Alliance for Water Stewardship Audit Report

Prepared for Taiwan Semiconductor Manufacturing Company, Ltd.

Single certification

Site: Advanced Backend Fab 3

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Prepared by: SGS

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1 EXECUTIVE SUMMARY

The scope of services covers the conformity assessment of water use in compliance with the AWS International Water Stewardship Standard (Version 2.0) for Taiwan Semiconductor Manufacturing Company, Ltd. Advanced Backend Fab 3 (hereinafter referred to as "TSMC AP3 PLANT" or "the site"), located at No.101, Longyuan 6th Rd., Longtan Dist., Taoyuan City 32542, Taiwan, R.O.C.

The assessment has been completed in compliance with the AWS Certification requirements, Version 2.0 dated Mar. 2019.

Established in 1987 and headquartered in Hsinchu Science Park, Taiwan, TSMC pioneered the pure-play foundry business model with an exclusive focus on manufacturing customers' products. By choosing not to design, manufacture or market any semiconductor products under its own name, the Company ensures that it never competes with its customers.

And so, TSMC's foundry business model has enabled the rise of the global fabless industry, and since its inception TSMC has been the world's leading semiconductor foundry. The Company manufactured 11,617 different products using 281 distinct technologies for 510 different customers in 2020.

On 26th November 2021, SGS Taiwan Ltd. (hereinafter referred to as "SGS") conducted the on-site conformity assessment for TSMC AP3 PLANT's facilities and activities with regard to certification to the AWS Standard (Version 2.0). A total of ten findings were raised during the course of the audit process and they were all categorized as observations. Four findings are for core indications and six findings are for advanced indicators, respectively.

TSMC AP3 PLANT responded to the findings raised with root cause analysis and action plans. Our review confirmed that all corrective action plans are acceptable.

Given the review of evidence provided and the site visit performed at TSMC AP3 PLANT, SGS recommends that TSMC AP3 PLANT be awarded the AWS Platinum Certified status with a surveillance audit interval of annual frequency.

2 SCOPE OF ASSESSMENT

The scope of services covers the conformity assessment of water use in compliance with the AWS International Water Stewardship Standard (Version 2.0) for TSMC AP3 PLANT, located at No.101, Longyuan 6th Rd., Longtan Dist., Taoyuan City 32542, Taiwan, R.O.C. The location of TSMC AP3 PLANT is within Longtan Science Park that management by Hsinchu Science Park Bureau, Ministry of Science and Technology. In The assessment has been completed in compliance with the AWS Certification requirements, Version 2.0 dated Mar. 2019.

A pre-assessment for TSMC AP3 PLANT's facilities and activities with regard to certification to the AWS Standard (Version 2.0) was performed by Kyle Lu, the AWS approved auditor from SGS Taiwan Ltd. (hereinafter referred to as "SGS") on 4th November 2021. During the pre-assessment, SGS conducted an on-site audit that covered water supply facilities, chemical warehouse, waste storage, wastewater treatment facilities, online monitoring devices installed for treated effluent, employees' canteen, personnel interviews and document reviews. A total of thirty-five findings were raised during the pre-assessment process. TSMC AP3 PLANT responded that corrective actions will be taken to successfully close all findings raised at pre-assessment stage and before commencement of conformity assessment.

On 26th November 2021, SGS conducted the conformity assessment on-site visit of TSMC AP3 PLANT's facilities and activities with regard to certification to the AWS Standard (Version 2.0). Table 2.1 includes details on SGS audit team. The audit plan is attached as a separate document.

Table 2.1 SGS Audit Team

Audit Team		Qualifications/Experience
Eric HUANG	Team Leader	AWS certified auditor with 32 years environmental engineering and management experiences in audit, consulting, engineering and operation, and specialising in energy and climate change. Mr. Huang has conducted numerous of river basins pollution management, energy management system audit, Corporate Social Responsibility (CSR)/ Sustainability Report Assurance, ISO 14064-1 Greenhouse Gas verifcation audit, energy & climate change consulting/ audit, waste management, waste treatment/ recycling, site remediation, site decontamination, vibration measurement, industrial service projects.
Finn HAN	Auditor	An AWS certified auditor with over 20 years of experience in environmental management and sustainable development experiences in audit and consulting, Ms. Han is specializing in Corporate Social Responsibility (CSR)/ Sustainability Report

		Assurance, ISO 14064, ISO 14067, ISO 14046 verification and ISO14001, ISO 20121 and other ESG related audit and consulting projects.

During the conformity assessment, two SGS auditors splited into A and B teams and spent 1.0 days inspecting TSMC AP3 PLANT's installations and reviewing activities and documents. Interviews with personnel were also carried out.

TSMC AP3 PLANT provided most of the requested supporting documentation as evidence whilst on site. SGS provided initial feedback on the gaps between TSMC AP3 PLANT's current management and the level required by the standard during the closing meeting of the conformity assessment on 26th November 2021.

Table 2.2 includes pictures taken while on-site.

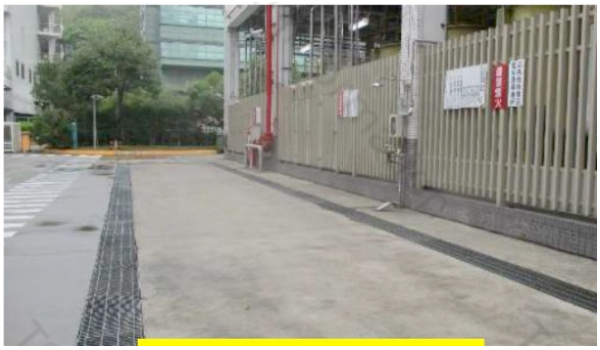
Table 2.2 Photos from 26th November 2021 Site Assessment

Tap Water Inlet

Wastewater Discharge Point

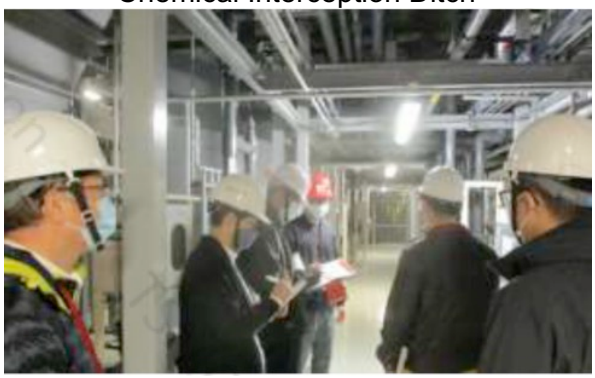
Rainfall Ditch Drain Point

Effluent Water Quality Monitor Instrument



Chemical Interception Ditch

Interception Ditch Sump



TSMC AP3 WWTP

3 STAKEHOLDER ANNOUNCEMENT AND CONCLUAION

Following the AWS Certification Requirements, before the on-site conformity assessment, SGS prepared a stakeholder announcement on 22nd September 2021, which stated TSMC Fab 5, F12A, F12B's intention to pursue AWS certification. Besides submitting to AWS for publication on the AWS website, the stakeholder announcement was also posted on the information disclosure bulletin board at security both of TSMC Fab 5, F12A, F12B's gate and displayed on TSMC ESG Facebook's website as below weblink, respectively.

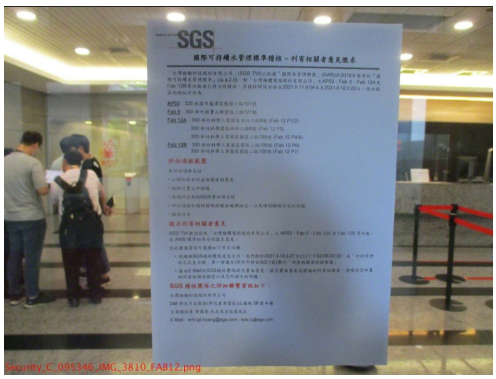
https://www.facebook.com/1757471104475504/posts/3140089776213623/?d=n

In addition, the stakeholder announcement was also displayed on SGS' website:

- SGS Taiwan Webpage：
  https://twap.sgs.com/Trainsys/TrainingType/TrainInfoDetail.aspx?ID=218

However, SGS didn't received any feedback information since the release of the stakeholder announcement.

F5 Lobby Bulletin Board

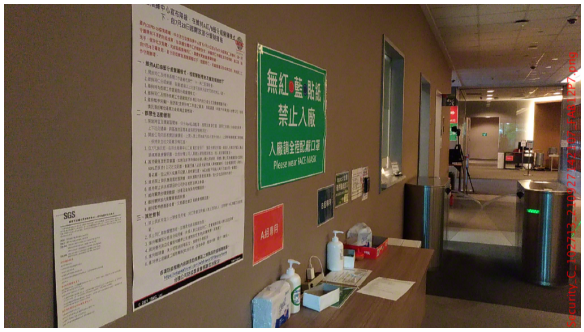


At the entrance of F12P1

At the entrance of F12P3

At the entrance of F12P4

At the entrance of F12P6



At the entrance of F12P7

TSMC ESG FB information

Figure 3-1 Information Disclosure Bulletin Board at stakeholder consulting meeitng venu

SGS held a stakeholder consultation meeting on 27th October 2021 at NINI Life Square Meeting Hall, Hsinchu Science Park Bureau.

Figure 3-2 Live Records of AWS Stakeholder Consultation Meetings (2021/10/27)

An AWS stakeholder consultation meeting will be held in Hsinchu City on October 27, 2021.

On the morning of the same day, TSMC arranged for a visit from the competent units, including: Construction Management Office of Planning and Design Division of Hsinchu Science Park Bureau, director and manager of sewage treatment plant of Hsinchu Science Park Bureau, etc. The content of the on-site visit is

- The Construction Management Office of the Planning and Design Division of the Hsinchu Science Park Bureau stated:

TSMC cooperates with the bureau, especially TSMC actively cooperates with the new plant to save water and saves water when the water conditions are severe.

- The director of the sewage treatment plant of the Hsinchu Science Park Bureau said:

The discharge water quality of TSMC factories is far below the acceptance standards of sewage treatment plants. It facilitates dilution of water and helps reduce the load on sewage treatment plants. When sewage is discharged from the sewage treatment plant into the watershed, the water quality of the watershed is diluted.

- Transcripts of interviews with managers of wastewater treatment plants of the Hsinchu Science Park Bureau need to include how they assessed TSMC's efforts in wastewater discharge quality to demonstrate that stakeholders have assessed TSMC's collective efforts to address water challenges.

On the afternoon of October 27, 2021, an AWS stakeholder consultation meeting was held in Hsinchu, with a total of 24 participants, including: suppliers, customers, residents near the factory, TSMC employees, etc. For detailed on-site attendance records, please refer to the attachment.

- Sun International Semiconductor Corporation (industry in the watershed): AWS's designation and scope of watersheds?

The scope of the watershed in AWS covers the upper, middle and lower reaches, from the water reservoir to the discharge outlet in the environment, and the company's corresponding supplier of commercial water is also the part that needs attention.

- Wanghong Electronics Co., Ltd. (industry in the watershed): Does the factory have questions about excess secondary water use in winter? Does TSMC suggest how to deal with the difference between winter and summer?

The TSMC factory will also encounter differences in water volume in winter and summer. In winter, there is too much secondary water. It will look for relatively clean and easy-to-treat recycled water in the waste water discharged from the machine, and then refine it, so that this water can be returned to the industrial pool. In order to reduce the use of tap water and reduce the problem of excessive discharge of secondary water in winter, but the characteristics of

each plant are different, they will find suitable secondary water for re-refining, and recycle as much as possible in summer to reduce the use of tap water.

- PSMC (industry in the watershed): As mentioned above, the reuse of water recycling will generate energy consumption and corresponding waste and other derived costs. How does TSMC deal with it?

Recycling wastewater in water treatment will generate energy consumption and waste and system construction and chemical treatment costs.

1. Energy consumption: The replacement of energy-saving equipment, such as the use of VFD frequency converters, will be evaluated to reduce the use of electricity.

2. Waste: TSMC is committed to resource reuse, and finds possible reuse methods from the characteristics of each wastewater. For example, CuCMP wastewater contains Cu, which can be converted into copper rods by the principle of electroplating. The copper system is required to turn the Cu in the wastewater into copper rods for reuse, and other TMAH/ammonium sulfate nitrogen have corresponding utilization methods.

3. The cost of dosing treatment: optimize the dosage through daily monitoring and fine-tunin.

- Demao Property Company (manufacturer near the factory): Is there any more sophisticated measures for TSMC's new factory due to the water supply affected by the expansion of Baoshan Reservoir?

Regarding the water used for the expansion of the Baoshan plant, there is information on this aspect in public information, and tsmc has promised to use 100% recycled and treated water.

- Kezhi New Technology Co., Ltd. (Supplier): 1. It is a supplier of TSMC, and it has tried its best to cooperate with TSMC/Water Resources Department's guidance in terms of energy saving, carbon reduction and water saving. However, the current water resources department's guidance is in the direction of water saving in the plant area. It is already extreme, and then it needs to be replaced with newer equipment. Is there any simple technology transferable or subsidized in terms of funding? 2. Does AWS have a common definition of calculation for the utilization of circulating water? For example, in Is there the same basis and calculation method for the calculation of recovery rate?

1. Effective improvement methods and promotion can be discussed in the supplier project counseling in the future.

2. The Science and Technology Administration Bureau of the Park provides a standard water balance table for companies in the park to calculate the water balance.

3. The recovery rate is usually based on the average of the previous year. AWS must conform to the national conditions of each country. The corresponding calculation method is mainly based on the standards of the local government or agency. There is no special presentation method, as long as the results and efforts can be specifically expressed.

- Taiwan's Mitsubishi Chemical Corporation (related industries in Hsinchu County): TSMC used 3.5 times to reuse a drop of water, and the calculation of the recovery rate is more than 300%. The energy consumption in this area will be very large, which is different from seawater. Compared with the energy consumption of desalination, should it be converted into seawater desalination to provide more water sources?

You may have misunderstood the calculation method of the part of TSMC that reuses 3.5 times of water. The calculation method is to divide the recycled water by the tap water, including: the recycled water is the sum of the tap water, pure water recycling, washing tower recycling, air conditioning condensation recycling, etc. In this way, 3.5 times of reuse can be achieved. The calculation of the recovery rate only calculates the recovery and utilization rate of the drainage of the table. These two items are different.

4 DESCRIPTION OF CATCHMENT

The Shimen Reservoir, the source of water supply, is one of the main reservoirs in northern Taiwan. It is located in the Shimen Canyon between Daxi District, Longtan District, Fuxing District, Taoyuan City, and Guanxi Town, Hsinchu County. It is the first multi-functional reservoir in Taiwan, which is formed by impounding water from the Dahan River. The daily average water supply volume regulated and stored by the reservoir is about 2.5 million cubic meters. If the total downstream uncontrolled flow and the Sanxia River pumping station are combined, the total water supply can reach up to 3 million cubic meters. It is mainly supplied the water to New Taipei City, Taoyuan City and Hsinchu County Hukou Township for public use.

The main water source of TSMC AP3 PLANT is tap water. The tap water source is treated and supplied by the Longtan Water Purification Plant managed by the Second District Management Office of Taiwan Water Corporation. The front-end water source of Longtan Water Purification Plant comes from Shimen Reservoir. The water supply area of Longtan Water Purification Plant covers Longtan District, Daxi District, Sanmin Villiage in Fuxing District, Longtan Science Park, Dongshi Area in Pingzhen District, Qiaoxing New Village in Bade District, etc. The water supply population is approximately 185,000 and 50,000 households. The plant doesn't use groundwater.

The wastewater discharged from TSMC AP3 PLANT is treated by Longtan Science Park Wastewater Treatment Plant and confirmed to meet the effluent water standards before being discharged into Tai Hang Que Creek and finally into final receiving water body Laojie River. Before discharge to Longtan Science Park wastewater treatment plant, TSMC AP3 PLANT need conduct wastewater pre-treatment process to meet Longtan Wastewater Treatment Plant intake criteria. As for Laojie River, the river has a total length of 36.7 kilometers and a drainage area of approximately 81.59 square kilometers. It flows through Taoyuan City several districts, including Longtan District, Pingzhen District, Zhongli District and Dayuan District.

The following Figure 4.1~4.5 shows the water bodies within catchment respect to TSMC AP3 PLANT, including the source of water supply Shimen Reservoir, the tap water source Longtan Water Purification Plant, TSMC AP3 PLANT WWTP, the Longtan Science Park Wastewater Treatment Plant, the wastewater discharged point Tai Hang Que Creek and ultimate receiving water body Laojie River.

Figure 4.1 water bodies within catchment -- Shimen Reservoir

Figure 4.2 water bodies within catchment -- Laojie River Watershed

Figure 4.3 Shimen Reservoir, Laojie River Watershed and Longtan Water Purification Plant

Figure 4.4 The effluent water discharge route from TSMC AP3 PLANT to Longtan Science Park Wastewater Treatment Plant and then to Tai Hang Que Creek.

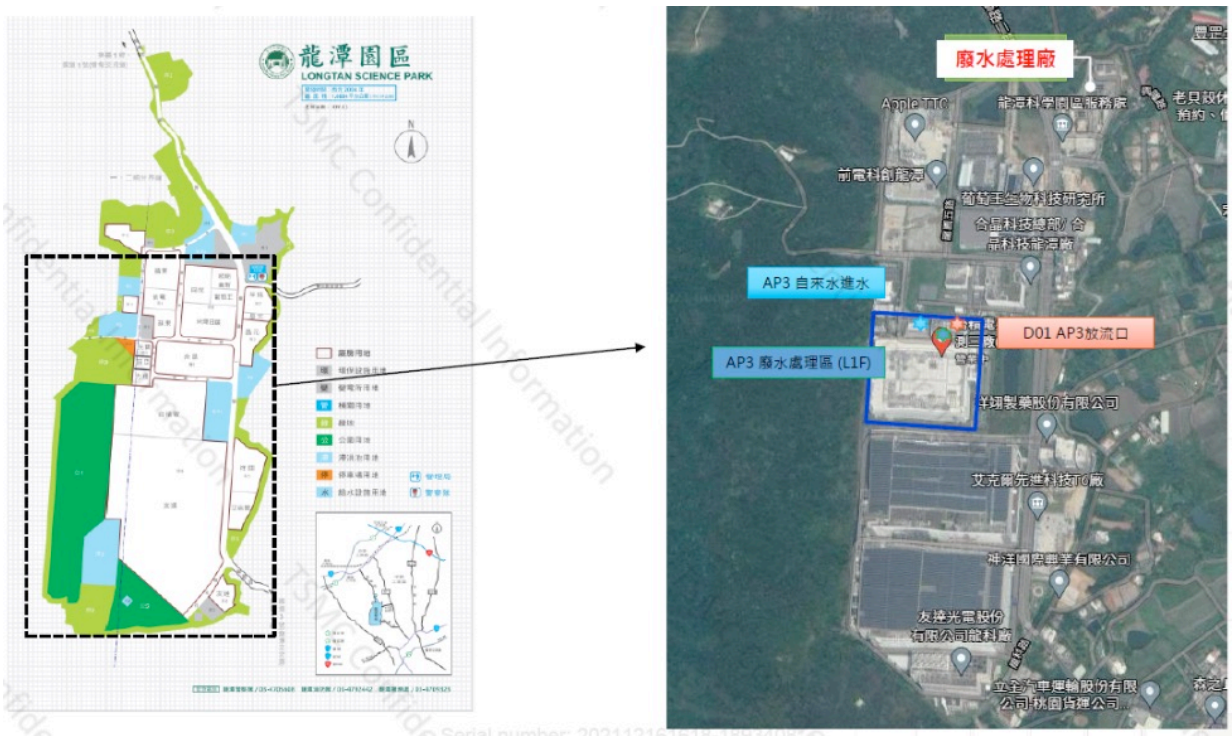


Figure 4.5 The respect locations of TSMC AP3 PLANT water supply inlet point, WWTP(L1F), wastewater discharge point (D01) and Longtan Science Park Wastewater Treatment Plant.

Within TSMC AP3 PLANT, Figure 4.6 & 4.7 show the conformity assessment boundary. The Figure 4.6 show tap water inlet points, wastewater discharge points, rainfall discharge points, waste storage area and diesel storage tank. There are three area defined as IWRAs, include WWTP (L1F) and two chemical area. TSMC AP3 PLANT also set “Chemical Key Area”. The area is surrounded by rainwater interception ditch, if there is chemical leakage, it can be led to sump to prevent chemical pollution. Figure 4.6 also show the rainfall ditch with the flow direction.

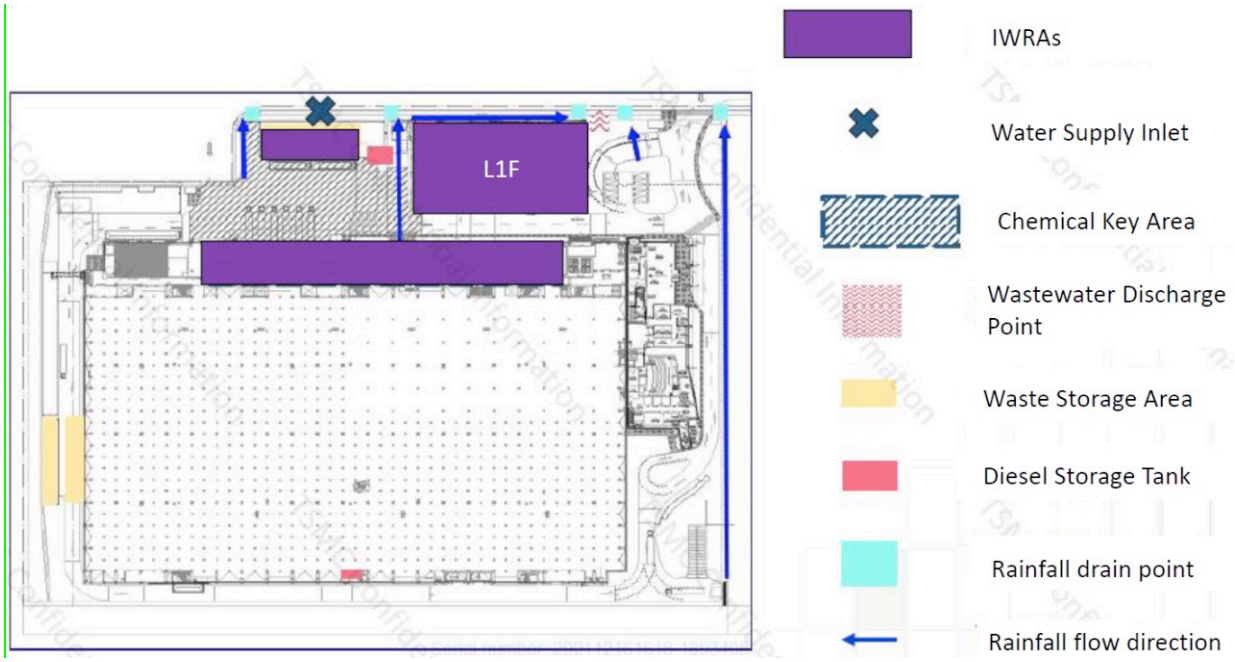


Figure 4.6 The conformity assessment boundary

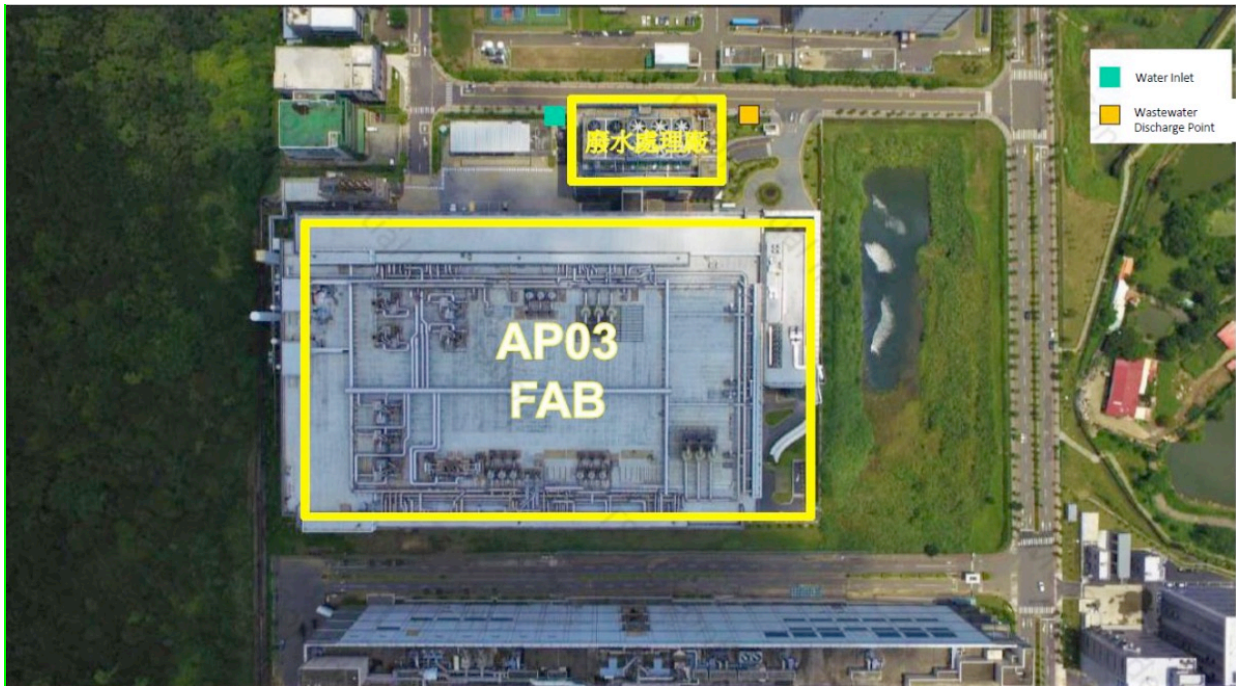


Figure 4.7 The conformity assessment boundary

5 SUMMARY OF SHARED WATER CHALLENGES

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.

TSMC identify 20 water related risks within their sites. Within conformity assessment sites, there are two risks identified as internal shared water challenges which is high-risk (≥6).

The internal shared water challenges are:

Business Risk Assessment	likelihood of event	Severity of Impact	Risk
Drought caused insufficient water supply	3	4	12
Effluent water increases river polluted index (RPI) cause river water quality risk	3	2	6

6 INDICATORS CHECKLIST

6.1 CORE AWS INDICATORS

As per the requirement set out in the Section 2.11.3.1 of the AWS Certification Requirements, the following table 6.1 presents all the CORE AWS indicators with the relevant reviewed evidence provided by TSMC AP3 PLANT.

Table 6.1 Gaps and Potential Areas for Improvement Against the CORE AWS Indicators

Indicator	Details (Core)	Evidence Reviewed/Document Reference
1	**Gather and Understand (core)**	
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.	Maps showing the physical scope of the site are available, including: TSMC AP3 PLANT, located at No.101, Longyuan 6th Rd., Longtan Dist., Taoyuan City 32542, Taiwan, R.O.C. The main water source of TSMC AP3 PLANT is tap water. The tap water source is treated and supplied by the Longtan Water Purification Plant managed by the Second District Management Office of Taiwan Water Corporation. The front-end water source of Longtan Water Purification Plant comes from Shimen Reservoir. The Shimen Reservoir, the source of water supply, is one of the main reservoirs in northern Taiwan. The daily average water supply volume regulated and stored by the reservoir is about 2.5 million cubic meters. It is mainly supplied the water to New Taipei City, Taoyuan City and Hsinchu County Hukou Township for public use. The wastewater discharged from TSMC AP3 PLANT is treated by Longtan Science Park Wastewater Treatment Plant and confirmed to meet the effluent water standards before being discharged into Tai Hang Que Creek and finally into final receiving water body Laojie River. Before discharge to Longtan Science Park wastewater treatment plant, TSMC AP3 PLANT need conduct wastewater pre-treatment process to meet Longtan Wastewater Treatment Plant intake criteria. As for Laojie River, the river has a total length of 36.7 kilometers and a drainage area of approximately 81.59 square kilometers. It flows through Taoyuan City several districts, including Longtan District, Pingzhen District, Zhongli District and Dayuan District.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		Figure 4.1~4.5 shows the water bodies within catchment respect to TSMC AP3 PLANT, including the source of water supply Shimen Reservoir, the tap water source Longtan Water Purification Plant, TSMC AP3 PLANT WWTP, the Longtan Science Park Wastewater Treatment Plant, the wastewater discharged point Tai Hang Que Creek and ultimate receiving water body Laojie River. Figure 4.6 show the conformity assessment boundary. The Figure 4.6 show tap water inlet points, wastewater discharge points, rainfall discharge points, waste storage area and diesel storage tank. There are three area defined as IWRAs, include WWTP (L1F) and two chemical area. TSMC AP3 PLANT also set “Chemical Key Area”. The area is surrounded by rainwater interception ditch, if there is chemical leakage, it can be led to sump to prevent chemical pollution. Figure 4.6 also show the rainfall ditch with the flow direction.
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.	TSMC define the following six stakeholders as the major stakeholders for engagement: employees, shareholders/investors, customers, suppliers/vendors, and government & society (community, academic institutions, media, NGO/ NPO). No indigenous people live in Laojie River Watershed. By evaluating global sustainability trends and engaging with internal/external stakeholders, TSMC identified 21 ESG issues relevant to TSMC in 2020 and shown in TSMC 2020 CSR Report. In 2020, materiality analysis was conducted through surveys due to the COVID-19 pandemic. TSMC received 842 replies in 2020 and used the surveys to analyze their level of interest in ESG issues relevant to TSMC. The ESG Steering Committee analyse the impacts of each issue on operations (profitability, revenue, customer satisfaction, employee cohesion, risk) and review the sustainability roadmap for long-term development with a total of 150 colleagues that included TSMC's senior vice presidents, vice presidents, senior fab directors, and fab directors. According to the results from previous process, TSMC have mapped out the TSMC materiality matrix. The ESG Committee has identifying 14 material issues, including climate change and water management. In July 2021, TSMC conducted AWS stakeholder questionnaire survey and result are following. Level of stakeholders interested: the highest is “Safe drinking water and sanitary environment”. The lowest is “Healthy water environment”. The level of TSMC actions: the highest is “Water pollution prevention”. The lowest is “Healthy water environment”. Another survey also conducted during stakeholder consultation meeting on 27th October 2021. Level of stakeholders interested: the highest is “Safe drinking water and sanitary environment”. The lowest is “Water saving of sustainable water balance”. The level of TSMC actions: the highest is “Safe drinking water and sanitary environment”. The lowest is “Water Challenges in the catchment”. Thus “Safe drinking water and sanitary environment” is the most interested topics by stakeholder.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
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.	The approved amount of tap water in Longtan Science Park is 46,500 CMD (currently usage is 20,000 CMD). TSMC AP3 Plant use 8,500 CMD. The treatment capacity of Longtan Science Park WWTP is 25,305 CMD. TSMC AP3 Plant WWTP treatment capacity is 4,867 CMD. During the droughts period, TSMC will use water tank truck to replenish water.
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.	TSMC already set the water related emergency response process documents. There are 5 documents related to water pollution and one document related to water shortage response, including: TSMC EMERGENCY RESPONSE PROCEDURE, TSMC EMERGENCY RESPONSE C.I. TSMC's raw water supply shortage crisis management internal control operation process etc. Those procedure cover the environmental protection incident notification time limit and process, the effluent water quality OCAP handling process, countermeasures against water shortage.
1.3.2	Site water balance, including inflows, losses, storage, and outflows shall be identified and mapped.	A volumetric balance of water input and output is identified and mapped by TSMC AP3 Plant. City Water Tank = 32,800 m3, Recycling Water=2,002 m3, AWD System= 4,313 m3
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.	A volumetric balance of water input and output is identified and mapped by TSMC AP3 Plant. City Water Tank = 32,800 m3, Recycling Water=2,002 m3, AWD System= 4,313 m3 The water volume of the storage tank in the plant site is usually "full level balance" to deal with the abnormal strain of the upstream water source. When the upstream water source is abnormal, the plant pool can provide water for about 3 days in the plant.
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,	The main water source of TSMC AP3 Plant is tap water. The tap water source is treated and supplied by the Longtan Water Purification Plant. The water quality need meet the water quality standard before providing to use. TSMC AP3 Plant wastewater need conduct the pre-treatment before discharge to Longtan Science Park WWTP and need meet the acceptance criteria set by WWTP.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
	and where appropriate, seasonal, high and low variances shall be quantified.	The criteria are 5<pH<9, Fluoride Salt <15ppm, S.S.<300 ppm, NH3<30 ppm, TMAH<30 ppm, COD<500PPM, Cu<1 ppm. The effluent water of Longtan Science Park WWTP need meet the effluent water criteria before discharged into Tai Hang Que Creek and finally into final receiving water body Laojie River. The effluent water criteria include SS, COD, pH, water temperature, NH3, and BOD.
1.3.5	Potential sources of pollution shall be identified and if applicable, mapped, including chemicals used or stored on site.	Figure 4.6 show the location of waste storage area and diesel storage tank. There are three area defined as IWRAs, include WWTP (L1F) and two chemical storage area. TSMC AP3 PLANT also set “Chemical Key Area”. The area is surrounded by rainwater interception ditch, if there is chemical leakage, it can be led to sump to prevent chemical pollution. Figure 4.6 also show the rainfall ditch with the flow direction.
1.3.6	On-site Important Water-Related Areas shall be identified and mapped, including a description of their status including Indigenous cultural values.	On-site Important Water-Related Areas are WWTP (L1F) and two chemical storage area. TSMC AP3 Plant has mapped the On-site Important Water-Related Areas. The location of Longtan Science Park was originally a hillside land before the establishment of Longtan Science Park. When setting up a factory in the park, it can only be established after the environmental assessment and review by the Hsinchu Science Park Bureau, Ministry of Science and Technology. Due to the fact, the government has set up appropriate management process. Thus, there is no IWRA damaged area exist in the site. From the front-end water source Dahan River, Shimen Reservoir, Longtan Water Purification Plant, Longtan Science Park, discharged point Tai Hang Que Creek and ultimate receiving water body Laojie River are all belong to streams/ mountain /farmland, respectively. There are no IWRA damaged area within catchment. AP3 Plant’s Important Water-Related Areas need be identified in the Site map properly. Therefore, an **Observation 01** is raised for this indicator.
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.	TSMC is continuous investment in various water-saving projects, a total of 163,000 tons of tap water will be saved in 2020 compared with the previous year (calculated based on the amount of water saved by TSMC AP3 Plant). Those saved water can supply 2.245 million people living in Taoyuan City with tap water consumption for 2.25 days. Total save is 19.84 million in water bills every year.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		TSMC AP3 Plant set up an ammonia nitrogen wastewater treatment system. The average effluent water concentration improves 0.04 ppm compared with based year 2016 ammonia nitrogen effluent concentration, from 0.6 ppm to 0.56 ppm. The acceptance criteria for Longtan Science Park WWTP are 30 ppm. TSMC AP3 Plant set up an TMAH wastewater treatment system. The average effluent water concentration improves 0.17 ppm compared with based year 2016 TMAH effluent concentration, from 0.27 ppm to 0.10 ppm. The acceptance criteria for Longtan Science Park WWTP are 30 ppm. The saved water need convert to how many people living in Taoyuan City, not Hsinchu city. Therefore, an **Observation 02** is raised for this indicator.
1.3.8	Levels of access and adequacy of WASH at the site shall be identified.	TSMC AP3 Plant tap water source is treated and supplied by the Longtan Water Purification Plant. Taiwan Water Corporation regularly inspects the water quality every season to confirm the water quality that supply to community. TSMC AP3 Plant provide employees with sufficient and safe drinking water, clean toilets (compliance with WBCSD standards and occupational safety and health facilities rules), warm water for washing in winter. To prevent COVID-19, the plant provides handwashing facilities that protect employees' health and avoid contact. Set up special toilets for handicap people which is better than the regulation requirements. The total number of drinking fountains in TSMC AP3 Plant is 36. According to customer requirements, there must be one drinking fountains for every 61M distance from the floor of the office building, and one for every 2900 m^2. TSMC AP3 Plant area is 44,670 m^2 . The minimum drinking fountains number are 15.4. The drinking fountains in the factory are maintained and replaced monthly, The E. coli is inspected every two months. Each inspection is 1/6 of the total number, which is better than Taiwan's regulation requirements. There are "men's and women's toilets" on each floor of the factory. The whole plant has a total of 53 urinals, 21 squatting toilets, and 71 sitting toilets. The number of induction type hand washing faucet are 58. Comparing the building legal requirements, the number is compliance and better than regulation requirements. The toilet number need be verified whether better than regulation after verified the employee number. Therefore, an **Observation 03** is raised for this indicator.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
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.	TSMC identify the water risk level through the 2021 aqueduct water risk atlas. Taiwan's overall water risk level falls into 1-2 grade that is Low to Medium. TSMC AP3 Plant's main raw material include packing material and bulk gas. All the raw material suppliers are outside catchment. The overall water risk level is low to medium (1~2).
1.4.2	The embedded water use of outsourced services shall be identified, and where those services originate within the site's catchment, quantified.	The site's outsourcing services include clothes clean, tray clean and parts clean and transportation vehicle. All the outsourcing services are outside catchment. Although all the outsourcing services are outside catchment, the water consumption is calculated for each service. Clothes clean consume 182 ton/ month, Tray clean consume 247 ton/ month, Parts clean consume 6424 ton/ month.
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.	The government agency—Water Resources Agency, MOEA set the "Industrial Stable Water Supply Strategy Action Plan". Water Resources Agency monitor the water supply for Science Park, Industry Zone, Technical Industry Park and identify the water supply with different color. Hsinchu Science Park Bureau manage the water supply. The approved amount of tap water in Longtan Science Park is 46,500 CMD (currently usage is 20,000 CMD). All water supply from Shimen Reservoir. In response to the stability of water supply, the Hsinchu Science Park Bureau handles the manufacturer's water-saving consulting program, and TSMC's site implement water-saving projects. TSMC AP3 Plant was awarded the outstanding water-saving plant by the Hsinchu Science Park Bureau in 2018. Taoyuan City Government set up Laojie River Water Environment Improvement Plan. The plan includes Longtan Dist. Sewage sewer system construction plan.
1.5.2	Applicable water-related legal and regulatory requirements shall be identified, including legally-	TSMC organize AWS meeting to review and update regulatory changes or new add requirements.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
	defined and/or stakeholder-verified customary water rights.	Since all TSMC sites located in the Science Park, no groundwater is used in all plant areas in accordance with "Article 11 of the Measures for the Management of Sewage Treatment and Sewage Sewerage in the Science Park" TSMC AP3 Plant already received the approval form Hsinchu Science Park Bureau for “Water Use Plan”. The plan applies water usage to 8,500 CMD.
1.5.3	The catchment water-balance, and where applicable, scarcity, shall be quantified, including indication of annual, and where appropriate, seasonal, variance.	In the northern part of Taiwan, the water level of the reservoir is low due to the low rainfall from March to May every year. Therefore, the water supply risk is higher from March to May. TSMC AP3 Plant already draw the annual and monthly rainfall trends in the catchment of the site. The Taoyuan Area tap water supply and demand diagram showed Taoyuan supply 1,200,000 CMD and estimated the demand will increase to 1,260,000 CMD in 2021. Water balance map of the northern region shows only 42.1% of rainfall is available for use. It indicated abundant water resources, but insufficient infrastructure utilization.
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.	The tap water source is Longtan Water Purification Plant, and the front-end water source is Shimen Reservoir. Water quality of water source: Shimen Reservoir is in between eutrophic or mesotrophic in most of time of 2020. (40< CTSI< 50) CTSI (Carlson Trophic State Index) is higher than 50 defined as eutrophic; 40< CTSI< 50 defined as mesotrophic. Water quality of tap water: Longtan Water Purification Plant meet the water quality criteria in 2020. The effluent water quality of Longtan Science Park WWTP: The Longtan Science Park WWTP wastewater discharged point Tai Hang Que Creek and ultimate receiving water body Laojie River meet the regulation requirements in 2020. Laojie River is a Class C water body according to the classification of surface water bodies and water quality criteria. The Laojie River Pollution Index (RPI) ranges from 1 to 6 (average 4.1), belonging to Moderate pollution indicates that the water quality of Laojie River is not seriously polluted.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
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.	The upstream is a reservoir water source protection area, which cannot be developed without special hazards, and the water source is a protected area, and there is no special hazard risk There is an important water related area in the catchment: Shimen Reservoir Shimen Reservoir is under eutrophic (CTSI> 50) Dahan River is not (slightly) polluted (river pollution index, ≦ 2). TSMC AP3 Plant effluent wastewater quality can meet Longtan Science Park WWTP acceptance criteria. Longtan Science Park: the water supply volume and water quality are normal. The wastewater meets the effluent criteria. Laojie River is a Class C water body.
1.5.6	Existing and planned water-related infrastructure shall be identified, including condition and potential exposure to extreme events.	Taoyuan Water Resources Bureau Water Resources Recovery Center can increase the total available water supply Taoyuan City Water Conservancy Bureau “Water Information Watch Taoyuan App” will affect the safety of downstream neighborhoods.
1.5.7	The adequacy of available WASH services within the catchment shall be identified.	According to publicly available tap water penetration rate data from the Water Resources Department of the Ministry of Economic Affairs, TSMC AP3 Plant area Taoyuan City’ water penetration rate was 96.22% in 2020, indicating that almost all people in this area have clean and stable tap water. The total sewage treatment rate in Taoyuan City is 66.20% in 2020, of which the penetration rate of public sewage sewers is 16.86%, the penetration rate of dedicated sewage sewers is 24.17%, and the installation rate of sewage facilities in buildings is 25.17%. Taoyuan City related infrastructure include the expansion of sewage sewer construction.
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.	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

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		■ 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. TSMC identify 20 water related risks within their sites. Within conformity assessment sites, there are two risks identified as internal shared water challenges which is high-risk (≥6). The internal shared water challenges are: ■ Drought caused insufficient water supply ■ Effluent water increases river polluted index (RPI) cause river water quality risk.
1.6.2	Initiatives to address shared water challenges shall be identified.	The initiative for water challenges is below: ■ Water use inventory: ▪ If the process recovery rate and the plant-wide recovery rate do not meet the requirements, it is necessary to review whether there is room for water saving ■ Water shortage problem-define water saving opportunities ▪ Measures can be taken according to the cost & water saving assessment ▪ Pure water: backwash wastewater recycling and reuse ▪ Wastewater: process drainage recovery system ▪ Cooling water: ▫ Use clean alternative water source ▫ Increase the number of cooling water cycles ▫ Discharged water recycling and reuse ■ Water scarcity-assess water saving opportunities ▪ Assess the possibility of wastewater recycling in the plant ▪ Evaluate whether to extend the D.I. water activated carbon & resin water collection time based on the operation water quality. ▪ Build a system to refine and recover water to pure water for use

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		■ Effluent water quality improvement The effluent water concentration lower than Hsinchu Science Park Bureau criteria: NH3 <30 ppm, TMAH<30 ppm, COD<500PPM, Cu<1 ppm. Government Agency Improvement Actions: ■ Throttling-Water Leakage Reduction Plan ■ Open source-development of renewable water resources ■ Dispatch/Redundancy-Taoyuan to Hsinchu Redundant Pipeline Project Taoyuan City related infrastructure include the expansion of sewage sewer construction.
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.	TSMC identify 20 water related risks within their sites. Within conformity assessment sites, there are two risks identified as internal shared water challenges which is high-risk (≥6). The internal shared water challenges are: ■ Drought caused insufficient water supply ■ Effluent water increases river polluted index (RPI) cause river water quality risk
1.7.2	Water-related opportunities shall be identified, including how the site may participate, assessment and prioritization of potential savings, and business opportunities.	TSMC AP3 Plant to respond identify two risks implement "risk management of water efficiency in each unit of the plant" and "development of pollution prevention and control technology for release" were carried out". The discharged sewage has already met the effluent criteria for management, so water saving is the top priority. Evaluate the possibility of water saving according to the utilization rate and characteristics of each site's machine specification. TSMC AP3 Plant implemented 10 water saving projects in manufacture process in 2020 and water saving volume was 83,008 Ton.
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.	The best practice for water governance identifies by TSMC AP3 Plant include (1) Water Risk Management (2) Expand diversified water resources (3) Water pollution concentration reduction.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		TSMC AP3 Plant benchmark AUO and Unimicron which located in the same catchment AUO and Unimicron have the best practice in “Water Risk Management” per TSMC’s benchmark. Furthermore, AUO has the best practice in “Water pollution concentration reduction” per TSMC’s benchmark. In “Water Risk Management”, TSMC AP3 Plant implement (1) Water consumption reduction in facility department (2) Increase the recycling of plant wastewater (3). Improve water production rate (4) Reduce drainage loss In “Water pollution concentration reduction”, TSMC AP3 improve the COD concentration from process up to reduction rate higher than 90%.
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.	TSMC benchmark related industries, include UMC, AUO, GLOBALFOUNDRIES, Intel ‘s water-saving practices. It is confirmed that the "Taiwan Semiconductor Standard" is better than the global standard after compare the wafer unit consumption standards recognized by the semiconductor associations in global level. TSMC also hold corporate/academic/official seminar actively to exchange and share various aspects of implementation practices, including 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.	TSMC benchmark water quality criteria with related industries UMC, Vanguard, AUO, Wafer Works Corp. TSMC meet Science Park WWTP wastewater acceptance criteria to discharge to WWTP. TSMC develop water pollution prevention technical include: ■ Strengthen the source management to diverse effectively ■ Wastewater discharge monitoring ■ Wastewater quality improvement
1.8.4	Relevant catchment best practice for site maintenance of Important Water-Related Areas shall be identified.	There are several projects for site maintenance related to IWRA, include: Longtan Science Park set up detention pond to establish a buffer zone with the farmland. TSMC AP3 Site set up groundwater monitoring wells to collect groundwater quality and also monitor buffer zone’s groundwater quality.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		Shimen Reservoir and Dahan River is a reservoir water source protection area, which cannot be developed and is a protected area, no special hazard. TSMC AP3 Plant effluent water meets Longtan Science Park WWTP acceptance criteria and Longtan Science Park WWTP meet effluent water criteria, thus no harm to catchment. TSMC AP3 Plant also set chemical storage management procedure as below: ■ A. Special chemical storage tanks are regularly maintained in accordance with regulations ■ B. Chemical dike sets the Leak sensor and according to the type performs regular maintenance ■ C. Emergency sump pit is installed in Chemical dike and regular maintenance ■ D. Sump pit in the tank truck drive road is regularly maintained ■ E. Daily on-site inspection TSMC AP3 Plant established ecological characteristics and identify 10 kinds inset surviving around the plant. Thus, this is called as “AP03 Ten Ecological Views”. The government agency also manages water-saving promotion activities
1.8.5	Relevant sector and/or catchment best practice for site provision of equitable and adequate WASH services shall be identified.	TSMC AP3 Plant apply the World Business Sustainability Committee (WBCSD) WASH self-evaluation tool through question and answer in 6 categories to evaluate the providing WASH level. The self-evaluation results satisfy all requirements. It is show that the plant has provided the best WASH level.
2	**Commit and Plan (core)**	
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	TSMC Environmental Protection Policy is signed by the Chairman Dr. Mark Liu. In addition, TSMC also released AWS Report in the TSMC ESG website and signed by Corp. EHS Director Han-Wen Fung. https://esg.tsmc.com/download/file/esg_aws_c.pdf

Indicator	Details (Core)	Evidence Reviewed/Document Reference
	- 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.	
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.	TSMC AP3 Plant announced AWS water management organization chart. The chart confirms the responsible person/position in the relevant facility organization, and related job responsibility.
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.	"Sustainable Water Resources Management Goal" has been set by TSMC, include: ■ Good management system ■ Governance and water management support ■ Excellent water quality ■ Healthy water environment ■ Safe drinking water and sanitary environment ■ Sustainable water balance Each Goal also set respect Water Management Target and total 18 action plans.
2.3.2	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	The sustainable water management related plans are disclosed on the TSMC ESG website. The goal: Maintain good water efficiency. Except for RD Fab, the water consumption per unit product is lower than the world WSC standard (9.97 L/cm2) AP3 implements 3 projects: BG UF system installation, ADWR system installation, MAUR system installation. Total save water 163,082 ton. All sites in Taiwan on average are below the world WSC standard. Maintain good water efficiency: the process recovery rate maintains above 85%

Indicator	Details (Core)	Evidence Reviewed/Document Reference
	- 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.	
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.	TSMC closely watch Taiwan Water Corp. water quality test results and real-time monitoring of tap water quality that from water purification plant. TSMC also work together with Longtan Science Park Wastewater Treatment Plant to sample the wastewater quality. Submit the water balance map to Hsinchu Science Park Bureau in monthly base. Cooperate with Taoyuan Department of Water Resources to set up sewage pipelines that within site boundary.
3	**Implement (core)**	
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.	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 Hsinchu Science Park Bureau), drought and water saving discussion meetings, legal explanation meetings, billing test results explanation, and plant counselling visits and water-saving performance review. TSMC AP3 Plant awarded the water-saving performance company from Hsinchu Science Park Bureau in 2018.
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.	The penetration rate of tap water in Taoyuan is 96.2%. Public facilities in the park (i.e., parks/public toilets) are properly and regularly maintained by Hsinchu Science Park Bureau, ensuring safe water, respecting environmental sanitation and human rights -During drought and low water period, the competent authority sets 5% water saving target AP3 Plant respond the water saving rate to Hsinchu Science Park Bureau every week. Environmental Impact Statement Approved Water and Wastewater volume Attend the Central Drought Response Center meeting that held by the Water Resources Agency, MOEA for the water resources allocation.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
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.	Unannounced audits and routine audits by external auditing units (Hsinchu Science Park Bureau, Environmental Protection Bureau) AP3: External audit qualification rate: 100% Supplier audit: C-ESH implements industrial safety/environmental protection audit and included in the supplier scoring card. Site audit: ISEP performs environmental-related audits every quarter and issue the audit results. The improvement actions were requested. Audit results are shared in TB meetings in quarterly base. Each plant has environmental protection department full-time staff to perform audits AP3 Plant: 2018~2021 no penalty. The water usage and wastewater discharge volume are followed Longtan Science Park Base Environmental Impact Assessment Report approved volume.
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.	TSMC AP3 daily average water consumption and wastewater discharge volume is less than the approved volume. The water rights of other people, including residents and aborigines are strictly followed. The water usage and wastewater discharge volume are followed Longtan Science Park Base Environmental Impact Assessment Report approved volume.
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.	The 2020 CSR Report indicted 2020/ 2021/ 2030 targets. The 2030 targets include a 30% reduction in water consumption per unit product and reclaimed water replacement rate of more than 30%. The comprehensive indicator of water pollution is better than the discharge water criteria by 50%. It also proposes 2020 water-saving project results is water consumption per unit product is lower than the world WSC standard (9.97 L/cm2). TSMC continues to manage water resources, to increase revenue and reduce expenditure in parallel to ensure sustainable production.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		TSMC AP3 Plant meets the standard process recovery rate >85%. For this purpose, relevant water-saving measures are implemented, such as BG UF system, ADWR system, MAUR system, SWR system, TMAH recovery system, CCRR recovery system, AWR&CWR recovery system, HFDR system, LSR system etc. The annual target process recovery rate of the AP3 plant is >85%, and the AP3 plant will reach the target from 2017 to 2021.
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.	TSMC AP3 Plant implemented multiple projects to maintain a water recovery rate of 85% and up to 88% in 2020 For example: Extend the backwash time of the pure water/recovery system: 10.2 ton, BWR recovery to ICW: 248 ton; Increase the RO water production rate of the recovery system: 60 ton
3.3.3	Legally-binding documentation, if applicable, for the re-allocation of water to social, cultural or environmental needs shall be identified.	The AP3 factory negotiates with the Hsinchu Science Park Bureau for water consumption according to the usage, and it is fulfilling the needs of the site and meet the EIA Report requirements. Currently, the total consumption of Longtan Science Park is still within the approved water volume.
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.	TSMC improve water pollution prevention and treatment efficiency and strengthen the removal of pollutants in wastewater. TSMC AP3 set ammonia nitrogen, Cu+, TMAH, COD, TUa as KPI and implement 8 projects to meet the short-, medium- and long-term target. The progress disclosed in CSR Report.
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.	TSMC AP3 Plant face the water quality management challenge include increasingly strict laws and regulations (tightened & new control criteria). In order to reflect this challenge, TSMC participated in the discussion at the Hsinchu Science Park Bureau meeting and attended the evaluation held by authority,
3.5	**Implement plan to maintain or improve the site's and/or catchment's Important Water-Related Areas.**	

Indicator	Details (Core)	Evidence Reviewed/Document Reference
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.	TSMC AP3 Plant's architectural design covers the artistic conception of mountains, flowing water and mountains and establish greenbelt to protecting and regenerating the diversity of native species and biological growth. The action includes green network, protected species and ecological education. TSMC AP3 Plant established ecological characteristics and identify 10 kinds inset surviving around the plant. Thus, this is called as "AP03 Ten Ecological Views". TSMC AP3 Plant also set chemical storage management procedure as below: ■ A. Special chemical storage tanks are regularly maintained in accordance with regulations ■ B. Chemical dike sets the Leak sensor and according to the type performs regular maintenance ■ C. Emergency sump pit is installed in Chemical dike and regular maintenance ■ D. Sump pit in the tank truck drive road is regularly maintained ■ E. Daily on-site inspection TSMC AP3 Plant set up groundwater monitoring wells to collect and monitor the groundwater quality.
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.	TSMC AP3 Plant tap water source is treated and supplied by the Longtan Water Purification Plant. Taiwan Water Corporation regularly inspects the water quality every season to confirm the water quality that supply to community. TSMC AP3 Plant provide employees with sufficient and safe drinking water, clean toilets (compliance with WBCSD standards and occupational safety and health facilities rules), warm water for washing in winter. To prevent COVID-19, the plant provides handwashing facilities that protect employees' health and avoid contact. Set up special toilets for handicap people which is better than the regulation requirements. The total number of drinking fountains in TSMC AP3 Plant is 36. According to customer requirements, there must be one drinking fountains for every 61M distance from the floor of the office building, and one for every 2900 m^2. TSMC AP3 Plant area is 44,670 m^2 . The minimum drinking fountains number are 15.4.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		The drinking fountains in the factory are maintained and replaced monthly, The E. coli is inspected every two months. Each inspection is 1/6 of the total number, which is better than Taiwan's regulation requirements. There are "men's and women's toilets" on each floor of the factory. The whole plant has a total of 53 urinals, 21 squatting toilets, and 71 sitting toilets. The number of induction type hand washing faucet are 58. Comparing the building legal requirements, the number is compliance and better than regulation requirements.
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.	According to publicly available tap water penetration rate data from the Water Resources Department of the Ministry of Economic Affairs, TSMC AP3 Plant area Taoyuan City' water penetration rate was 96.22% in 2020, indicating that almost all people in this area have clean and stable tap water. The Water Resources Agency regularly implements water supply improvement projects for the indigenous areas to help the indigenous tribes to use water without worry, and the results is good over the years. The water used in the plant area does not affect the aboriginal people's right to use water, and the follow Hsinchu Science Park Bureau's approved water volume.
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.	TSMC set supplier's water saving target is 4.5 million tons in 2021 and 35 million tons in 2030, which is disclosed in the company's CSR report. TSMC track the supplier's water-saving effectiveness and target achievement status every year. Suppliers saved 2.13 million tons of water in 2020. TSMC AP3 Plant calculate the actual situation of indirect water use through water footprint certification.
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.	Interaction with suppliers in the catchment to conduct ESH audit by TSMC Plant ISEP (Industry Safety and Environmental Protection) in the catchment watershed audit items included HCL, H2O2, Poly 700, KOH(5%), KOH (45%).
3.8	**Implement plan to engage with and notify the owners of any shared water-related infrastructure of any concerns the site may have.**	

Indicator	Details (Core)	Evidence Reviewed/Document Reference
3.8.1	Evidence of engagement, and the key messages relayed with confirmation of receipt, shall be identified.	Documents between TSMC Plant ISEP and the water authority have official records of receiving and dispatches for tracking TSMC AP3 Plant ISEP proposes a water pollution prevention and control measure plan and submit to competent authority which includes a water use plan related to tap water. TSMC held a sustainable supply chain experience sharing, including water saving target setting. A total of 148 people from 101 suppliers participated. Email between ESH and suppliers kept as record. ISEP audits waste manufacturers to confirm the compliance of air pollution/water pollution/toxic chemical /ISO/work safety. TSMC AP3 Plant also keep the client request for AWS Assessment communication e-mail.
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.	According to the "Waste (sewage) water treatment unit or personnel setting and management method", the level A wastewater professional is set 3 personnel and deputy person. TSMC AP3 Plant required to set 3 person and actually set 3 people. Fulfil regulation requirement. The personnel registered in TSMC TSM Platform and check periodically. TSMC set up a monitoring platform to track daily: ■ Water balance platform/ ■ Hydrological platform/ ■ Release water value management and control platform TSMC set up the FAM platform to control equipment and instrument maintenance schedule. Maintain good water efficiency:■ Water consumption per unit product is decreasing year by year/ ■ Process recovery rate maintained above 85%.
3.9.2	Actions towards achieving best practice, related to targets in terms of water balance shall be implemented.	Strength water resources saving without wasting a drop of water to ensure sustainable production • Increase water saving reached 1.927 million metric tons in 2020. Maintain good water efficiency ● Except for RD Fab, the water consumption per unit product is lower than the world WSC standard (9.97 L/cm2) ● All districts in Taiwan are below the world WSC standard on average ● AP3 reached 1.96 L/cm2 in 2020

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		• The amount of recovered wastewater from the facility department increased by 297,000 tons compared with last year. TSMC AP3 Plant meets the standard process recovery rate >85%. Set up new backup wells during insufficiency water support period. The dry and dry backup water in Taoyuan area is 30,000 tons per day.
3.9.3	Actions towards achieving best practice, related to targets in terms of water quality shall be implemented.	TSMC improve water pollution prevention and treatment efficiency and strengthen the removal of pollutants in wastewater. TSMC AP3 set ammonia nitrogen, Cu+, TMAH, COD, TUa as KPI and implement 8 projects to meet the short-, medium- and long-term target.
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.	Longtan Science Park set up detention pond to establish a buffer zone with the farmland. TSMC AP3 Site set up groundwater monitoring wells to collect groundwater quality and also monitor buffer zone's groundwater quality. TSMC AP3 Plant also set chemical storage management procedure as below: ■ A. Special chemical storage tanks are regularly maintained in accordance with regulations ■ B. Chemical dike sets the Leak sensor and according to the type performs regular maintenance ■ C. Emergency sump pit is installed in Chemical dike and regular maintenance ■ D. Sump pit in the tank truck drive road is regularly maintained ■ E. Daily on-site inspection TSMC AP3 Plant established ecological characteristics and identify 10 kinds inset surviving around the plant. Thus, this is called as "AP03 Ten Ecological Views". The government agency monitors Laojie river water quality periodically. The government agency also manages water-saving promotion activities.
3.9.5	Actions towards achieving best practice related to targets in terms of WASH shall be implemented.	TSMC AP3 Plant tap water source is treated and supplied by the Longtan Water Purification Plant. Taiwan Water Corporation regularly inspects the water quality every season to confirm the water quality that supply to community. TSMC AP3 Plant provide employees with sufficient and safe drinking water, clean toilets (compliance with WBCSD standards and occupational safety and health facilities rules), warm

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		water for washing in winter. To prevent COVID-19, the plant provides handwashing facilities that protect employees' health and avoid contact. Set up special toilets for handicap people which is better than the regulation requirements. The total number of drinking fountains in TSMC AP3 Plant is 36. According to customer requirements, there must be one drinking fountains for every 61M distance from the floor of the office building, and one for every 2900 m^2. TSMC AP3 Plant area is 44,670 m^2 . The minimum drinking fountains number are 15.4. The drinking fountains in the factory are maintained and replaced monthly, The E. coli is inspected every two months. Each inspection is 1/6 of the total number, which is better than Taiwan's regulation requirements. There are "men's and women's toilets" on each floor of the factory. The whole plant has a total of 53 urinals, 21 squatting toilets, and 71 sitting toilets. The number of induction type hand washing faucet are 58. Comparing the building legal requirements, the number is compliance and better than regulation requirements.
4	**Evaluate (core)**	
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.	The recycling rate of AP3 need >85%. AP3 reach 85% since 2017. Water quality need meet acceptance criteria set by Longtan Science Park WWTP. The 2021 target vs. 2020 result: ● NH3<3ppm vs. 0.48 ppm, compare with 2016 baseline, decrease 22.5% ● Cu<0.3 ppm vs. 0.23 ppm, compare with 2016 baseline, decrease 11.5% ● TMAH<1 ppm vs. 1 ppm, compare with 2016 baseline, decrease 72.2% ● COD meet company 2025 target ● TUa <1 TSMC AP3 implements 3 projects: BG UF system installation, ADWR system installation, MAU-R system installation. ● Total save water 163,082 ton. ● Compared with 2019, 2020 reduction results are -16%; and ● Finance/Environment benefit: ■ Annual savings of 1.95 million tap water costs. It also can supply 2.2 million people in Taoyuan city for 0.25 days tap water consumption for people's livelihood.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
		Maintain good water efficiency ● Except for RD Fab, the water consumption per unit product is lower than the world WSC standard (9.97 L/cm2) ● All districts in Taiwan are below the world WSC standard on average. ● AP3 reached 1.96 L/cm2 in 2020 The process recovery rate maintains over 85%. AP3 reached 88.0% in 2020. In response to the stable water supply, the Hsinchu Science Park Bureau held the manufacturer's water usage consulting for efficiency improvement. TSMC AP3 Plant cooperated with the program and awarded outstanding water-saving plant.
4.1.2	Value creation resulting from the water stewardship plan shall be evaluated.	TSMC AP3 Plant implement water diversion projects can save 1.95 million tap water costs annually. It also can supply 2.2 million people in Taoyuan city for 0.25 days tap water consumption for people's livelihood. Those saved water need convert to how many people living in Taoyuan City, not Hsinchu city. Therefore, an **Observation 04** is raised for this indicator.
4.1.3	The shared value benefits in the catchment shall be identified and where applicable, quantified.	AP3 wastewater quality is lower than acceptance criteria of the Longtan Science Park WWTP, which reduces the WWTP loading and assists in the reduction of loading in the river catchment. It allows river catchment manufacturers to share water-saving experience and ecological conservation of the river catchment.
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.	ATSMC AP3 Plant had one environmental incident in 2021. The root cause and preventation action had been verified.
4.3	**Evaluate stakeholders' consultation feedback regarding the site's water stewardship performance, including the effectiveness of the site's engagement process.**	

Indicator	Details (Core)	Evidence Reviewed/Document Reference
4.3.1	Consultation efforts with stakeholders on the site's water stewardship performance shall be identified.	In July 2021, TSMC conducted AWS stakeholder questionnaire survey and result are following. Level of stakeholders interested: the highest is "Safe drinking water and sanitary environment". The lowest is "Healthy water environment". The level of TSMC actions: the highest is "Water pollution prevention". The lowest is "Healthy water environment". a stakeholder consultation meeting on 27th October 2021
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.	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.
5	**Communicate & Disclose (core)**	
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.	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.	Use CSR Report to communicate with stakeholders. The current implement actions are the same as the five major promotion results of AWS that described in the CSR report.
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.**	

Indicator	Details (Core)	Evidence Reviewed/Document Reference
5.3.1	A summary of the site's water stewardship performance, including quantified performance against targets, shall be disclosed annually at a minimum.	TSMC announced the AWS Report and stated AP3 Plant 2020 annual water management goals and performance. The water quantity per unit production is reduce 47.4% better than target "reduce 30%". The water pollution indicator is reduced 91.8%, better than target "better than effluent criteria 50%." TSMC released the target achievement and tracked the water saving effectiveness of suppliers every year. All information is released in CSR Report annually.
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.	TSMC AP3 Plant take the actions to response the water challenges that related to stakeholder, included: ● Floods: Set up a waterproof gate ● Droughts: (1) Promote water saving and water recycling operations; (2) Cooperate with stakeholders to implement save water activities. (3) Strengthen preparations for backup water sources and water trucks. ● Unstable water supply: (1) Use and development of reclaimed water; (2) Establish and improve the water supply status monitoring system
5.4.2	Efforts made by the site to engage stakeholders and coordinate and support public-sector agencies shall be identified.	TSMC AP3 Plant was awarded the outstanding water-saving plant by the Hsinchu Science Park Bureau in 2018. AP3 also implemented water saving experience activities with Hsinchu Science Park and Longtan Science Park industries. TSMC AP3 Plant also share groundwater well monitor report to Hsinchu Science Park Bureau.
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.	TSMC AP3 Plant has no violation of water-related laws and regulations in the past five years. The screenshot of the EPA Penalty website is verified.

Indicator	Details (Core)	Evidence Reviewed/Document Reference
5.5.2	Necessary corrective actions taken by the site to prevent future occurrences shall be disclosed if applicable.	Although TSMC AP3 Plant has no violation of water-related laws and regulations in the past five years, AP3 Plant will follow “A-RMS-01-03-029 Plant environment and occupational safety management system internal control operation process”.
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.	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.

6.2 ADVANCED-LEVEL AWS INDICATORS

SGS also conducted a benchmarking exercise for TSMC AP3 Plant's performance against the AWS Advanced-Level Criteria. The evaluation results are presented in the following Table 6.2.

Table 6.2 Evidence Reviewed by SGS Against Advanced-Level AWS Criteria

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
1	**Gather and Understand (advanced)**		
1.4.3	The embedded water use of primary inputs in catchment(s) of origin shall be quantified. (7 points)	TSMC AP3 Plant main raw materials are divided into packaging and bulk gas. According to water footprint inventory sheet, the raw materials water usage is calculated based on wafer yield times the intensity. TSMC AP3 Plant has two main raw materials suppliers located in catchment and three suppliers located outside catchment. The water use in the catchment is 6,085 CMD and outside catchments are 40,446 CMD.	7
1.5.8	Efforts by the site to support and undertake catchment level water-related data collection shall be identified. (4-7 points)	Inside the site-autonomously collect and monitor groundwater quality. Share the groundwater monitoring result to Hsinchu Science Park Bureau. Whenever found abnormal groundwater quality will take follow up actions. The background groundwater quality meets the monitoring criteria reached 91.5% Outside the site -- Pay attention to Hsinchu Science Park Bureau water quality sampling result, including effluent water quality and Tai Hang Que Creek water quality.	7
1.5.9	The adequacy of WASH provision within the catchments of origin of primary inputs shall be identified. (4 points)	According to the international environmental performance index (Environmental Performance Index, EPI) global evaluation result, within 179 countries, Taiwan ranked 32 with a score of 72.4, Japan ranked 17 with a score of 95, South Korea ranked 23 with a score of 90.7, and the United States ranked 26 with a score of 86.1. the Water Quality Rankings of the raw material supplier's WASH is quite complete. Based on the water footprint survey data of the Longtan plant area, the counties and cities of origin of the raw materials are located in Taoyuan City, Hsinchu County/City,	4

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		Taichung City, and Tainan City. In 2020, the penetration rate of tap water supply is quite sufficient. Based on the water footprint survey data of the Longtan plant area, the sewage sewer penetration rate of the county and city where the source of the raw material located is higher than the national average. According to the Taiwan Water Corporation website to check the quality of tap water, the water quality of the water purification plants in all regions of Taiwan must meet the drinking water quality standards.	
1.6.3	Future water issues shall be identified, including anticipated impacts and trends. (3 points)	Short-term risk: drought • In 2021, a large-scale severe drought occurred in the western part of Taiwan's main island. The Central Disaster Response Center was established by the Ministry of Economic Affairs on 2021/3/24. The Center review water conditions regularly, strengthen water source scheduling, and develop contingency measures. • Adjust the water-saving rate of the plant in accordance with the central policy: 13%(4/23)→15%(5/7)→17%(5/14)→7%(6/7) →5%(6/22) 2021/6/22 The Central Disaster Response Center was opened • In this large-scale severe drought, the water used in the plant area was supplemented by water tank truck which can still supply the demand for use. Water regime forecast for the main water supply reservoirs in Longtan Park: Although the water regime has recovered, TSMC AP3 Plant still need to pay close attention to the follow-up rainfall. The second phase of the new water supply improvement Phase II plan for the Taoyuan area started in 2019. The second phase of the Dahan River water source was deployed 170,000 CMD in Taoyuan. The long-term trend is sufficient to use, and actively develop reclaimed water plants and the dispatching of water from north to south. Internal improvement: Water Tank Truck dispatch. Water saving: 2018~2021 on site water saving case. Using the climate change risk and opportunity matrix to predict future water risks.	3

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		Conduct risk assessment and analysis on the impact of future water risks-floods/droughts, and TSMC has established a complete water regime monitoring mechanism to respond the identify risk.	
1.6.4	Potential water-related social impacts from the site shall be identified, resulting in a social impact assessment with a particular focus on water.	Calculate the added value of each plant based on the proportion of each plant's annual revenue, the efficiency of electricity, water, and carbon emissions. Research on the relationship between the contribution of TSMC's use of domestic resources to Taiwan's economy and society and carbon emissions in 2020 which lists the use of domestic resources and the value created by TSMC in 2018~2020. The added value created by TSMC using 1 ton of water is NT$ 14,698, This value is 12.4 times the national average, which is also 3.4 times the overall industrial average.	4
2	**Commit and Plan (advanced)**		
2.1.2	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. (1 point)	TSMC Environmental Protection Policy is signed by the Chairman Dr. Mark Liu. A water stewardship commitment to follow all the AWS criteria has been signed by Corp. EHS Director Han-Wen Fung. The commitment has been displayed on TSMC ESG website. AP3 AWS Management Review Meeting also held on 21st Oct. 2021 and chair by Plant Manager Mr, Liu. https://esg.tsmc.com/download/file/esg_aws_c.pdf	1
2.3.3	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. (4 points)	In response to the water shortage in early 2021, contingency plan was implemented according to the water conditions. Held meeting with Hsinchu Science Park Bureau, Taiwan Water Corporation and the Environmental Protection Agency and other government agencies to discuss required actions. 14th Oct. 2020 water supply conditions turn to yellow lights, and emergency response meetings for water shortages was held. The action to yellow lights includes (1) autonomous 5% water saving, (2) establish water truck source inventory, 3) Water replenishment exercise In 2021/6, in response to water restriction request to meet the 17% water restriction requirement, autonomous water saving 10%. It still needs to make up water 7 % (3,841CMD). Total water saving rate 17.4%	4

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		The Taoyuan area has been changed orange lights and the Pingzhen/Longtan Water Purification Plant cannot carry water after 26th May 2021. The contingency plan is implemented. From Water Resources Center, groundwater wells and construction sites drainage to collect 12,490 CMD. Another 4,200 CMD to be obtained. In total water supply reach 16,690 CMD.	
2.3.4	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. (4 points)	In response to the water shortage in early 2021, contingency plan was implemented according to the water conditions. Held meeting with Hsinchu Science Park Bureau, Taiwan Water Corporation and the Environmental Protection Agency and other government agency to discuss required actions. The cooperation and water saving experience sharing stakeholder include: ■ Government agencies ■ Neighbourhood ■ Industry sectors (including industry park plants) ■ Upstream/downstream supply chain and customers ■ Academic groups ■ Non-governmental environmental groups A total of 64 plants partnerships ■ A total of 27 cooperation/visit/activity in the same river basin from 2015 to 2019 ■ A total of 37 cooperation / visits / activities in different basins from 2013 to 2019	4
2.3.5	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. (7 points)	During 27th Oct. 2021 AWS stakeholder meeting, the questions raised by participants regarding concerns issues and water challenges had been reached consensus. ■ Reuse of water resources: the new expansion plant in Hsinchu Science Park Baoshan base uses 100% reclaimed water and the reclaimed water plant is being established. ■ Reuse of water resources: The recycling rate of the plant is >85%, which saves water and reduces the waste of water resources. TSMC uses 1 drop of water 3.5 times. ■ Concerns about water pollution: TSMC focuses on waste reduction and discharge wastewater pollution factor reduction to be friendly to the environment.	7

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		Due to the severe water conditions in 2020~2021, the Water Resources Agency, MOEA requested major water users (over 1,000CMD) must achieve water saving 17%. The result is saving 17.06%.	
2.4.2	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. (6 points)	The Hsinchu Science Park Bureau expects to reach 100% of the use of recycled water by 2030. The daily water demand of 98,000 tons will be provided through the recycled water plant, Zhubei and Keya Water Resources Center. The backup water transport pipeline to link with Taoyuan area and Hsinchu area.	6
3	**Stewardship strategy and plan (advanced)**		
3.1.3	Evidence of improvements in water governance capacity from a site-selected baseline date shall be identified. (2 points)	Water quality sustainable water management results: ● Expansion of biological treatment system ● Renewal of processing facilities to improve processing efficiency ● CuCMP Keeping going ● Resin copper extraction project ● Find copper in liquid ● TMAH resin tower adsorption system ● Expansion of biological treatment system ● Expansion of biological treatment system ● Machine drainage diversion ● Improve the acute toxicity of flowing water organisms in the plant area (spine movement) ● Thing) TUa<1 Water balance: ● MAU-R system construction ● ADWR system implementation ● BG wastewater recycling Improved water efficiency ● Except for RD Fab, the water consumption per unit product is lower than the world WSC standard (9.97 L/cm2) ● All districts in Taiwan are below the world WSC standard on average ● AP3 reached 1.96 L/cm2 in 2020 The process recovery rate maintains the standard 85% or more	2

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		Set up AWS organizational structure, water management organizational structure Water map- Online system water supply status and water quality monitoring -The TSMC School of Facility provides basic skills training for new recruits, engineers and associate managers conduct on-the-job expertise. -Training of wastewater specialists	
3.1.4	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. (2 points)	TSMC water management requirements to suppliers: ▪ The supplier's water saving target is 4.5 million tons in 2021 and 35 million tons in 2030, which is disclosed in the company's CSR report. TSMC track the supplier's water-saving effectiveness and target achievement status every year. UP to end of 2021, the total suppliers' water saving 2.13 million Ton. TSMC AP3 Plant received several awards from different government agency, such as Hsinchu Science Park Bureau, Taoyuan Government and Taoyuan EPB etc. The TSMC employee also received serval award from external government agency.	2
3.3.4	The total volume of water voluntarily re-allocated (from site water savings) for social, cultural and environmental needs shall be quantified.	TSMC transfers smart irrigation technology to the Ministry of Economic Affairs to rescues water resources on 23rd April 2021. Due to water conditions are severe, TSMC saves water ahead of schedule, and increases the amount of water trucks to transport more water started from 21st May 2021.	6
3.5.2	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. (6 points)	TSMC AP3 Plant's architectural design covers the artistic conception of mountains, flowing water and mountains and establish greenbelt to protecting and regenerating the diversity of native species and biological growth as shown in Figure 4.7. TSMC's tree planting plan: Cooperate with contractors to expand the tree planting plan from the Hsinchu Science Park to the entire Taoyuan City and Hsinchu City. The first phase is currently being implemented planting 2,025 trees; 1939 trees have been completed (completion rate 95.6%).	6

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
3.5.3	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. (2 points)	TSMC AP3 Plant cooperates with the EPA to reduce copper in order to improve Laojie River copper concentration. The improvement was completed in October 2021, and the copper concentration will be reduced to <0.1 ppm. The percentage of copper concentration released by various manufacturers in Longtan Science Park dropped from 46.7% to 19.9%.	2
3.6.3	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. (5 points)	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. Furthermore, outside the catchment (i.e., Hualien/Chiayi County) for Water Pheasant ecological environment and Zengwen Reservoir environmental education.	5
3.6.4	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.	For safe drinking water and environmental sanitation, conduct joint disaster drills with environmental protection bureau, fire brigades, Hsinchu Science Park Bureau, and Longtan Science Park WWTP, with the theme of disaster response drills special for wastewater treatment plant. AP3 held an annual disaster prevention and rescue drill in 2020 and invite Longtan Science Park Chemical Disaster Response Joint Prevention Organization, Hsinchu Science Park Bureau and park manufacturers to visit site and observations (6 companies including AUO etc.) conduct joint exercises. Dengue fever: drain dredging and drainage of stagnant water to prevent mosquitoes' breed. The plant advocates government environmental hygiene posters and share TSMC's energy-saving, water-saving and waste-reduction technologies with the industry to maintain industrial competitiveness. The shared water challenge in AP3 Plant need provide more clear information. Therefore, an **Observation 05** is raised for this indicator.	0
3.7.3	Actions taken to address water related risks and challenges related to indirect water use outside the catchment shall be documented and evaluated. (5-7 points)	TSMC water usage consulting for efficiency improvement achievement: •Supplier audit annual follow "A-RMS-10-02-012 procedure" management	5

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		•Request suppliers to implement water saving actions and set annual savings target >1.5% •Implementing the S.H.A.R.P. plan for 36 suppliers, with a 2020 water saving target of 2.13 million tons. For example, Chang Chun Petrochemical saved 1.21 million tons of water. • 60 S.H.A.R.P. audits will be implemented in 2021 and estimated water volume about 4.5 million tons. In response to the risks and challenges outside the river catchment, it needs to more strengthen and clearer the solutions. Therefore, an **Observation 06** is raised for this indicator.	
3.9.6	Achievement of identified best practice related to targets in terms of good water governance shall be quantified. (8 points)	Promote various water conservation and environmental protection measures and reach good water management results. Maintain good water efficiency:■ Water consumption per unit product is decreasing year by year/ ■ Process recovery rate maintained above 85% Invite government agencies, industry (including park manufacturers), upstream/downstream supply chains, academic groups, and private environmental groups visit plant for water saving experience exchanges. A total of 40 visits and exchanges from 2014 to 2019, including 40 in different water catchment.	8
3.9.7	Achievement of identified best practice related to targets in terms of sustainable water balance shall be quantified. (8 points)	Strength water resources saving without wasting a drop of water to ensure sustainable production • Increase water saving reached 1.927 million metric tons in 2020. Maintain good water efficiency ● Except for RD Fab, the water consumption per unit product is lower than the world WSC standard (9.97 L/cm2) ● All districts in Taiwan are below the world WSC standard on average ● AP3 reach 1.96 L/cm2 in 2020 • The amount of recovered wastewater from the facility department increased by 297,000 tons compared with last year.	8

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		TSMC AP3 Plant meets the standard process recovery rate >85%. Set up new backup trucks during insufficiency water support period. The dry backup water in Taoyuan area is 30,000 tons per day.	
3.9.8	Achievement of identified best practices related to targets in terms of water quality shall be quantified. (8 points)	TSMC improve water pollution prevention and treatment efficiency and strengthen the removal of pollutants in wastewater. TSMC AP3 set ammonia nitrogen, Cu+, TMAH, COD, TUa as KPI and implement 8 projects to meet the short-, medium- and long-term target. The progress disclosed in CSR Report.	8
3.9.9	Achievement of identified best practices related to targets in terms of the site's maintenance of Important Water-Related Areas have been implemented. (8 points)	Longtan Science Park set up detention pond to establish a buffer zone with the farmland. TSMC AP3 Site set up groundwater monitoring wells to collect groundwater quality and also monitor buffer zone's groundwater quality. TSMC AP3 Plant also set chemical storage management procedure as below: ■ A. Special chemical storage tanks are regularly maintained in accordance with regulations ■ B. Chemical dike sets the Leak sensor and according to the type performs regular maintenance ■ C. Emergency sump pit is installed in Chemical dike and regular maintenance ■ D. Sump pit in the tank truck drive road is regularly maintained ■ E. Daily on-site inspection TSMC AP3 Plant established ecological characteristics and identify 10 kinds inset surviving around the plant. Thus, this is called as "AP03 Ten Ecological Views". The government agency monitors Laojie river water quality periodically. The government agency also manages water-saving promotion activities.	8
3.9.10	Achievement of identified best practice related to targets in terms of WASH shall be quantified. (4 points)	The drinking fountains in the factory are maintained and replaced monthly, The E. coli is inspected every two months. Each inspection is 1/6 of the total number, which is better than Taiwan's regulation requirements.	4

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		WBCSD standard ● Male: 22 people/a toilet seat & 22 people/a urinal ● Female: 16 people/toilet TSMC AP3 Plant: ● Male: 12.3 people/a toilet seat & 10.9 people/a urinal ● Female: 9.6 people/toilet According to the results of WBCSD WASH practice-set up special toilets for handicap. TSMC AP3 Plant set up 3. WBCSD standard request toilet need be cleaned at least once a day. TSMC inspects and cleans the toilet every hour.	
3.9.11	A list of efforts to spread best practices shall be identified. (3 points)	Promote various water conservation and environmental protection measures and reach good water management results. Invite government agencies, industry (including park manufacturers), upstream/downstream supply chains, academic groups, and private environmental groups visit plant for water saving experience exchanges. A total of 40 visits and exchanges from 2014 to 2019, including 40 in different water catchment. Due to COVID-19, AP3 has no related water management promotion activities. Thus, it has no relevant major and positive contributions to the organization and stakeholders. Please continue to strengthen it in the future. Therefore, an **Observation 07** is raised for this indicator.	0
3.9.12	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. (8-14 points)	TSMC conducted several water saving activities. The relevant visit records and evidence were verified. Therefore, an **Observation 07** is raised for this indicator.	0
3.9.13	Evidence of the quantified improvement that has resulted from the collective action relative to a site-	Verified water-saving demonstration activity held on 8th Nov. 2018-Sharing TSMC's water-saving technology with the industry, maintaining industrial competitiveness and	0

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
	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. (3-10 points)	environmentally sustainable operation. TSMC explained the water conservation strategy and the implementation of the wastewater recycling and reuse in the factory, 30 people attended the same day from different industry. Verified the Industrial Water Conservation Experience Sharing Seminar held by the Ministry of Economic Affairs and Water Conservancy Agency held on 23rd Aug 2017- industrial water conservation experience exchange. Total 93 persons from the industry. Therefore, an **Observation 07** is raised for this indicator.	
4	**Evaluate (advanced)**		
4.1.4	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. (3 points)	Continue to implement daily water saving and water shortage adjustments to manage water shortage risks. From March 01, 2021 until now, the AP3 Plant cooperates with Hsinchu Science Park Bureau to implement autonomous water saving in response to the water conditions, and the water saving results are better than 5%. Hsinchu Science Park Bureau set Aug. 2020 daily average water usage volume is 4,791 ton for AP3 Plan. After the water saving plan had been implemented, the daily average water usage volume is 4,192 ton, save 12.5%. Maintain good water efficiency, reduced water consumption per unit product. AP3 plant reached 1.96 L/cm2 in 2020 better than Taiwan average 7.93 L/cm2. AP3 Plant process recovery rate reached 88.0% in 2020 and better than target maintains over 85%. TSMC integrated company's internal and external resources, develop reclaimed water technology, and continue to implement process water saving and reclaimed water utilization. AP3 senior management (Plant director) has no record of relevant discussions on the risks, opportunities and related benefits of organizational water management. Therefore, an **Observation 08** is raised for this indicator.	0
4.3.2	The site's efforts to address shared water challenges shall be evaluated by stakeholders. This shall include stakeholder reviewing of the site's	TSMC identified seven Shared Water Challenges, include internal and external challenges. The external shared water challenges are water shortage and water effluent.	6

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
	efforts across all five outcome areas, and their suggestions for continual improvement. (6 points)	The internal shared water challenges are (1) Drought caused insufficient water supply, (2) Effluent water increases river polluted index (RPI) cause river water quality risk. The Section Chief Mr. Su of Construction Management Division, Planning and Design Section, Hsinchu Science Park Bureau indicated: TSMC and the Bureau cooperate with each other, especially TSMC actively cooperate in water conservation in new plants, water conservation when water conditions are severe. Hsinchu Science Park Bureau WWTP Plant Manager indicted: The discharged water quality from the TSMC plant is far below the WWTP acceptance criteria. It is good for dilution water and helps reduce the loading of WWTP. The water quality of reiver catchment can be diluted when the wastewater discharged into the catchment from WWTP. The Hsinchu Science Park Bureau WWTP Plant Manager interview record need to include how they appreciated TSMC's effort for wastewater discharge water quality to prove stakeholder already evaluate AP3's effort for shared water challenges. Therefore, an **Observation 09** is raised for this indicator.	
5	**Communicate & Disclose (advanced)**		
5.3.2	The site's efforts to implement the AWS Standard shall be disclosed in the organization's annual report. (1 point)	TSMC disclosed AWS Report in ESG Report. The performance result also released in AWS annual report. In the ESG Report indicated below effort: ● the volunteers are dedicated to promoting water conservation knowledge. ● Wastewater diversion, recycling system, wastewater treatment, recycling and reuse (silicon products, copper rods). ●	1
5.3.3	Benefits to the site and stakeholders from implementation of the AWS Standard shall be quantified in the organization's annual report. (1 points)	In the TSMC AWS Report, TSMC stated there are five benefits to implement AWS: Promoting AWS will have five benefits for TSMC's water use ● Good water management ● Sustainable water balance ● Good water quality control ● Confirmation of maintaining the same watershed water quality ● Safe drinking water and environmental sanitation guarantee	0

Indicator	Details (AWS Advanced-Level Criteria)	Evidence	Score
		In the 2020 annual report, it doesn't to quantify the benefits of the implementation of AWS standard by sites and stakeholders. Therefore, an **Observation 10** is raised for this indicator.	

7 AUDIT FINDINGS CONCLUSIONS AND RECOMMANDATIONS

A total of 4 basic indicators and 6 advanced indicators related AWS Core criterion requirement were raised during the course of the audit process and they were all categorized as observations. They were considered partially meeting the AWS Core criterion requirement, and some small adjustments were requested to make to the documentation in order to be considered fully compliant. The following table 7.1 shows the details of the minor non-conformities and required new information.

Table 7.1 Observations Raised during the AWS Audit Process

No.	Type	Ref.	Details	Response by TSMC AP3 Plant	Relevant Reference
1	Observations	01OBS	Indicator 1.3.6 AP3 Plant's Important Water-Related Areas need be identified in the Site map properly.	Updated to AP3 version.	
2	Observations	02OBS	Indicator 1.3.7 The saved water need convert to how many people living in Taoyuan City, not Hsinchu city.	The report has been updated to the water consumption of Taoyuan citizens.	
3	Observations	03OBS	Indicator 1.3.8 The toilet number need be verified whether better than regulation after verified the employee number.	Updated AP3 headcounts to confirm numbers are better than regulations.	
4	Observations	04OBS	Indicator 4.1.2 Those saved water need convert to how many people living in Taoyuan City, not Hsinchu city.	The report has been updated to the water consumption of Taoyuan citizens.	
5	Observations	05OBS	Indicator 3.6.4 There is no clear information on the common water challenges in the watershed of the Taoyuan plant.	In response to the common water challenge in the watershed of the Taoyuan plant, the plant participated in the Taoyuan Environmental Protection Bureau's beach clean-up activity for three consecutive years from 2017 to 2019, conveying environmental awareness to the next generation through parent-child beach clean-up activities, and jointly contribute to a sustainable planet.	

No.	Type	Ref.	Details	Response by TSMC AP3 Plant	Relevant Reference
6	Observations	06OBS	Indicator 3.7.3	Strategies for addressing risks and challenges beyond the basin are recommended to strengthen more explicit solutions.	
7	Observations	07OBS	Indicator 3.9.11/3.9.12/3.9.13 Taoyuan Plant AP3 has no related water management promotion activities in 2020 due to the epidemic, so it has no significant and positive contribution to the organization and stakeholders. Please continue to strengthen it in the future.	In the past, the Taoyuan plant has conducted beach cleaning activities from 2017 to 2019 to maintain the environment of the water basin. In 2020, it will also cooperate with the Science and Technology Administration to organize a three-chapter water environment education tour to promote environmental education, and will strengthen water management promotion activities in the future.	
8	Observations	08OBS	Indicator 4.1.4 Taoyuan Plant AP3 senior management (plant manager), there is no relevant discussion record on the organization of water management risks, opportunities and related benefits.	There is no special evaluation for AWS executives at the management level. There is a management review report at the safety committee, and the AWS report is also approved by the director-level officer.	
9	Observations	09OBS	Indicator 4.3.2 Please supplement the Hsinchu Science Park Wastewater Treatment Site's interview transcript with a positive record of the quality of TSMC's effluent water to demonstrate that stakeholders need to assess the site's efforts to address common water challenges.	The report has supplemented the Hsinchu Science Park Wastewater Treatment Plant, which has a positive record of the quality of wastewater discharged by TSMC.	
10	Observations	10OBS	Indicator 5.3.3 The Taoyuan Plant’s 2020 Annual Report was unable to show quantifying the benefits of implementing AWS standards for the site and stakeholders.	This program is required to list the benefits of AWS implementation in future certifications.	

8 SUMMARY

Based on the review of documents presented by TSMC AP3 Plant, the interview with TSMC AP3 Plant's managers and employees, the interview with local stakeholders, and the site observation, TSMC AP3 Plant has paid great attention to its water stewardship. A considerable quantity of effort and work has been put into the preparation for the audit of AWS certification.

A total of four findings related AWS Core criterion requirement were raised during the course of the audit process. They were considered meeting the AWS Core criterion requirement but has minor discrepancy, and some small adjustments were requested to make to the documentation in order to be considered fully compliant. We will further ascertain their compliance to the AWS Standard when performing the surveillance assessment in 2022.

In addition, according to the conformity assessment of TSMC AP3 Plant's performance against the AWS advanced-level criteria, the total of TSMC AP3 Plant's cumulative advanced-level criteria scores is 118, which is up to the AWS Platinum level.

9 OPPORTUNITIES FOR IMPROVEMENT

This is the initial conformity assessment for TSMC AP3 Plant against the AWS Standard, and more attention is paid to the documented plan and implementation to date. Less focus was placed on the evaluation of TSMC AP3 Plant's performance against the indicators as this was the first year of operation under the intention of conformity to the AWS Standard. Therefore, it allows for many areas for improvement going forward.

Besides the follow-up of implementation of corrective action plans to address all observations, the future audits will additionally evaluate TSMC AP3 Plant's performance against the AWS Standard indicators and how this is monitored and presented as compliance. Thus, SGS recommends that TSMC AP3 Plant develop practicable ways to monitor its performance against the AWS Standard indicators and keep relevant records in anticipation of future audits.

10 CONCLUSION AND RECOMMANDATIONS

Given the review of evidence presented and the site observation performed at TSMC AP3 Plant, SGS recommends that TSMC AP3 Plant be awarded the AWS Platinum Certified status with a surveillance audit interval of annual frequency.

11 REFERENCE

REF001: AWS-(Step1) - AP03_wmc

REF002: AWS-(Step2) - AP03_wmc

REF003 AWS-(Step3) - AP03_wmc

REF004: AWS-(Step4) - AP03_wmc

REF005: AWS-(Step5) - AP03_wmc