate has reached 83%). TSMC went to Jilai Elementary School to conduct environmental education about energy-saving and water-saving , mainly to check cooling towers, water pipe leaks and introduce water-saving faucets; 2.Scheduled to go to Shinmei Elementary School for environmental education on Dec 9, 2022. 3.Cooperated with the Southern Region Water Resources Office to handle the ecological education of Pheasant- tailed Jacana in Jilai Elementary School
Score	2

3.6 *Implement plan to provide access to safe drinking water, effective sanitation, and protective hygiene (WASH) for all workers at all premises under the site's control.*

3.6.1 *Evidence of the site's provision of adequate access to safe drinking water, effective sanitation, and protective hygiene (WASH) for all workers onsite shall be identified and where applicable, quantified.* — Yes

Comment	The site provides employees with sufficient and safe drinking water, clean toilets (in compliance with WBCSD standards and occupational safety and hygiene facility rules), and warm water for winter washing. For drinking water, the Taiwan Water Corporation tests the water quality once a quarter, and TSMC tests Escherichia coli every 2 months for drinking water and obtains the test report by third party. TSMC also conducts WASH-related Training for employees.

3.6.2 *Evidence that the site is not impinging on the human right to safe water and sanitation of communities through their operations, and that traditional access rights for indigenous and local communities are being respected, and that remedial actions are in place where this is not the case, and that these are effective.* — Yes

Comment	According to the tap water penetration rate data released by the Water Resources Department of the Ministry of Economic Affairs, in 2020, the tap water penetration rate of Tainan City where TSMC's Tainan plant is located, is 99.05% indicating that almost everyone in the area has clean and stable tap water. The Water Resources Bureau regularly implements water supply improvement projects in indigenous areas to help indigenous tribes to use water without worry, with good results over the years. The water use in the plant area does not affect the water rights of the aborigines, and the water consumption approved by the Tainan Science Park Bureau shall prevail.

3.6.3 *Advanced Indicator*
A list of actions taken to support the provision to stakeholders in the catchment of access to safe drinking water, adequate sanitation and hygiene awareness shall be identified. — Yes

Comment	TSMC Charity Foundation and the volunteer society is committed to the companionship and care of rural area children and the elderly inside and outside of the catchment. TSMC assisted stakeholders in the catchment to guided eco-environmental sanitation and assisted in obtaining safe drinking water.
Score	5

3.6.4 *Advanced Indicator:*
In catchments where WASH has been identified as a shared water challenge, evidence of efforts taken with relevant public-sector agencies to share information and to advocate for change to address access to safe drinking water and sanitation shall be identified. — N/A

Comment	The facility does not perform this indicator.

3.7 *Implement plan to maintain or improve indirect water use within the catchment:*

3.7.1	*Evidence that indirect water use targets set in the water stewardship plan, as applicable, have been met shall be quantified.*	Yes
Comment	TSMC set suppliers' water-saving targets at 4.5 million tons in 2021 and 35 million tons in 2030, and disclosed in the company's CSR report. TSMC tracks suppliers' water-saving effects and target achievement every year.	
3.7.2	*Evidence of engagement with suppliers and service providers, as well as, when applicable, actions they have taken in the catchment as a result of the site's engagement related to indirect water use, shall be identified.*	Yes
Comment	1. TSMC analyzed the situation of suppliers using water through the water footprint report. 2. Hosted the "Supplier Sustainable Supply Chain Experience Sharing Conference" to share experience in energy saving and water saving. 3.SO360(Supply online) share related experience."	
3.7.3	*Advanced Indicator* *Actions taken to address water related risks and challenges related to indirect water use outside the catchment shall be documented and evaluated.*	Yes
Comment	TSMC set suppliers' water-saving targets at 4.5 million tons in 2021 and 35 million tons in 2030, and disclosed in the company's CSR report. TSMC tracks suppliers' water-saving effects and target achievement every year.	
Score	5	
3.8	*Implement plan to engage with and notify the owners of any shared water-related infrastructure of any concerns the site may have.*	
3.8.1	*Evidence of engagement, and the key messages relayed with confirmation of receipt, shall be identified.*	Yes
Comment	Documents between ISEP and the Water Authority of TSMC's plants can be tracked with official receipt and delivery records. TSMC held a sustainable supply chain experience sharing session, including water saving goal setting. ISEP audits waste manufacturers to confirm compliance with air pollution/water pollution/toxic chemicals/ISO/work safety.	
3.9	*Implement actions to achieve best practice towards AWS outcomes: continually improve towards achieving sectoral best practice having a local/catchment, regional, or national relevance.*	
3.9.1	*Actions towards achieving best practice, related to water governance, as applicable, shall be implemented.*	Yes
Comment	TSMC has performed the following actions: 1. Regularly review and update a comprehensive sustainable water management plan. 2. Set up a monitoring platform to monitor water regime, water quality, and water balance diagrams daily. 3. Set up the FAM platform to control the equipment maintenance cycle. 4. Sharing water resources management and recycling economy reuse.	
3.9.2	*Actions towards achieving best practice, related to targets in terms of water balance shall be implemented.*	Yes
Comment	1.Ensure the use of reclaimed water, aiming to use 60% reclaimed water by 2030, and ensure the quality of reclaimed water in accordance with reclaimed water quality standards of NSTC 2. LSR RO module expansion in F6P1, 20% increase in recycled water. 3. Reclaim the TMAH wastewater, increase 40% recycle water of this process. 4. The AWS Report signed by Corporate EHS Director and published in TSMC's website;	

3.9.3	*Actions towards achieving best practice, related to targets in terms of water quality shall be implemented.*	Yes
Comment	TSMC improves the efficiency of water pollution prevention and control and strengthens the removal of wastewater pollutants. TSMC's Tainan plant uses ammonia nitrogen, Cu+, TMAH, COD, and TUa as KPIs, and implements 8 projects to achieve short, medium and long-term goals. Cobalt was included in the calculation in 2022.	
3.9.4	*Actions towards achieving best practice, related to targets in terms of the site's maintenance of Important Water-Related Areas shall be implemented.*	Yes
Comment	The STSP was originally a sugarcane field, and it was no IWRA within the site. TSMC is aware of the ecological environment and biodiversity within the site, and they perform the activities included establishing green belts, protecting and regenerating the diversity of native species and biological growth. TSMC also breeding the firefly within the site as it is a key indicator species of the ecological environment. The program started in 2015, and the amount of firefly increased about 57% in 2022 while compared with 2021. Action included: Planting honey source plants to attract butterflies. Construction of landscape ecological pool. Planting native plants.	
3.9.5	*Actions towards achieving best practice related to targets in terms of WASH shall be implemented.*	Yes
Comment	The site provides employees with sufficient and safe drinking water, clean toilets (in compliance with WBCSD standards and occupational safety and hygiene facility rules), and warm water for winter washing. For drinking water, the Taiwan Water Corporation tests the water quality once a quarter, and TSMC tests Escherichia coli every 2 months for drinking water and obtains the test report by third party. TSMC also conducts WASH-related Training for employees.	
3.9.6	*Advanced Indicator* *Achievement of identified best practice related to targets in terms of good water governance shall be quantified.*	Yes
Comment	TSMC has performed the following actions: 1. Regularly review and update a comprehensive sustainable water management plan. 2. Set up a monitoring platform to monitor water regime, water quality, and water balance diagrams daily. 3. Set up the FAM platform to control the equipment maintenance cycle. 4. Sharing water resources management and recycling economy reuse. Furthermore, F14B obtained the Regional Enterprise Environmental Conservation Gold Award in 2022.	
Score	8	
3.9.7	*Advanced Indicator* *Achievement of identified best practice related to targets in terms of sustainable water balance shall be quantified.*	Yes
Comment	1.Ensure the use of reclaimed water, aiming to use 60% reclaimed water by 2030, and ensure the quality of reclaimed water in accordance with reclaimed water quality standards of NSTC 2. The water consumption per unit of product in the Tainan plant in 2021 reduced 2.8% compared with 2021. 3. The unit water consumption of three fabs are all lower than the standard set by Taiwan Semiconductor Industrial Association.	
Score	8	

3.9.8	*Advanced Indicator* *Achievement of identified best practices related to targets in terms of water quality shall be quantified*	Yes
Comment	TSMC improves the efficiency of water pollution prevention and control and strengthens the removal of wastewater pollutants. TSMC's Tainan plant uses ammonia nitrogen, Cu+, TMAH, COD, and TUa as KPIs, and implements 8 projects to achieve short, medium and long-term goals. Cobalt was included in the calculation in 2022. The approaches are beyond legal and STSP's requirment.	
Score	8	
3.9.9	*Advanced Indicator* *Achievement of identified best practices related to targets in terms of the site's maintenance of Important Water-Related Areas have been implemented.*	Yes
Comment	The STSP was originally a sugarcane field, and it was no IWRA within the site. TSMC is aware of the ecological environment and biodiversity within the site, and they perform the activities included establishing green belts, protecting and regenerating the diversity of native species and biological growth. TSMC also breeding the firefly within the site as it is a key indicator species of the ecological environment. The program started in 2015, and the amount of firefly increased about 57% in 2022 while compared with 2021. Action included: Planting honey source plants to attract butterflies. Construction of landscape ecological pool. Planting native plants.	
Score	8	
3.9.10	*Advanced Indicator* *Achievement of identified best practice related to targets in terms of WASH shall be quantified.*	Yes
Comment	The site provides employees with sufficient and safe drinking water, clean toilets (in compliance with WBCSD standards and occupational safety and hygiene facility rules), and warm water for winter washing. For drinking water, the Taiwan Water Corporation tests the water quality once a quarter, and TSMC tests Escherichia coli every 2 months for drinking water and obtains the test report by third party. TSMC assisted stakeholders in the catchment to guided eco-environmental sanitation and assisted in obtaining safe drinking water. The site helped to install the drinking water facility and repair the toilet flushing facility for a school of neighbor community.	
Score	4	
3.9.11	*Advanced Indicator* *A list of efforts to spread best practices shall be identified.*	Yes
Comment	Promote various water-saving and environmental protection measures to achieve good water resources management results. Invite government agencies, industries (including park manufacturers), upstream and downstream supply chains, academic groups, and non-governmental environmental groups to visit the factory and exchange water-saving experience.	
Score	3	
3.9.12	*Advanced Indicator* *A list of collective action efforts, including the organizations involved, positions of responsible persons of other entities involved, and a description of the role played by the site shall be identified.*	Yes

Comment	1. Cooperated with the Tainan City Government to developed the Tainan Shan-Shang Garden and Old Waterworks Museum and planted trees to make a total of 45,000 saplings. 2. The Water Resource Bureau aimed to install intelligent irrigation system in Jianan Region to improve the water efficiency of farmland. The TSMC was responsible for research and development of one important component of the system, the intelligent water gate. After successful development, TSMC has provided free patents of the intelligent water gates. The technology transfer had completed and returned to the government at present. The system is expected to be applied in 18410-hectare farmland and saved about 25-million-ton water annually.
Score	8

3.9.13 *Advanced Indicator* ✓ Yes

Evidence of the quantified improvement that has resulted from the collective action relative to a site-selected baseline date shall be identified and evidence from an appropriate range of stakeholders linked to the collective action (including both those implementing the action and those affected by the action) that the site is materially and positively contributing to the achievement of the collective action shall be identified.

Comment	1. Cooperated with the Tainan City Government to developed the Tainan Shan-Shang Garden and Old Waterworks Museum and planted trees to make a total of 45,000 saplings. 2. The Water Resource Bureau aimed to install intelligent irrigation system in Jianan Region to improve the water efficiency of farmland. The TSMC was responsible for research and development of one important component of the system, the intelligent water gate. After successful development, TSMC has provided free patents of the intelligent water gates. The technology transfer had completed and returned to the government at present. The system is expected to be applied in 18410-hectare farmland and saved about 25-million-ton water annually.
Score	4

4	STEP 4: EVALUATE - Evaluate the site's performance.	
4.1	*Evaluate the site's performance in light of its actions and targets from its water stewardship plan and demonstrate its contribution to achieving water stewardship outcomes.*	
4.1.1	*Performance against targets in the site's water stewardship plan and the contribution to achieving water stewardship outcomes shall be evaluated.*	Yes
Comment	2021 goals and 2022 results: The concentration of discharged water is lower than the management standard of the Bureau of Science and Technology (< 500 ppm). Industrial and people's livelihood water - The water company regularly tests the water quality every quarter to ensure that there is no doubt that the water supply for people's livelihood in the factory area. Drinking water quality control - The water dispenser in the factory is maintained and replaced every month, and the E. coli is checked once every two months. Each inspection is 1/6 of the total number of units, which is better than Taiwan regulations Safely achieve sustainable water management outcomes. Ecological restoration of near-natural forests and rare species. The amount of firefly increased 57% compared with 2021. The water consumption of unit product reduced 2.8% compared with 2021, and lower than the standard set by TSIA.	
4.1.2	*Value creation resulting from the water stewardship plan shall be evaluated.*	Obs.
Comment	By reducing the water consumption of products, a total of 11.7 million tons of water and 154.5 million NTD in water bill were saved from 2013 to 2021.	
4.1.3	*The shared value benefits in the catchment shall be identified and where applicable, quantified.*	Yes
Comment	The quality of wastewater in the Tainan plant is lower than the acceptance standard of the sewage treatment plant in STSP, which reduces the load of the sewage treatment plant and helps reduce the load of the watershed. Let watershed manufacturers share their experience in water conservation and ecological protection of watersheds. The Water Resource Bureau aimed to install intelligent irrigation system in Jianan Region to improve the water efficiency of farmland. The TSMC was responsible for research and development of one important component of the system, the intelligent water gate. After successful development, TSMC has provided free patents of the intelligent water gates. The technology transfer had completed and returned to the government at present. The system is expected to be applied in 18410-hectare farmland and saved about 25-million-ton water annually.	
4.1.4	*Advanced Indicator* *A governance or executive-level review, including discussion of shared water challenges, water risks, and opportunities, and any water-related cost savings or benefits realized, and any relevant incidents shall be identified.*	N/A
Comment	The facility does not perform this indicator.	
4.2	*Evaluate the impacts of water-related emergency incidents (including extreme events), if any occurred, and determine the effectiveness of corrective and preventative measures.*	
4.2.1	*A written annual review and (where appropriate) root-cause analysis of the year's emergency incident(s) shall be prepared and the site's response to the incident(s) shall be evaluated and proposed preventative and corrective actions and mitigations against future incidents shall be identified.*	Yes

Comment	1. Compare the emergency response information center system (ERIC system), there is no specific emergency in 2021, there is a water quality abnormal notification (record abnormal handling measures); 2. The content and tracking of emergency incidents reported by the factory-level safety committee every month; 3. Currently, in response to different water supply status during the dry season, according to the emergency response procedures, the contract of water tanker and water consume rights will be started in advance, and various preparations such as visits and contacts of water supply sites will be carried out as planned.
4.3	*Evaluate stakeholders' consultation feedback regarding the site's water stewardship performance, including the effectiveness of the site's engagement process.*
4.3.1	*Consultation efforts with stakeholders on the site's water stewardship performance shall be identified.* ✓ Yes
Comment	The opinions of stakeholders were collected through questionnaires during the period from September 2022 to November 8, 2022, and a stakeholder meeting was held on November 17, 2022.
4.3.2	*Advanced Indicator* *The site's efforts to address shared water challenges shall be evaluated by stakeholders. This shall include stakeholder reviewing of the site's efforts across all five outcome areas, and their suggestions for continual improvement.* ✓ Yes
Comment	TSMC cooperates with STSP, especially TSMC actively cooperates with the new plant to save water, saving water when the water situation is severe. TSMC also cooperate with STSP on the introduction of the reclaim water. TSMC sent questionaries to stakeholders to understand their concerns and opinions on water-related issue, and their feedback on TSMC's water stewardship. 23% of the questionaries were returned. The highest topics were 'sustainable water balance' and 'good water quality'. One stakeholder encourages TSMC to continuously improved the water recycle rate and reduced the volume of discharge water.
Score	6
4.4	*Evaluate and update the site's water stewardship plan, incorporating the information obtained from the evaluation process in the context of continual improvement.*
4.4.1	*The site's water stewardship plan shall be modified and adapted to incorporate any relevant information and lessons learned from the evaluations in this step and these changes shall be identified.* ✓ Yes
Comment	TSMC consolidated water management plan (include objectives, regulations... etc.) will be communicated in AWS group meeting and management review meeting of senior executives to confirm whether adjustments are needed. The water related targets will be updated in CSR Report annually. The water related regulations will be reviewed periodically. The water stewardship performance will be reviewed annually. The water stewardship plan will be updated annually.

5	STEP 5: COMMUNICATE & DISCLOSE - Communicate about water stewardship and disclose the site's stewardship efforts	
5.1	*Disclose water-related internal governance of the site's management, including the positions of those accountable for legal compliance with water-related local laws and regulations.*	
5.1.1	*The site's water-related internal governance, including positions of those accountable for compliance with water-related laws and regulations shall be disclosed.*	Yes
Comment	The water-related internal governance is announced in TSMC website "Climate sustainability related declarations and reports "webpage. The AWS Report also can be download from the webpage. The AWS Report released the water management organization, responsible person and unit and accountability to water management. TSMC ESG weblink: https://esg.tsmc.com/csr/ch/resources/documents.html	
5.2	*Communicate the water stewardship plan with relevant stakeholders.*	
5.2.1	*The water stewardship plan, including how the water stewardship plan contributes to AWS Standard outcomes, shall be communicated to relevant stakeholders.*	Yes
Comment	The site disclosed the site's water stewardship plan in following ways: 1. ESG report 2. AWS online webinar 3. Company website https://esg.tsmc.com/download/file/esg_aws_c.pdf	
5.3	*Disclose annual site water stewardship summary, including: the relevant information about the site's annual water stewardship performance and results against the site's targets.*	
5.3.1	*A summary of the site's water stewardship performance, including quantified performance against targets, shall be disclosed annually at a minimum.*	Yes
Comment	TSMC released the AWS report and stated the 2021 water resources management goals and performance of the Tainan plant. TSMC publishes target results every year and tracks suppliers' water-saving effects. All information is published annually in the Corporate Social Responsibility Report. TSMC ESG weblink: https://esg.tsmc.com/csr/ch/resources/documents.html	
5.3.2	*Advanced Indicator* *The site's efforts to implement the AWS Standard shall be disclosed in the organization's annual report.*	Yes
Comment	In the TSMC AWS Report, TSMC stated there are five benefits to implement AWS: TSMC ESG weblink: https://esg.tsmc.com/csr/ch/resources/documents.html	
Score	1	
5.3.3	*Advanced Indicator* *Benefits to the site and stakeholders from implementation of the AWS Standard shall be quantified in the organization's annual report.*	Yes
Comment	In the TSMC AWS Report, TSMC stated there are five benefits to implement AWS: TSMC ESG weblink: https://esg.tsmc.com/csr/ch/resources/documents.html	
Score	1	
5.4	*Disclose efforts to collectively address shared water challenges, including: associated efforts to address the challenges;engagement with stakeholders; and co-ordination with public-sector agencies.*	

5.4.1	*The site's shared water-related challenges and efforts made to address these challenges shall be disclosed.*	Yes
Comment	TSMC plants take action to address stakeholder-related water challenges, including: Flood: set waterproof door Drought resistance: (1) Promote water saving and water recycling; (2) Cooperate with stakeholders to carry out water saving activities; (3) Strengthen the preparation of backup water sources and water trucks. Unstable water supply: (1) Utilization and development of reclaimed water; (2) Establish and improve the monitoring system of water supply status.	
5.4.2	*Efforts made by the site to engage stakeholders and coordinate and support public-sector agencies shall be identified.*	Yes
Comment	The site organized the suppliers conference to share the share the experience on sustainability, water stewardship was covered, which both increased the awareness on water and shared the water stewardship practices with the suppliers. The site also introduced the use of reclaim water to respond STSP's propose.	
5.5	*Communicate transparency in water-related compliance: make any site water-related compliance violations available upon request as well as any corrective actions the site has taken to prevent future occurrences.*	
5.5.1	*Any site water-related compliance violations and associated corrections shall be disclosed.*	Yes
Comment	The site did not have violations of water-related laws and regulations.	
5.5.2	*Necessary corrective actions taken by the site to prevent future occurrences shall be disclosed if applicable.*	Yes
Comment	Although the site has not violated water-related laws and regulations in the past 5 years, it still complies with "A-RMS-01-03-029 Factory Environmental and Occupational Safety Management System Internal Control Operation Process" to manage non-conformance and related corrective action	
5.5.3	*Any site water-related violation that may pose significant risk and threat to human or ecosystem health shall be immediately communicated to relevant public agencies and disclosed.*	Yes
Comment	TSMC sets (1) the emergency response process for abnormal WWTP equipment, (2) emergency response process for abnormal discharge of rain gutter, and (3) emergency response process for abnormal discharge of domestic sewage. When the incident occurred, TSMC will follow above to communicated with authorities.	
	Photographic Evidence from Audit	
		Yes

Previous Findings	
All non-conformities raised in the previous audit have been satisfactorily closed.	Yes
Comment	In last audit, one minor non-conformity was raised, and the audit team verified its corrective action and confirmed that it could be closed. Detail list below: 1. Some objectives did not show the continual improvement commitment. The year 2021 objectives set up as per TSMC CSR objectives. However, the implementation performance had already better than the target. For example: □ The 2021 target is reduced 44% of wastewater indicator for F14 P7. However, the performance of 2020 F14 P7 is 54.2% reduced. □ The 2021 F14B objective is wastewater quality of 6 mg/L for THAM. The 2020 performance for the THAM is already 1.34 mg/L. 2. According to the program list of F14B, there is no program refer to the objective of reduced 44% of wastewater indicator. The responsible personnel explain that there is another NH3-N improvement plan, it can cause the indicators reduced. However, there is no evidence to show that F14B had confirmed that the wastewater indicator can reduce > 44% after the NH3-N improvement program completed. (On site checked, if the NH3-N improvement program reached the target (20 ppm/L), the wastewater indicator can reduce 44.5%) Root cause: The wastewater indicator is a new indicator of CSR in 2020, but it's performance and goals of each plant have not been fully connected. Corrective action: Setting appropriate and proactive goals based on the current status of each plant, and regularly review the improvement of various water quality. (1) In 2021, F14 P7 will be affected by the expansion of plant capacity and the increased chemicals, and its water pollution composite indicator reduction rate will also be affected. Therefore, the wastewater indicator reduction rate will maintain the original target of 44%; and the TMAH improvement target has been set to Target 1ppm in 2025. (2) At the December 2021, we will review the water quality of the year. And, to review various water quality improvements and regular semi-annual meeting reviews to ensure that the comprehensive water pollution indicators are met Target.