KEMENTERIAN SUMBER ASLI
DAN KELESTARIAN ALAM
JABATAN ALAM SEKITAR

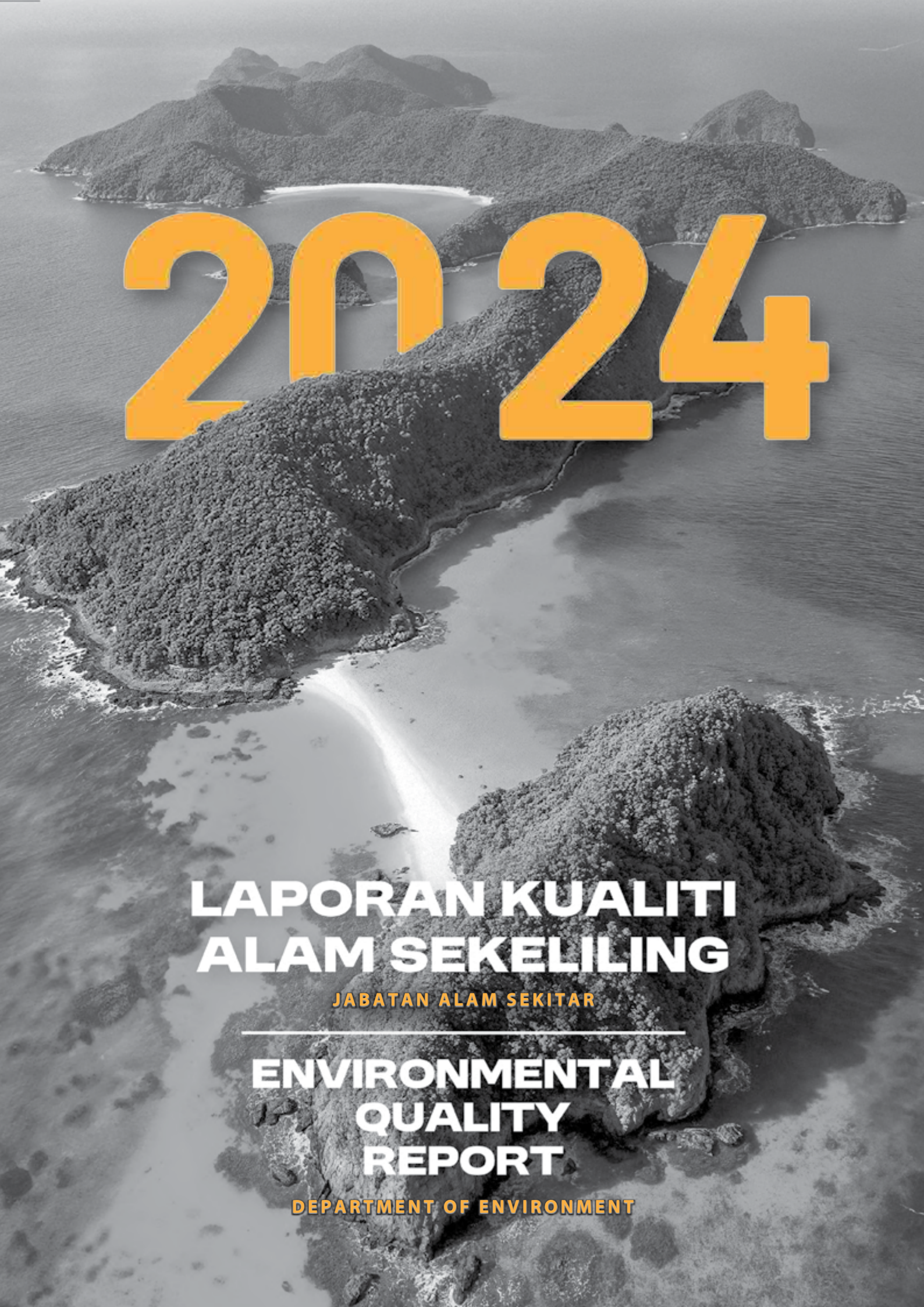
2024

LAPORAN KUALITI ALAM SEKELILING

JABATAN ALAM SEKITAR

ENVIRONMENTAL QUALITY REPORT

DEPARTMENT OF ENVIRONMENT



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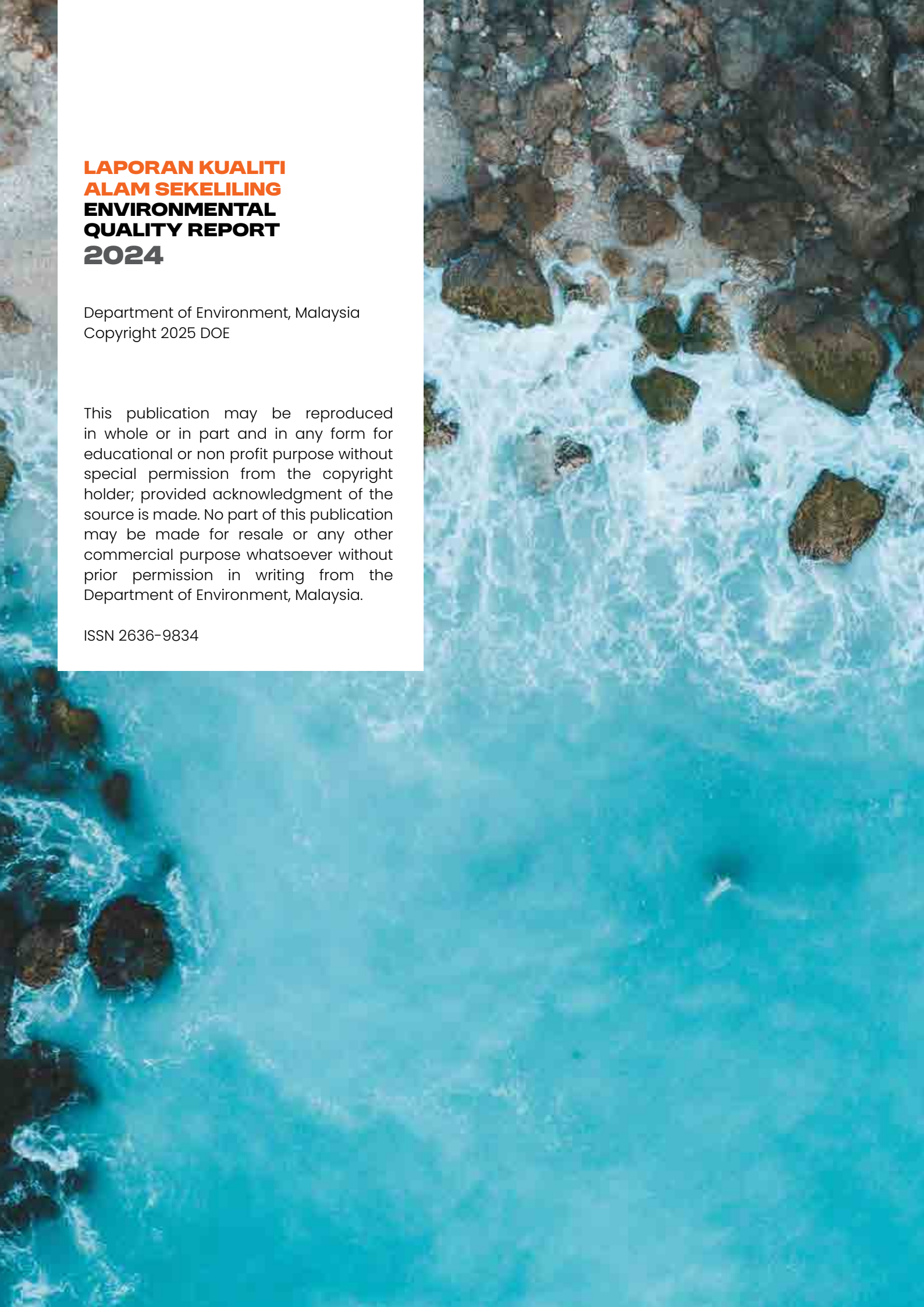

LAPORAN KUALITI ALAM SEKELILING
ENVIRONMENTAL QUALITY REPORT
2024

Department of Environment, Malaysia

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PRAKATA/ PREFACE

Saya amat berbesar hati untuk membentangkan Laporan Kualiti Alam Sekeliling 2024 seperti yang dikehendaki di bawah Seksyen 3(1)(i) Akta Kualiti Alam Sekeliling 1974.

It is my pleasure to present the Environmental Quality Report 2024 as required under Section 3(1)(i) of the Environmental Quality Act 1974.

Status kualiti udara di Malaysia ditunjukkan menerusi bacaan Indeks Pencemar Udara (IPU). Pada tahun 2024 bacaan IPU status baik adalah sebanyak 35.2% meningkat berbanding IPU status baik pada tahun 2023 adalah 33.2%. Bacaan IPU sederhana adalah sebanyak 64.1% dan 0.7% adalah tidak sihat pada tahun 2024 untuk seluruh Malaysia.

The air quality status is reported in terms of Air Pollutant Index (API). In 2024 the API ranked good was 35.2%, an improvement from 33.2% recorded in 2023. The API ranked moderate and unhealthy were 64.1% dan 0.7% respectively, throughout Malaysia in 2024.

Status kualiti air sungai yang ditentukan menerusi Indeks Kualiti Air (IKA) menunjukkan penurunan pada tahun 2024. Sebanyak 1,353 stesen pengawasan kualiti air sungai manual yang merangkumi 672 sungai telah dipantau dalam tahun 2024. Peratus bilangan sungai bersih adalah 71% (475) pada tahun 2024 berbanding 72% (486) pada tahun 2023.

The river quality in terms of Water Quality Index (WQI) showed a slight decrease in 2024. A total of 1,353 manual river water quality monitoring stations covering 672 rivers were monitored in 2024. The percentage of clean river stations is 71% (475) in 2024 compared to 72% (486) in 2023.

Status kualiti air mengikut stesen sungai juga menunjukkan penurunan kepada kualiti air sungai pada stesen-stesen yang dipantau pada tahun 2024. Bilangan stesen sungai yang dikategorikan sebagai bersih adalah 973 (72%) stesen pada tahun 2024 berbanding 987 (73%) stesen pada tahun 2023. Secara umumnya, penurunan kualiti air yang direkodkan pada tahun 2024 adalah disebabkan oleh peningkatan beban pencemaran pada sungai daripada punca tetap dan punca tidak tetap.

There has been a decrease in river water quality status by monitored stations in 2024. The numbers of river stations categorised as clean was 973 (72%) of stations in 2024 compared to 987 (73%) stations in the previous year. In general, the decrease in water quality recorded in 2024 is due to an increase in the pollution load on the river from point sources and nonpoint sources.

Pada tahun 2024, pengawasan kualiti air tanah yang dijalankan menunjukkan bahawa semua stesen berada dalam julat nilai pematuhan Standard Kualiti Air Tanah Bagi Rawatan Air Mentah Secara Konvensional (Air Minuman) kecuali bagi parameter besi (Fe), mangan (Mn), dan sebatian fenol mempunyai peratusan julat nilai pematuhan Standard Kualiti Air Tanah Bagi Rawatan Air Mentah Secara Konvensional (Air Minuman) yang rendah bagi guna tanah tertentu.

In 2024, the results derived from the groundwater quality monitoring showed that all stations were within the Groundwater Quality Standards for Conventional Raw Water Treatment (Drinking Water) values except for iron (Fe), manganese (Mn), and phenolics which had a low range of Groundwater Quality Standards for Conventional Raw Water Treatment (Drinking Water) value.

Dalam tahun 2024, daripada 368 stesen pengawasan kualiti air marin bagi pantai, muara sungai dan pulau di negara ini, sebanyak 171 stesen adalah terbaik, 39 stesen baik, 153 stesen sederhana dan lima (5) stesen dikategorikan tercemar. Stesen-stesen tercemar ini berada di kawasan muara.

In 2024, out of the 368 marine water quality monitoring stations at coastal, estuary and islands in the country, 171 stations were excellent, 39 were good, 153 were moderate while the remaining five (5) stations were categorised as poor. The marine water quality stations categorised as poor were located at the estuary.

Sebanyak 5,378,977.55 tan metrik buangan terjadual telah dihasilkan pada tahun 2024. Ini mewakili penurunan keseluruhan sebanyak 7.92% berbanding 5,841,596.82 tan metrik yang dilaporkan pada 2023.

A total of 5,378,977.55 metric tonnes of scheduled wastes were generated in 2024. This represents an overall decrease of 7.92% as compared to 5,841,596.82 metric tonnes reported in 2023.

JAS akan terus mengukuhkan dan melaksanakan strategi, program dan aktivitinya dengan berkesan dalam menguruskan alam sekitar secara lestari.

DOE will continue to strengthen and implement its strategies, programmes and activities effectively in managing the environment sustainably.

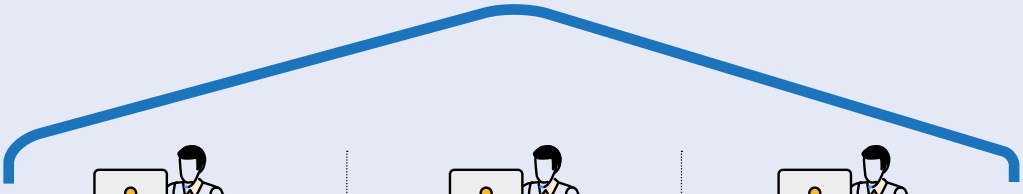
"Alam Sekitar, Tanggungjawab Bersama"
"Environment, Our Shared Responsibility"

DATO' WAN ABDUL LATIFF BIN WAN JAFFAR
Ketua Pengarah Kualiti Alam Sekeliling Malaysia
Director-General of Environmental Quality Malaysia

KUALITI UDARA
Air Quality

Pengawasan Kualiti Udara
Air Quality Monitoring

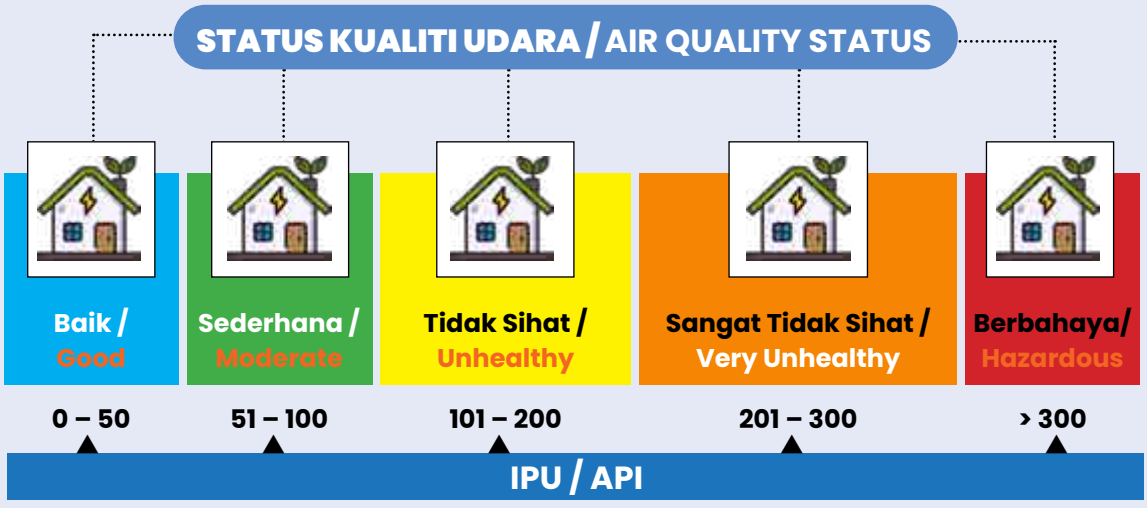
Stesen pemantauan kualiti udara di seluruh negara /
Air quality monitoring stations in the country



STESEN PEMANTAUAN AUTOMATIK / Automatic Monitoring Stations	STESEN PEMANTAUAN MANUAL / Manual Monitoring Stations	STESEN PEMANTAUAN MOBIL / Mobile Monitoring Stations
65	14	3

IPU adalah dikira berdasarkan kepekatan enam (6) bahan pencemar utama /
The API is calculated based on concentration of six (6) major pollutants:

- Ozon di Permukaan Bumi (O_3)
  Ground Level Ozone (O_3)
- Karbon Monoksida (CO)
  Carbon Monoxide (CO)
- Nitrogen Dioksida (NO_2)
  Nitrogen Dioxide (NO_2)
- Sulfur Dioksida (SO_2)
  Sulphur Dioxide (SO_2)
- Habuk Halus Bersaiz Kurang dari 10 Mikron (PM_{10})
  Particulate Matter of Less than 10 Microns in Size (PM_{10})
- Habuk Halus Bersaiz Kurang dari 2.5 Mikron ($PM_{2.5}$)
  Particulate Matter of Less than 2.5 Microns in Size ($PM_{2.5}$)



Indeks Pencemar Udara (IPU) bagi keseluruhan Malaysia pada tahun 2024 telah menunjukkan peningkatan bagi peratus IPU berstatus baik berbanding tahun 2023.

The Air Pollutant Index (API) for the whole of Malaysia in 2024 has shown increase in the percentage of good API status compared to 2023.

4

Jenis pengkelasan stesen kualiti udara mengikut guna tanah/ Types of classification of air quality stations according to land use:

- Industri / Industrial
- Bandar / Urban
- Pinggir Bandar / Suburban
- Luar Bandar / Rural

35.2%

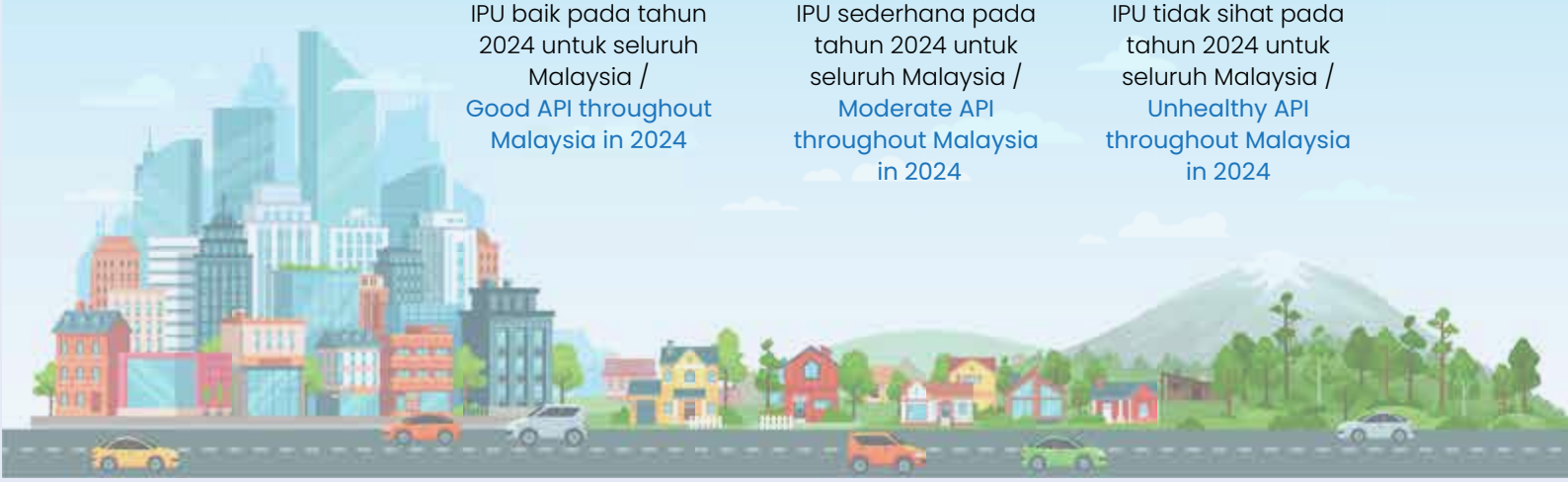
IPU baik pada tahun 2024 untuk seluruh Malaysia / Good API throughout Malaysia in 2024

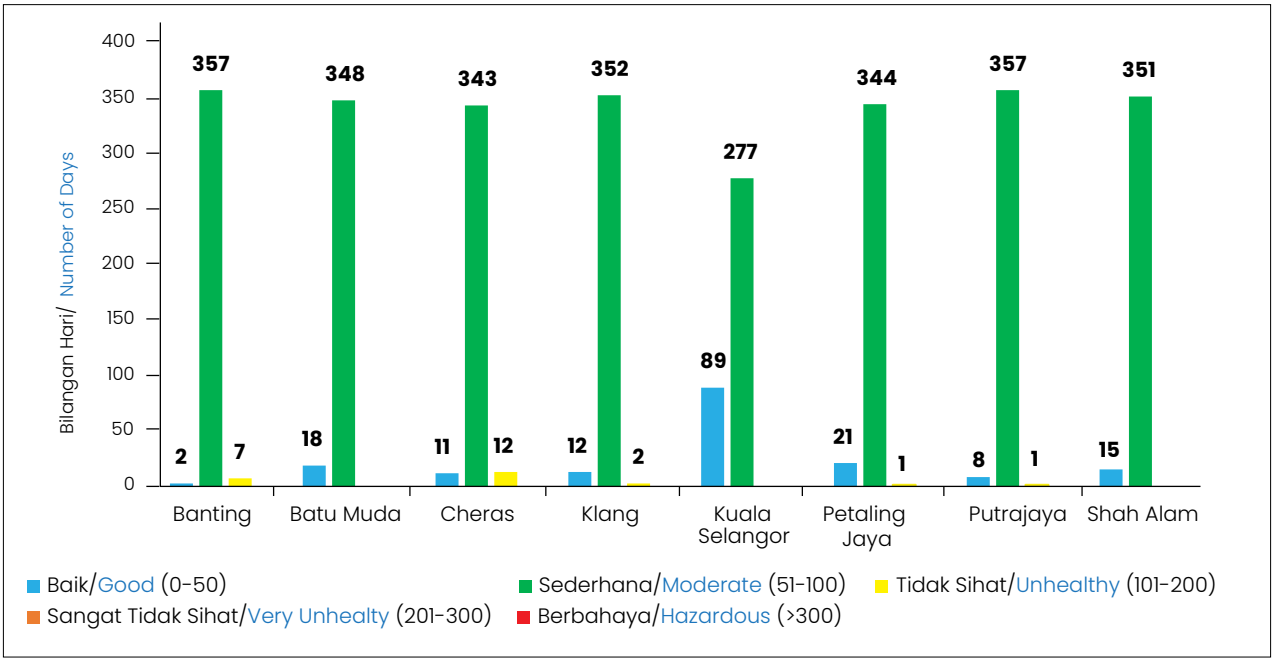
64.1%

IPU sederhana pada tahun 2024 untuk seluruh Malaysia / Moderate API throughout Malaysia in 2024

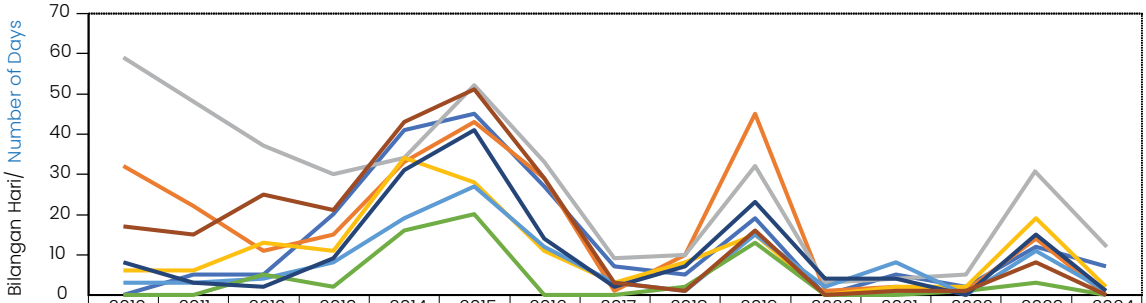
0.7%

IPU tidak sihat pada tahun 2024 untuk seluruh Malaysia / Unhealthy API throughout Malaysia in 2024





Rajah 1.4: Status Kualiti Udara, Lembah Klang 2024
Figure 1.4: Air Quality Status, Klang Valley 2024



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Banting	0	5	5	20	41	45	27	7	5	19	0	5	2	12	7
Shah Alam	32	22	11	15	33	43	29	1	10	45	1	2	1	14	0
Cheras	59	48	37	30	34	52	33	9	10	32	3	4	5	31	12
Klang	6	6	13	11	34	28	11	3	8	15	0	2	2	19	2
Petaling Jaya	3	3	4	8	19	27	12	3	1	15	2	8	0	11	1
Kuala Selangor	0	0	5	2	16	20	0	0	2	13	0	0	1	3	0
Putrajaya	8	3	2	9	31	41	14	2	7	23	4	4	0	15	1
Batu Muda	17	15	25	21	43	51	29	3	1	16	0	1	1	8	0

Rajah 1.5: Bilangan Hari Tidak Sihat, Lembah Klang, 2010 - 2024
Figure 1.5: Number of Unhealthy Days, Klang Valley 2010 - 2024

Status Kualiti Udara di Wilayah Utara

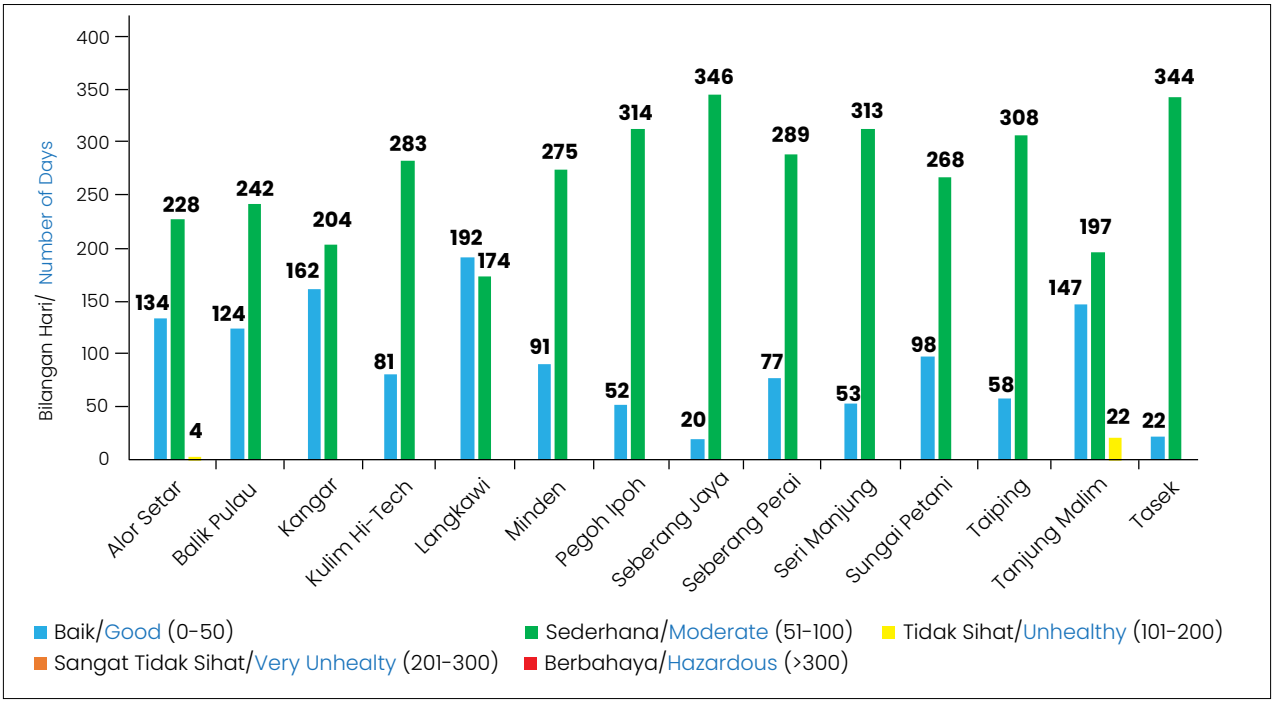
Secara keseluruhan, status kualiti udara di utara Pantai Barat Semenanjung Malaysia yang meliputi negeri Perlis, Kedah, Pulau Pinang dan Perak adalah pada tahap baik dan sederhana sepanjang masa. Stesen Langkawi, Kedah mencatatkan bacaan hari IPU baik yang lebih tinggi (192 hari) berbanding stesen-stesen yang lain manakala Stesen Seberang Jaya, Pulau Pinang mencatatkan bacaan hari IPU sederhana tertinggi iaitu 346 hari. Terdapat dua (2) stesen yang mencatatkan bacaan hari IPU tidak sihat iaitu; di Stesen Tanjung Malim, Perak (22 hari) dan di Stesen Alor Setar, Kedah (4 hari) dan yang

Air Quality Status in Northern Region

Overall, the air quality status of the Northern region of the West Coast of Peninsular Malaysia which comprises the states of Perlis, Kedah, the State of Penang, and the State of Perak was at a good to moderate level at all times. The Langkawi Station in Kedah recorded a higher number of good daily API readings (192 days) compared to other stations, while the Seberang Jaya Station in Penang recorded the highest number of moderate daily API readings of 346 days. Unhealthy API readings were recorded at two (2) stations; Tanjung Malim Station, Perak (22 days) and Alor Setar Station,

dipengaruhi oleh habuk halus, $PM_{2.5}$ daripada kejadian jerebu dan pembentukan O_3 daripada peningkatan bahan pencemar daripada pelepasan asap kenderaan bermotor. Status kualiti udara keseluruhan bagi wilayah utara di Pantai Barat Semenanjung Malaysia ditunjukkan di dalam **Rajah 1.6**.

Kedah (4 days). These readings were influenced by particulate matter ($PM_{2.5}$) from haze events and O_3 formation due to increased pollutants from motor vehicle emissions. **Figure 1.6** illustrates the overall air quality status for the northern region of the West Coast of Peninsular Malaysia.



Rajah 1.6: Status Kualiti Udara, Wilayah Utara Pantai Barat Semenanjung Malaysia, 2024
Figure 1.6: Air Quality Status, Northern Region of the West Coast of Peninsular Malaysia, 2024

Status Kualiti Udara di Wilayah Selatan

Kualiti udara di Wilayah Selatan Pantai Barat Semenanjung Malaysia meliputi Negeri Sembilan, Negeri Melaka dan Negeri Johor berada pada tahap bacaan hari IPU baik dan sederhana sepanjang masa. Stesen Kota Tinggi, Johor mencatatkan bilangan bacaan hari IPU baik yang tertinggi iaitu 205 hari manakala Stesen Nilai mencatatkan bacaan hari IPU sederhana tertinggi iaitu 340 hari.

Kawasan yang merekodkan bacaan hari IPU tidak sihat tertinggi adalah di Stesen Bukit Rambai, Melaka (35 hari) diikuti oleh Stesen Nilai, Negeri Sembilan (13 hari), Stesen Seremban, Negeri Sembilan (3 hari), Stesen Kota Tinggi, Johor (2 hari) dan Stesen Port Dickson, Negeri Sembilan (1 hari).

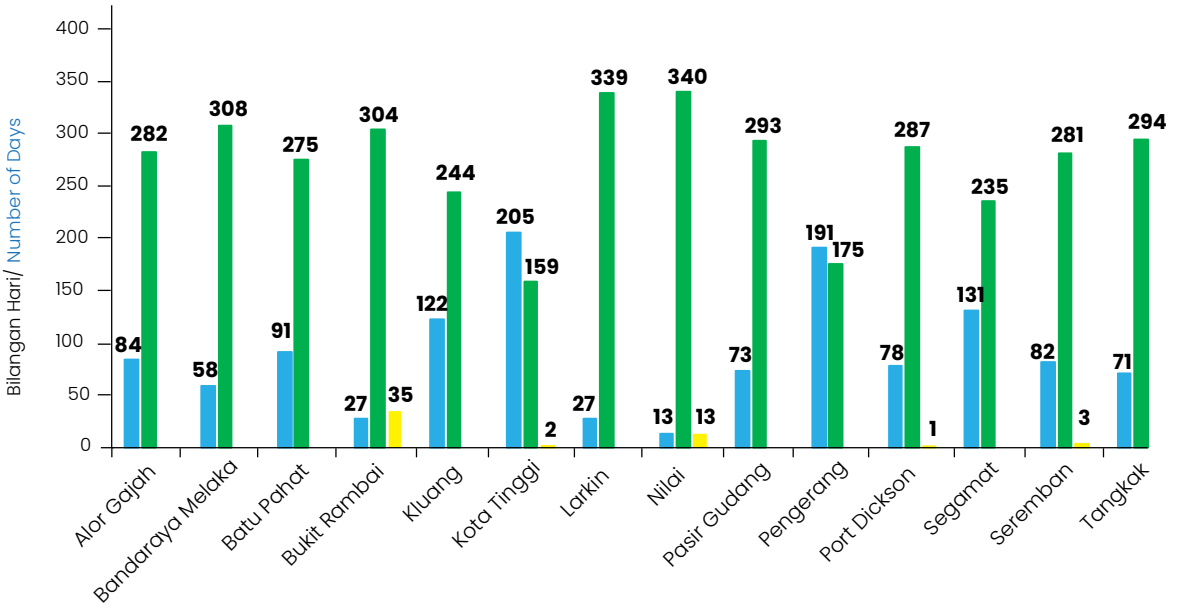
Peningkatan bacaan hari IPU yang tidak sihat ini adalah disebabkan oleh kejadian jerebu setempat akibat daripada aktiviti pembakaran hutan dan kawasan pertanian di samping pembentukan O_3 di udara berpunca daripada kepadatan trafik yang tinggi. Status kualiti udara secara keseluruhan bagi wilayah selatan di Pantai Barat Semenanjung Malaysia adalah seperti yang ditunjukkan di dalam **Rajah 1.7**.

Air Quality Status in Southern Region

The air quality in the Southern Region of the West Coast of Peninsular Malaysia covering Negeri Sembilan, Melaka and Johor were at good to moderate API readings at all times. The Kota Tinggi Station, Johor recorded the highest number of good daily API readings of 205 days while Nilai Station recorded the highest moderate daily API readings of 340 days.

Bukit Rambai Station, Melaka recorded the highest number of unhealthy API days (35 days), followed by Nilai Station, Negeri Sembilan (13 days), Seremban Station, Negeri Sembilan (3 days), Kota Tinggi Station, Johor (2 days), and Port Dickson Station, Negeri Sembilan (1 day).

The rise in the unhealthy API readings was attributed to localized haze from forest and agricultural fires, along with O_3 formation in the air due to high traffic density. **Figure 1.7** illustrates the overall air quality status for the southern region of the West Coast of Peninsular Malaysia.



Rajah 1.7: Status Kualiti Udara, Wilayah Selatan Pantai Barat Semenanjung Malaysia, 2024
Figure 1.7: Air Quality Status, Southern Region of the West Coast of Peninsular Malaysia, 2024

Gunung Pulai, Johor

Status Kualiti Udara di Pantai Timur

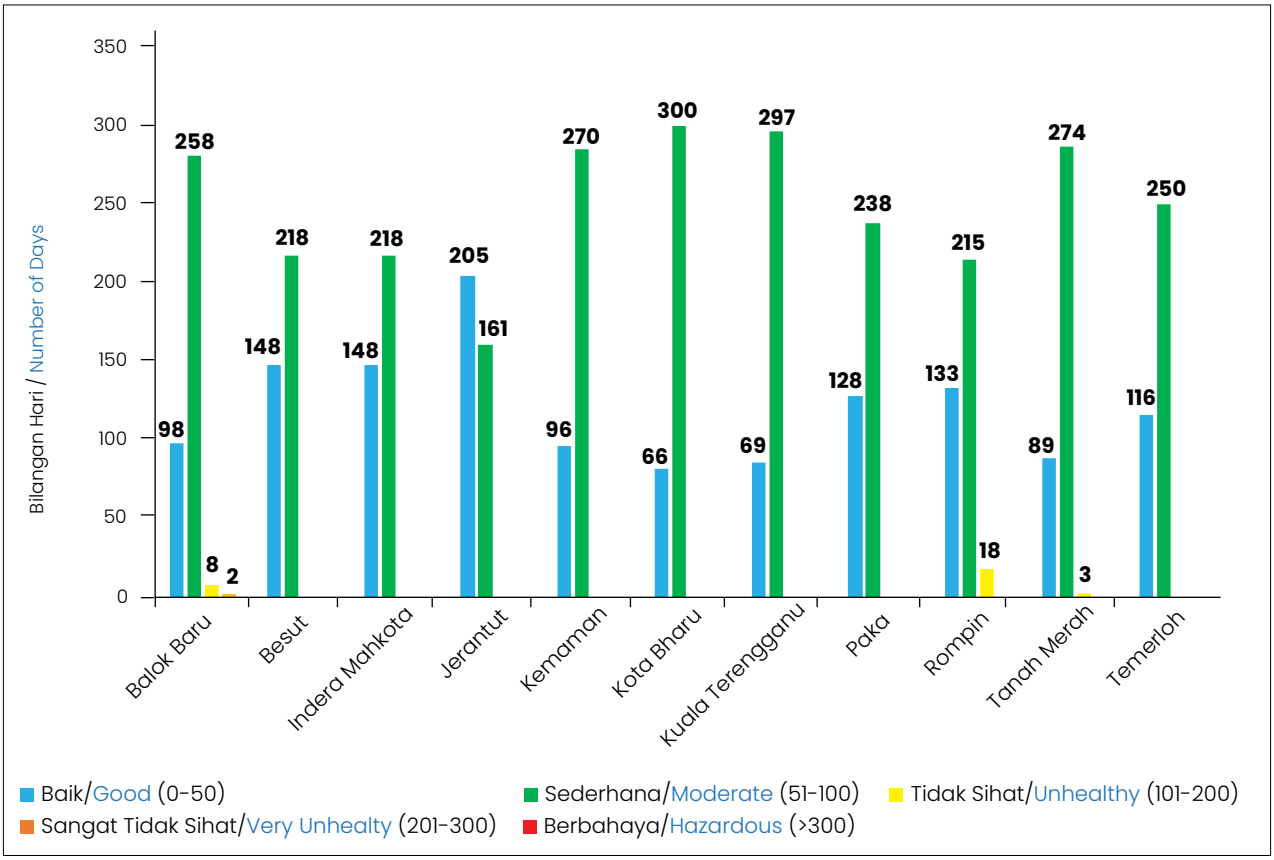
Kualiti udara di Pantai Timur Semenanjung Malaysia yang merangkumi negeri Pahang, Terengganu dan Kelantan bagi tahun 2024 berstatus baik dan sederhana pada kebanyakan masa. Stesen Jerantut, Pahang mencatatkan bilangan bacaan hari IPU baik tertinggi iaitu 205 hari manakala Stesen Kota Bharu, Kelantan merekodkan bacaan hari IPU sederhana tertinggi iaitu 300 hari.

Tiga (3) stesen mencatatkan status kualiti udara tidak sihat. Dua (2) stesen disebabkan oleh peningkatan kepekatan $PM_{2.5}$ akibat kebakaran hutan dan belukar di kawasan setempat iaitu Stesen Tanah Merah, Kelantan (3 hari) dan Stesen Rompin, Pahang (18 hari). Manakala Stesen Balok Baru, Pahang mencatatkan 8 hari bacaan IPU yang tidak sihat dan status kualiti udara sangat tidak sihat sebanyak 2 hari yang disebabkan oleh peningkatan kepekatan gas sulfur dioksida daripada kawasan perindustrian yang berhampiran. Status kualiti udara di Pantai Timur Semenanjung Malaysia secara keseluruhan adalah seperti yang ditunjukkan di dalam **Rajah 1.8**.

Air Quality Status in East Coast

The air quality in the East Coast of Peninsular Malaysia, covering the states of Pahang, Terengganu, and Kelantan, was generally classified as good and moderate throughout most of 2024. Jerantut Station, Pahang, recorded the highest number of good API days at 205 days, while Kota Bharu Station, Kelantan, recorded the highest number of moderate API days at 300 days.

Three (3) stations recorded unhealthy air quality status. Two (2) station were caused by increased $PM_{2.5}$ concentrations due to forest and bush fires in the local area, namely Tanah Merah Station, Kelantan (3 days) and Rompin Station, Pahang (18 days). Meanwhile, Balok Baru Station, Pahang, recorded 8 days unhealthy API days and 2 days very unhealthy API days, attributed to elevated sulfur dioxide concentrations from nearby industrial areas. The overall air quality status at East Coast of Peninsular Malaysia is shown in **Figure 1.8**.



Rajah 1.8: Status Kualiti Udara, Pantai Timur Semenanjung Malaysia, 2024
Figure 1.8: Air Quality Status, East Coast of Peninsular Malaysia, 2024

Status Kualiti Udara di Sabah, Wilayah Persekutuan Labuan dan Sarawak

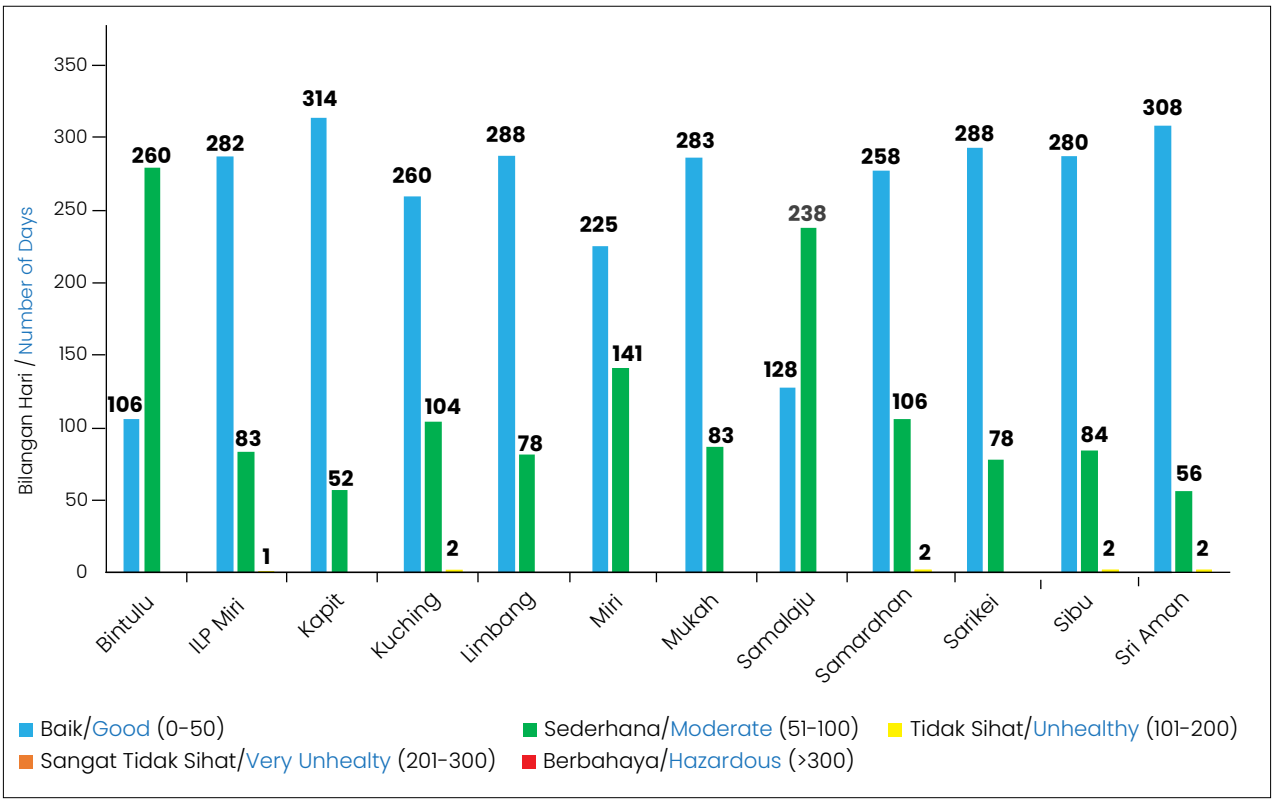
Kualiti udara di Sabah, Wilayah Persekutuan Labuan dan Sarawak berada pada tahap baik dan sederhana sepanjang masa bagi tahun 2024. Stesen Kapit merekodkan bacaan hari IPU baik yang paling tinggi di Sarawak iaitu 314 hari dan Stesen Kimanis merekodkan bacaan hari IPU baik yang tertinggi di Sabah iaitu 271 hari. Manakala bagi Stesen Labuan, bacaan hari IPU baik lebih tinggi dicatatkan iaitu 197 hari berbanding dengan bacaan hari IPU sederhana iaitu 169 hari. Terdapat lima (5) stesen di Sarawak yang mencatatkan bacaan tidak sihat bagi tahun 2024 iaitu Stesen Sri Aman (2 hari), Stesen Kuching (2 hari), Stesen Sibu (2 hari), Stesen Samarahan (2 hari) dan Stesen Institut Latihan Perindustrian Miri (1 hari). Sementara itu, di Sabah pula, hanya satu stesen mencatatkan status kualiti udara tidak sihat iaitu di Stesen Kimanis selama 18 hari

Faktor penyumbang adalah peningkatan kepekatan $PM_{2.5}$ akibat kebakaran hutan dan belukar di kawasan setempat. Status kualiti udara di Sarawak secara keseluruhan ditunjukkan dalam **Rajah 1.9** manakala status di Sabah dan Wilayah Persekutuan Labuan ditunjukkan dalam **Rajah 1.10**.

Air Quality Status in Sabah, Federal Teritory Labuan and Sarawak

The air quality in Sabah, Federal Territory Labuan, and Sarawak was at good to moderate at all times for the year 2024. The Kapit Station recorded the highest number of good daily API readings of 314 days in Sarawak and the Kimanis Station recorded the highest number of good daily API readings in Sabah at 271 days. Meanwhile, for the Labuan Station, the number of good daily API readings (197 days) was higher compared to the moderate daily API readings of 169 days. There were five (5) stations in Sarawak that recorded unhealthy' readings for 2024, namely Sri Aman Station (2 days), Kuching Station (2 days), Sibu Station (2 days), Samarahan Station (2 days) and Institut Latihan Perindustrian Miri Station (1 day). Meanwhile, in Sabah, only one station recorded unhealthy air quality, with Kimanis Station reported 18 days of unhealthy API readings.

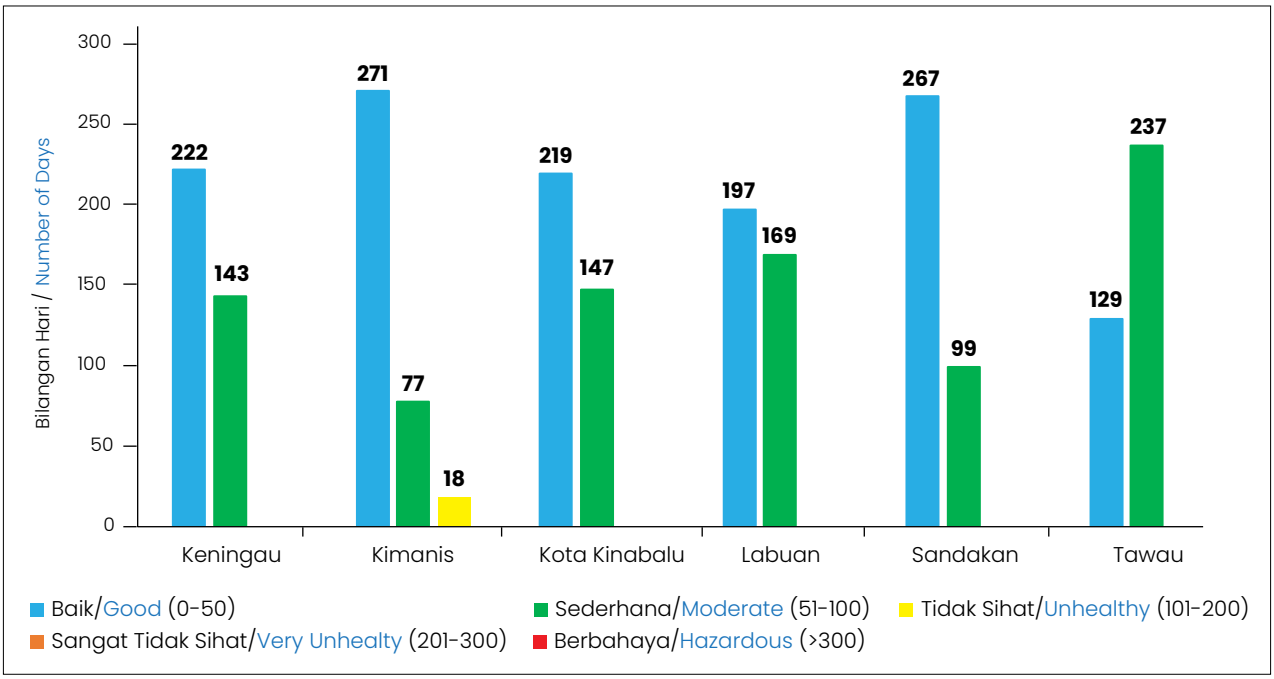
The contributing factor was the increased concentration of $PM_{2.5}$ due to local forest and bush fires. The overall air quality status in Sarawak is shown in **Figure 1.9** while the status in Sabah and Federal Territory of Labuan are shown in **Figure 1.10**.



Rajah 1.9: Status Kualiti Udara, Sarawak, 2024
Figure 1.9: Air Quality Status, Sarawak, 2024

Stesen Sibu / Sibu Station

Stesen Bintulu / Bintulu Station



Rajah 1.10: Status Kualiti Udara, Sabah dan Wilayah Persekutuan Labuan, 2024
Figure 1.10: Air Quality Status, Sabah and Federal Territory Labuan, 2024

TREND KUALITI UDARA

Enam (6) pencemar udara iaitu habuk halus bersaiz 10 mikron (PM_{10}), habuk halus bersaiz 2.5 mikron ($PM_{2.5}$), Ozon permukaan bumi (O_3), Sulfur Dioksida (SO_2), Nitrogen Dioksida (NO_2) dan Karbon Monoksida (CO) dipantau secara berterusan di 65 lokasi. Parameter $PM_{2.5}$ mula dipantau pada tahun 2018. Trend kualiti udara dari tahun 2010 hingga 2024 ditentukan dengan mengambil kira purata data kualiti udara tahunan daripada stesen-stesen pengawasan dan merujuk kepada Standard Kualiti Udara Ambien Malaysia seperti yang ditunjukkan dalam **Jadual 1.2**. Bagi tahun 2024, Standard Kualiti Udara Ambien Malaysia IT-2 digunakan.

AIR QUALITY TRENDS

There are six (6) air pollutants namely particulate matter with size of 10 microns (PM_{10}), particulate matter with size of 2.5 microns ($PM_{2.5}$), ground-level Ozone (O_3), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), and Carbon Monoxide (CO) that are continuously monitored at 65 locations. The $PM_{2.5}$ parameter has been monitored since the year 2018. The air quality trend from 2010 to 2024 is established by taking into consideration the average annual air quality data from monitoring stations and referred to the Malaysian Ambient Air Quality Standard as shown in **Table 1.2**. For the year 2024, Malaysian Ambient Air Quality Standard IT-2 was used.

Jadual 1.2: Standard Kualiti Udara Ambien Malaysia
Table 1.2: Malaysian Ambient Air Quality Standard

PARAMETER	MASA PURATA / TIME AVERAGING	UNIT	GARIS PANDUAN SEDIA ADA / EXISTING GUIDELINES	STANDARD KUALITI UDARA AMBIEN MALAYSIA / MALAYSIAN AMBIENT AIR QUALITY		
				IT-1 (2015)	IT-2 (2018)	IT-3 (2020)
PM_{10}	1 Tahun	µg/m³	50	50	45	40
	24 Jam	µg/m³	150	150	120	100
$PM_{2.5}$	1 Tahun	µg/m³	-	35	25	15
	24 Jam	µg/m³	-	75	50	35
SO_2	1 Jam	µg/m³	350	350	300	250
		ppm	0.135	0.135	0.115	0.095
	24 Jam	µg/m³	105	105	90	80
		ppm	0.040	0.040	0.035	0.030
*CO	1 Jam	mg/m³	35	35	35	30
		ppm	30.6	30.6	30.6	26.2
	8 Jam	mg/m³	10	10	10	10
		ppm	8.75	8.75	8.75	8.75
NO_2	1 Jam	µg/m³	320	320	300	280
		ppm	0.170	0.170	0.160	0.150
	24 Jam	µg/m³	75	75	75	70
		ppm	0.040	0.040	0.040	0.037
O_3	1 Jam	µg/m³	200	200	200	180
		ppm	0.100	0.100	0.100	0.090
	8 Jam	µg/m³	120	120	120	100
		ppm	0.060	0.060	0.060	0.050

Nota: *mg/m³ IT-Interim Tier (tahun)
Note: *mg/m³ IT-Interim Tier (year)

Habuk Halus (PM_{10})

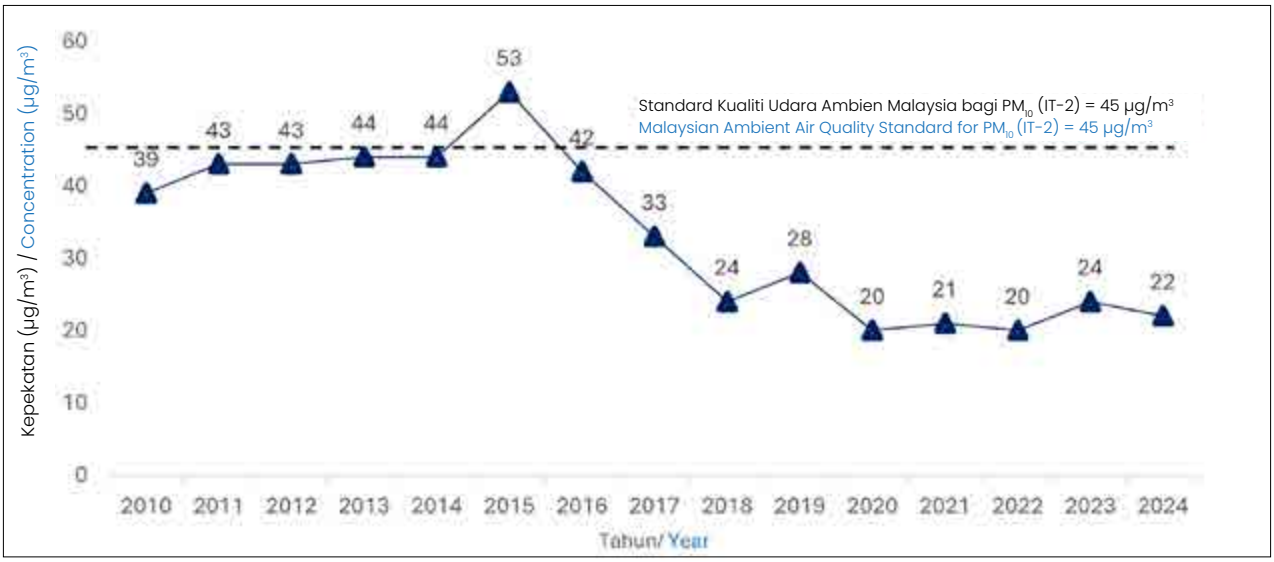
Trend purata kepekatan tahunan parameter PM_{10} dalam udara ambien bagi tahun 2010 hingga tahun 2024 adalah seperti yang ditunjukkan dalam **Rajah 1.11**. Pada tahun 2024, nilai purata kepekatan tahunan PM_{10} dalam udara ambien adalah 22 µg/m_3 iaitu lebih rendah berbanding yang ditetapkan dalam Standard Kualiti Udara Ambien Malaysia bagi IT-2 iaitu 45 µg/m_3.

Berdasarkan kategori guna tanah, kawasan bandar merekodkan purata kepekatan PM_{10} yang lebih tinggi berbanding kawasan yang lain seperti yang ditunjukkan dalam **Rajah 1.12**. Keadaan cuaca yang panas dan kering telah menyebabkan peningkatan aktiviti pembakaran terbuka dan bilangan titik panas yang menyebabkan peningkatan kepekatan PM_{10}.

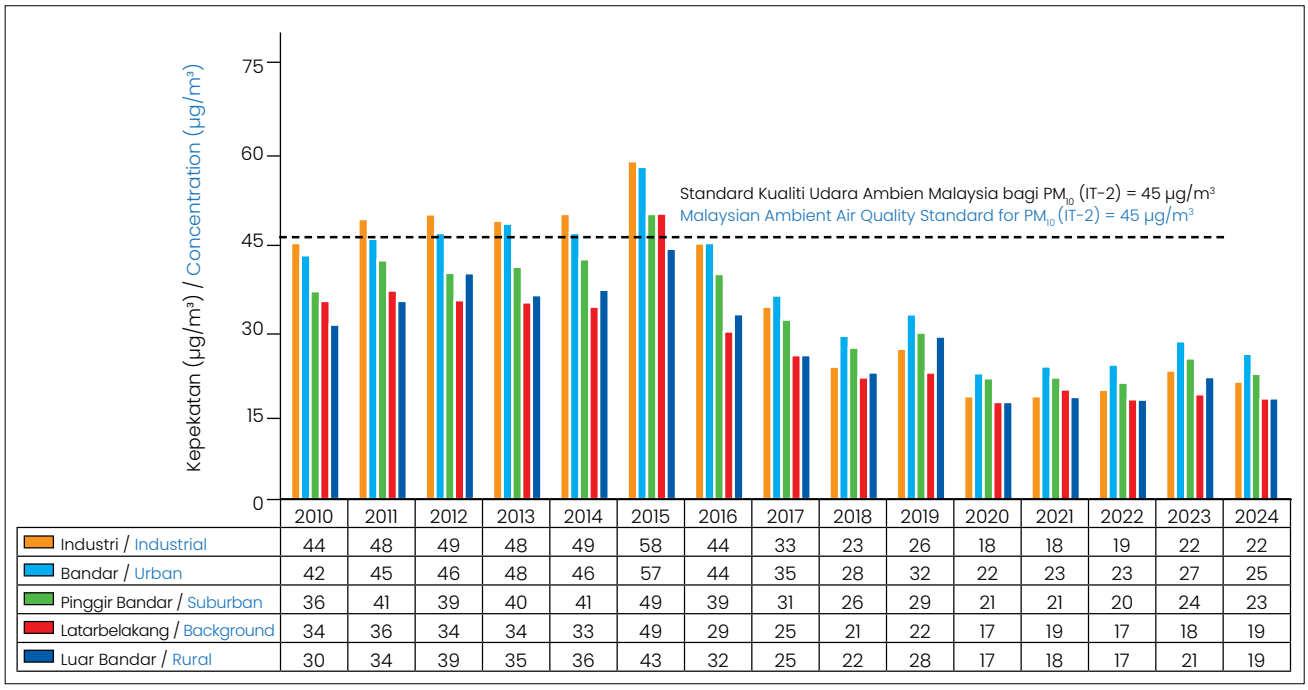
Particulate Matter (PM_{10})

The trend of the annual average concentration of PM_{10} parameters in the ambient air for the years 2010 to 2024 is as shown in **Figure 1.11**. In 2024, the average annual concentration of PM_{10} in ambient air was 22 µg/m_3, lower than the Malaysia Ambient Air Quality Standard for IT-2 which is 45 µg/m_3.

Based on the land use category, urban areas recorded a higher average concentration of PM_{10} than other areas as shown in **Figure 1.12**. The hot and dry weather conditions had caused an increase in open burning activities and the number of hot spots thus resulting in an increase in the concentration of PM_{10}.



Rajah 1.11: Purata Kepekatan Tahunan Habuk Halus (PM_{10}), 2010 -2024
Figure 1.11: Annual Average Concentration of Particulate Matter (PM_{10}), 2010 -2024



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	44	48	49	48	49	58	44	33	23	26	18	18	19	22	22
Bandar / Urban	42	45	46	48	46	57	44	35	28	32	22	23	23	27	25
Pinggir Bandar / Suburban	36	41	39	40	41	49	39	31	26	29	21	21	20	24	23
Latarbelakang / Background	34	36	34	34	33	49	29	25	21	22	17	19	17	18	19
Luar Bandar / Rural	30	34	39	35	36	43	32	25	22	28	17	18	17	21	19

Rajah 1.12: Purata Kepekatan Tahunan Habuk Halus (PM_{10}) Mengikut Guna Tanah, 2010 -2024
Figure 1.12: Annual Average Concentration of Particulate Matter (PM_{10}) Based on Land Used, 2010

Habuk Halus ($PM_{2.5}$)

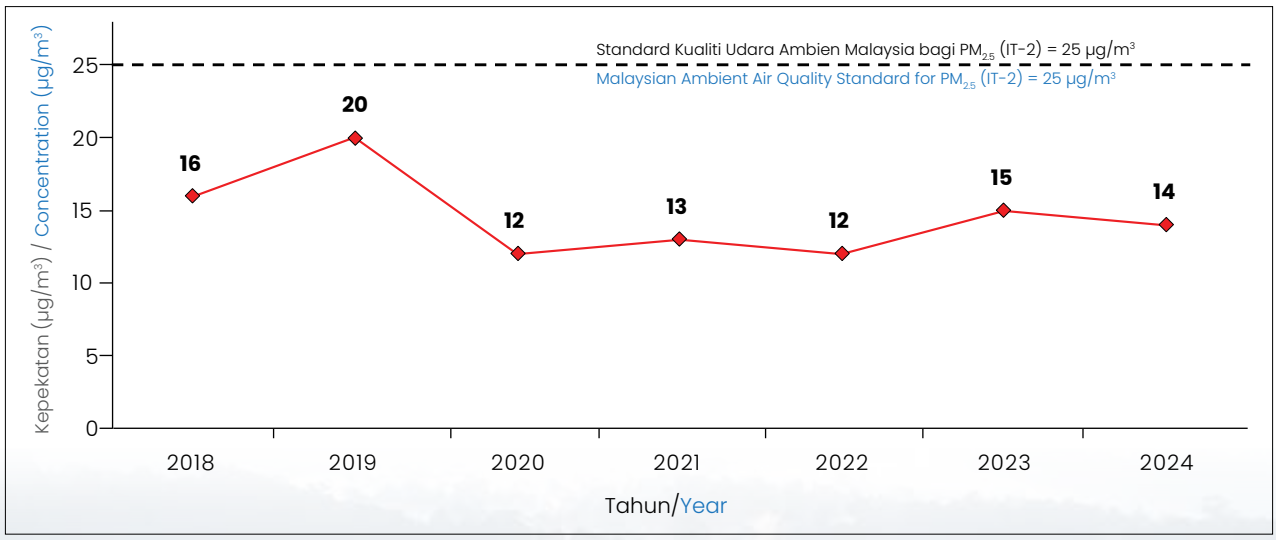
Pengukuran dan analisa parameter $PM_{2.5}$ telah bermula pada pertengahan tahun 2017 dan mula dilaporkan di dalam Laporan Kualiti Sekeliling bermula pada tahun 2018. Nilai purata tahunan $PM_{2.5}$ dalam udara ambien bagi tahun 2024 adalah 14 $\mu g/m_3$ iaitu lebih rendah dari tahun 2023. Nilai purata ini tidak melebihi had yang ditetapkan dalam Standard Kualiti Udara Ambien Malaysia bagi IT-2 iaitu sebanyak 25 $\mu g/m_3$ seperti yang ditunjukkan di dalam **Rajah 1.13**.

Berdasarkan kategori guna tanah, nilai purata kepekatan tahunan $PM_{2.5}$ tertinggi adalah di kawasan bandar iaitu 16 $\mu g/m^3$ dan diikuti dengan kawasan pinggir bandar 15 $\mu g/m^3$, industri 13 $\mu g/m^3$ dan pendalaman 11 $\mu g/m^3$ seperti yang ditunjukkan dalam **Rajah 1.14**. Peningkatan kepekatan $PM_{2.5}$ di udara adalah disebabkan oleh pembakaran bahan bakar daripada kenderaan, aktiviti kerja tanah dan kegiatan pembakaran terbuka perladangan serta tapak pelupusan sampah.

Particulate Matter ($PM_{2.5}$)

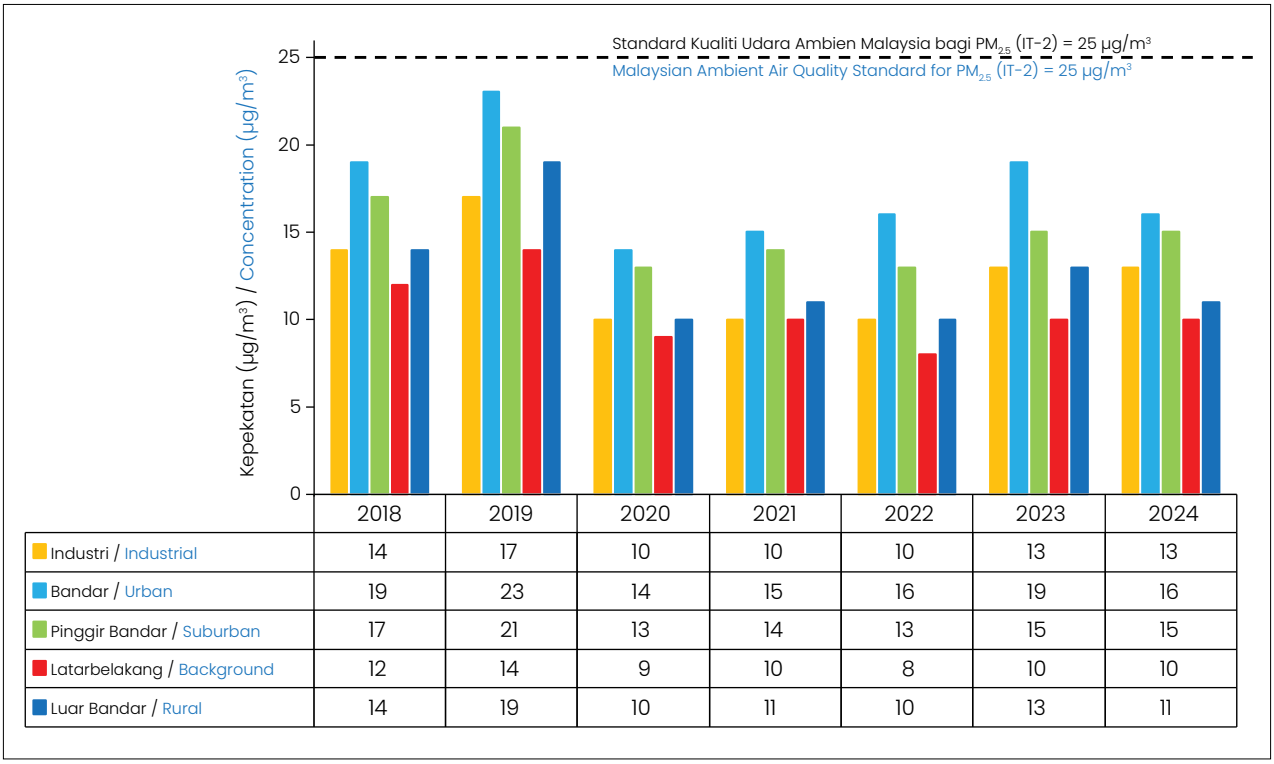
Measurement and analysis of $PM_{2.5}$ parameters started in the middle of 2017 and started to be reported in the Environmental Quality Report in 2018. The annual average value of $PM_{2.5}$ in the ambient air for the year 2024 was 14 $\mu g/m_3$, lower than the year 2023. This average value did not exceed the limit set in the Malaysian Ambient Air Quality Standard for IT-2 which is 25 $\mu g/m_3$ as shown in **Figure 1.13**.

Based on the land use category, the highest annual concentration value for $PM_{2.5}$ was in urban areas which was 16 $\mu g/m^3$ followed by the sub-urban areas 15 $\mu g/m^3$, industrial 13 $\mu g/m^3$, and rural areas 11 $\mu g/m^3$ each as shown in **Figure 1.14**. The increase in the concentration of $PM_{2.5}$ in air was caused by fuel burning from vehicles, as well as earthworks, and open burning activities in plantations and landfills.



Rajah 1.13: Purata Kepekatan Tahunan Habuk Halus ($PM_{2.5}$), 2018-2024
Figure 1.13: Annual Average Concentration of Particulate Matter ($PM_{2.5}$), 2018-2024

Hutan Simpan Royal Belum, Perak



	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	14	17	10	10	10	13	13
Bandar / Urban	19	23	14	15	16	19	16
Pinggir Bandar / Suburban	17	21	13	14	13	15	15
Latarbelakang / Background	12	14	9	10	8	10	10
Luar Bandar / Rural	14	19	10	11	10	13	11

Rajah 1.14: Purata Kepekatan Tahunan Habuk Halus ($PM_{2.5}$) Mengikut Guna Tanah, 2018 - 2024
Figure 1.14: Annual Average Concentration of Particulate Matter ($PM_{2.5}$) Based on Land Use, 2018 - 2024

Ozon (O_3) di Permukaan Bumi

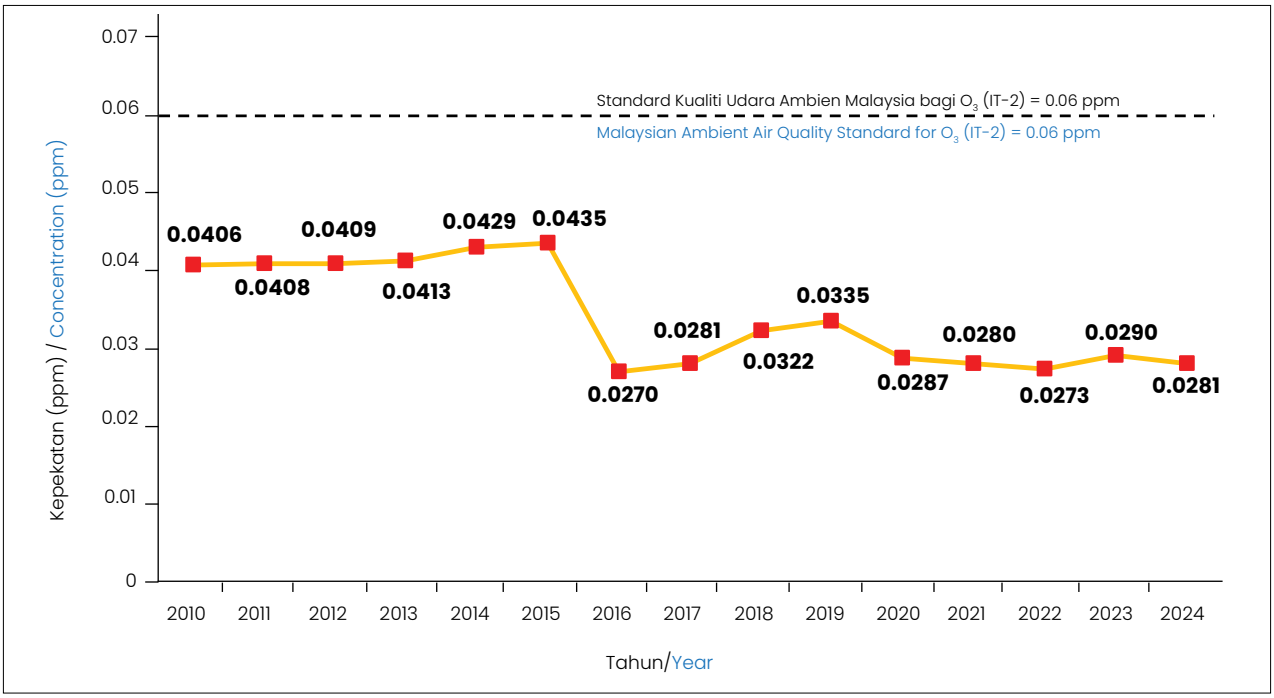
Pada tahun 2024, purata tahunan kepekatan maksimum harian O_3 di permukaan bumi didapati lebih tinggi berbanding dengan tahun 2023 dengan bacaan 0.0281 ppm. Secara keseluruhan, trend purata tahunan kepekatan maksimum ozon bagi tempoh lapan (8) jam dalam udara ambien adalah mematuhi had sebanyak 0.060 ppm seperti yang ditetapkan dalam Standard Kualiti Udara Ambien Malaysia IT-2 (**Rajah 1.15**).

Rajah 1.16 menunjukkan kepekatan O_3 permukaan bumi untuk pelbagai kategori guna tanah dari tahun 2010 hingga 2024. Bermula tahun 2018, tiada pemantauan O_3 dilakukan di kawasan industri kerana memberi keutamaan pemantauan O_3 di kawasan bandar. Kawasan bandar mencatatkan bacaan O_3 lebih tinggi disebabkan oleh jumlah trafik yang padat dan keadaan atmosfera yang sesuai bagi pembentukan O_3. Peningkatan bacaan O_3 permukaan bumi juga ketara di beberapa kawasan pinggir bandar disebabkan oleh pergerakan angin yang membawa pencetus pencemar ozon iaitu nitrogen oksida (NOx) dan sebatian organik meruap (VOC) yang kebanyakannya dilepaskan daripada kenderaan bermotor dan industri.

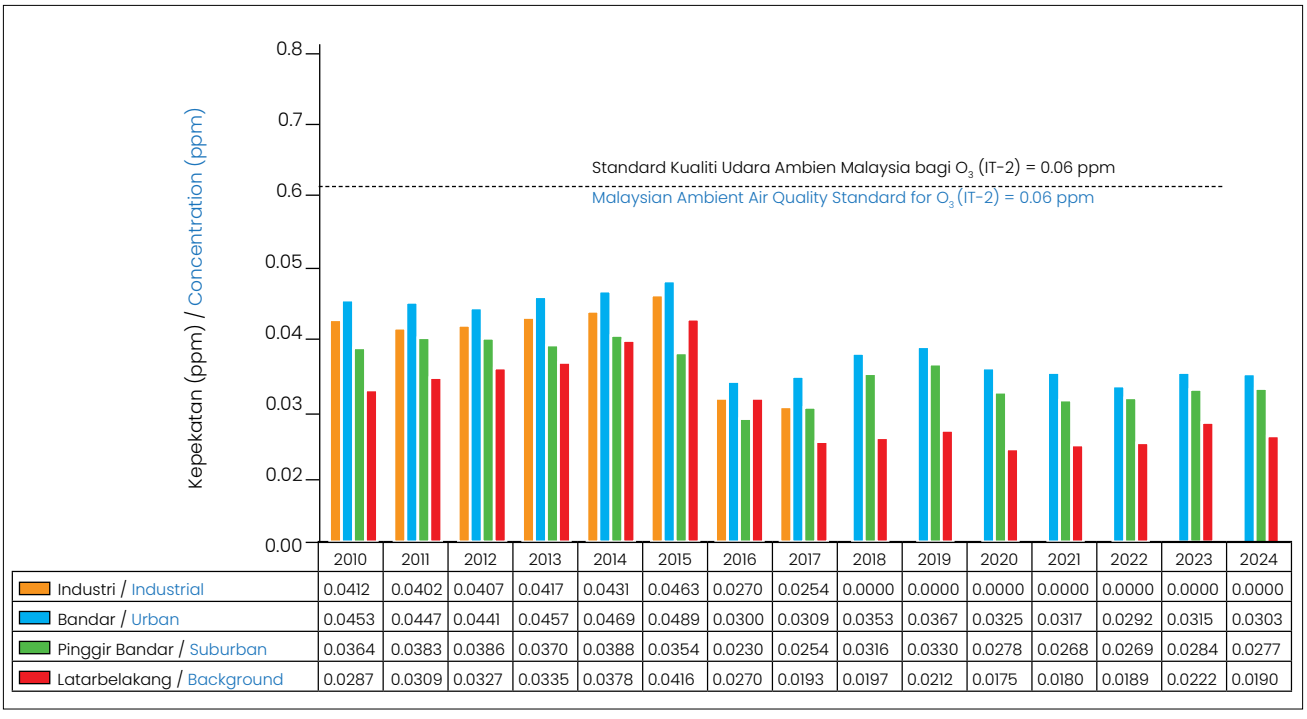
Ground Level Ozone (O_3)

In 2024, the annual average daily maximum concentration of ground-level O_3 was found to be lower compared to 2023 with a reading of 0.0281 ppm. Overall, the annual average trend for the maximum concentration of ozone for a period of eight (8) hours in the ambient air was in compliance with the limit of 0.060 ppm as stipulated in the Malaysian Ambient Air Quality Standard IT-2 (**Figure 1.15**).

Figure 1.16 shows the concentration of ground-level O_3 for various categories of land use from the year 2010 until 2024. Starting in 2018, no O_3 monitoring had been carried out in industrial areas due to the priority for O_3 monitoring being given to urban areas. Urban areas recorded higher O_3 readings due to the traffic density and atmospheric conditions which are suitable for the formation of O_3. The increase in ground-level O_3 readings was also significant in some suburban areas due to the movement of the wind that carried ozone pollutant pre-cursors which are nitrogen oxides (NOx) and volatile organic compounds (VOCs) mostly released from motor vehicles and industry.



Rajah 1.15: Purata Kepekatan Tahunan Ozon Permukaan Bumi (O_3), 2010-2024
Figure 1.15: Annual Average Concentration of Ground Level Ozone (O_3), 2010-2024



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	0.0412	0.0402	0.0407	0.0417	0.0431	0.0463	0.0270	0.0254	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bandar / Urban	0.0453	0.0447	0.0441	0.0457	0.0469	0.0489	0.0300	0.0309	0.0353	0.0367	0.0325	0.0317	0.0292	0.0315	0.0303
Pinggir Bandar / Suburban	0.0364	0.0383	0.0386	0.0370	0.0388	0.0354	0.0230	0.0254	0.0316	0.0330	0.0278	0.0268	0.0269	0.0284	0.0277
Latarbelakang / Background	0.0287	0.0309	0.0327	0.0335	0.0378	0.0416	0.0270	0.0193	0.0197	0.0212	0.0175	0.0180	0.0189	0.0222	0.0190

Rajah 1.16: Purata Kepekatan Tahunan Permukaan Bumi Ozon (O_3), Mengikut Guna Tanah 2010-2024
Figure 1.16: Annual Average Concentration of Ground Level Ozone (O_3) Based on Land Use, 2010-2024

Sulfur Dioksida (SO_2)

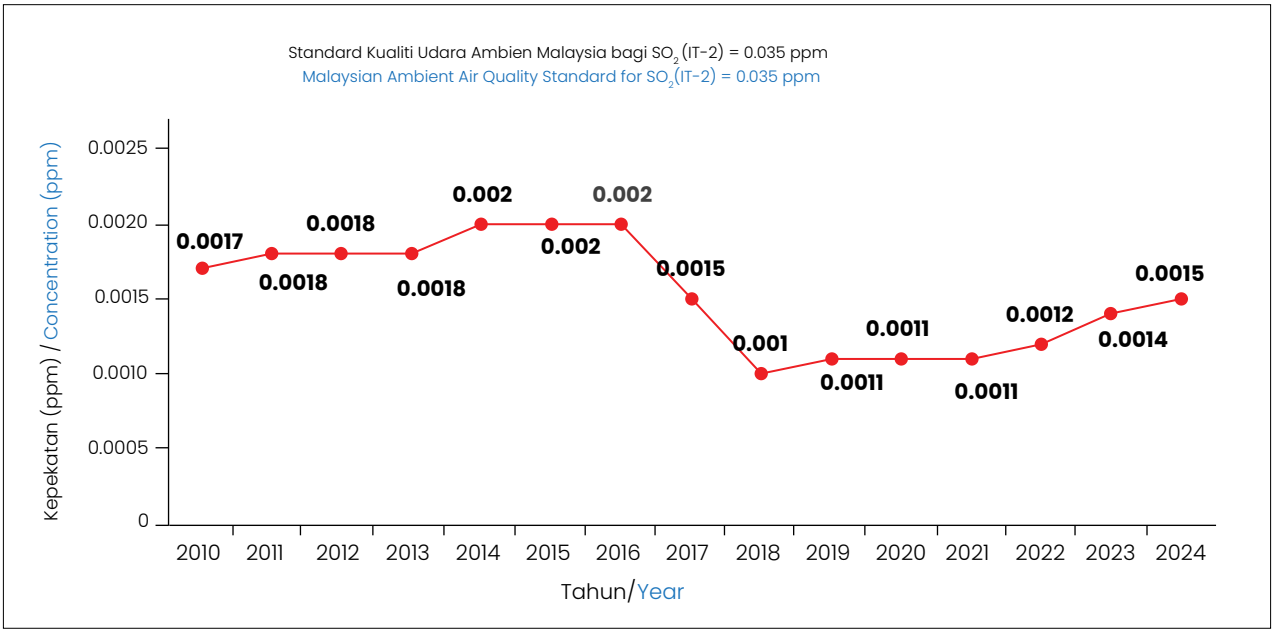
Purata kepekatan tahunan SO_2 yang direkodkan pada tahun 2024 adalah 0.0015 ppm lebih tinggi dibandingkan dengan tahun 2023 iaitu 0.0014 ppm. Walau bagaimanapun, bacaan ini berada di bawah had yang ditetapkan dalam Standard Kualiti Udara Ambien Malaysia IT-2 iaitu 0.035 ppm (**Rajah 1.17**). JAS dan beberapa agensi berkaitan telah melaksanakan beberapa strategi dalam mengawal SO_2 di Malaysia. Antara strategi tersebut adalah menggalakkan penggunaan bahan api yang lebih bersih dan menggalakkan penggunaan gas asli dalam proses industri dan kenderaan. Mulai Januari 2020, bahan api petrol EURO4M RON95 yang mengandungi kandungan sulfur kurang dari 50 mg/l telah diperkenalkan dan pada 1 April 2021, EURO5 Diesel yang mengandungi kandungan sulfur kurang dari 10 mg/l pula telah berada di pasaran.

Rajah 1.18 menunjukkan kepekatan purata tahunan bagi SO_2 mengikut kategori guna tanah. Berdasarkan kepada rajah tersebut, kepekatan SO_2 di kawasan-kawasan bandar dan pinggir bandar pada tahun 2024 adalah lebih tinggi berbanding dengan tahun 2023. Ini menunjukkan bahawa pelepasan gas daripada industri dan peningkatan bilangan kenderaan di jalan raya memberi kesan kepada peningkatan SO_2 di udara.

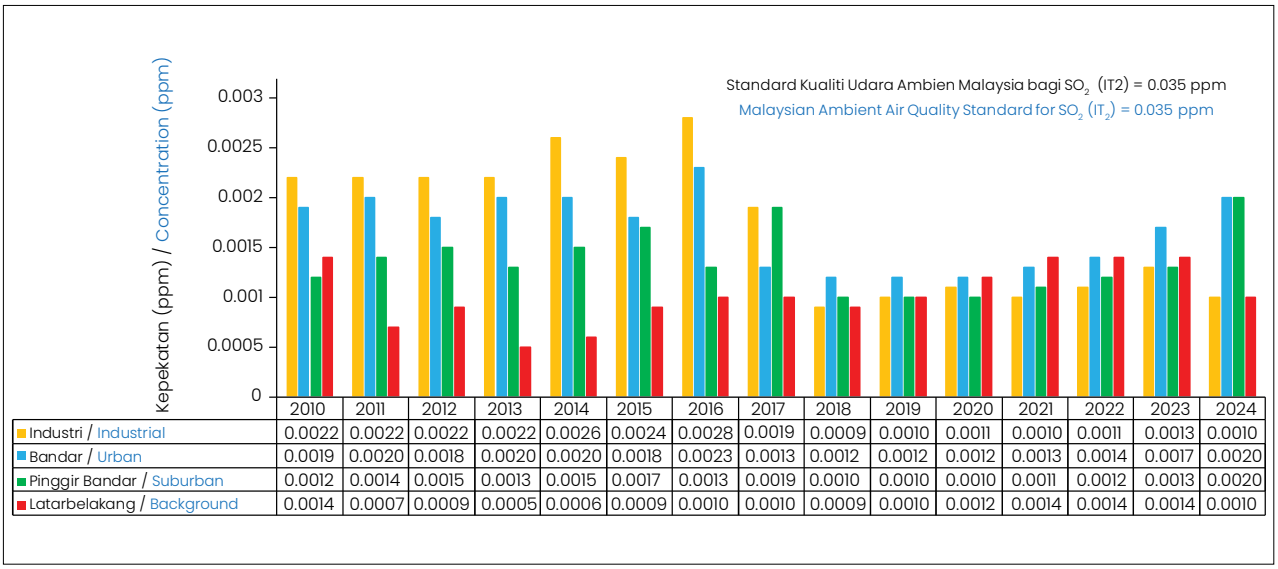
Sulfur Dioxide (SO_2)

The average annual concentration of SO2 recorded in the year 2024 was 0.0015 ppm - higher than in the year 2023 which was 0.0014 ppm. However, this reading was below the limit set in the Malaysian Ambient Air Quality Standard IT-2 at 0.035 ppm (**Figure 1.17**). The DOE and other related agencies have implemented strategies for controlling SO_2 in Malaysia. Encouraging the use of cleaner fuel and encouraging the use of natural gas in industrial processes and vehicles are among the strategies used. Since January 2020, petrol fuel EURO4M RON95 containing sulphur content less than 50 mg/l had been introduced, and on 1 April 2021, EURO5 Diesel which contains sulphur less than 10 mg/l had been made available in the market.

Figure 1.18 shows the annual average concentration of SO_2 according to land use categories. Based on the figure, it shows that in the year 2024, the SO_2 concentration in urban and sub-urban areas was higher than in 2023. This shows that the gas emissions from industries and the increase in the number of vehicles have an impact on the increase of SO_2 in the air.



Rajah 1.17: Purata Kepekatan Tahunan Sulfur Dioksida (SO_2), 2010 -2024
Figure 1.17: Annual Average Concentration of Sulphur Dioxide (SO_2), 2010 -2024



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	0.0022	0.0022	0.0022	0.0022	0.0026	0.0024	0.0028	0.0019	0.0009	0.0010	0.0011	0.0010	0.0011	0.0013	0.0010
Bandar / Urban	0.0019	0.0020	0.0018	0.0020	0.0020	0.0018	0.0023	0.0013	0.0012	0.0012	0.0012	0.0013	0.0014	0.0017	0.0020
Pinggir Bandar / Suburban	0.0012	0.0014	0.0015	0.0013	0.0015	0.0017	0.0013	0.0019	0.0010	0.0010	0.0010	0.0011	0.0012	0.0013	0.0020
Latarbelakang / Background	0.0014	0.0007	0.0009	0.0005	0.0006	0.0009	0.0010	0.0010	0.0009	0.0010	0.0012	0.0014	0.0014	0.0014	0.0010

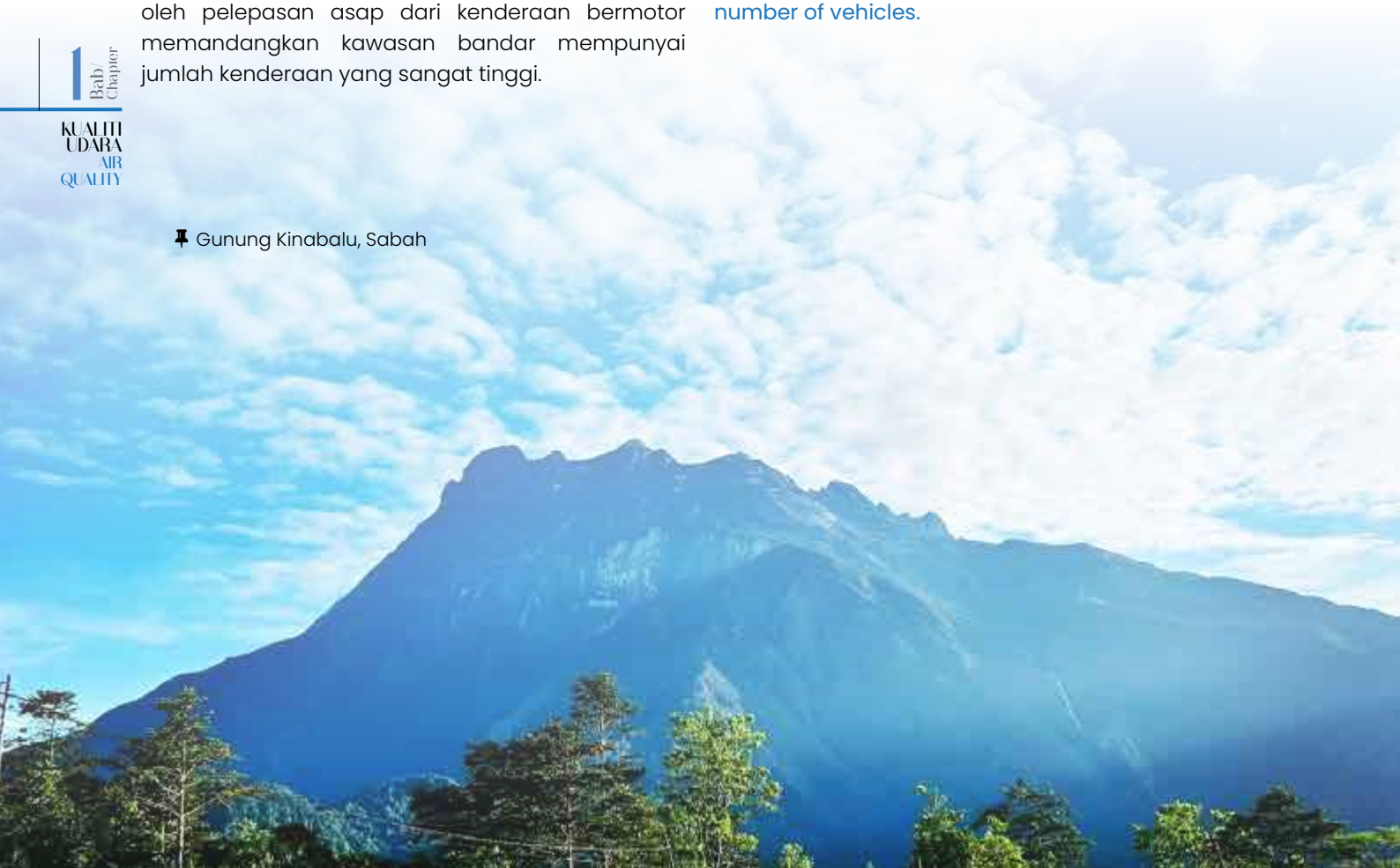
Rajah 1.18: Purata Kepekatan Tahunan Sulfur Dioksida (SO_2) Mengikut Guna Tanah, 2010 - 2024
Figure 1.18: Annual Average Concentration of Sulfur Dioxide (SO_2) Based on Land Use, 2010 - 2024

Nitrogen Dioksida (NO_2)

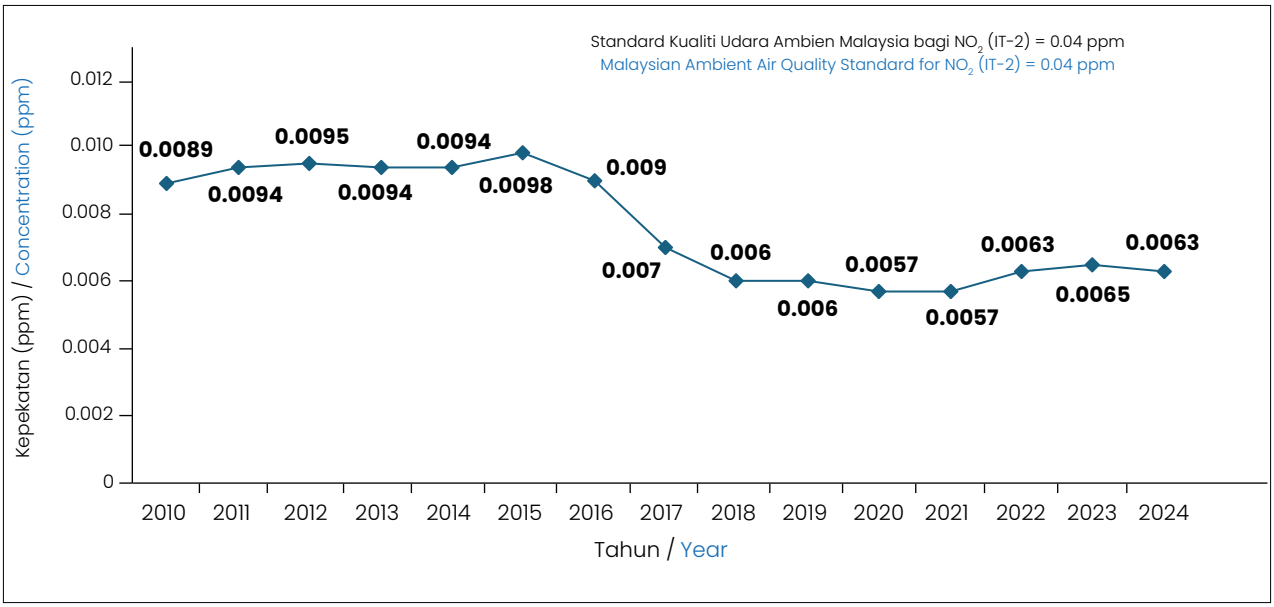
Pada tahun 2024, kepekatan purata tahunan NO_2 adalah lebih rendah dibandingkan dengan tahun 2023 iaitu dengan bacaan 0.0063 ppm, jauh berada di bawah had yang ditetapkan dalam Standard Kualiti Udara Ambien Malaysia IT-2 seperti yang ditunjukkan di dalam **Rajah 1.19**. Kepekatan NO_2 tinggi di kawasan bandar seperti yang ditunjukkan di dalam **Rajah 1.20**. Ini mungkin disebabkan oleh pelepasan asap dari kenderaan bermotor memandangkan kawasan bandar mempunyai jumlah kenderaan yang sangat tinggi.

Nitrogen Dioxide (NO_2)

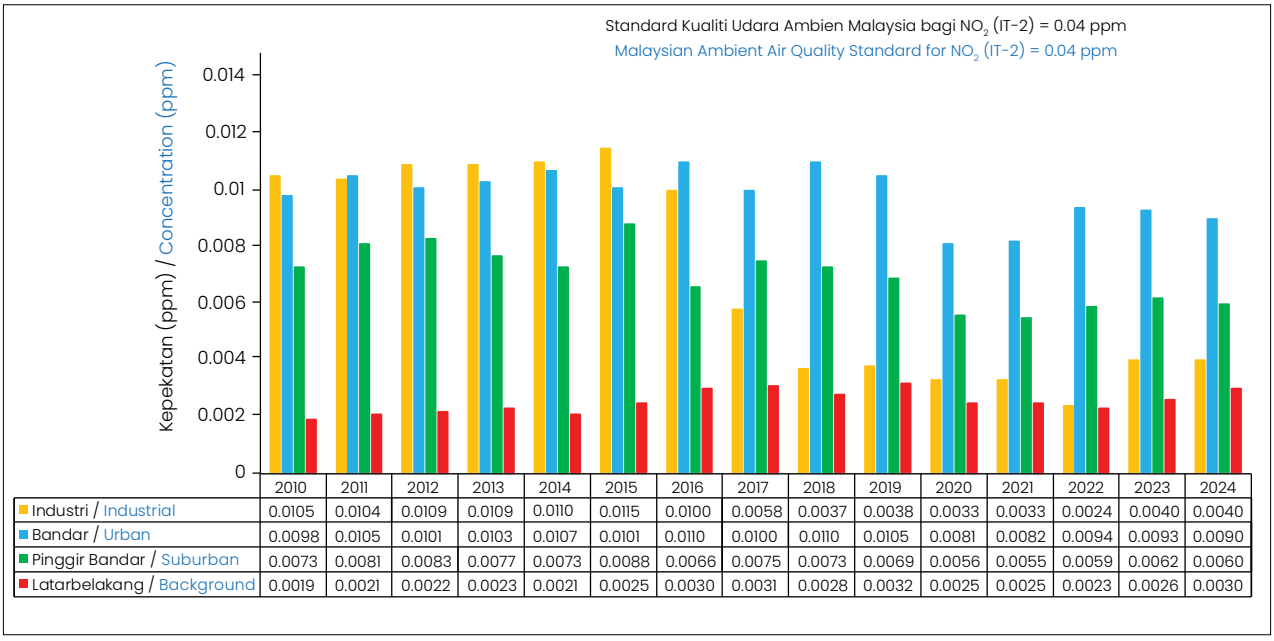
In the year 2024, the annual average concentration of NO_2 was lower than the year 2023 with the average reading at 0.0063 ppm which is much lower than the limit set in the Malaysia Ambient Air Quality Standard IT-2 as shown in **Figure 1.19**. The concentration of NO_2 is high in urban areas as shown in **Figure 1.20**. This may be due to smoke emissions from motor vehicles as urban areas have very high number of vehicles.



Gunung Kinabalu, Sabah



Rajah 1.19: Purata Kepekatan Tahunan Nitrogen Dioksida (NO_2), 2010 - 2024
Figure 1.19: Annual Average Concentration of Nitrogen Dioxide (NO_2), 2010 - 2024



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	0.0105	0.0104	0.0109	0.0109	0.0110	0.0115	0.0100	0.0058	0.0037	0.0038	0.0033	0.0033	0.0024	0.0040	0.0040
Bandar / Urban	0.0098	0.0105	0.0101	0.0103	0.0107	0.0101	0.0110	0.0100	0.0110	0.0105	0.0081	0.0082	0.0094	0.0093	0.0090
Pinggir Bandar / Suburban	0.0073	0.0081	0.0083	0.0077	0.0073	0.0088	0.0066	0.0075	0.0073	0.0069	0.0056	0.0055	0.0059	0.0062	0.0060
Latarbelakang / Background	0.0019	0.0021	0.0022	0.0023	0.0021	0.0025	0.0030	0.0031	0.0028	0.0032	0.0025	0.0025	0.0023	0.0026	0.0030

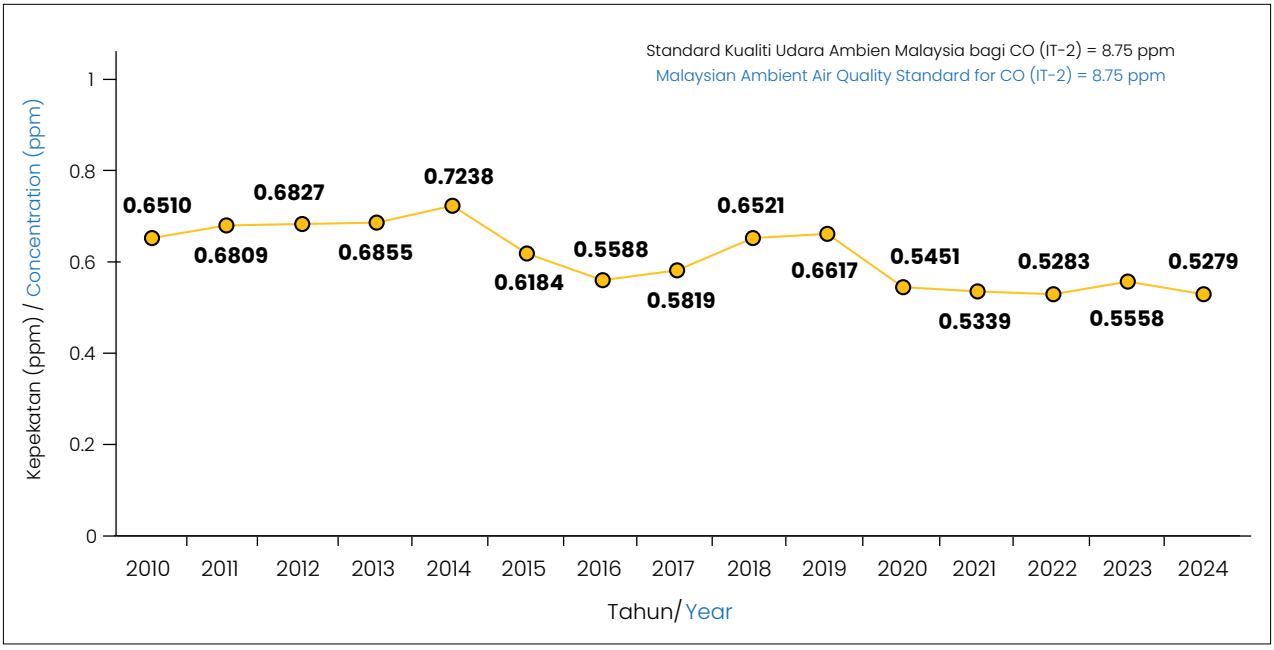
Rajah 1.20: Purata Kepekatan Tahunan Nitrogen Dioksida (NO_2) Mengikut Guna Tanah, 2010 - 2024
Figure 1.20: Annual Average Concentration of Nitrogen Dioxide (NO_2) Based on Land Use, 2010 - 2024

Karbon Monoksida (CO)

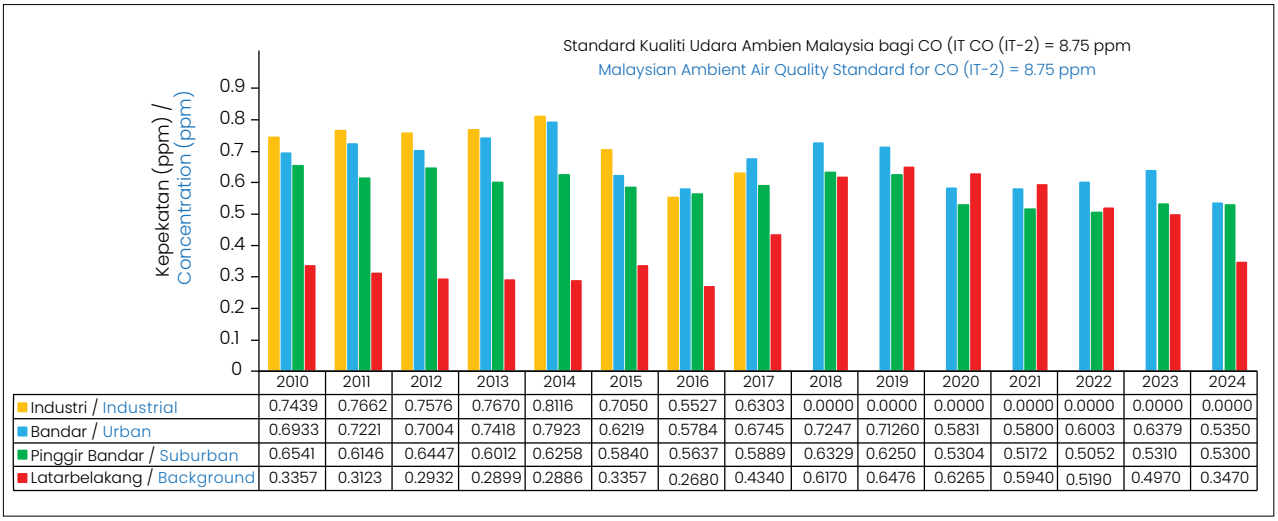
Kepekatan purata tahunan CO pada tahun 2024 menunjukkan penurunan berbanding tahun 2023 iaitu dengan bacaan 0.5279 ppm yang mematuhi Standard Kualiti Udara Ambien Malaysia IT-2 (**Rajah 1.21**). **Rajah 1.22** menunjukkan kepekatan CO untuk pelbagai kategori guna tanah di mana kawasan bandar masih merekodkan bacaan purata tahunan CO tertinggi berbanding dengan kawasan yang lain.

Carbon Monoxide (CO)

The annual average concentration of CO in 2024 showed an increase compared to 2023 with a reading of 0.5279 ppm which complies with the Malaysian Ambient Air Quality Standard IT-2. **Figure 1.21** and **Figure 1.22** show the concentration of CO for various categories of land use where urban areas continue to record the highest average annual CO readings compared to other areas.



Rajah 1.21: Purata Kepekatan Tahunan Karbon Monoksida (CO), 2010 -2024
Figure 1.21: Annual Average Concentration of Carbon Monoxide (CO), 2010 -2024



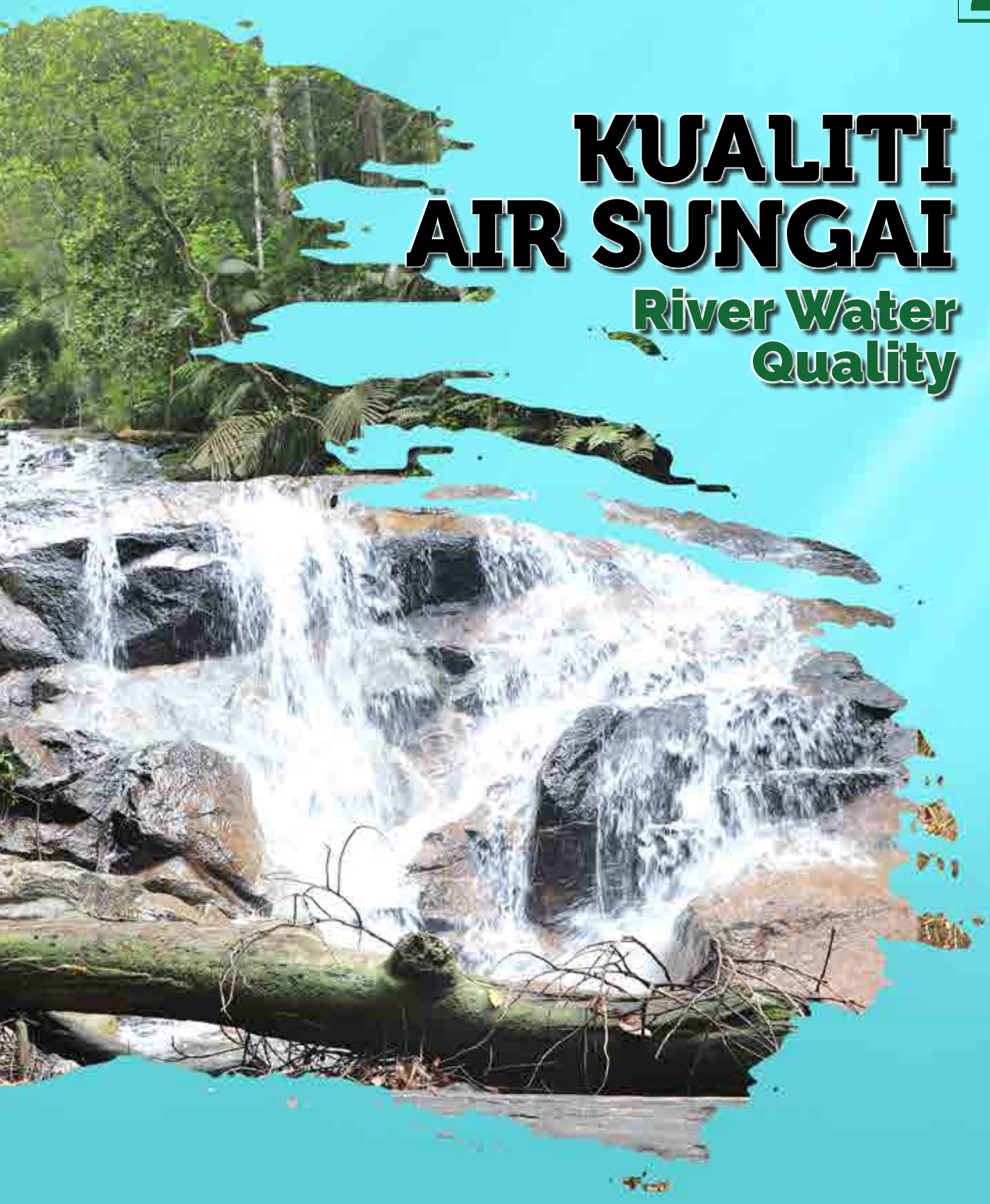
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Industri / Industrial	0.7439	0.7662	0.7576	0.7670	0.8116	0.7050	0.5527	0.6303	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bandar / Urban	0.6933	0.7221	0.7004	0.7418	0.7923	0.6219	0.5784	0.6745	0.7247	0.71260	0.5831	0.5800	0.6003	0.6379	0.5350
Pinggir Bandar / Suburban	0.6541	0.6146	0.6447	0.6012	0.6258	0.5840	0.5637	0.5889	0.6329	0.6250	0.5304	0.5172	0.5052	0.5310	0.5300
Latarbelakang / Background	0.3357	0.3123	0.2932	0.2899	0.2886	0.3357	0.2680	0.4340	0.6170	0.6476	0.6265	0.5940	0.5190	0.4970	0.3470

Rajah 1.22: Purata Kepekatan Tahunan Karbon Monoksida (CO) Mengikut Guna Tanah, 2010 -2024
Figure 1.22: Annual Average Concentration of Carbon Monoxide (CO) Based on Land Use, 2010 -2024

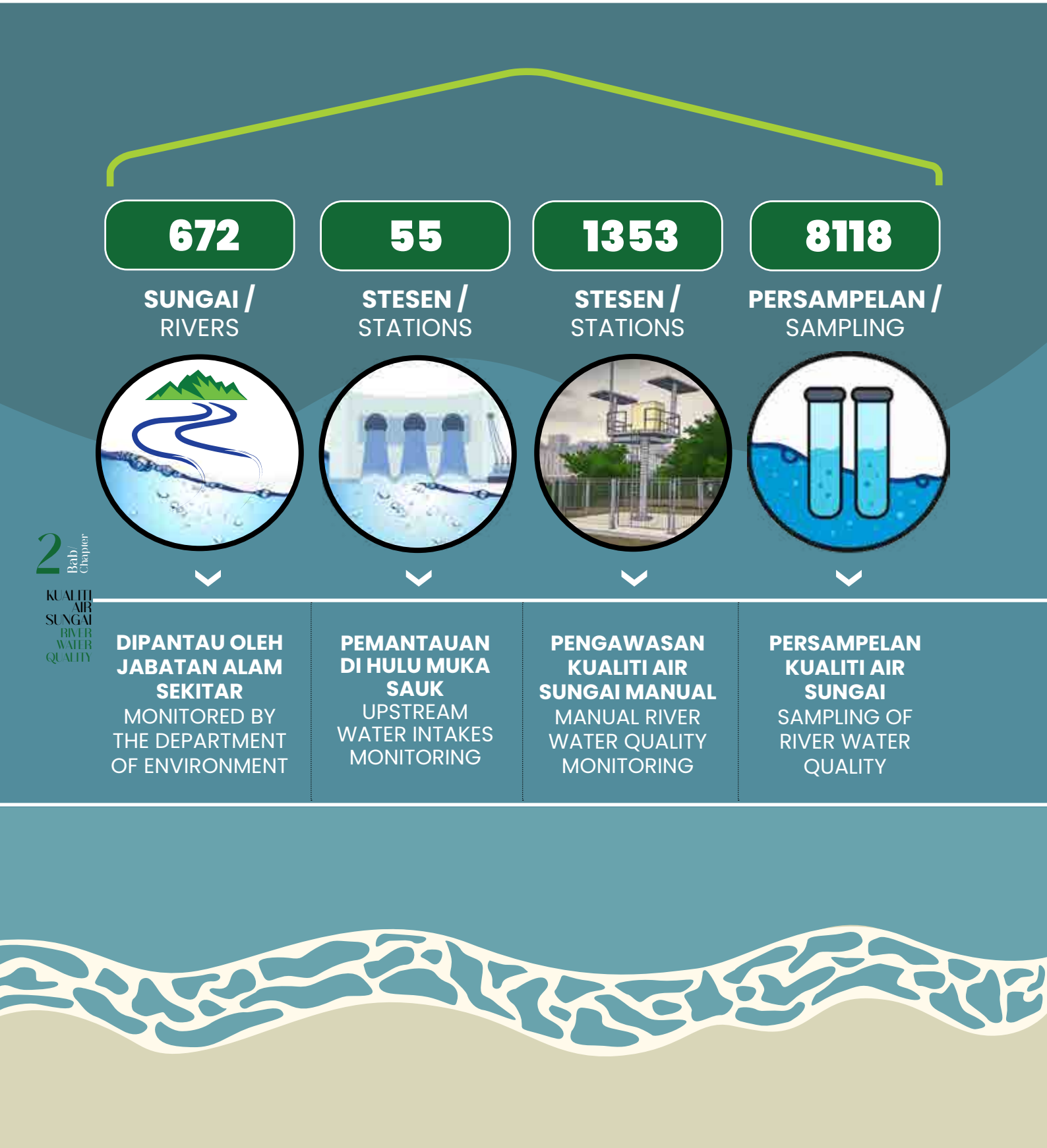
2 Bab/Chapter

KUALITI AIR SUNGAI

River Water Quality



Pengawasan Kualiti Air Sungai Manual / Manual River Water Quality Monitoring



Pengawasan Kualiti Air Sungai Automatik / Continuous River Water Quality Monitoring

26
SUNGAI/RIVERS

DIPANTAU OLEH JABATAN ALAM SEKITAR
Monitored By the Department of Environment

30
STESEN/STATIONS

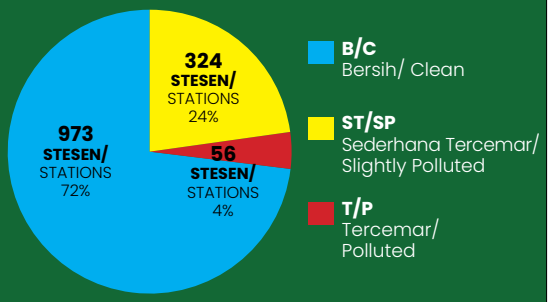
PENGAWASAN KUALITI AIR SUNGAI AUTOMATIK
Continuous Monitoring Stations

17
PARAMETER/PARAMETERS

DIPANTAU OLEH JABATAN ALAM SEKITAR
Monitored By the Department of Environment

STATUS KUALITI AIR MENGIKUT STESEN / WATER QUALITY STATUS BY STATION

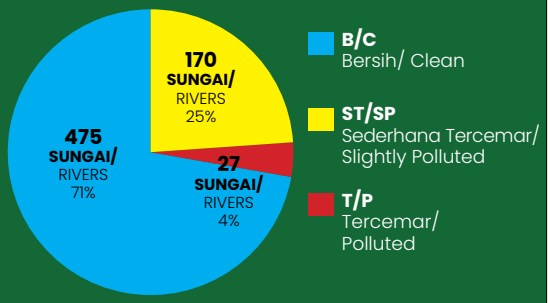
KELAS I CLASS I	KELAS II CLASS II	KELAS III CLASS III	KELAS IV CLASS IV	KELAS V CLASS V
328 STESEN STATIONS (24%)	729 STESEN STATIONS (54%)	272 STESEN STATIONS (20%)	24 STESEN STATIONS (2%)	0 STESEN STATIONS (0%)



INDEKS KUALITI AIR MENGIKUT STESEN
WATER QUALITY INDEX BY STATION

STATUS KUALITI AIR MENGIKUT SUNGAI / WATER QUALITY STATUS BY RIVER

KELAS I CLASS I	KELAS II CLASS II	KELAS III CLASS III	KELAS IV CLASS IV	KELAS V CLASS V
157 SUNGAI RIVERS (24%)	365 SUNGAI RIVERS (54%)	136 SUNGAI RIVERS (20%)	14 SUNGAI RIVERS (2%)	0 SUNGAI RIVERS (0%)



INDEKS KUALITI AIR MENGIKUT SUNGAI
WATER QUALITY INDEX BY RIVER

KUALITI AIR SUNGAI/ River Water Quality

PENGAWASAN KUALITI AIR SUNGAI MANUAL

Jabatan Alam Sekitar (JAS) meneruskan program pengawasan kualiti air sungai pada tahun 2024 bagi menentukan kualiti air sungai dan mengesan perubahan ke atas kualiti air sungai. Sampel-sampel air sungai diambil daripada stesen-stesen yang telah ditetapkan dan diukur kualitinya secara in-situ serta dihantar ke makmal untuk dianalisa bertujuan menentukan kriteria dari segi fizik-kimia dan biologi. Indeks Kualiti Air (IKA) digunakan untuk mengukur tahap pencemaran dan kesesuaian jenis guna air seperti yang digariskan di dalam Standard Kualiti Air Negara. Standard Kualiti Air Negara merupakan standard ambien untuk melindungi kepelbagaian biologi akuatik sebagai penanda aras untuk penetapan jenis guna air bagi sungai tertentu.

IKA adalah julat indeks daripada 0 hingga 100 di mana julat ini dibahagi kepada tiga (3) kategori iaitu bersih, sederhana tercemar dan tercemar. Indeks ini berdasarkan kepada enam (6) parameter iaitu oksigen terlarut (DO), keperluan oksigen biokimia (BOD), keperluan oksigen kimia (COD), ammoniakal nitrogen (AN), pepejal terampai (SS) dan pH.

Pada tahun 2024, sebanyak 1,353 stesen pengawasan kualiti air sungai manual yang merangkumi 672 sungai telah dipantau di negara ini. Frekuensi persampelan bagi setiap stesen pengawasan kualiti air sungai manual dijalankan sebanyak enam (6) kali setahun dengan jumlah persampelan sebanyak 8,118.

Pelaporan status kualiti air dilaporkan di dalam dua (2) pendekatan iaitu:-

i. Status kualiti air mengikut sungai; dan
ii. Status kualiti air mengikut stesen

Bagi pelaporan status kualiti air mengikut sungai, Indeks Kualiti Air (IKA) ditentukan dengan menggunakan kaedah pengiraan median yang diambil daripada semua data yang direkodkan di setiap stesen untuk mendapatkan nilai IKA keseluruhan bagi sungai tersebut. Pelaporan status kualiti air mengikut sungai adalah menggambarkan status kualiti air bagi keseluruhan sungai berdasarkan jumlah stesen yang dipantau.

Manakala bagi pelaporan status kualiti air mengikut stesen, penentuan IKA adalah berdasarkan pengiraan secara median bagi enam (6) IKA di stesen tersebut. Pelaporan status kualiti air mengikut stesen adalah menggambarkan status kualiti air di stesen tersebut sahaja (**ANNEX**).

MANUAL RIVER WATER QUALITY MONITORING

The Department of Environment (DOE) continued the river water quality monitoring programme in 2024, which is done to determine the status of river water quality and to detect changes in river water quality. Water samples were collected from designated stations for in-situ measurements and were also sent to the laboratory for analysis, focusing on determining criteria based on physic-chemical and biological sciences. The Water Quality Index (WQI) is used to indicate the level of pollution and the corresponding suitability in terms of water use according to the National Water Quality Standards for Malaysia (NWQS). NWQS is an ambient standard to protect aquatic biodiversity and used as a benchmark for the setting of water use for certain rivers.

WQI is an index ranged from 0 to 100 where the range is divided into three (3) categories of clean, slightly polluted, and polluted. The index is derived based on six (6) parameters, which are dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), ammoniacal nitrogen (AN), suspended solids (SS), and pH.

In 2024, a total of 1,353 manual river water quality monitoring stations covering 672 rivers were monitored in this country. The sampling frequency for each manual river water quality monitoring station is six (6) times a year with a total sampling of 8,118.

Reporting of water quality status is reported in two (2) approaches:-

i. River water quality status by river; and
ii. River water quality status by station

For water quality status reporting by river, the Water Quality Index (WQI) is determined using the median calculation method which involves calculating the median WQI from all the data recorded at each station to obtain the overall WQI for the river. The reporting of water quality status by river reflects the quality status of the entire river based on the number of stations monitored.

While for water quality status reporting by station, the WQI determination is based on the median calculation of six (6) WQI at the station. The reporting of water quality status by station reflects the quality status at the station only (**ANNEX**).

STATUS KUALITI AIR MENGIKUT SUNGAI

Status kualiti air bagi 672 sungai telah dipantau pada tahun 2024. Daripada 672 sungai yang dipantau, sebanyak 475 (71%) sungai dikategorikan sebagai bersih, 170 (25%) sungai dikategorikan sebagai sederhana tercemar dan 27 (4%) dikategorikan sebagai tercemar. IKA bagi tempoh lima (5) tahun di 672 sungai yang dipantau adalah seperti di dalam **Jadual 2.1**. Trend bagi kualiti air sungai yang dipantau adalah seperti dalam **Rajah 2.1**.

Bagi pengkelasan IKA, sebanyak 157 (24%) sungai berada di dalam Kelas I, 365 (54%) sungai di dalam Kelas II, 136 (20%) sungai di Kelas III dan 14 (2%) sungai di Kelas IV.

Petunjuk utama yang diambil kira untuk menentukan kualiti air sungai adalah berdasarkan parameter BOD, AN dan SS. Punca kemerosotan kualiti air disebabkan oleh pelepasan beban bahan pencemar sama ada daripada punca tetap atau punca tidak tetap.

Punca tetap beban pencemaran air adalah punca-punca yang mempunyai takat pelepasan yang boleh dikenal pasti dan tidak berubah dalam masa yang singkat seperti sektor industri, ternakan, sistem rawatan kumbahan dan sebagainya.

Manakala punca tidak tetap seperti aktiviti pertanian, kerja tanah, perlombongan dan kumbahan bukan najis (air cucian dapur dan bilik air selain kumbahan) tidak mempunyai takat pelepasan yang tetap dan sering berubah-ubah yang menyukarkan anggaran

WATER QUALITY STATUS BY RIVER

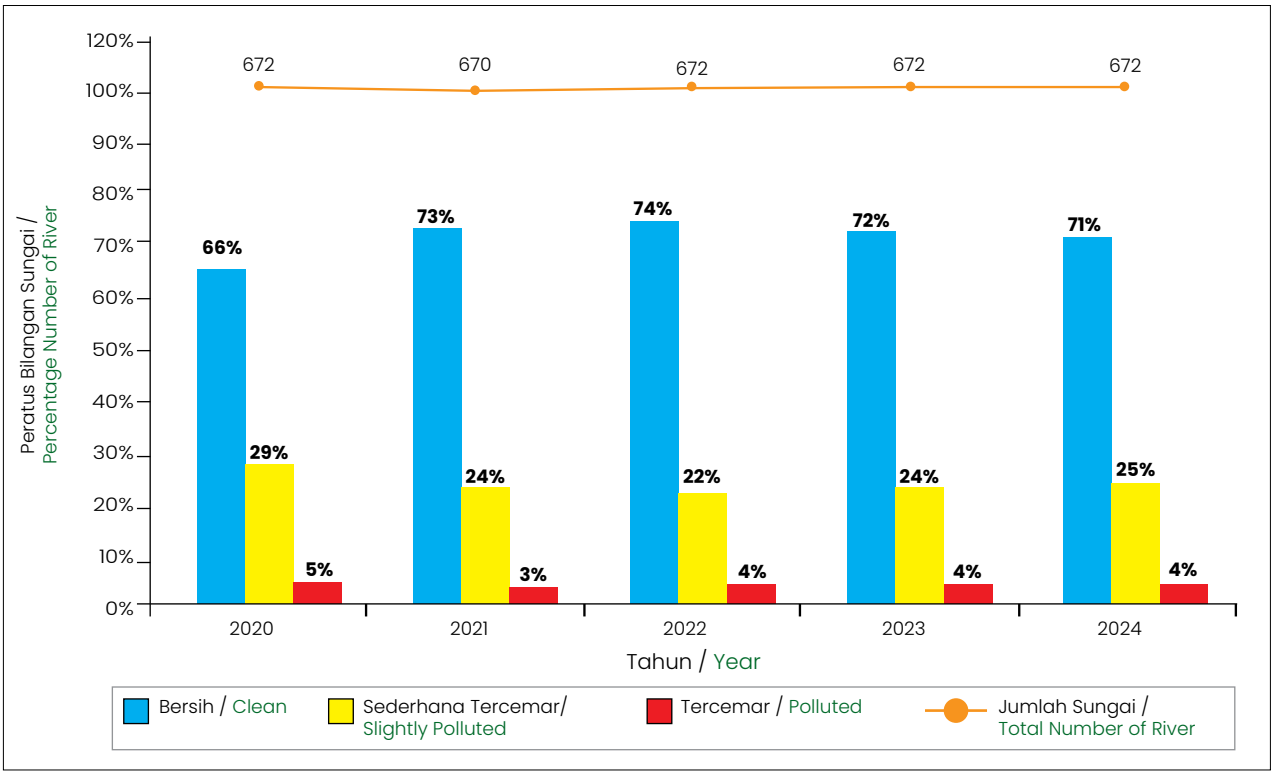
The water quality status of a total of 672 rivers were monitored in 2024. Out of the 672 rivers monitored, the water quality of 475 (71%) rivers were indicated as clean, 170 (25%) rivers were indicated as slightly polluted, and 27 (4%) rivers were indicated as polluted. The WQI over five (5) year period for the 672 monitoredriver is as shown in **Table 2.1**. The trend of the monitored river water quality is as shown in **Figure 2.1**.

For WQI classification, as many as 157 (24%) rivers are in Class I, 365 (54%) rivers are in Class II, 136 (20%) rivers are in Class III, and 14 (2%) rivers are in Class IV.

The main indicators were considered to determine the quality of river water based on the parameters of BOD, AN, and SS. The cause of the deterioration of water quality is due to the discharge of the pollution load either from a point source or from a nonpoint source.

Point sources can be described as pollution sources that have specific identifiable discharge points which are unchanged over time. Sectors such as industry, livestock, and sewage treatment systems fall under this category.

Meanwhile nonpoint sources such agricultural activities, earthworks, mining, and sullage (domestic wastewater other than sewage including kitchen and bathroom wastewater) do not have specific identifiable discharge points and the locations are



Rajah 2.1: Trend Kualiti Air Sungai, 2020-2024
Figure 2.1: River Water Quality Trend, 2020-2024

pelepasan beban pencemaran dibuat. Kajian berkaitan beban pencemaran di bawah kategori ini bagi Malaysia tidak banyak dibuat dan tersedia untuk rujukan buat masa ini.

BOD adalah jumlah oksigen yang diperlukan oleh bakteria atau mikroorganisma yang lain untuk menguraikan bahan organik. Kepekatan BOD yang tinggi kerap kali dikaitkan dengan pelepasan efluen yang berterusan daripada industri. AN dikaitkan dengan aktiviti penternakan haiwan berkaki dan kumbahan domestik. Manakala SS dikaitkan dengan kerja-kerja tanah yang tidak teratur dan aktiviti pembukaan tanah yang tidak terkawal.

Jadual 2.2 menunjukkan kualiti air sungai yang dikategorikan sebagai tercemar berdasarkan sub-indeks BOD, AN dan SS pada tahun 2024. Daripada 27 sungai yang dikategorikan sebagai tercemar, sebanyak 13 sungai berada di Kelas III manakala 14 sungai di Kelas IV.

Berdasarkan sub-indeks BOD, sebanyak lima (5) berada di Kelas II, sembilan (9) di Kelas IV dan selebihnya 13 sungai berada di Kelas V.

Dari segi sub-indeks AN pula, sebanyak dua (2) sungai berada di Kelas II, dua (2) sungai di Kelas III, lapan (8) di Kelas IV dan selebihnya 15 sungai berada di Kelas V.

Dari segi sub-indeks SS, 19 sungai berada di Kelas I, lima (5) sungai di Kelas II dan tiga (3) sungai berada di Kelas III.

varied over time. This makes it difficult to estimate the amount of released pollution loads. Studies on pollution load under this category in Malaysia and available reference data is still limited.

BOD is the amount of oxygen required by bacteria or other microorganisms to decompose organic matter. High BOD concentrations are often associated with continuous discharge of effluents from industries. AN is associated with livestock farming activities and domestic sewage, while SS is caused by improper earthworks and uncontrolled land clearing activities.

Table 2.2 shows the quality of river water categorised as polluted based on the BOD, AN, and SS sub-indexes in 2024. Out of the 27 rivers categorised as polluted, 13 rivers were in Class III while 14 rivers were in Class IV.

Based on the BOD sub-index, five (5) rivers were in Class II, nine (9) rivers in Class IV, and the remaining 13 rivers were in Class V.

In terms of sub-index AN, two (2) rivers were in Class II, two (2) rivers in Class III, eight (8) rivers in Class IV, and the remaining 15 rivers were in Class V.

In terms of SS sub-index, 19 rivers were in Class I, five (5) rivers in Class II, and three (3) rivers in Class III.

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Perlis	Sg. Perlis	Sg. Arau	83	89	88	89	90	B/C
		Sg. Empangan Timah Tasoh	93	95	96	95	95	B/C
		Sg. Jarum	88	91	89	88	90	B/C
		Sg. Jernih	91	93	95	94	95	B/C
		Sg. Kok Mak	88	87	88	86	85	B/C
		Sg. Korok	75	76	74	79	75	ST/SP
		Sg. Ngulang	90	92	93	88	87	B/C
		Sg. Pelarit	94	96	96	96	97	B/C
		Sg. Perlis	76	77	78	81	70	ST/SP
		Sg. Serai	82	86	90	86	89	B/C
		Sg. Terusan Mada	88	91	91	92	90	B/C
		Sg. Wang Kelian	95	97	97	97	97	B/C
Kedah	Sg. Kedah	Sg. Ahning	92	96	95	94	97	B/C
		Sg. Changlun	87	88	87	86	87	B/C
		Sg. Janing	93	97	97	97	97	B/C
		Sg. Kedah	70	77	76	73	67	ST/SP

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NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Kedah	Sg. Kedah	Sg. Napoh	82	89	90	88	87	B/C
		Sg. Padang Terap	86	93	91	92	95	B/C
		Sg. Pedu	91	95	94	95	94	B/C
		Sg. Pendang	81	82	85	85	82	B/C
		Sg. Sintok	92	96	95	92	90	B/C
		Sg. Tekai	88	94	93	91	92	B/C
		Sg. Temin	84	89	89	87	86	B/C
		Sg. Terusan Lengkuas	86	92	92	93	95	B/C
		Sg. Terusan Mada Selatan	89	92	90	91	90	B/C
		Sg. Terusan Tengah	88	93	93	94	96	B/C
	Sg. Kisap	Sg. Kisap	95	97	97	96	97	B/C
	Sg. Kuah	Sg. Kuah	81	79	81	69	79	ST/SP
	Sg. Merbok	Sg. Bakar Arang	56	69	66	58	60	ST/SP
		Sg. Batu	70	64	59	65	52	T/P
		Sg. Bongkok	71	75	71	74	69	ST/SP
		Sg. Bukit Merah	92	92	89	95	92	B/C
		Sg. Bukit Nanas	95	97	97	98	97	B/C
		Sg. Korok	65	71	66	64	70	ST/SP
		Sg. Merbok	79	81	81	82	83	B/C
		Sg. Petani	63	68	64	53	65	ST/SP
		Sg. Tok Pawang	90	95	94	96	94	B/C
		Sg. Tupah	94	97	97	98	98	B/C
	Sg. Muda	Sg. Chepir	89	91	92	90	93	B/C
		Sg. Gunung Inas	93	93	95	96	89	B/C
		Sg. Jerong	68	78	71	74	75	ST/SP
		Sg. Karangan	85	91	83	87	84	B/C
		Sg. Ketil	87	93	91	93	96	B/C
		Sg. Muda	87	92	91	92	94	B/C
		Sg. Pegang	95	97	97	97	97	B/C
		Sg. Sedim	89	92	92	93	94	B/C
		Sg. Tawar	88	89	94	91	89	B/C
	Sg. Ulu Melaka	Sg. Chenang	78	84	77	84	76	ST/SP
		Sg. Melaka	90	92	93	93	92	B/C
		Sg. Petang	96	97	98	97	97	B/C
		Sg. Saga	81	92	88	85	90	B/C
		Sg. Tuba	94	96	97	96	96	B/C
P.Pinang/ Kedah	Sg. Perai	Sg. Air Melintas	58	57	60	64	59	T/P
		Sg. Jarak	73	73	72	73	74	ST/SP
		Sg. Keladi	78	81	82	82	78	ST/SP
		Sg. Kereh	55	62	57	60	55	T/P
		Sg. Kubang Semang	64	66	68	74	63	ST/SP
		Sg. Kulim	89	92	92	88	92	B/C
		Sg. Perai	66	70	62	66	65	ST/SP

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			2020	2021	2022	2023	2024	
P.Pinang/ Kedah	Sg. Perai	Sg. Pertama	65	69	52	63	63	ST/SP
		Sg. Seluang	64	67	65	64	57	T/P
		Sg. Seluang Bawah	61	71	67	63	61	ST/SP
P.Pinang	Sg. Bayan Lepas	Sg. Bayan Lepas	64	74	69	71	74	ST/SP
		Sg. Tiram	73	74	76	68	70	ST/SP
	Sg. Jawi	Sg. Chempedak	47	41	36	55	42	T/P
		Sg. Jawi	55	52	57	54	52	T/P
		Sg. Junjong	66	60	63	66	64	ST/SP
		Sg. Machang Bubok	76	72	68	73	65	ST/SP
		Sg. Tengah	49	58	47	63	55	T/P
	Sg. Juru	Sg. Ara	67	77	75	77	75	ST/SP
		Sg. Juru	68	69	68	63	62	ST/SP
		Sg. Kilang Ubi	70	71	72	65	70	ST/SP
		Sg. Pasir	65	75	66	63	63	ST/SP
		Sg. Permatang Rawa	59	75	77	74	70	ST/SP
		Sg. Rambai	57	59	56	57	53	T/P
	Sg. Kluang	Sg. Ara	82	90	88	89	87	B/C
		Sg. Dua Besar	64	68	67	63	63	ST/SP
		Sg. Kluang	65	68	52	58	45	T/P
		Sg. Relau	66	68	69	65	73	ST/SP
	Sg. Pinang	Sg. Air Itam	77	79	69	69	76	ST/SP
		Sg. Air Terjun	95	97	97	97	97	B/C
		Sg. Batu Feringghi	92	94	92	94	95	B/C
		Sg. Dondang	73	77	65	66	70	ST/SP
		Sg. Jelutong	63	65	68	63	72	ST/SP
		Sg. Pinang	69	71	64	50	58	T/P
		Sg. Satu	96	97	97	97	98	B/C
		Sg. Titi Kerawang	68	75	63	57	57	T/P
P.Pinang/ Kedah/Perak	Sg. Kerian	Sg. Kechil	86	89	89	89	88	B/C
		Sg. Kerian	86	88	88	87	88	B/C
		Sg. Selama	88	89	89	90	91	B/C
		Sg. Semang	81	80	81	72	80	ST/SP
		Sg. Serdang	71	80	83	89	92	B/C
		Sg. Terusan Bagan Serai	93	93	93	94	94	B/C
Perak	Sg. Bruas	Sg. Bruas	90	94	95	95	96	B/C
		Sg. Dandang	91	94	95	95	95	B/C
		Sg. Licin	96	97	97	97	97	B/C
		Sg. Rotan	89	93	92	93	93	B/C
	Sg. Kurau	Sg. Air Hitam	95	98	97	96	97	B/C
		Sg. Ara	93	96	96	96	97	B/C
		Sg. Kurau	86	87	85	85	87	B/C
	Sg. Perak	Sg. Batang Padang	88	90	90	91	91	B/C
		Sg. Behrang	97	97	98	97	98	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
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NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Perak	Sg. Perak	Sg. Berok	96	97	97	96	97	B/C
		Sg. Bidor	84	87	89	88	90	B/C
		Sg. Chenderiang	93	94	94	91	96	B/C
		Sg. Chepor	96	97	96	97	97	B/C
		Sg. Cuar	87	96	95	95	96	B/C
		Sg. Ibol	94	97	96	97	97	B/C
		Sg. Kampar	92	95	95	93	94	B/C
		Sg. Kangsar	91	93	94	96	96	B/C
		Sg. Kepayang	79	84	78	84	86	B/C
		Sg. Kerbau	94	96	95	96	95	B/C
		Sg. Kerdah	80	82	81	82	79	ST/SP
		Sg. Kinjang	96	97	97	97	97	B/C
		Sg. Kinta	83	85	83	85	85	B/C
		Sg. Klah	91	95	90	92	94	B/C
		Sg. Klian Baru	81	84	77	79	85	B/C
		Sg. Klian Gunong	96	97	96	97	97	B/C
		Sg. Kuang	81	88	85	88	87	B/C
		Sg. Manong	95	97	97	98	98	B/C
		Sg. Nyamok	76	77	74	73	72	ST/SP
		Sg. Pari	80	82	86	89	86	B/C
		Sg. Pelus	88	90	88	89	87	B/C
		Sg. Perak	89	92	94	93	94	B/C
		Sg. Pinji	73	76	77	79	80	ST/SP
		Sg. Pulau	95	97	97	97	97	B/C
		Sg. Raia	86	90	90	91	91	B/C
		Sg. Rui	94	95	89	92	95	B/C
		Sg. Seluang	72	62	62	66	68	ST/SP
		Sg. Serokai	73	77	81	83	85	B/C
		Sg. Sintang	72	72	67	64	68	ST/SP
		Sg. Sungkai	91	94	92	90	92	B/C
		Sg. Sungkai Mati	81	81	84	87	74	ST/SP
		Sg. Tapah	96	97	96	97	97	B/C
		Sg. Teja	82	88	85	81	83	B/C
		Sg. Tesong	96	97	97	97	97	B/C
		Sg. Tumboh	73	73	76	76	78	ST/SP
		Sg. Woh	96	97	98	97	97	B/C
	Sg. Raja Hitam	Sg. Derhaka	77	79	75	74	77	ST/SP
		Sg. Manjong	86	87	86	88	86	B/C
		Sg. Nyior	96	97	97	98	98	B/C
		Sg. Raja Hitam	72	80	75	73	81	B/C
	Sg. Sepetang	Sg. Batu Tegoh	90	93	91	91	92	B/C
		Sg. Jana	83	84	84	88	87	B/C
		Sg. Lidin	84	86	84	86	84	B/C

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NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Perak	Sg. Sepetang	Sg. Limau	91	96	96	96	96	B/C
		Sg. Malai	76	80	76	74	77	ST/SP
		Sg. Nyior	95	97	97	97	95	B/C
		Sg. Sepetang	79	81	79	79	82	B/C
		Sg. Temerloh	88	95	94	94	91	B/C
		Sg. Trong	95	96	97	97	96	B/C
	Sg. Wangi	Sg. Deralik	73	74	74	75	75	ST/SP
		Sg. Wangi	81	76	69	82	81	B/C
Selangor/ Perak	Sg. Bernam	Sg. Bernam	83	91	88	90	89	B/C
		Sg. Dusun	91	95	95	95	95	B/C
		Sg. Gelinting	92	96	96	97	92	B/C
		Sg. Inki	94	97	97	97	97	B/C
		Sg. Slim	88	94	92	92	92	B/C
		Sg. Trolak	92	96	95	96	95	B/C
Selangor	Sg. Buloh	Sg. Buloh	60	56	51	54	67	ST/SP
	Sg. Selangor	Sg. Air Hitam	75	80	77	73	75	ST/SP
		Sg. Batang Kali	90	96	93	91	90	B/C
		Sg. Guntong	80	81	83	82	78	ST/SP
		Sg. Kanching	90	96	93	94	94	B/C
		Sg. Kerling	94	97	96	97	97	B/C
		Sg. Kundang	70	71	77	77	77	ST/SP
		Sg. Rangkap	95	96	97	97	96	B/C
		Sg. Rawang	77	81	81	82	82	B/C
		Sg. Selangor	85	91	91	90	91	B/C
		Sg. Sembah	75	83	82	81	83	B/C
		Sg. Serendah	90	96	95	95	95	B/C
	Sg. Sepang	Sg. Sepang	78	82	84	88	84	B/C
	Sg. Tengi	Sg. Tengi	87	91	89	88	88	B/C
Selangor/ W.P. Kuala Lumpur	Sg. Klang	Sg. Air Busuk	41	40	52	42	46	T/P
		Sg. Ampang	64	66	72	70	73	ST/SP
		Sg. Anak Air Batu	81	89	80	81	82	B/C
		Sg. Batu	68	71	79	73	73	ST/SP
		Sg. Belongkong	69	73	65	78	74	ST/SP
		Sg. Bunos	70	76	71	68	70	ST/SP
		Sg. Damansara	65	76	69	66	69	ST/SP
		Sg. Gombak	73	74	83	82	74	ST/SP
		Sg. Jinjang	64	71	70	68	67	ST/SP
		Sg. Kerayong	58	62	59	58	57	T/P
		Sg. Keroh	64	69	68	65	70	ST/SP
		Sg. Klang	61	67	70	69	63	ST/SP
		Sg. Kuyoh	62	69	68	68	66	ST/SP
		Sg. Penchala	60	80	76	71	68	ST/SP

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Selangor/ W.P. Kuala Lumpur	Sg. Klang	Sg. Pusu	71	80	78	75	74	ST/SP
		Sg. Rasau	83	87	93	94	91	B/C
		Sg. Rumput	92	97	95	97	97	B/C
		Sg. Semelah	83	87	90	91	84	B/C
		Sg. Toba	61	69	63	53	60	ST/SP
		Sg. Untut	64	73	78	64	65	ST/SP
Selangor/ W.P. Putrajaya/ N.Sembilan	Sg. Langat	Sg. Anak Chuau	89	94	94	94	94	B/C
		Sg. Balak	71	70	71	74	68	ST/SP
		Sg. Batang Benar	74	74	76	84	63	ST/SP
		Sg. Batang Labu	79	82	84	82	80	ST/SP
		Sg. Batang Nilai	78	81	79	80	77	ST/SP
		Sg. Beranang	82	87	85	84	82	B/C
		Sg. Buan	80	83	85	82	78	ST/SP
		Sg. Chuau	91	94	94	94	94	B/C
		Sg. Jijan	85	82	88	88	86	B/C
		Sg. Langat	77	82	82	83	78	ST/SP
		Sg. Limau Manis	71	75	82	75	82	B/C
		Sg. Pajam	73	68	74	72	74	ST/SP
		Sg. Rinching	88	94	90	95	89	B/C
		Sg. Semenyih	83	87	86	86	84	B/C
		Sg. Sering	69	72	80	81	83	B/C
N.Sembilan	Sg. Lukut	Sg. Lukut	74	73	80	79	79	ST/SP
N.Sembilan/ Selangor	Sg. Sepang	Sg. Rambai	25	25	60	64	61	ST/SP
N.Sembilan/ Melaka	Sg. Baru	Sg. Baru	74	70	75	79	78	ST/SP
	Sg. Linggi	Sg. Batang Penar	89	93	90	90	86	B/C
		Sg. Batu Hampar	93	91	93	92	91	B/C
		Sg. Chembong	93	88	89	92	94	B/C
		Sg. Empangan Terip	80	82	85	83	83	B/C
		Sg. Jelai	89	86	88	87	89	B/C
		Sg. Kayu Ara	77	80	84	81	78	ST/SP
		Sg. Kenaboi	83	87	85	89	81	B/C
		Sg. Kepayong	88	89	85	93	90	B/C
		Sg. Kundur Besar	91	92	92	93	95	B/C
		Sg. Linggi	79	84	85	84	82	B/C
		Sg. Muar	88	93	91	93	94	B/C
		Sg. Ngoi Ngoi	76	80	83	80	80	ST/SP
		Sg. Paroi	78	80	85	80	83	B/C
		Sg. Pedas	90	94	93	95	92	B/C
		Sg. Rembau	91	92	91	91	86	B/C
		Sg. Senawang	73	77	81	83	84	B/C
		Sg. Simin	82	85	87	84	80	ST/SP
		Sg. Simpang Ampat	83	87	84	87	87	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
N.Sembilan/ Melaka	Sg. Linggi	Sg. Siput	87	90	90	89	90	B/C
		Sg. Temiang	78	71	83	78	82	B/C
		Sg. Tuang	57	62	70	74	69	ST/SP
	Sg. Tuang	Sg. Tuang	59	63	75	75	74	ST/SP
Melaka/ N.Sembilan	Sg. Melaka	Sg. Batang Melaka	88	91	91	92	92	B/C
		Sg. Durian Tunggal	79	86	88	85	85	B/C
		Sg. Dusun	93	94	94	96	95	B/C
		Sg. Kemunting	92	92	91	96	93	B/C
		Sg. Malim	67	68	71	68	66	ST/SP
		Sg. Melaka	78	80	83	84	82	B/C
		Sg. Putat	60	72	67	67	63	ST/SP
		Sg. Rembia	73	77	77	76	77	ST/SP
		Sg. Tampin	92	94	87	93	92	B/C
Melaka	Sg. Duyong	Sg. Duyong	65	71	74	76	81	B/C
		Sg. Gapam	88	92	93	93	91	B/C
		Sg. Punggur	51	63	58	60	69	ST/SP
	Sg. Kesang	Sg. Chin-Chin	78	84	80	84	84	B/C
		Sg. Chohong	88	92	93	94	94	B/C
		Sg. Kesang	77	87	85	86	87	B/C
		Sg. Tangkak	67	77	74	71	75	ST/SP
	Sg. Merlimau	Sg. Merlimau	56	59	61	63	67	ST/SP
	Sg. Seri Melaka	Sg. Air Salak	62	79	78	67	68	ST/SP
		Sg. Seri Melaka	65	66	69	67	67	ST/SP
		Sg. Udang	87	86	91	94	88	B/C
Johor/ N.Sembilan/ Pahang	Sg. Muar	Sg. Air Panas	94	97	96	97	97	B/C
		Sg. Belemang	94	95	94	96	96	B/C
		Sg. Gemas	72	83	82	83	80	ST/SP
		Sg. Gemencheh	82	91	85	92	92	B/C
		Sg. Jelai	88	92	91	94	93	B/C
		Sg. Jementah	93	96	95	96	97	B/C
		Sg. Juasseh	94	95	94	94	95	B/C
		Sg. Kelamah	71	88	79	84	85	B/C
		Sg. Labis	88	88	86	86	87	B/C
		Sg. Meda	82	85	80	85	85	B/C
		Sg. Merbudu	63	77	72	85	81	B/C
		Sg. Merlimau	70	66	73	72	67	ST/SP
		Sg. Muar	83	87	85	88	87	B/C
		Sg. P.Mengkuang	89	92	91	89	93	B/C
		Sg. Pagoh	66	74	76	76	78	ST/SP
		Sg. Palong	85	87	83	88	85	B/C
		Sg. Pendol	90	95	93	95	95	B/C
		Sg. Sarang Buaya	58	60	60	67	69	ST/SP
		Sg. Segamat	90	93	89	91	93	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Johor/ N.Sembilan/ Pahang	Sg. Muar	Sg. Senarut	75	77	79	75	76	ST/SP
		Sg. Serom	63	63	63	67	67	ST/SP
		Sg. Simpang Loi	77	84	73	81	66	ST/SP
		Sg. Tenang	79	76	81	78	85	B/C
Johor	Sg. Air Baloi	Sg. Air Baloi	60	55	58	67	64	ST/SP
	Sg. Batu Pahat	Sg. Amran	75	81	80	82	86	B/C
		Sg. Bantang	96	97	97	97	97	B/C
		Sg. Batu Pahat	66	64	61	63	68	ST/SP
		Sg. Bekok	81	88	83	84	87	B/C
		Sg. Berlian	78	77	79	82	82	B/C
		Sg. Chaah	88	93	90	90	87	B/C
		Sg. Kahang	90	92	82	86	90	B/C
		Sg. Lenik	82	91	90	90	91	B/C
		Sg. Merek	88	89	88	92	90	B/C
		Sg. Merpo	91	90	91	94	94	B/C
		Sg. Panchor	59	63	59	62	68	ST/SP
		Sg. Semberong	58	71	66	77	72	ST/SP
		Sg. Semberong Dam	89	91	89	93	91	B/C
		Sg. Simpang Kanan	59	62	59	62	67	ST/SP
		Sg. Simpang Kiri	67	71	75	69	74	ST/SP
		Sg. Temehel	57	54	59	62	64	ST/SP
	Sg. Benut	Sg. Benut	75	78	77	81	78	ST/SP
		Sg. Machap Dam	92	94	93	90	94	B/C
		Sg. Parit Hj.Yassin	85	81	81	83	84	B/C
		Sg. Pinggan	60	59	63	67	67	ST/SP
		Sg. Ulu Benut	89	90	86	90	91	B/C
	Sg. Danga	Sg. Danga	57	61	64	57	69	ST/SP
	Sg. Endau	Sg. Anak Sg. Semberong	84	85	84	82	71	ST/SP
		Sg. Dengar	84	91	90	90	91	B/C
		Sg. Empangan Labong	89	91	91	91	92	B/C
		Sg. Endau	87	92	91	92	94	B/C
		Sg. Jasin	94	97	96	97	96	B/C
		Sg. Jebong	74	82	75	86	88	B/C
		Sg. Kahang	90	91	90	92	93	B/C
		Sg. Lenga	68	69	74	78	73	ST/SP
		Sg. Lenggor	81	89	89	89	92	B/C
		Sg. Mamai	87	88	89	86	89	B/C
		Sg. Melatai	70	71	73	71	75	ST/SP
		Sg. Mengkibol	77	84	82	81	83	B/C
		Sg. Paloh	82	85	85	90	86	B/C
		Sg. Pamol	72	76	73	69	81	B/C
		Sg. Selai	92	94	94	90	94	B/C
		Sg. Semberong	84	87	83	88	91	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Johor	Sg. Endau	Sg. Singol	79	83	87	84	85	B/C
		Sg. Tamok	91	90	91	87	92	B/C
	Sg. Jemaluang	Sg. Jemaluang	81	88	86	91	91	B/C
	Sg. Johor	Sg. Anak Sg. Sayong	80	90	79	84	83	B/C
		Sg. Belitong	83	89	86	87	85	B/C
		Sg. Berangan	71	82	81	82	84	B/C
		Sg. Bukit Besar	75	82	77	68	75	ST/SP
		Sg. Chemangar	70	73	77	79	80	ST/SP
		Sg. Johor	84	89	89	88	89	B/C
		Sg. Layang	93	93	93	94	95	B/C
		Sg. Layau Kiri	87	92	89	87	93	B/C
		Sg. Lebam	79	87	88	94	90	B/C
		Sg. Linggiu	84	93	92	92	93	B/C
		Sg. Panti	79	87	86	84	90	B/C
		Sg. Papan	81	86	87	90	89	B/C
		Sg. Pelepah	88	91	91	92	92	B/C
		Sg. Penggeli	89	88	90	90	87	B/C
		Sg. Remis	86	89	89	92	86	B/C
		Sg. Santi	89	87	90	92	91	B/C
		Sg. Sayong	82	85	87	88	86	B/C
		Sg. Sebol	73	80	79	80	84	B/C
		Sg. Seluyut	83	87	83	85	90	B/C
		Sg. Semangar	81	92	90	89	90	B/C
		Sg. Semenchu	66	85	86	86	78	ST/SP
		Sg. Sening	89	93	96	94	96	B/C
		Sg. Serai	67	60	62	64	74	ST/SP
		Sg. Telor	88	89	93	92	93	B/C
		Sg. Temoh	74	84	88	79	82	B/C
		Sg. Tiram	76	85	82	87	87	B/C
	Sg. Kaw. Pasir Gudang	Sg. Buluh	41	43	40	46	35	T/P
		Sg. Latoh	62	68	71	69	71	ST/SP
		Sg. Masai	63	60	63	73	69	ST/SP
		Sg. Perembi	57	47	59	69	56	T/P
		Sg. Tukang Batu	42	35	34	35	44	T/P
	Sg. Kempas	Sg. Kempas	32	42	41	38	40	T/P
	Sg. Kim-Kim	Sg. Kim-Kim	74	79	69	84	81	B/C
	Sg. Mersing	Sg. Empangan Congok	85	88	86	92	93	B/C
		Sg. Mersing	86	92	87	92	91	B/C
	Sg. Paloi	Sg. Paloi	89	90	90	91	91	B/C
	Sg. Pontian Besar	Sg. Air Hitam	71	74	73	82	80	ST/SP
		Sg. Ayer Merah	43	54	54	65	61	ST/SP
		Sg. Pontian Besar	73	71	74	81	78	ST/SP

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Johor	Sg. Pontian Kecil	Sg. Pontian Kecil	82	79	77	79	80	ST/SP
	Sg. Pulai	Sg. Pulai	80	80	85	80	76	ST/SP
		Sg. Pulai Dam	95	95	96	96	95	B/C
		Sg. Ulu Choh	72	72	74	74	83	B/C
	Sg. Rambah	Sg. Rambah	68	66	71	70	65	ST/SP
	Sg. Sanglang	Sg. Sanglang	59	57	51	66	63	ST/SP
	Sg. Sedili Besar	Sg. Ambat	86	84	76	88	84	B/C
		Sg. Dohol	89	90	86	89	86	B/C
		Sg. Mupur	67	73	73	60	78	ST/SP
		Sg. Pasir Panjang	88	87	76	71	83	B/C
		Sg. Sedili Besar	86	87	85	89	88	B/C
		Sg. Temubor Kanan	93	95	93	95	93	B/C
	Sg. Sedili Kecil	Sg. Anak Sedili Kecil	64	63	75	80	75	ST/SP
		Sg. Bahan	74	75	69	83	80	ST/SP
		Sg. Sedili Kecil	82	80	82	84	83	B/C
	Sg. Segget	Sg. Segget	65	70	68	52	55	T/P
	Sg. Skudai	Sg. Melana	78	81	83	83	83	B/C
		Sg. Skudai	66	76	74	79	79	ST/SP
	Sg. Tebrau	Sg. Bala	55	47	55	60	63	ST/SP
		Sg. Pandan	46	43	58	44	45	T/P
		Sg. Plentong	56	66	67	63	71	ST/SP
		Sg. Sebulung	53	58	62	56	58	T/P
		Sg. Sengkuang	52	53	50	35	37	T/P
		Sg. Tampoi	52	60	58	54	48	T/P
		Sg. Tebrau	58	71	65	62	65	ST/SP
Pahang	Sg. Anak Endau	Sg. Anak Endau	87	90	89	90	89	B/C
	Sg. Balok	Sg. Balok	69	77	76	76	69	ST/SP
		Sg. Panjang	76	78	72	80	71	ST/SP
		Sg. Yior	62	75	74	72	65	ST/SP
	Sg. Bebar	Sg. Bebar	82	88	87	90	89	B/C
		Sg. Merba	85	91	88	88	86	B/C
		Sg. Serai	79	86	83	87	90	B/C
	Sg. Cherating	Sg. Cherating	81	86	85	86	82	B/C
	Sg. Kuantan	Sg. Belat	80	86	88	87	86	B/C
		Sg. Charu	93	96	95	96	96	B/C
		Sg. Galing Besar	64	67	76	76	77	ST/SP
		Sg. Kenau	94	97	96	97	97	B/C
		Sg. Kuantan	88	93	91	92	92	B/C
		Sg. Pandan	87	93	94	93	95	B/C
		Sg. Pinang	80	88	88	89	85	B/C
		Sg. Reman	87	91	90	91	93	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Pahang	Sg. Kuantan	Sg. Riau	84	88	88	87	82	B/C
		Sg. Talam	72	70	76	70	63	ST/SP
	Sg. Merchong	Sg. Merchong	87	92	87	89	85	B/C
	Sg. Rompin	Sg. Aur	86	91	90	91	88	B/C
		Sg. Bakar	75	69	92	95	94	B/C
		Sg. Jekatih	87	90	91	91	90	B/C
		Sg. Jeram	88	93	90	90	90	B/C
		Sg. Kepasing	88	90	92	88	91	B/C
		Sg. Keratong	85	91	90	91	90	B/C
		Sg. Pontian	85	90	84	88	89	B/C
		Sg. Pukin	86	89	94	94	94	B/C
		Sg. Rompin	83	92	90	89	88	B/C
		Sg. Sepayang	77	84	86	85	85	B/C
	Sg. Tonggok	Sg. Tonggok	76	81	73	80	73	ST/SP
Pahang/ N.Sembilan	Sg. Pahang	Sg. Anak Sg. Lepar	85	93	89	94	91	B/C
		Sg. Batu	84	92	91	94	90	B/C
		Sg. Belayar	94	94	92	93	91	B/C
		Sg. Bentong	89	94	93	92	91	B/C
		Sg. Benus	93	95	91	95	94	B/C
		Sg. Bera	84	86	86	87	84	B/C
		Sg. Berkelah	93	97	97	97	97	B/C
		Sg. Bertam	94	95	95	93	93	B/C
		Sg. Bilut	83	88	89	88	92	B/C
		Sg. Burung	96	96	95	93	90	B/C
		Sg. Chini	82	84	85	84	86	B/C
		Sg. Gapoi	94	97	96	97	97	B/C
		Sg. Habu	90	96	94	94	96	B/C
		Sg. Jelai	88	92	89	91	92	B/C
		Sg. Jempol	87	95	92	95	94	B/C
		Sg. Jengka	88	92	91	93	94	B/C
		Sg. Kecau	86	88	91	91	90	B/C
		Sg. Kelau	88	90	89	90	94	B/C
		Sg. Kertam	91	91	93	93	92	B/C
		Sg. Koyan	89	94	92	93	94	B/C
		Sg. Krau	92	94	92	94	92	B/C
		Sg. Kundang	79	82	85	86	81	B/C
		Sg. Lenggok	93	96	92	96	95	B/C
		Sg. Lepar	92	91	93	95	94	B/C
		Sg. Lipis	89	92	92	93	92	B/C
		Sg. Luit	91	93	92	89	92	B/C
		Sg. Maran	93	96	96	96	95	B/C
		Sg. Mentiga	84	86	88	91	90	B/C
		Sg. Pahang	87	91	90	90	90	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Pahang/ N.Sembilan	Sg. Pahang	Sg. Penjuring	94	97	97	97	97	B/C
		Sg. Pertang	90	91	91	91	91	B/C
		Sg. Perting	94	96	97	97	96	B/C
		Sg. Raub	93	95	95	96	94	B/C
		Sg. Retang	92	93	94	94	92	B/C
		Sg. Ringlet	83	91	89	91	94	B/C
		Sg. Salak	87	91	91	92	94	B/C
		Sg. Semantan	88	91	88	90	91	B/C
		Sg. Serting	81	84	83	84	84	B/C
		Sg. T. Paya Bungor	91	91	92	92	92	B/C
		Sg. Tahan	91	92	94	96	94	B/C
		Sg. Tanglir	88	89	89	90	93	B/C
		Sg. Tasik Bera	91	88	89	89	88	B/C
		Sg. Tasik Chini	92	90	92	92	93	B/C
		Sg. Teh	93	94	94	96	96	B/C
		Sg. Tekal	85	89	87	90	86	B/C
		Sg. Telang	91	94	93	93	93	B/C
		Sg. Telemong	93	96	94	94	96	B/C
		Sg. Telom	86	94	92	91	92	B/C
		Sg. Tembeling	91	90	94	95	94	B/C
		Sg. Teranum	95	96	96	97	96	B/C
		Sg. Teras	92	96	96	96	96	B/C
		Sg. Teris	91	94	94	94	95	B/C
		Sg. Terla	94	97	97	97	96	B/C
		Sg. Triang	88	91	85	87	87	B/C
		Sg. Tringkap	89	94	96	97	94	B/C
		Sg. Ulong	96	97	97	97	97	B/C
Terengganu	Sg. Besut	Sg. Besut	92	94	94	94	95	B/C
		Sg. Jertih	88	92	91	87	89	B/C
	Sg. Chukai	Sg. Bungkus	80	83	81	82	84	B/C
		Sg. Chukai	80	87	88	84	82	B/C
		Sg. Ibok	85	89	89	91	90	B/C
		Sg. Ruang	67	80	80	79	75	ST/SP
	Sg. Dungun	Sg. Dungun	90	96	92	93	95	B/C
		Sg. Telemboh	86	89	89	87	86	B/C
	Sg. Ibai	Sg. Ibai	83	80	82	80	79	ST/SP
	Sg. Kemaman	Sg. Cherul	90	91	91	93	94	B/C
		Sg. Kemaman	88	92	92	92	93	B/C
		Sg. Neram	75	86	85	88	77	ST/SP
		Sg. Perasing	82	92	94	90	90	B/C
		Sg. Ransan	81	87	87	90	90	B/C
	Sg. Kertih	Sg. Kertih	85	85	88	88	88	B/C
	Sg. Kluang	Sg. Kluang	88	84	84	85	84	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Terengganu	Sg. Marang	Sg. Kerak	79	82	85	82	82	B/C
		Sg. Marang	88	89	94	90	91	B/C
		Sg. Temala	91	92	91	90	92	B/C
	Sg. Merang	Sg. Merang	82	77	77	80	84	B/C
	Sg. Merchang	Sg. Landas	71	87	87	84	87	B/C
		Sg. Merchang	71	80	73	76	81	B/C
	Sg. Paka	Sg. Besul	92	96	96	92	96	B/C
		Sg. Paka	87	90	90	90	90	B/C
		Sg. Rasau	82	84	83	83	81	B/C
		Sg. Rengat	84	91	91	89	89	B/C
	Sg. Setiu	Sg. Bari	92	95	95	93	94	B/C
		Sg. Chalok	86	92	90	91	91	B/C
		Sg. Setiu	89	93	93	93	96	B/C
		Sg. Tarom	89	94	95	92	91	B/C
	Sg. Terengganu	Sg. Berang	91	95	96	97	97	B/C
		Sg. Nerus	89	92	93	92	94	B/C
		Sg. Pueh	73	87	92	91	86	B/C
		Sg. Telemong	88	93	91	93	96	B/C
		Sg. Terengganu	87	91	92	92	91	B/C
Kelantan	Sg. Golok	Sg. Golok	88	93	90	93	96	B/C
		Sg. Jedok	90	95	95	93	95	B/C
		Sg. Lanas	84	94	90	94	96	B/C
		Sg. Tasik Garu	80	85	82	87	90	B/C
	Sg. Kelantan	Sg. Aring	79	80	83	82	85	B/C
		Sg. Belatop	82	89	87	89	91	B/C
		Sg. Ber	87	91	91	91	89	B/C
		Sg. Berok	82	88	89	87	88	B/C
		Sg. Betis	86	93	92	92	93	B/C
		Sg. Chiku	88	89	91	87	94	B/C
		Sg. Galas	86	88	90	91	89	B/C
		Sg. Isos	73	73	78	74	80	ST/SP
		Sg. Kelantan	82	86	87	87	90	B/C
		Sg. Kelesa	87	94	91	90	83	B/C
		Sg. Kenkren	92	93	94	94	93	B/C
		Sg. Kerilla	91	94	94	95	93	B/C
		Sg. Ketil	90	97	90	92	95	B/C
		Sg. Lebir	87	92	90	91	92	B/C
		Sg. Muring	85	92	90	93	93	B/C
		Sg. Nal	88	91	89	91	91	B/C
		Sg. Nenggiri	81	82	87	87	88	B/C
		Sg. Pehi	86	91	91	92	94	B/C
		Sg. Pelaur	90	96	95	87	96	B/C
		Sg. Penangau	78	87	89	86	90	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Kelantan	Sg. Kelantan	Sg. Pergau	92	96	96	96	97	B/C
		Sg. Rasau	80	80	85	85	88	B/C
		Sg. Relai	90	91	90	87	91	B/C
		Sg. Sokor	86	89	89	88	93	B/C
		Sg. Tuang	90	94	91	97	96	B/C
	Sg. Kemasin	Sg. Gali	79	75	83	81	89	B/C
		Sg. Kemasin	83	85	87	84	88	B/C
		Sg. Semerak	85	87	88	86	87	B/C
	Sg. Pengkalan Chepa	Sg. Alor B	65	63	59	63	63	ST/SP
		Sg. Alor Lintah	76	68	70	74	70	ST/SP
		Sg. Keladi	76	84	89	87	87	B/C
		Sg. Pengkalan Chepa	73	73	75	69	72	ST/SP
		Sg. Raja Gali	79	87	81	87	87	B/C
	Sg. Pengkalan Datu	Sg. Pasir Hor	73	77	75	77	82	B/C
		Sg. Pengkalan Datu	85	86	85	87	86	B/C
Sarawak	Sg. Balingian	Sg. Balingian	90	87	87	76	71	ST/SP
	Sg. Baram	Sg. Baram	84	85	86	81	76	ST/SP
		Sg. Tutuh	90	-	87	79	78	ST/SP
	Sg. Kayan	Sg. Kayan	82	83	82	78	77	ST/SP
	Sg. Kemena	Sg. Kemena	82	82	84	79	74	ST/SP
		Sg. Sibiu	81	79	83	76	77	ST/SP
	Sg. Kerian	Sg. Kerian	86	84	86	83	80	ST/SP
		Sg. Seblak	84	88	87	79	77	ST/SP
		Sg. Selalang	92	92	90	90	89	B/C
	Sg. Lawas	Sg. Lawas	89	89	91	92	87	B/C
	Sg. Limbang	Sg. Limbang	88	89	88	85	82	B/C
	Sg. Lupar	Sg. Ai	90	91	89	91	90	B/C
		Sg. Lupar	85	84	88	79	75	ST/SP
		Sg. Sekerang	92	88	87	90	90	B/C
		Sg. Seterap	82	86	89	80	76	ST/SP
		Sg. Undup	91	85	89	89	85	B/C
	Sg. Miri	Sg. Adong	83	78	57	54	51	T/P
		Sg. Dalam	84	83	80	70	71	ST/SP
		Sg. Lutong	78	82	79	74	67	ST/SP
		Sg. Miri	87	88	58	50	49	T/P
		Sg. Padang Liku	89	88	83	81	82	B/C
	Sg. Mukah	Sg. Mukah	88	82	86	75	73	ST/SP
	Sg. Niah	Sg. Niah	86	86	86	83	83	B/C
		Sg. Sekaloh	75	81	83	75	70	ST/SP
	Sg. Oya	Sg. Oya	86	84	86	73	67	ST/SP
	Sg. Rajang	Sg. Baloi	89	-	89	73	73	ST/SP
		Sg. Binatang	89	89	87	86	84	B/C
		Sg. Daro	80	62	66	53	53	T/P

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Sarawak	Sg. Rajang	Sg. Jemoreng	80	63	66	55	52	T/P
		Sg. Julau	88	86	85	89	85	B/C
		Sg. Kanowit	89	87	87	88	86	B/C
		Sg. Meradong	80	82	85	78	70	ST/SP
		Sg. Pakan	88	89	88	88	88	B/C
		Sg. Pila Parit	62	77	78	81	80	ST/SP
		Sg. Rajang	85	85	86	83	81	B/C
		Sg. Salim	83	81	86	76	66	ST/SP
		Sg. Sarikei	85	89	88	83	82	B/C
	Sg. Sadong	Sg. Karangan	74	76	84	68	69	ST/SP
		Sg. Sadong	83	85	85	83	84	B/C
		Sg. Tarat	91	90	90	90	92	B/C
	Sg. Sarawak	Sg. Kelantan	74	59	68	66	60	ST/SP
		Sg. Kuap	87	88	89	79	77	ST/SP
		Sg. Maong Kiri	72	73	82	70	59	T/P
		Sg. Samarahan	74	71	79	72	69	ST/SP
		Sg. Sarawak	87	86	88	87	85	B/C
		Sg. Sarawak Kanan	82	84	85	83	80	ST/SP
		Sg. Sarawak Kiri	88	87	87	89	91	B/C
		Sg. Semadang	89	90	90	93	92	B/C
		Sg. Semenggoh	71	78	83	75	75	ST/SP
		Sg. Tabuan	77	76	78	64	61	ST/SP
		Sg. Tapah	89	91	90	88	84	B/C
	Sg. Saribas	Sg. Layar	86	89	88	84	88	B/C
		Sg. Saribas	74	79	87	75	67	ST/SP
	Sg. Semunsam	Sg. Semunsam	87	80	85	88	88	B/C
	Sg. Sibuti	Sg. Kabuloh	71	64	76	82	72	ST/SP
		Sg. Kejapil	88	89	85	86	79	ST/SP
		Sg. Satap	88	84	84	74	77	ST/SP
		Sg. Sibuti	85	85	81	79	78	ST/SP
	Sg. Similajau	Sg. Similajau	90	85	87	83	83	B/C
	Sg. Suai	Sg. Suai	88	87	85	80	79	ST/SP
	Sg. Tatau	Sg. Tatau	88	85	86	84	81	B/C
	Sg. Trusan	Sg. Trusan	88	88	90	86	84	B/C
Sabah	Sg. Apas	Sg. Apas	89	90	92	90	91	B/C
	Sg. Balung	Sg. Balung	87	91	92	90	92	B/C
	Sg. Bengkoka	Sg. Bengkoka	88	89	90	85	88	B/C
	Sg. Bingkongan	Sg. Bandau	91	92	92	94	92	B/C
		Sg. Bingkongan	91	94	93	94	94	B/C
		Sg. Menggaris	93	92	92	93	93	B/C
		Sg. Tandek	91	91	91	91	90	B/C
	Sg. Bongawan	Sg. Bongawan	87	87	88	87	88	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Sabah	Sg. Brantian	Sg. Brantian	86	84	90	87	91	B/C
	Sg. Kalabakan	Sg. Kalabakan	84	83	86	81	86	B/C
	Sg. Kalumpang	Sg. Kalumpang	86	87	88	87	86	B/C
		Sg. Pang Burong 1	83	86	86	87	90	B/C
		Sg. Pang Burong 2	69	85	80	79	76	ST/SP
	Sg. Kedamaian	Sg. Kedamaian	90	93	92	95	96	B/C
		Sg. Tempasuk	91	92	91	92	94	B/C
		Sg. Wariu	91	93	93	94	94	B/C
	Sg. Kimanis	Sg. Kimanis	87	90	92	90	89	B/C
	Sg. Kinabatangan	Sg. Karamuak	91	92	92	91	94	B/C
		Sg. Kinabatangan	84	85	84	84	85	B/C
		Sg. Koyah	87	89	88	86	87	B/C
		Sg. Leepang	84	85	84	83	85	B/C
		Sg. Menanggul	81	86	86	82	81	B/C
		Sg. Pin	86	87	86	86	86	B/C
		Sg. Takala	85	88	87	85	84	B/C
	Sg. Labok	Sg. Kinipir	90	91	90	92	92	B/C
		Sg. Labok	87	86	88	87	89	B/C
		Sg. Liwagu	88	89	88	92	88	B/C
		Sg. Maliau	92	94	93	95	94	B/C
		Sg. Tungud	88	91	85	87	90	B/C
	Sg. Lakutan	Sg. Lakutan	89	93	88	92	87	B/C
	Sg. Likas	Sg. Darau	80	83	83	81	81	B/C
		Sg. Inanam	84	88	89	88	87	B/C
		Sg. Likas	78	76	78	71	71	ST/SP
		Sg. Menggatal	85	89	91	94	89	B/C
	Sg. Lingkungan	Sg. Bukau	88	92	87	90	88	B/C
		Sg. Lingkungan	91	93	89	93	88	B/C
	Sg. Membakut	Sg. Membakut	85	87	89	89	89	B/C
	Sg. Menggalong	Sg. Menggalong	89	93	90	91	91	B/C
	Sg. Merotai	Sg. Merotai	89	91	91	92	91	B/C
	Sg. Mounad	Sg. Mounad	86	87	88	87	86	B/C
	Sg. Moyog	Sg. Moyog	89	92	92	93	90	B/C
	Sg. Padas	Sg. Bunsit	91	93	92	94	94	B/C
		Sg. Liawan	91	91	92	93	93	B/C
		Sg. Padas	86	88	87	86	84	B/C
		Sg. Pangatan	87	88	87	86	86	B/C
		Sg. Pegalan	88	88	87	90	90	B/C
		Sg. Tandulu	91	92	92	93	92	B/C
	Sg. Paitan	Sg. Paitan	85	91	90	88	86	B/C
	Sg. Papar	Sg. Papar	90	91	91	92	93	B/C

Jadual 2.1 : Status Kualiti Air Sungai mengikut Sungai, 2024
Table 2.1 : Water Quality Status by River, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NILAI IKA/ WQI VALUE					KATEGORI IKA/ WQI CATEGORY
			2020	2021	2022	2023	2024	
Sabah	Sg. Sapi	Sg. Sapi	85	87	84	85	85	B/C
		Sg. Sualong	92	92	93	95	95	B/C
	Sg. Segaliud	Sg. Segaliud	87	85	82	84	86	B/C
	Sg. Segama	Sg. Segama	85	87	86	86	88	B/C
	Sg. Sembulan	Sg. Sembulan	79	81	74	70	75	ST/SP
	Sg. Silabukan	Sg. Silabukan	89	89	87	93	91	B/C
	Sg. Sugut	Sg. Bongkud	91	92	93	93	93	B/C
		Sg. Lohan	91	92	93	95	93	B/C
		Sg. Merali	88	91	90	95	92	B/C
		Sg. Sugut	88	91	91	94	93	B/C
	Sg. Tawau	Sg. Tawau	85	91	91	92	91	B/C
	Sg. Telipok	Sg. Telipok	86	89	89	91	82	B/C
	Sg. Tenghilan	Sg. Tenghilan	92	92	90	92	92	B/C
	Sg. Tingkayu	Sg. Tingkayu	85	85	85	80	87	B/C
	Sg. Tuaran	Sg. Damit	89	87	89	92	91	B/C
		Sg. Song Sai	90	92	92	94	93	B/C
		Sg. Tuaran	92	93	93	94	94	B/C
	Sg. Tungku	Sg. Tungku	89	90	89	92	92	B/C
	Sg. Umas-Umas	Sg. Umas-Umas	83	84	89	85	86	B/C

Nota / Note:

Kategori IKA / WQI Category

	B / C	Bersih / Clean
	ST / SP	Sederhana Tercemar / Slightly Polluted
	T / P	Tercemar / Polluted

Nilai IKA / WQI Value

	> 92.7	Kelas I / Class I
	76.5 - 92.7	Kelas II / Class II
	51.9 - 76.5	Kelas III / Class III
	31.0 - 51.9	Kelas IV / Class IV
	< 31.0	Kelas V / Class V
	–	Tiada Data / No Data

Jadual 2.2: Sungai Tercemar dan Kelas Kualiti Air berdasarkan BOD, AN dan SS, 2024
Table 2.2: The Polluted Rivers and Classes based on BOD, AN and SS, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	2024			KELAS BERDASARKAN/ CLASS BASED ON		
			IKA/ WQI	KATEGORI/ CATEGORY	KELAS/ CLASS	BOD	AN	SS
Kedah	Sg. Merbok	Sg. Batu	52	T/P	IV	V	V	I
P.Pinang/Kedah	Sg. Perai	Sg. Air Melintas	59	T/P	III	IV	V	II
		Sg. Kereh	55	T/P	III	IV	V	II
		Sg. Seluang	57	T/P	III	IV	IV	I
P.Pinang	Sg. Jawi	Sg. Chempedak	42	T/P	IV	V	IV	III
		Sg. Jawi	52	T/P	IV	IV	V	III
		Sg. Tengah	55	T/P	III	IV	IV	III
	Sg. Juru	Sg. Rambai	53	T/P	III	IV	V	I
	Sg. Kluang	Sg. Kluang	45	T/P	IV	V	V	I
	Sg. Pinang	Sg. Pinang	58	T/P	III	IV	IV	I
		Sg. Titi Kerawang	57	T/P	III	IV	IV	I
Selangor/ W.P. Kuala Lumpur	Sg. Klang	Sg. Air Busuk	46	T/P	IV	V	V	II
		Sg. Kerayong	57	T/P	III	V	V	I
Johor	Sg. Kaw. Pasir Gudang	Sg. Buluh	35	T/P	IV	V	IV	I
		Sg. Perembi	56	T/P	III	V	IV	I
		Sg. Tukang Batu	44	T/P	IV	V	V	I
	Sg. Kempas	Sg. Kempas	40	T/P	IV	V	V	II
	Sg. Segget	Sg. Segget	55	T/P	III	V	V	I
	Sg. Tebrau	Sg. Pandan	45	T/P	IV	V	V	I
		Sg. Sebulung	58	T/P	III	IV	V	I
		Sg. Sengkuang	37	T/P	IV	V	V	II
		Sg. Tampoi	48	T/P	IV	V	V	I
Sarawak	Sg. Miri	Sg. Adong	51	T/P	IV	II	III	I
		Sg. Miri	49	T/P	IV	II	III	I
	Sg. Rajang	Sg. Daro	53	T/P	III	II	II	I
		Sg. Jemoreng	52	T/P	IV	II	II	I
	Sg. Sarawak	Sg. Maong Kiri	59	T/P	III	II	IV	I

Nota / Note:

Kategori IKA / WQI Category

	B / C	Bersih / Clean
	ST / SP	Sederhana Tercemar / Slightly Polluted
	T / P	Tercemar / Polluted

Nilai IKA / WQI Value

	> 92.7	Kelas I / Class I
	76.5 - 92.7	Kelas II / Class II
	51.9 - 76.5	Kelas III / Class III
	31.0 - 51.9	Kelas IV / Class IV
	< 31.0	Kelas V / Class V
	–	Tiada Data / No Data

TREND AIR SUNGAI

Berdasarkan kepada IKA yang telah direkodkan pada tahun 2024, terdapat penurunan kepada kualiti air sungai. Bilangan sungai yang dikategorikan sebagai bersih telah menurun kepada 475 (71%) sungai pada tahun 2024 berbanding 486 (72%) sungai pada tahun 2023. Secara umum, penurunan kualiti air yang direkodkan pada tahun 2024 adalah disebabkan oleh peningkatan beban pencemaran pada sungai daripada punca tetap dan punca tidak tetap.

Bilangan sungai tercemar telah meningkat daripada 25 sungai pada tahun 2023 kepada 27 sungai pada tahun 2024. Ini menunjukkan terdapat penurunan trend kualiti air dan bilangan sungai tercemar semakin meningkat. Trend kualiti air sungai adalah ditunjukkan di dalam **Rajah 2.1**.

Berdasarkan sub-indeks BOD, bilangan sungai yang dikategorikan sebagai bersih adalah 511 (76%) sungai pada tahun 2024 **(Rajah 2.2)**. Bilangan sungai yang tercemar dari segi sub-indeks BOD telah meningkat daripada 59 (9%) pada tahun 2023 kepada 72 (11%) sungai pada tahun 2024. Penurunan kualiti air sungai dari segi BOD ini adalah disebabkan oleh peningkatan pelepasan bahan buangan yang bersifat organik daripada pelbagai punca seperti aktiviti industri serta aktiviti komersial dan domestik.

Dari segi sub-indeks AN pula, bilangan sungai bersih telah meningkat daripada 311 (46%) sungai pada tahun 2023 kepada 328 (49%) sungai pada tahun 2024 (**Rajah 2.3**). Bilangan sungai yang tercemar dari segi sub-indeks AN juga meningkat daripada 188 (28%) sungai pada tahun 2023 kepada 193 (29%) sungai pada tahun 2024. Penurunan kualiti air sungai bagi sub-indeks AN boleh dikaitkan dengan peningkatan pelepasan air sisa kumbahan manusia dan haiwan yang tidak diolah dan diolah ke dalam air sungai.

Dari segi sub-indeks SS pula, bilangan sungai yang dikategorikan bersih telah meningkat daripada 551 (82%) sungai pada tahun 2023 kepada 558 (83%) sungai pada tahun 2024 (**Rajah 2.4**). Bilangan sungai yang dikategorikan sebagai tercemar dari segi sub-indeks SS pula telah menurun daripada 76 (11%) sungai pada 2023 kepada 69 (10%) sungai pada tahun 2024. Peningkatan kualiti air sungai dari segi pepejal terampai tersebut disebabkan oleh kecekapan kawalan ke atas aktiviti kerja tanah dan pembukaan tanah di kawasan-kawasan tertentu.

Secara keseluruhan, penyumbang utama kepada kemerosotan kualiti air sungai yang direkodkan adalah daripada BOD dan AN manakala SS pada tahap yang lebih rendah.

TREND IN RIVER WATER

Based on the WQI recorded in 2024, there had been a decrease in river water quality. The number of rivers categorised as clean had decreased to 475 (71%) rivers in 2024 compared to 486 (72%) rivers in 2023. In general, the decrease in water quality recorded in 2024 was due to an increase in the pollution load on the river from point sources and nonpoint sources.

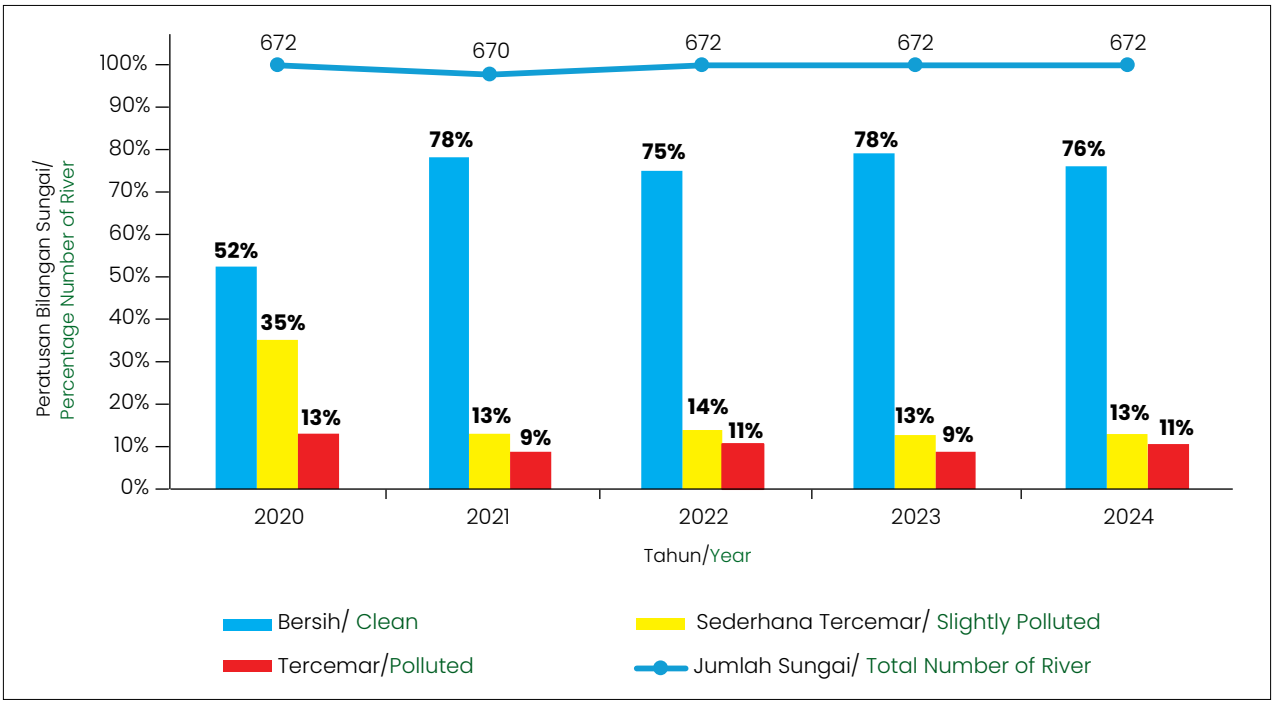
The number of polluted rivers had increased from 25 rivers in 2023 to 27 rivers in 2024. This indicates that there was a decrease in water quality trend and the number of polluted rivers was increasing. The river water quality trend is shown in **Figure 2.1.**

Based on the BOD sub-index, the number of rivers categorised as clean were 511 (76%) rivers in 2024 (**Figure 2.2**). The number of polluted rivers in terms of the BOD sub-index had increased from 59 (9%) in 2023 to 72 (11%) rivers in 2024. The deterioration in river water quality in terms of BOD was due to the higher discharge of organic wastes from various sources such as industrial activities, as well as commercial and domestic activities.

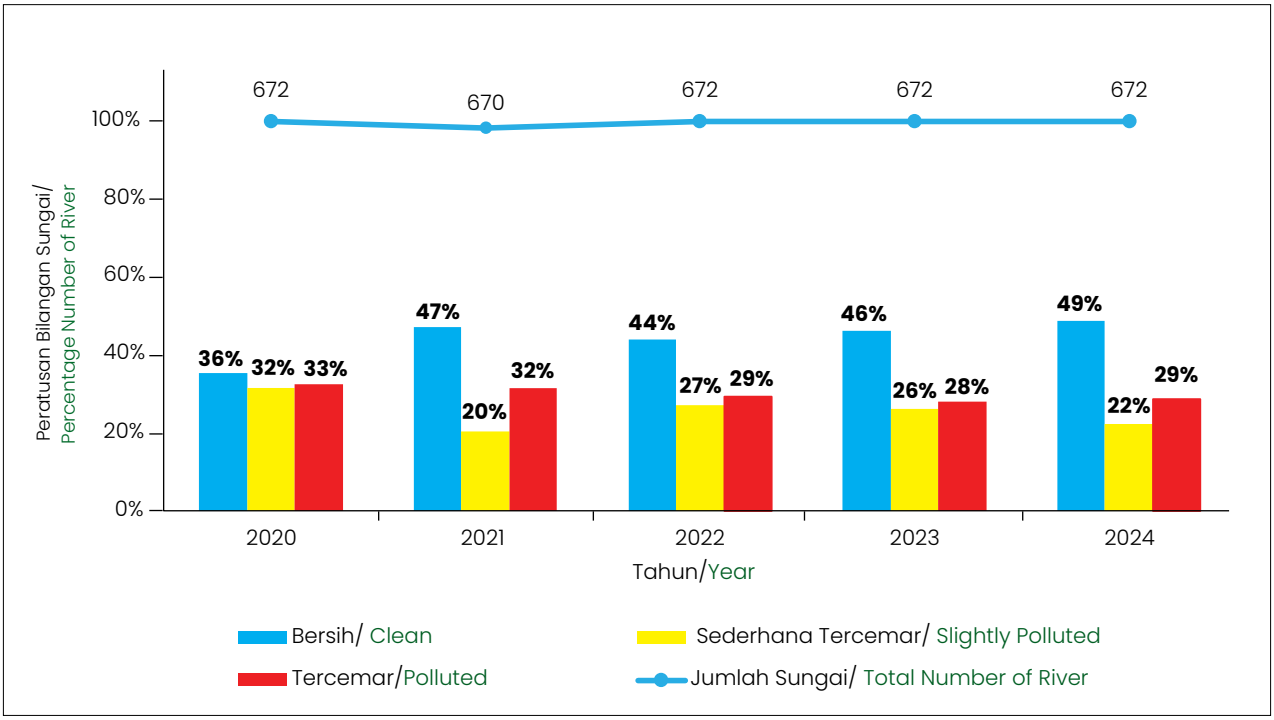
In terms of sub-index AN, the number of clean rivers had increased from 311 (46%) rivers in 2023 to 328 (49%) rivers in 2024 (**Figure 2.3**). The number of polluted rivers in terms of sub-index AN had increased from 188 (28%) rivers in 2023 to 193 (29%) rivers in 2024. The deterioration in river water quality for the AN sub- index can be attributed to an increase in the discharge of human and animal wastewater that was untreated and treated into the river water.

In terms of SS sub-index, the number of clean rivers had increased from 551 (82%) rivers in 2023 to 558 (83%) rivers in 2024 (**Figure 2.4**). The number of rivers categorised as polluted in terms of sub-index SS had decreased from 76 (11%) rivers in 2023 to 69 (10%) rivers in 2024. The improvement in river water quality in terms of suspended solids was due to the efficiency of control over earthworks activities and land clearing in certain areas.

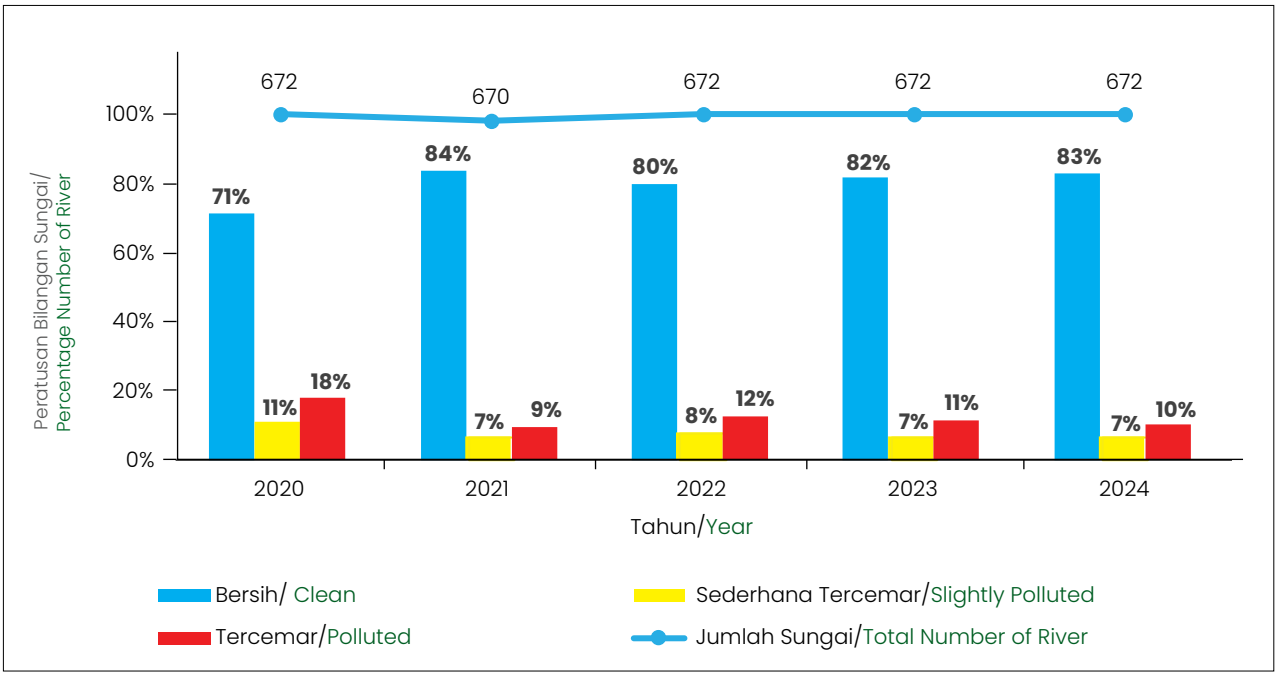
Overall, the main contributors to the deterioration in river water quality have been recorded as BOD and AN, and to a lesser extent, SS.



Rajah 2.2: Trend Kualiti Air Sungai Berdasarkan Sub-Indeks BOD (2020-2024)
Figure 2.2: River Water Quality Trend Based on BOD Sub-Index (2020-2024)



Rajah 2.3: Trend Kualiti Air Sungai Berdasarkan Sub-Indeks AN (2020-2024)
Figure 2.3: River Water Quality Trend Based on AN Sub-Index (2020-2024)



Rajah 2.4: Trend Kualiti Air Sungai Berdasarkan Sub-Indeks SS (2020-2024)
Figure 2.4: River Water Quality Trend Based on SS Sub-Index (2020-2024)

Air Terjun Jeram Tinggi Jementah, Johor

Status Kualiti Air Sungai Mengikut Stesen
River Water Quality By Station

STATUS KUALITI AIR MENGIKUT STESEN

Jadual 2.3 menunjukkan status kualiti air mengikut stesen. Daripada 1,353 stesen, 973 (72%) stesen dikategorikan sebagai bersih, 324 (24%) stesen adalah sederhana tercemar dan 56 (4%) stesen adalah tercemar **(Rajah 2.5).**

Berdasarkan kepada IKA yang telah direkodkan pada tahun 2024, didapati berlaku penurunan kepada kualiti air sungai pada stesen-stesen yang dipantau. Penurunan ini adalah kerana terdapat stesen-stesen yang sebelum ini dikategorikan sebagai bersih telah bertukar kepada kategori sederhana tercemar.

Bilangan stesen sungai yang dikategorikan sebagai bersih adalah 973 (72%) stesen pada tahun 2024 berbanding 987 (73%) stesen pada tahun sebelumnya. Bilangan stesen sungai yang dikategorikan sebagai sederhana tercemar telah berlaku sedikit peningkatan daripada 314 (23%) stesen pada tahun 2023 kepada 324 (24%) stesen pada tahun 2024. Bilangan stesen yang berada di dalam kategori tercemar telah meningkat daripada 52 (4%) stesen pada tahun 2023 kepada 56 (4%) stesen pada tahun 2024. Ini menunjukkan terdapat sedikit penurunan trend kualiti air pada bilangan stesen yang berada di dalam kategori tercemar.

Secara umum, penurunan kualiti air yang direkodkan pada tahun 2024 adalah disebabkan oleh peningkatan pelepasan beban bahan pencemar sama ada daripada punca tetap atau punca tidak tetap ke dalam sungai.

Bagi pengkelasan IKA stesen pengawasan kualiti air sungai pula, sebanyak 328 (24%) stesen berada di dalam Kelas I, 729 (54%) stesen di Kelas II, 272 (20%) stesen di Kelas III dan 24 (2 %) stesen di Kelas IV.

WATER QUALITY STATUS BY STATIONS

Table 2.3 shows the water quality status by station. Out of the 1,353 stations, 973 (72%) stations were categorised as clean, 324 (24%) stations were slightly polluted, and 56 (4%) stations were polluted (**Figure 2.5).**

Based on the WQI recorded in 2024, there has been a decrease in river water quality at the monitored stations. This decline is due to several stations that were previously categorised as clean now being classified as slightly polluted.

The number of river stations categorised as clean was 973 (72%) of stations in 2024 compared to 987 (73%) stations in the previous year. The number of river stations categorised as slightly polluted had increased slightly from 314 (23%) stations in 2023 to 324 (24%) stations in 2024. The number of stations in the polluted category had increased from 52 (4%) stations in 2023 to 56 (4%) stations in 2024. This indicates that there was a slight decrease in water quality trends in the number of stations that were in the polluted category.

Generally, the decrease in water quality recorded in 2024 was due to increased emissions of the pollutant load either from point sources or nonpoint sources into the river.

For the WQI classification of river water quality monitoring stations, 328 (24%) stations were in Class I, 729 (54%) stations in Class II, 272 (20%) stations in Class III, and 24 (2%) stations in Class IV.

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perlis	Sg. Perlis	Sg. Arau	1RPLS012	79	88	85	90	87	B/C
		Sg. Arau	1RPLS014	91	92	93	89	90	B/C
		Sg. Empangan Timah Tasoh	1RPLS015	93	95	96	95	95	B/C
		Sg. Jarum	1RPLS006	88	91	89	88	90	B/C
		Sg. Jernih	1RPLS004	92	92	95	91	91	B/C
		Sg. Jernih	1RPLS005	90	95	94	94	95	B/C
		Sg. Kok Mak	1RPLS007	88	87	88	86	85	B/C
		Sg. Korok	1RPLS013	75	76	74	79	75	ST/SP
		Sg. Ngulang	1RPLS002	90	92	93	88	87	B/C
		Sg. Pelarit	1RPLS008	94	96	96	96	97	B/C
		Sg. Perlis	1RPLS001	76	77	78	81	70	ST/SP
		Sg. Serai	1RPLS003	82	86	90	86	89	B/C
		Sg. Terusan Mada	1RPLS010	88	91	92	93	89	B/C
		Sg. Terusan Mada	1RPLS011	89	92	89	91	91	B/C
		Sg. Wang Kelian	1RPLS009	95	97	97	97	97	B/C
Kedah	Sg. Kedah	Sg. Ahning	1KKDH011	92	96	95	94	97	B/C
		Sg. Changlun	1KKDH016	87	88	87	86	87	B/C
		Sg. Janing	1KKDH007	93	97	97	97	97	B/C
		Sg. Kedah	1KKDH001	70	77	76	73	67	ST/SP
		Sg. Napoh	1KKDH017	82	89	90	88	87	B/C
		Sg. Padang Terap	1KKDH002	87	91	89	93	95	B/C
		Sg. Padang Terap	1KKDH003	88	91	90	87	91	B/C
		Sg. Padang Terap	1KKDH004	85	96	95	95	96	B/C
		Sg. Padang Terap	1KKDH009	74	81	78	86	80	ST/SP
		Sg. Padang Terap	1KKDH012	92	97	95	96	96	B/C
		Sg. Pedu	1KKDH005	91	95	94	95	94	B/C
		Sg. Pendang	1KKDH008	81	82	85	85	82	B/C
		Sg. Sintok	1KKDH018	92	96	95	92	90	B/C
		Sg. Tekai	1KKDH006	88	94	93	91	92	B/C
		Sg. Temin	1KKDH010	84	89	89	87	86	B/C
		Sg. Terusan Lengkuas	1KKDH014	86	92	92	93	95	B/C
		Sg. Terusan Mada Selatan	1KKDH013	89	92	90	91	90	B/C
		Sg. Terusan Tengah	1KKDH015	88	93	93	94	96	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kedah	Sg. Kerian	Sg. Kerian	1KKER001	94	95	96	95	95	B/C
	Sg. Kisap	Sg. Kisap	1KKSP001	95	97	97	96	97	B/C
	Sg. Kuah	Sg. Kuah	1KKUA001	81	79	81	69	79	ST/SP
	Sg. Merbok	Sg. Bakar Arang	1KMBK008	56	69	66	58	60	ST/SP
		Sg. Batu	1KMBK002	70	64	59	65	52	T/P
		Sg. Bongkok	1KMBK003	71	75	71	74	69	ST/SP
		Sg. Bukit Merah	1KMBK006	92	92	89	95	92	B/C
		Sg. Bukit Nanas	1KMBK011	95	97	97	98	97	B/C
		Sg. Korok	1KMBK009	65	71	66	64	70	ST/SP
		Sg. Merbok	1KMBK001	79	81	81	82	83	B/C
		Sg. Petani	1KMBK007	63	68	64	53	65	ST/SP
		Sg. Tok Pawang	1KMBK004	90	95	94	96	95	B/C
		Sg. Tok Pawang	1KMBK005	90	95	96	96	94	B/C
		Sg. Tupah	1KMBK010	94	97	97	98	98	B/C
	Sg. Muda	Sg. Chepir	1KMUD012	89	91	92	90	93	B/C
		Sg. Gunung Inas	1KMUD021	93	93	95	96	89	B/C
		Sg. Jerong	1KMUD002	66	75	73	77	75	ST/SP
		Sg. Jerong	1KMUD003	74	78	70	74	75	ST/SP
		Sg. Karangan	1KMUD009	85	91	83	87	84	B/C
		Sg. Ketil	1KMUD007	87	93	91	93	96	B/C
		Sg. Muda	1KMUD001	86	92	90	87	89	B/C
		Sg. Muda	1KMUD004	85	90	91	90	94	B/C
		Sg. Muda	1KMUD005	88	94	95	94	94	B/C
		Sg. Muda	1KMUD013	86	92	91	88	89	B/C
		Sg. Muda	1KMUD014	90	91	94	94	94	B/C
		Sg. Muda	1KMUD015	88	92	94	95	93	B/C
		Sg. Muda	1KMUD016	85	90	91	91	92	B/C
		Sg. Muda	1KMUD018	86	94	91	90	91	B/C
		Sg. Muda	1KMUD019	90	93	96	94	96	B/C
		Sg. Muda	1KMUD023	87	92	91	89	92	B/C
		Sg. Muda	1KMUD024	85	90	91	90	94	B/C
		Sg. Muda	1KMUD025	89	94	95	94	96	B/C
		Sg. Pegang	1KMUD011	95	97	97	97	97	B/C
		Sg. Sedim	1KMUD008	90	93	91	93	94	B/C
		Sg. Sedim	1KMUD017	89	91	93	93	94	B/C
		Sg. Tawar	1KMUD006	89	91	92	92	87	B/C
		Sg. Tawar	1KMUD010	88	89	94	91	94	B/C
		Sg. Tawar	1KMUD020	88	90	93	91	89	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kedah	Sg. Perai	Sg. Jarak	1KPRI018	74	77	69	71	73	ST/SP
		Sg. Jarak	1KPRI019	74	76	69	75	74	ST/SP
		Sg. Jarak	1KPRI024	72	70	71	69	72	ST/SP
		Sg. Keladi	1KPRI015	78	81	82	82	78	ST/SP
		Sg. Kulim	1KPRI014	77	82	78	81	83	B/C
		Sg. Kulim	1KPRI016	90	91	92	91	92	B/C
		Sg. Kulim	1KPRI017	91	93	94	88	93	B/C
		Sg. Kulim	1KPRI023	90	92	91	91	93	B/C
		Sg. Kulim	1KPRI025	88	94	94	88	93	B/C
		Sg. Seluang	1KPRI021	64	67	65	64	57	T/P
		Sg. Seluang Bawah	1KPRI020	67	71	66	64	63	ST/SP
	Sg. Ulu Melaka	Sg. Chenang	1KMLK006	78	84	77	84	76	ST/SP
		Sg. Melaka	1KMLK002	81	90	85	83	89	B/C
		Sg. Melaka	1KMLK003	87	91	91	93	92	B/C
		Sg. Melaka	1KMLK007	96	97	97	97	97	B/C
		Sg. Petang	1KMLK001	96	97	98	97	97	B/C
		Sg. Saga	1KMLK004	81	92	88	85	90	B/C
		Sg. Tuba	1KMLK005	94	96	97	96	96	B/C
P.Pinang	Sg. Bayan Lepas	Sg. Bayan Lepas	1PBLS003	64	74	69	71	74	ST/SP
		Sg. Tiram	1PBLS001	77	76	78	71	78	ST/SP
		Sg. Tiram	1PBLS002	67	67	71	67	62	ST/SP
	Sg. Jawi	Sg. Chempedak	1PJWI003	47	41	36	55	42	T/P
		Sg. Jawi	1PJWI001	55	52	57	54	52	T/P
		Sg. Junjong	1PJWI002	64	60	57	66	59	T/P
		Sg. Junjong	1PJWI004	57	52	58	53	49	T/P
		Sg. Junjong	1PJWI006	94	95	96	97	97	B/C
		Sg. Machang Bubok	1PJWI007	76	72	68	73	65	ST/SP
		Sg. Tengah	1PJWI005	49	58	47	63	55	T/P
	Sg. Juru	Sg. Ara	1PJRU006	67	77	75	77	75	ST/SP
		Sg. Juru	1PJRU001	68	69	66	63	62	ST/SP
		Sg. Juru	1PJRU012	64	65	70	65	53	T/P
		Sg. Kilang Ubi	1PJRU002	70	69	68	66	71	ST/SP
		Sg. Kilang Ubi	1PJRU003	75	70	68	67	72	ST/SP
		Sg. Kilang Ubi	1PJRU009	93	97	96	97	95	B/C
		Sg. Kilang Ubi	1PJRU010	63	60	61	54	60	ST/SP
		Sg. Kilang Ubi	1PJRU011	66	69	68	65	66	ST/SP
		Sg. Pasir	1PJRU004	65	75	66	63	63	ST/SP
		Sg. Permatang Rawa	1PJRU008	53	60	55	64	56	T/P
		Sg. Permatang Rawa	1PJRU013	66	90	87	79	79	ST/SP
		Sg. Rambai	1PJRU005	57	57	56	50	46	T/P
		Sg. Rambai	1PJRU007	56	62	55	67	60	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
P.Pinang	Sg. Kerian	Sg. Kechil	1PKER002	87	90	91	91	92	B/C
		Sg. Kechil	1PKER005	84	87	84	85	86	B/C
		Sg. Kerian	1PKER003	88	89	87	88	90	B/C
		Sg. Kerian	1PKER004	85	89	92	92	91	B/C
		Sg. Kerian	1PKER006	86	89	89	87	90	B/C
		Sg. Kerian	1PKER009	80	84	82	82	83	B/C
		Sg. Kerian	1PKER014	85	86	85	84	85	B/C
		Sg. Serdang	1PKER007	71	80	83	89	92	B/C
	Sg. Kluang	Sg. Ara	1PKLU002	95	97	97	97	97	B/C
		Sg. Ara	1PKLU003	68	69	72	63	60	ST/SP
		Sg. Dua Besar	1PKLU005	64	68	67	63	63	ST/SP
		Sg. Kluang	1PKLU001	65	68	52	58	45	T/P
		Sg. Relau	1PKLU004	66	68	69	65	73	ST/SP
	Sg. Perai	Sg. Air Melintas	1PPRI007	58	57	60	64	59	T/P
		Sg. Jarak	1PPRI009	74	79	71	76	73	ST/SP
		Sg. Jarak	1PPRI011	72	70	74	69	74	ST/SP
		Sg. Jarak	1PPRI012	71	71	76	80	79	ST/SP
		Sg. Kereh	1PPRI006	47	59	57	60	48	T/P
		Sg. Kereh	1PPRI008	55	60	56	57	55	T/P
		Sg. Kereh	1PPRI024	64	66	64	62	63	ST/SP
		Sg. Kubang Semang	1PPRI005	64	66	68	74	63	ST/SP
		Sg. Perai	1PPRI003	64	74	62	67	80	ST/SP
		Sg. Perai	1PPRI004	67	70	62	65	61	ST/SP
		Sg. Pertama	1PPRI022	65	69	52	63	63	ST/SP
		Sg. Seluang Bawah	1PPRI010	61	68	67	62	58	T/P
	Sg. Pinang	Sg. Air Itam	1PPNG006	70	74	69	65	69	ST/SP
		Sg. Air Itam	1PPNG011	76	76	65	62	72	ST/SP
		Sg. Air Itam	1PPNG018	96	97	96	97	98	B/C
		Sg. Air Terjun	1PPNG019	95	97	97	97	97	B/C
		Sg. Batu Feringghi	1PPNG001	80	82	81	77	81	B/C
		Sg. Batu Feringghi	1PPNG002	95	96	96	97	97	B/C
		Sg. Dondang	1PPNG012	83	86	54	57	56	T/P
		Sg. Dondang	1PPNG013	84	87	58	56	58	T/P
		Sg. Dondang	1PPNG014	71	79	75	73	77	ST/SP
		Sg. Dondang	1PPNG015	73	75	73	76	79	ST/SP
		Sg. Dondang	1PPNG016	71	73	68	68	67	ST/SP
		Sg. Dondang	1PPNG017	67	63	61	66	74	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
P.Pinang	Sg. Pinang	Sg. Jelutong	1PPNG010	63	65	68	63	72	ST/SP
		Sg. Pinang	1PPNG003	88	94	92	89	83	B/C
		Sg. Pinang	1PPNG008	69	67	61	50	51	T/P
		Sg. Pinang	1PPNG021	55	63	56	41	41	T/P
		Sg. Satu	1PPNG020	96	97	97	97	98	B/C
		Sg. Titi Kerawang	1PPNG004	68	75	63	57	57	T/P
Perak	Sg. Bernam	Sg. Bernam	1ABNM001	64	73	74	68	67	ST/SP
		Sg. Bernam	1ABNM002	72	66	63	67	68	ST/SP
		Sg. Bernam	1ABNM003	80	81	82	84	76	ST/SP
		Sg. Bernam	1ABNM004	86	93	93	90	90	B/C
		Sg. Bernam	1ABNM005	86	93	93	92	91	B/C
		Sg. Bernam	1ABNM006	90	97	96	96	96	B/C
		Sg. Gelinting	1ABNM015	92	96	96	97	92	B/C
		Sg. Inki	1ABNM012	94	97	97	97	97	B/C
		Sg. Slim	1ABNM007	87	94	95	94	93	B/C
		Sg. Slim	1ABNM008	88	94	95	94	93	B/C
		Sg. Slim	1ABNM011	89	94	91	92	90	B/C
		Sg. Trolak	1ABNM009	91	96	96	96	94	B/C
		Sg. Trolak	1ABNM010	92	97	95	95	95	B/C
		Sg. Trolak	1ABNM014	93	96	96	97	97	B/C
	Sg. Bruas	Sg. Bruas	1ABRU001	72	75	69	73	74	ST/SP
		Sg. Bruas	1ABRU004	91	94	95	95	96	B/C
		Sg. Bruas	1ABRU005	96	97	97	98	97	B/C
		Sg. Dandang	1ABRU006	91	94	95	95	95	B/C
		Sg. Licin	1ABRU007	96	97	97	97	97	B/C
		Sg. Rotan	1ABRU002	92	96	94	96	98	B/C
		Sg. Rotan	1ABRU003	83	88	83	86	84	B/C
	Sg. Kerian	Sg. Selama	1AKER011	86	88	86	89	90	B/C
		Sg. Selama	1AKER012	87	88	89	89	90	B/C
		Sg. Selama	1AKER016	94	97	97	97	98	B/C
		Sg. Semang	1AKER013	81	80	81	72	80	ST/SP
		Sg. Terusan Bagan Serai	1AKER015	93	93	93	94	94	B/C
	Sg. Kurau	Sg. Air Hitam	1AKRU007	95	98	97	96	97	B/C
		Sg. Ara	1AKRU001	92	96	94	96	97	B/C
		Sg. Ara	1AKRU006	95	97	97	97	98	B/C
		Sg. Kurau	1AKRU002	77	76	78	78	78	ST/SP
		Sg. Kurau	1AKRU003	77	78	79	82	82	B/C
		Sg. Kurau	1AKRU004	91	94	93	94	93	B/C
		Sg. Kurau	1AKRU005	91	91	90	92	92	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Sg. Perak	Sg. Batang Padang	1APRK003	83	86	87	86	88	B/C
		Sg. Batang Padang	1APRK006	90	95	96	96	97	B/C
		Sg. Batang Padang	1APRK009	87	90	90	91	90	B/C
		Sg. Behrang	1APRK077	97	97	98	97	98	B/C
		Sg. Berok	1APRK068	96	97	97	96	97	B/C
		Sg. Bidor	1APRK002	71	84	87	83	83	B/C
		Sg. Bidor	1APRK004	88	89	91	88	90	B/C
		Sg. Bidor	1APRK005	91	88	87	92	94	B/C
		Sg. Chenderiang	1APRK012	94	95	94	94	97	B/C
		Sg. Chenderiang	1APRK013	92	93	94	90	93	B/C
		Sg. Chepor	1APRK056	96	97	96	97	97	B/C
		Sg. Cuar	1APRK046	87	96	95	95	96	B/C
		Sg. Ibol	1APRK066	94	97	96	97	97	B/C
		Sg. Kampar	1APRK031	93	95	96	94	96	B/C
		Sg. Kampar	1APRK032	90	94	93	92	93	B/C
		Sg. Kangsar	1APRK043	89	93	94	92	93	B/C
		Sg. Kangsar	1APRK044	90	91	93	95	96	B/C
		Sg. Kangsar	1APRK079	96	97	97	97	98	B/C
		Sg. Kepayang	1APRK037	79	86	78	84	85	B/C
		Sg. Kepayang	1APRK038	78	83	78	84	86	B/C
		Sg. Kerbau	1APRK064	94	96	95	96	96	B/C
		Sg. Kerbau	1APRK078	93	94	91	95	95	B/C
		Sg. Kerdah	1APRK041	74	73	69	79	74	ST/SP
		Sg. Kerdah	1APRK053	86	85	86	89	83	B/C
		Sg. Kinjang	1APRK055	96	97	97	97	97	B/C
		Sg. Kinta	1APRK019	78	86	83	79	81	B/C
		Sg. Kinta	1APRK022	90	95	96	96	97	B/C
		Sg. Kinta	1APRK024	86	85	67	92	89	B/C
		Sg. Kinta	1APRK025	75	79	78	82	81	B/C
		Sg. Kinta	1APRK033	78	84	84	83	83	B/C
		Sg. Kinta	1APRK034	81	85	83	88	85	B/C
		Sg. Kinta	1APRK057	80	83	80	83	83	B/C
		Sg. Kinta	1APRK058	82	83	85	83	84	B/C
		Sg. Kinta	1APRK063	92	95	96	97	97	B/C
		Sg. Klah	1APRK014	91	95	90	92	94	B/C
		Sg. Klah	1APRK015	91	95	91	93	94	B/C
		Sg. Klian Baru	1APRK016	82	84	80	88	89	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Sg. Perak	Sg. Klian Baru	1APRK017	78	84	77	79	79	ST/SP
		Sg. Klian Gunong	1APRK081	96	97	96	97	97	B/C
		Sg. Kuang	1APRK042	81	88	85	88	87	B/C
		Sg. Manong	1APRK060	95	97	97	98	98	B/C
		Sg. Nyamok	1APRK052	76	77	74	73	72	ST/SP
		Sg. Pari	1APRK023	79	83	87	91	92	B/C
		Sg. Pari	1APRK028	80	79	83	85	85	B/C
		Sg. Pelus	1APRK039	82	86	89	89	87	B/C
		Sg. Pelus	1APRK040	89	91	87	90	87	B/C
		Sg. Perak	1APRK001	84	86	88	81	83	B/C
		Sg. Perak	1APRK018	87	90	92	89	90	B/C
		Sg. Perak	1APRK020	90	92	94	93	91	B/C
		Sg. Perak	1APRK045	88	94	95	95	95	B/C
		Sg. Perak	1APRK047	86	88	86	86	88	B/C
		Sg. Perak	1APRK048	90	94	94	94	95	B/C
		Sg. Perak	1APRK049	86	92	92	93	93	B/C
		Sg. Perak	1APRK051	87	94	94	93	95	B/C
		Sg. Perak	1APRK059	95	97	97	97	97	B/C
		Sg. Perak	1APRK065	88	95	95	95	95	B/C
		Sg. Perak	1APRK069	88	91	86	87	84	B/C
		Sg. Perak	1APRK070	89	92	93	93	92	B/C
		Sg. Perak	1APRK071	88	92	92	93	95	B/C
		Sg. Perak	1APRK072	86	93	94	95	95	B/C
		Sg. Perak	1APRK074	87	92	92	93	94	B/C
		Sg. Perak	1APRK080	95	97	97	96	97	B/C
		Sg. Perak	1APRK082	95	96	96	96	96	B/C
		Sg. Perak	1APRK086	96	94	96	97	97	B/C
		Sg. Pinji	1APRK021	75	75	77	79	80	ST/SP
		Sg. Pinji	1APRK036	72	78	79	79	79	ST/SP
		Sg. Pulau	1APRK067	95	97	97	97	97	B/C
		Sg. Raia	1APRK030	89	90	93	93	95	B/C
		Sg. Raia	1APRK035	86	89	89	91	90	B/C
		Sg. Rui	1APRK084	95	96	93	94	96	B/C
		Sg. Rui	1APRK085	86	91	88	85	92	B/C
		Sg. Seluang	1APRK050	72	62	62	66	68	ST/SP
		Sg. Serokai	1APRK026	71	71	77	79	78	ST/SP
		Sg. Serokai	1APRK027	77	86	87	89	91	B/C
		Sg. Sintang	1APRK054	72	72	67	64	68	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Sg. Perak	Sg. Sungkai	1APRK007	95	95	94	94	96	B/C
		Sg. Sungkai	1APRK008	90	91	91	89	89	B/C
		Sg. Sungkai	1APRK073	92	93	92	89	93	B/C
		Sg. Sungkai	1APRK075	91	93	93	90	93	B/C
		Sg. Sungkai Mati	1APRK010	57	65	67	69	67	ST/SP
		Sg. Sungkai Mati	1APRK011	92	87	89	92	92	B/C
		Sg. Tapah	1APRK076	96	97	96	97	97	B/C
		Sg. Teja	1APRK083	82	88	85	81	83	B/C
		Sg. Tesong	1APRK062	96	97	97	97	97	B/C
		Sg. Tumboh	1APRK029	73	73	76	76	78	ST/SP
		Sg. Woh	1APRK061	96	97	98	97	97	B/C
	Sg. Raja Hitam	Sg. Derhaka	1ARHT004	79	78	74	75	77	ST/SP
		Sg. Derhaka	1ARHT006	76	79	75	74	78	ST/SP
		Sg. Manjong	1ARHT001	85	88	87	88	86	B/C
		Sg. Manjong	1ARHT002	86	86	85	88	86	B/C
		Sg. Nyior	1ARHT007	96	97	97	98	98	B/C
		Sg. Raja Hitam	1ARHT003	76	81	78	75	80	ST/SP
		Sg. Raja Hitam	1ARHT005	72	84	78	71	82	B/C
		Sg. Raja Hitam	1ARHT008	52	39	30	47	75	ST/SP
	Sg. Sepetang	Sg. Batu Tegoh	1ASPT006	85	87	84	87	84	B/C
		Sg. Batu Tegoh	1ASPT007	87	92	91	88	92	B/C
		Sg. Batu Tegoh	1ASPT009	87	90	89	87	90	B/C
		Sg. Batu Tegoh	1ASPT012	96	97	97	97	97	B/C
		Sg. Batu Tegoh	1ASPT016	95	97	97	97	98	B/C
		Sg. Jana	1ASPT004	72	68	72	73	72	ST/SP
		Sg. Jana	1ASPT013	95	97	97	97	97	B/C
		Sg. Lidin	1ASPT008	84	86	84	86	84	B/C
		Sg. Limau	1ASPT014	91	96	96	96	96	B/C
		Sg. Malai	1ASPT002	77	82	77	75	79	ST/SP
		Sg. Malai	1ASPT019	73	77	73	73	77	ST/SP
		Sg. Nyior	1ASPT018	97	97	98	98	97	B/C
		Sg. Nyior	1ASPT020	88	94	92	96	92	B/C
		Sg. Sepetang	1ASPT001	76	75	72	76	78	ST/SP
		Sg. Sepetang	1ASPT003	83	84	83	84	88	B/C
		Sg. Temerloh	1ASPT010	90	96	95	96	94	B/C
		Sg. Temerloh	1ASPT011	86	92	92	93	88	B/C
		Sg. Trong	1ASPT015	92	96	94	96	95	B/C
		Sg. Trong	1ASPT017	96	97	97	97	97	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Sg. Wangi	Sg. Deralik	1AWGI001	71	70	77	75	74	ST/SP
		Sg. Deralik	1AWGI002	76	79	74	74	79	ST/SP
		Sg. Wangi	1AWGI003	82	82	75	84	82	B/C
		Sg. Wangi	1AWGI004	79	68	65	77	81	B/C
Selangor	Sg. Bernam	Sg. Bernam	2BBNM013	84	92	91	91	92	B/C
		Sg. Bernam	2BBNM016	84	91	90	91	93	B/C
		Sg. Dusun	2BBNM017	91	95	95	95	95	B/C
	Sg. Buloh	Sg. Buloh	2BBLH001	58	67	55	60	65	ST/SP
		Sg. Buloh	2BBLH002	54	61	51	48	66	ST/SP
		Sg. Buloh	2BBLH003	57	47	46	41	53	T/P
		Sg. Buloh	2BBLH004	59	43	45	59	67	ST/SP
		Sg. Buloh	2BBLH005	79	82	84	79	81	B/C
		Sg. Buloh	2BBLH006	57	55	50	48	67	ST/SP
	Sg. Klang	Sg. Ampang	2BKLG032	63	64	64	66	71	ST/SP
		Sg. Ampang	2BKLG042	70	76	81	83	85	B/C
		Sg. Anak Air Batu	2BKLG047	81	89	80	81	82	B/C
		Sg. Batu	2BKLG007	93	97	97	97	96	B/C
		Sg. Batu	2BKLG036	92	96	97	98	97	B/C
		Sg. Damansara	2BKLG008	62	71	68	66	68	ST/SP
		Sg. Damansara	2BKLG009	66	71	66	64	68	ST/SP
		Sg. Damansara	2BKLG017	64	64	65	65	62	ST/SP
		Sg. Damansara	2BKLG055	66	71	70	68	70	ST/SP
		Sg. Damansara	2BKLG067	92	95	95	95	96	B/C
		Sg. Gombak	2BKLG020	93	97	97	97	97	B/C
		Sg. Gombak	2BKLG027	93	97	95	97	95	B/C
		Sg. Jinjang	2BKLG044	81	84	86	86	87	B/C
		Sg. Kerayong	2BKLG013	51	55	50	49	56	T/P
		Sg. Kerayong	2BKLG051	66	65	63	60	54	T/P
		Sg. Keroh	2BKLG030	95	97	97	97	97	B/C
		Sg. Klang	2BKLG005	93	97	96	96	95	B/C
		Sg. Klang	2BKLG006	84	84	91	90	71	ST/SP
		Sg. Klang	2BKLG016	58	64	77	68	65	ST/SP
		Sg. Klang	2BKLG022	58	60	61	64	59	T/P
		Sg. Klang	2BKLG023	56	61	63	66	57	T/P
		Sg. Klang	2BKLG024	55	60	66	66	61	ST/SP
		Sg. Klang	2BKLG034	61	67	64	70	61	ST/SP
		Sg. Klang	2BKLG050	52	56	60	65	58	T/P
		Sg. Kuyoh	2BKLG011	59	69	72	69	63	ST/SP
		Sg. Penchala	2BKLG019	53	72	60	66	61	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Selangor	Sg. Klang	Sg. Penchala	2BKLG054	57	73	75	71	67	ST/SP
		Sg. Pusu	2BKLG021	71	80	78	75	74	ST/SP
		Sg. Rasau	2BKLG003	83	87	93	94	91	B/C
		Sg. Rumput	2BKLG033	92	97	95	97	97	B/C
		Sg. Semelah	2BKLG025	83	87	90	91	84	B/C
	Sg. Langat	Sg. Anak Chuau	2BCHU004	89	94	94	94	94	B/C
		Sg. Balak	2BLGT025	71	70	71	74	68	ST/SP
		Sg. Batang Labu	2BLGT028	79	75	83	82	80	ST/SP
		Sg. Batang Labu	2BLGT030	74	80	81	79	73	ST/SP
		Sg. Batang Labu	2BLGT031	69	71	78	77	76	ST/SP
		Sg. Batang Labu	2BLGT032	66	65	79	80	79	ST/SP
		Sg. Batang Labu	2BLGT033	86	91	88	86	72	ST/SP
		Sg. Batang Labu	2BLGT035	91	94	91	88	88	B/C
		Sg. Chuau	2BCHU001	91	94	94	95	93	B/C
		Sg. Chuau	2BCHU002	91	93	94	93	94	B/C
		Sg. Langat	2BLGT002	77	82	85	88	83	B/C
		Sg. Langat	2BLGT003	77	82	80	81	78	ST/SP
		Sg. Langat	2BLGT004	70	72	76	79	75	ST/SP
		Sg. Langat	2BLGT005	68	71	79	77	69	ST/SP
		Sg. Langat	2BLGT006	93	96	97	97	96	B/C
		Sg. Langat	2BLGT007	83	84	84	85	83	B/C
		Sg. Langat	2BLGT008	95	95	93	91	90	B/C
		Sg. Langat	2BLGT026	73	78	80	75	66	ST/SP
		Sg. Langat	2BLGT027	72	72	74	63	67	ST/SP
		Sg. Limau Manis	2BCHU003	71	75	82	75	82	B/C
		Sg. Rinching	2BLGT014	81	84	80	88	87	B/C
		Sg. Rinching	2BLGT015	94	97	94	97	95	B/C
		Sg. Semenyih	2BLGT010	83	88	85	86	86	B/C
		Sg. Semenyih	2BLGT011	82	86	84	86	81	B/C
		Sg. Semenyih	2BLGT012	84	86	89	86	86	B/C
		Sg. Sering	2BLGT034	69	72	80	81	83	B/C
	Sg. Selangor	Sg. Air Hitam	2BSEL002	74	80	74	73	75	ST/SP
		Sg. Air Hitam	2BSEL024	76	80	79	74	76	ST/SP
		Sg. Batang Kali	2BSEL003	90	96	93	91	90	B/C
		Sg. Guntong	2BSEL021	80	81	83	82	78	ST/SP
		Sg. Kanching	2BSEL007	90	96	93	94	94	B/C
		Sg. Kerling	2BSEL006	94	97	96	97	97	B/C
		Sg. Kundang	2BSEL012	70	71	77	77	77	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Selangor	Sg. Selangor	Sg. Rangkap	2BSEL016	95	96	97	97	96	B/C
		Sg. Rawang	2BSEL013	77	81	81	82	82	B/C
		Sg. Selangor	2BSEL001	77	81	80	79	81	B/C
		Sg. Selangor	2BSEL004	92	96	96	97	96	B/C
		Sg. Selangor	2BSEL005	95	97	96	97	96	B/C
		Sg. Selangor	2BSEL010	79	83	86	86	88	B/C
		Sg. Selangor	2BSEL011	82	91	91	90	92	B/C
		Sg. Selangor	2BSEL014	80	84	85	83	88	B/C
		Sg. Selangor	2BSEL015	93	97	96	97	96	B/C
		Sg. Selangor	2BSEL017	92	95	94	92	92	B/C
		Sg. Selangor	2BSEL018	86	88	88	84	92	B/C
		Sg. Selangor	2BSEL023	80	83	85	82	86	B/C
		Sg. Sembah	2BSEL009	74	80	80	80	83	B/C
		Sg. Sembah	2BSEL019	76	83	84	82	84	B/C
		Sg. Serendah	2BSEL008	90	96	95	95	95	B/C
	Sg. Sepang	Sg. Sepang	2BSPG001	85	83	88	90	86	B/C
		Sg. Sepang	2BSPG002	73	78	81	87	83	B/C
		Sg. Sepang	2BSPG003	76	80	83	82	80	ST/SP
	Sg. Tengi	Sg. Tengi	2BTGI001	76	80	72	77	70	ST/SP
		Sg. Tengi	2BTGI002	92	96	96	96	97	B/C
		Sg. Tengi	2BTGI003	79	84	82	78	74	ST/SP
		Sg. Tengi	2BTGI004	92	94	95	95	95	B/C
W.P. Kuala Lumpur	Sg. Klang	Sg. Air Busuk	2WKLG041	41	40	52	42	46	T/P
		Sg. Batu	2WKLG028	63	58	64	69	64	ST/SP
		Sg. Batu	2WKLG056	59	67	72	67	63	ST/SP
		Sg. Batu	2WKLG061	68	61	78	65	69	ST/SP
		Sg. Belongkong	2WKLG040	69	73	65	78	74	ST/SP
		Sg. Bunos	2WKLG006	71	63	44	57	57	T/P
		Sg. Bunos	2WKLG039	68	75	71	68	70	ST/SP
		Sg. Bunos	2WKLG043	73	85	83	89	81	B/C
		Sg. Gombak	2WKLG018	61	65	67	67	63	ST/SP
		Sg. Gombak	2WKLG026	73	74	80	82	74	ST/SP
		Sg. Gombak	2WKLG060	61	69	70	71	64	ST/SP
		Sg. Jinjang	2WKLG014	61	69	67	67	67	ST/SP
		Sg. Jinjang	2WKLG031	62	70	70	68	69	ST/SP
		Sg. Jinjang	2WKLG045	56	59	63	62	62	ST/SP
		Sg. Kerayong	2WKLG046	58	61	64	63	49	T/P
		Sg. Kerayong	2WKLG058	62	64	58	59	62	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
W.P. Kuala Lumpur	Sg. Klang	Sg. Keroh	2WKLG015	62	65	61	64	62	ST/SP
		Sg. Keroh	2WKLG048	61	61	65	64	68	ST/SP
		Sg. Klang	2WKLG001	63	67	72	71	58	T/P
		Sg. Klang	2WKLG002	65	69	70	71	62	ST/SP
		Sg. Klang	2WKLG003	67	68	74	71	68	ST/SP
		Sg. Klang	2WKLG004	67	75	70	69	59	T/P
		Sg. Klang	2WKLG049	66	69	72	72	76	ST/SP
		Sg. Kuyoh	2WKLG052	64	70	66	68	67	ST/SP
		Sg. Penchala	2WKLG010	92	92	89	92	92	B/C
		Sg. Toba	2WKLG037	61	69	63	53	60	ST/SP
		Sg. Untut	2WKLG038	64	73	78	64	65	ST/SP
N.Sembilan	Sg. Langat	Sg. Batang Benar	3NLGT013	74	74	76	84	63	ST/SP
		Sg. Batang Labu	3NLGT009	81	87	85	78	81	B/C
		Sg. Batang Labu	3NLGT025	90	94	89	91	92	B/C
		Sg. Batang Nilai	3NLGT023	83	87	83	87	80	ST/SP
		Sg. Batang Nilai	3NLGT024	76	75	75	73	76	ST/SP
		Sg. Beranang	3NLGT019	82	87	85	84	82	B/C
		Sg. Buan	3NLGT022	80	83	85	82	78	ST/SP
		Sg. Jijan	3NLGT026	85	82	88	88	86	B/C
		Sg. Pajam	3NLGT020	82	85	86	87	82	B/C
		Sg. Pajam	3NLGT021	60	56	58	59	56	T/P
	Sg. Linggi	Sg. Batang Penar	3NLGI009	81	89	84	89	85	B/C
		Sg. Batang Penar	3NLGI010	92	95	91	92	92	B/C
		Sg. Batang Penar	3NLGI020	84	92	89	90	85	B/C
		Sg. Batang Penar	3NLGI021	95	95	93	96	93	B/C
		Sg. Batang Penar	3NLGI027	94	96	97	97	97	B/C
		Sg. Batang Penar	3NLGI034	80	78	84	84	81	B/C
		Sg. Batu Hampar	3NLGI024	93	91	93	92	91	B/C
		Sg. Chembong	3NLGI012	93	88	89	92	94	B/C
		Sg. Empangan Terip	3NLGI022	80	82	85	83	83	B/C
		Sg. Jelai	3NLGI025	89	86	88	87	89	B/C
		Sg. Kayu Ara	3NLGI016	77	80	84	81	78	ST/SP
		Sg. Kenaboi	3NLGI032	83	87	85	89	81	B/C
		Sg. Kepayong	3NLGI007	78	80	79	80	83	B/C
		Sg. Kepayong	3NLGI023	94	97	97	96	97	B/C
		Sg. Kundur Besar	3NLGI013	91	92	92	93	95	B/C
		Sg. Linggi	3NLGI001	83	87	86	83	84	B/C
		Sg. Linggi	3NLGI002	82	86	86	85	84	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
N.Sembilan	Sg. Linggi	Sg. Linggi	3NLGI003	83	85	87	85	84	B/C
		Sg. Linggi	3NLGI004	77	85	85	85	83	B/C
		Sg. Linggi	3NLGI005	78	82	82	81	78	ST/SP
		Sg. Linggi	3NLGI006	77	82	83	80	82	B/C
		Sg. Muar	3NLGI026	88	93	91	93	94	B/C
		Sg. Ngoi Ngoi	3NLGI040	76	80	83	80	80	ST/SP
		Sg. Paroi	3NLGI018	78	80	85	80	83	B/C
		Sg. Pedas	3NLGI014	90	94	93	95	92	B/C
		Sg. Rembau	3NLGI011	91	92	91	91	86	B/C
		Sg. Senawang	3NLGI017	73	77	81	83	84	B/C
		Sg. Simin	3NLGI015	82	85	87	84	80	ST/SP
		Sg. Temiang	3NLGI019	83	85	87	88	87	B/C
		Sg. Temiang	3NLGI033	68	61	70	74	68	ST/SP
	Sg. Lukut	Sg. Lukut	3NLKT001	74	73	80	79	79	ST/SP
	Sg. Melaka	Sg. Dusun	3NMLK017	93	94	94	96	95	B/C
		Sg. Kemunting	3NMLK039	92	92	91	96	93	B/C
		Sg. Tampin	3NMLK038	95	96	95	97	97	B/C
		Sg. Tampin	3NMLK041	81	83	84	84	79	ST/SP
	Sg. Muar	Sg. Gemas	3NMUA041	70	71	76	78	55	T/P
		Sg. Gemencheh	3NMUA043	82	91	88	94	93	B/C
		Sg. Gemencheh	3NMUA045	82	90	85	90	91	B/C
		Sg. Jelai	3NMUA054	88	92	91	94	93	B/C
		Sg. Kelamah	3NMUA044	71	88	79	84	85	B/C
		Sg. Muar	3NMUA042	91	95	96	96	97	B/C
		Sg. Muar	3NMUA046	84	90	84	89	86	B/C
		Sg. Muar	3NMUA047	86	90	85	89	93	B/C
		Sg. Muar	3NMUA048	85	86	86	90	92	B/C
		Sg. Muar	3NMUA049	88	89	89	92	93	B/C
		Sg. Muar	3NMUA050	85	88	87	90	83	B/C
		Sg. Muar	3NMUA051	86	90	86	91	82	B/C
		Sg. Muar	3NMUA052	85	91	90	92	92	B/C
		Sg. Muar	3NMUA053	85	90	90	91	93	B/C
		Sg. Muar	3NMUA055	84	91	91	92	91	B/C
	Sg. Pahang	Sg. Pertang	3NPHG002	89	92	91	88	90	B/C
		Sg. Serting	3NPHG003	80	87	82	85	76	ST/SP
		Sg. Serting	3NPHG004	79	86	81	84	82	B/C
		Sg. Serting	3NPHG005	77	81	77	78	75	ST/SP
		Sg. Triang	3NPHG006	84	93	89	91	92	B/C
	Sg. Sepang	Sg. Rambai	2BSPG004	25	25	60	64	61	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Melaka	Sg. Baru	Sg. Baru	3MBAR001	74	70	75	79	78	ST/SP
	Sg. Duyong	Sg. Duyong	3MDYG001	63	69	72	68	82	B/C
		Sg. Duyong	3MDYG002	58	65	66	68	70	ST/SP
		Sg. Duyong	3MDYG003	77	84	87	86	85	B/C
		Sg. Gapam	3MDYG004	88	92	93	93	91	B/C
		Sg. Punggur	3MPGR001	52	67	58	66	69	ST/SP
		Sg. Punggur	3MPGR002	49	58	56	54	67	ST/SP
	Sg. Kesang	Sg. Chin-Chin	3MKSG006	62	53	66	64	69	ST/SP
		Sg. Chin-Chin	3MKSG008	79	87	84	85	89	B/C
		Sg. Chin-Chin	3MKSG009	78	89	86	87	88	B/C
		Sg. Chohong	3MKSG004	86	91	93	92	94	B/C
		Sg. Chohong	3MKSG005	90	94	94	95	95	B/C
		Sg. Kesang	3MKSG001	72	82	83	84	87	B/C
		Sg. Kesang	3MKSG002	79	88	84	87	87	B/C
		Sg. Kesang	3MKSG003	77	88	88	88	89	B/C
		Sg. Tangkak	3MKSG007	67	77	74	71	75	ST/SP
	Sg. Linggi	Sg. Simpang Ampat	3MLGI029	83	87	84	87	87	B/C
		Sg. Siput	3MLGI030	87	90	91	89	90	B/C
		Sg. Siput	3MLGI031	86	92	89	90	89	B/C
		Sg. Tuang	3MTUG002	57	62	70	74	69	ST/SP
	Sg. Melaka	Sg. Batang Melaka	3MMLK008	90	91	91	92	89	B/C
		Sg. Batang Melaka	3MMLK027	87	91	91	93	92	B/C
		Sg. Batang Melaka	3MMLK028	86	89	92	91	90	B/C
		Sg. Durian Tunggal	3MMLK011	79	86	88	85	85	B/C
		Sg. Malim	3MMLK014	67	71	70	66	66	ST/SP
		Sg. Malim	3MMLK034	67	68	71	70	66	ST/SP
		Sg. Melaka	3MMLK007	72	71	74	72	71	ST/SP
		Sg. Melaka	3MMLK009	91	93	92	93	94	B/C
		Sg. Melaka	3MMLK010	93	96	96	95	97	B/C
		Sg. Melaka	3MMLK012	70	72	71	69	65	ST/SP
		Sg. Melaka	3MMLK013	63	68	73	67	67	ST/SP
		Sg. Melaka	3MMLK015	81	82	84	85	83	B/C
		Sg. Melaka	3MMLK021	81	85	86	88	84	B/C
		Sg. Melaka	3MMLK022	83	86	87	88	88	B/C
		Sg. Melaka	3MMLK023	72	72	67	75	68	ST/SP
		Sg. Melaka	3MMLK024	59	69	72	66	61	ST/SP
		Sg. Melaka	3MMLK025	79	84	84	87	85	B/C
		Sg. Melaka	3MMLK026	80	81	83	86	84	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Melaka	Sg. Melaka	Sg. Melaka	3MMLK030	82	84	85	84	82	B/C
		Sg. Melaka	3MMLK032	70	67	68	74	71	ST/SP
		Sg. Putat	3MMLK029	62	74	68	68	66	ST/SP
		Sg. Putat	3MMLK033	59	63	64	65	61	ST/SP
		Sg. Rembia	3MMLK035	73	82	77	76	78	ST/SP
		Sg. Rembia	3MMLK036	68	54	82	76	75	ST/SP
		Sg. Tampin	3MMLK031	91	94	90	93	92	B/C
	Sg. Merlimau	Sg. Merlimau	3MMLU001	60	55	59	61	64	ST/SP
		Sg. Merlimau	3MMLU002	52	56	51	54	63	ST/SP
		Sg. Merlimau	3MMLU003	40	58	61	62	71	ST/SP
		Sg. Merlimau	3MMLU004	58	58	63	67	67	ST/SP
		Sg. Merlimau	3MMLU005	67	68	66	69	70	ST/SP
	Sg. Seri Melaka	Sg. Air Salak	3MSMK001	62	79	78	67	68	ST/SP
		Sg. Seri Melaka	3MSMK002	65	66	69	67	67	ST/SP
		Sg. Sg.Udang	3MSUD001	87	86	91	94	88	B/C
	Sg. Tuang	Sg. Tuang	3MTUG001	59	63	75	75	74	ST/SP
Johor	Sg. Air Baloi	Sg. Air Baloi	3JABL001	60	56	55	64	68	ST/SP
		Sg. Air Baloi	3JABL002	59	52	56	69	57	T/P
		Sg. Air Baloi	3JABL003	60	57	61	67	64	ST/SP
	Sg. Batu Pahat	Sg. Amran	3JBPT018	75	81	80	82	86	B/C
		Sg. Bantang	3JBPT020	96	97	97	97	97	B/C
		Sg. Batu Pahat	3JBPT001	66	64	61	63	68	ST/SP
		Sg. Bekok	3JBPT005	79	84	81	84	84	B/C
		Sg. Bekok	3JBPT008	57	67	58	73	74	ST/SP
		Sg. Bekok	3JBPT016	85	91	85	84	90	B/C
		Sg. Bekok	3JBPT017	87	91	90	89	90	B/C
		Sg. Bekok	3JBPT019	92	94	93	94	94	B/C
		Sg. Bekok	3JBPT023	57	63	60	66	68	ST/SP
		Sg. Berlian	3JBPT007	78	77	79	82	82	B/C
		Sg. Chaah	3JBPT010	88	93	90	90	87	B/C
		Sg. Kahang	3JBPT022	90	92	82	86	90	B/C
		Sg. Lenik	3JBPT011	82	91	90	90	91	B/C
		Sg. Merek	3JBPT009	88	89	88	92	90	B/C
		Sg. Merpo	3JBPT006	91	90	91	94	94	B/C
		Sg. Panchor	3JBPT025	59	63	59	62	68	ST/SP
		Sg. Semberong	3JBPT003	57	64	63	73	70	ST/SP
		Sg. Semberong	3JBPT004	64	77	72	77	73	ST/SP
		Sg. Semberong Dam	3JBPT021	89	91	89	93	91	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Batu Pahat	Sg. Simpang Kanan	3JBPT002	58	62	59	65	67	ST/SP
		Sg. Simpang Kanan	3JBPT013	59	60	59	60	67	ST/SP
		Sg. Simpang Kiri	3JBPT012	81	82	80	87	88	B/C
		Sg. Simpang Kiri	3JBPT014	65	71	76	66	70	ST/SP
		Sg. Simpang Kiri	3JBPT015	60	64	66	65	68	ST/SP
		Sg. Temehel	3JBPT024	57	54	59	62	64	ST/SP
	Sg. Benut	Sg. Benut	3JBNT001	86	92	92	94	91	B/C
		Sg. Benut	3JBNT002	79	86	86	82	85	B/C
		Sg. Benut	3JBNT005	64	66	68	72	69	ST/SP
		Sg. Benut	3JBNT006	69	62	62	72	68	ST/SP
		Sg. Machap Dam	3JBNT008	92	94	93	90	94	B/C
		Sg. Parit Hj.Yassin	3JBNT004	85	81	81	83	84	B/C
		Sg. Pinggan	3JBNT007	60	59	63	67	67	ST/SP
		Sg. Ulu Benut	3JBNT003	89	90	86	90	91	B/C
	Sg. Danga	Sg. Danga	3JDGA001	58	62	66	57	67	ST/SP
		Sg. Danga	3JDGA002	55	59	62	57	69	ST/SP
	Sg. Endau	Sg. Anak Sg. Semberong	3JEND007	84	85	84	82	71	ST/SP
		Sg. Dengar	3JEND010	84	91	90	90	91	B/C
		Sg. Empangan Labong	3JEND027	89	91	91	91	92	B/C
		Sg. Endau	3JEND019	85	88	89	91	89	B/C
		Sg. Endau	3JEND022	87	90	91	91	94	B/C
		Sg. Endau	3JEND023	93	96	92	95	96	B/C
		Sg. Jasin	3JEND024	94	97	96	97	96	B/C
		Sg. Jebong	3JEND005	74	82	75	86	88	B/C
		Sg. Kahang	3JEND020	90	89	89	91	92	B/C
		Sg. Kahang	3JEND026	90	94	92	93	93	B/C
		Sg. Kahang	3JEND028	90	88	88	90	89	B/C
		Sg. Lenga	3JEND008	68	69	74	78	73	ST/SP
		Sg. Lenggor	3JEND009	82	89	89	89	92	B/C
		Sg. Lenggor	3JEND029	81	88	90	88	93	B/C
		Sg. Mamai	3JEND015	87	88	89	86	89	B/C
		Sg. Melatai	3JEND017	70	71	73	71	75	ST/SP
		Sg. Mengkibol	3JEND001	88	89	92	88	91	B/C
		Sg. Mengkibol	3JEND002	77	84	82	83	81	B/C
		Sg. Mengkibol	3JEND003	69	75	77	72	80	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Endau	Sg. Paloh	3JEND016	82	85	85	90	86	B/C
		Sg. Pamol	3JEND011	72	76	73	69	81	B/C
		Sg. Selai	3JEND025	92	94	94	90	94	B/C
		Sg. Semberong	3JEND004	89	90	87	91	92	B/C
		Sg. Semberong	3JEND006	84	84	80	90	93	B/C
		Sg. Semberong	3JEND012	76	80	77	79	80	ST/SP
		Sg. Semberong	3JEND018	85	88	88	86	88	B/C
		Sg. Semberong	3JEND021	84	88	89	88	92	B/C
		Sg. Singol	3JEND013	79	83	87	84	85	B/C
		Sg. Tamok	3JEND014	91	90	91	87	92	B/C
	Sg. Jemaluang	Sg. Jemaluang	3JJML001	81	90	90	93	92	B/C
		Sg. Jemaluang	3JJML002	81	86	80	89	89	B/C
	Sg. Johor	Sg. Anak Sg. Sayong	3JJHR023	86	92	92	92	88	B/C
		Sg. Anak Sg. Sayong	3JJHR032	75	84	72	71	75	ST/SP
		Sg. Belitong	3JJHR038	83	89	86	87	85	B/C
		Sg. Berangan	3JJHR013	71	82	81	82	84	B/C
		Sg. Bukit Besar	3JJHR007	61	60	56	46	60	ST/SP
		Sg. Bukit Besar	3JJHR009	90	95	95	90	91	B/C
		Sg. Chemangar	3JJHR019	70	73	77	79	80	ST/SP
		Sg. Johor	3JJHR011	83	89	91	88	90	B/C
		Sg. Johor	3JJHR014	85	89	91	86	90	B/C
		Sg. Johor	3JJHR015	86	91	92	90	88	B/C
		Sg. Johor	3JJHR040	84	87	88	84	86	B/C
		Sg. Johor	3JJHR041	82	89	88	90	87	B/C
		Sg. Johor	3JJHR042	85	90	88	90	90	B/C
		Sg. Layang	3JJHR001	93	93	93	94	95	B/C
		Sg. Layau Kiri	3JJHR017	87	92	89	87	93	B/C
		Sg. Lebam	3JJHR020	79	87	88	94	90	B/C
		Sg. Linggiu	3JJHR030	84	93	92	92	93	B/C
		Sg. Panti	3JJHR037	79	87	86	84	90	B/C
		Sg. Papan	3JJHR034	81	86	87	90	89	B/C
		Sg. Pelepah	3JJHR039	95	97	97	97	97	B/C
		Sg. Pelepah	3JJHR043	86	87	87	84	81	B/C
		Sg. Pelepah	3JJHR044	87	88	90	92	89	B/C
		Sg. Pelepah	3JJHR045	90	92	93	93	92	B/C
		Sg. Penggeli	3JJHR028	89	87	90	90	85	B/C
		Sg. Penggeli	3JJHR031	89	88	89	90	89	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Johor	Sg. Remis	3JJHR026	86	89	89	92	86	B/C
		Sg. Santi	3JJHR022	89	87	90	92	91	B/C
		Sg. Sayong	3JJHR024	82	85	82	84	86	B/C
		Sg. Sayong	3JJHR025	78	84	88	90	85	B/C
		Sg. Sayong	3JJHR027	82	84	88	88	90	B/C
		Sg. Sayong	3JJHR033	83	88	89	88	87	B/C
		Sg. Sebol	3JJHR029	73	80	79	80	84	B/C
		Sg. Seluyut	3JJHR035	83	87	83	85	90	B/C
		Sg. Semangar	3JJHR008	81	92	90	89	90	B/C
		Sg. Semenchu	3JJHR018	66	85	86	86	78	ST/SP
		Sg. Sening	3JJHR021	89	93	96	94	96	B/C
		Sg. Serai	3JJHR002	67	60	62	64	74	ST/SP
		Sg. Telor	3JJHR012	88	89	93	92	93	B/C
		Sg. Temoh	3JJHR016	74	84	88	79	82	B/C
		Sg. Tiram	3JJHR003	71	79	77	84	85	B/C
		Sg. Tiram	3JJHR004	86	91	89	90	90	B/C
		Sg. Tiram	3JJHR005	69	68	77	79	80	ST/SP
		Sg. Tiram	3JJHR006	88	93	92	91	93	B/C
	Sg. Kaw. Pasir Gudang	Sg. Buluh	3JPGD002	41	43	40	46	35	T/P
		Sg. Latoh	3JPGD004	62	68	71	69	71	ST/SP
		Sg. Masai	3JPGD005	63	60	63	73	69	ST/SP
		Sg. Perembi	3JPGD001	57	47	59	69	56	T/P
		Sg. Tukang Batu	3JPGD003	42	35	34	35	44	T/P
	Sg. Kempas	Sg. Kempas	3JKPS001	29	33	39	33	37	T/P
		Sg. Kempas	3JKPS002	37	42	43	45	40	T/P
	Sg. Kim-Kim	Sg. Kim-Kim	3JKIM001	51	66	57	58	61	ST/SP
		Sg. Kim-Kim	3JKIM002	85	90	89	89	90	B/C
	Sg. Mersing	Sg. Empangan Congok	3JMSG004	85	88	86	92	93	B/C
		Sg. Mersing	3JMSG001	87	95	93	94	96	B/C
		Sg. Mersing	3JMSG002	84	88	81	80	84	B/C
		Sg. Mersing	3JMSG003	83	92	87	92	93	B/C
	Sg. Muar	Sg. Air Panas	3JMUA035	94	97	96	97	97	B/C
		Sg. Belemang	3JMUA051	94	95	94	96	96	B/C
		Sg. Gemas	3JMUA036	80	85	86	89	88	B/C
		Sg. Jementah	3JMUA040	93	96	95	96	97	B/C
		Sg. Juasseh	3JMUA014	94	96	92	88	91	B/C
		Sg. Juasseh	3JMUA037	93	95	95	94	96	B/C
		Sg. Juasseh	3JMUA045	94	95	94	94	96	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Muar	Sg. Labis	3JMUA011	89	88	87	85	88	B/C
		Sg. Labis	3JMUA012	89	89	88	85	87	B/C
		Sg. Labis	3JMUA015	87	87	82	89	87	B/C
		Sg. Meda	3JMUA034	82	85	80	85	85	B/C
		Sg. Merbudu	3JMUA030	63	77	72	85	81	B/C
		Sg. Merlimau	3JMUA020	70	66	73	72	67	ST/SP
		Sg. Muar	3JMUA017	82	86	81	86	86	B/C
		Sg. Muar	3JMUA019	85	87	76	87	84	B/C
		Sg. Muar	3JMUA022	85	89	82	88	82	B/C
		Sg. Muar	3JMUA026	84	89	85	88	84	B/C
		Sg. Muar	3JMUA027	85	84	83	87	87	B/C
		Sg. Muar	3JMUA028	83	81	83	88	87	B/C
		Sg. Muar	3JMUA029	75	84	85	86	89	B/C
		Sg. Muar	3JMUA031	77	83	84	83	87	B/C
		Sg. Muar	3JMUA033	73	77	80	83	83	B/C
		Sg. Muar	3JMUA039	82	85	82	89	87	B/C
		Sg. Muar	3JMUA041	80	86	84	88	88	B/C
		Sg. Muar	3JMUA042	78	86	85	87	90	B/C
		Sg. Muar	3JMUA043	79	83	85	87	89	B/C
		Sg. Muar	3JMUA046	86	89	83	87	86	B/C
		Sg. Muar	3JMUA047	81	87	84	89	88	B/C
		Sg. P.Mengkuang	3JMUA018	89	92	91	89	93	B/C
		Sg. Pagoh	3JMUA049	66	74	76	76	78	ST/SP
		Sg. Palong	3JMUA024	88	89	87	87	86	B/C
		Sg. Palong	3JMUA025	84	85	81	88	84	B/C
		Sg. Pendol	3JMUA050	90	95	93	95	95	B/C
		Sg. Sarang Buaya	3JMUA038	58	60	60	67	69	ST/SP
		Sg. Segamat	3JMUA016	89	90	86	90	91	B/C
		Sg. Segamat	3JMUA044	91	94	89	89	91	B/C
		Sg. Segamat	3JMUA048	92	95	91	94	93	B/C
		Sg. Senarut	3JMUA021	75	77	79	75	76	ST/SP
		Sg. Serom	3JMUA032	63	63	63	67	67	ST/SP
		Sg. Simpang Loi	3JMUA023	77	84	73	81	66	ST/SP
		Sg. Tenang	3JMUA013	79	76	81	78	85	B/C
	Sg. Paloi	Sg. Paloi	3JPAL001	89	90	90	91	91	B/C
	Sg. Pontian Besar	Sg. Air Hitam	3JPBS001	71	74	73	82	80	ST/SP
		Sg. Ayer Merah	3JPBS005	43	54	54	65	61	ST/SP
		Sg. Pontian Besar	3JPBS002	65	65	63	78	74	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Pontian Besar	Sg. Pontian Besar	3JPBS003	80	85	78	81	77	ST/SP
		Sg. Pontian Besar	3JPBS004	86	84	85	86	89	B/C
		Sg. Pontian Besar	3JPBS006	64	63	60	79	74	ST/SP
		Sg. Pontian Besar	3JPBS007	73	73	74	80	83	B/C
	Sg. Pontian Kecil	Sg. Pontian Kecil	3JPKC001	86	84	85	82	90	B/C
		Sg. Pontian Kecil	3JPKC002	76	75	70	61	66	ST/SP
	Sg. Pulai	Sg. Pulai	3JPLI001	82	83	86	83	74	ST/SP
		Sg. Pulai	3JPLI002	72	77	82	80	79	ST/SP
		Sg. Pulai Dam	3JPLI004	95	95	96	96	95	B/C
		Sg. Ulu Choh	3JPLI003	72	72	74	74	83	B/C
	Sg. Rambah	Sg. Rambah	3JRBH001	75	69	78	72	69	ST/SP
		Sg. Rambah	3JRBH002	65	63	70	68	65	ST/SP
	Sg. Sanglang	Sg. Sanglang	3JSLG001	59	57	51	66	63	ST/SP
	Sg. Sedili Besar	Sg. Ambat	3JSBE005	86	84	76	88	84	B/C
		Sg. Dohol	3JSBE001	89	90	86	89	86	B/C
		Sg. Mupur	3JSBE009	67	73	73	60	78	ST/SP
		Sg. Pasir Panjang	3JSBE010	88	87	76	71	83	B/C
		Sg. Sedili Besar	3JSBE002	86	86	86	87	87	B/C
		Sg. Sedili Besar	3JSBE004	91	93	91	92	92	B/C
		Sg. Sedili Besar	3JSBE006	82	87	85	88	88	B/C
		Sg. Sedili Besar	3JSBE007	74	72	70	86	82	B/C
		Sg. Sedili Besar	3JSBE008	87	89	85	89	89	B/C
		Sg. Sedili Besar	3JSBE011	90	88	87	91	88	B/C
		Sg. Temubor Kanan	3JSBE003	93	95	93	95	93	B/C
	Sg. Sedili Kecil	Sg. Anak Sedili Kecil	3JSKE005	25	24	74	74	73	ST/SP
		Sg. Anak Sedili Kecil	3JSKE006	79	85	75	86	84	B/C
		Sg. Bahan	3JSKE002	78	73	64	79	79	ST/SP
		Sg. Bahan	3JSKE004	74	78	76	85	84	B/C
		Sg. Sedili Kecil	3JSKE001	89	88	83	88	85	B/C
		Sg. Sedili Kecil	3JSKE003	80	76	78	82	83	B/C
	Sg. Segget	Sg. Segget	3JSGT001	81	71	64	47	48	T/P
		Sg. Segget	3JSGT002	77	68	72	47	47	T/P
		Sg. Segget	3JSGT003	59	67	65	53	56	T/P
		Sg. Segget	3JSGT004	63	78	76	61	66	ST/SP
		Sg. Segget	3JSGT005	54	65	72	59	58	T/P
	Sg. Skudai	Sg. Melana	3JSKU008	91	95	94	94	94	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Sg. Skudai	Sg. Melana	3JSKU009	61	59	66	62	62	ST/SP
		Sg. Skudai	3JSKU001	55	63	65	65	71	ST/SP
		Sg. Skudai	3JSKU002	66	71	65	78	81	B/C
		Sg. Skudai	3JSKU003	61	74	74	66	76	ST/SP
		Sg. Skudai	3JSKU004	89	90	93	92	95	B/C
		Sg. Skudai	3JSKU005	72	79	81	80	84	B/C
		Sg. Skudai	3JSKU006	66	76	77	74	77	ST/SP
		Sg. Skudai	3JSKU007	43	54	63	66	68	ST/SP
		Sg. Skudai	3JSKU010	55	62	61	67	67	ST/SP
		Sg. Skudai	3JSKU011	92	92	95	96	95	B/C
	Sg. Tebrau	Sg. Bala	3JTRU008	55	47	55	60	63	ST/SP
		Sg. Pandan	3JTRU007	46	43	58	44	45	T/P
		Sg. Plentong	3JTRU004	56	66	67	63	71	ST/SP
		Sg. Sebulung	3JTRU009	53	58	62	56	58	T/P
		Sg. Sengkuang	3JTRU011	52	53	50	35	37	T/P
		Sg. Tampoi	3JTRU010	52	60	58	54	48	T/P
		Sg. Tebrau	3JTRU001	44	65	57	56	57	T/P
		Sg. Tebrau	3JTRU002	55	72	54	71	64	ST/SP
		Sg. Tebrau	3JTRU003	65	72	68	72	69	ST/SP
		Sg. Tebrau	3JTRU005	57	65	62	56	69	ST/SP
		Sg. Tebrau	3JTRU006	64	69	71	54	56	T/P
Pahang	Sg. Anak Endau	Sg. Anak Endau	4CAED001	94	95	95	96	94	B/C
		Sg. Anak Endau	4CAED002	84	87	86	84	83	B/C
	Sg. Balok	Sg. Balok	4CBLK001	66	82	74	75	67	ST/SP
		Sg. Balok	4CBLK002	70	77	77	76	73	ST/SP
		Sg. Panjang	4CBLK004	76	78	72	80	71	ST/SP
		Sg. Yior	4CBLK003	62	75	74	72	65	ST/SP
	Sg. Bebar	Sg. Bebar	4CBBR001	76	86	83	84	87	B/C
		Sg. Bebar	4CBBR002	82	92	89	90	90	B/C
		Sg. Merba	4CBBR005	85	91	88	88	86	B/C
		Sg. Serai	4CBBR003	75	85	74	86	90	B/C
		Sg. Serai	4CBBR004	85	88	86	87	91	B/C
	Sg. Cherating	Sg. Cherating	4CCHE001	81	86	85	86	82	B/C
	Sg. Kuantan	Sg. Belat	4CKTN001	80	86	88	87	86	B/C
		Sg. Charu	4CKTN006	93	96	95	96	96	B/C
		Sg. Galing Besar	4CKTN003	63	70	76	75	77	ST/SP
		Sg. Galing Besar	4CKTN004	64	62	76	77	77	ST/SP
		Sg. Kenau	4CKTN010	94	97	96	97	97	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Sg. Kuantan	Sg. Kuantan	4CKTN002	88	93	87	92	93	B/C
		Sg. Kuantan	4CKTN015	87	93	87	93	93	B/C
		Sg. Kuantan	4CKTN016	90	93	94	91	92	B/C
		Sg. Kuantan	4CKTN017	93	96	96	97	96	B/C
		Sg. Kuantan	4CKTN018	94	96	97	97	97	B/C
		Sg. Kuantan	4CKTN019	80	85	87	85	86	B/C
		Sg. Kuantan	4CKTN020	86	93	87	92	92	B/C
		Sg. Kuantan	4CKTN021	85	88	89	91	91	B/C
		Sg. Pandan	4CKTN012	87	93	94	93	95	B/C
		Sg. Pinang	4CKTN005	80	88	88	89	85	B/C
		Sg. Reman	4CKTN014	87	91	90	91	93	B/C
		Sg. Riau	4CKTN007	84	88	88	87	82	B/C
		Sg. Talam	4CKTN013	72	70	76	70	63	ST/SP
	Sg. Merchong	Sg. Merchong	4CMCO002	82	92	86	87	85	B/C
		Sg. Merchong	4CMCO003	89	93	89	89	87	B/C
	Sg. Pahang	Sg. Anak Sg. Lepar	4CPHG136	85	93	89	94	91	B/C
		Sg. Batu	4CPHG056	84	92	91	94	90	B/C
		Sg. Belayar	4CPHG135	94	94	92	93	91	B/C
		Sg. Bentong	4CPHG040	92	95	95	94	94	B/C
		Sg. Bentong	4CPHG045	87	91	89	90	87	B/C
		Sg. Bentong	4CPHG092	92	95	90	89	90	B/C
		Sg. Bentong	4CPHG133	86	93	94	93	94	B/C
		Sg. Bentong	4CPHG134	92	96	96	95	97	B/C
		Sg. Bentong	4CPHG144	86	89	88	86	88	B/C
		Sg. Benus	4CPHG047	91	91	91	90	89	B/C
		Sg. Benus	4CPHG118	94	94	92	96	95	B/C
		Sg. Benus	4CPHG152	93	96	91	97	95	B/C
		Sg. Bera	4CPHG019	83	86	85	87	84	B/C
		Sg. Bera	4CPHG020	84	86	89	87	83	B/C
		Sg. Bera	4CPHG058	85	86	88	87	83	B/C
		Sg. Bera	4CPHG059	85	91	85	88	85	B/C
		Sg. Bera	4CPHG063	85	86	85	88	84	B/C
		Sg. Berkelah	4CPHG098	93	97	97	97	97	B/C
		Sg. Bertam	4CBTM002	91	94	89	90	87	B/C
		Sg. Bertam	4CBTM010	74	79	78	79	86	B/C
		Sg. Bertam	4CBTM011	96	96	97	97	96	B/C
		Sg. Bertam	4CBTM013	97	97	97	96	97	B/C
		Sg. Bilut	4CPHG119	83	88	85	87	92	B/C
		Sg. Bilut	4CPHG129	85	92	92	88	94	B/C
		Sg. Burung	4CBTM005	96	96	95	93	90	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Sg. Pahang	Sg. Chini	4CPHG004	82	84	85	84	86	B/C
		Sg. Gapoi	4CPHG086	94	97	96	97	97	B/C
		Sg. Habu	4CBTM004	90	96	94	94	96	B/C
		Sg. Jelai	4CPHG0130	90	93	93	93	94	B/C
		Sg. Jelai	4CPHG096	86	91	88	86	90	B/C
		Sg. Jelai	4CPHG125	88	90	90	90	92	B/C
		Sg. Jempol	4CPHG049	83	91	90	91	87	B/C
		Sg. Jempol	4CPHG050	93	97	94	96	94	B/C
		Sg. Jempol	4CPHG087	93	95	93	96	95	B/C
		Sg. Jempol	4CPHG088	90	95	91	91	89	B/C
		Sg. Jempol	4CPHG121	85	95	94	95	95	B/C
		Sg. Jengka	4CPHG041	92	95	93	94	96	B/C
		Sg. Jengka	4CPHG051	86	89	90	91	91	B/C
		Sg. Kecau	4CPHG091	83	87	91	91	89	B/C
		Sg. Kecau	4CPHG116	84	87	84	85	87	B/C
		Sg. Kecau	4CPHG151	89	89	95	94	95	B/C
		Sg. Kelau	4CPHG117	88	91	94	93	95	B/C
		Sg. Kelau	4CPHG145	82	86	86	87	92	B/C
		Sg. Kelau	4CPHG146	91	93	94	91	96	B/C
		Sg. Kelau	4CPHG153	84	89	84	88	90	B/C
		Sg. Kertam	4CPHG014	91	91	93	93	92	B/C
		Sg. Koyan	4CPHG033	89	94	92	93	94	B/C
		Sg. Krau	4CPHG003	92	94	92	94	92	B/C
		Sg. Kundang	4CPHG018	79	82	85	86	81	B/C
		Sg. Lenggok	4CBTM003	93	96	92	96	95	B/C
		Sg. Lepar	4CPHG006	92	91	93	95	94	B/C
		Sg. Lipis	4CPHG029	85	90	89	92	91	B/C
		Sg. Lipis	4CPHG030	88	91	91	91	90	B/C
		Sg. Lipis	4CPHG035	93	96	94	97	94	B/C
		Sg. Luit	4CPHG015	91	93	92	89	92	B/C
		Sg. Maran	4CPHG016	93	96	96	96	95	B/C
		Sg. Mentiga	4CPHG005	80	77	83	91	87	B/C
		Sg. Mentiga	4CPHG042	85	86	88	89	89	B/C
		Sg. Mentiga	4CPHG089	85	87	89	90	90	B/C
		Sg. Pahang	4CPHG007	82	90	88	88	88	B/C
		Sg. Pahang	4CPHG008	93	93	91	94	91	B/C
		Sg. Pahang	4CPHG010	87	90	92	91	89	B/C
		Sg. Pahang	4CPHG011	88	93	89	90	86	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Sg. Pahang	Sg. Pahang	4CPHG012	89	93	90	92	92	B/C
		Sg. Pahang	4CPHG013	89	91	90	88	88	B/C
		Sg. Pahang	4CPHG021	87	92	90	93	93	B/C
		Sg. Pahang	4CPHG022	87	91	91	93	93	B/C
		Sg. Pahang	4CPHG023	91	94	92	91	90	B/C
		Sg. Pahang	4CPHG027	88	94	92	96	95	B/C
		Sg. Pahang	4CPHG054	87	90	88	90	90	B/C
		Sg. Pahang	4CPHG055	86	91	90	91	89	B/C
		Sg. Pahang	4CPHG097	88	93	89	89	88	B/C
		Sg. Pahang	4CPHG100	84	89	88	88	87	B/C
		Sg. Pahang	4CPHG104	87	91	90	91	94	B/C
		Sg. Pahang	4CPHG111	89	92	93	92	92	B/C
		Sg. Pahang	4CPHG113	87	92	88	90	89	B/C
		Sg. Pahang	4CPHG124	89	91	91	90	92	B/C
		Sg. Pahang	4CPHG126	88	92	91	91	91	B/C
		Sg. Pahang	4CPHG127	89	88	96	95	95	B/C
		Sg. Pahang	4CPHG131	88	88	89	93	92	B/C
		Sg. Pahang	4CPHG137	86	93	90	90	89	B/C
		Sg. Pahang	4CPHG138	85	90	89	89	90	B/C
		Sg. Pahang	4CPHG139	83	90	89	89	89	B/C
		Sg. Pahang	4CPHG141	87	91	93	93	93	B/C
		Sg. Pahang	4CPHG148	88	92	88	90	89	B/C
		Sg. Pahang	4CPHG150	87	89	89	88	91	B/C
		Sg. Penjuring	4CPHG044	94	97	97	97	97	B/C
		Sg. Pertang	4CPHG132	91	90	91	92	92	B/C
		Sg. Perting	4CPHG120	94	96	97	97	96	B/C
		Sg. Raub	4CPHG123	93	95	95	96	94	B/C
		Sg. Retang	4CPHG105	92	93	94	94	92	B/C
		Sg. Ringlet	4CBTM001	83	91	89	91	94	B/C
		Sg. Salak	4CPHG122	87	91	91	92	94	B/C
		Sg. Semantan	4CPHG025	87	92	88	89	92	B/C
		Sg. Semantan	4CPHG036	91	92	93	96	94	B/C
		Sg. Semantan	4CPHG061	87	90	85	88	89	B/C
		Sg. Semantan	4CPHG084	88	93	88	90	88	B/C
		Sg. Serting	4CPHG101	84	85	86	87	85	B/C
		Sg. Serting	4CPHG102	85	84	86	88	85	B/C
		Sg. T. Paya Bungor	4CPHG002	91	91	92	92	92	B/C
		Sg. Tahan	4CPHG109	91	92	94	96	94	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Sg. Pahang	Sg. Tanglir	4CPHG048	88	94	90	92	93	B/C
		Sg. Tanglir	4CPHG053	89	87	89	89	93	B/C
		Sg. Tanglir	4CPHG057	87	84	89	90	92	B/C
		Sg. Tanglir	4CPHG106	88	86	87	90	94	B/C
		Sg. Tanglir	4CPHG107	88	88	90	90	93	B/C
		Sg. Tasik Bera	4CPHG140	91	88	89	89	88	B/C
		Sg. Tasik Chini	4CPHG043	92	88	93	91	93	B/C
		Sg. Tasik Chini	4CPHG060	93	90	92	92	94	B/C
		Sg. Tasik Chini	4CPHG071	91	92	93	93	93	B/C
		Sg. Tasik Chini	4CPHG108	92	93	93	93	95	B/C
		Sg. Tasik Chini	4CPHG110	91	87	93	92	93	B/C
		Sg. Tasik Chini	4CPHG112	93	89	92	93	93	B/C
		Sg. Tasik Chini	4CPHG114	92	92	93	94	94	B/C
		Sg. Tasik Chini	4CPHG115	92	90	92	92	93	B/C
		Sg. Tasik Chini	4CPHG130	92	90	92	91	94	B/C
		Sg. Tasik Chini	4CPHG143	92	87	90	90	90	B/C
		Sg. Teh	4CPHG090	93	94	94	96	96	B/C
		Sg. Tekal	4CPHG062	85	89	87	90	86	B/C
		Sg. Telang	4CPHG032	91	94	93	93	93	B/C
		Sg. Telemong	4CPHG046	94	96	95	95	96	B/C
		Sg. Telemong	4CPHG093	93	93	93	93	94	B/C
		Sg. Telemong	4CPHG094	91	97	94	94	97	B/C
		Sg. Telom	4CBTM008	86	95	94	93	93	B/C
		Sg. Telom	4CBTM009	86	93	92	90	89	B/C
		Sg. Tembeling	4CPHG142	91	90	94	95	94	B/C
		Sg. Teranum	4CPHG038	95	96	96	97	96	B/C
		Sg. Teras	4CPHG037	93	96	95	96	95	B/C
		Sg. Teras	4CPHG147	91	96	96	94	96	B/C
		Sg. Teris	4CPHG081	91	94	95	94	96	B/C
		Sg. Teris	4CPHG082	92	95	94	95	95	B/C
		Sg. Teris	4CPHG083	92	94	94	95	95	B/C
		Sg. Terla	4CBTM007	92	95	97	97	95	B/C
		Sg. Terla	4CBTM012	95	97	97	97	96	B/C
		Sg. Triang	4CPHG024	88	91	85	87	87	B/C
		Sg. Triang	4CPHG074	88	91	84	86	88	B/C
		Sg. Tringkap	4CBTM006	89	94	96	97	94	B/C
		Sg. Ulong	4CBTM014	96	97	97	97	97	B/C
	Sg. Rompin	Sg. Aur	4CRPN005	86	91	90	91	88	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Sg. Rompin	Sg. Bakar	4CRPN016	75	69	92	95	94	B/C
		Sg. Jekatih	4CRPN012	87	91	92	91	91	B/C
		Sg. Jekatih	4CRPN013	87	90	91	91	90	B/C
		Sg. Jeram	4CRPN006	88	93	90	90	90	B/C
		Sg. Kepasing	4CRPN010	88	90	92	88	91	B/C
		Sg. Keratong	4CRPN011	84	87	91	89	90	B/C
		Sg. Keratong	4CRPN018	84	91	91	90	85	B/C
		Sg. Keratong	4CRPN021	86	93	90	93	91	B/C
		Sg. Keratong	4CRPN022	88	93	90	93	91	B/C
		Sg. Pontian	4CRPN003	85	90	84	88	89	B/C
		Sg. Pukin	4CRPN014	87	90	92	94	94	B/C
		Sg. Pukin	4CRPN015	84	90	94	94	93	B/C
		Sg. Pukin	4CRPN017	87	89	94	94	95	B/C
		Sg. Rompin	4CRPN004	78	88	87	86	86	B/C
		Sg. Rompin	4CRPN007	79	92	88	88	86	B/C
		Sg. Rompin	4CRPN008	85	93	91	91	88	B/C
		Sg. Rompin	4CRPN020	83	93	91	89	90	B/C
		Sg. Rompin	4CRPN030	86	90	91	90	90	B/C
		Sg. Sepayang	4CRPN002	77	84	86	85	85	B/C
	Sg. Tonggok	Sg. Tonggok	4CTGK001	80	82	67	80	80	ST/SP
		Sg. Tonggok	4CTGK002	65	80	75	81	72	ST/SP
Terengganu	Sg. Besut	Sg. Besut	4TBST002	91	93	94	93	95	B/C
		Sg. Besut	4TBST003	92	94	93	94	96	B/C
		Sg. Besut	4TBST004	93	96	93	94	96	B/C
		Sg. Besut	4TBST005	92	93	95	94	95	B/C
		Sg. Besut	4TBST006	92	94	95	93	95	B/C
		Sg. Jertih	4TBST001	88	92	91	87	89	B/C
	Sg. Chukai	Sg. Bungkus	4TCKI006	80	83	81	82	84	B/C
		Sg. Chukai	4TCKI003	80	87	88	84	82	B/C
		Sg. Ibok	4TCKI001	81	87	89	89	85	B/C
		Sg. Ibok	4TCKI002	91	91	87	94	93	B/C
		Sg. Ruang	4TCKI004	74	80	80	80	74	ST/SP
		Sg. Ruang	4TCKI005	65	80	79	78	77	ST/SP
	Sg. Dungun	Sg. Dungun	4TDGN002	92	96	95	96	95	B/C
		Sg. Dungun	4TDGN003	91	95	93	93	96	B/C
		Sg. Dungun	4TDGN004	90	94	91	93	93	B/C
		Sg. Dungun	4TDGN005	90	94	92	92	95	B/C
		Sg. Dungun	4TDGN006	91	94	91	92	95	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Terengganu	Sg. Dungun	Sg. Telemboh	4TDGN001	86	89	89	87	86	B/C
	Sg. Ibai	Sg. Ibai	4TIBI001	81	75	73	81	73	ST/SP
		Sg. Ibai	4TIBI002	79	84	83	79	78	ST/SP
		Sg. Ibai	4TIBI003	85	82	87	83	89	B/C
	Sg. Kemaman	Sg. Cherul	4TKMM003	90	92	92	94	92	B/C
		Sg. Cherul	4TKMM004	91	91	90	94	92	B/C
		Sg. Cherul	4TKMM010	89	90	91	93	95	B/C
		Sg. Kemaman	4TKMM007	92	95	95	96	95	B/C
		Sg. Kemaman	4TKMM008	87	94	89	91	93	B/C
		Sg. Kemaman	4TKMM009	86	90	92	91	87	B/C
		Sg. Neram	4TKMM005	75	86	85	88	77	ST/SP
		Sg. Perasing	4TKMM006	82	92	94	90	90	B/C
		Sg. Ransan	4TKMM001	65	78	79	87	85	B/C
		Sg. Ransan	4TKMM002	91	95	95	95	95	B/C
	Sg. Kertih	Sg. Kertih	4TKTH001	82	88	91	89	84	B/C
		Sg. Kertih	4TKTH002	87	83	86	87	91	B/C
	Sg. Kluang	Sg. Kluang	4TKLU005	88	84	84	85	84	B/C
	Sg. Marang	Sg. Kerak	4TMRG001	79	82	85	82	82	B/C
		Sg. Marang	4TMRG002	88	89	94	90	91	B/C
		Sg. Temala	4TMRG003	91	92	91	90	92	B/C
	Sg. Merang	Sg. Merang	4TMER001	82	77	77	80	84	B/C
	Sg. Merchang	Sg. Landas	4TMCA001	71	87	87	84	87	B/C
		Sg. Merchang	4TMCA002	71	80	73	76	81	B/C
	Sg. Paka	Sg. Besul	4TPKA001	92	96	96	92	96	B/C
		Sg. Paka	4TPKA005	87	88	89	90	90	B/C
		Sg. Paka	4TPKA006	88	92	91	89	90	B/C
		Sg. Paka	4TPKA007	88	90	91	89	89	B/C
		Sg. Rasau	4TPKA003	83	85	86	87	82	B/C
		Sg. Rasau	4TPKA004	77	83	79	80	80	ST/SP
		Sg. Rengat	4TPKA002	84	91	91	89	89	B/C
	Sg. Setiu	Sg. Bari	4TSTU002	92	95	95	93	94	B/C
		Sg. Chalok	4TSTU001	85	94	91	93	92	B/C
		Sg. Chalok	4TSTU005	90	92	93	92	94	B/C
		Sg. Chalok	4TSTU006	83	83	85	87	85	B/C
		Sg. Setiu	4TSTU004	87	93	93	93	96	B/C
		Sg. Setiu	4TSTU007	90	94	93	94	96	B/C
		Sg. Tarom	4TSTU003	89	94	95	92	91	B/C
	Sg. Terengganu	Sg. Berang	4TTGG002	89	92	96	95	94	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Terengganu	Sg. Terengganu	Sg. Berang	4TTGG011	92	97	96	97	97	B/C
		Sg. Nerus	4TTGG004	85	91	87	90	92	B/C
		Sg. Nerus	4TTGG005	92	95	96	94	96	B/C
		Sg. Nerus	4TTGG006	89	93	95	94	95	B/C
		Sg. Nerus	4TTGG010	66	68	72	71	70	ST/SP
		Sg. Nerus	4TTGG014	90	94	94	92	94	B/C
		Sg. Nerus	4TTGG015	91	94	95	92	95	B/C
		Sg. Pueh	4TTGG007	70	82	86	89	78	ST/SP
		Sg. Pueh	4TTGG008	77	89	93	93	91	B/C
		Sg. Telemong	4TTGG012	88	93	91	93	96	B/C
		Sg. Terengganu	4TTGG001	87	91	90	89	90	B/C
		Sg. Terengganu	4TTGG003	90	95	96	94	94	B/C
		Sg. Terengganu	4TTGG009	87	88	89	91	92	B/C
		Sg. Terengganu	4TTGG013	89	92	93	93	90	B/C
Kelantan	Sg. Golok	Sg. Golok	4DGLK002	86	93	91	92	94	B/C
		Sg. Golok	4DGLK003	94	97	94	97	97	B/C
		Sg. Golok	4DGLK004	87	93	89	94	95	B/C
		Sg. Golok	4DGLK005	89	93	90	92	95	B/C
		Sg. Golok	4DGLK006	86	91	88	87	86	B/C
		Sg. Jedok	4DGLK008	90	95	95	93	95	B/C
		Sg. Lanas	4DGLK007	84	94	90	94	96	B/C
		Sg. Tasik Garu	4DGLK001	80	85	82	87	90	B/C
	Sg. Kelantan	Sg. Aring	4DKLT013	79	80	83	82	85	B/C
		Sg. Belatop	4DKLT020	83	89	87	87	90	B/C
		Sg. Belatop	4DKLT021	87	96	93	92	95	B/C
		Sg. Belatop	4DKLT046	78	82	82	80	80	ST/SP
		Sg. Ber	4DKLT018	87	91	91	91	89	B/C
		Sg. Berok	4DKLT016	81	83	85	85	86	B/C
		Sg. Berok	4DKLT019	88	90	90	90	89	B/C
		Sg. Berok	4DKLT022	81	84	81	83	88	B/C
		Sg. Betis	4DKLT017	86	93	92	92	93	B/C
		Sg. Chiku	4DKLT037	88	88	90	84	89	B/C
		Sg. Chiku	4DKLT043	89	90	92	90	95	B/C
		Sg. Galas	4DKLT014	89	89	81	85	89	B/C
		Sg. Galas	4DKLT031	89	90	92	97	95	B/C
		Sg. Galas	4DKLT032	87	92	87	91	92	B/C
		Sg. Galas	4DKLT033	84	81	91	88	85	B/C
		Sg. Galas	4DKLT034	82	79	92	88	86	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kelantan	Sg. Kelantan	Sg. Isos	4DKLT049	73	73	78	74	80	ST/SP
		Sg. Kelantan	4DKLT001	82	83	87	86	90	B/C
		Sg. Kelantan	4DKLT006	78	87	89	87	89	B/C
		Sg. Kelantan	4DKLT010	84	83	82	88	88	B/C
		Sg. Kelantan	4DKLT045	80	84	87	88	89	B/C
		Sg. Kelantan	4DKLT054	88	89	91	87	91	B/C
		Sg. Kelantan	4DKLT055	85	93	90	94	97	B/C
		Sg. Kelantan	4DKLT056	81	83	87	87	89	B/C
		Sg. Kelesa	4DKLT015	87	94	91	90	83	B/C
		Sg. Kenkren	4DKLT047	92	93	94	94	93	B/C
		Sg. Kerilla	4DKLT002	92	94	94	95	93	B/C
		Sg. Kerilla	4DKLT003	91	94	93	95	94	B/C
		Sg. Ketil	4DKLT036	90	97	90	93	97	B/C
		Sg. Ketil	4DKLT053	90	96	90	92	94	B/C
		Sg. Lebir	4DKLT026	92	94	91	91	94	B/C
		Sg. Lebir	4DKLT027	85	87	79	87	91	B/C
		Sg. Lebir	4DKLT028	88	94	94	93	93	B/C
		Sg. Lebir	4DKLT029	84	87	81	88	92	B/C
		Sg. Lebir	4DKLT058	88	95	91	95	95	B/C
		Sg. Muring	4DKLT059	85	92	90	93	93	B/C
		Sg. Nal	4DKLT007	89	93	90	91	91	B/C
		Sg. Nal	4DKLT008	88	91	89	91	91	B/C
		Sg. Nal	4DKLT009	87	91	88	90	90	B/C
		Sg. Nenggiri	4DKLT023	82	83	86	88	89	B/C
		Sg. Nenggiri	4DKLT024	83	86	87	86	87	B/C
		Sg. Nenggiri	4DKLT025	80	78	91	85	88	B/C
		Sg. Pehi	4DKLT011	88	92	91	92	96	B/C
		Sg. Pehi	4DKLT044	86	90	91	92	92	B/C
		Sg. Pelaur	4DKLT048	90	96	95	87	96	B/C
		Sg. Penangau	4DKLT050	78	87	89	86	90	B/C
		Sg. Pergau	4DKLT004	91	96	97	97	98	B/C
		Sg. Pergau	4DKLT005	90	95	94	95	96	B/C
		Sg. Pergau	4DKLT038	94	96	97	97	97	B/C
		Sg. Pergau	4DKLT039	94	97	97	97	96	B/C
		Sg. Pergau	4DKLT040	94	97	97	96	98	B/C
		Sg. Pergau	4DKLT041	90	94	93	93	96	B/C
		Sg. Pergau	4DKLT051	91	96	97	97	97	B/C
		Sg. Pergau	4DKLT052	92	94	94	95	96	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kelantan	Sg. Kelantan	Sg. Rasau	4DKLT061	80	80	85	85	88	B/C
		Sg. Relai	4DKLT012	90	91	88	88	91	B/C
		Sg. Relai	4DKLT030	88	91	94	85	91	B/C
		Sg. Sokor	4DKLT042	86	89	89	88	93	B/C
		Sg. Tuang	4DKLT035	90	94	91	97	96	B/C
	Sg. Kemasin	Sg. Gali	4DKMS006	79	75	83	81	89	B/C
		Sg. Kemasin	4DKMS001	84	90	90	87	90	B/C
		Sg. Kemasin	4DKMS003	75	76	76	78	85	B/C
		Sg. Semerak	4DKMS002	85	91	88	88	89	B/C
		Sg. Semerak	4DKMS004	86	89	89	88	87	B/C
		Sg. Semerak	4DKMS005	80	77	80	76	85	B/C
	Sg. Pengkalan Chepa	Sg. Alor B	4DPCH003	65	63	59	63	63	ST/SP
		Sg. Alor Lintah	4DPCH004	76	68	70	74	70	ST/SP
		Sg. Keladi	4DPCH002	76	84	89	87	87	B/C
		Sg. Pengkalan Chepa	4DPCH005	68	70	70	61	64	ST/SP
		Sg. Pengkalan Chepa	4DPCH006	75	82	76	76	78	ST/SP
		Sg. Raja Gali	4DPCH001	79	87	81	87	87	B/C
	Sg. Pengkalan Datu	Sg. Pasir Hor	4DPDT004	73	77	75	77	82	B/C
		Sg. Pengkalan Datu	4DPDT001	83	86	88	86	86	B/C
		Sg. Pengkalan Datu	4DPDT002	83	87	85	87	86	B/C
		Sg. Pengkalan Datu	4DPDT003	86	86	87	89	87	B/C
Sarawak	Sg. Balingian	Sg. Balingian	6QBLG001	90	87	84	69	63	ST/SP
		Sg. Balingian	6QBLG002	88	86	89	88	88	B/C
	Sg. Baram	Sg. Baram	6QBRM001	79	81	83	79	74	ST/SP
		Sg. Baram	6QBRM002	81	83	83	84	75	ST/SP
		Sg. Baram	6QBRM003	89	89	88	80	77	ST/SP
		Sg. Baram	6QBRM004	90	88	88	80	78	ST/SP
		Sg. Tutuh	6QBRM005	90	-	87	79	78	ST/SP
	Sg. Kayan	Sg. Kayan	6QKYN001	77	76	76	76	72	ST/SP
		Sg. Kayan	6QKYN002	82	83	84	82	78	ST/SP
		Sg. Kayan	6QKYN003	87	88	87	84	83	B/C
	Sg. Kemena	Sg. Kemena	6QKMN001	82	82	82	78	71	ST/SP
		Sg. Kemena	6QKMN002	89	83	84	76	73	ST/SP
		Sg. Kemena	6QKMN003	81	80	85	80	74	ST/SP
		Sg. Kemena	6QKMN004	91	83	84	82	80	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Sg. Kemena	Sg. Sibiu	6QKMN005	81	79	83	76	77	ST/SP
	Sg. Kerian	Sg. Kerian	6QKRN014	82	81	86	77	73	ST/SP
		Sg. Kerian	6QKRN015	89	84	88	86	87	B/C
		Sg. Seblak	6QKRN016	84	88	87	79	77	ST/SP
		Sg. Selalang	6QKRN017	92	92	90	90	89	B/C
	Sg. Lawas	Sg. Lawas	6QLWS001	89	87	90	90	87	B/C
		Sg. Lawas	6QLWS002	87	88	91	93	86	B/C
		Sg. Lawas	6QLWS003	89	90	92	92	90	B/C
	Sg. Limbang	Sg. Limbang	6QLBG001	88	86	88	83	79	ST/SP
		Sg. Limbang	6QLBG002	87	86	88	85	83	B/C
		Sg. Limbang	6QLBG003	88	90	89	86	81	B/C
		Sg. Limbang	6QLBG004	90	91	88	87	82	B/C
		Sg. Limbang	6QLBG005	92	88	90	87	87	B/C
	Sg. Lupar	Sg. Ai	6QLPR001	89	91	88	87	88	B/C
		Sg. Ai	6QLPR002	91	91	89	94	93	B/C
		Sg. Lupar	6QLPR003	77	83	88	76	66	ST/SP
		Sg. Lupar	6QLPR004	82	85	87	75	73	ST/SP
		Sg. Lupar	6QLPR005	89	85	90	90	87	B/C
		Sg. Sekerang	6QLPR006	92	88	87	90	90	B/C
		Sg. Seterap	6QLPR007	82	86	89	80	76	ST/SP
		Sg. Undup	6QLPR008	91	85	89	89	85	B/C
	Sg. Miri	Sg. Adong	6QMRI001	83	78	57	54	51	T/P
		Sg. Dalam	6QMRI002	84	83	80	70	71	ST/SP
		Sg. Lutong	6QMRI003	80	82	83	79	67	ST/SP
		Sg. Lutong	6QMRI004	77	80	74	72	67	ST/SP
		Sg. Miri	6QMRI005	87	88	56	48	48	T/P
		Sg. Miri	6QMRI006	88	88	60	52	50	T/P
		Sg. Padang Liku	6QMRI007	89	88	83	81	82	B/C
	Sg. Mukah	Sg. Mukah	6QMKH001	85	80	81	72	65	ST/SP
		Sg. Mukah	6QMKH002	89	82	86	61	58	T/P
		Sg. Mukah	6QMKH003	89	81	86	73	69	ST/SP
		Sg. Mukah	6QMKH004	89	87	88	86	84	B/C
		Sg. Mukah	6QMKH005	89	84	87	80	77	ST/SP
	Sg. Niah	Sg. Niah	6QNIA001	86	87	85	82	83	B/C
		Sg. Niah	6QNIA002	86	86	86	84	84	B/C
		Sg. Sekaloh	6QNIA003	68	64	79	59	67	ST/SP
		Sg. Sekaloh	6QNIA004	87	86	84	79	77	ST/SP
	Sg. Oya	Sg. Oya	6QOYA001	79	76	83	67	64	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Sg. Oya	Sg. Oya	6QOYA002	89	81	87	68	64	ST/SP
		Sg. Oya	6QOYA003	89	89	86	84	86	B/C
	Sg. Rajang	Sg. Baloi	6QRJG019	89	-	89	73	73	ST/SP
		Sg. Binatang	6QRJG004	89	89	87	86	84	B/C
		Sg. Daro	6QRJG021	80	62	66	53	53	T/P
		Sg. Jemoreng	6QRJG022	80	63	66	55	52	T/P
		Sg. Julau	6QRJG005	88	86	85	89	85	B/C
		Sg. Kanowit	6QRJG006	89	87	87	88	86	B/C
		Sg. Meradong	6QRJG003	80	82	85	78	70	ST/SP
		Sg. Pakan	6QRJG020	88	89	88	88	88	B/C
		Sg. Pila Parit	6QRJG023	62	77	78	81	80	ST/SP
		Sg. Rajang	6QRJG008	83	86	86	81	75	ST/SP
		Sg. Rajang	6QRJG009	84	86	87	81	75	ST/SP
		Sg. Rajang	6QRJG010	82	86	85	81	75	ST/SP
		Sg. Rajang	6QRJG011	80	85	87	81	75	ST/SP
		Sg. Rajang	6QRJG012	85	84	89	64	72	ST/SP
		Sg. Rajang	6QRJG013	87	86	87	83	84	B/C
		Sg. Rajang	6QRJG014	85	84	86	82	83	B/C
		Sg. Rajang	6QRJG015	85	83	84	83	83	B/C
		Sg. Rajang	6QRJG016	85	86	87	84	83	B/C
		Sg. Rajang	6QRJG017	90	86	86	88	87	B/C
		Sg. Rajang	6QRJG018	90	84	87	85	84	B/C
		Sg. Salim	6QRJG007	83	81	86	76	66	ST/SP
		Sg. Sarikei	6QRJG001	80	86	87	82	78	ST/SP
		Sg. Sarikei	6QRJG002	89	90	88	88	86	B/C
	Sg. Sadong	Sg. Karangan	6QSDG001	68	69	76	62	63	ST/SP
		Sg. Karangan	6QSDG002	87	87	88	72	74	ST/SP
		Sg. Sadong	6QSDG003	73	81	84	77	77	ST/SP
		Sg. Sadong	6QSDG004	72	66	78	63	64	ST/SP
		Sg. Sadong	6QSDG005	88	90	87	88	89	B/C
		Sg. Sadong	6QSDG006	90	91	88	92	92	B/C
		Sg. Tarat	6QSDG007	91	90	90	90	92	B/C
	Sg. Sarawak	Sg. Kelantan	6QSWK017	74	59	68	66	60	ST/SP
		Sg. Kuap	6QSWK009	79	88	86	72	69	ST/SP
		Sg. Kuap	6QSWK010	87	88	89	87	88	B/C
		Sg. Maong Kiri	6QSWK011	72	73	82	70	59	T/P
		Sg. Samarahan	6QSWK013	65	63	66	62	61	ST/SP
		Sg. Samarahan	6QSWK014	80	85	87	80	80	ST/SP

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Sg. Sarawak	Sg. Sarawak	6QSWK001	81	84	84	78	74	ST/SP
		Sg. Sarawak	6QSWK003	83	85	87	83	78	ST/SP
		Sg. Sarawak	6QSWK004	88	87	88	88	87	B/C
		Sg. Sarawak	6QSWK006	84	80	84	81	83	B/C
		Sg. Sarawak	6QSWK007	90	88	91	91	91	B/C
		Sg. Sarawak	6QSWK008	91	89	90	92	93	B/C
		Sg. Sarawak Kanan	6QSWK002	82	84	85	83	80	ST/SP
		Sg. Sarawak Kiri	6QSWK005	88	87	87	89	91	B/C
		Sg. Semadang	6QSWK016	89	90	90	93	92	B/C
		Sg. Semenggoh	6QSWK012	71	78	83	75	75	ST/SP
		Sg. Tabuan	6QSWK015	77	76	78	64	61	ST/SP
		Sg. Tapah	6QSWK018	89	91	90	88	84	B/C
	Sg. Saribas	Sg. Layar	6QSRB002	85	88	87	83	82	B/C
		Sg. Layar	6QSRB003	87	90	88	90	90	B/C
		Sg. Saribas	6QSRB001	74	79	87	75	67	ST/SP
	Sg. Semunsam	Sg. Semunsam	6QSMS001	87	80	85	88	88	B/C
	Sg. Sibuti	Sg. Kabuloh	6QSBT001	76	61	70	69	68	ST/SP
		Sg. Kabuloh	6QSBT002	69	64	87	92	82	B/C
		Sg. Kejapil	6QSBT003	88	89	85	86	79	ST/SP
		Sg. Satap	6QSBT004	88	84	84	74	77	ST/SP
		Sg. Sibuti	6QSBT005	82	84	77	78	75	ST/SP
		Sg. Sibuti	6QSBT006	87	88	84	81	81	B/C
	Sg. Similajau	Sg. Similajau	6QSML001	90	86	86	83	83	B/C
		Sg. Similajau	6QSML002	89	84	88	85	80	ST/SP
	Sg. Suai	Sg. Suai	6QSUA001	88	87	85	80	79	ST/SP
	Sg. Tatau	Sg. Tatau	6QTTU001	88	85	86	84	81	B/C
	Sg. Trusan	Sg. Trusan	6QTSN001	88	88	90	86	84	B/C
Sabah	Sg. Apas	Sg. Apas	5SAPS001	89	90	92	90	91	B/C
	Sg. Balung	Sg. Balung	5SBLU001	87	91	92	90	92	B/C
	Sg. Bengkoka	Sg. Bengkoka	5SBKK001	90	91	90	88	89	B/C
		Sg. Bengkoka	5SBKK002	86	86	88	85	84	B/C
	Sg. Bingkongan	Sg. Bandau	5SBKG001	91	92	92	94	92	B/C
		Sg. Bingkongan	5SBKG005	92	94	93	94	93	B/C
		Sg. Bingkongan	5SBKG006	91	94	94	94	95	B/C
		Sg. Menggaris	5SBKG002	93	93	90	93	94	B/C
		Sg. Menggaris	5SBKG003	92	92	93	93	93	B/C
		Sg. Tandek	5SBKG004	91	91	91	91	90	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Sg. Bongawan	Sg. Bongawan	5SBGW001	87	87	88	87	88	B/C
	Sg. Brantian	Sg. Brantian	5SBTN001	86	84	90	87	91	B/C
	Sg. Kalabakan	Sg. Kalabakan	5SKBK001	85	85	90	82	86	B/C
		Sg. Kalabakan	5SKBK002	84	84	86	81	84	B/C
		Sg. Kalabakan	5SKBK003	82	83	86	83	89	B/C
	Sg. Kalumpang	Sg. Kalumpang	5SKLP001	86	86	91	91	84	B/C
		Sg. Kalumpang	5SKLP002	86	90	88	89	86	B/C
		Sg. Kalumpang	5SKLP003	84	85	86	83	86	B/C
		Sg. Pang Burong 1	5SKLP004	83	86	86	87	90	B/C
		Sg. Pang Burong 2	5SKLP005	69	85	80	79	76	ST/SP
	Sg. Kedamaian	Sg. Kedamaian	5SKDI004	90	93	92	95	96	B/C
		Sg. Tempasuk	5SKDI001	87	93	91	92	94	B/C
		Sg. Tempasuk	5SKDI002	91	92	92	93	93	B/C
		Sg. Wariu	5SKDI003	91	93	93	94	94	B/C
	Sg. Kimanis	Sg. Kimanis	5SKMA001	87	90	92	90	89	B/C
	Sg. Kinabatangan	Sg. Karamuak	5SKBT006	91	92	92	91	94	B/C
		Sg. Kinabatangan	5SKBT001	85	86	83	84	85	B/C
		Sg. Kinabatangan	5SKBT002	82	84	85	83	85	B/C
		Sg. Kinabatangan	5SKBT004	84	87	84	83	83	B/C
		Sg. Kinabatangan	5SKBT005	86	85	83	83	86	B/C
		Sg. Koyah	5SKBT003	87	89	88	86	87	B/C
		Sg. Leepang	5SKBT009	84	85	84	83	85	B/C
		Sg. Menanggul	5SKBT008	81	86	86	82	81	B/C
		Sg. Pin	5SKBT010	86	87	86	86	86	B/C
		Sg. Takala	5SKBT007	85	88	87	85	84	B/C
	Sg. Labok	Sg. Kinipir	5SLBK001	90	91	90	92	89	B/C
		Sg. Kinipir	5SLBK002	86	91	91	93	93	B/C
		Sg. Labok	5SLBK006	87	86	88	87	89	B/C
		Sg. Liwagu	5SLBK003	88	89	86	89	89	B/C
		Sg. Liwagu	5SLBK004	88	88	91	93	88	B/C
		Sg. Maliau	5SLBK005	92	94	93	95	94	B/C
		Sg. Tungud	5SLBK007	88	91	85	87	90	B/C
	Sg. Lakutan	Sg. Lakutan	5SLKT001	89	93	88	92	87	B/C
	Sg. Likas	Sg. Darau	5SLKS008	80	83	83	81	81	B/C
		Sg. Inanam	5SLKS001	79	81	80	75	73	ST/SP
		Sg. Inanam	5SLKS002	84	87	90	88	87	B/C
		Sg. Inanam	5SLKS003	92	93	93	95	94	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Sg. Likas	Sg. Likas	5SLKS004	77	73	78	71	71	ST/SP
		Sg. Likas	5SLKS005	78	77	80	73	70	ST/SP
		Sg. Menggatal	5SLKS006	81	87	89	95	84	B/C
		Sg. Menggatal	5SLKS007	87	91	92	91	94	B/C
	Sg. Lingkungan	Sg. Bukau	5SLKG002	88	92	87	90	88	B/C
		Sg. Lingkungan	5SLKG001	91	93	89	93	88	B/C
	Sg. Membakut	Sg. Membakut	5SMBT001	85	87	89	89	89	B/C
	Sg. Menggalong	Sg. Menggalong	5SMGL001	86	91	85	87	86	B/C
		Sg. Menggalong	5SMGL002	92	93	92	92	94	B/C
	Sg. Merotai	Sg. Merotai	5SMRT001	88	90	91	91	89	B/C
		Sg. Merotai	5SMRT002	92	94	92	94	94	B/C
		Sg. Merotai	5SMRT003	87	90	87	90	90	B/C
	Sg. Mounad	Sg. Mounad	5SMND001	85	89	88	88	83	B/C
		Sg. Mounad	5SMND002	86	86	89	85	88	B/C
	Sg. Moyog	Sg. Moyog	5SMYG001	86	88	91	90	88	B/C
		Sg. Moyog	5SMYG002	89	92	91	92	88	B/C
		Sg. Moyog	5SMYG003	92	94	93	94	95	B/C
		Sg. Moyog	5SMYG004	92	94	92	95	92	B/C
	Sg. Padas	Sg. Bunsit	5SPDS001	91	93	92	94	94	B/C
		Sg. Liawan	5SPDS002	91	91	92	93	93	B/C
		Sg. Padas	5SPDS003	86	87	88	85	79	ST/SP
		Sg. Padas	5SPDS004	88	90	88	90	86	B/C
		Sg. Padas	5SPDS005	86	88	82	86	89	B/C
		Sg. Padas	5SPDS011	85	88	87	85	81	B/C
		Sg. Pangatan	5SPDS006	87	88	87	86	86	B/C
		Sg. Pegalan	5SPDS008	89	91	90	93	92	B/C
		Sg. Pegalan	5SPDS009	87	86	86	89	88	B/C
		Sg. Pegalan	5SPDS010	86	87	84	89	89	B/C
		Sg. Tandulu	5SPDS007	91	92	92	93	92	B/C
	Sg. Paitan	Sg. Paitan	5SPTN001	85	91	90	88	86	B/C
	Sg. Papar	Sg. Papar	5SPPR001	89	91	90	92	91	B/C
		Sg. Papar	5SPPR002	90	91	90	91	94	B/C
		Sg. Papar	5SPPR003	89	90	88	92	87	B/C
		Sg. Papar	5SPPR004	90	91	93	92	94	B/C
		Sg. Papar	5SPPR005	92	91	93	91	95	B/C
	Sg. Sapi	Sg. Sapi	5SSAP002	85	85	83	86	87	B/C
		Sg. Sapi	5SSAP003	86	86	84	88	85	B/C
		Sg. Sapi	5SSAP004	87	88	87	82	86	B/C

Jadual 2.3: Status Kualiti Air Sungai Mengikut Stesen, 2024
Table 2.3: Water Quality Status by Stations, 2024

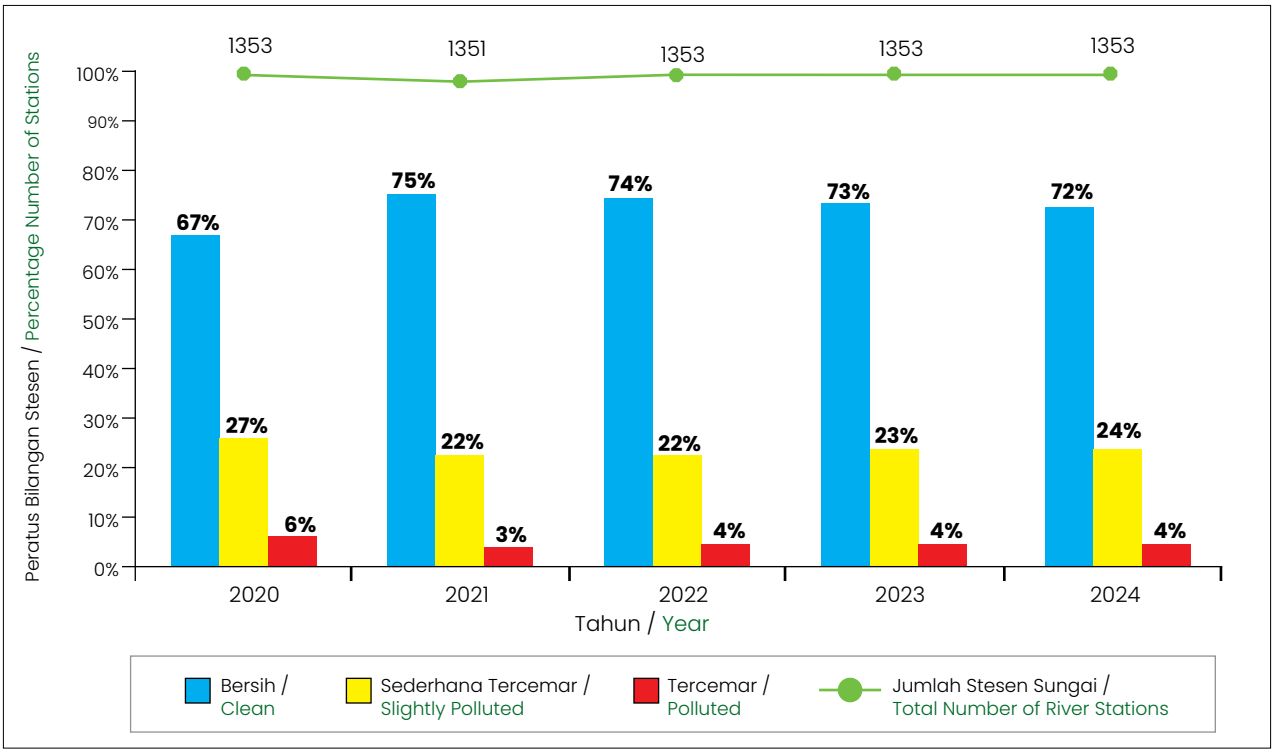
NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	NILAI IKA/ WQI VALUE					KATEGORI IKA (2024)/ WQI CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Sg. Sapi	Sg. Sualong	5SSAP001	92	92	93	95	95	B/C
	Sg. Segaliud	Sg. Segaliud	5SSLD001	86	85	81	83	86	B/C
		Sg. Segaliud	5SSLD002	87	86	84	85	86	B/C
	Sg. Segama	Sg. Segama	5SSGM001	86	87	86	86	88	B/C
		Sg. Segama	5SSGM002	85	88	87	87	88	B/C
		Sg. Segama	5SSGM003	85	88	87	85	90	B/C
	Sg. Sembulan	Sg. Sembulan	5SSBL001	84	81	74	75	80	ST/SP
		Sg. Sembulan	5SSBL002	74	80	69	70	70	ST/SP
	Sg. Silabukan	Sg. Silabukan	5SSBK001	86	87	83	89	88	B/C
		Sg. Silabukan	5SSBK002	89	91	91	95	93	B/C
	Sg. Sugut	Sg. Bongkud	5SSUG001	91	92	93	93	93	B/C
		Sg. Lohan	5SSUG002	91	92	93	95	93	B/C
		Sg. Merali	5SSUG003	88	91	90	95	92	B/C
		Sg. Sugut	5SSUG004	91	91	91	94	93	B/C
		Sg. Sugut	5SSUG005	88	92	91	95	94	B/C
		Sg. Sugut	5SSUG006	85	89	87	89	92	B/C
	Sg. Tawau	Sg. Tawau	5STWU001	77	83	78	80	81	B/C
		Sg. Tawau	5STWU002	83	88	88	88	89	B/C
		Sg. Tawau	5STWU003	91	93	92	94	94	B/C
		Sg. Tawau	5STWU004	91	93	93	94	93	B/C
	Sg. Telipok	Sg. Telipok	5STLP001	70	70	82	86	73	ST/SP
		Sg. Telipok	5STLP002	90	90	91	93	92	B/C
	Sg. Tenghilan	Sg. Tenghilan	5STHL001	92	92	90	92	92	B/C
	Sg. Tingkayu	Sg. Tingkayu	5STKY001	84	85	85	80	86	B/C
		Sg. Tingkayu	5STKY002	86	86	84	80	87	B/C
	Sg. Tuaran	Sg. Damit	5STUA001	89	87	88	93	91	B/C
		Sg. Damit	5STUA002	87	87	90	92	90	B/C
		Sg. Song Sai	5STUA003	90	92	92	94	93	B/C
		Sg. Tuaran	5STUA004	92	93	93	95	94	B/C
		Sg. Tuaran	5STUA005	92	93	93	94	93	B/C
	Sg. Tungku	Sg. Tungku	5STKU001	89	90	88	90	90	B/C
		Sg. Tungku	5STKU002	90	89	90	94	92	B/C
Nota / Note:	Sg. Umas-Umas	Sg. Umas Umas	5SUSM001	83	84	89	85	86	B/C

Kategori IKA / WQI Category

	B / C	Bersih / Clean
	ST / SP	Sederhana Tercemar / Slightly Polluted
	T / P	Tercemar / Polluted

Nilai IKA / WQI Value

	> 92.7	Kelas I / Class I
	76.5 - 92.7	Kelas II / Class II
	51.9 - 76.5	Kelas III / Class III
	31.0 - 51.9	Kelas IV / Class IV
	< 31.0	Kelas V / Class V
	–	Tiada Data / No Data



Rajah 2.5 : Trend Stesen Kualiti Air Sungai, 2020-2024
Figure 2.5 : River Water Quality Stations Trend, 2020-2024

Sungai Klang, Kuala Lumpur

STESEN PENGAWASAN KUALITI AIR SUNGAI KATEGORI TERCEMAR

Jadual 2.4 menunjukkan sebanyak 56 stesen pengawasan kualiti air sungai dikategorikan tercemar pada tahun 2024. Sebanyak 32 stesen berada di dalam Kelas III dan 24 stesen berada di Kelas IV.

Berdasarkan sub-indeks BOD, lapan (8) stesen sungai dikategorikan sebagai Kelas II, tiga (3) stesen di Kelas III, 22 stesen di Kelas IV dan 23 stesen di Kelas V.

Dari segi sub-indeks AN pula, satu (1) stesen sungai dikategorikan sebagai Kelas I, tiga (3) stesen di Kelas II, tiga (3) stesen di Kelas III, 14 stesen di Kelas IV dan 35 stesen di Kelas V.

Dari segi sub-indeks SS, sebanyak 36 stesen sungai dikategorikan sebagai Kelas I, 14 stesen di Kelas II dan enam (6) stesen di Kelas III.

Daripada 56 stesen sungai yang berada di dalam kategori tercemar, penyumbang terbesar kemerosotan stesen pengawasan kualiti air sungai kepada Kelas V adalah berpunca daripada parameter AN iaitu sebanyak 65% dan diikuti parameter BOD iaitu sebanyak 50%.

WATER QUALITY MONITORING STATIONS CATEGORISED AS POLLUTED

Table 2.4 indicates a total of 56 river water quality monitoring stations categorised as polluted in 2024. 32 stations were in Class III and 24 stations in Class IV.

Based on the BOD sub-index, eight (8) river stations were classified as Class II, three (3) stations in Class III, 22 stations in Class IV, and 23 stations in Class V.

In terms of the AN sub-index, one (1) river station classified as Class I, three (3) stations in Class II, three (3) stations in Class III, 14 stations in Class IV, and 35 stations in Class V.

In terms of the SS sub-index, 36 river stations were classified as Class I, 14 stations in Class II, and six (6) stations in Class III.

Of the 56 river stations in the polluted category, the largest contributor to the deterioration of river water quality monitoring stations to Class V was due to the AN parameter of 65%, followed by the BOD parameter of 50%.

Jadual 2.4 : Stesen Sungai Tercemar dan Kelas Kualiti Air Berdasarkan Sub-Indeks BOD, AN dan SS, 2024
Table 2.4 : Polluted River Stations and Classes Based on BOD, AN and SS Sub-Index, 2024

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	2024			KELAS BERDASARKAN/ CLASS BASED ON		
				IKA/ WQI	KATEGORI/ CATEGORY	KELAS/ CLASS	BOD	AN	SS
Kedah	Sg. Merbok	Sg. Batu	1KMBK002	52	T/P	IV	V	V	I
	Sg. Perai	Sg. Seluang	1KPRI021	57	T/P	III	IV	IV	I
P.Pinang	Sg. Juru	Sg. Rambai	1PJRU005	46	T/P	IV	V	V	I
		Sg. Permatang Rawa	1PJRU008	56	T/P	III	IV	V	I
		Sg. Juru	1PJRU012	53	T/P	III	IV	V	I
	Sg. Jawi	Sg. Jawi	1PJWI001	52	T/P	IV	IV	V	III
		Sg. Junjong	1PJWI002	59	T/P	III	IV	IV	III
		Sg. Chempedak	1PJWI003	42	T/P	IV	V	IV	III
		Sg. Junjong	1PJWI004	49	T/P	IV	IV	V	I
		Sg. Tengah	1PJWI005	55	T/P	III	IV	IV	III
	Sg. Kluang	Sg. Kluang	1PKLU001	45	T/P	IV	V	V	I
	Sg. Pinang	Sg. Titi Kerawang	1PPNG004	57	T/P	III	IV	IV	I
		Sg. Pinang	1PPNG008	51	T/P	IV	IV	V	I
		Sg. Dondang	1PPNG012	56	T/P	III	IV	IV	I
		Sg. Dondang	1PPNG013	58	T/P	III	IV	IV	I

NEGERI/ STATE	LEMBANGAN/ BASIN	SUNGAI/ RIVER	NOMBOR STESEN/ STATION NUMBER	2024			KELAS BERDASARKAN/ CLASS BASED ON		
				IKA/ WQI	KATEGORI/ CATEGORY	KELAS/ CLASS	BOD	AN	SS
	Sg. Pinang	Sg. Pinang	1PPNG021	41	T/P	IV	V	V	I
	Sg. Perai	Sg. Kereh	1PPRI006	48	T/P	IV	V	V	II
		Sg. Air Melintas	1PPRI007	59	T/P	III	IV	V	II
		Sg. Kereh	1PPRI008	55	T/P	III	IV	V	I
		Sg. Seluang Bawah	1PPRI010	58	T/P	III	IV	IV	I
Selangor	Sg. Buloh	Sg. Buloh	2BBLH003	53	T/P	III	V	IV	II
	Sg. Klang	Sg. Kerayong	2BKLG013	56	T/P	III	IV	V	I
		Sg. Klang	2BKLG022	59	T/P	III	III	V	III
		Sg. Klang	2BKLG023	57	T/P	III	IV	V	II
		Sg. Klang	2BKLG050	58	T/P	III	III	V	III
		Sg. Kerayong	2BKLG051	54	T/P	III	V	V	I
W.P. Kuala Lumpur		Sg. Klang	2WKLG001	58	T/P	III	IV	V	II
		Sg. Klang	2WKLG004	59	T/P	III	IV	V	I
		Sg. Bunos	2WKLG006	57	T/P	III	V	IV	I
		Sg. Air Busuk	2WKLG041	46	T/P	IV	V	V	II
		Sg. Kerayong	2WKLG046	49	T/P	IV	V	V	I
Johor	Sg. Air Baloi	Sg. Air Baloi	3JABL002	57	T/P	III	II	I	I
	Sg. Kempas	Sg. Kempas	3JKPS001	37	T/P	IV	V	V	II
		Sg. Kempas	3JKPS002	40	T/P	IV	V	V	II
	Sg. Kaw. Pasir Gudang	Sg. Perembi	3JPGD001	56	T/P	III	V	IV	I
		Sg. Buluh	3JPGD002	35	T/P	IV	V	IV	I
		Sg. Tukang Batu	3JPGD003	44	T/P	IV	V	V	I
	Sg. Segget	Sg. Segget	3JSGT001	48	T/P	IV	V	V	I
		Sg. Segget	3JSGT002	47	T/P	IV	V	V	I
		Sg. Segget	3JSGT003	56	T/P	III	IV	V	II
		Sg. Segget	3JSGT005	58	T/P	III	V	V	I
	Sg. Tebrau	Sg. Tebrau	3JTRU001	57	T/P	III	III	V	II
		Sg. Tebrau	3JTRU006	56	T/P	III	IV	V	II
		Sg. Pandan	3JTRU007	45	T/P	IV	V	V	I
		Sg. Sebulung	3JTRU009	58	T/P	III	IV	V	I
		Sg. Tampoi	3JTRU010	48	T/P	IV	V	V	I
		Sg. Sengkuang	3JTRU011	37	T/P	IV	V	V	II
N.Sembilan	Sg. Langat	Sg. Pajam	3NLGT021	56	T/P	III	V	V	II
	Sg. Muar	Sg. Gemas	3NMUA041	55	T/P	III	IV	IV	II
Sarawak	Sg. Mukah	Sg. Mukah	6QMKH002	58	T/P	III	II	II	I
	Sg. Miri	Sg. Adong	6QMRI001	51	T/P	IV	II	III	I
		Sg. Miri	6QMRI005	48	T/P	IV	II	III	I
		Sg. Miri	6QMRI006	50	T/P	IV	II	III	I
	Sg. Rajang	Sg. Daro	6QRJG021	53	T/P	III	II	II	I
		Sg. Jemoreng	6QRJG022	52	T/P	IV	II	II	I
	Sg. Sarawak	Sg. Maong Kiri	6QSWK011	59	T/P	III	II	IV	I

TREND PENCEMARAN STESEN PENGAWASAN KUALITI AIR SUNGAI

Berdasarkan sub-indeks BOD, 1,038 (77%) stesen sungai dikategorikan sebagai bersih adalah sedikit menurun pada tahun 2024 berbanding 1,057 (78%) stesen pada tahun 2023 (**Rajah 2.6**). Bilangan stesen sungai yang sederhana tercemar dari segi sub-indeks BOD telah meningkat daripada 162 (12%) stesen pada tahun 2023 kepada 163 (12%) stesen pada tahun 2024, manakala bilangan stesen yang berada di dalam kategori tercemar telah meningkat daripada 134 (10%) stesen pada tahun 2023 kepada 152 (11%) stesen pada tahun 2024.

Dari segi sub-indeks AN, bilangan stesen sungai berada di dalam kategori bersih telah meningkat daripada 686 (51%) stesen pada tahun 2023 kepada 688 (51%) stesen pada tahun 2024 (**Rajah 2.7**). Bilangan sungai yang sederhana tercemar telah menurun daripada 310 (23%) stesen pada tahun 2023 kepada 300 (22%) stesen pada tahun 2024, manakala bilangan stesen yang berada di dalam kategori tercemar telah meningkat daripada 357 (26%) stesen pada tahun 2023 kepada 365 (27%) stesen pada tahun 2024.

Dari segi sub-indeks SS pula, bilangan stesen sungai yang dikategorikan bersih telah meningkat daripada 1,006 (74%) stesen pada tahun 2023 kepada 1,011 (75%) stesen pada tahun 2024 (**Rajah 2.8**). Bilangan stesen sungai yang dikategorikan sebagai sederhana tercemar telah meningkat daripada 110 (8%) stesen pada 2023 kepada 148 (11%) stesen pada tahun 2024, manakala bilangan stesen yang tercemar telah menurun daripada 237 (18%) stesen pada tahun 2023 kepada 194 (14%) stesen pada tahun 2024.

Kesimpulannya, didapati stesen pengawasan kualiti air sungai mengalami sedikit kemerosotan kualiti air bagi tahun 2024 berbanding 2023. Secara umumnya, kemerosotan tersebut adalah disebabkan peningkatan jumlah beban pencemaran kepada stesen pengawasan berkenaan yang berpunca daripada aktiviti yang berkaitan dengan punca tetap serta punca tidak tetap.

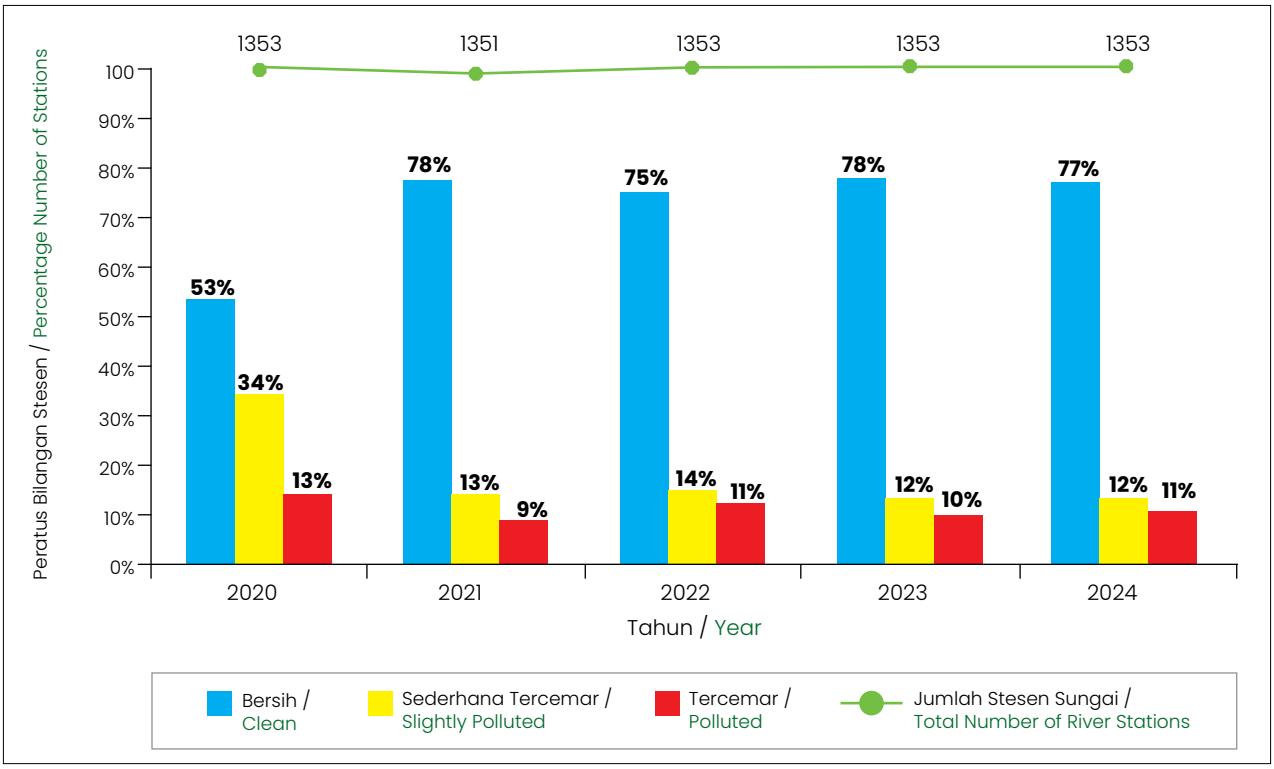
POLLUTION TRENDS OF RIVER WATER QUALITY MONITORING STATIONS

In terms of the BOD sub-index, 1,038 (77%) river stations were categorised as clean in 2024; this is a slight decrease compared to 1,057 (78%) stations in the year before (**Figure 2.6**). The number of river stations in the slightly polluted category in terms of BOD sub-index increased from 162 (12%) stations in 2023 to 163 (12%) stations in 2024 while the number of stations in the polluted category increased from 134 (10%) stations in 2023 to 152 (11%) stations in 2024.

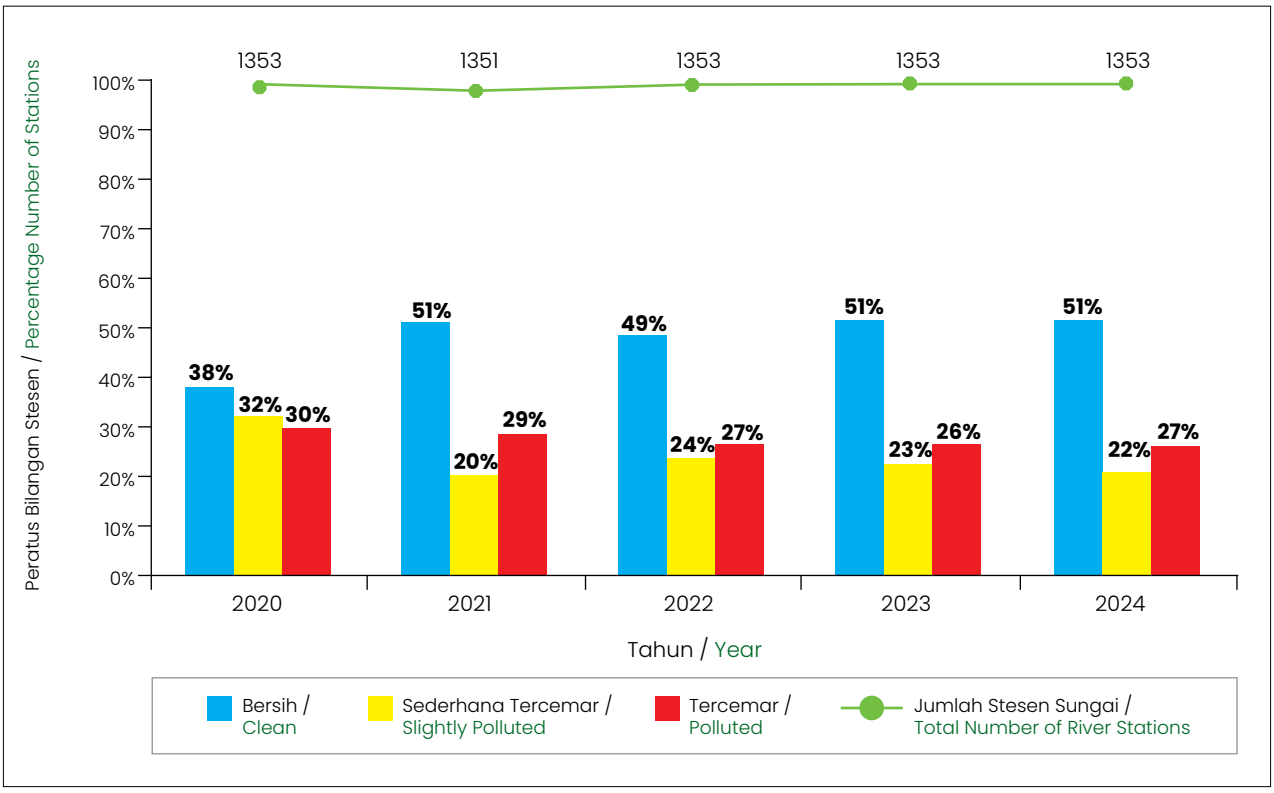
In terms of the AN sub-index, the number of river stations in the clean category significantly increased from 686 (51%) stations in 2023 to 688 (51%) stations in 2024 (**Figure 2.7**). The number of river stations in the slightly polluted category has decreased from 310 (23%) stations in 2023 to 300 (22%) stations in 2024 while the number of stations in the clean category increased from 357 (26%) stations in 2023 to 365 (27%) stations in 2024.

In terms of SS sub-index, the number of river stations in the clean category has increased from 1,006 (74%) stations in 2023 to 1,011 (75%) stations in 2024 (**Figure 2.8**). The number of river stations categorised as slightly polluted has increased from 110 (8%) stations in 2023 to 148 (11%) stations in 2024, while the number of polluted stations has decreased from 237 (18%) stations in 2023 to 194 (14%) stations in 2024.

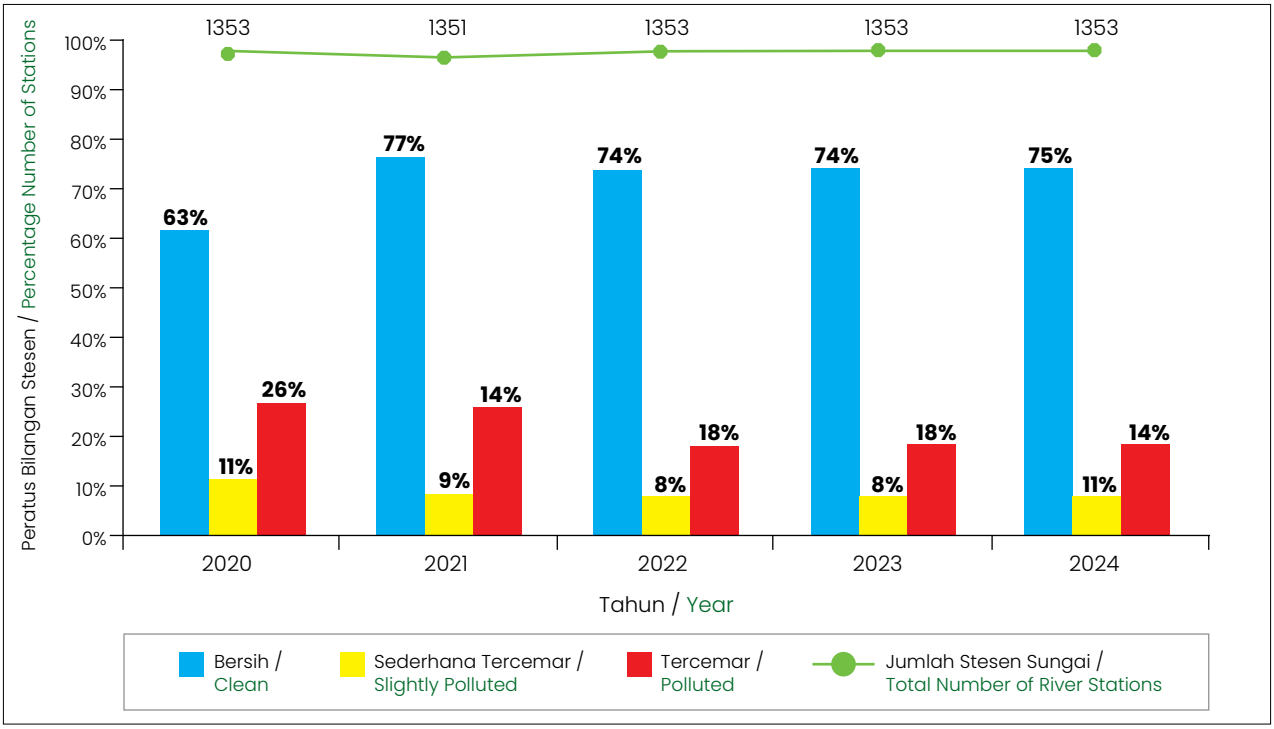
In conclusion, it was found that the river water quality monitoring station experienced a slight deterioration in water quality for 2024 compared to 2023. In general, the decrease is due to the increase in the amount of pollution load to the monitoring station due to activities related to point sources and nonpoint sources.



Rajah 2.6 : Trend Stesen Kualiti Air Sungai Berdasarkan Sub-Indeks BOD, 2020 – 2024
Figure 2.6 : River Water Quality Stations Trend on BOD Sub-Index, 2020 – 2024



Rajah 2.7 : Trend Stesen Kualiti Air Sungai Berdasarkan Sub-Indeks AN, 2020 – 2024
Figure 2.7 : River Water Quality Stations Trend on AN Sub-Index, 2020 – 2024



Rajah 2.8 : Trend Stesen Kualiti Air Sungai Berdasarkan Sub-Indeks SS, 2020 – 2024
Figure 2.8 : River Water Quality Stations Trend on SS Sub-Index, 2020 – 2024

ANALISIS LOGAM BERAT DI STESEN PENGAWASAN KUALITI AIR SUNGAI

Pada tahun 2024, sebanyak 8,118 sampel kualiti air mewakili 1,353 stesen pengawasan sungai manual setiap negeri diambil bagi memantau kandungan beberapa jenis logam berat seperti raksa (Hg), arsenik (As), kadmium (Cd), kromium (Cr), plumbum (Pb) dan zink (Zn). Pematuhan dipantau dengan merujuk kepada Standard Kualiti Air Kebangsaan (NWQS) (**Jadual 2.5**).

Bagi parameter Hg, semua stesen sungai di seluruh negara telah menunjukkan pematuhan penuh kepada Kelas II. Parameter As, Cd, Cr, Pb dan Zn menunjukkan julat pematuhan Kelas II antara 89.51% hingga 100%.

ANALYSIS OF HEAVY METAL AT RIVER WATER QUALITY MONITORNG STATIONS

In 2024, a total of 8,118 water quality samples of 1,353 manual river water quality stations for each state were taken to monitor a few heavy metal concentrations such as mercury (Hg), arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), and zinc (Zn). Compliance was monitored by referring to the National Water Quality Standards (NWQS) (**Table 2.5**).

For Hg parameters, all river stations in the country showed full compliance to Class II. Parameters of As, Cd, Cr, Pb, and Zn showed compliance to Class II in the range of 89.51% to 100%.

Jadual 2.5: Peratusan Pematuhan Parameter Logam Berat mengikut Negeri
Table 2.5: Percentage of Heavy Metal Parameter Compliance by State

NEGERI/ STATE	BIL. STESEN/ NO OF STATIONS	BIL. PERSAMPELAN/ NO OF SAMPLING	PEMATUHAN KELAS II (%)/ COMPLIANCE OF CLASS II (%)					
			RAKSA/ MERCURY (Hg)	ARSENIK/ ARSENIC (As)	KADMIUM/ CADMIUM (Cd)	KROMIUM/ CHROMIUM (Cr)	PLUMBUM/ PLUMBUM (Pb)	ZINK/ ZINC (Zn)
Perlis	15	90	100%	100%	100%	100%	100%	100%
Kedah	74	444	100%	100%	100%	100%	100%	100%
P.Pinang	66	396	100%	100%	100%	100%	100%	100%
Perak	150	900	100%	97.33%	99.77%	100%	100%	100%

Jadual 2.5: Peratusan Pematuhan Parameter Logam Berat mengikut Negeri
Table 2.5: Percentage of Heavy Metal Parameter Compliance by State

NEGERI/ STATE	BIL. STESEN/ NO OF STATIONS	BIL. PERSAMPELAN/ NO OF SAMPLING	PEMATUHAN KELAS II (%)/ COMPLIANCE OF CLASS II (%)					
			RAKSA/ MERCURY (Hg)	ARSENIK/ ARSENIC (As)	KADMIUM/ CADMIUM (Cd)	KROMIUM/ CHROMIUM (Cr)	PLUMBUM/ PLUMBUM (Pb)	ZINK/ ZINC (Zn)
Selangor	95	570	100%	95.96%	100%	100%	99.65%	100%
WP Kuala Lumpur	27	162	100%	89.51%	100%	100%	100%	100%
N.Sembilan	66	396	100%	99.74%	100%	100%	98.23%	100%
Melaka	54	324	100%	100%	99.69%	99.38%	99.07%	100%
Johor	227	1362	100%	99.93%	100%	99.93%	100%	99.93%
Pahang	192	1152	100%	100%	100%	100%	99.73%	100%
Terengganu	69	414	100%	100%	100%	100%	100%	100%
Kelantan	83	498	100%	100%	100%	100%	99.80%	100%
Sarawak	117	702	100%	99.86%	100%	100%	100%	100%
Sabah	118	708	100%	100%	100%	100%	100%	100%

KUALITI AIR SUNGAI BAGI STESEN DI HULU MUKA SAUK

Pada tahun 2024, 50 (91%) daripada 55 stesen pengawasan kualiti air di hulu muka sauk telah menunjukkan indeks kualiti air bersih, tiga (3) (5%) stesen kategori sederhana tercemar, manakala dua (2) (4%) stesen berada dalam kategori tercemar.

Berdasarkan pengkelasan kualiti air, sebanyak 28 (51%) stesen berada di dalam Kelas I dan 25 (45%) stesen di Kelas II, manakala satu (1) (2%) stesen di Kelas III dan satu (1) (2%) di Kelas IV. **Jadual 2.6** menunjukkan status kualiti air di stesen hulu muka sauk.

Bagi sub-indeks BOD, 55 (100%) stesen sungai telah menunjukkan kualiti air di dalam Kelas II.

Berdasarkan sub-indeks AN, sebanyak 43 (78%) stesen menunjukkan kualiti air di Kelas I, 10 (18%) stesen di Kelas II dan dua (2) (4%) stesen di Kelas III.

Dari segi sub-indeks SS, 37 (67%) stesen sungai telah berada di dalam Kelas I, 10 (18%) stesen di Kelas II, tujuh (7) (13%) stesen di Kelas III dan satu (1) (2%) stesen di Kelas V (**Rajah 2.9**).

RIVER WATER QUALITY FOR STATIONS LOCATED AT THE UPSTREAM OF WATER INTAKES

In 2024, 50 (91%) of the 55 water quality monitoring stations located at the upstream of water intake point showed clean water quality index, three (3) (5%) in the slightly polluted category, while two (2) (4%) stations were in the polluted category.

Based on the water quality classification, 28 (51%) stations were in Class I and 25 (45%) stations in Class II, while one (1) (2%) station were in Class III and one (1) (2%) in Class IV. **Table 2.6** shows the status of water quality at the upstream of water intake point stations.

For the BOD sub-index, 55 (100%) river stations have shown water quality in Class II.

Based on sub-index AN, 43 (78%) stations showed water quality in Class I, 10 (18%) stations in Class II and two (2) (4%) station in Class III.

In terms of SS sub-index, 37 (67%) river stations were in Class I, 10 (18%) stations in Class II, seven (7) (13%) stations in Class III and one (1) (2%) station in Class V (**Figure 2.9**).

Jadual 2.6: Status Kualiti Air di Hulu Muka Sauk, 2024
Table 2.6: Water Quality Status of Upstream of Water Intake, 2024

NEGERI/ STATE	LEMBANGAN SUNGAI/ RIVER BASIN	SUNGAI/ RIVER	STATION ID BARU/ NEW ID STATION	MUKA SAUK/ WATER INTAKE	NILAI IKA/ WQI VALUE	2024		
						SUB-INDEKS BOD/ BOD SUB-INDEX	SUB-INDEKS AN/ AN SUB-INDEX	SUB-INDEKS SS/ SS SUB-INDEX
Perlis	Sg. Perlis	Sg. Terusan Mada	1RPLS010	Loji Rawatan Air Arau Fasa IV	89	96	98	82
		Sg. Terusan Mada	1RPLS011	Loji Rawatan Air TTPC, Sg. Baru	91	96	98	85
Kedah	Sg. Kedah	Sg. Ahning	1KKDH011	Padang Sanai	97	96	99	94
		Sg. Padang Terap	1KKDH012	Kuala Nerang	96	96	98	96
		Sg. Temin	1KKDH010	Changloon	86	94	65	84
	Sg. Muda	Sg. Muda	1KMUD014	Jeneri	94	96	99	85
		Sg. Muda	1KMUD015	Jeniang	93	96	99	83
		Sg. Muda	1KMUD016	Bukit Selambau	92	96	96	80
		Sg. Muda	1KMUD018	Pinang Tunggal	91	96	93	88
		Sg. Muda	1KMUD019	Nami	96	96	99	91
		Sg. Sedim	1KMUD017	Bikan	94	96	99	84
	Sg. Ulu Melaka	Sg. Melaka	1KMLK003	Ulu Melaka	92	94	90	86
		Sg. Saga	1KMLK004	Padang Saga	90	94	89	87
P.Pinang	Sg. Pinang	Sg. Satu	1PPNG020	Batu Feringgi	98	96	99	97
Perak	Sg. Kurau	Sg. Air Hitam	1AKRU007	Loji Rawatan Air Jelai	97	96	99	97
	Sg. Perak	Sg. Manong	1APRK060	Loji Rawatan Air Manong	98	96	99	96
		Sg. Perak	1APRK059	Loji Rawatan Air Sauk	97	96	99	97
		Sg. Tesong	1APRK062	Loji Rawatan Air Sg. Klah	97	96	99	97
		Sg. Woh	1APRK061	Loji Rawatan Air Kuala Woh	97	96	99	97
	Sg. Sepetang	Sg. Batu Tegoh	1ASPT016	Loji Rawatan Air Bukit Larut	98	96	99	97
	Sg. Bernam	Sg. Gelinting	1ABNM015	Loji Rawatan Air Ulu Slim	92	96	99	75
		Sg. Trolak	1ABNM014	Loji Rawatan Air Trolak Timur	97	96	99	95
Selangor	Sg. Klang	Sg. Gombak	2BKLG020	Loji Rawatan Air Gombak	97	96	99	97
	Sg. Langat	Sg. Batang Labu	2BLGT028	Loji Rawatan Air Salak Tinggi	80	88	69	65
		Sg. Semenyih	2BLGT010	Loji Rawatan Air Semenyih	86	92	76	76
N.Sembilan	Sg. Muar	Sg. Jelai	3NMUA054	Loji Rawatan Air Dangi	93	96	99	85
Melaka	Sg. Kesang	Sg. Chin-Chin	3MKSG008	Muka sauk Loji Rawatan Air Chin-chin	89	96	87	58

Nota / Note:
Kelas IKA / WQI Classes

Kelas I / Class I | Kelas II / Class II | Kelas III / Class III | Kelas IV / Class IV | Kelas V / Class V

Jadual 2.6: Status Kualiti Air di Hulu Muka Sauk, 2024
Table 2.6: Water Quality Status of Upstream of Water Intake, 2024

NEGERI/ STATE	LEMBANGAN SUNGAI/ RIVER BASIN	SUNGAI/ RIVER	STATION ID BARU/ NEW ID STATION	MUKA SAUK/ WATER INTAKE	NILAI IKA/ WQI VALUE	2024		
						SUB-INDEKS BOD/ BOD SUB-INDEX	SUB-INDEKS AN/ AN SUB-INDEX	SUB-INDEKS SS/ SS SUB-INDEX
Johor	Sg. Muar	Sg. Jementah	3JMUA040	Loji Rawatan Air Jementah	97	96	99	95
		Sg. Muar	3JMUA039	Loji Rawatan Air Gombang	87	92	97	87
	Sg. Batu Pahat	Sg. Semberong Dam	3JBPT021	Semberong Dam	91	88	99	90
	Sg. Benut	Sg. Machap Dam	3JBNT008	Machap Dam	94	96	99	93
	Sg. Endau	Sg. Kahang	3JEND026	Jalan Felda Kahang Timur, Kluang	93	96	93	90
	Sg. Pulai	Sg. Pulai Dam	3JPLI004	Pulai Dam	95	96	99	97
Pahang	Sg. Pahang	Sg. Bertam	4CBTM013	Loji Rawatan Air Habu	97	96	99	97
		Sg. Gapoi	4CPHG086	Muka sauk Loji Rawatan Air Gapoi	97	96	99	97
		Sg. Jempol	4CPHG087	Loji Air Sg Jerik	95	96	99	90
		Sg. Jempol	4CPHG088	Loji Air Jengka 3	89	92	95	79
		Sg. Mentiga	4CPHG089	Loji Air Chini	90	96	96	74
		Sg. Terla	4CBTM012	Loji Rawatan Air Kuala Terla	96	96	99	97
		Sg. Triang	4CPHG074	Loji Rawatan Air Sg. Triang	88	96	97	62
		Sg. Ulong	4CBTM014	Brinchang Dam	97	96	99	97
Terengganu	Sg. Terengganu	Sg. Terengganu	4TTGG013	Loji Air Serada	90	96	96	95
Kelantan	Sg. Golok	Sg. Golok	4DGLK003	Syarikat Air Kelantan	97	96	99	97
	Sg. Kelantan	Sg. Chiku	4DKLT043	Felda Ciku 2	95	96	98	88
		Sg. Kelantan	4DKLT045	Loji Air Kelar, Pasir Mas	89	96	98	55
		Sg. Pehi	4DKLT044	Loji Air Pahi	92	96	99	68
Sarawak	Sg. Kerian	Sg. Selalang	6QKRN017	Selalang Water Intake	89	96	90	91
	Sg. Mukah	Sg. Mukah	6QMKH005	Mukah Water Intake	77	96	83	66
	Sg. Rajang	Sg. Daro	6QRJG021	Daro Water Intake	53	96	87	95
		Sg. Jemoreng	6QRJG022	Jemoreng Water Intake	52	96	83	96
		Sg. Pakan	6QRJG020	Pakan Water Intake	88	96	87	89
		Sg. Pila Parit	6QRJG023	Igan Water Intake	80	96	83	65

Nota / Note:
Kelas IKA / WQI Classes

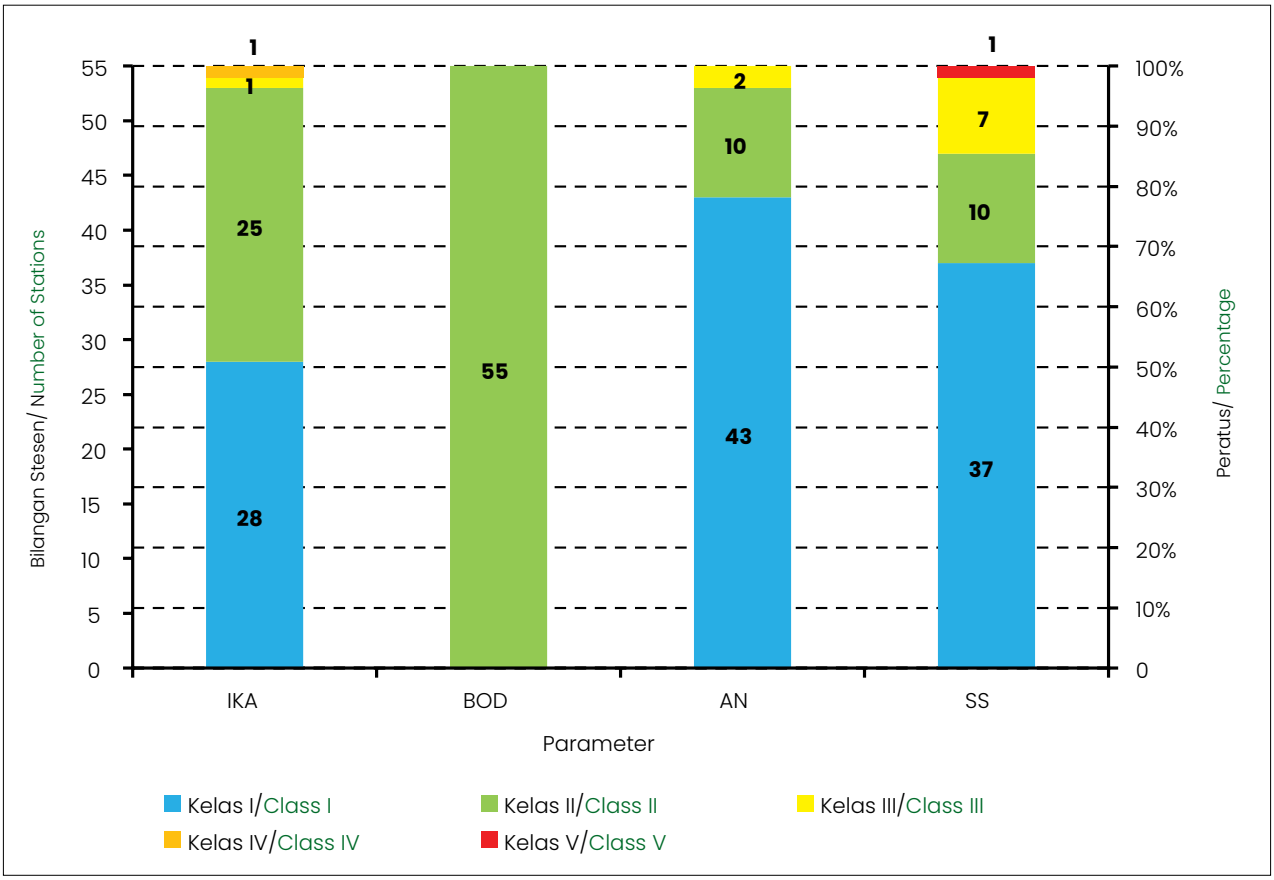
Kelas I / Class I | Kelas II / Class II | Kelas III / Class III | Kelas IV / Class IV | Kelas V / Class V

Jadual 2.6: Status Kualiti Air di Hulu Muka Sauk, 2024
Table 2.6: Water Quality Status of Upstream of Water Intake, 2024

NEGERI/ STATE	LEMBANGAN SUNGAI/ RIVER BASIN	SUNGAI/ RIVER	STATION ID BARU/ NEW ID STATION	MUKA SAUK/ WATER INTAKE	NILAI IKA/ WQI VALUE	2024		
						SUB-INDEKS BOD/ BOD SUB-INDEX	SUB-INDEKS AN/ AN SUB-INDEX	SUB-INDEKS SS/ SS SUB-INDEX
Sabah	Sg. Padas	Sg. Padas	5SPDS011	Water Intake Jabatan Air Beaufort	81	94	97	36
	Sg. Papar	Sg. Papar	5SPPR004	Sekolah Kebangsaan Mandalipau	94	96	99	94
		Sg. Papar	5SPPR005	Water Intake Kogopon	95	96	94	96

Nota / Note:
Kelas IKA / WQI Classes

Kelas I / Class I | Kelas II / Class II | Kelas III / Class III | Kelas IV / Class IV | Kelas V / Class V



Rajah 2.9 : Kualiti Air Sungai di Stesen Hulu Muka Sauk, 2024
Figure 2.9 : River Water Quality at Upstream Water Intake Stations, 2024

STATUS PENGAWASAN KUALITI AIR SUNGAI AUTOMATIK

Rajah 2.10(a) dan **Rajah 2.10(b)** menunjukkan lokasi 30 stesen pengawasan sungai automatik serta takat pengambilan air yang disenaraikan seperti dalam **Jadual 2.7**.

Pada tahun 2024, status kualiti air sungai bagi 30 stesen pengawasan sungai automatik telah dinilai berdasarkan peratusan pematuhan Kelas II. Parameter yang diukur adalah pH, DO, BOD, COD, AN dan pepejal terampai (SS). Pematuhan ini ditunjukkan seperti yang tertera pada **Jadual 2.8**.

Dari segi pematuhan Kelas II, stesen yang menunjukkan pematuhan 90% atau lebih kepada kualiti air Kelas II pada tahun 2024 adalah didapati di 15 (50%) stesen iaitu CR02K, CR05A, CR06A, CR14N, CR15N, CR17M, CR18J, CR22C, CR23C, CR25T, CR26D, CR27S, CR29Q, CR30Q dan CR31S.

DO adalah salah satu penunjuk yang menunjukkan kehadiran BOD yang disebabkan oleh bahan pencemar organik. Pematuhan Kelas II DO yang lebih atau sama dengan 90% didapati di 9 (30%) stesen iaitu CR06A, CR12W, CR14N, CR15N, CR18J, CR25T, CR26D, CR27S dan CR31S.

Ammonium (NH4) adalah satu bentuk ammonia (NH3) yang telah terion. Pengukuran NH4 memberi petunjuk kepada potensi kehadiran pencemar NH3 atau AN dalam air sungai apabila pH dan suhu air berubah. Pematuhan kurang daripada 90% bagi Kelas II AN didapati di 17 (56.7%) stesen iaitu CR02K, CR06A, CR14N, CR15N, CR17M, CR18J, CR19J, CR20J, CR22C, CR23C, CR24T, CR25T, CR26D, CR27S, CR31S, CR29Q dan CR30Q.

pH adalah ukuran bagi keasidan dan kealkalian mengikut skala pH. Julat pematuhan yang rendah bagi pH diperhatikan di 20 (66.7%) stesen sungai iaitu CR01K, CR02K, CR03K, CR06A, CR07B, CR08B, CR09B, CR10B, CR11B, CR12W, CR13N, CR14N, CR15N, CR16M, CR22C, CR26D, CR27S, CR31S, CR29Q dan CR30Q.

Kekeruhan digunakan sebagai penunjuk kehadiran SS di dalam sungai. Pematuhan Kelas II SS yang direkodkan adalah kurang daripada 90% bagi semua stesen.

Rajah 2.11 hingga **Rajah 2.16** menunjukkan peratus pematuhan Kelas II mengikut zon.

CONTINUOUS RIVER WATER QUALITY MONITORING STATUS

Figure 2.10(a) and **Figure 2.10(b)** show the location of the 30 continuous river monitoring stations and subsequent water intakes as listed in **Table 2.7.**

In 2024, the river water quality status of the 30 continuous river water quality monitoring stations were assessed based on percentage of compliance to Class II. The measured parameters are pH, DO, BOD, COD, AN and suspended solid (SS). The compliance is shown in **Table 2.8.**

In terms of compliance to Class II, 90% compliance or more to Class II water quality in 2024 were shown at at 15 (50%) stations which are CR02K, CR05A, CR06A, CR14N, CR15N, CR17M, CR18J, CR22C, CR23C, CR25T, CR26D, CR27S, CR29Q, CR30Q, and CR31S stations.

DO is one of the indicators of the presence of BOD which is caused by organic pollutants. Compliance of more or equal than 90% to Class II DO was observed at 9 (30%) stations which are CR06A, CR12W, CR14N, CR15N, CR18J, CR25T, CR26D, CR27S, and CR31S.

Ammonium (NH4) is an ionized form of ammonia (NH3). The measurement of NH4 indicates the potential presence of NH3 or AN pollutant in rivers when the pH and temperature changes. Low range compliance of AN was observed at 17 (56.7%) stations which are CR02K, CR06A, CR14N, CR15N, CR17M, CR18J, CR19J, CR20J, CR22C, CR23C, CR24T, CR25T, CR26D, CR27S, CR31S, CR29Q, and CR30Q.

pH is a measurement of acidity and alkalinity based on the pH scale. Relatively low compliance of pH ranges was observed at 20 (66.7%) river stations which are CR01K, CR02K, CR03K, CR06A, CR07B, CR08B, CR09B, CR10B, CR11B, CR12W, CR13N, CR14N, CR15N, CR16M, CR22C, CR26D, CR27S, CR31S, CR29Q, and CR30Q.

Turbidity is used as an indicator of SS presence in a river. Compliance to Class II SS were less than 90% at all stations.

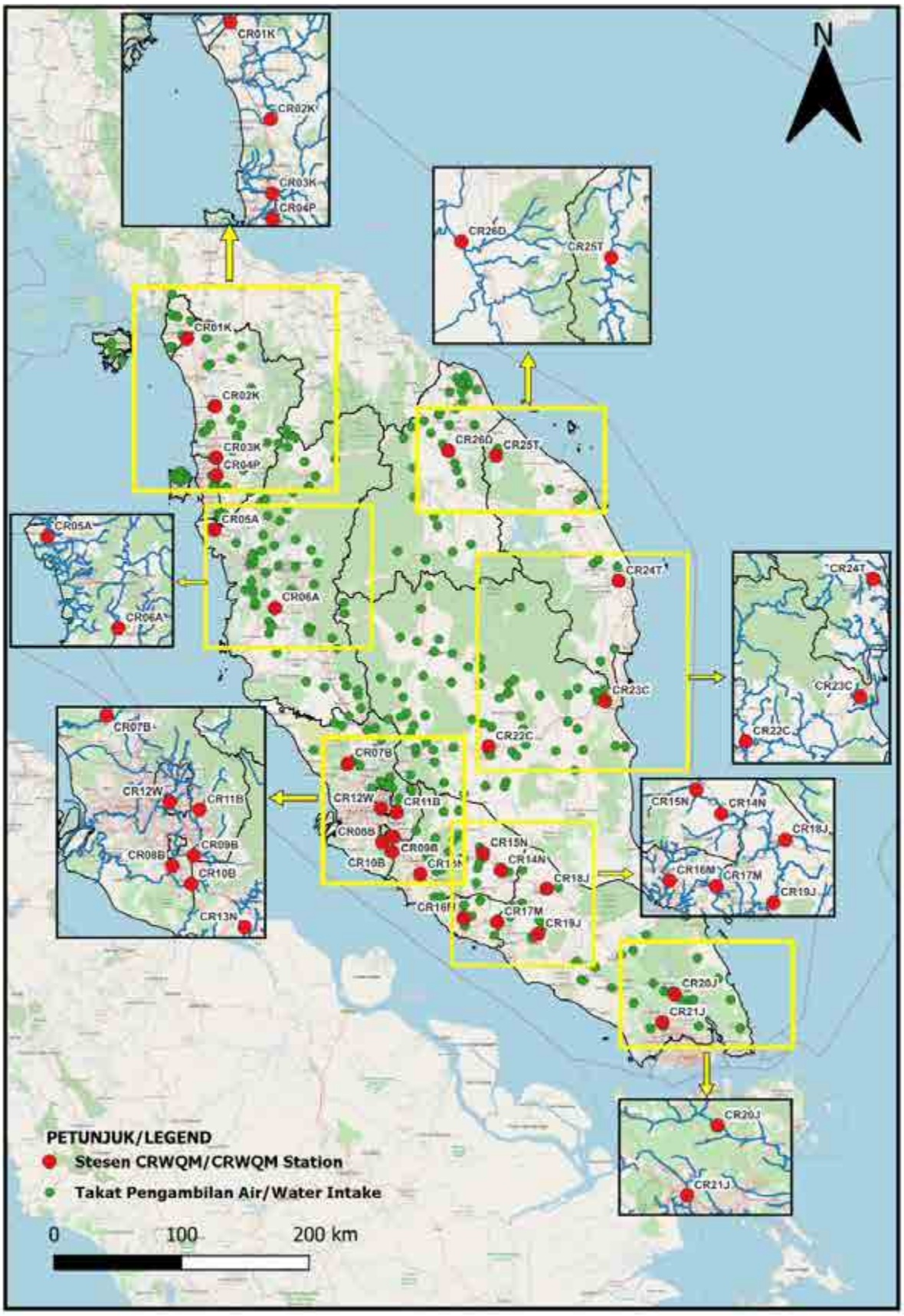
Figure 2.11 to **Figure 2.16** shows the percentage of Class II compliance by zones.

Jadual 2.7: Lokasi CRWQM: ID Stesen, Sungai bagi Stesen dan Takat Pengambilan Air
Table 2.7: CRWQM Location: Station ID, River Monitored and Water Intake

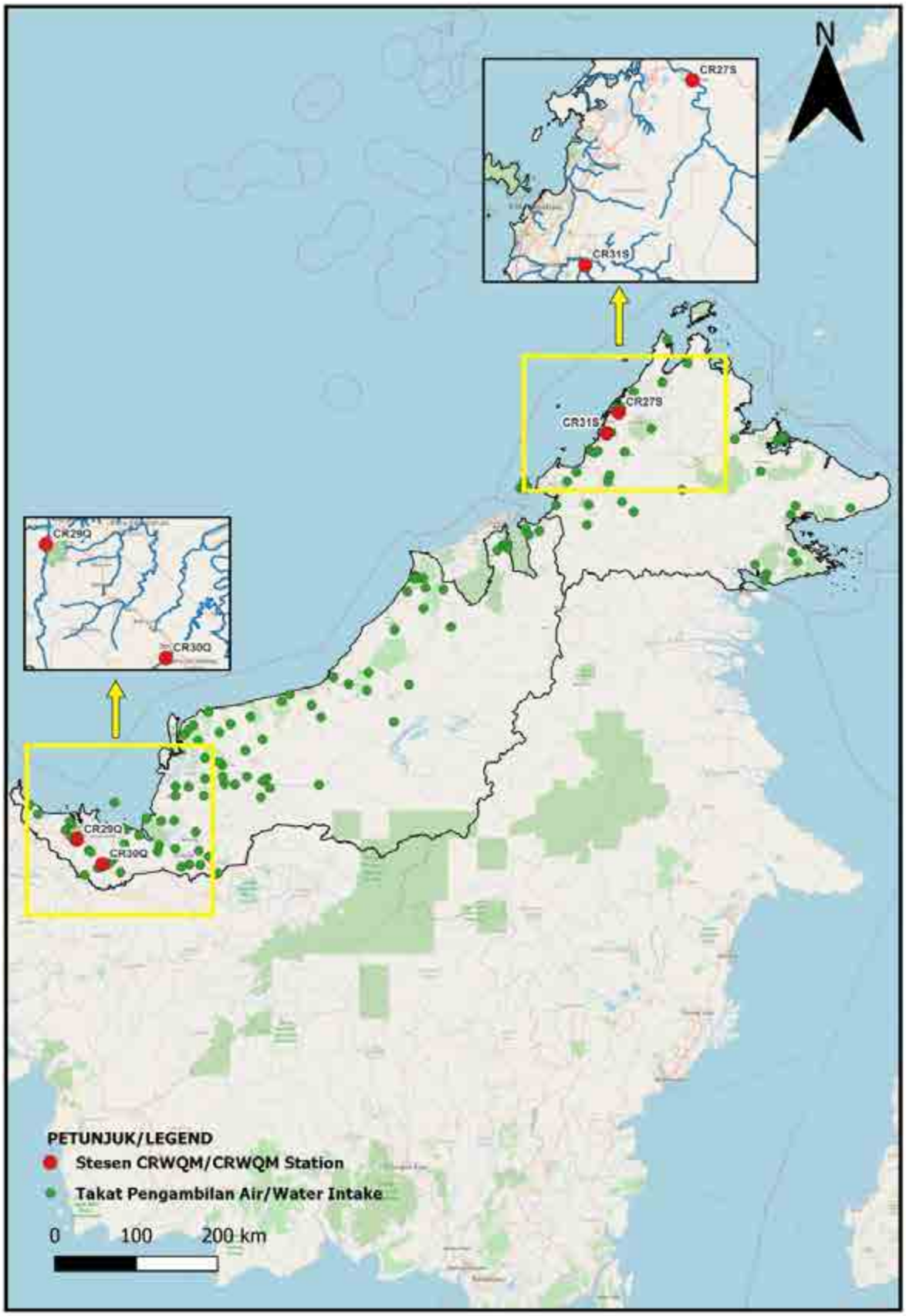
NEGERI/ STATE	ID STESEN/ ID STATION	SUNGAI/ RIVER	TAKAT PENGAMBILAN AIR/ WATER INTAKE
Kedah	CR01K CR02K CR03K	Terusan MADA Terusan MADA Sungai Muda	Arau Fasa IV Bukit Jenun Kulim Hi-Tech
P.Pinang	CR04P	Sungai Kulim	Toh Along
Perak	CR05A CR 06A	Sungai Bogak Sungai Perak	Parit Buntar Sultan Idris
Selangor	CR07B CR08B CR09B CR10B CR11B	Sungai Selangor Sungai Langat Sungai Semenyih Sungai Labu Sungai Langat	Sg. Selangor Fasa 1,2,3 Bukit Tampoi Jenderam Labu Lanjut Cheras Batu 11
W.P. Kuala Lumpur	CR12W	Sungai Klang	Tiada Berkenaan / Not Applicable
N.Sembilan	CR13N CR14N CR15N	Sungai Linggi Sungai Muar Sungai Muar	Linggi Pasir Besar Jelai Jempol
Melaka	CR16M CR17M	Sungai Melaka Sungai Kesang	Durian Tunggal Chin Chin
Johor	CR18J CR19J CR20J CR21J	Sungai Segamat Sungai Muar Sungai Johor Sungai Sekudai	Segamat Panchor Semanggar Skudai
Pahang	CR22C CR23C	Sungai Pahang Sungai Kuantan	Lubuk Kawah Semambu
Terengganu	CR24T CR25T	Sungai Paka Sungai Besut	Bukit Bauk Bukit Bunga
Kelantan	CR26D	Sungai Kelantan	Sokor
Sabah	CR27S CR31S	Sungai Tuaran Sungai Moyog	Telibong Kasigui
Sarawak	CR29Q CR30Q	Sungai Sarawak Sungai Batang Sadong	Sarawak Kiri Tebekang

Jadual 2.8: Peratus Pematuhan Kelas II mengikut Stesen
Table 2.8: Percentage of Compliance to Class II by Station

NEGERI/ STATE	ID STESEN/ STATION ID	PEMATUHAN KELAS II (%) / COMPLIANCE TO CLASS II (%)						
		WQI	DO	BOD	COD	TSS	AN	pH
Kedah	CR01K	73.64	46.72	100.00	100	51.88	89.95	90.15
	CR02K	93.88	78.69	95.71	99.63	29.42	98.85	93.58
	CR03K	79.03	33.35	100	99.94	44.14	84.07	96.59
P.Pinang	CR04P	19.16	25.41	97.87	81.69	34.41	30.54	49.21
Perak	CR05A	93.80	83.80	100.00	100.00	89.15	66.12	54.58
	CR06A	99.91	100.00	100.00	100.00	44.96	100.00	100.00
Selangor	CR07B	77.38	83.03	0	100.00	51.86	57.58	99.38
	CR08B	41.39	37.30	0	100.00	45.66	32.13	99.47
	CR09B	48.43	28.13	100	100.00	28.48	50.27	99.58
	CR10B	30.23	20.04	99.97	100.00	54.95	15.00	99.73
	CR11B	79.23	89.33	0	100.00	8.88	63.44	93.51
W.P. Kuala Lumpur	CR12W	0.28	96.26	0	100.00	48.63	1.47	100.00
N.Sembilan	CR13N	30.56	31.68	81.21	100.00	12.37	38.74	99.13
	CR14N	94.38	98.78	98.87	99.1	4.04	98.37	98.73
	CR15N	96.97	99.50	100.00	100.00	16.2	95.61	99.36
Melaka	CR16M	70.49	46.24	100.00	99.97	21.74	53.77	97.61
	CR17M	91.93	87.99	100.00	100.00	15.37	97.55	75.20
Johor	CR18J	97.13	95.93	97.12	100.00	31.35	99.24	88.05
	CR19J	54.10	0.95	99.28	100.00	34.03	93.80	43.32
	CR20J	78.58	87.56	99.98	100.00	7.13	95.19	22.30
	CR21J	26.04	48.38	0.73	80.79	55.75	27.47	78.75
Pahang	CR22C	97.44	85.51	100.00	100.00	41.42	96.09	99.79
	CR23C	90.19	70.98	100.00	100.00	74.53	94.59	81.62
Terengganu	CR24T	80.40	75.29	100.00	100.00	69.67	96.32	16.67
	CR25T	99.75	99.52	100.00	100.00	64.13	99.75	86.15
Kelantan	CR26D	98.27	97.70	100.00	100.00	17.44	99.30	100.00
Sabah	CR27S	99.98	100.00	100.00	100.00	77.85	99.54	99.88
	CR31S	99.28	95.69	69.70	100.00	76.97	99.72	99.79
Sarawak	CR29Q	95.35	69.29	100.00	100.00	87.00	98.98	99.84
	CR30Q	96.60	74.22	79.02	100.00	83.66	98.60	92.54

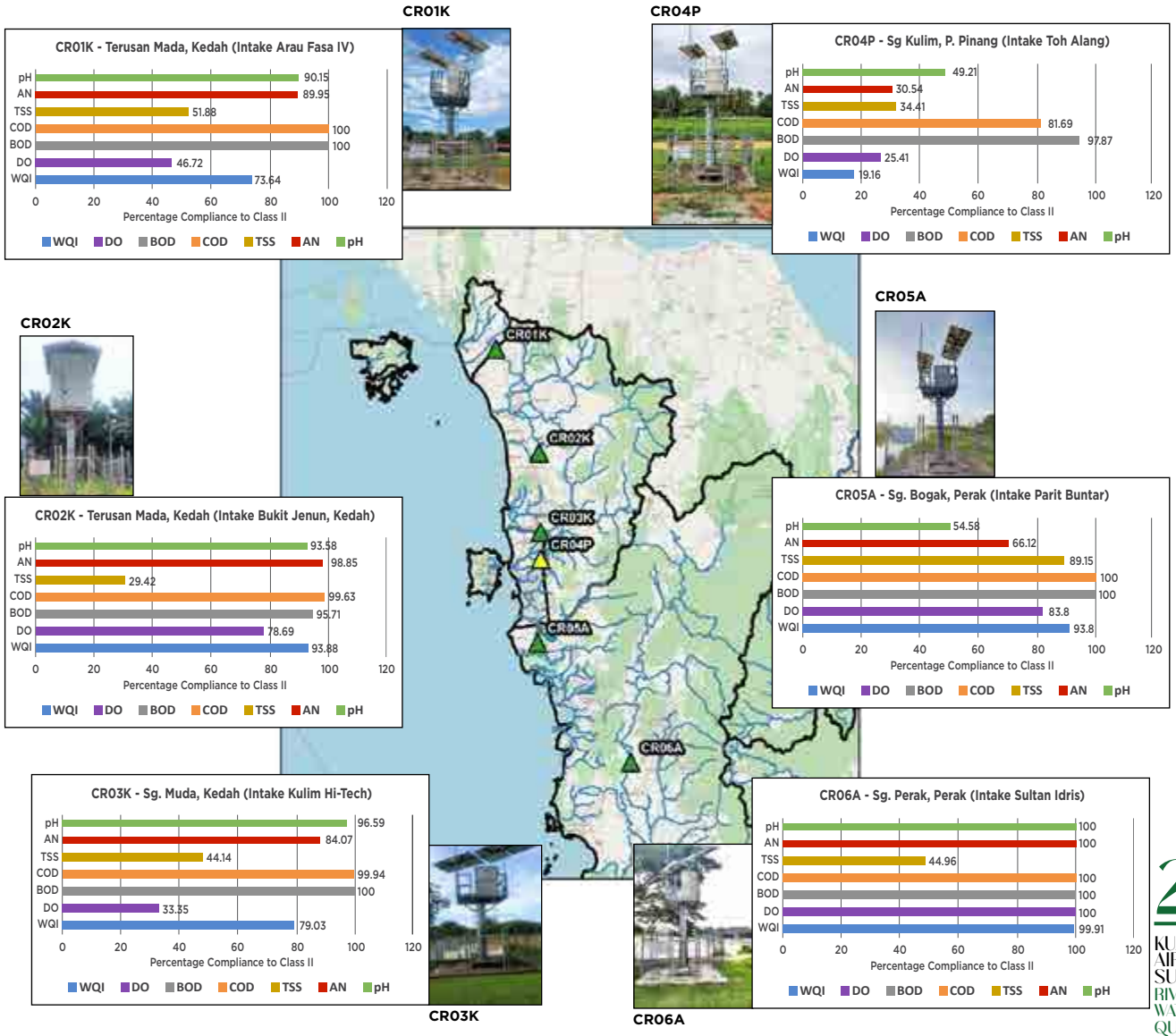


Rajah 2.10(a): Stesen Pengawasan Kualiti Air Sungai Automatik dan Takat Pengambilan Air
Figure 2.10(a): Continuous River Water Quality Monitoring Stations and Water Intakes



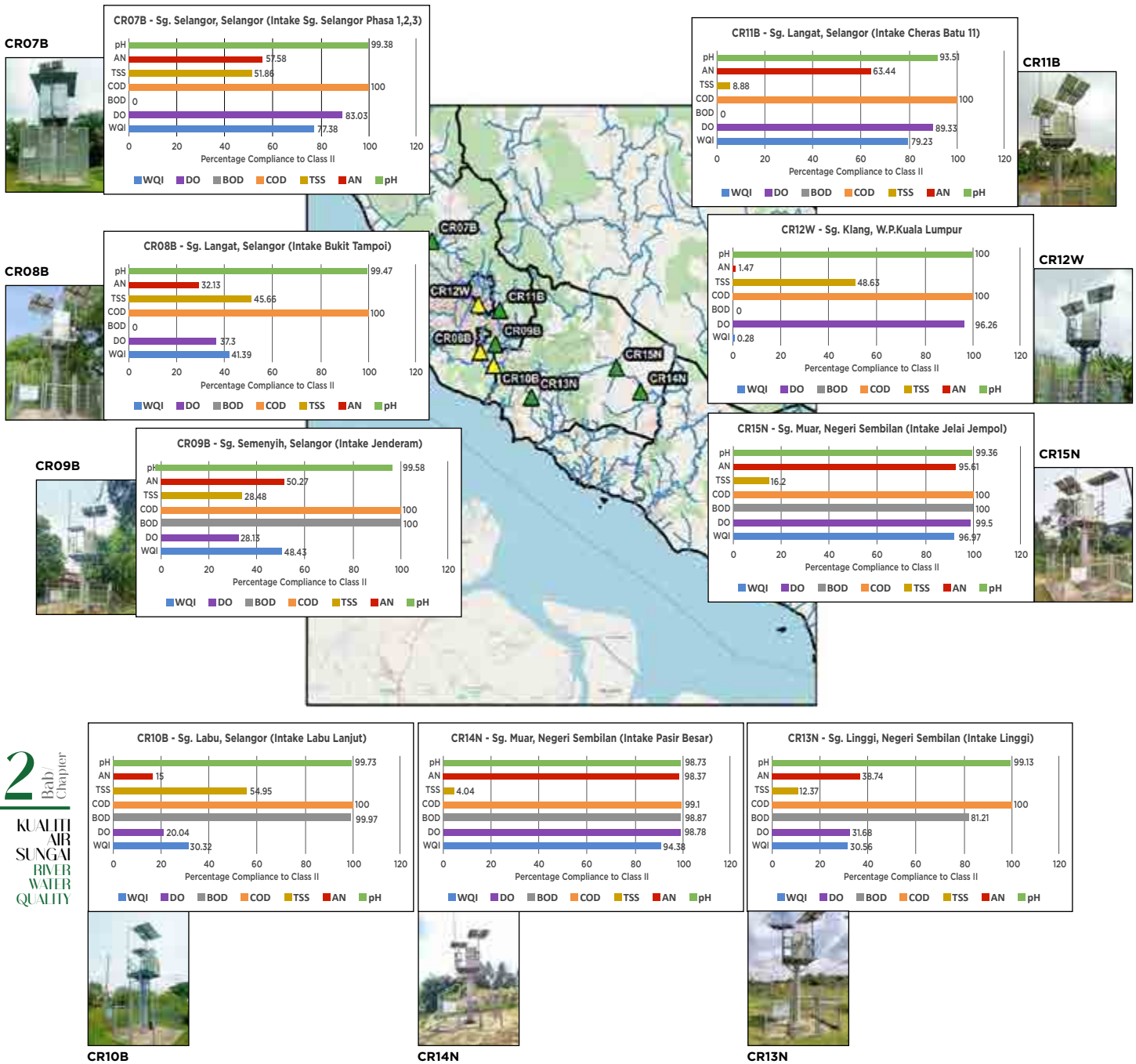
Rajah 2.10(b): Stesen Pengawasan Kualiti Air Sungai Automatik dan Takat Pengambilan Air
Figure 2.10(b): Continuous River Water Quality Monitoring Stations and Water Intakes

CRWQM 2024 (WILAYAH UTARA)



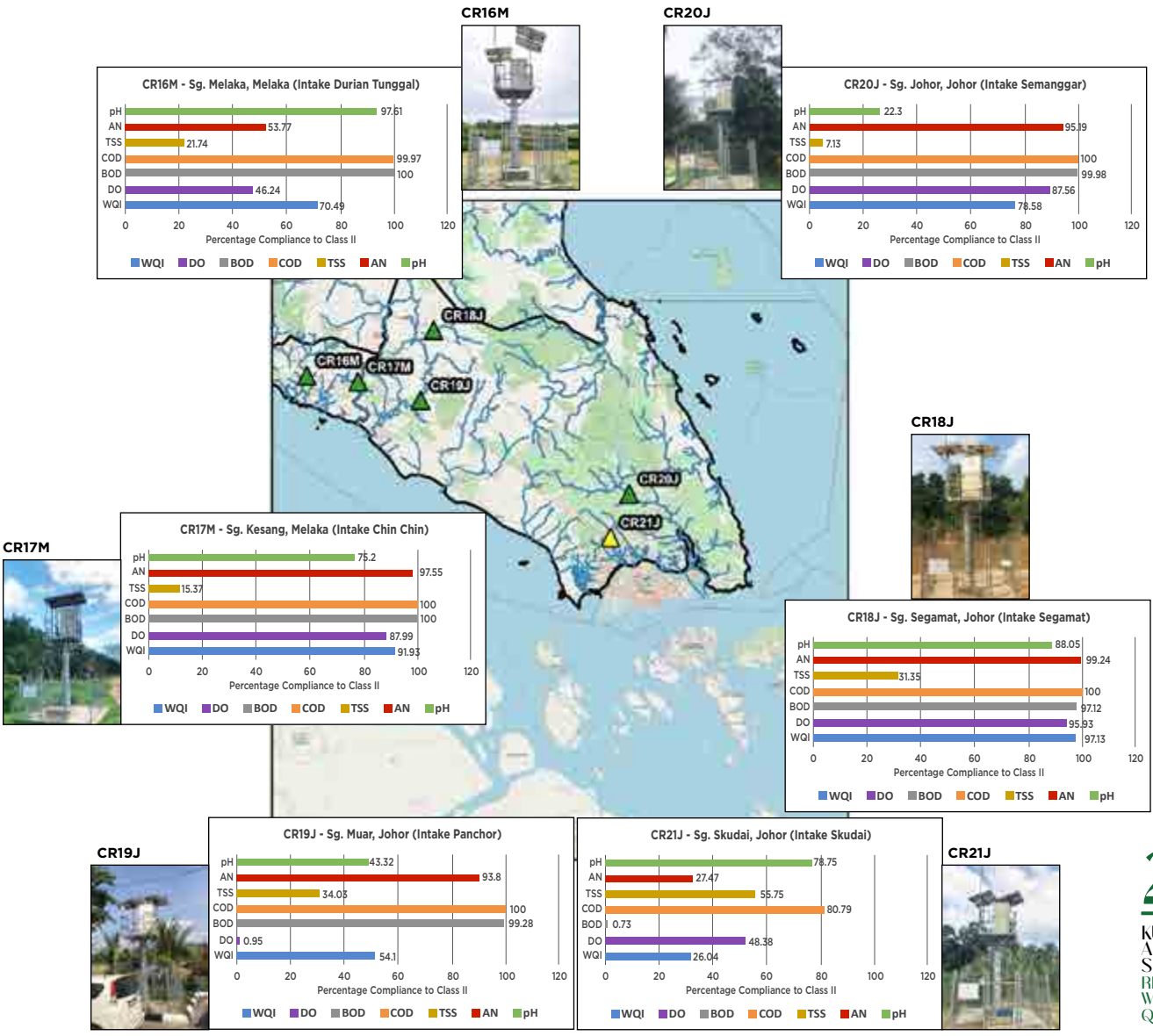
Rajah 2.11 : Peratus Pematuhan Kelas II (Wilayah Utara)
Figure 2.11 : Percentage of Compliance to Class II (Northern Region)

CRWQM 2024 (WILAYAH TENGAH)



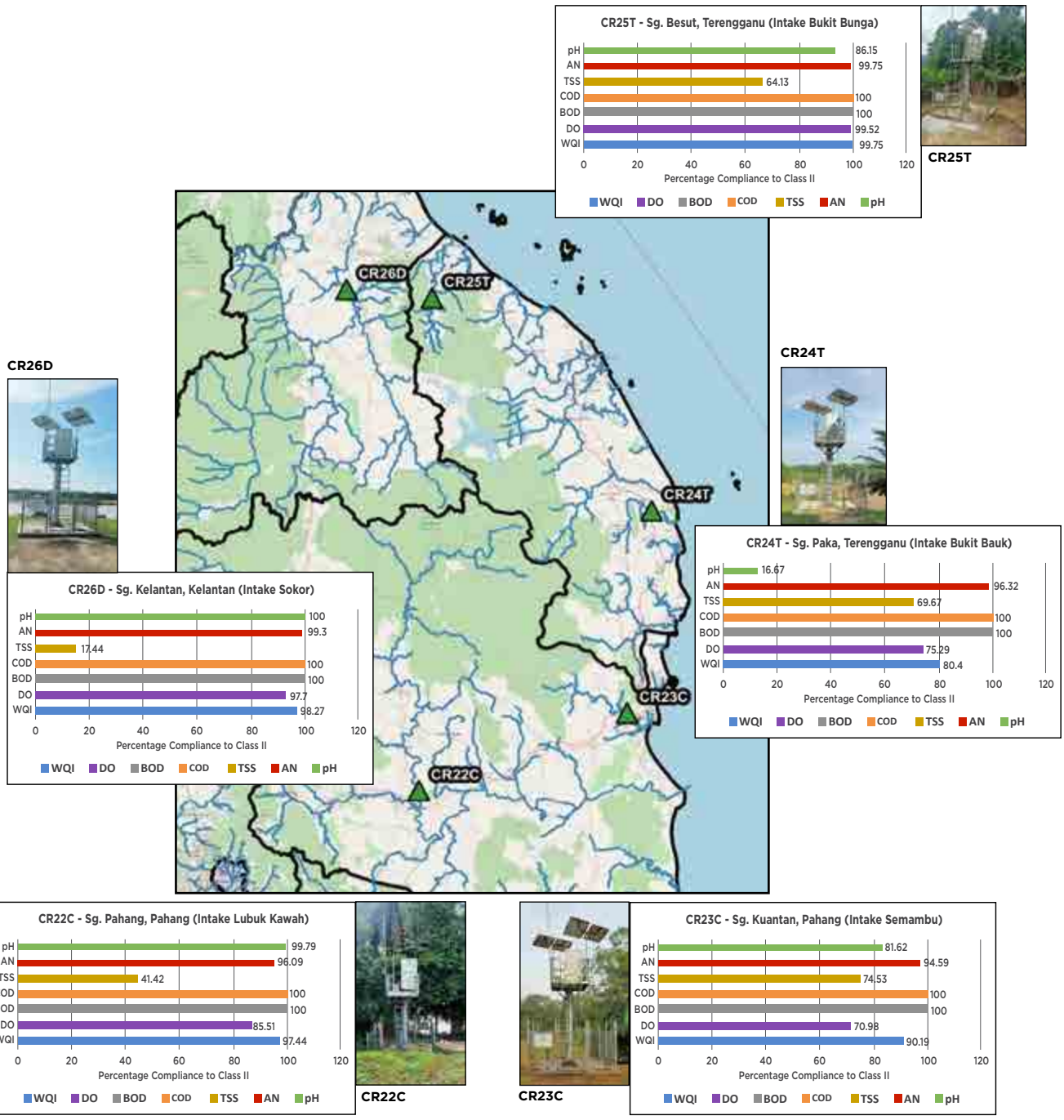
Rajah 2.12 : Peratus Pematuhan Kelas II (Wilayah Tengah)
Figure 2.12 : Percentage of Compliance to Class II (Central Region)

CRWQM 2024 (WILAYAH SELATAN)



Rajah 2.13 : Peratus Pematuhan Kelas II (Wilayah Selatan)
Figure 2.13 : Percentage of Compliance to Class II (Southern Region)

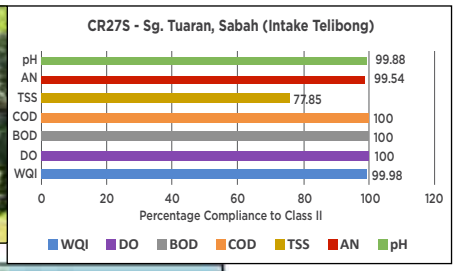
CRWQM 2024 (WILAYAH TIMUR)

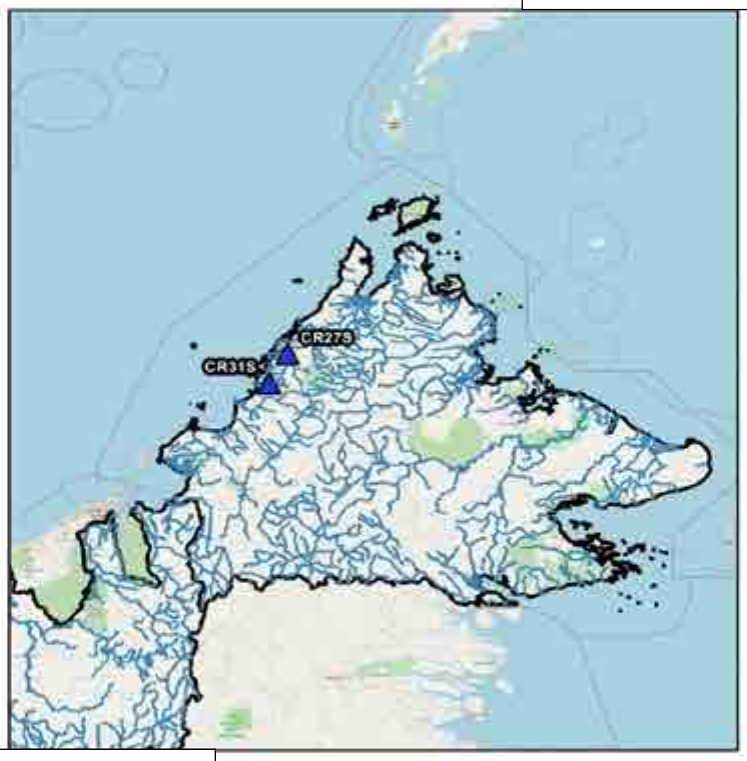


Rajah 2.14: Peratus Pematuhan Kelas II (Wilayah Timur)
Figure 2.14: Percentage of Compliance to Class II (Eastern Region)

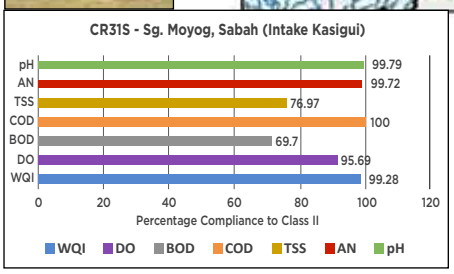
CRWQM 2024 (SABAH)

CR27S





CR31S



Petunjuk / Legend

Kelas IKA / WQI Class

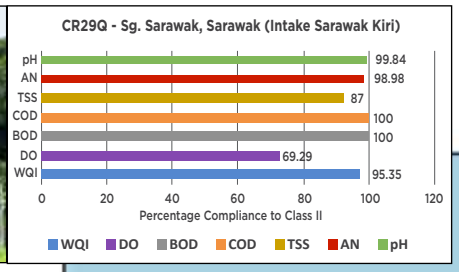
- Kelas I / Class I
- Kelas II / Class II
- Kelas III / Class III
- Kelas IV / Class IV
- Kelas V / Class V
- Sempadan Negeri / State Boundary

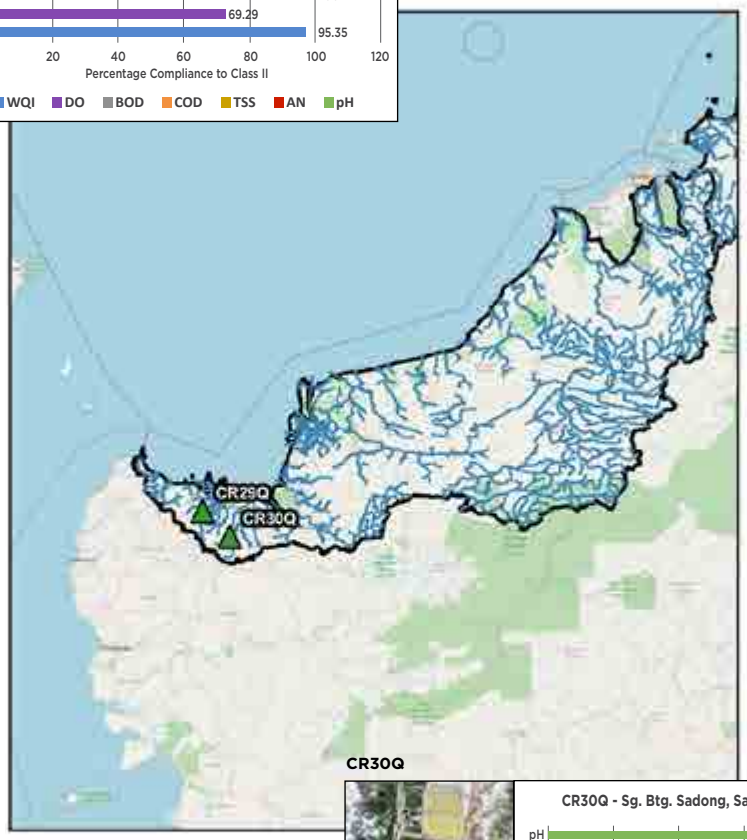
0 50 100 km

Rajah 2.15 : Peratus Pematuhan Kelas II (Wilayah Sabah)
Figure 2.15 : Percentage of Compliance to Class II (Sabah Region)

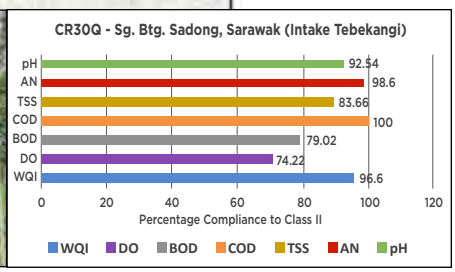
CRWQM 2024 (WILAYAH SARAWAK)

CR29Q





CR30Q



Petunjuk / Legend

Kelas IKA / WQI Class

- Kelas I / Class I
- Kelas II / Class II
- Kelas III / Class III
- Kelas IV / Class IV
- Kelas V / Class V
- Sempadan Negeri / State Boundary

0 50 100 km

Rajah 2.16 : Peratus Pematuhan Kelas II (Wilayah Sarawak)
Figure 2.16 : Percentage of Compliance to Class II (Sarawak Region)

3 Bab/Chapter

KUALITI AIR TANAH
Groundwater Quality

Pengawasan Kualiti Air Tanah
Groundwater Quality Monitoring

Stesen di Seluruh Negara
Stations (Wells) Nationwide

119

Jenis Guna Tanah
Land Use Category

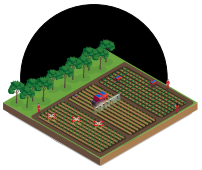
12

Bilangan Sampel Air Tanah Dianalisa
Number of Groundwater Samples Analysed

440

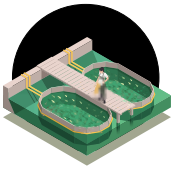
BEKAS LOMBONG EMAS
USED GOLD MINES

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	2	1



KAWASAN PERTANIAN
AGRICULTURAL AREA

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
2	8	4



AKUAKULTUR
AQUACULTURE

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	5	2

BEKAS TAPAK PELUPUSAN SAMPAH
USED SOLID WASTE LANDFILL

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	16	7

BANDAR & PINGGIR BANDAR
URBAN & SUBURBAN AREA

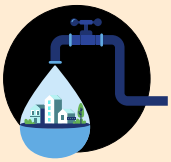
Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
1	12	0

PADANG GOLF
GOLF COURSES

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	5	1

TAPAK PERINDUSTRIAN
INDUSTRIAL SITES

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	13	8



BEKALAN AIR
WATER SUPPLY

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	4	0

LUAR BANDAR
RURAL

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	4	1

KAWASAN PERANGINAN
RESORTS

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	2	0

BEKAS TAPAK PELUPUSAN BANGKAI HAIWAN
USED ANIMAL BURIAL SITES

Sangat Baik/ Excellent	Baik/ Good	Sederhana / Moderate
0	7	6

KUALITI AIR TANAH/ Groundwater Quality

PENGAWASAN KUALITI AIR TANAH

Program Pengawasan Kualiti Air Tanah Kebangsaan telah dimulakan semenjak tahun 1997. Tapak stesen pengawasan yang telah dipilih adalah mewakili jenis guna tanah spesifik di mana terdapat 119 buah stesen pengawasan kualiti air tanah (telaga) di seluruh negara.

Pada tahun 2024, sebanyak 111 stesen sahaja terlibat dalam pensampelan kualiti air bawah tanah. Ini adalah kerana terdapat lapan (8) stesen pengawasan kualiti air tanah yang tidak mempunyai luahan air akibat faktor pembangunan di kawasan berhampiran, keadaan stesen yang memerlukan penyelenggaraan dalaman dan ketiadaan akses masuk ke stesen. **Jadual 3.1** menunjukkan taburan stesen pengawasan kualiti air tanah di Malaysia mengikut jenis kategori guna tanah.

Pada tahun 2024, sebanyak 440 sampel telah dianalisa bagi mendapatkan bacaan bahan kimia organik meruap (VOCs), racun perosak, logam berat, anion, bakteria (koliform), sebatian berfenol, jumlah keliatan, jumlah pepejal terlarut, pH, suhu, konduktiviti dan oksigen terlarut (DO).

Indeks Kualiti Air Tanah (IKAT) digunakan sebagai kaedah untuk menentukan kategori dan status kualiti air tanah. IKAT dibangunkan berdasarkan tujuh (7) parameter utama iaitu pH, Besi, Jumlah Pepejal Terlarut, Nitrat, E. Coli, Fenol dan Sulfat. Skala IKAT yang bermula daripada 0 hingga 100 digunakan bagi menentukan kategori kualiti air tanah daripada sangat baik hingga sangat tercemar (**Jadual 3.2**).

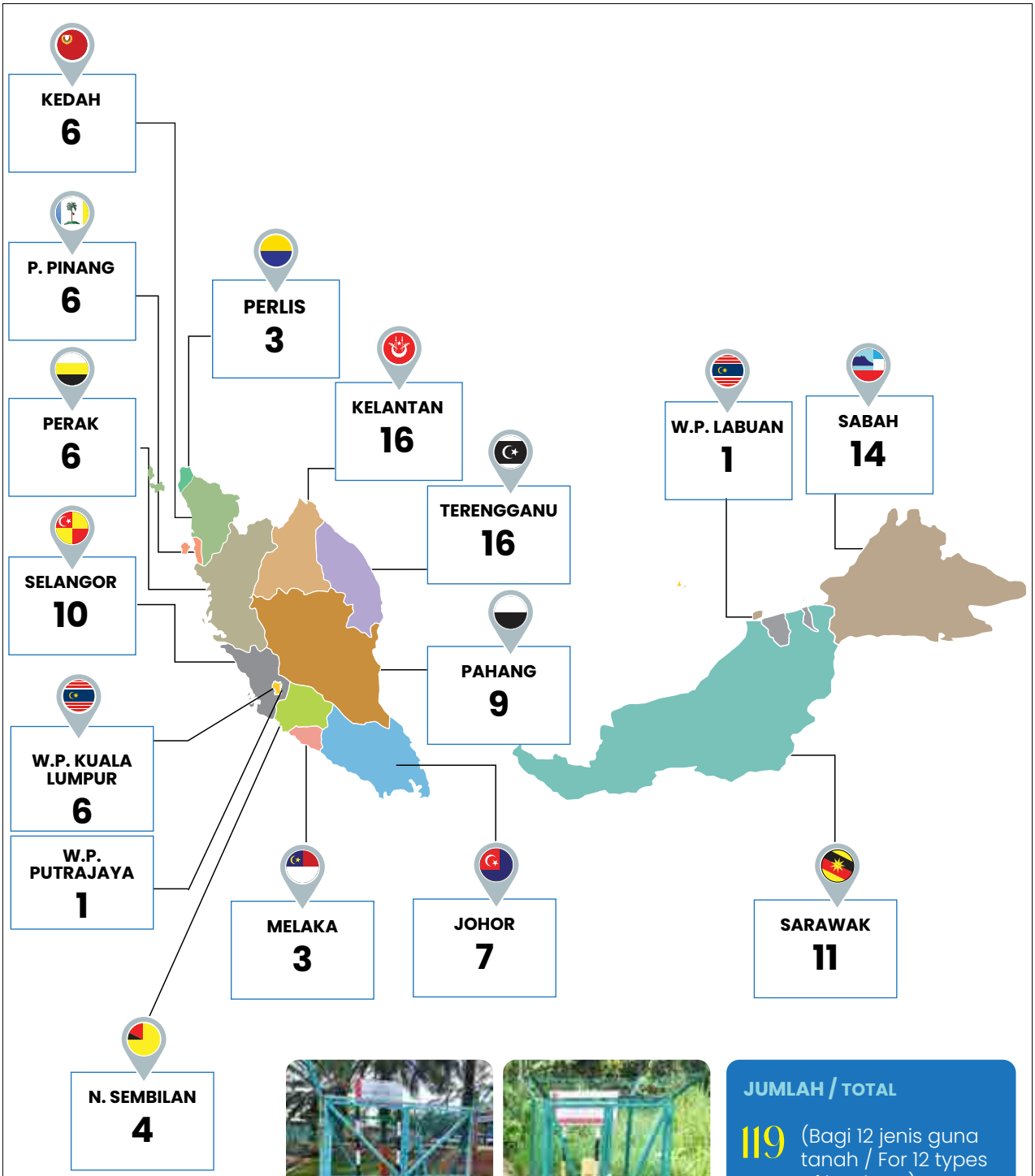
GROUNDWATER QUALITY MONITORING

Groundwater Water Quality Monitoring was established in 1997. The monitoring station sites that have been selected are representative of specific land use, where there are 119 groundwater quality monitoring stations (wells) across the country.

In 2024, a total of only 111 stations were involved in groundwater quality sampling. This is because there are eight (8) ground water quality monitoring stations that have no water discharge due to nearby development factors, the condition of the station that requires internal maintenance and no access to the station. **Table 3.1** shows the distribution of groundwater quality monitoring stations in Malaysia based on land use.

In 2024, 440 samples were analysed for volatile organic compounds (VOCs), pesticides, heavy metals, anions, bacteria (coliform), phenolic compounds, total hardness, total dissolved solids (TDS), pH, temperature, conductivity, and dissolved oxygen (DO).

The Groundwater Quality Index (GWQI) is used as a benchmark to determine the groundwater quality status and its category. GWQI was developed based on seven (7) parameters which are pH, Iron, Total Dissolved Solids, Nitrate, E. coli, Phenol, and Sulphate. The GWQI with a scale ranging from 0 to 100 will identify the quality of the groundwater from excellent to very poor (**Table 3.2**).



Pusat Kecemerlangan Kenderaan Bermotor, JAS Gopeng, Perak

Stesen IATC Penampang, Sabah

JUMLAH / TOTAL

119 (Bagi 12 jenis guna tanah / For 12 types of land use)

Jumlah Stesen Pengawasan bagi Setiap Negeri Seluruh Malaysia, 2024
Total Number of Monitoring Stations for Each State of Malaysia, 2024

Jadual 3.1: Taburan Stesen Pengawasan Kualiti Air Tanah di Seluruh Negeri di Malaysia mengikut Jenis Kategori Guna Tanah, 2024
Table 3.1: Distribution of Groundwater Quality Monitoring Stations Throughout the States in Malaysia Based on Land Use, 2024

KATEGORI / CATEGORY	BILANGAN STESEN / NUMBER OF STATIONS	NEGERI / STATE	BILANGAN TELAGA / NUMBER OF WELLS
Kawasan Pertanian / Agricultural Area	15	Sabah	2
		Terengganu	5
		Pahang	1
		Kedah	3
		Perlis	1
		Kelantan	2
		Selangor	1
Bandar & Pinggir Bandar / Urban & Suburban Area	13	Sabah	1
		Terengganu	2
		Pahang	1
		Kedah	1
		Perlis	2
		Kelantan	3
		Selangor	2
		W.P. Putrajaya	1
Tapak Perindustrian / Industrial Sites	21	W.P. Labuan	1
		Terengganu	5
		Johor	2
		Kedah	1
		Kelantan	2
		Melaka	1
		Selangor	3
		P. Pinang	3
		N. Sembilan	1
		Perak	1
		Pahang	1
Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfill	26	Sabah	7
		Sarawak	2
		Terengganu	2
		Johor	2
		Kelantan	3
		Perak	1
		W.P. Kuala Lumpur	5
		N. Sembilan	3
		Melaka	1
Padang Golf / Golf Courses	7	Sabah	2
		Kelantan	4
		W.P. Kuala Lumpur	1
Luar Bandar / Rural	5	Terengganu	1
		Kelantan	2
		Melaka	1
		Selangor	1

KATEGORI / CATEGORY	BILANGAN STESEN / NUMBER OF STATIONS	NEGERI / STATE	BILANGAN TELAGA / NUMBER OF WELLS
Bekas Lombong Emas / Used Gold Mine	3	Sarawak	3
Bekalan Air / Water Supply	5	Sabah	1
		Sarawak	4
Bekas Tapak Pelupusan Bangkai Haiwan / Used Animal Burial Sites	14	Sarawak	2
		Johor	3
		Perak	3
		Selangor	3
		P. Pinang	3
Akuakultur / Aquaculture	7	Pahang	6
		Terengganu	1
Tapak Pelupusan Radioaktif / Radioactive Landfills	1	Perak	1
Kawasan Peranginan / Resorts	2	Sabah	1
		Kedah	1
JUMLAH / TOTAL			**119**

Jadual 3.2: Klasifikasi Indeks Kualiti Air Tanah
Table 3.2: Groundwater Quality Index Classification

KATEGORI / CATEGORY	IKAT / GWQI	POTENSI KEGUNAAN / POTENTIAL USE
Sangat Tercemar / Very Poor	0-15	Kajian air terperinci sebelum digunakan/ Detailed investigation before use
Tercemar / Poor	16-39	Pengairan atau pertanian / Irrigation or agriculture
Sederhana / Moderate	40-69	Penggunaan industri / Industrial use
Baik / Good	70-89	Berpontensi sebagai air minuman / Potential use as drinking water
Sangat Baik / Excellent	≥90	Air berkualiti untuk semua kegunaan/ High quality water for all purpose

STATUS KUALITI AIR TANAH BAGI KAWASAN PERTANIAN

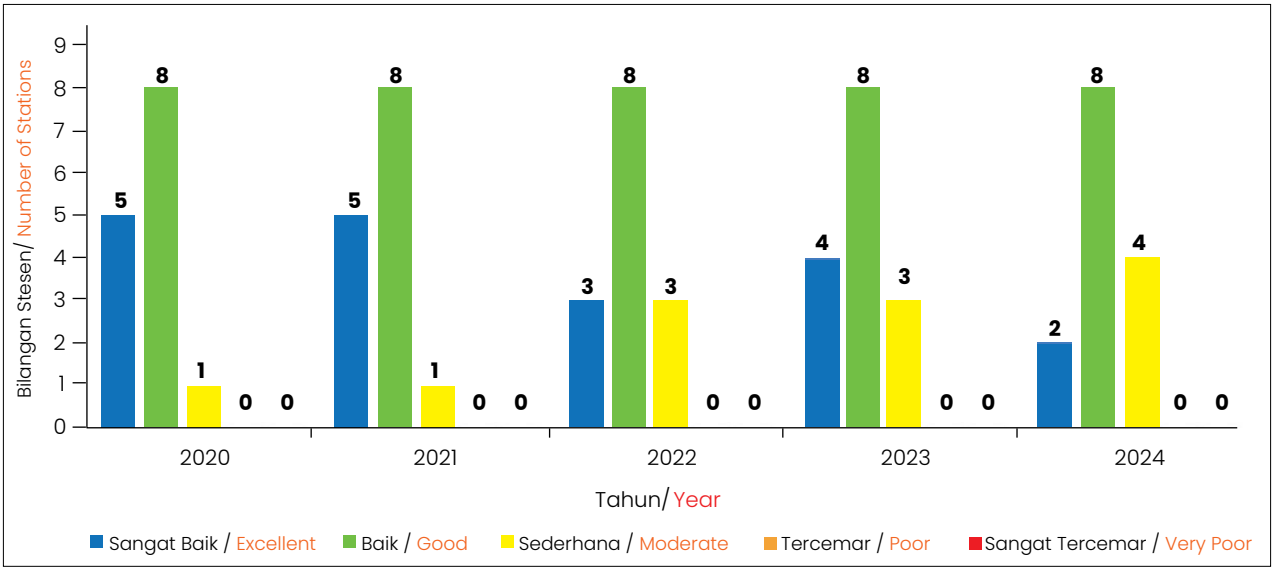
Trend IKAT mulai tahun 2020 hingga 2024 bagi kawasan pertanian adalah seperti yang ditunjukkan dalam **Rajah 3.1**. Berdasarkan **Rajah 3.1**, bilangan stesen dalam kategori sangat baik pada tahun 2024 telah menurun daripada tahun sebelumnya, manakala stesen baik kekal seperti tahun sebelumnya dan stesen sederhana meningkat dari tahun 2023. Tiada stesen tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak 15 stesen kawasan pertanian telah dipantau. Hasil program pengawasan yang telah dijalankan, dua (2) stesen (14%) dikategorikan sebagai sangat baik, lapan (8) stesen (57%) dikategorikan sebagai baik dan empat (4) stesen (29%) dikategorikan sebagai sederhana. Satu (1) stesen tiada luahan air (**Jadual 3.3**).

STATUS OF GROUNDWATER QUALITY INDEX FOR AGRICULTURE

The GWQI trend for agriculture from the year 2020 until 2024 is shown in **Figure 3.1**. Based on **Figure 3.1**, the number of stations ranked excellent in 2024 had decreased compared to the previous year, stations ranked as good maintained as the previous year, and stations ranked as moderate had increased from the year 2023. There were no stations ranked as poor and very poor in the year 2024.

In 2024, a total of 15 stations under agriculture area were monitored. The monitoring results indicated that two (2) stations were categorised as excellent (14%), eight (8) stations were good (57%), and four (4) stations were moderate (29%). There was no groundwater discharge from one (1) station (**Table 3.3**).



Rajah 3.1: Trend Indeks Kualiti Air Tanah Kawasan Pertanian, 2020-2024
Figure 3.1: Trends of Groundwater Quality Index for Agriculture, 2020-2024

Jadual 3.3: Status Indeks Kualiti Air Tanah bagi Kawasan Pertanian
Table 3.3: Status of Groundwater Quality Index for Agriculture

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perlis	Pertanian / Agriculture	Rimba Mas, Padang Besar	MW(7)-R610006-1-15.72	96	86	90	90	81	Baik/ Good
Kedah	Pertanian / Agriculture	Padang Mat Sirat, Langkawi	MW(7)-K69911-1-5.80	97	97	91	91	82	Baik/ Good
		Padang Mat Sirat, Langkawi	MW(7)-K69911-2-12.09	95	95	78	85	79	Baik/ Good
		Sek.Keb. Kepala Batas	MW(7)-R610014-2-9.34	73	91	81	77	70	Baik/ Good
Selangor	Pertanian / Agriculture	Masjid Jameul Huda, Parit 7, Sekinchan	MW(7)-B310105-1-13.70	60	63	65	64	60	Sederhana/ Moderate
Pahang	Pertanian / Agriculture	Sek. Keb. Lepar	MW(7)-C310302-1-6.64	88	90	91	91	90	Sangat Baik/ Excellent
Kelantan	Pertanian / Agriculture	Kampong Jembal Kota Bharu	MW(7)-D610214-7-7.58	82	79	79	85	86	Baik/ Good
		Sek. Keb. Beris Lalang Bachok	MW(7)-D510202-1-4.05	-	-	-	74	-	Tiada Data
Terengganu	Pertanian / Agriculture	Kg.Merang, Setiu	MW(7)-T510208-1-8.56	79	78	82	80	81	Baik/ Good
		Sek. Keb. Alor Peroi Kg. Gajah Mati	MW(7)-T510203-3-45.82	78	77	61	66	66	Sederhana/ Moderate
		Sek. Keb. Alor Peroi Kg. Gajah Mati	MW(7)-T510203-4-22.13	72	80	63	65	68	Sederhana/ Moderate
		Sek. Keb. Alor Peroi Kg. Gajah Mati	MW(7)-T510203-5-6.16	91	97	80	82	86	Baik/ Good
		Sek Keb. Telaga Hulu Terengganu	MW(7)-T510216-1-9.06	82	72	79	78	80	Baik/ Good

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Pertanian / Agriculture	Limbawang Agriculture Stesen, Beaufort	MW(7)-H511511-1-7.50	76	81	70	76	68	Sederhana/ Moderate
		Yongs Farm, Tawau	MW(7)-H411712-1-16.2	97	79	83	90	90	Sangat Baik/ Excellent

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI BANDAR DAN PINGGIR BANDAR

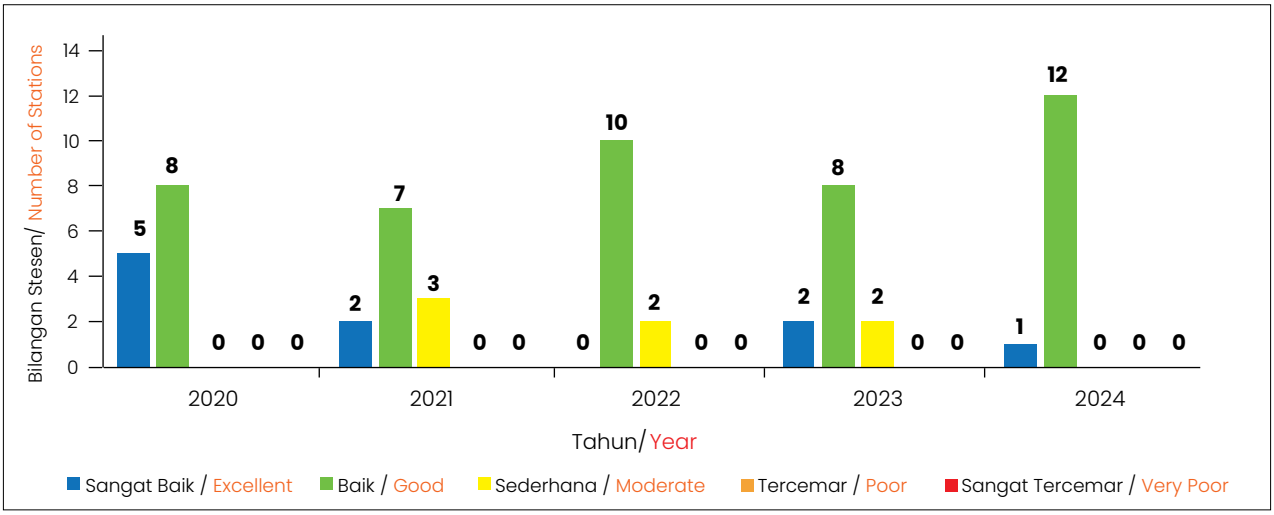
Trend IKAT pada tahun 2020 hingga 2024 bagi kawasan bandar dan pinggir bandar adalah seperti yang ditunjukkan dalam **Rajah 3.2**. Berdasarkan **Rajah 3.2**, bilangan stesen sangat baik telah menurun, manakala bilangan stesen baik meningkat jika dibandingkan dengan tahun sebelumnya. Tiada stesen dalam kategori sederhana, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak 13 stesen guna tanah bandar dan pinggir bandar telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan satu (1) stesen (8%) dikategorikan sebagai sangat baik dan 12 stesen (92%) dikategorikan sebagai baik (**Jadual 3.4**).

STATUS OF GROUNDWATER QUALITY INDEX FOR URBAN AND SUBURBAN

The GWQI trend for urban and suburban from year 2020 until 2024 is shown in **Figure 3.2**. Based on **Figure 3.2**, the number of stations ranked as excellent had decreased, while the number of stations ranked as good had increased compared to the previous year. There were no stations ranked as moderate, poor or very poor in 2024.

In 2024, a total of 13 stations under urban and suburban were monitored. The monitoring results indicated that one (1) station (8%) was categorised as excellent and 12 stations (92%) were ranked as good (**Table 3.4**).



Rajah 3.2: Trend Indeks Kualiti Air Tanah bagi Bandar dan Pinggir Bandar, 2020-2024
Figure 3.2: Trends of Groundwater Quality Index for Urban and Suburban, 2020-2024

Jadual 3.4: Status Indeks Kualiti Air Tanah bagi Bandar dan Pinggir Bandar
Table 3.4: Status of Groundwater Quality Index for Urban and Suburban

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAT /GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perlis	Bandar & Pinggir Bandar / Urban & Suburban	Arau, Perlis	MW(7)-R610010-1-5.41	75	68	68	83	70	Baik/Good
		Arau, Perlis	MW(7)-R610010-2-19.80	93	88	87	89	92	Sangat Baik/ Excellent
Kedah	Bandar & Pinggir Bandar / Urban & Suburban	Sek. Keb. Darul Uloom Kepala Batas	MW(7)-K610014-1-6.22	74	82	77	67	70	Baik/Good
Selangor	Bandar & Pinggir Bandar / Urban & Suburban	Saujana Golf Resort, Subang	MW(7)-B310115-4-5.45	78	80	78	82	87	Baik/Good
		Saujana Golf Resort, Subang	MW(7)B310115-5-12.67	97	89	83	85	89	Baik/Good
W.P. Putrajaya	Bandar & Pinggir Bandar / Urban & Suburban	Taman Wetland	MW(7)-W210103-1-10.0	80	-	-	91	77	Baik/Good
Pahang	Bandar & Pinggir Bandar / Urban & Suburban	Nenasi	MW(7)-C310314-1-45.97	93	85	88	87	85	Baik/Good
Kelantan	Bandar & Pinggir Bandar / Urban & Suburban	Sek. Men. Keb. Rantau Panjang	MW(7)-D610116-2-5.50	97	80	85	86	77	Baik/Good
		Sek. Men. Keb. Rantau Panjang	MW(7)-D610116-1-20.23	82	79	80	77	77	Baik/Good
		Sek.Men.Keb. Cherang Ruku, Pasir Puteh	MW(7)-D510202-1-7.96	88	68	76	76	80	Baik/Good
Terengganu	Bandar & Pinggir Bandar / Urban & Suburban	Kg. Raja, Besut	MW(7)-T510203-1-7.25	88	96	76	82	87	Baik/Good
		Kg. Raja, Besut	MW(7)-T510203-2-31.79	73	64	64	67	70	Baik/Good
Sabah	Bandar & Pinggir Bandar / Urban & Suburban	Sek. Keb. Inanam	MW(7)-H511601-8-7.50	91	92	84	90	74	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI TAPAK PERINDUSTRIAN

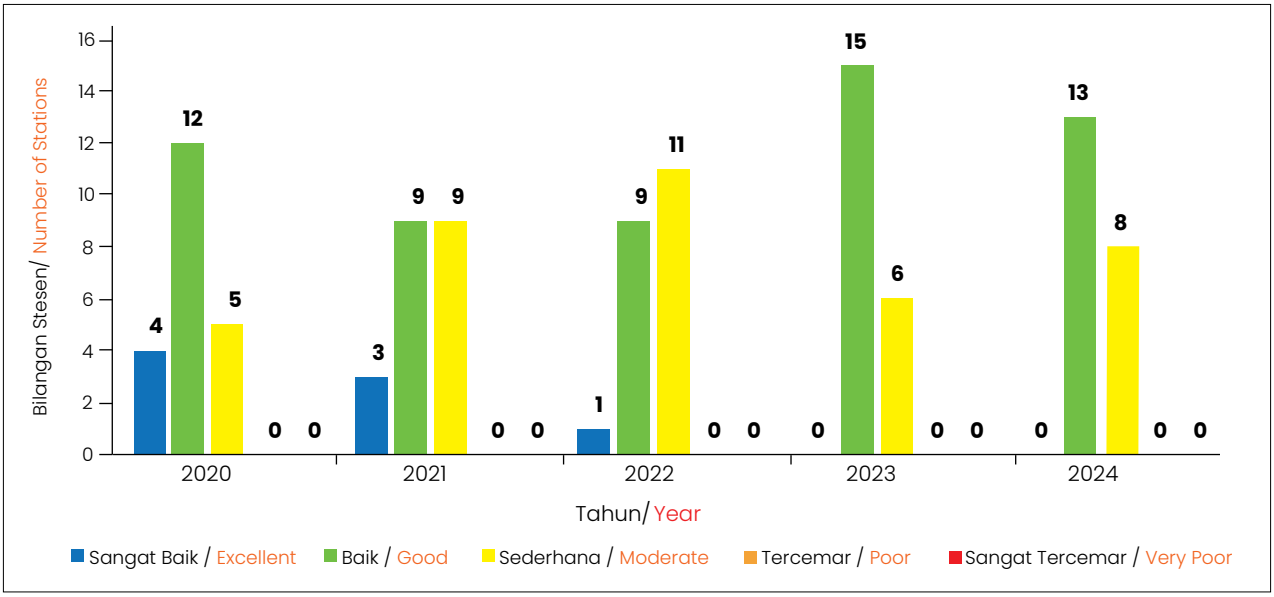
Trend IKAT mulai tahun 2020 hingga 2024 bagi tapak perindustrian adalah seperti yang ditunjukkan dalam **Rajah 3.3**. Berdasarkan **Rajah 3.3**, bilangan stesen baik telah menurun dan bilangan stesen sederhana meningkat berbanding tahun sebelumnya. Tiada stesen berada dalam kategori sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak 22 stesen tapak perindustrian telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan 13 stesen (62%) dikategorikan sebagai baik dan lapan (8) stesen (38%) dikategorikan sebagai sederhana. Satu (1) stesen telah ditutup (**Jadual 3.5**).

STATUS OF GROUNDWATER QUALITY INDEX FOR INDUSTRIAL SITES

The GWQI trend for industrial sites from year 2020 until 2024 is shown in **Figure 3.3**. Based on **Figure 3.3**, the number of stations ranked as excellent had decreased, while the good category had increased compared to the previous year. No station was categorised as poor or very poor in the year 2024.

In 2024, a total of 22 stations for industrial sites were monitored. The monitoring result indicates that 13 stations (62%) were categorised as good, and eight (8) stations (38%) were categorised as moderate. One (1) station has been closed (**Table 3.5**).



Rajah 3.3: Trend Indeks Kualiti Air Tanah bagi Tapak Perindustrian, 2020 - 2024
Figure 3.3: Trends of Groundwater Quality Index for Industrial Sites, 2020 -2024

Jadual 3.5: Status Indeks Kualiti Air Tanah bagi Tapak Perindustrian
Table 3.5: Status of Groundwater Quality Index for Industrial Sites

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perlis	Tapak Perindustrian / Industrial Sites	Felda Chuping	MW(7)-R610006-2-7.32	90	76	84	84	-	Stesen ditutup/ Station Closed
Kedah	Tapak Perindustrian / Industrial Sites	Kulim Hi-Tech	MW(7)-K510011-1-8.45	72	82	76	73	64	Sederhana/ Moderate
P. Pinang	Tapak Perindustrian / Industrial Sites	Mak Mandin (MAGRI)	MW(7)-P510010-1-4.50	78	78	65	70	70	Baik/Good
		Mak Mandin (KASTAM)	MW(7)-P510010-2-6.50	79	84	74	75	77	Baik/Good
		Bayan Lepas	MW(7)-P510010-3-4.34	98	95	77	78	76	Baik/Good
Selangor	Tapak Perindustrian / Industrial Sites	Sek Keb. Seksyen 20, Shah Alam	MW(7)-B310115-1-8.20	73	62	75	65	76	Baik/Good
		CIAST, Seksyen 19, Shah Alam	MW(7)-B310115-2-20.21	81	66	78	70	72	Baik/Good
		CIAST, Seksyen 19, Shah Alam	MW(7)-B310115-3-5.97	78	53	68	67	71	Baik/Good
N. Sembilan	Tapak Perindustrian / Industrial Sites	Senawang Edible Oil	MW(7)-N210108-1-6.44	65	72	66	71	71	Baik/Good
Melaka	Tapak Perindustrian / Industrial Sites	Petronas Oil Refinery, Melaka	MW(7)-M210209-1-8.10	64	82	64	64	65	Sederhana/ Moderate
Johor	Tapak Perindustrian / Industrial Sites	Tg. Puteri, Pasir Gudang	MW(7)-J110312-2-7.34	85	90	91	80	84	Baik/Good
		Tg. Puteri, Pasir Gudang	MW(7)-J110312-3-7.49	60	48	64	63	67	Sederhana/ Moderate
Pahang	Tapak Perindustrian / Industrial Sites	LYNAS, Gebeng	MW(7)-C310302-1-6.50	62	77	68	65	67	Sederhana/ Moderate

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kelantan	Tapak Perindustrian / Industrial Sites	Eastern Garment Manufacturing, Pengkalan Chepa	MW(7)-D610214-4-51.38	71	57	67	84	69	Sederhana/ Moderate
		Eastern Garment Manufacturing, Pengkalan Chepa	MW(7)-D610214-3-4.24	71	68	81	82	86	Baik/Good
Terengganu	Tapak Perindustrian / Industrial Sites	TCOT Kerteh, Kemaman	MW(7)-T410306-1-5.68	97	80	84	86	82	Baik/Good
		TCOT Kerteh, Kemaman	MW(7)-T410306-2-24.89	82	65	68	70	65	Sederhana/ Moderate
		KSB Telok Kalong, Kemaman	MW(7)-T410310-1-5.57	82	64	69	70	68	Sederhana/ Moderate
		KSB Telok Kalong, Kemaman	MW(7)-T410310-2-18.76	69	60	66	67	63	Sederhana/ Moderate
		Sek. Keb. Bari Pantai, Setiu	MW(7)-T510208-1-7.86	78	78	78	84	86	Baik/Good
Perak	Tapak Perindustrian / Industrial Sites	Pusat Kecemerlangan, Gopeng, Perak	MW(7)-A410109-2-11.95	-	-	-	-	87	Baik/Good
W.P. Labuan	Tapak Perindustrian / Industrial Sites	Asian Supply Base W. P. Labuan	MW(7)-L511510-1-6.80	94	91	69	80	84	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI BEKAS TAPAK PELUPUSAN SAMPAH

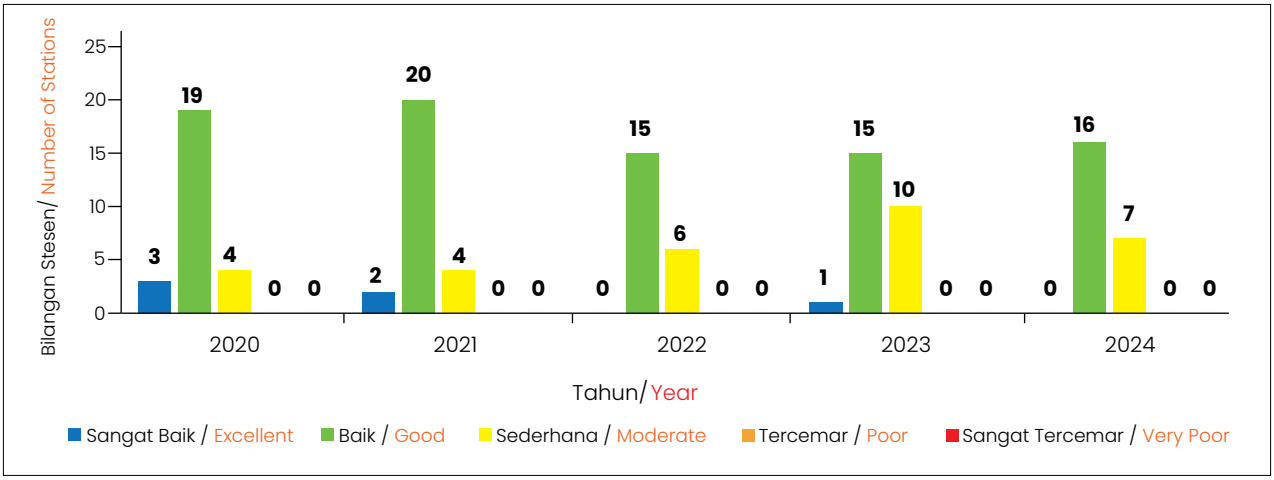
Trend IKAT mulai tahun 2020 hingga 2024 bagi bekas tapak pelupusan sampah adalah seperti yang ditunjukkan dalam **Rajah 3.4**. Berdasarkan **Rajah 3.4**, bilangan stesen sangat baik dan sederhana telah menurun, manakala bilangan stesen baik meningkat dari tahun sebelumnya. Tiada stesen sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak 26 stesen bekas tapak pelupusan sampah telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan 16 stesen (70%) dikategorikan sebagai baik dan tujuh (7) stesen (30%) dikategorikan sebagai sederhana. Tiga (3) stesen tidak dapat dijalankan persampelan atas faktor keselamatan dan tiada akses masuk (**Jadual 3.6**).

STATUS OF GROUNDWATER QUALITY INDEX FOR USED SOLID WASTE LANDFILLS

The GWQI trend from 2020 to 2024 for used solid waste landfills is shown in **Figure 3.4**. Based on **Figure 3.4**, the number of stations ranked as excellent and moderate decreased, while the number of stations ranked as good increased from the previous year. There were no stations ranked excellent, poor or very poor in 2024.

In 2024, a total of 26 stations for used solid waste landfills were monitored. The results of the monitoring programme conducted showed that 16 stations (70%) were categorised as good and seven (7) stations (30%) were categorised as moderate. Three (3) stations could not be sampled due to safety factors and no access to enter (**Table 3.6**).



Rajah 3.4: Trend Indeks Kualiti Air Tanah bagi Bekas Tapak Pelupusan Sampah, 2020 -2024
Figure 3.4: Trends of Groundwater Quality Index for Used Solid Waste Landfills, 2020 -2024

Jadual 3.6: Status Indeks Kualiti Air Tanah bagi Guna Tanah Bekas Tapak Pelupusan Sampah
Table 3.6: Status of Groundwater Quality Index of Used Solid Waste Landfills

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT / GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Pusing, Batu Gajah	MW(7)-A410109-1-6.05	73	79	67	68	62	Sederhana/ Moderate
W.P. Kuala Lumpur	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Jalan Sg. Besi	MW(7)-W310115-1-5.50	79	64	-	61	-	Tiada Data
		Jalan Sg. Besi	MW(7)-W310115-2-5.54	74	73	-	69	83	Baik/Good
		Jalan Sg. Besi	MW(7)-W310115-3-5.57	74	82	-	70	83	Baik/Good
		Taman Beringin, Kepong	MW(7)-W310115-4-7.26	84	73	-	89	88	Baik/Good
		Taman Beringin, Kepong	MW(7)-W310115-5-6.10	75	77	-	69	66	Sederhana/ Moderate
N. Sembilan	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Kualiti Alam	MW(7)-N210108-2-8.00	79	83	81	91	77	Baik/Good
		Kualiti Alam	MW(7)-N210108-3-7.55	64	82	70	75	64	Sederhana/ Moderate
		TPS Tanah Merah (CYPARK), Port Dickson	MW(7)-N210108-2-10.03	70	71	66	73	73	Baik/Good
Melaka	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Tapak Pelupusan Sampah, Sungai Udang	MW(7)-M210209-1-7.68	75	56	64	64	64	Sederhana/ Moderate
Johor	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Kg. Batu 4, Kota Tinggi	MW(7)J110304-1-6.94	89	61	73	76	76	Baik/Good
		Tapak Pelupusan Sisa Pepejal, Ladang CEP, Simpang Renggam	MW(7)-J110302-1-7.02	63	64	72	69	71	Baik/Good

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT / GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kelantan	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Panji Landfill, Panji Kota Bharu	MW(7)-D610214-5-13.43	82	73	86	85	83	Baik/Good
		Panji Landfill, Panji Kota Bharu	MW(7)-D610214-6-5.34	82	73	74	83	86	Baik/Good
		Pasir Mas Landfill, Kg.Pusu 40, Pasir Mas	MW(7)D510201-1-5.22	94	72	76	82	72	Baik/Good
Terengganu	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Kg. Kubang Badak, K.Terengganu	MW(7)-T510309-1-5.45	98	75	74	85	-	Tiada Data
		Kg. Kubang Badak, K.Terengganu	MW(7)-T510309-2-22.89	97	76	73	77	-	Tiada Data
Sabah	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	IATC, Kg. Duvanson, Penampang	MW(7)-H511601-1-8.80	82	82	77	64	64	Sederhana/ Moderate
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-2-14.00	82	82	70	72	65	Sederhana/ Moderate
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-3-8.00	85	85	75	71	80	Baik/Good
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-4-17.35	85	84	72	74	74	Baik/Good
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-5-19.00	80	80	69	69	68	Sederhana/ Moderate
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-6-10.20	80	96	69	64	71	Baik/Good
		IATC, Kg. Duvanson, Penampang	MW(7)-H511601-7-10.30	82	97	84	82	80	Baik/Good
Sarawak	Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	Kemuyang, No.1	MW(7)-Q211112-1-11.10	53	84	61	63	72	Baik/Good
		Kemuyang, No.2	MW(7)-Q211112-2-10.78	69	83	70	70	72	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI PADANG GOLF

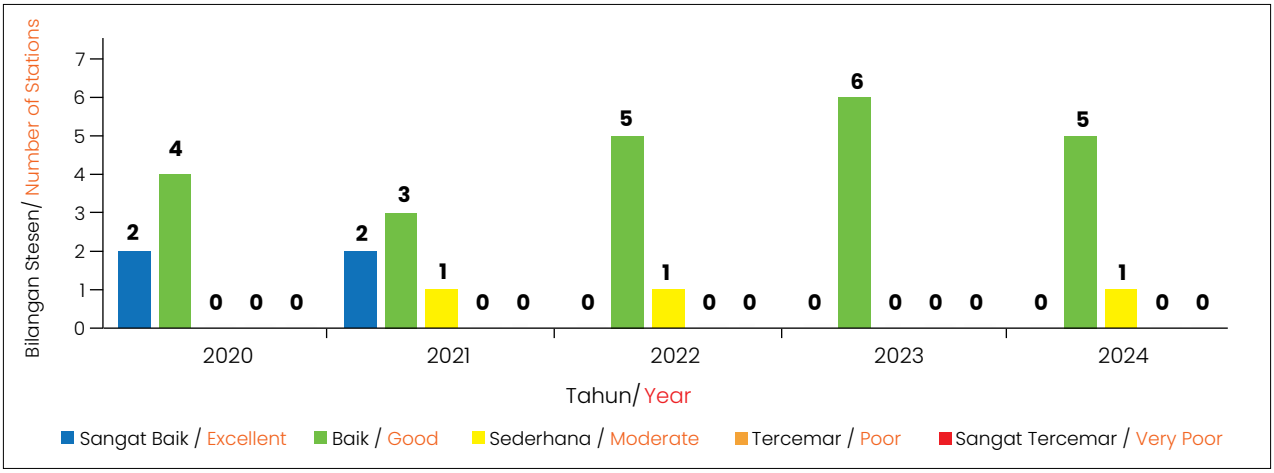
Trend IKAT mulai tahun 2020 hingga 2024 bagi padang golf adalah seperti yang ditunjukkan dalam **Rajah 3.5**. Berdasarkan **Rajah 3.5**, bilangan stesen dalam kategori baik telah menurun berbanding tahun sebelumnya. Tiada stesen dalam kategori sangat baik, tercemar dan sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak tujuh (7) stesen telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan lima (5) stesen (83%) dikategorikan sebagai baik dan satu (1) stesen (17%) dikategorikan sebagai sederhana. Satu (1) stesen tiada luahan air (**Jadual 3.7**).

STATUS OF GROUNDWATER QUALITY INDEX OF GOLF COURSES

The GWQI trend from 2020 to 2024 for golf courses is as shown in **Figure 3.5**. Based on **Figure 3.5**, the number of stations under the good category in 2024 decreased compared to the previous year. No station was categorised as excellent, poor and very poor category in the year 2024.

In the year 2024, seven (7) stations were monitored. The monitoring results indicate that all five (5) stations (83%) were categorised as good, and one (1) station was categorised as moderate. There was no groundwater discharge from one (1) station (**Table 3.7**).



Rajah 3.5: Trend Indeks Kualiti Air Tanah bagi Padang Golf, 2020 -2024
Figure 3.5: Trends of Groundwater Quality Index for Golf Courses, 2020 -2024

Jadual 3.7: Status Indeks Kualiti Air Tanah bagi Padang Golf
Table 3.7: Status of Groundwater Quality Index for Golf Courses

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT / GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
W.P. Kuala Lumpur	Padang Golf / Golf Course	Royal Selangor Golf Club	MW(7)-D610214-2-6.90	-	-	-	-	-	Tiada Data / No Data
Kelantan	Padang Golf / Golf Course	Kelab Golf & Desa Pengkalan Chepa	MW(7)-D610214-1-6.37	82	79	86	86	79	Baik / Good
		Kelab Golf & Desa Pengkalan Chepa	MW(7)-D610214-8-31.29	71	62	82	86	76	Baik / Good
		Kelab Golf D'Raja Kubang Kerian	MW(7)-D610214-9-9.05	82	75	64	83	70	Baik / Good
		Kelab Golf D'Raja Kubang Kerian	MW(7)-H511801-1-8.82	81	90	76	83	82	Baik / Good
Sabah	Padang Golf / Golf Course	Sandakan Golf Club, Sandakan	MW(7)-H511801-2-8.60	96	81	76	71	64	Sederhana/ Moderate
		Sandakan Golf Club, Sandakan	MW(7)-D610214-2-6.90	95	95	78	89	81	Baik / Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI LUAR BANDAR

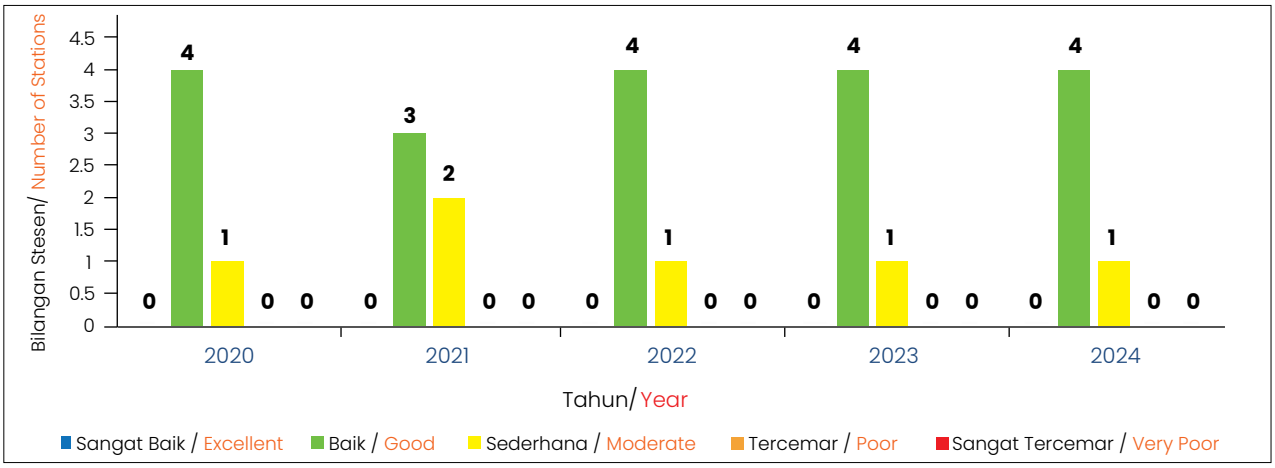
Trend IKAT mulai tahun 2020 hingga 2024 bagi kawasan luar bandar adalah seperti yang ditunjukkan dalam **Rajah 3.6**. Berdasarkan **Rajah 3.6**, bilangan stesen baik dan sederhana adalah sama seperti tahun sebelumnya. Tiada stesen dalam kategori sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak lima (5) stesen kawasan luar bandar telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan empat (4) stesen (80%) dikategorikan sebagai baik dan satu (1) stesen (20%) dikategorikan sebagai sederhana (**Jadual 3.8**).

STATUS OF GROUNDWATER QUALITY INDEX FOR RURAL

GWQI trend for rural area from the year 2020 until 2024 is shown in **Figure 3.6**. Based on **Figure 3.6**, the number of stations under the category of good and moderate were the same as the previous year. No station was categorised as excellent, poor or very poor in the year 2024.

In 2024, a total of five (5) stations under rural areas were monitored. The monitoring results indicate that four (4) stations (80%) were categorised as good, and one (1) station (20%) was categorised as moderate (**Table 3.8**).



Rajah 3.6: Trend Indeks Kualiti Air Tanah bagi Luar Bandar, 2020 -2024
Figure 3.6: Trends of Groundwater Quality Index for Rural, 2020 -2024

Jadual 3.8: Status Indeks Kualiti Air Tanah bagi Luar Bandar
Table 3.8: Status of Groundwater Quality Index for Rural

NEGERI/ STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kelantan	Luar Bandar / Rural Areas	Sek. Keb. Jelawat Bachok	MW(7)-D610214-10-6.10	79	73	84	78	81	Baik/Good
		Sek. Men. Keb. Jelawat Bachok	MW(7)-D610213-1-5.09	81	58	79	81	70	Baik/Good
Selangor	Luar Bandar / Rural Areas	Institut Alam Sekitar, Malaysia EiMAS, UKM Bangi	MW(7)-B210104-1-20.40	85	76	73	88	88	Baik/Good
Melaka	Luar Bandar / Rural Areas	Pusat Kecemerlangan Buangan Terjadual, JAS Taboh Naning	MW(7)-M210209-2-21.10	42	63	45	50	55	Sederhana/ Moderate
Terengganu	Luar Bandar / Rural Areas	Kg.Padang Pak Wan, Bkt. Payung, Marang	MW(7)-T510313-1-6.99	88	79	85	84	81	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI BEKAS LOMBONG EMAS

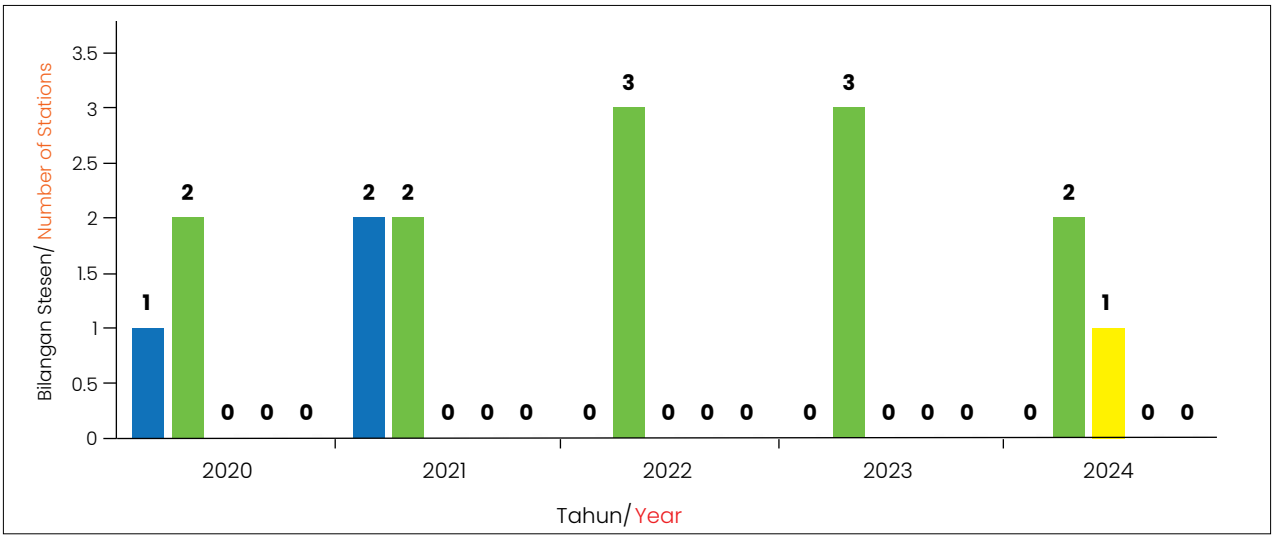
Trend IKAT mulai tahun 2020 hingga 2024 bagi bekas lombong emas adalah seperti yang ditunjukkan dalam **Rajah 3.7**. Berdasarkan **Rajah 3.7**, bilangan stesen baik telah menurun dari tahun sebelumnya. Tiada stesen yang berada dalam kategori sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak tiga (3) stesen bekas lombong emas telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan dua (2) stesen (67%) dikategorikan sebagai baik dan (1) stesen (33%) dikategorikan sebagai sederhana (**Jadual 3.9**).

STATUS OF GROUNDWATER QUALITY INDEX FOR USED GOLD MINE

GWQI trend for used gold mine from the year 2020 until 2024 is shown in **Figure 3.7**. Based on **Figure 3.7,** the number of stations ranked in good category in 2024 decreased compared to the previous year. No station was categorised as excellent, poor or very poor in the year 2024.

In 2024, a total of three (3) stations for used gold mines were monitored. The monitoring results indicate that two (2) stations (67%) were categorised as good and one (1) station (33%) was categorised as moderate (**Table 3.9**).



Rajah 3.7: Trend Indeks Kualiti Air Tanah bagi Bekas Lombong Emas, 2020 -2024
Figure 3.7: Trends of Groundwater Quality Index for Used Gold Mine, 2020 -2024

Jadual 3.9: Status Indeks Kualiti Air Tanah bagi Bekas Lombong Emas
Jadual 3.9: Status of Groundwater Quality Index for Used Gold Mine

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Bekas Lombong Emas / Used Gold Mine	Bau, No. 1	MW(7)-Q111009-1-27.27	88	92	87	71	76	Baik/Good
		Bau, No. 2	MW(7)-Q111009-2-29.50	93	87	84	70	69	Sederhana/ Moderate
		Bau	MW(7)-Q111009-3-29.00	82	82	87	70	70	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI BEKALAN AIR

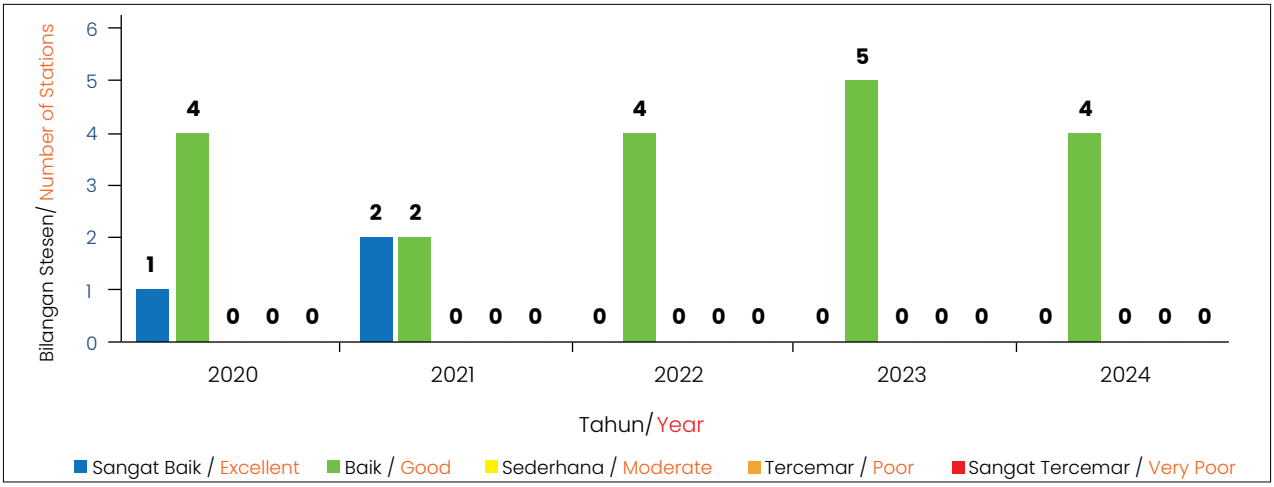
Trend IKAT pada tahun 2020 hingga 2024 bagi bekalan air adalah seperti yang ditunjukkan dalam **Rajah 3.8**. Berdasarkan **Rajah 3.8**, bilangan stesen bagi kategori baik menurun berbanding tahun sebelumnya. Tiada stesen dalam kategori sangat baik, sederhana, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak lima (5) stesen bekalan air telah dipantau. Hasil program pengawasan yang telah dijalankan menunjukkan empat (4) stesen (100%) dikategorikan sebagai baik. Satu (1) stesen tidak dijalankan persampelan atas faktor keselamatan (**Jadual 3.10**).

STATUS OF GROUNDWATER QUALITY INDEX FOR WATER SUPPLY

GWQI trend for water supply from the year 2020 until 2024 is shown in **Figure 3.8**. Based on **Figure 3.8**, the number of stations categorised as good had decreased compared to the previous year. No stations were categorised under excellent, moderate, poor or very poor in the year 2024.

In 2024, a total of five (5) stations for water supply were monitored. The monitoring results indicate that four (4) stations (100%) were categorised as good. One (1) station was not sampled due to safety factors (**Table 3.10**).



Rajah 3.8: Trend Indeks Kualiti Air Tanah bagi Bekalan Air, 2020 -2024
Figure 3.8: Trends of Groundwater Quality Index for Water Supply, 2020 -2024

Jadual 3.10: Status Indeks Kualiti Air Tanah bagi Bekalan Air
Table 3.10: Status of Groundwater Quality Index for Water Supply

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Bekalan Air Tempatan/ Municipal Water Supply	Kg. Tajau Laut, Kudat	MW(7)-H611604-1-4.5	88	97	77	88	81	Baik/Good
Sarawak	Bekalan Air Tempatan / Municipal Water Supply	Kabong, No. 1	MW(7)-Q111101-1-6.70	70	79	70	70	73	Baik/Good
		Pusat Rawatan Air.JKR, No. 1, Miri	MW(7)-Q411501-1-7.53	99	-	-	71	70	Baik/Good
		LAKU (Lambir), No. 1, Miri	MW(7)-Q411409-1-30.50	83	93	80	81	-	Tiada Data
		Kg. Lusut Kiri, No. 3, Miri	MW(7)-Q411312-1-28.30	87	76	70	70	74	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI BEKAS TAPAK PELUPUSAN BANGKAI HAIWAN

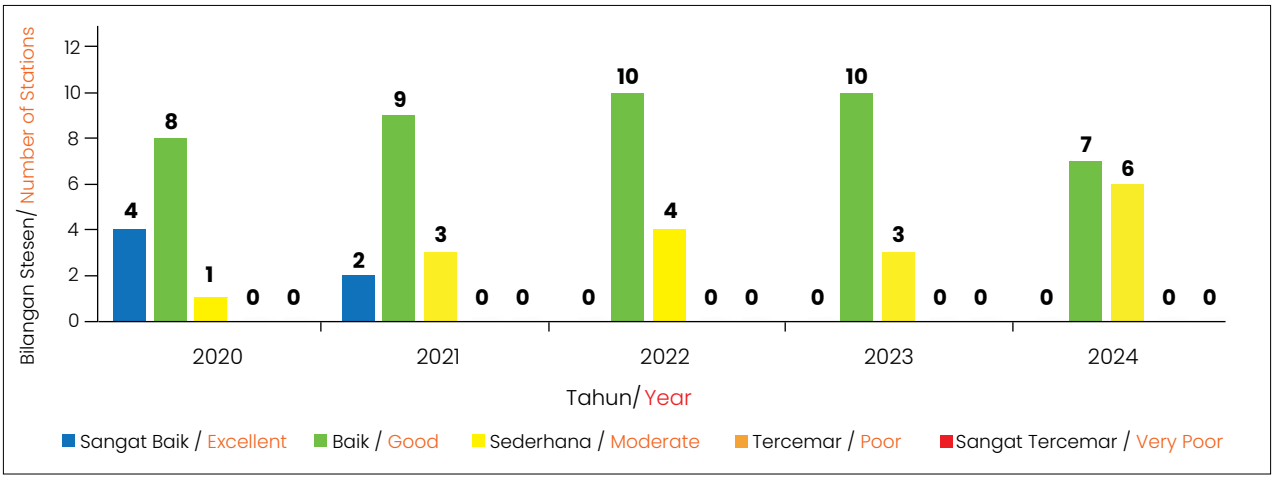
Trend IKAT pada tahun 2020 hingga 2024 bagi bekas tapak pelupusan bangkai haiwan adalah seperti yang ditunjukkan dalam **Rajah 3.9**. Berdasarkan **Rajah 3.9**, bilangan stesen dalam kategori baik telah menurun berbanding tahun sebelumnya, manakala bilangan stesen sederhana meningkat daripada tahun sebelumnya. Tiada stesen dalam kategori sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak 14 stesen yang dipantau. Berdasarkan **Jadual 3.11**, tujuh (7) stesen (54%) dikategorikan sebagai baik dan enam (6) stesen (46%) dikategorikan sebagai sederhana. Satu (1) stesen tiada akses masuk (**Jadual 3.11**).

STATUS OF GROUNDWATER QUALITY INDEX FOR USED ANIMAL BURIAL SITES

GWQI trend for used animal burial sites from the year 2020 until 2024 is shown in **Figure 3.9**. Based on **Figure 3.9**, the number of stations categorised as good had decreased compared to the previous year while stations in the moderate category increased from the previous year. No stations were in the excellent, poor or very poor categories in the year 2024

In the year 2024, 14 stations were monitored. Based on Table 3.11, seven (7) stations (54%) were categorised as good, and six (6) stations (46%) were categorised as moderate. No access permission for one (1) station (**Table 3.11**).



Rajah 3.9: Trend Indeks Kualiti Air Tanah bagi Bekas Tapak Pelupusan Bangkai Haiwan, 2020-2024
Figure 3.9: Trends of Groundwater Quality Index for Used Animal Burial Sites, 2020 -2024

Jadual 3.11: Status indeks Kualiti Air Tanah bagi Bekas Tapak Pelupusan Bangkai Haiwan
Table 3.11: Status of Groundwater Quality Index for Used Animal Burial Sites

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perak	Bekas Tapak Pelupusan Bangkai Haiwan/ Used Animal Burial Sites	Tapak Bazar Seramik Tambun	MW(7)-A410105-1-5.92	78	73	67	69	68	Sederhana/ Moderate
		Tapak Bekas Wabak JE Jalong	MW(7)-A410101-1-3.14	-	88	73	85	68	Sederhana/ Moderate
		Tapak Bekas Wabak JE Jalong	MW(7)-A410101-2-7.65	87	84	74	75	80	Baik/ Good
P. Pinang	Bekas Tapak Pelupusan Bangkai Haiwan / Used Animal Burial Sites	Perkampungan Ldg Valdor (Kelapa)	MW(7)-P510010-4-7.45	96	93	72	72	76	Baik/ Good
		Perkampungan Ldg Valdor (Tengah)	MW(7)-P510010-5-6.78	90	92	75	74	68	Sederhana/ Moderate
		Perkampungan Ldg Valdor (Jalan)	MW(7)-P510010-6-7.30	90	81	74	64	64	Sederhana/ Moderate
Johor	Bekas Tapak Pelupusan Bangkai Haiwan / Used Animal Burial Sites	Ulu Choh (Pintu)	MW(7)-J110307-1-6.90	73	81	63	68	64	Sederhana/ Moderate
		Ulu Choh (Kolam)	MW(7)-J110311-2-6.10	70	62	71	74	68	Sederhana/ Moderate
		Ulu Choh (Sungai)	MW(7)-J110311-3-6.71	83	82	69	85	79	Baik/ Good
Selangor	Bekas Tapak Pelupusan Bangkai Haiwan / Used Animal Burial Sites	Stesen Kg. Sg. Keroh, Sepang	MW(7)-B210107-1-5.67	52	62	62	-	-	Tiada Data
		TNB Sepang	MW(7)-B210107-2-6.95	96	68	76	80	72	Baik/ Good
		Ladang Sepang	MW(7)-B210107-3-5.60	87	72	77	81	85	Baik/ Good
Sarawak	Bekas Tapak Pelupusan Bangkai Haiwan/ Used Animal Burial Sites	Oya Road, No. 1, Sibu	MW(7)-Q211209-1-10.00	79	89	71	70	72	Baik/ Good
		Oya Road, No. 2, Sibu	MW(7)-Q211209-2-9.17	83	82	72	76	81	Baik/ Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI AKUAKULTUR

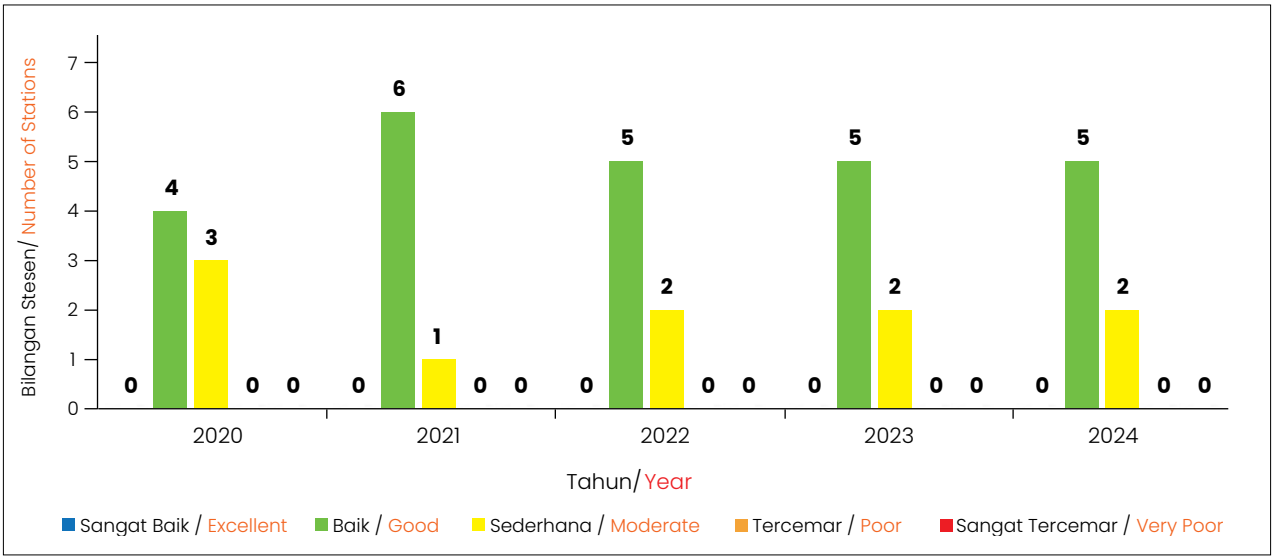
Trend IKAT pada tahun 2020 hingga 2024 bagi akuakultur adalah seperti yang ditunjukkan dalam **Rajah 3.10**. Berdasarkan **Rajah 3.10**, bilangan stesen yang dikategorikan sebagai baik dan sederhana adalah sama seperti tahun sebelumnya. Tiada stesen dalam kategori sangat baik, tercemar atau sangat tercemar pada tahun 2024.

Pada tahun 2024, sebanyak tujuh (7) stesen bagi akuakultur telah dipantau. Hasil program pengawasan yang telah dijalankan, lima (5) stesen (71%) dikategorikan sebagai baik, manakala dua (2) stesen (29%) dikategorikan sebagai sederhana (**Jadual 3.12**).

STATUS GROUNDWATER QUALITY FOR AQUACULTURE

GWQI trend for aquaculture from the year 2020 until 2024 is shown in **Figure 3.10**. Based on **Figure 3.10**, the number of stations categorised as good and moderate was the same from the previous year. No stations were in excellent, poor or very poor categories in 2024

In 2024, a total of seven (7) stations for aquaculture were monitored. The monitoring results indicate that five (5) stations (71%) were categorised as good, while two (2) stations (29%) were categorised as moderate (**Table 3.12**).



Rajah 3.10: Trend Indeks Kualiti Air Tanah bagi Akuakultur, 2020-2024
Figure 3.10: Trends of Groundwater Quality Index for Aquaculture, 2020 -2024

Ladang Ikan Terapung, Pulau Langkawi

Jadual 3.12: Status Indeks Kualiti Air Tanah bagi Akuakultur
Table 3.12: Status of Groundwater Quality Index for Aquaculture

NEGERI / STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Akuakultur / Aquaculture	Nenasi (Agrobest)	MW(7)-C310310-1-10.5	61	79	68	66	61	Sederhana/ Moderate
		Nenasi (Agrobest)	MW(7)-C310314-4-43	74	79	73	73	72	Baik/Good
		Nenasi (Agrobest)	MW(7)-C310314-5-38	76	82	76	74	71	Baik/Good
		Nenasi (Agrobest)	MW(7)-C310314-3-10	58	76	73	74	76	Baik/Good
		Nenasi (Agrobest)	MW(7)-C310314-6-10	82	82	76	89	73	Baik/Good
		Nenasi (Agrobest)	MW(7)C310314-2-7.29	80	86	80	78	73	Baik/Good
Terengganu	Akuakultur / Aquaculture	Blue Archipelago (i-Sharp, Setiu)	MW(7)-T510208-2-14.00	68	59	61	64	62	Sederhana/ Moderate

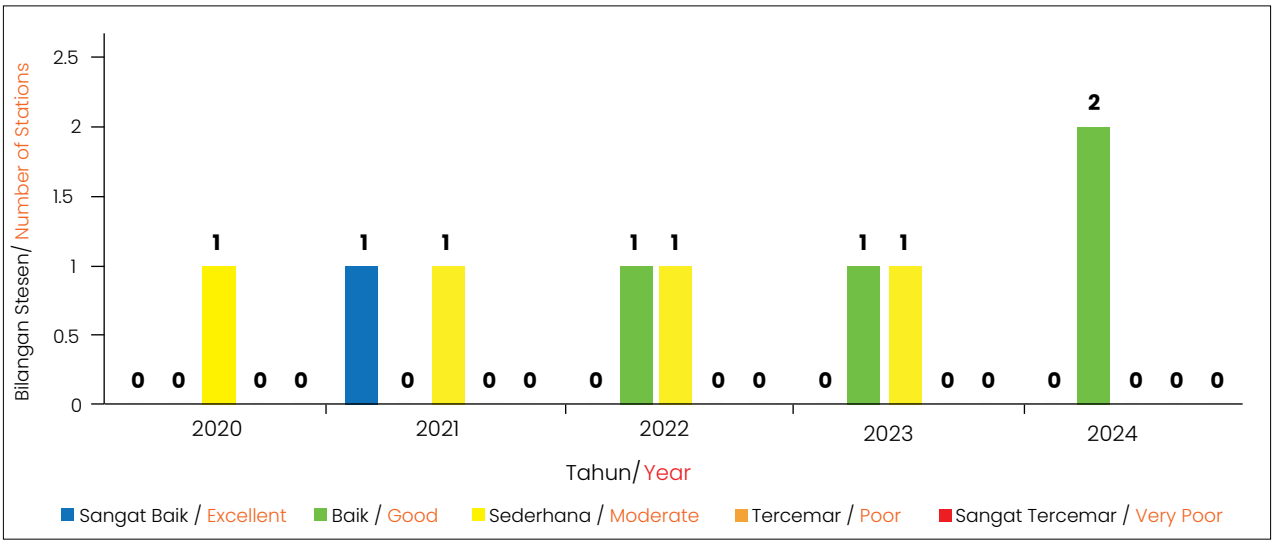
Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

STATUS KUALITI AIR TANAH BAGI KAWASAN PERANGINAN

Trend IKAT pada tahun 2020 hingga 2024 bagi kawasan peranginan adalah seperti yang ditunjukkan dalam **Rajah 3.11**. Berdasarkan **Rajah 3.11**, bilangan stesen dalam kategori baik meningkat berbanding tahun sebelumnya. Tiada stesen dalam kategori sangat baik, sederhana, tercemar atau sangat tercemar.

STATUS OF GROUNDWATER QUALITY INDEX FOR RESORTS

GWQI trend from 2020 to 2024 for resorts is shown in **Figure 3.11**. Based on **Figure 3.11**, the number of stations categorised as good increased compared to the previous year. There were no stations in the excellent, moderate, poor or very poor categories.



Rajah 3.11: Trend Indeks Kualiti Air Tanah bagi Kawasan Peranginan, 2020 -2024
Figure 3.11: Trends of Groundwater Quality Index for Resorts, 2020 -2024

Pada tahun 2024, sebanyak dua (2) stesen bagi kawasan peranginan telah dipantau. Hasil program pengawasan yang telah dijalankan, dua (2) stesen (100%) dikategorikan sebagai baik (**Jadual 3.13**).

In 2024, a total of two (2) stations for resorts were monitored. As a result of the monitoring programme conducted, two (2) stations (100%) were categorised as good (**Table 3.13**).

Jadual 3.13: Status Indeks Kualiti Air Tanah bagi Kawasan Peranginan
Table 3.13: Status of Groundwater Quality Index for Resorts

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	KAWASAN / AREA	NOMBOR STESEN / STATION NUMBER	NILAI IKAT/ GWQI VALUE					KATEGORI (2024) / CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Kawasan Peranginan / Resort	Pulau Manukan	MW(7)-H511601-9-6.50	-	95	82	74	73	Baik/Good
Kedah	Kawasan Peranginan / Resort	Kuarters Imigresen Tanjung Rhu, Langkawi	MW(7)-KV69912-1-10.10	57	79	65	60	73	Baik/Good

Nota / Note:
- Tiada Data / No Data
i. Tiada Air / No Water
ii. Stesen Rosak / Destroyed Station

Jadual 3.14 menunjukkan Standard Kualiti Air Tanah bagi Rawatan Air Mentah Secara Konvensional (Air Minuman) Merujuk kepada Parameter Utama dalam Penilaian Status Kualiti Air Tanah.

Table 3.14 shows the Groundwater Quality Standards for Conventional Treatment of Raw Water (Drinking Water) with Reference to Significant Parameters in Assessing Groundwater Quality Status.

Jadual 3.14: Standard Kualiti Air Tanah bagi Rawatan Air Mentah Secara Konvensional (Air Minuman) Merujuk kepada Parameter Utama dalam Penilaian Status Kualiti Air Tanah
Table 3.14: Groundwater Quality Standards for Conventional Treatment of Raw Water (Drinking Water) with Reference to Significant Parameters in Assessing Groundwater Quality Status

PARAMETER / PARAMETER	SIMBOL / SYMBOL	STANDARD / STANDARD	UNIT / UNIT
Jumlah Koliform / Total coliform	–	5000	MPN/100 ml
Pepejal Terlarut / TDS	–	1500	mg/l
Klorida / Chloride	Cl	250	mg/l
Besi / Iron	Fe	1.0	mg/l
Keliatan / Hardness	$CaCO_3$	500	mg/l
Mangan / Manganese	Mn	0.2	mg/l
Nitrat / Nitrate	NO_3	10	mg/l
Raksa / Mercury	Hg	0.001	mg/l
Kadmium / Cadmium	Cd	0.003	mg/l
Arsenik / Arsenic	As	0.01	mg/l
Plumbum / Lead	Pb	0.05	mg/l
Kromium / Chromium	Cr	0.05	mg/l
Kuprum / Copper	Cu	1.0	mg/l
Zink / Zinc	Zn	3.0	mg/l
Sulfat / Sulphate	SO_4^{2-}	250	mg/l
Selenium / Selenium	Se	0.01	mg/l
Fenol / Phenol	–	0.002	mg/l

STATUS PEMATUHAN AIR TANAH MENGIKUT PARAMETER UTAMA

Penilaian terhadap kualiti air tanah adalah berdasarkan kepada nilai peratusan yang melebihi had penerimaan dalam Standard Kebangsaan Bagi Standard Kualiti Air Tanah Bagi Rawatan Air Mentah Secara Konvensional (Air Minuman).

Nilai peratusan tersebut ditunjukkan di dalam **Jadual 3.15**.

GROUNDWATER COMPLIANCE STATUS ACCORDING TO KEY PARAMETERS

The assessment of groundwater quality is based on the percentage value that exceeds the acceptance limit in the National Standards for Groundwater Quality Standards for Conventional Raw Water Treatment (Drinking Water).

The value of the percentage is shown in the **Table 3.15**.

Jadual 3.15: Peratusan Julat Nilai Pematuhan, 2024
Table 3.15: Percentage of Compliance, 2024

PERATUSAN JULAT NILAI PEMATUHAN (%) / PERCENTAGE OF COMPLIANCE (%)	KATEGORI / CATEGORY
0% - 49%	Rendah / Low
50% - 79%	Sederhana / Moderate
80% - 100%	Tinggi / High

ANALISIS PERATUSAN NILAI PEMATUHAN MENGIKUT PARAMETER BERDASARKAN JENIS GUNA TANAH

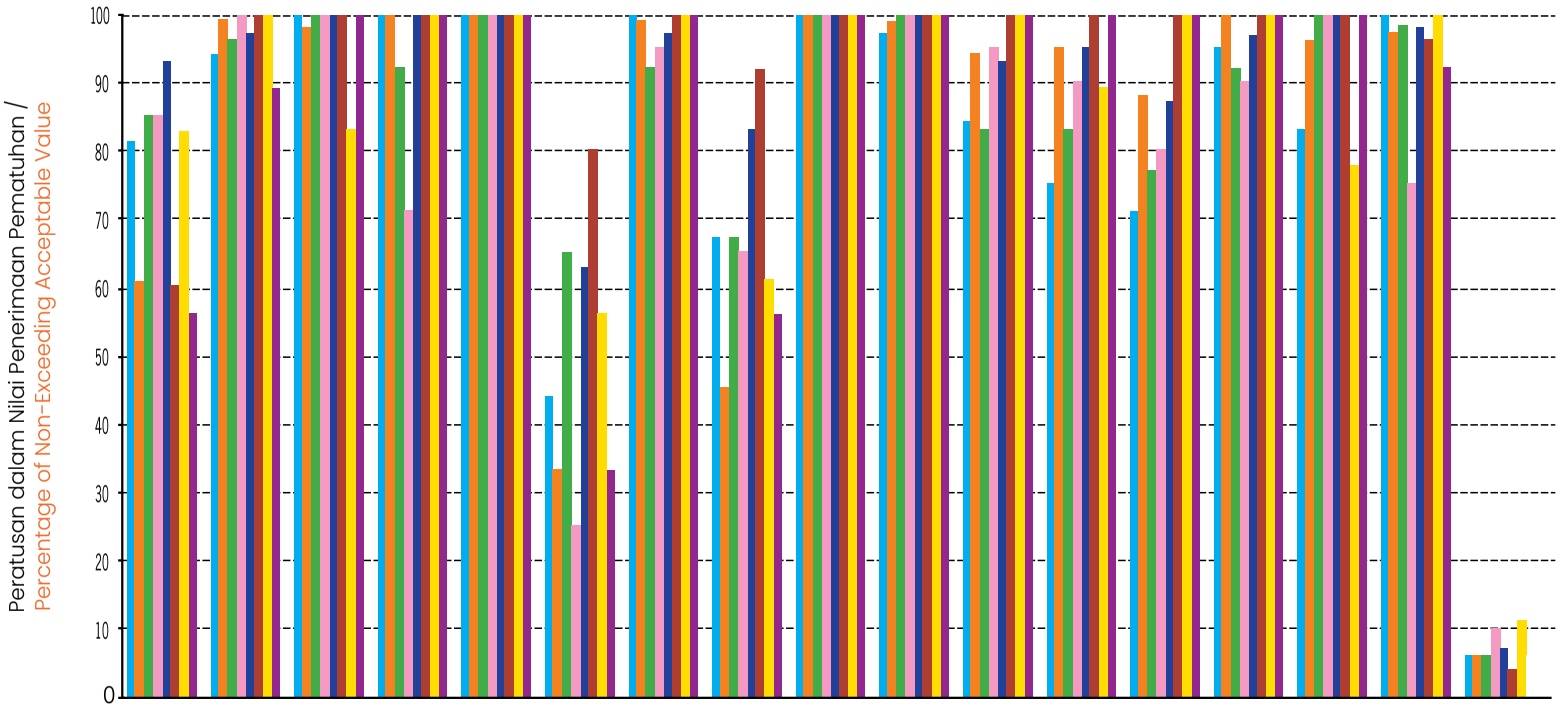
Berdasarkan **Jadual 3.15**, analisis peratusan nilai pematuhan mengikut parameter berdasarkan lapan (8) jenis guna tanah mengikut parameter utama dalam penilaian status kualiti air tanah adalah seperti yang ditunjukkan dalam **Rajah 3.12**. Berdasarkan rajah tersebut, parameter Fenol berada pada kategori rendah (0-49%) bagi semua jenis guna tanah. Selain itu, Ferum berada pada kategori rendah di dalam Guna Tanah Tapak Perindustrian, Bekas Tapak Pelupusan Sampah, Bekalan Air dan Bekas Lombong Emas manakala Mangan berada pada kategori rendah dalam Guna Tanah Bekas Tapak Pelupusan Sampah.

PERCENTAGE ANALYSIS OF COMPLIANCE VALUE BY PARAMETER BASED ON TYPE OF LAND USE

Based on **Table 3.15**, the analysis of the percentage of compliance values by parameter based on eight (8) land use type with reference to significant parameters in assessing groundwater quality status is as shown in **Figure 3.12**. Based on the diagram, Phenol is in the low category (0-49%) for all types of land use. Besides that, Ferum is in the low category for Landuse of Industry, Used Solid Waste Landfill, Water Supply, and Used Gold Mine while Manganese falls under low category for Land Use of Used Solid Waste Landfill.

Bukit Tagar Sanitary Landfill

Rajah 3.12: Peratusan Pematuhan oleh Pencemar Terpilih mengikut Guna Tanah, 2023
Figure 3.12: Percentage of Compliance of Selected Contaminants by Land Use, 2023



	As	Hg	Cd	Cr	Cu	Fe	Pb	Mn	Zn	Se	$CaCO_3$	TDS	Cl	NO_3	SO_4	T-Coliform	Phenol
Tapak Perindustrian / Industrial Sites	81	94	100	100	100	44	100	67	100	97	84	75	71	95	83	100	6
Bekas Tapak Pelupusan Sampah / Used Solid Waste Landfills	61	99	98	100	100	33	99	45	100	99	94	95	88	100	96	97	6
Kawasan Pertanian / Agriculture	85	96	100	92	100	65	92	67	100	100	83	83	77	92	100	98	6
Bekalan Air / Water Supply	85	100	100	70	100	25	95	65	100	100	95	90	80	90	100	75	10
Bandar dan Pinggir Bandar / Urban and Suburban	93	97	100	100	100	63	97	83	100	100	93	95	87	97	100	98	7
Padang Golf / Golf Course	60	100	100	100	100	80	100	92	100	100	100	100	100	100	100	96	4
Luar Bandar / Rural	83	100	83	100	100	56	100	61	100	100	100	89	100	100	78	100	11
Bekas Lombong Emas / Used Gold Mine	56	89	100	100	100	33	100	56	100	100	100	100	100	100	100	92	0

4 Bab/Chapter

KUALITI AIR MARIN BAGI PULAU, PANTAI DAN MUARA SUNGAI

Marine Water Quality for Island, Coastal and Estuary

KUALITI AIR MARIN
Marine Water Quality

PENGAWASAN KUALITI AIR MARIN MANUAL
MANUAL MARINE WATER QUALITY MONITORING (MMWQM)

29 **PARAMETER DIPANTAU /** PARAMETERS MONITORED

STESEN PANTAI
COASTAL STATIONS
188

PERSAMPELAN STESEN PANTAI
COASTAL STATION SAMPLING
1128

STESEN MUARA SUNGAI
ESTUARY STATIONS
85

PERSAMPELAN STESEN MUARA SUNGAI
ESTUARY STATION SAMPLING
510

STESEN PULAU
ISLAND STATIONS
95

PERSAMPELAN STESEN PULAU
ISLAND STATION SAMPLING
570

PENGAWASAN KUALITI AIR MARIN AUTOMATIK
CONTINUOUS MARINE WATER QUALITY MONITORING (CMWQM)

10 **STESEN AUTOMATIK** CONTINUOUS STATIONS

11 **PARAMETER DIPANTAU** PARAMETERS MONITORED

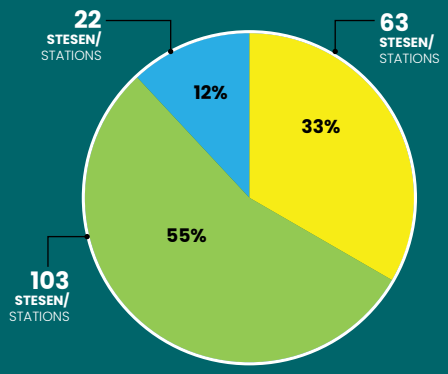
STESEN TERBAIK AIR MARIN 2024 / EXCELLENT MARINE WATER STATION 2024

STATUS KUALITI AIR MARIN 2024 MARINE WATER QUALITY STATUS 2024

STESEN PANTAI / COSTAL STATION

BIL. / NO.	NEGERI / STATE	LOKASI / LOCATION
1	Pahang	Pantai Cherating (Club Med B)
2	Pahang	Pantai Cherating (Legend B)
3	Pahang	Pantai Batu Hitam B
4	Kelantan	Pantai Cahaya Bulan
5	Terengganu	Pantai Batu Buruk
6	Terengganu	Pantai Rhu 10
7	Terengganu	Pantai Teluk Kalong
8	Terengganu	Pantai Tanjung Bidara
9	Perak	Pantai Tanjung Batu
10	Perak	Pantai Teluk Rubiah

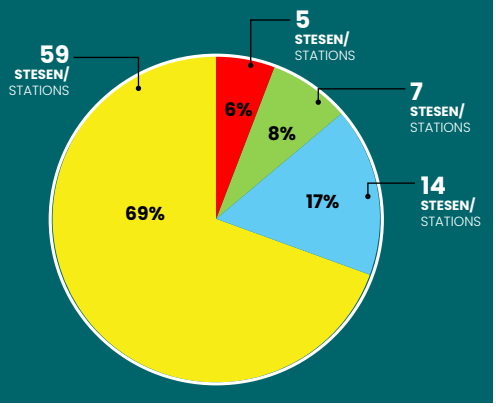
STESEN PANTAI / COSTAL STATION



STESEN MUARA SUNGAI / ESTUARY STATION

BIL. / NO.	NEGERI / STATE	LOKASI / LOCATION
1	Terengganu	Tioxide Utara (Kg. Bukit Kuang, Kijal)
2	Terengganu	Tioxide Tengah (Pupuk Semangat Kijal)
3	Terengganu	Tioxide Selatan (KSB, T. Kalong)
4	Perak	Kuala Sungai Manjung
5	Terengganu	Kuala Sungai Ibai
6	Terengganu	Kuala Sungai Setiu
7	Kelantan	Kuala Sungai Semerak

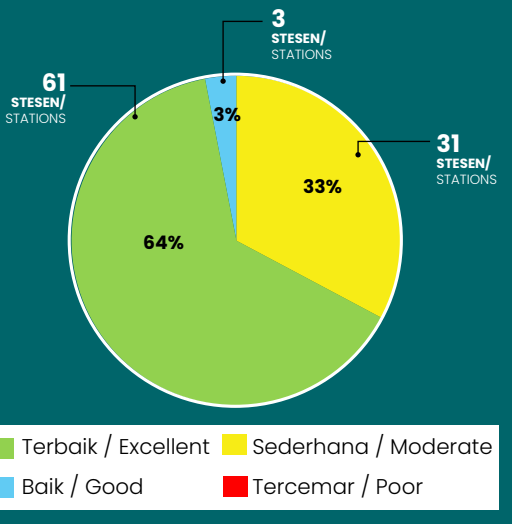
STESEN MUARA SUNGAI / ESTUARY STATION



STESEN PULAU / ISLAND STATION

BIL. / NO.	NEGERI / STATE	LOKASI / LOCATION
1	Pahang	Cebeh
2	Pahang	Sepui
3	Pahang	Sembilang
4	Johor	Nanga Besar
5	Johor	Setindan
6	Johor	Babi Tengah
7	Kedah	Kaca
8	Terengganu	Perhentian Besar (West)
9	Terengganu	Perhentian Kecil
10	Terengganu	Redang (North)

STESEN PULAU / ISLAND STATION



KUALITI AIR MARIN BAGI PULAU, PANTAI DAN MUARA SUNGAI

Marine Water Quality for Island, Coastal and Estuary

PENGAWASAN KUALITI AIR MARIN

Jabatan Alam Sekitar (JAS) telah menjalankan pengawasan kualiti air marin semenjak tahun 1978 di Semenanjung Malaysia dan 1985 di Sabah dan Sarawak. Objektif utama program pengawasan kualiti air marin ini adalah untuk menilai status kualiti air marin dan seterusnya untuk menentukan tahap pencemaran daripada punca-punca di daratan dan juga laut. Punca-punca pencemaran ini boleh menimbulkan ancaman terhadap kemampanan ekosistem dari segi kesihatan dan biodiversiti persekitaran marin.

Stesen-stesen pengawasan yang dibangunkan di bawah Program Pengawasan Kualiti Air Marin diklasifikasikan kepada tiga (3) kategori seperti berikut:

1. Stesen Pantai
2. Stesen Muara Sungai
3. Stesen Pulau

Stesen pantai terletak di sepanjang pantai kira-kira 100 meter dari gigi air laut dan ia mestilah sekurang-kurangnya 500 meter dari punca yang berpotensi sebagai punca pencemaran.

Stesen muara sungai terletak di persekitaran muara sungai di mana terdapat interaksi antara air tawar dan air laut. Stesen muara sungai banyak menerima kesan daripada ekosistem sungai.

Stesen pulau pula dibahagikan kepada empat (4) kategori iaitu Kawasan Dilindungi, Taman Laut, Pembangunan dan Peranginan:

MARINE WATER QUALITY MONITORING

The Department of Environment (DOE) has been monitoring marine water quality since 1978 in Peninsular Malaysia and since 1985 in Sabah and Sarawak. The main objective of this marine water quality monitoring programme is to assess the status of marine water quality and to further determine the level of pollution from sources on land and sea. The causes of this pollution can pose a threat to the sustainability of the ecosystem in terms of health and biodiversity of the marine environment.

Monitoring stations established under the Marine Water Quality Monitoring Programme are classified into three (3) categories as follows:

1. Coastal Stations
2. Estuary Stations
3. Island Stations

Coastal stations are located along the coastline; approximately 100 meters from the water edge and it must be at least 500 meters away from potential point source(s).

Estuary stations are located within an estuarine environment where the freshwater and seawater interact. The estuarine stations have been impacted by the riverine ecosystem.

The island stations are divided into four (4) categories namely Protected Area, Marine Park, Development, and Resort:

i. Stesen Pulau (Kawasan Dilindungi) adalah stesen yang dibangunkan di dalam Kawasan Perlindungan Perikanan di bawah Peraturan-Peraturan Perikanan (Kawasan Larangan) 1994.

ii. Stesen Pulau (Taman Laut) adalah stesen pengawasan yang dibangunkan di kawasan Taman Laut yang ditetapkan di bawah Perintah Taman Laut Malaysia 1994.

iii. Stesen Pulau (Pembangunan) adalah stesen pengawasan yang dibangunkan di sekitar pulau yang sekurang-kurangnya 90 km^2 dengan jumlah penduduk lebih daripada 20,000 orang; dan/ atau pulau-pulau yang ada kepentingan ekonomi.

iv. Stesen Pulau (Peranginan) adalah stesen pengawasan di sekitar pulau yang dibangunkan untuk pelancongan, yang mempunyai pusat peranginan dan chalet sebagai pemacu ekonomi setempat bagi pulau tersebut.

Standard Kualiti Air Marin Malaysia (SKAMM) merupakan standard ambien yang memberi fokus kepada perlindungan dan kelestarian ekosistem akuatik serta perkhidmatan ekosistem tersebut terhadap masyarakat dan mengambil kira faktor ekonomi, praktikal dan sosial. Pada tahun 2023, JAS telah mengemas kini maklumat stesen untuk menambah baik keberkesanan rangkaian pengawasan kualiti air marin. Inisiatif ini adalah sejajar dengan matlamat program untuk mengoptimumkan program pengawasan dan pengurusan kualiti air marin di negara ini.

Penggunaan SKAMM adalah berdasarkan pra-penentuan pengelasan air marin mengikut kegunaan di persekitaran tersebut (**Rajah 4.1**). Terdapat lima (5) kelas yang dikategorikan di bawah SKAMM iaitu:

i. Kelas 1 merangkumi air di perairan yang diwartakan atau ada perlindungan berkanun dan perairan yang tidak diwartakan tetapi mempunyai ekosistem marin yang sensitif seperti terumbu karang, rumpai laut, kawasan pendaratan penyu, dan perairan yang menjadi habitat serta kawasan pemakanan hidupan marin sensitif.

ii. Kelas 2 merangkumi air di perairan yang mempunyai aktiviti perikanan dan marikultur berdasarkan zon penangkapan ikan yang diterbitkan oleh Jabatan Perikanan Malaysia sebagai panduan. Perairan dalam Kelas 2 terdiri daripada sebahagian zon pemuliharaan (termasuk 'Kawasan Larangan Perikanan') sehingga ke Zon Ekonomi Eksklusif (ZEE). Aktiviti

i. Island Stations (Protected Area) are stations established within the Fisheries Protected Area under the Fisheries (Prohibited Area) Regulation, 1994.

ii. Island Stations (Marine Parks) are stations established within the designated Marine Park area under the Marine Park Malaysia Order, 1994.

iii. Island Stations (Development) are monitoring stations established around islands that are at least 90 km^2 with a total population of more than 20,000 people; and/ or islands of economic importance.

iv. Island Stations (Resort) are stations that have been established surrounding the islands that were developed for tourism; with resorts and chalets developed on the islands as the key driver of the economy for the islands.

The Malaysia Marine Water Quality Standard (MMWQS) is an ambient standard that focuses on the protection and sustainability of aquatic ecosystems and their ecosystem services to society, while also taking into account economic, practical, and social factors. In 2023, DOE underwent a comprehensive review of station information, resulting in the enhancement of the Marine Water Quality Monitoring Network. This initiative was undertaken with the overarching goal of optimising the efficiency of monitoring and managing marine water quality in the country.

The application of the MMWQS is based on the pre-determined marine water classification according to the use in the environment (**Figure 4.1**). There are five (5) classes categorised under the MMWQS.

i. Class 1 water comprises the gazetted and statutory protected waters; and non-gazetted areas with the presence of a sensitive ecosystem including coral reefs, seagrass, turtle landing sites and water specific to habitats and feeding grounds of sensitive marine organisms.

ii. Class 2 water encompasses both fisheries and mariculture activities based on the fishing zone established by the Department of Fisheries as a guide. Its water comprises the conservation zone (including 'Fisheries Prohibited Area') right up to the Economic Exclusive Zone (EEZ). Mariculture activities are defined within the marine water bodies such as marine cage culture and

marikultur yang ditakrifkan sebagai Kelas 2 adalah aktiviti dalam badan air marin tersebut (seperti penternakan ikan dalam sangkar dan penternakan kerang) dan tidak termasuk aktiviti akuakultur perikanan darat.

cockle farming; but excluding land aquaculture activities.

iii. Kelas 3 ialah standard untuk air marin yang terdedah kepada pelepasan efluen secara langsung daripada aktiviti antropogenik. Oleh itu, ekosistem di perairan ini akan mengalami banyak pencemaran. Tahap perlindungan ini adalah bertujuan untuk mengekalkan kesihatan ekosistem yang masih ada dan memulihara kualiti air marin di kawasan yang terjejas.

iii. Class 3 is the standard for marine water that is exposed to direct discharge of effluent from anthropogenic activities. Hence, ecosystems in these areas are subjected to some degree of degradation. The corresponding level of protection is therefore aimed at sustaining the health of the remaining ecosystem and to improve water quality of the affected areas.

iv. Kelas E (Interim) merupakan standard bagi muara sungai yang tertakluk kepada variasi bermusim dan harian. Selain itu, ciri-ciri geologi dan corak pergerakan air turut menyumbang kepada sifat dinamik di perairan ini. Berdasarkan kepelbagaian semula jadi ini, standard yang diperoleh daripada kualiti air adalah merupakan ciri-ciri muara sungai yang dianggap mewakili persekitaran yang tidak terganggu. Kawasan muara sungai sebegini akan dijadikan Tapak Rujukan untuk mewakili tiga (3) jenis muara utama di Malaysia. Kelas E1 dipilih untuk mewakili muara jenis dataran pantai, Kelas E2 mewakili muara jenis lagun manakala Kelas E3 akan mewakili muara sungai yang besar dan memiliki rangkaian kompleks.

iv. Class E (Interim) is the standard for estuarine water subject to both seasonal and diurnal variations. In addition, the geological characteristics and water circulation patterns also contribute to the dynamic nature of these waters. Based on these natural variations, the standards derived from the water quality are the characteristic of estuarine waters deemed to represent relatively undisturbed environment. These sites, which are referred to as Reference Sites, are selected to represent the three (3) major estuary types in Malaysia. Class E1 is the representative of coastal plains, Class E2 represents the lagoon-type estuary while Class E3 is referred to when assessing estuaries with large and complex distributary networks.

v. Kelas R merupakan standard untuk kegunaan air marin bagi tujuan rekreasi. Ia merujuk pada Standard Kebangsaan Kualiti Air Rekreasi Semulajadi dan Garis Panduan bagi Pemantauan Air Rekreasi Semulajadi (Air Marin dan Air Tawar) yang diterbitkan oleh Kementerian Kesihatan Malaysia.

v. Class R is the standard for recreational use of marine waters. It is based on the National Standards for Water Quality for Nature-based Recreation and Guidelines for Monitoring for Nature-based Recreation (Marine and Freshwater) by the Ministry of Health, Malaysia.

Indeks Kualiti Air Marin Malaysia (IKAMM) adalah pengagregatan parameter kualiti air marin yang paling relevan bertujuan untuk menyediakan maklumat yang berkaitan dengan status kualiti air marin bagi badan air. Indeks ini berdasarkan pada enam (6) parameter kualiti air iaitu oksigen terlarut, faecal coliform, ammonia tidak terion, nitrat, fosfat dan jumlah pepejal terampai.

Malaysian Marine Water Quality Index (MMWQI) is an aggregation of the most relevant marine water quality parameters aimed at providing information pertinent to the marine water quality status of a water body. The index is derived based on six (6) water quality parameters, which are dissolved oxygen, faecal coliform, unionized ammonia, nitrate, phosphate and total suspended solids.

Pengagregatan IKAMM adalah dalam julat daripada 0 hingga 100, di mana 0 menunjukkan kualiti air tercemar manakala 100 menunjukkan kualiti air terbaik (**Jadual 4.1**).

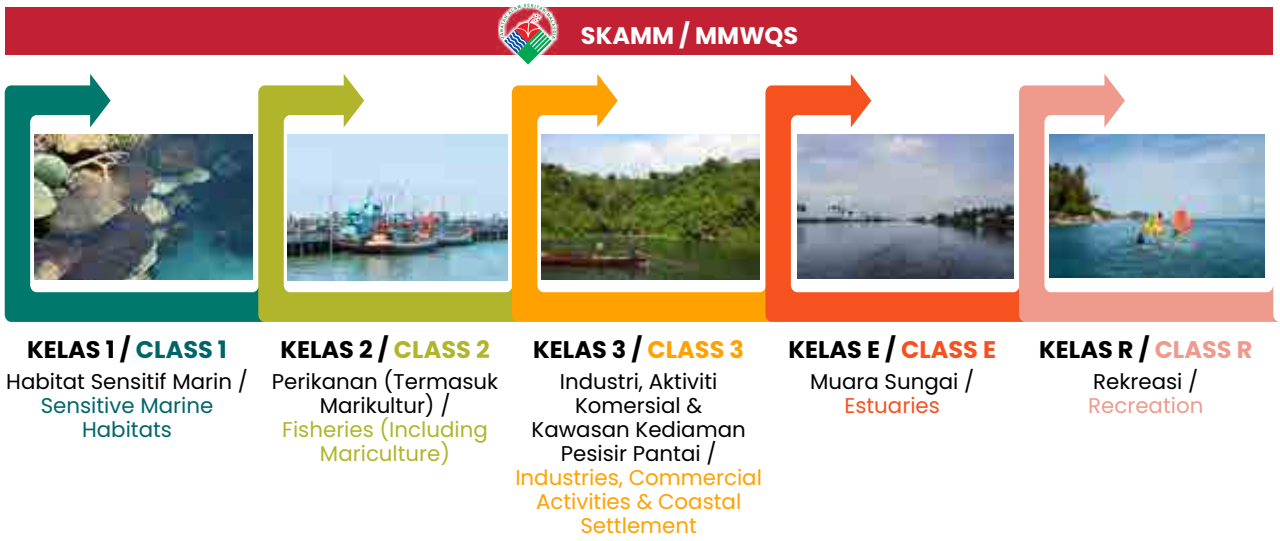
The MMWQI aggregation is scaled from 0 to 100 where 0 indicates poor water quality while 100 indicates excellent water quality (**Table 4.1**).

Sebanyak 188 stesen pantai, 85 stesen muara sungai dan 95 stesen pulau telah dipantau pada tahun 2024.

A total of 188 coastal stations, 85 estuary stations, and 95 island stations were monitored in the year 2024.

Terdapat enam (6) frekuensi persampelan bagi setiap stesen dengan jumlah sampel sebanyak 1,128 sampel untuk stesen pantai, 510 sampel untuk stesen muara sungai dan 570 sampel untuk stesen pulau. Sampel-sampel tersebut dianalisa dan hasil analisa dirumuskan berdasarkan IKAMM bagi enam (6) frekuensi persampelan.

There were six (6) sampling frequencies in total for each monitoring station amounting to 1,128 samples for coastal stations, 510 samples for estuary stations, and 570 samples for island stations. The samples were analysed and results were summarised based on the MMWQI of the six (6) sampling frequencies.



Rajah 4.1: Pemakaian Standard Kualiti Air Marin Malaysia (SKAMM) berdasarkan Pra-penentuan Pengelasan Air Marin
Figure 4.1: The Application of the Malaysian Marine Water Quality Standards (MMWQS) based on the Pre-determined Marine Water Classification

Jadual 4.1: Klasifikasi Indeks Kualiti Air Marin Malaysia (IKAMM)
Table 4.1: Malaysian Marine Water Quality Index (MMWQI) Classification

KATEGORI / CATEGORY	NILAI INDEKS/ INDEX VALUE
Terbaik / Excellent	90 - 100
Baik / Good	80 - <90
Sederhana / Moderate	50 - <80
Tercemar / Poor	0 - <50

Pulau Langkawi, Kedah

188
Stesen Pantai /
Coastal Stations

Pantai Penarik, Terengganu

85
Stesen Muara Sungai /
Estuary Stations

Kuala Kedah, Kedah

95
Stesen Pulau /
Island Stations

Pulau Lang Tengah, Terengganu

STATUS STESEN-STESEN PENGAWASAN KUALITI AIR MARIN

Dalam tahun 2024, daripada 368 stesen pengawasan kualiti air marin bagi pantai, muara sungai dan pulau di negara ini, status kualiti air marin dinilai berdasarkan nilai median IKAMM bagi data yang dicerap di setiap stesen sepanjang 2024. Stesen kualiti air marin sebanyak 171 stesen dikategorikan sebagai terbaik, 39 stesen sebagai baik, sementara kualiti air marin bagi 153 stesen dikategorikan sebagai sederhana. Pada tahun 2024, terdapat sebanyak lima (5) stesen yang dikategorikan sebagai tercemar. Bilangan stesen yang tercemar bagi tahun 2024 lebih tinggi berbanding tahun sebelumnya iaitu daripada satu (1) stesen tercemar kepada lima (5) stesen pada tahun 2024.

Daripada lima (5) stesen yang tercemar tahun 2024, dua (2) stesen terletak di Pulau Pinang manakala Selangor, Pahang dan Melaka masing-masing melaporkan satu (1) stesen tercemar.

STATUS OF MARINE WATER QUALITY MONITORING STATIONS

In 2024, out of 368 marine water quality monitoring stations established at coastal, estuary, and island in the country, the marine water quality status was evaluated based on the median value of MMWQI obtained from the data collected at each station in 2024. The marine water quality of 171 stations was categorised as excellent, 39 stations categorised as good while marine water quality of 153 stations were categorised as moderate. In 2024, five (5) stations were categorised as poor. The number of poor marine water quality stations increased from one (1) station in the previous year, up to five (5) stations this year.

Out of the five (5) polluted stations this year, two (2) stations are located in Pulau Pinang while Selangor, Pahang, and Melaka each reported one (1) polluted station.

Faecal coliform, nutrien dan jumlah pepejal terampai masih merupakan parameter utama yang menyebabkan kemerosotan kualiti air marin di stesen MMWQM. Semua stesen tercemar menerima kesan daripada muara sungai dan aktiviti antropogenik di hulu sungai.

Secara amnya, kualiti air marin yang dipantau di bawah rangkaian MMWQM menunjukkan status keseluruhan kualiti air yang terbaik di persekitaran marin Malaysia. Walaupun bilangan stesen tercemar meningkat, peratusan stesen baik turut meningkat dengan ketara pada tahun 2024.

Jadual 4.2, **Jadual 4.3** dan **Jadual 4.4** menunjukkan senarai stesen pantai, muara sungai dan pulau yang mencapai kategori terbaik berdasarkan median IKAMM bagi tahun 2024.

Rajah 4.2 - 4.7 menunjukkan status kualiti air marin berdasarkan IKAMM mengikut lokasi stesen pengawasan bagi pantai, muara sungai dan pulau bagi tahun 2024.

Faecal coliform, nutrients, and total suspended solids remained the main parameters that deteriorated the marine water quality at the Marine Manual Water Quality Monitoring (MMWQM) stations. All polluted stations received impacts from the river estuaries and anthropogenic activities in the upstream area of the river.

In general, the marine water quality monitored under the MMWQM network showed an overall excellent category of water quality in the marine environment of Malaysia. Although the number of poor stations increased, the percentage of good stations also increased significantly in 2024.

Table 4.2, **Table 4.3** and **Table 4.4** show the list of coastal, estuary, and island stations in the excellent category based on median value of MMWQI in 2024.

Figures 4.2 - 4.7 show the marine water quality status based on MMWQI according to coastal, estuary, and island monitoring stations in 2024.

Jadual 4.2: Senarai Stesen Pengawasan Kualiti Air Marin bagi Pantai dengan Status Kategori Terbaik, 2024
Table 4.2: List of Marine Water Quality Monitoring of Coastal Stations with Excellent Status, 2024

Bil / No	Negeri / State	Lokasi / Location
1	Pahang	Pantai Cherating (Club Med B)
2	Pahang	Pantai Cherating (Legend B)
3	Pahang	Pantai Batu Hitam B
4	Kelantan	Pantai Cahaya Bulan
5	Terengganu	Pantai Batu Buruk
6	Terengganu	Pantai Rhu 10
7	Terengganu	Pantai Teluk Kalong
8	Terengganu	Pantai Tanjung Bidara
9	Perak	Pantai Tanjung Batu
10	Perak	Pantai Teluk Rubiah

Nota / Notes:
Senarai menunjukkan sepuluh (10) stesen teratas dengan status kategori terbaik /
The list shows the top ten (10) stations in the excellent category


Pantai Teluk Cempedak, Pahang

Jadual 4.3: Senarai Stesen Pengawasan Kualiti Air Marin bagi Muara Sungai dengan Status Kategori Terbaik, 2024
Table 4.3: List of Marine Water Quality Monitoring of Estuary Stations with Excellent Status, 2024

Bil / No	Negeri / State	Lokasi / Location
1	Terengganu	Tioxide Utara (Kg. Bukit Kuang, Kijal)
2	Terengganu	Tioxide Tengah (Pupuk Semangat, Kijal)
3	Terengganu	Tioxide Selatan (KSB, T. Kalong)
4	Perak	Kuala Sungai Manjung
5	Terengganu	Kuala Sungai Ibai
6	Terengganu	Kuala Sungai Setiu
7	Kelantan	Kuala Sungai Semerak

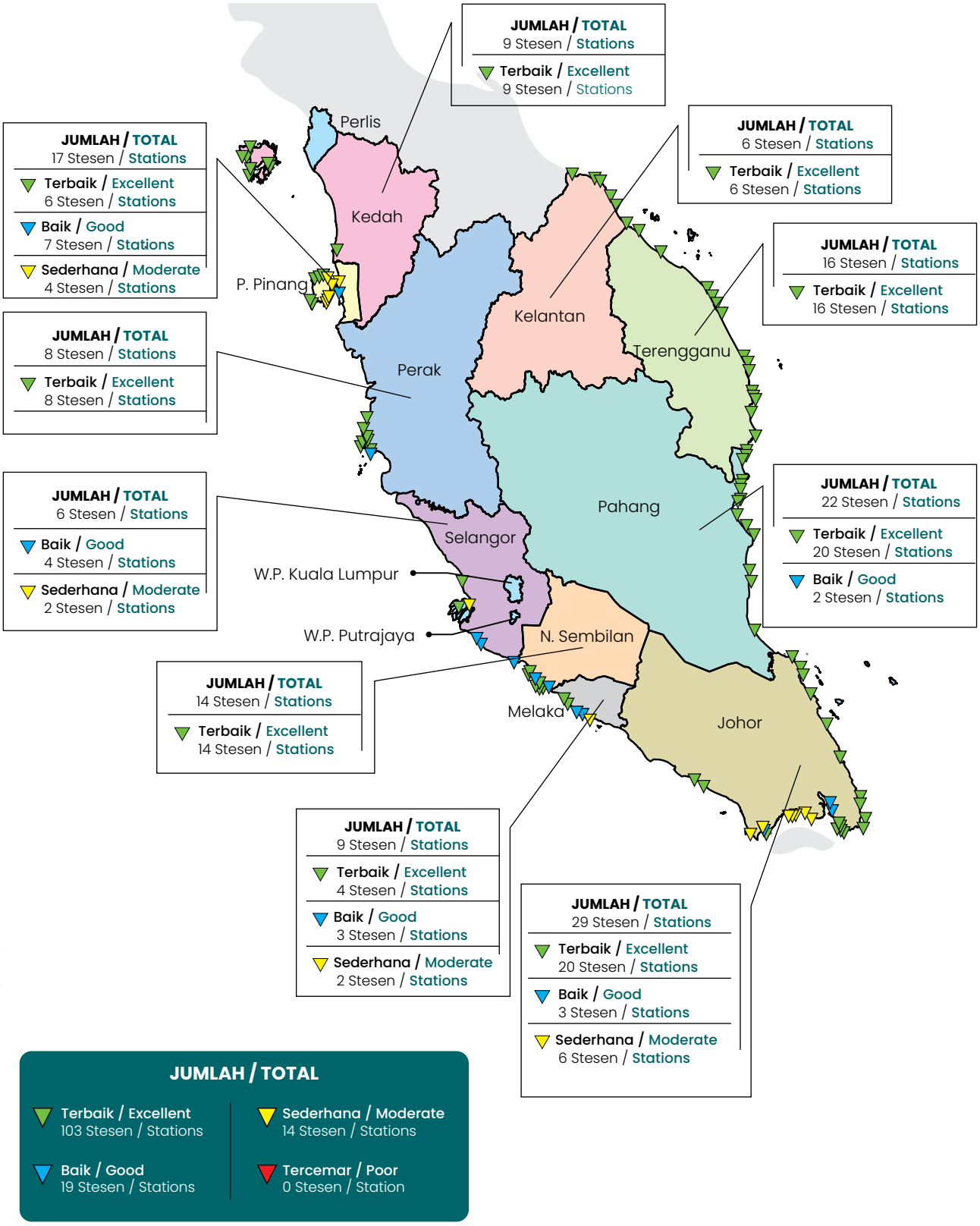
Nota / Notes:
Senarai menunjukkan tujuh (7) stesen teratas dengan status kategori terbaik /
The list shows the top seven (7) stations in the excellent category

Jadual 4.4: Senarai Stesen Pengawasan Kualiti Air Marin bagi Pulau dengan Status Kategori Terbaik, 2024
Table 4.4: List of Marine Water Quality Monitoring of Island Stations with Excellent Status, 2024

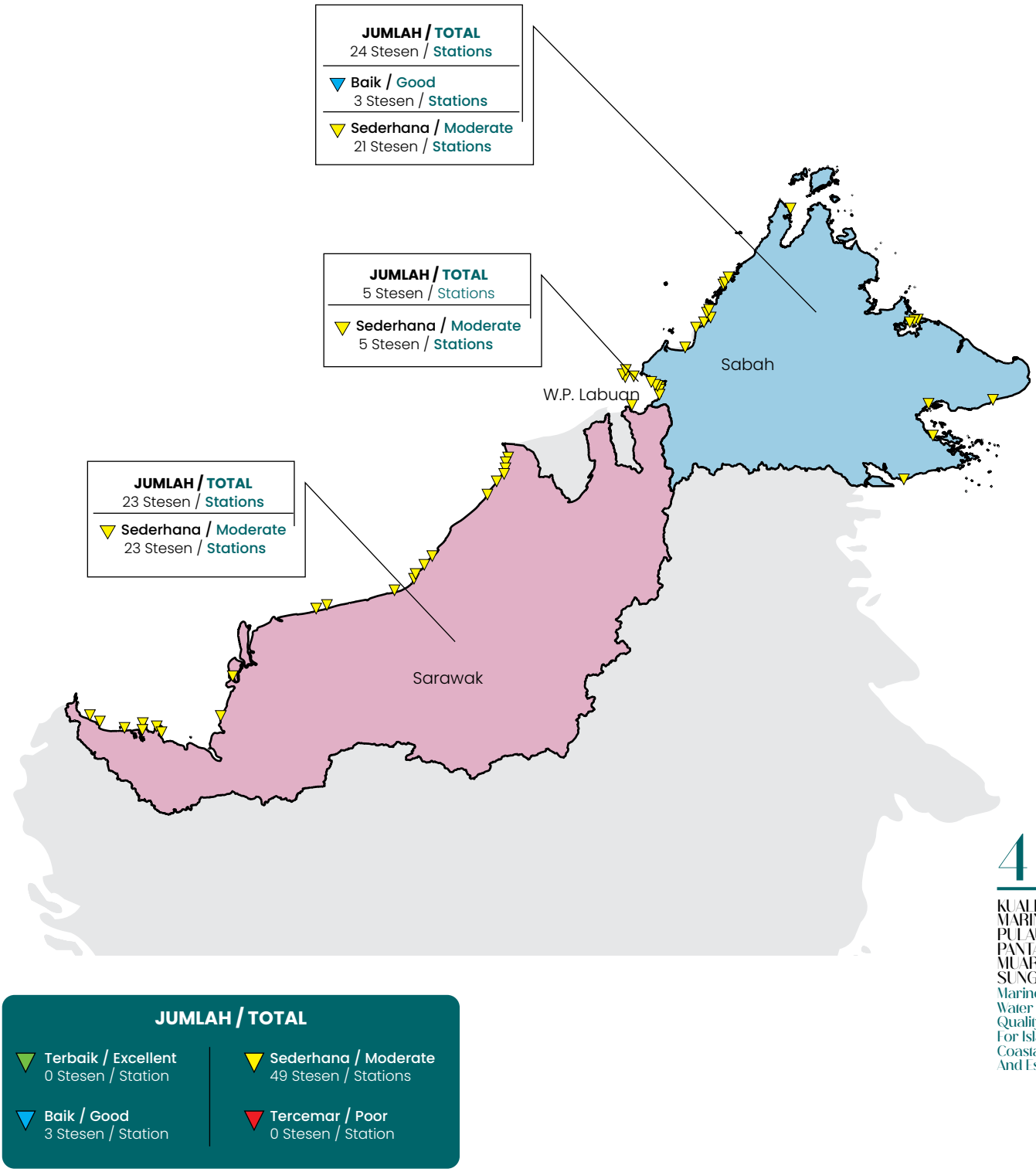
Bil / No	Negeri / State	Lokasi / Location
1	Pahang	Cebeh
2	Pahang	Sepui
3	Pahang	Sembilang
4	Johor	Nanga Besar
5	Johor	Setindan
6	Johor	Babi Tengah
7	Kedah	Kaca
8	Terengganu	Perhentian Besar (West)
9	Terengganu	Perhentian Kecil
10	Terengganu	Redang (North)

Nota / Notes:
Senarai menunjukkan sepuluh (10) stesen teratas dengan status kategori terbaik /
The list shows the top ten (10) stations in the excellent category


Kuala Sungai Pulai, Johor

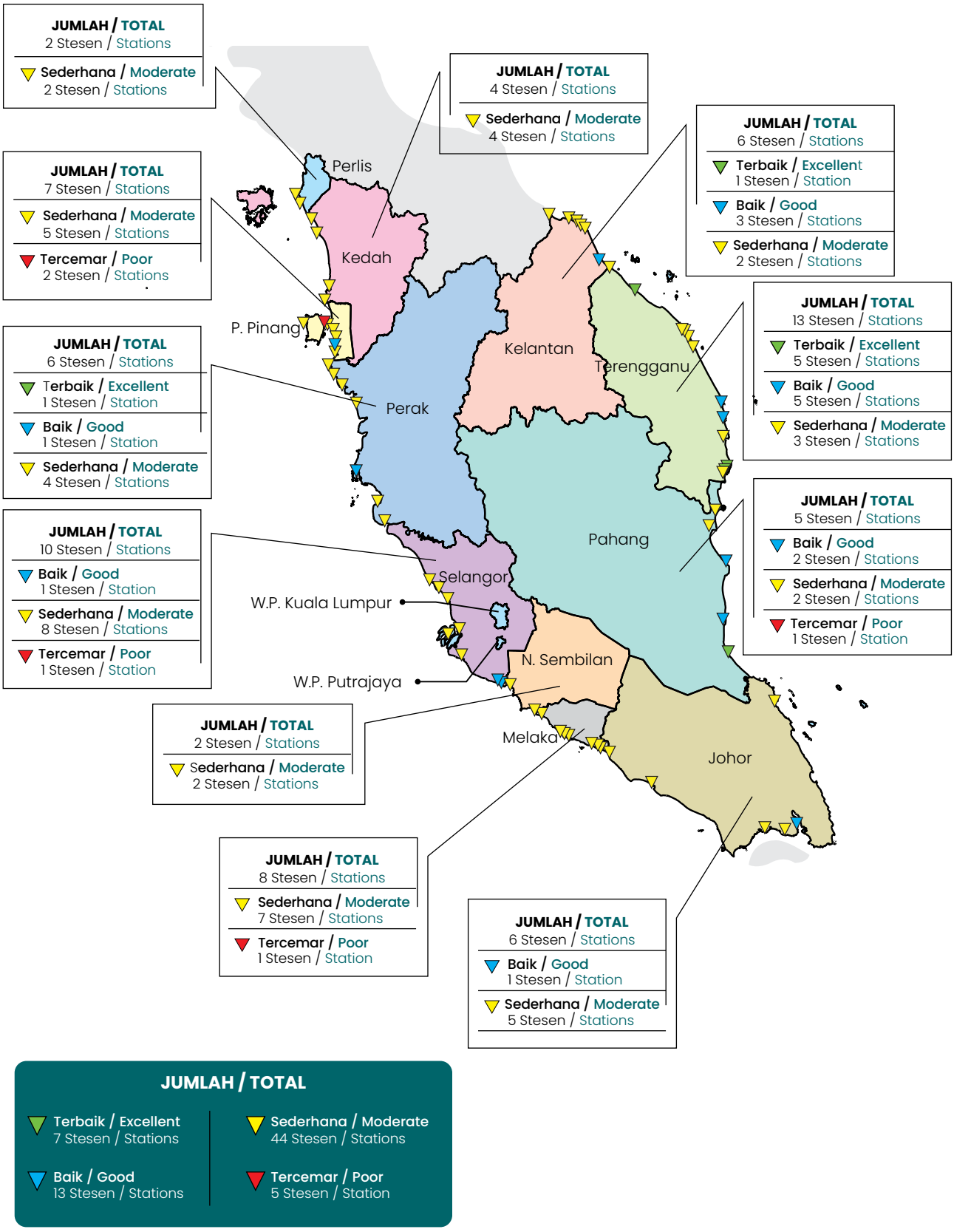


Rajah 4.2: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Pantai di Semenanjung Malaysia
Figure 4.2: Marine Water Quality Status based on the Location of Coastal Monitoring Stations in Peninsular Malaysia



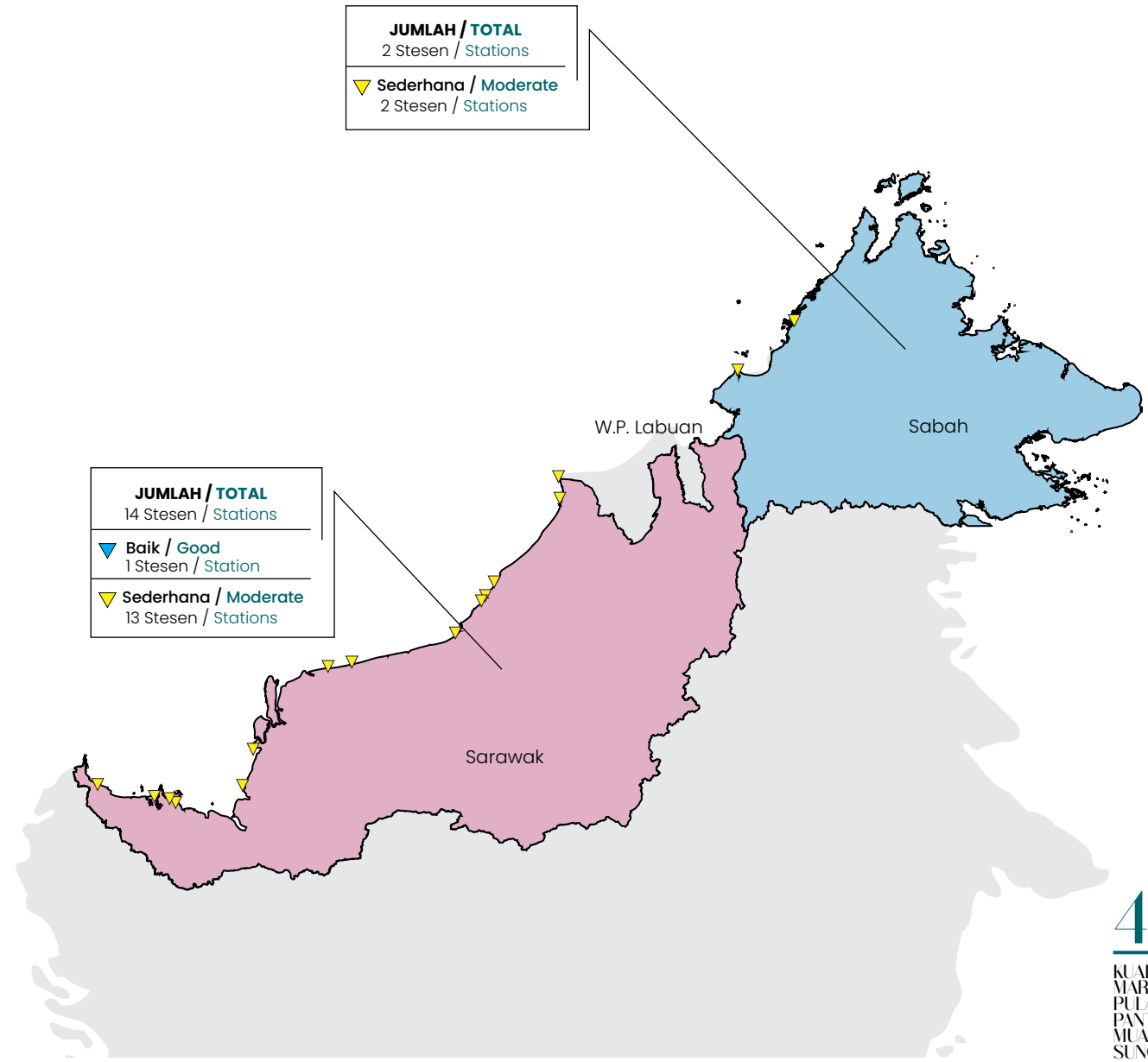
Rajah 4.3: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Pantai di Sabah, Sarawak dan W.P. Labuan

Figure 4.3: Marine Water Quality Status based on the Location of Coastal Monitoring Stations in Sabah, Sarawak, and W.P. Labuan

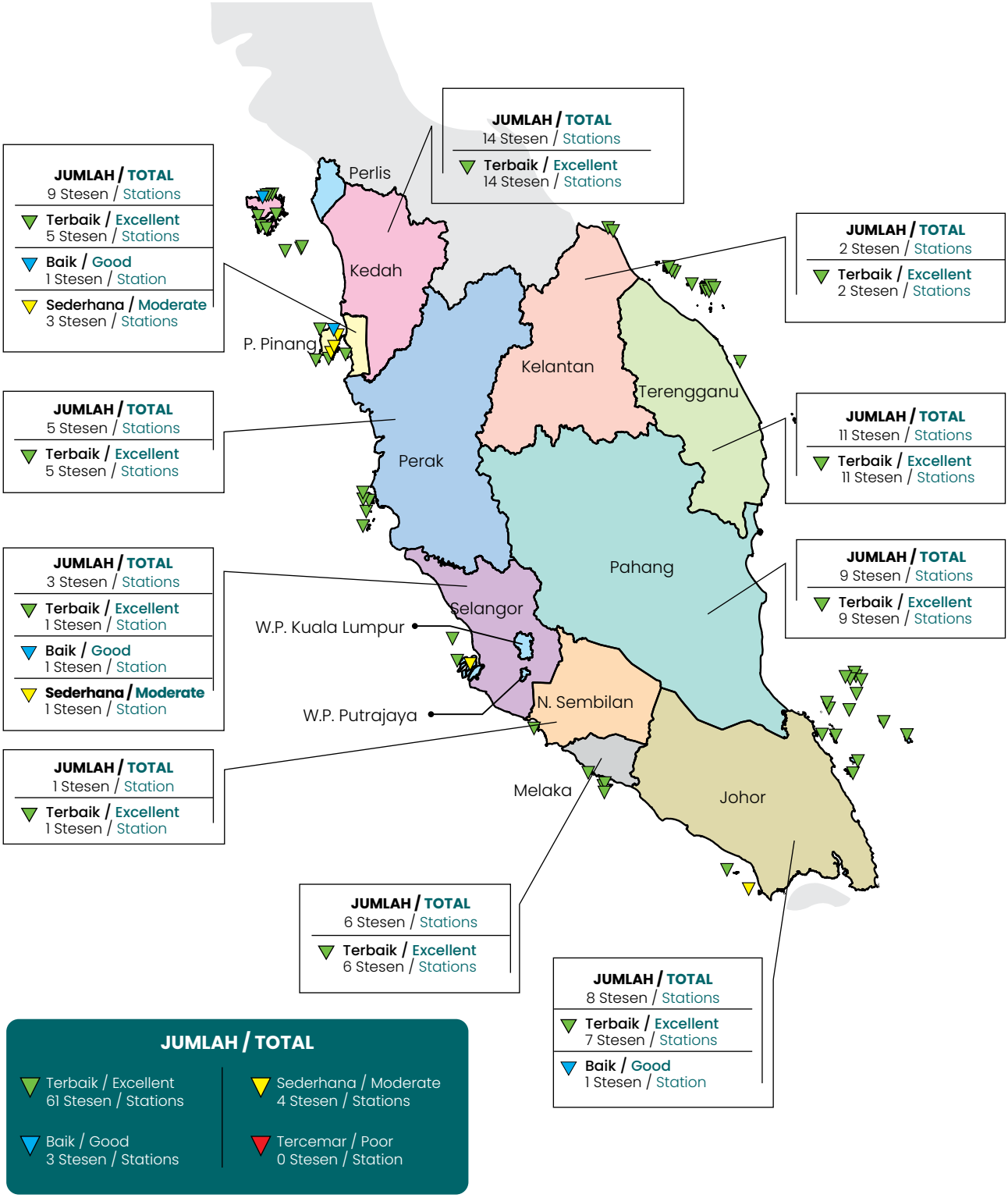


Rajah 4.4: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Muara Sungai di Semenanjung Malaysia

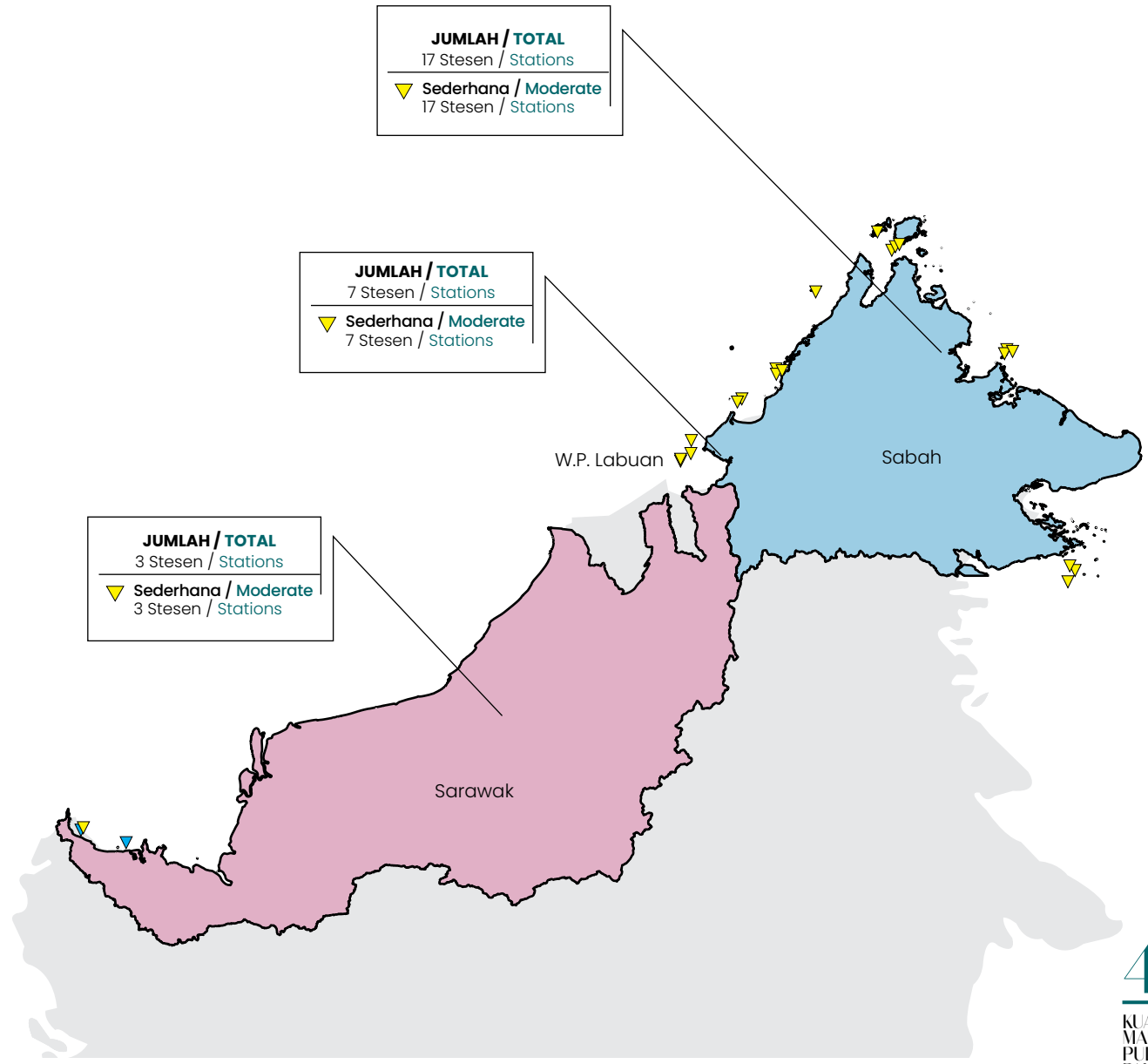
Figure 4.4: Marine Water Quality Status based on the Location of Estuary Monitoring Stations in Peninsular Malaysia



Rajah 4.5: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Muara Sungai di Sabah dan Sarawak
Figure 4.5: Marine Water Quality Status based on the Location of Monitoring Stations for Estuary in Sabah and Sarawak



Rajah 4.6: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Pulau di Semenanjung Malaysia
Figure 4.6: Marine Water Quality Status based on the Location of Island Monitoring Stations in Peninsular Malaysia



Rajah 4.7: Status Kualiti Air Marin mengikut Lokasi Stesen Pengawasan bagi Pulau di Sabah, Sarawak dan W.P. Labuan

Figure 4.7: Marine Water Quality Status based on the Location of Island Monitoring Stations in Sabah, Sarawak, and W.P. Labuan

STATUS KUALITI AIR MARIN BAGI PANTAI

Sebanyak 188 stesen pantai dipantau pada tahun 2024. Daripada 188 stesen pantai, 103 stesen (55%) dikategorikan sebagai terbaik, 22 stesen (12%) baik, 63 stesen (33%) sederhana manakala tiada stesen dikategorikan sebagai tercemar. Bilangan stesen bagi kategori terbaik menurun daripada 106 stesen tahun lalu kepada 103 stesen tahun ini (**Jadual 4.5**).

MARINE WATER QUALITY STATUS FOR COASTAL AREAS

A total of 188 coastal stations were monitored for water quality in 2024. Of this number, 103 stations (55%) were ranked as excellent, 22 stations (12%) ranked as good, 63 stations (33%) ranked as moderate and no station was ranked poor. The number of stations ranked as excellent slightly reduced from 106 stations last year to 103 stations this year (**Table 4.5**).

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kedah	Pantai/Coastal	Pantai Merdeka	MMKC001	71	85	88	91	92	Terbaik/ Excellent
		Langkawi Island Resort	MMKC002	93	94	94	96	95	Terbaik/ Excellent
		Pantai Kok	MMKC003	95	90	83	95	96	Terbaik/ Excellent
		Pantai Kuah	MMKC004	89	88	90	91	95	Terbaik/ Excellent
		Pantai Pasir Tengkorak	MMKC005	93	96	93	93	95	Terbaik/ Excellent
		Pantai Teluk Burau	MMKC006	89	94	86	96	94	Terbaik/ Excellent
		Pantai Teluk Nibong	MMKC007	94	86	92	95	96	Terbaik/ Excellent
		Pantai Tengah	MMKC008	96	92	92	94	96	Terbaik/ Excellent
		Pantai Beras Basah	MMKC009	95	92	96	96	96	Terbaik/ Excellent
P. Pinang	Pantai/Coastal	Gertak Sanggul	MMPC001	84	81	83	94	91	Terbaik/ Excellent
		Kawasan Perindustrian Bayan Lepas 1	MMPC002	56	72	60	79	67	Sederhana/ Moderate
		Pantai Bersih	MMPC003	58	75	86	73	84	Baik/Good
		Pantai Miami	MMPC004	81	70	86	90	88	Baik/Good
		Pantai Pasir Panjang	MMPC005	81	93	95	93	93	Terbaik/ Excellent
		Batu Feringgi (Casuarina)	MMPC006	58	83	82	93	85	Baik/Good
		Luar Pantai Teluk Bahang	MMPC007	83	81	88	94	91	Terbaik/ Excellent
		Persiaran Gurney	MMPC008	59	60	79	73	84	Baik/Good
		Rumah Pam Baru Perai	MMPC009	61	68	76	88	83	Baik/Good
		Rumah Pam Lama Perai	MMPC010	60	65	59	67	72	Sederhana/ Moderate
		Selat PP Selatan (Jelutong)	MMPC011	55	59	59	59	57	Sederhana/ Moderate
		Tanjung Bungah	MMPC012	70	67	72	90	80	Baik/Good
		Tanjung Bungah 2	MMPC013	69	70	63	69	87	Baik/Good

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
P.Pinang	Pantai/Coastal	Batu Maung 2	MMPC014	56	69	58	72	71	Sederhana/ Moderate
		Pantai Sungai Batu Ferringhi 3	MMPC015	84	86	92	92	91	Terbaik/ Excellent
		Pantai Sungai Batu Ferringhi 2	MMPC016	74	90	94	94	93	Terbaik/ Excellent
		Pantai Sungai Batu Ferringhi 1	MMPC017	85	91	91	92	91	Terbaik/ Excellent
Perak	Pantai/Coastal	Pantai Pasir Bogak	MMAC001	93	95	94	92	95	Terbaik/ Excellent
		Pantai Teluk Dalam	MMAC002	89	94	92	93	95	Terbaik/ Excellent
		Pantai Teluk Batik	MMAC003	84	78	89	92	95	Terbaik/ Excellent
		Pantai Tanjung Batu	MMAC004	83	93	94	93	96	Terbaik/ Excellent
		Pantai Teluk Rubiah	MMAC005	92	90	81	88	96	Terbaik/ Excellent
		Pantai Damai Laut	MMAC006	93	94	91	93	95	Terbaik/ Excellent
		Pantai Teluk Senangin	MMAC007	90	90	93	95	95	Terbaik/ Excellent
		Pantai Pasir Panjang	MMAC008	94	91	95	94	95	Terbaik/ Excellent
Selangor	Pantai/Coastal	Pantai Bagan Lalang	MMBC001	91	84	84	89	86	Baik/Good
		Pantai Morib	MMBC002	68	68	84	88	85	Baik/Good
		Selat Pulau Babi	MMBC003	73	87	91	95	89	Baik/Good
		Selat Klang Utara	MMBC004	55	62	56	79	56	Sederhana/ Moderate
		Pantai Remis	MMBC005	63	83	79	92	84	Baik/Good
		Pantai Klanang	MMBC006	71	74	69	82	66	Sederhana/ Moderate
N. Sembilan	Pantai/Coastal	Bagan Pinang	MMNC001	85	91	90	95	95	Terbaik/ Excellent
		Telok Sinting	MMNC002	86	87	94	89	91	Terbaik/ Excellent
		Port Dickson Bandar	MMNC003	74	88	88	93	95	Terbaik/ Excellent
		Port Dickson Batu 4	MMNC004	86	88	89	89	95	Terbaik/ Excellent
		Port Dickson Batu 5	MMNC005	67	73	81	94	95	Terbaik/ Excellent
		Port Dickson Batu 6	MMNC006	90	90	93	96	93	Terbaik/ Excellent
		Port Dickson Batu 7	MMNC007	92	93	95	94	93	Terbaik/ Excellent
		Port Dickson Batu 8	MMNC008	85	93	95	95	94	Terbaik/ Excellent
		Port Dickson Batu 10	MMNC009	92	92	97	95	95	Terbaik/ Excellent
		Port Dickson Janakuasa TNB	MMNC010	89	70	90	93	95	Terbaik/ Excellent
		Telok Pelanduk	MMNC011	83	91	94	92	93	Terbaik/ Excellent
		Pantai Cermin	MMNC012	83	94	94	94	92	Terbaik/ Excellent

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
N.Sembilan	Pantai/Coastal	Pantai Teluk Kemang	MMNC013	94	91	95	95	94	Terbaik/ Excellent
		Pantai Seri Purnama	MMNC014	90	92	96	92	95	Terbaik/ Excellent
Melaka	Pantai/Coastal	Pantai Rombang	MMMC001	89	88	88	91	93	Terbaik/ Excellent
		Pantai Kundur	MMMC002	90	89	83	89	90	Terbaik/ Excellent
		Pantai Tanjung Bidara	MMMC003	90	69	87	92	94	Terbaik/ Excellent
		Teluk Gong	MMMC004	83	60	90	90	92	Terbaik/ Excellent
		Pulau Melaka Point A1	MMMC005	91	89	83	88	88	Baik/Good
		Pulau Melaka Point A2	MMMC006	79	80	83	92	88	Baik/Good
		Pulau Melaka Point B1	MMMC007	58	58	57	54	57	Sederhana/ Moderate
		Pulau Melaka Point B2	MMMC008	57	57	57	55	56	Sederhana/ Moderate
		Pantai Klebang	MMMC009	78	87	89	88	85	Baik/Good
Johor	Pantai/Coastal	Tanjung Bin	MMJC001	90	90	91	93	93	Terbaik/ Excellent
		Pelabuhan Tanjung Pelepas	MMJC002	92	91	82	80	92	Terbaik/ Excellent
		Hadapan Jabatan Laut	MMJC003	87	82	81	69	83	Baik/Good
		Pantai Stulang Laut	MMJC004	48	56	55	56	55	Sederhana/ Moderate
		Jeti Teluk Jawa	MMJC005	62	70	59	64	79	Sederhana/ Moderate
		Pelabuhan Pasir Gudang	MMJC006	57	59	66	58	59	Moderate/ Moderate
		Hadapan HSAJB	MMJC007	49	58	51	56	56	Sederhana/ Moderate
		Pantai Lido	MMJC008	44	54	50	55	54	Sederhana/ Moderate
		Pantai Teluk Mahkota	MMJC009	90	93	95	93	95	Terbaik/ Excellent
		Pantai Tanjung Leman	MMJC010	83	97	94	96	96	Terbaik/ Excellent
		Pantai Sri Pantai	MMJC011	87	91	95	97	96	Terbaik/ Excellent
		Tanjung Merak	MMJC012	89	85	89	92	95	Terbaik/ Excellent
		Tanjung Pengelih	MMJC013	90	92	88	94	95	Terbaik/ Excellent
		Pantai Tanjong Stapa	MMJC014	91	72	77	93	95	Terbaik/ Excellent
		Pantai Teluk Gorek	MMJC015	83	93	93	95	96	Terbaik/ Excellent
		Pantai Air Papan	MMJC016	95	92	93	95	95	Terbaik/ Excellent
		Jeti Kukup	MMJC017	59	62	83	70	76	Sederhana/ Moderate
		Pasir Gogok	MMJC018	92	89	89	91	93	Terbaik/ Excellent

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Johor	Pantai/Coastal	Tanjung Buai	MMJC019	75	91	87	89	90	Terbaik/ Excellent
		Pantai Desaru	MMJC020	95	94	95	96	94	Terbaik/ Excellent
		Tanjung Sepang	MMJC021	92	90	93	92	94	Terbaik/ Excellent
		Tanjung Penyusup	MMJC022	83	93	93	95	94	Terbaik/ Excellent
		Pantai Sungai Lurus	MMJC023	74	88	85	94	94	Terbaik/ Excellent
		Punggur	MMJC024	69	90	79	95	81	Baik/Good
		Pantai Penyabung	MMJC025	82	95	96	94	95	Terbaik/ Excellent
		Tanjung Resang	MMJC026	90	92	94	94	95	Terbaik/ Excellent
		Tanjung Balau	MMJC027	93	94	94	97	96	Terbaik/ Excellent
		Batu Layar	MMJC028	90	92	95	97	96	Terbaik/ Excellent
		Tanjung Sengat	MMJC029	72	85	92	83	89	Baik/Good
Pahang	Pantai/Coastal	Pantai Cherating (Club Med A)	MMCC001	91	95	80	96	96	Terbaik/ Excellent
		Pantai Cherating (Club Med B)	MMCC002	94	97	87	96	97	Terbaik/ Excellent
		Pantai Cherating (Legend A)	MMCC003	96	93	93	96	95	Terbaik/ Excellent
		Pantai Cherating (Legend B)	MMCC004	96	95	94	96	97	Terbaik/ Excellent
		Pantai Muhibbah Balok A	MMCC005	73	90	93	96	94	Terbaik/ Excellent
		Pantai Muhibbah Balok B	MMCC006	67	74	90	92	94	Terbaik/ Excellent
		Pantai Batu Hitam A	MMCC007	76	92	93	92	95	Terbaik/ Excellent
		Pantai Batu Hitam B	MMCC008	73	84	96	94	97	Terbaik/ Excellent
		Pantai Berserah A	MMCC009	76	93	93	93	95	Terbaik/ Excellent
		Pantai Berserah B	MMCC010	60	90	90	94	93	Terbaik/ Excellent
		Pantai Teluk Cempedak A	MMCC011	84	94	95	95	92	Terbaik/ Excellent
		Pantai Teluk Cempedak B	MMCC012	95	93	95	96	87	Baik/Good
		Pantai Teluk Gelora A	MMCC013	60	72	70	95	91	Terbaik/ Excellent
		Pantai Teluk Gelora B	MMCC014	59	59	59	92	87	Baik/Good
		Pantai Sepat A	MMCC015	92	94	96	96	96	Terbaik/ Excellent
		Pantai Sepat B	MMCC016	92	95	95	94	95	Terbaik/ Excellent
		Pantai Legenda A	MMCC017	97	92	95	96	96	Terbaik/ Excellent
		Pantai Legenda B	MMCC018	96	92	95	97	96	Terbaik/ Excellent

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Pahang	Pantai/Coastal	Pantai Kuala Api-Api	MMCC019	85	94	95	96	96	Terbaik/ Excellent
		Pantai Tanjung Batu	MMCC020	85	94	92	96	95	Terbaik/ Excellent
		Pantai Chendor	MMCC021	87	92	84	95	96	Terbaik/ Excellent
		Pantai Lanjut	MMCC022	85	94	91	95	93	Terbaik/ Excellent
Terengganu	Pantai/Coastal	Pantai Batu Buruk	MMTC001	93	88	95	91	97	Terbaik/ Excellent
		Pantai Bukit Keluang	MMTC002	95	96	95	96	96	Terbaik/ Excellent
		Pantai Chendering	MMTC003	93	95	95	97	96	Terbaik/ Excellent
		Pantai Rantau Abang	MMTC004	95	96	97	97	96	Terbaik/ Excellent
		KIPC Utara	MMTC005	78	95	94	96	96	Terbaik/ Excellent
		KIPC Tengah	MMTC006	88	94	94	96	96	Terbaik/ Excellent
		KIPC Selatan	MMTC007	88	95	95	96	95	Terbaik/ Excellent
		Pantai Rhu 10	MMTC008	95	97	90	97	97	Terbaik/ Excellent
		Pantai Tok Jembal	MMTC009	96	95	96	97	96	Terbaik/ Excellent
		Pantai Kelulut	MMTC010	93	96	97	97	96	Terbaik/ Excellent
		Pantai Teluk Ketapang	MMTC011	95	96	96	97	96	Terbaik/ Excellent
		Pantai Kuala Abang	MMTC012	94	95	97	97	96	Terbaik/ Excellent
		Pantai Teluk Kalong	MMTC013	94	95	97	96	97	Terbaik/ Excellent
		Pantai Sura	MMTC014	94	94	96	97	96	Terbaik/ Excellent
		Pantai Tanjung Bidara	MMTC015	93	94	97	97	97	Terbaik/ Excellent
		Pantai Kemasik	MMTC016	90	97	97	96	95	Terbaik/ Excellent
Kelantan	Pantai/Coastal	Pantai Seri Tujuh	MMDC001	84	93	94	95	95	Terbaik/ Excellent
		Pantai Cahaya Bulan	MMDC002	92	95	95	96	97	Terbaik/ Excellent
		Pantai Sabak	MMDC003	89	95	95	96	96	Terbaik/ Excellent
		Pantai Irama Bachok	MMDC004	66	95	93	95	96	Terbaik/ Excellent
		Pantai Bisikan Bayu	MMDC005	83	95	94	96	96	Terbaik/ Excellent
		Pantai Melawi	MMDC006	83	95	95	95	96	Terbaik/ Excellent
Sarawak	Pantai/Coastal	Pantai Sematan	MMQC001	72	93	90	66	68	Sederhana/ Moderate
		Pantai Pandan	MMQC002	75	92	86	62	60	Sederhana/ Moderate

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Pantai/Coastal	Pantai Pasir Putih	MMQC003	80	84	85	76	64	Sederhana/ Moderate
		Pantai Bako	MMQC004	85	89	91	70	63	Sederhana/ Moderate
		Pantai Damai	MMQC005	68	86	89	75	74	Sederhana/ Moderate
		Pantai Tanjung Kembang	MMQC006	86	77	90	58	70	Sederhana/ Moderate
		Pantai Harmoni Mukah	MMQC007	60	67	73	76	78	Sederhana/ Moderate
		Pantai Tanjung Batu	MMQC008	56	81	74	58	68	Sederhana/ Moderate
		Pantai Likau	MMQC009	62	88	66	58	75	Sederhana/ Moderate
		Pantai Emas	MMQC010	62	75	66	58	72	Sederhana/ Moderate
		Pantai Piasau	MMQC011	70	85	74	72	58	Sederhana/ Moderate
		Pantai Brighton	MMQC012	79	75	56	61	57	Sederhana/ Moderate
		Pantai Esplaned	MMQC013	70	83	56	57	57	Sederhana/ Moderate
		Pantai Beraya	MMQC014	65	83	57	58	58	Sederhana/ Moderate
		Pantai Bungai	MMQC015	68	75	66	56	57	Sederhana/ Moderate
		Pantai Belawai	MMQC016	66	67	92	64	61	Sederhana/ Moderate
		Pantai Mukah	MMQC017	49	89	89	76	75	Sederhana/ Moderate
		Tanjung Kidurong	MMQC018	63	80	90	58	75	Sederhana/ Moderate
		Pasir Pandak	MMQC019	74	91	91	66	74	Sederhana/ Moderate
		Rambungan	MMQC020	69	93	83	71	76	Sederhana/ Moderate
		Sri Tanjung Lawas	MMQC021	71	68	67	59	59	Sederhana/ Moderate
		Pantai Luak	MMQC022	77	84	56	57	57	Sederhana/ Moderate
		Pasir Panjang	MMQC023	55	86	78	58	68	Sederhana/ Moderate
Sabah	Pantai/Coastal	Pantai Teluk Brunei 1	MMSC001	67	73	61	60	74	Sederhana/ Moderate
		Pantai Teluk Brunei 2	MMSC002	69	84	67	59	75	Sederhana/ Moderate
		Pantai Teluk Brunei 3	MMSC003	62	75	67	59	66	Sederhana/ Moderate
		Pantai Teluk Brunei 4	MMSC004	72	84	60	59	66	Sederhana/ Moderate
		Pantai Teluk Brunei 5	MMSC005	64	69	59	59	59	Sederhana/ Moderate
		Pantai Teluk Brunei 6	MMSC006	67	58	59	59	74	Sederhana/ Moderate
		Borneo Golf Seawater	MMSC007	72	59	67	59	71	Sederhana/ Moderate

Jadual 4.5: Status Kualiti Air Marin bagi Kawasan Pantai
Table 4.5: Marine Water Quality Status for Coastal Area

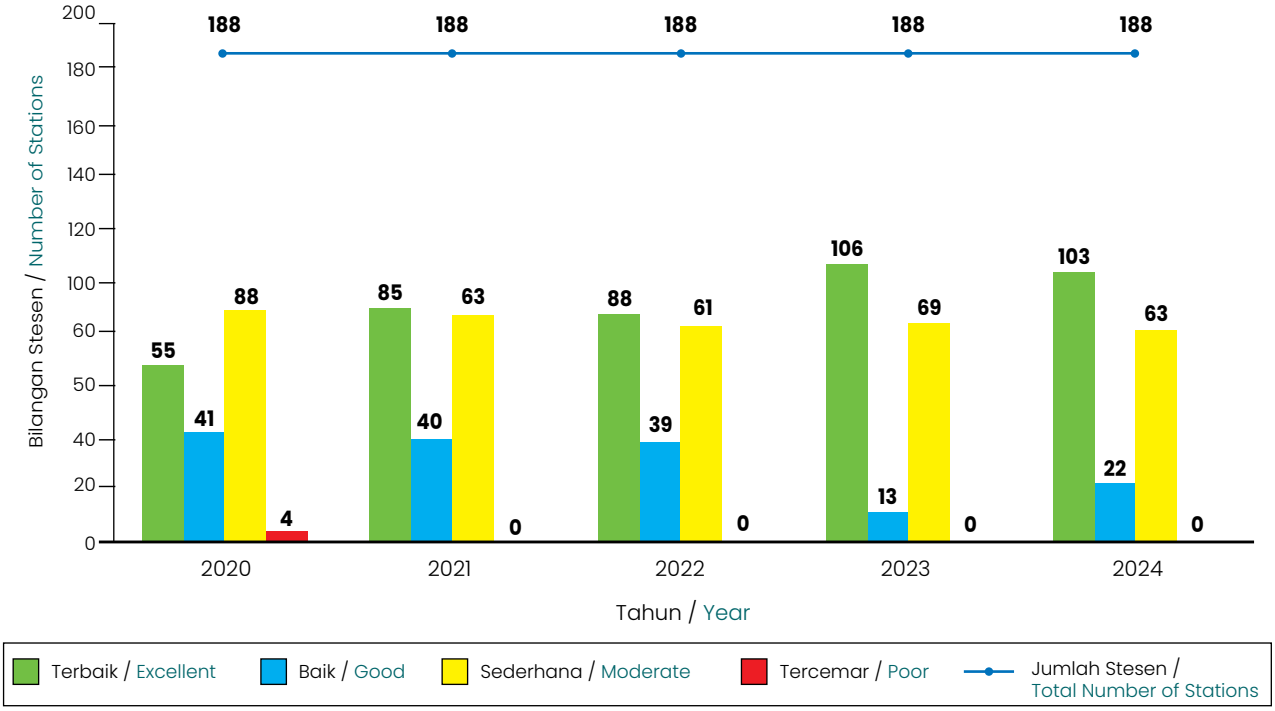
NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/ MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Pantai/Coastal	Pantai Manis Papar	MMSC008	60	59	60	62	59	Sederhana/ Moderate
		Pantai Melinsung	MMSC009	67	70	59	65	60	Sederhana/ Moderate
		Pantai Tanjung Aru (Roll Skating)	MMSC010	67	65	57	58	61	Sederhana/ Moderate
		Pantai Tanjung Aru (No. 3)	MMSC011	64	76	57	59	64	Sederhana/ Moderate
		Pantai Lok Kawi	MMSC012	72	65	58	59	58	Sederhana/ Moderate
		Pantai Dalit Tuaran	MMSC013	78	58	58	59	74	Sederhana/ Moderate
		Mangrove Paradise	MMSC014	73	58	58	61	72	Sederhana/ Moderate
		Pantai Sabandar	MMSC015	75	58	58	59	73	Sederhana/ Moderate
		Pantai Bak-Bak Kudat	MMSC016	62	76	85	59	64	Sederhana/ Moderate
		Pasir Putih Sandakan	MMSC017	63	83	82	58	73	Sederhana/ Moderate
		Pantai TLDM	MMSC018	72	75	62	59	89	Baik/Good
		Pantai Batu Sapi	MMSC019	61	76	75	58	77	Sederhana/ Moderate
		Pantai Ulu Tungku	MMSC020	66	57	58	59	69	Sederhana/ Moderate
		Pantai Sarina Kunak	MMSC021	74	58	58	59	62	Sederhana/ Moderate
		Pantai Kg. Lamak	MMSC022	64	57	61	59	68	Sederhana/ Moderate
		Pantai Tinagat	MMSC023	58	58	68	58	88	Baik/Good
		Pantai Tanjung Aru (Rest Lido)	MMSC024	63	69	58	59	81	Baik/Good
W.P. Labuan	Pantai/Coastal	Pulau Papan	MMLC001	62	59	58	59	58	Sederhana/ Moderate
		Kiamsam	MMLC002	68	58	58	59	72	Sederhana/ Moderate
		Sungai Pagar	MMLC003	61	58	59	59	76	Sederhana/ Moderate
		Layang-Layangan	MMLC004	69	57	58	59	74	Sederhana/ Moderate
		Tanjung Aru	MMLC005	58	59	60	59	65	Sederhana/ Moderate

Nota / Notes

Terbaik / Excellent | Baik / Good | Sederhana / Moderate | Tercemar / Poor

Rajah 4.8 menunjukkan bilangan stesen MMWQM mengikut status kualiti air marin bagi kawasan pesisir pantai bagi tahun 2020 hingga 2024. Bilangan stesen terbaik menurun sedikit daripada 106 stesen pada tahun 2023 kepada 103 stesen pada tahun 2024. Walau bagaimanapun, stesen dengan status kualiti air baik meningkat daripada 13 stesen pada tahun 2023 kepada 22 stesen pada tahun 2024. Tiada stesen tercemar yang direkodkan pada tahun 2024.

Figure 4.8 shows the number of MMWQM stations based on the marine water quality status in the coastal environment from 2020 to 2024. The number of excellent water quality stations decreased slightly from 106 stations in 2023 to 103 stations in 2024. However, the number of stations that were classified to have good water quality increased from 13 stations in year 2023 to 22 in year 2024. There was no polluted station recorded in year 2024.



Rajah 4.8: Trend Status Kualiti Air Marin bagi Kawasan Pantai, 2020-2024
Figure 4.8: The Marine Water Quality Status Trend for Coastal Area, 2020 -2024

STATUS KUALITI AIR MARIN BAGI MUARA SUNGAI

Status kualiti air marin bagi 85 stesen muara sungai telah dipantau pada tahun 2024. Daripada 85 stesen yang dipantau, kualiti air marin bagi tujuh (7) stesen (8%) telah dikategorikan sebagai terbaik, 14 stesen (17%) baik, 59 stesen (69%) dikategorikan sebagai sederhana manakala terdapat lima (5) stesen (6%) dikategorikan sebagai tercemar (**Jadual 4.6**). Bilangan stesen yang dikategorikan sebagai baik telah meningkat daripada sepuluh (10) stesen tahun lalu, kepada 14 stesen tahun ini. Namun, bilangan stesen yang disenaraikan sebagai tercemar telah bertambah daripada satu (1) stesen tahun lalu, kepada lima (5) stesen tahun ini.

MARINE WATER QUALITY STATUS FOR ESTUARY

The marine water quality status of a total of 85 estuary stations were monitored in 2024. Out of the 85 stations monitored this year, the marine water quality of seven (7) stations (8%) were ranked as excellent, 14 stations (17%) ranked as good, 59 stations (69%) were ranked as moderate, while five (5) stations (6%) were ranked as poor (**Table 4.6**). The number of stations that were categorised to have good water quality increased from ten (10) stations last year to 14 stations this year. However, the number of stations listed as poor increased from one (1) station last year to five (5) stations this year.

Jadual 4.6: Status Kualiti Air Marin bagi Muara Sungai
Table 4.6: Marine Water Quality Status for Estuary

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Perlis	Muara Sungai/ Estuary	Kuala Sungai Perlis	MMRE001	56	57	57	55	58	Sederhana/ Moderate
		Kuala Sungai Baru	MMRE002	54	57	57	56	56	Sederhana/ Moderate
Kedah	Muara Sungai/ Estuary	Kuala Kedah	MMKE001	53	57	56	54	64	Sederhana/ Moderate
		Kuala Jerlun	MMKE002	57	55	54	56	57	Sederhana/ Moderate
		Kuala Segantang Garam	MMKE003	70	69	72	58	57	Sederhana/ Moderate
		Kuala Sungai Muda	MMKE004	58	56	57	56	57	Sederhana/ Moderate
P.Pinang	Muara Sungai/ Estuary	Kuala Sungai Jawi	MMPE001	38	43	52	72	53	Sederhana/ Moderate
		Kuala Sungai Juru	MMPE002	30	42	53	55	47	Tercemar/ Poor
		Kuala Sungai Kerian	MMPE003	54	56	73	55	68	Sederhana/ Moderate
		Kuala Sungai Pinang	MMPE004	53	52	54	48	47	Tercemar/ Poor
		Kuala Sungai Perai	MMPE005	43	55	55	56	55	Sederhana/ Moderate
		Kuala Sungai Tengah	MMPE006	52	57	81	87	65	Sederhana/ Moderate
		Kuala Sungai Pinang (Balik Pulau)	MMPE007	48	56	58	72	56	Sederhana/ Moderate
Perak	Muara Sungai/ Estuary	Kuala Sungai Manjung	MMAE001	75	73	85	89	94	Terbaik/ Excellent
		Kuala Sungai Gula	MMAE002	53	54	79	57	58	Sederhana/ Moderate
		Kuala Sungai Kurau	MMAE003	53	54	64	56	58	Sederhana/ Moderate
		Kuala Sungai Tanjung Piandang	MMAE004	38	45	50	51	51	Sederhana/ Moderate
		Kuala Sungai Sepetang	MMAE005	48	55	53	53	58	Sederhana/ Moderate
		Kuala Sungai Perak	MMAE006	58	55	75	62	82	Baik/Good
Selangor	Muara Sungai/ Estuary	Kuala Sungai Sepang	MMBE001	57	66	72	83	70	Sederhana/ Moderate
		Kuala Sungai Sepang (Kecil)	MMBE002	88	80	58	82	57	Sederhana/ Moderate
		Kuala Sungai Sepang (Kawalan)	MMBE003	88	81	91	90	84	Baik/Good
		Kuala Sungai Langat (Jugra)	MMBE004	44	54	58	63	53	Sederhana/ Moderate
		Kuala Sungai Klang	MMBE005	35	40	43	51	51	Sederhana/ Moderate
		Kuala Sungai Langat (Lumut)	MMBE006	45	54	55	60	63	Sederhana/ Moderate

Jadual 4.6: Status Kualiti Air Marin bagi Muara Sungai
Table 4.6: Marine Water Quality Status for Estuary

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Selangor	Muara Sungai/ Estuary	Kuala Sungai Buloh	MMBE007	58	57	56	64	56	Sederhana/ Moderate
		Kuala Sungai Selangor	MMBE008	45	43	51	55	49	Tercemar/ Poor
		Kuala Sungai Tengi	MMBE009	43	51	48	56	52	Sederhana/ Moderate
		Kuala Sungai Bernam	MMBE010	55	55	61	54	55	Sederhana/ Moderate
N. Sembilan	Muara Sungai/ Estuary	Kuala Sungai Linggi	MMNE001	64	68	55	68	67	Sederhana/ Moderate
		Kuala Sungai Lukut	MMNE002	52	56	53	55	52	Sederhana/ Moderate
Melaka	Muara Sungai/ Estuary	Kuala Sungai Melaka	MMME001	56	60	63	56	54	Sederhana/ Moderate
		Kuala Sungai Sri Melaka	MMME002	53	50	54	53	56	Sederhana/ Moderate
		Kuala Sungai Merlimau	MMME003	55	58	57	53	55	Sederhana/ Moderate
		Kuala Sungai Kesang	MMME004	85	74	57	57	56	Sederhana/ Moderate
		Kuala Sungai Sebatu	MMME005	63	63	75	57	53	Sederhana/ Moderate
		Kuala Sungai Melaka 2	MMME006	54	56	54	55	55	Sederhana/ Moderate
		Kuala Sungai Baru	MMME007	56	57	64	54	56	Sederhana/ Moderate
		Kuala Sungai Lereh	MMME008	57	55	56	53	49	Tercemar/ Poor
Johor	Muara Sungai/ Estuary	Kuala Sungai Segget	MMJE001	41	51	46	51	53	Sederhana/ Moderate
		Kuala Sungai Laloh	MMJE002	42	55	54	52	59	Sederhana/ Moderate
		Kuala Sungai Johor	MMJE003	88	92	92	81	89	Baik/Good
		Kuala Sungai Batu Pahat	MMJE004	67	58	57	57	52	Sederhana/ Moderate
		Kuala Sungai Muar	MMJE005	57	57	55	56	56	Sederhana/ Moderate
		Kuala Sungai Mersing	MMJE006	62	59	59	78	58	Sederhana/ Moderate
Pahang	Muara Sungai/ Estuary	Kuala Kuantan	MMCE001	59	58	58	58	60	Sederhana/ Moderate
		Kuala Rompin Kecil	MMCE002	79	72	79	90	87	Baik/Good
		Kuala Pahang	MMCE003	59	57	59	81	59	Sederhana/ Moderate
		Kuala Nenasi	MMCE004	93	85	91	89	89	Baik/Good
		Kuala Sungai Balok	MMCE005	59	55	65	54	41	Tercemar/ Poor
Terengganu	Muara Sungai/ Estuary	Kuala Sungai Besut	MMTE001	59	74	70	60	89	Baik/Good
		Kuala Sungai Dungun	MMTE002	60	69	59	85	87	Baik/Good
		Kuala Sungai Ibai	MMTE003	77	90	87	73	92	Terbaik/ Excellent

Jadual 4.6: Status Kualiti Air Marin bagi Muara Sungai
Table 4.6: Marine Water Quality Status for Estuary

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Terengganu	Muara Sungai/ Estuary	Kuala Sungai Kerteh	MMTE004	73	58	75	75	85	Baik/Good
		Kuala Sungai Marang	MMTE005	71	84	84	79	86	Baik/Good
		Kuala Sungai Paka	MMTE006	73	65	87	83	83	Baik/Good
		Kuala Sungai Setiu	MMTE007	64	92	75	92	92	Terbaik/ Excellent
		Kuala Sungai Terengganu	MMTE008	59	66	59	69	59	Sederhana/ Moderate
		Kuala Sungai Kemaman/Chukai	MMTE009	60	58	59	60	64	Sederhana/ Moderate
		Tioxide Utara (Kg. Bukit Kuang, Kijal)	MMTE010	94	94	97	95	97	Terbaik/ Excellent
		Tioxide Tengah (Pupuk Semangat, Kijal)	MMTE011	87	93	96	95	97	Terbaik/ Excellent
		Tioxide Selatan (Ksb, T. Kalong)	MMTE012	94	86	95	95	97	Terbaik/ Excellent
		Pulau Duyung	MMTE013	59	59	60	59	59	Sederhana/ Moderate
Kelantan	Muara Sungai/ Estuary	Kuala Sungai Golok	MMDE001	59	79	65	74	87	Baik/Good
		Kuala Sungai Kelantan	MMDE002	58	70	57	66	79	Sederhana/ Moderate
		Kuala Sungai Pengkalan Chepa	MMDE003	56	64	59	61	59	Sederhana/ Moderate
		Kuala Sungai Pengkalan Datu	MMDE004	59	59	69	59	87	Baik/Good
		Kuala Sungai Kemasin	MMDE005	56	59	58	63	89	Baik/Good
		Kuala Sungai Semerak	MMDE006	59	85	60	83	91	Terbaik/ Excellent
Sarawak	Muara Sungai/ Estuary	Kuala Sungai Semantan	MMQE001	65	90	70	71	62	Sederhana/ Moderate
		Kuala Sungai Sarawak	MMQE002	64	85	82	71	73	Sederhana/ Moderate
		Kuala Sungai Bako	MMQE003	56	79	88	70	68	Sederhana/ Moderate
		Kuala Sungai Santubong	MMQE004	76	90	90	64	73	Sederhana/ Moderate
		Kuala Batang Krian (Kabong)	MMQE005	83	71	87	58	58	Sederhana/ Moderate
		Kuala Batang Rejang	MMQE006	66	85	82	59	72	Sederhana/ Moderate
		Kuala Mukah	MMQE007	50	62	70	58	80	Baik/Good
		Kuala Batang Kemena	MMQE008	53	58	55	58	61	Sederhana/ Moderate
		Kuala Tanjung Similajau	MMQE009	55	85	67	59	59	Sederhana/ Moderate
		Kuala Sungai Panipah	MMQE010	55	83	64	58	62	Sederhana/ Moderate
		Kuala Pantai Nyalau	MMQE011	58	71	84	61	59	Sederhana/ Moderate

Jadual 4.6: Status Kualiti Air Marin bagi Muara Sungai
Table 4.6: Marine Water Quality Status for Estuary

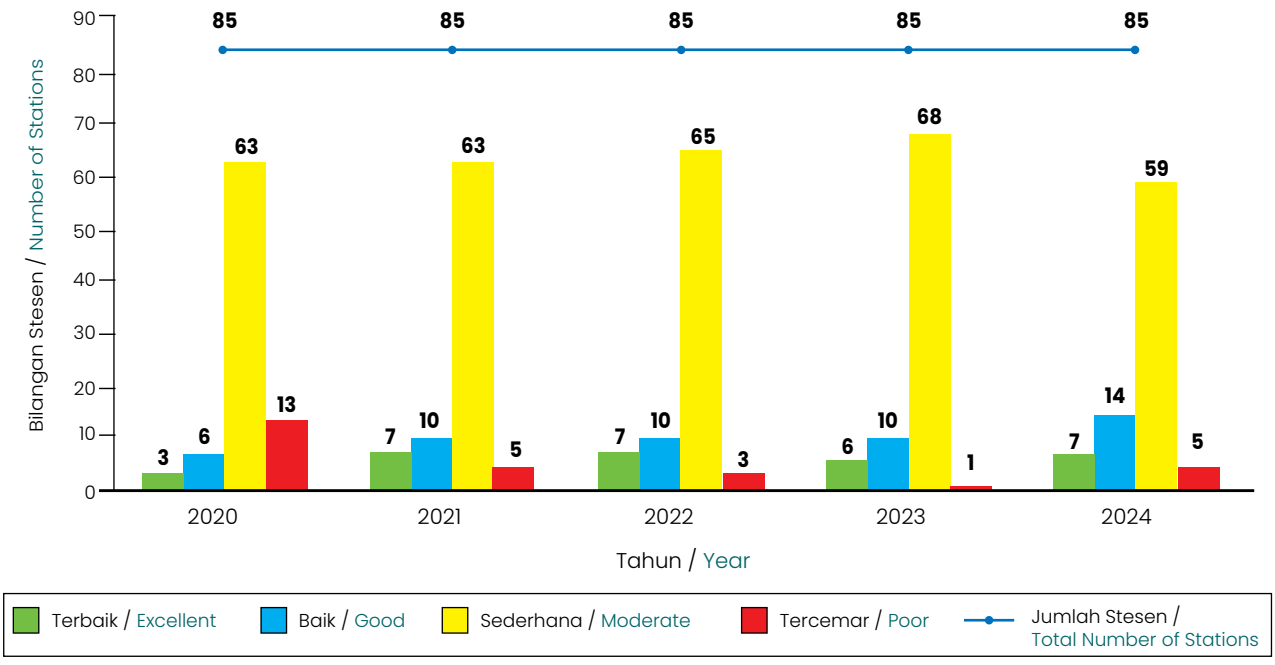
NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sarawak	Muara Sungai/ Estuary	Kuala Sungai Baram	MMQE012	57	76	55	61	58	Sederhana/ Moderate
		Kuala Sungai Miri	MMQE013	68	63	54	64	57	Sederhana/ Moderate
		Kuala Sungai Trusan	MMQE014	54	64	56	58	78	Sederhana/ Moderate
Sabah	Muara Sungai/ Estuary	Kuala Penyu	MMSE001	63	58	66	65	57	Sederhana/ Moderate
		Muara Sungai Inanam	MMSE002	57	59	58	59	57	Sederhana/ Moderate

Nota / Notes

Terbaik / Excellent | Baik / Good | Sederhana / Moderate | Tercemar / Poor

Rajah 4.9 menunjukkan trend status kualiti air marin bagi stesen muara sungai mengikut bilangan stesen pengawasan. Pada tahun 2024, bilangan stesen yang dikategorikan sebagai terbaik adalah tujuh (7) dan baik adalah 14. Bilangan stesen sederhana telah berkurang daripada 68 stesen pada tahun 2023 kepada 59 stesen pada tahun 2024. Namun, bilangan stesen yang dikategorikan sebagai tercemar telah meningkat daripada satu (1) stesen pada tahun 2023, kepada lima (5) stesen pada tahun 2024.

Figure 4.9 displays the marine water quality status trend for estuaries based on the number of monitoring stations. In 2024, the number of stations classified as excellent were seven (7) and good were 14. The number of moderate stations decreased from 68 in year 2023 to 59 stations in 2024. However, the number of stations that were categorised as poor increased from one (1) station in 2023 to five (5) stations in 2024.



Rajah 4.9: Trend Status Kualiti Air Marin bagi Kawasan Muara Sungai, 2020-2024
Figure 4.9: The Marine Water Quality Status Trend for Estuary, 2020-2024

STATUS KUALITI AIR MARIN BAGI PULAU

Sebanyak 95 stesen pengawasan kualiti air marin bagi pulau telah dibangunkan meliputi 79 pulau yang telah dipantau pada tahun 2024. **Jadual 4.7** menunjukkan senarai stesen pengawasan kualiti air marin bagi pulau. Daripada 95 stesen pengawasan, 61 stesen (64%) dikategorikan sebagai terbaik, tiga (3) stesen (3%) baik serta 31 stesen (33%) sederhana. Tiada stesen yang dikategorikan sebagai tercemar pada tahun 2024 (**Jadual 4.8**).

MARINE WATER QUALITY STATUS FOR ISLANDS

A total of 95 island water quality monitoring stations were established for 79 islands that were monitored in the year 2024. **Table 4.7** shows the list of marine water quality monitoring stations for islands. Out of the 95 monitoring stations, 61 stations (64%) were ranked excellent, three (3) stations (3%) ranked good, and the remaining 31 stations (33%) were ranked moderate. No station was ranked to have poor marine water quality in 2024 (**Table 4.8**).

Jadual 4.7: Stesen-Stesen Pengawasan Kualiti Air Marin bagi Pulau
Table 4.7: Marine Water Quality Monitoring Stations for Island

NEGERI / STATE	BIL. PULAU / NO. OF ISLAND	BIL. STESEN / NO. OF STATION	PULAU / ISLAND	ID STESEN LAMA/ OLD STATION ID	ID STESEN BARU/ NEW STATION ID	KATEGORI / CATEGORY
Kedah	11	1	Singa Besar	7KR01	MMKR001	PERANGINAN / RESORT
		2	Dayang Bunting	7KR02	MMKR002	PERANGINAN / RESORT
			Dayang Bunting 2*	NA	MMKR003	PERANGINAN / RESORT
		1	Pulau Perak	7KP01	MMKP004	DILINDUNGI / PROTECTED
		1	Payar	7KM03	MMKM001	TAMAN LAUT / MARINE PARK
		1	Kaca	7KM04	MMKM002	TAMAN LAUT / MARINE PARK
		1	Segantang	7KM06	MMKM003	TAMAN LAUT / MARINE PARK
		4	Pantai Kuah	7KD07	MMKD001	PEMBANGUNAN / DEVELOPMENT
			Pantai Chenang	7KD09	MMKD002	PEMBANGUNAN / DEVELOPMENT
			Tanjung Rhu	7KD010	MMKD003	PEMBANGUNAN / DEVELOPMENT
			Teluk Ewa	7KD08	MMKD004	PEMBANGUNAN / DEVELOPMENT
		1	Lembu**	7KM05	NA	TAMAN LAUT / MARINE PARK
		1	Pasir*	NA	MMKP001	DILINDUNGI / PROTECTED
		1	Gasing*	NA	MMKP002	DILINDUNGI / PROTECTED
		1	Dangli*	NA	MMKP003	DILINDUNGI / PROTECTED
P. Pinang	7	1	Tanjung Tokong*	NA	MMPP001	DILINDUNGI / PROTECTED
		3	Batu Maung	7PD01	MMPD001	PEMBANGUNAN / DEVELOPMENT
			Padang Kota	7PD04	MMPD002	PEMBANGUNAN / DEVELOPMENT
			Teluk Bahang	7PD03	MMPD003	PEMBANGUNAN / DEVELOPMENT
		1	Aman	7PR05	MMPR001	PERANGINAN / RESORT
		1	Jerejak	7PR06	MMPR002	PERANGINAN / RESORT
		1	Kendi	7PR07	MMPR003	PERANGINAN / RESORT
		1	Rimau	7PR08	MMPR004	PERANGINAN / RESORT
		1	Gedong	7PR09	MMPR005	PERANGINAN / RESORT

Jadual 4.7: Stesen-Stesen Pengawasan Kualiti Air Marin bagi Pulau
Table 4.7: Marine Water Quality Monitoring Stations for Island

NEGERI / STATE	BIL. PULAU / NO. OF ISLAND	BIL. STESEN / NO. OF STATION	PULAU / ISLAND	ID STESEN LAMA/ OLD STATION ID	ID STESEN BARU/ NEW STATION ID	KATEGORI / CATEGORY
Perak	4	2	Pantai Teluk Gedong	7AR01	MMAR001	PERANGINAN / RESORT
			Pantai Puteri Dewi	7AR02	MMAR002	PERANGINAN / RESORT
		1	Pangkor Laut	7AR03	MMAR003	PERANGINAN / RESORT
		1	Sembilan	7AR04	MMAR004	PERANGINAN / RESORT
		1	Tukun Perak	7AP05	MMAP001	DILINDUNGI / PROTECTED
Selangor	3	1	Ketam	7BR01	MMBR001	PERANGINAN / RESORT
		1	Angsa	7BR02	MMBR002	PERANGINAN / RESORT
		1	Lumut	7BR03	MMBR003	PERANGINAN / RESORT
N. Sembilan	1	1	Arang	7NP01	MMNP001	DILINDUNGI / PROTECTED
Melaka	3	2	Upeh (Point A)	7MR02	MMMR001	PERANGINAN / RESORT
			Upeh (Point B)	7MR02	MMMR002	PERANGINAN / RESORT
		2	Besar (Point A)	7MR01	MMMR003	PERANGINAN / RESORT
			Besar (Point B)	7MR01	MMMR004	PERANGINAN / RESORT
		2	Undan (Point A)	7MR03	MMMR005	PERANGINAN / RESORT
			Undan (Point B)	7MR03	MMMR006	PERANGINAN / RESORT
Johor	8	1	Setindan	7JR01	MMJR001	PERANGINAN / RESORT
		1	Babi Tengah	7JR02	MMJR002	PERANGINAN / RESORT
		1	Dayang	7JM03	MMJM001	TAMAN LAUT / MARINE PARK
		1	Nanga Besar	7JM08	MMJM002	TAMAN LAUT / MARINE PARK
		1	Sibu Tengah	7JM11	MMJM003	TAMAN LAUT / MARINE PARK
		1	Pemanggil	7JM15	MMJM004	TAMAN LAUT / MARINE PARK
		1	Kukup	7JP17	MMJP001	DILINDUNGI / PROTECTED
		1	Pisang	7JP18	MMJP002	DILINDUNGI / PROTECTED
Pahang	9	1	Pulau Tioman (Kg. Genting)	7CM02	MMCM001	TAMAN LAUT / MARINE PARK
		1	Pulau Tioman (Teluk Salang)	7CM01	MMCM002	TAMAN LAUT / MARINE PARK
		1	Tulai	7CM05	MMCM003	TAMAN LAUT / MARINE PARK
		1	Labas	7CM07	MMCM004	TAMAN LAUT / MARINE PARK
		1	Cebeh	7CM04	MMCM005	TAMAN LAUT / MARINE PARK
		1	Sepui	7CM06	MMCM006	TAMAN LAUT / MARINE PARK
		1	Sembilang	7CM08	MMCM007	TAMAN LAUT / MARINE PARK
		1	Seri Buat	7CM03	MMCM008	TAMAN LAUT / MARINE PARK
		1	Tokong Bahara	7CM09	MMCM009	TAMAN LAUT / MARINE PARK
Terengganu	9	1	Gemia	7TR01	MMTR001	PERANGINAN / RESORT
		1	Perhentian Besar (South)	7TM04	MMTM001	TAMAN LAUT / MARINE PARK
		2	Perhentian Besar (West)	7TM05	MMTM002	TAMAN LAUT / MARINE PARK
			Perhentian Kecil	7TM06	MMTM003	TAMAN LAUT / MARINE PARK

Jadual 4.7: Stesen-Stesen Pengawasan Kualiti Air Marin bagi Pulau
Table 4.7: Marine Water Quality Monitoring Stations for Island

NEGERI / STATE	BIL. PULAU / NO. OF ISLAND	BIL. STESEN / NO. OF STATION	PULAU / ISLAND	ID STESEN LAMA/ OLD STATION ID	ID STESEN BARU/ NEW STATION ID	KATEGORI / CATEGORY
Terengganu		2	Redang (North)	7TM07	MMTM004	TAMAN LAUT / MARINE PARK
			Redang (South)	7TM08	MMTM005	TAMAN LAUT / MARINE PARK
		1	Lang Tengah	7TM11	MMTM006	TAMAN LAUT / MARINE PARK
		1	Pinang	7TM12	MMTM007	TAMAN LAUT / MARINE PARK
		1	Ekor Tebu	7TM13	MMTM008	TAMAN LAUT / MARINE PARK
		1	Lima	7TM14	MMTM009	TAMAN LAUT / MARINE PARK
		1	Kapas	7TM09	MMTM010	TAMAN LAUT / MARINE PARK
Kelantan	2	1	Panjang	7DP01	MMDP001	DILINDUNGI / PROTECTED
		1	Kundur	7DP02	MMDP002	DILINDUNGI / PROTECTED
Sarawak	3	1	Satang	7QP01	MMQP001	DILINDUNGI / PROTECTED
		1	Talang-Talang Kecil	7QP02	MMQP002	DILINDUNGI / PROTECTED
		1	Talang-Talang Besar	7QP03	MMQP003	DILINDUNGI / PROTECTED
Sabah	16	1	Gaya	7SR01	MMSR001	PERANGINAN / RESORT
		1	Mabul	7SR03	MMSR002	PERANGINAN / RESORT
		2	Sipadan (N)	7SR04	MMSR003	PERANGINAN / RESORT
			Sipadan (W)	7SR05	MMSR004	PERANGINAN / RESORT
		1	Manukan	7SM09	MMSR005	PERANGINAN / RESORT
		1	Tiga	7SR10	MMSR006	PERANGINAN / RESORT
		1	Kapalai	7SR12	MMSR007	PERANGINAN / RESORT
		1	Molleangan Besar	7SR14	MMSR008	PERANGINAN / RESORT
		1	Banggi (South)	7SR15	MMSR009	PERANGINAN / RESORT
		1	Banggi (East)	7SR20	MMSR010	PERANGINAN / RESORT
		1	Balambangan	7SR16	MMSR011	PERANGINAN / RESORT
		1	Mantanani Besar	7SR21	MMSR012	PERANGINAN / RESORT
		1	Sapi	7SM08	MMSM001	TAMAN LAUT / MARINE PARK
		1	Kalampunian Besar	7SM11	MMSM002	TAMAN LAUT / MARINE PARK
		1	Selingan	7SP17	MMSP001	DILINDUNGI / PROTECTED
		1	Gulisan	7SP18	MMSP002	DILINDUNGI / PROTECTED
		1	Bakungan Kecil	7SP19	MMSP003	DILINDUNGI / PROTECTED
W.P Labuan	4	1	Kuraman	7LM05	MMLM001	TAMAN LAUT / MARINE PARK
		1	Rusukan Besar	7LM07	MMLM002	TAMAN LAUT / MARINE PARK
		1	Rusukan Kecil	7LM06	MMLM003	TAMAN LAUT / MARINE PARK
		4	Pohon Batu	7LD01	MMLD001	PEMBANGUNAN / DEVELOPMENT
			Water Front	7LD02	MMLD002	PEMBANGUNAN / DEVELOPMENT
			Lubuk Temiang	7LD03	MMLD003	PEMBANGUNAN / DEVELOPMENT
			Ranca-Ranca	7LD04	MMLD004	PEMBANGUNAN / DEVELOPMENT

Nota / Notes:
* (Stesen baru / New station)
** (Stesen tutup / Closed station)
NA (Tidak berkenaan / Not available)

Jadual 4.8: Status Kualiti Air Marin bagi Pulau
Table 4.8: Marine Water Quality Status for Island

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Kedah	Pulau/Island	Pantai Kuah	MMKD001	92	93	91	96	95	Terbaik/Excellent
		Pantai Chenang	MMKD002	93	91	89	94	96	Terbaik/Excellent
		Tanjung Rhu	MMKD003	93	91	91	96	96	Terbaik/Excellent
		Teluk Ewa	MMKD004	94	92	96	88	96	Terbaik/Excellent
		Payar	MMKM001	96	95	96	96	96	Terbaik/Excellent
		Kaca	MMKM002	95	95	94	97	97	Terbaik/Excellent
		Segantang	MMKM003	95	96	96	97	95	Terbaik/Excellent
		Pasir	MMKP001	96	96	96	96	96	Terbaik/Excellent
		Gasing	MMKP002	95	92	97	96	96	Terbaik/Excellent
		Dangli	MMKP003	95	91	97	96	96	Terbaik/Excellent
		Pulau Perak	MMKP004	89	92	96	96	96	Terbaik/Excellent
		Singa Besar	MMKR001	92	88	90	96	95	Terbaik/Excellent
		Dayang Bunting	MMKR002	87	95	91	96	95	Terbaik/Excellent
		Dayang Bunting 2	MMKR003	94	92	94	96	96	Terbaik/Excellent
P. Pinang	Pulau/Island	Batu Maung	MMPD001	57	57	59	67	69	Sederhana/ Moderate
		Padang Kota	MMPD002	67	60	81	75	76	Sederhana/ Moderate
		Teluk Bahang	MMPD003	85	83	87	94	87	Baik/Good
		Tanjung Tokong	MMPP001	71	68	83	88	93	Terbaik/Excellent
		Aman	MMPR001	72	72	92	91	92	Terbaik/Excellent
		Jerejak	MMPR002	58	76	59	73	70	Sederhana/ Moderate
		Kendi	MMPR003	93	92	85	96	95	Terbaik/Excellent
		Rimau	MMPR004	90	92	93	96	96	Terbaik/Excellent
		Gedong	MMPR005	84	82	91	91	92	Terbaik/Excellent
Perak	Pulau/Island	Tukun Perak	MMAP001	93	96	96	92	96	Terbaik/Excellent
		Pantai Teluk Gedong	MMAR001	79	88	84	91	96	Terbaik/Excellent
		Pantai Puteri Dewi	MMAR002	95	95	94	94	96	Terbaik/Excellent
		Pangkor Laut	MMAR003	93	96	95	95	94	Terbaik/Excellent
		Sembilan	MMAR004	91	94	96	93	96	Terbaik/Excellent
Selangor	Pulau/Island	Ketam	MMBR001	68	72	85	94	88	Baik/Good
		Angsa	MMBR002	58	89	83	95	93	Terbaik/Excellent
		Lumut	MMBR003	46	50	47	53	53	Sederhana/ Moderate
N. Sembilan	Pulau/Island	Arang	MMNP001	92	94	92	94	95	Terbaik/Excellent

Jadual 4.8: Status Kualiti Air Marin bagi Pulau
Table 4.8: Marine Water Quality Status for Island

NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Melaka	Pulau/Island	Upeh (Point A)	MMMR001	87	77	77	94	92	Terbaik/Excellent
		Upeh (Point B)	MMMR002	80	87	85	94	94	Terbaik/Excellent
		Besar (Point A)	MMMR003	95	96	95	95	96	Terbaik/Excellent
		Besar (Point B)	MMMR004	95	94	94	95	96	Terbaik/Excellent
		Undan (Point A)	MMMR005	96	96	94	95	96	Terbaik/Excellent
		Undan (Point B)	MMMR006	96	95	94	94	96	Terbaik/Excellent
Johor	Pulau/Island	Dayang	MMJM001	94	95	93	97	96	Terbaik/Excellent
		Nanga Besar	MMJM002	78	78	94	97	97	Terbaik/Excellent
		Sibu Tengah	MMJM003	86	96	96	97	96	Terbaik/Excellent
		Pemanggil	MMJM004	95	94	95	96	96	Terbaik/Excellent
		Kukup	MMJP001	62	70	89	73	86	Baik/Good
		Pisang	MMJP002	94	86	90	92	95	Terbaik/Excellent
		Setindan	MMJR001	95	97	97	96	97	Terbaik/Excellent
		Babi Tengah	MMJR002	94	93	97	97	97	Terbaik/Excellent
Pahang	Pulau/Island	Pulau Tioman (Kg. Genting)	MMCM001	89	96	96	97	96	Terbaik/Excellent
		Pulau Tioman (Teluk Salang)	MMCM002	95	96	97	97	96	Terbaik/Excellent
		Tulai	MMCM003	95	97	97	97	96	Terbaik/Excellent
		Labas	MMCM004	95	97	97	96	96	Terbaik/Excellent
		Cebeh	MMCM005	96	96	97	97	97	Terbaik/Excellent
		Sepui	MMCM006	96	97	96	97	97	Terbaik/Excellent
		Sembilang	MMCM007	94	97	97	97	97	Terbaik/Excellent
		Seri Buat	MMCM008	93	97	97	97	96	Terbaik/Excellent
		Tokong Bahara	MMCM009	69	95	97	97	95	Terbaik/Excellent
Terengganu	Pulau/Island	Perhentian Besar (South)	MMTM001	95	97	96	97	96	Terbaik/Excellent
		Perhentian Besar (West)	MMTM002	96	96	97	97	97	Terbaik/Excellent
		Perhentian Kecil	MMTM003	96	97	97	96	97	Terbaik/Excellent
		Redang (North)	MMTM004	96	96	97	97	97	Terbaik/Excellent
		Redang (South)	MMTM005	95	96	97	97	96	Terbaik/Excellent
		Lang Tengah	MMTM006	96	97	97	97	97	Terbaik/Excellent
		Pinang	MMTM007	95	96	97	97	97	Terbaik/Excellent
		Ekor Tebu	MMTM008	97	97	97	97	96	Terbaik/Excellent
		Lima	MMTM009	96	97	97	97	97	Terbaik/Excellent
		Kapas	MMTM010	94	96	97	97	96	Terbaik/Excellent
		Gemia	MMTR001	90	94	97	97	97	Terbaik/Excellent
Kelantan	Pulau/Island	Panjang	MMDP001	77	92	95	95	96	Terbaik/Excellent
		Kundur	MMDP002	84	92	96	95	96	Terbaik/Excellent
Sarawak	Pulau/Island	Satang	MMQP001	76	86	89	81	78	Sederhana/ Moderate
		Talang-Talang Kecil	MMQP002	69	93	86	84	59	Sederhana/ Moderate
		Talang-Talang Besar	MMQP003	79	93	80	60	62	Sederhana/ Moderate

Jadual 4.8: Status Kualiti Air Marin bagi Pulau
Table 4.8: Marine Water Quality Status for Island

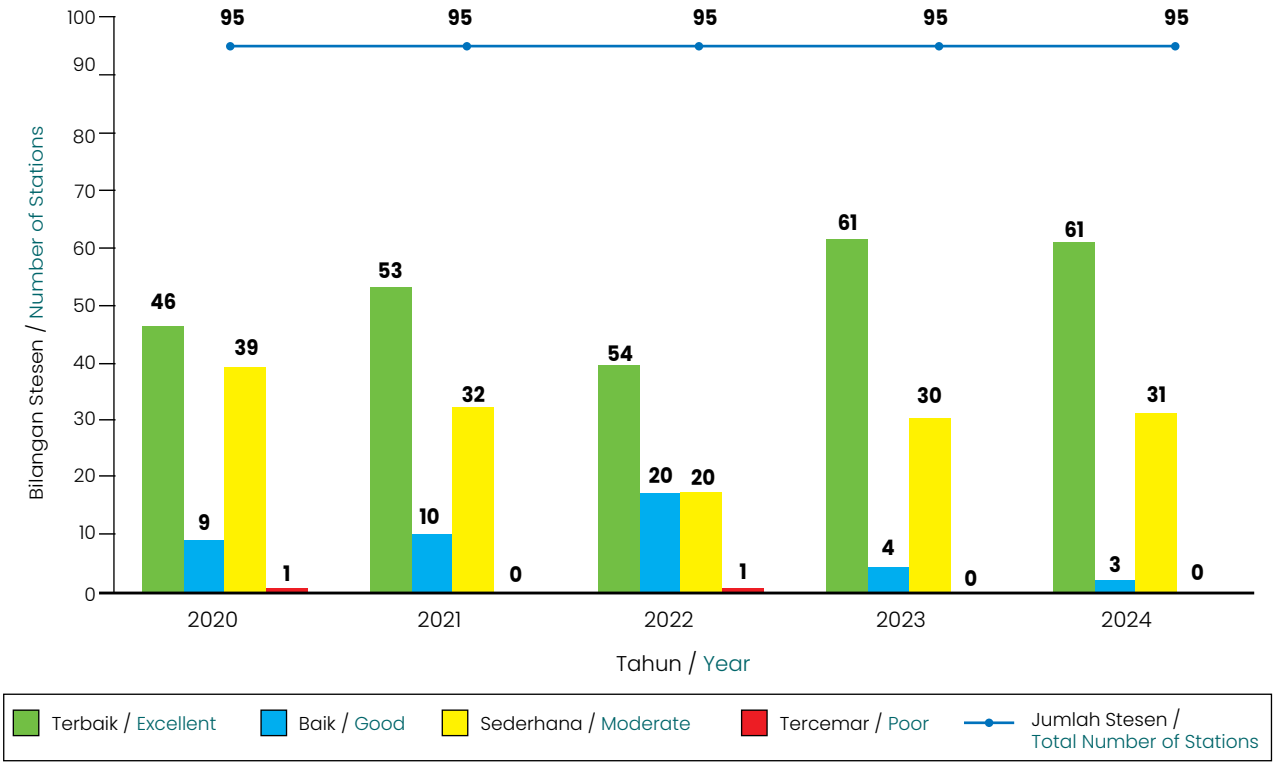
NEGERI/ STATE	KLASIFIKASI STESEN/ STATION CLASSIFICATION	KAWASAN/ AREA	NOMBOR STESEN/ STATION NUMBER	NILAI IKAMM/MMWQI VALUE					KATEGORI (2024)/ CATEGORY (2024)
				2020	2021	2022	2023	2024	
Sabah	Pulau/Island	Sapi	MMSM001	65	81	58	59	69	Sederhana/ Moderate
		Kalampunian Besar	MMSM002	67	58	64	60	58	Sederhana/ Moderate
		Selingan	MMSP001	60	74	81	59	77	Sederhana/ Moderate
		Gulisan	MMSP002	65	70	72	59	59	Sederhana/ Moderate
		Bakungan Kecil	MMSP003	59	75	88	59	65	Sederhana/ Moderate
		Gaya	MMSR001	68	72	58	58	71	Sederhana/ Moderate
		Mabul	MMSR002	58	71	74	59	58	Sederhana/ Moderate
		Sipadan (N)	MMSR003	59	66	86	58	71	Sederhana/ Moderate
		Sipadan (W)	MMSR004	58	61	62	62	67	Sederhana/ Moderate
		Manukan	MMSR005	75	86	57	59	62	Sederhana/ Moderate
		Tiga	MMSR006	72	58	61	71	59	Sederhana/ Moderate
		Kapalai	MMSR007	58	77	69	63	58	Sederhana/ Moderate
		Molleangan Besar	MMSR008	61	61	85	59	76	Sederhana/ Moderate
		Banggi (South)	MMSR009	65	58	81	59	60	Sederhana/ Moderate
		Banggi (East)	MMSR010	75	60	85	58	68	Sederhana/ Moderate
		Balambangan	MMSR011	69	71	85	59	73	Sederhana/ Moderate
		Mantanani Besar	MMSR012	72	58	58	59	61	Sederhana/ Moderate
W.P. Labuan	Pulau/Island	Pohon Batu	MMLD001	67	58	58	59	72	Sederhana/ Moderate
		Water Front	MMLD002	59	58	63	59	58	Sederhana/ Moderate
		Lubuk Temiang	MMLD003	69	58	63	58	74	Sederhana/ Moderate
		Ranca-Ranca	MMLD004	59	60	59	59	75	Sederhana/ Moderate
		Kuraman	MMLM001	67	58	58	59	74	Sederhana/ Moderate
		Rusukan Besar	MMLM002	59	58	64	59	73	Sederhana/ Moderate
		Rusukan Kecil	MMLM003	64	58	59	59	71	Sederhana/ Moderate

Nota / Notes

Terbaik / Excellent | Baik / Good | Sederhana / Moderate | Tercemar / Poor

Rajah 4.10 memaparkan trend bilangan stesen mengikut status kualiti air marin bagi stesen pulau. Bilangan stesen yang dikategorikan mempunyai status kualiti air marin terbaik kekal pada 61 stesen pada tahun 2024, sama seperti yang dilaporkan pada tahun 2023. Bilangan stesen baik sedikit menurun daripada empat (4) stesen pada tahun 2023 kepada tiga (3) stesen pada tahun 2024. Bilangan stesen sederhana pula meningkat daripada 30 stesen tahun lalu kepada 31 stesen tahun ini. Tiada stesen tercemar dilaporkan pada tahun 2024.

Figure 4.10 shows the trend of the marine water quality status for island stations. The number of stations categorised as excellent remained at 61 stations in 2024, the same as reported in 2023. The number of stations with good quality slightly decreased from four (4) stations in 2023 to three (3) stations in 2024. The number of stations with moderate quality increased from 30 stations last year to 31 stations this year. No polluted station was reported in 2024.



Rajah 4.10: Trend Status Kualiti Air Marin bagi Pulau, 2020-2024
Figure 4.10: The Trend of Marine Water Quality Status for Island, 2020-2024

Jadual 4.9 menunjukkan status kualiti air marin mengikut bilangan stesen dan kategori stesen bagi tahun 2023 dan 2024. **Jadual 4.10** menunjukkan status kualiti air marin mengikut peratusan bilangan stesen dan kategori stesen bagi tahun 2023 dan 2024.

Table 4.9 shows the marine water quality status by number of stations and station categories for 2023 and 2024. **Table 4.10** shows the marine water quality status by number of stations and station categories on a percentage basis for 2023 and 2024.

Jadual 4.9: Status Kualiti Air Marin mengikut Bilangan Stesen dan Kategori Stesen, 2023-2024
Table 4.9: Marine Water Quality Status by Number of Stations and Station Categories, 2023-2024

KATEGORI STESEN / STATION CATEGORY	TERBAIK / EXCELLENT (%)		BAIK / GOOD (%)		SEDERHANA / MODERATE (%)		TERCEMAR / POOR (%)	
	2023	2024	2023	2024	2023	2024	2023	2024
Pantai / Coastal	106	103	13	22	69	63	0	0
Muara Sungai / Estuary	6	7	10	14	68	59	1	5
Pulau / Island	61	61	4	3	30	31	0	0
Pulau - Pembangunan / Island - Development	4	4	1	1	6	6	0	0
Pulau - Taman Laut / Island - Marine Park	26	26	0	0	5	5	0	0
Pulau - Dilindungi / Island - Protected	9	10	3	1	5	6	0	0
Pulau - Peranginan / Island - Resort	22	21	0	1	14	14	0	0
JUMLAH / TOTAL	**173**	**171**	**27**	**39**	**167**	**153**	**1**	**5**

Jadual 4.10: Status Kualiti Air Marin mengikut Peratusan Bilangan Stesen dan Kategori Stesen, 2023-2024
Table 4.10: Marine Water Quality Status by Number of Stations on Percentage Basis and Station Categories 2023-2024

KATEGORI STESEN / STATION CATEGORY	TERBAIK / EXCELLENT (%)		BAIK / GOOD (%)		SEDERHANA / MODERATE (%)		TERCEMAR / POOR (%)	
	2023	2024	2023	2024	2023	2024	2023	2024
Pantai / Coastal	56	55	7	12	37	33	0	0
Muara Sungai / Estuary	7	8	12	17	80	69	1	6
Pulau / Island	64	64	4	3	32	33	0	0
Pulau - Pembangunan / Island - Development	36	36	9	9	55	55	0	0
Pulau - Taman Laut / Island - Marine Park	84	84	0	0	16	16	0	0
Pulau - Dilindungi / Island - Protected	53	59	18	6	29	35	0	0
Pulau - Peranginan / Island - Resort	61	58	0	3	39	39	0	0
JUMLAH / TOTAL	**47**	**46**	**7**	**11**	**45**	**42**	**1**	**1**

Jadual 4.11 menunjukkan status kualiti air marin mengikut bilangan stesen dan kategori stesen bagi setiap negeri untuk tahun 2023 dan 2024. **Jadual 4.12** menunjukkan status kualiti air marin mengikut peratusan bilangan stesen dan kategori stesen bagi setiap negeri untuk tahun 2023 dan 2024.

Table 4.11 shows the marine water quality status by number of stations and station categories for the states for 2023 and 2024. **Table 4.12** shows the marine water quality status of stations and station categories for the state for 2023 and 2024 on a percentage basis.

Jadual 4.11: Status Kualiti Air Marin mengikut Bilangan Stesen dan Kategori Stesen untuk Negeri, 2023-2024
Table 4.11: Marine Water Quality Status by Number of Stations and Station Category for the State, 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN / KATEGORI STESEN MARINE WATER QUALITY STATUS / STATION CATEGORY	TERBAIK / EXCELLENT		BAIK / GOOD		SEDERHANA / MODERATE		TERCEMAR / POOR	
			2023	2024	2023	2024	2023	2024	2023	2024
1	Perlis		0	0	0	0	2	2	0	0
		Pantai / Coastal	-	-	-	-	-	-	-	-
		Muara Sungai / Estuary	0	0	0	0	2	2	0	0
		Pulau / Island	-	-	-	-	-	-	-	-
2	P. Pinang		14	11	3	8	15	12	1	2
		Pantai / Coastal	9	6	1	7	7	4	0	0
		Muara Sungai / Estuary	0	0	1	0	5	5	1	2
		Pulau / Island	5	5	1	1	3	3	0	0
		Pulau - Pembangunan / Island - Development	1	0	0	1	2	2	0	0
		Pulau - Dilindungi / Island - Protected	0	1	1	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	4	4	0	0	1	1	0	0
3	Kedah		22	23	1	0	4	4	0	0
		Pantai / Coastal	9	9	0	0	0	0	0	0
		Muara Sungai / Estuary	0	0	0	0	4	4	0	0
		Pulau / Island	13	14	1	0	0	0	0	0
		Pulau - Pembangunan / Island - Development	3	4	1	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	3	3	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	4	4	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	3	3	0	0	0	0	0	0
4	Perak		12	14	2	1	5	4	0	0
		Pantai / Coastal	7	8	1	0	0	0	0	0
		Muara Sungai / Estuary	0	1	1	1	5	4	0	0
		Pulau / Island	5	5	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	1	1	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	4	4	0	0	0	0	0	0
5	Selangor		5	1	5	6	9	11	0	1
		Pantai / Coastal	2	0	3	4	1	2	0	0
		Muara Sungai / Estuary	1	0	2	1	7	8	0	1
		Pulau / Island	2	1	0	1	1	1	0	0
		Pulau - Peranginan / Island - Resort	2	1	0	1	1	1	0	0
6	N. Sembilan		13	15	2	0	2	2	0	0
		Pantai / Coastal	12	14	2	0	0	0	0	0
		Muara Sungai / Estuary	0	0	0	0	2	2	0	0
		Pulau / Island	1	1	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	1	1	0	0	0	0	0	0

Jadual 4.11: Status Kualiti Air Marin mengikut Bilangan Stesen dan Kategori Stesen untuk Negeri, 2023-2024
Table 4.11: Marine Water Quality Status by Number of Stations and Station Category for the State, 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN / KATEGORI STESEN MARINE WATER QUALITY STATUS / STATION CATEGORY	TERBAIK / EXCELLENT		BAIK / GOOD		SEDERHANA / MODERATE		TERCEMAR / POOR	
			2023	2024	2023	2024	2023	2024	2023	2024
7	Melaka		10	10	3	3	10	9	0	1
		Pantai / Coastal	4	4	3	3	2	2	0	0
		Muara Sungai / Estuary	0	0	0	0	8	7	0	1
		Pulau / Island	6	6	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	6	6	0	0	0	0	0	0
8	Johor		26	27	4	5	13	11	0	0
		Pantai / Coastal	19	20	3	3	7	6	0	0
		Muara Sungai / Estuary	0	0	1	1	5	5	0	0
		Pulau / Island	7	7	0	1	1	0	0	0
		Pulau - Taman Laut / Island - Marine Park	4	4	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	1	1	0	1	1	0	0	0
		Pulau - Peranginan / Island - Resort	2	2	0	0	0	0	0	0
9	Pahang		32	29	2	4	2	2	0	1
		Pantai / Coastal	22	20	0	2	0	0	0	0
		Muara Sungai / Estuary	1	0	2	2	2	2	0	1
		Pulau / Island	9	9	0	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	9	9	0	0	0	0	0	0
10	Terengganu		31	32	2	5	7	3	0	0
		Pantai / Coastal	16	16	0	0	0	0	0	0
		Muara Sungai / Estuary	4	5	2	5	7	3	0	0
		Pulau / Island	11	11	0	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	10	10	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	1	1	0	0	0	0	0	0
11	Kelantan		8	9	1	3	5	2	0	0
		Pantai / Coastal	6	6	0	0	0	0	0	0
		Muara Sungai / Estuary	0	1	1	3	5	2	0	0
		Pulau / Island	2	2	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	2	2	0	0	0	0	0	0
12	Sabah		0	0	0	3	43	40	0	0
		Pantai / Coastal	0	0	0	3	24	21	0	0
		Muara Sungai / Estuary	0	0	0	0	2	2	0	0
		Pulau / Island	0	0	0	0	17	17	0	0
		Pulau - Taman Laut / Island - Marine Park	0	0	0	0	2	2	0	0
		Pulau - Dilindungi / Island - Protected	0	0	0	0	3	3	0	0
		Pulau - Peranginan / Island - Resort	0	0	0	0	12	12	0	0

Jadual 4.11: Status Kualiti Air Marin mengikut Bilangan Stesen dan Kategori Stesen untuk Negeri, 2023-2024
Table 4.11: Marine Water Quality Status by Number of Stations and Station Category for the State, 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN / KATEGORI STESEN MARINE WATER QUALITY STATUS / STATION CATEGORY	TERBAIK / EXCELLENT		BAIK / GOOD		SEDERHANA / MODERATE		TERCEMAR / POOR	
			2023	2024	2023	2024	2023	2024	2023	2024
13	Sarawak		0	0	2	1	38	39	0	0
		Pantai / Coastal	0	0	0	0	23	23	0	0
		Muara Sungai / Estuary	0	0	0	1	14	13	0	0
		Pulau / Island	0	0	2	0	1	3	0	0
		Pulau - Dilindungi / Island - Protected	0	0	2	0	1	3	0	0
14	W.P. Labuan		0	0	0	0	12	12	0	0
		Pantai / Coastal	0	0	0	0	5	5	0	0
		Muara Sungai / Estuary	-	-	-	-	-	-	-	-
		Pulau / Island	0	0	0	0	7	7	0	0
		Pulau - Pembangunan / Island - Development	0	0	0	0	4	4	0	0
		Pulau - Taman Laut / Island - Marine Park	0	0	0	0	3	3	0	0

Nota / Notes:
'–' (Tiada stesen / No station)

Pangkor Laut, Perak

Jadual 4.12: Peratusan Status Kualiti Air Marin berdasarkan Kategori Stesen mengikut Negeri, 2023-2024
Table 4.12: Marine Water Quality Status of Station Categories by State on Percentage Basis 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN/ KATEGORI STESEN MARINE WATER QUALITY STATUS/ STATION CATEGORY	TERBAIK / EXCELLENT (%)		BAIK / GOOD (%)		SEDERHANA / MODERATE (%)		TERCEMAR / POOR (%)	
			2023	2024	2023	2024	2023	2024	2023	2024
1	Perlis		0	0	0	0	100	100	0	0
		Pantai / Coastal	-	-	-	-	-	-	-	-
		Muara Sungai / Estuary	0	0	0	0	100	100	0	0
		Pulau / Island	-	-	-	-	-	-	-	-
2	P. Pinang		42.42	33.33	9.10	24.24	45.45	36.36	3.03	6.07
		Pantai / Coastal	52.94	35.29	5.88	41.18	41.18	23.53	0	0
		Muara Sungai / Estuary	0	0	14.29	0	71.42	71.43	14.29	28.57
		Pulau / Island	55.56	55.56	11.11	11.11	33.33	33.33	0	0
		Pulau - Pembangunan / Island - Development	33.33	0	0	33.33	66.67	66.67	0	0
		Pulau - Dilindungi / Island - Protected	0	100	100	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	80.00	80.00	0	0	20.00	20.00	0	0
3	Kedah		81.49	85.19	3.70	0	14.81	14.81	0	0
		Pantai / Coastal	100	100	0	0	0	0	0	0
		Muara Sungai / Estuary	0	0	0	0	100	100	0	0
		Pulau / Island	92.86	100	7.14	0	0	0	0	0
		Pulau - Pembangunan / Island - Development	75.00	100	25.00	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	100	100	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	100	100	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	100	100	0	0	0	0	0	0
4	Perak		63.15	73.68	10.53	5.26	26.32	21.06	0	0
		Pantai / Coastal	87.50	100	12.50	0	0	0	0	0
		Muara Sungai / Estuary	0	16.67	16.67	16.67	83.33	66.66	0	0
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	100	100	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	100	100	0	0	0	0	0	0
5	Selangor		26.32	5.26	26.32	31.58	47.36	57.89	0	5.27
		Pantai / Coastal	33.33	0	50.00	66.67	16.67	33.33	0	0
		Muara Sungai / Estuary	10.00	0	20.00	10.00	70.00	80.00	0	10.00
		Pulau / Island	66.67	33.33	0	33.33	33.33	33.34	0	0
		Pulau - Peranginan / Island - Resort	66.67	33.33	0	33.33	33.33	33.34	0	0
6	N. Sembilan		76.48	88.24	11.76	0	11.76	11.76	0	0
		Pantai / Coastal	85.71	100	14.29	0	0	0	0	0
		Muara Sungai / Estuary	0	0	0	0	100	100	0	0
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	100	100	0	0	0	0	0	0

Jadual 4.12: Peratusan Status Kualiti Air Marin berdasarkan Kategori Stesen mengikut Negeri, 2023-2024
Table 4.12: Marine Water Quality Status of Station Categories by State on Percentage Basis 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN/ KATEGORI STESEN MARINE WATER QUALITY STATUS/ STATION CATEGORY	TERBAIK / EXCELLENT (%)		BAIK / GOOD (%)		SEDERHANA / MODERATE (%)		TERCEMAR / POOR (%)	
			2023	2024	2023	2024	2023	2024	2023	2024
7	Melaka		43.48	43.48	13.04	13.04	43.48	39.13	0	4.35
		Pantai / Coastal	44.45	44.44	33.33	33.33	22.22	22.23	0	0
		Muara Sungai / Estuary	0	0	0	0	100	87.50	0	12.50
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	100	100	0	0	0	0	0	0
8	Johor		60.47	62.79	9.30	11.63	30.23	25.58	0	0
		Pantai / Coastal	65.52	68.97	10.34	10.34	24.14	20.69	0	0
		Muara Sungai / Estuary	0	0	16.67	16.67	83.33	83.33	0	0
		Pulau / Island	87.50	87.50	0	12.50	12.50	0	0	0
		Pulau - Taman Laut / Island - Marine Park	100	100	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	50.00	50.00	0	50.00	50.00	0	0	0
		Pulau - Peranginan / Island - Resort	100	100	0	0	0	0	0	0
9	Pahang		88.88	80.56	5.56	11.11	5.56	5.56	0	2.77
		Pantai / Coastal	100	90.91	0	9.09	0	0	0	0
		Muara Sungai / Estuary	20.00	0	40.00	40.00	40.00	40.00	0	20.00
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	100	100	0	0	0	0	0	0
10	Terengganu		77.50	80.00	5.00	12.50	17.50	7.50	0	0
		Pantai / Coastal	100	100	0	0	0	0	0	0
		Muara Sungai / Estuary	30.77	38.46	15.38	38.46	53.85	23.08	0	0
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Taman Laut / Island - Marine Park	100	100	0	0	0	0	0	0
		Pulau - Peranginan / Island - Resort	100	100	0	0	0	0	0	0
11	Kelantan		57.14	64.29	7.14	21.43	35.72	14.28	0	0
		Pantai / Coastal	100	100	0	0	0	0	0	0
		Muara Sungai / Estuary	0	16.67	16.67	50.00	83.33	33.33	0	0
		Pulau / Island	100	100	0	0	0	0	0	0
		Pulau - Dilindungi / Island - Protected	100	100	0	0	0	0	0	0
12	Sabah		0	0	0	6.98	100	93.02	0	0
		Pantai / Coastal	0	0	0	12.50	100	87.50	0	0
		Muara Sungai / Estuary	0	0	0	0	100	100	0	0
		Pulau / Island	0	0	0	0	100	100	0	0
		Pulau - Taman Laut / Island - Marine Park	0	0	0	0	100	100	0	0
		Pulau - Dilindungi / Island - Protected	0	0	0	0	100	100	0	0
		Pulau - Peranginan / Island - Resort	0	0	0	0	100	100	0	0
13	Sarawak		0	0	5.00	2.50	95.00	97.50	0	0
		Pantai / Coastal	0	0	0	0	100	100	0	0
		Muara Sungai / Estuary	0	0	0	7.14	100	92.86	0	0
		Pulau / Island	0	0	66.67	0	33.33	100	0	0
		Pulau - Dilindungi / Island - Protected	0	0	66.67	0	33.33	100	0	0

Jadual 4.12: Peratusan Status Kualiti Air Marin berdasarkan Kategori Stesen mengikut Negeri, 2023-2024
Table 4.12: Marine Water Quality Status of Station Categories by State on Percentage Basis 2023-2024

BIL. / NO.	NEGERI / STATE	STATUS KUALITI AIR MARIN/ KATEGORI STESEN MARINE WATER QUALITY STATUS/ STATION CATEGORY	TERBAIK / EXCELLENT (%)		BAIK / GOOD (%)		SEDERHANA / MODERATE (%)		TERCEMAR / POOR (%)	
			2023	2024	2023	2024	2023	2024	2023	2024
14	W.P. Labuan		0	0	0	0	100	100	0	0
		Pantai / Coastal	0	0	0	0	100	100	0	0
		Muara Sungai / Estuary	-	-	-	-	-	-	-	-
		Pulau / Island	0	0	0	0	100	100	0	0
		Pulau - Pembangunan / Island - Development	0	0	0	0	100	100	0	0
		Pulau - Taman Laut / Island - Marine Park	0	0	0	0	100	100	0	0

Nota / Notes:
'–' (Tiada stesen / No station)

Stesen Marin dalam Kategori Tercemar

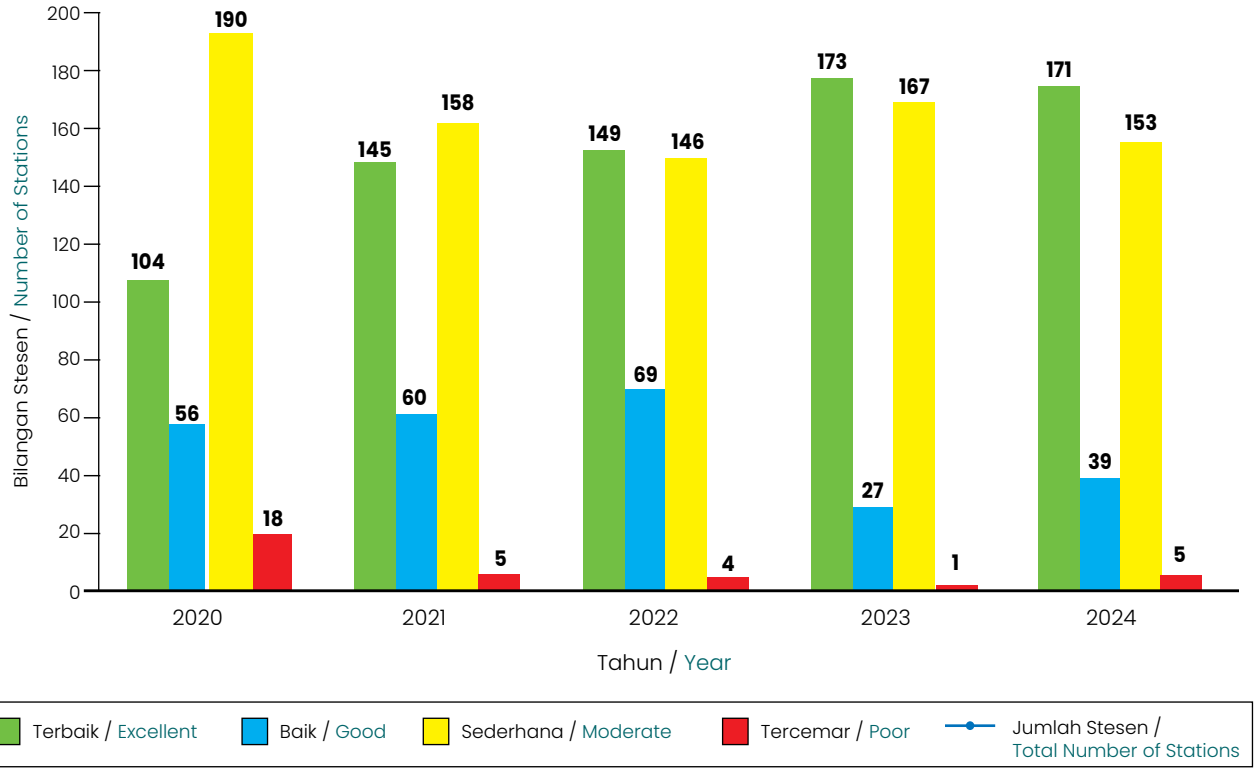
Jadual 4.13 menunjukkan senarai stesen MMWQM yang dikategorikan sebagai tercemar pada tahun 2024. Nilai sub-indeks yang rendah memberi gambaran tahap impak ke atas status kualiti air marin secara keseluruhan. Sehubungan itu, *faecal coliform* merupakan faktor utama kemerosotan kualiti air marin di stesen tercemar tersebut, diikuti dengan kepekatan oksigen terlarut dan kandungan fosfat. **Rajah 4.11** menunjukkan trend stesen pengawasan kualiti air marin mengikut status dari tahun 2020 sehingga tahun 2024. Bilangan stesen tercemar pada tahun 2024 lebih tinggi berbanding tahun 2023. **Jadual 4.14** menunjukkan indeks stesen pengawasan kualiti air marin di bawah kategori tercemar dari tahun 2020 ke 2024.

Marine Stations in the Poor Category

Table 4.13 shows the list of MMWQM stations that were ranked poor in 2024. The low value of a sub-index implies a greater degree of impact on the overall status of the marine water quality. Accordingly, faecal coliform was the primary factor that deteriorated the marine water quality of the stations ranked poor, followed by dissolved oxygen level, and phosphate concentration. **Figure 4.11** shows the trend of marine water quality monitoring stations by status from 2020 to 2024. The number of poor stations is higher compared with the previous year. **Table 4.14** shows list of marine water quality monitoring stations under the category of poor status and their index, from 2020 to 2024.

Jadual 4.13: Senarai Stesen Pengawasan Kualiti Air Marin dengan Status Kategori Tercemar dan Sub-Indeks Mengikut Parameter, 2024
Table 4.13: List of Marine Water Quality Monitoring Stations under the Category of Poor Status and Sub-Index by Parameter, 2024

NEGERI / STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	LOKASI / LOCATION	STESEN ID / ID STATION	IKAMM / MMWQI	STATUS/ STATUS	SUB-INDEKS/ SUB-INDEX					
						OKSIGEN TERLARUT/ DISSOLVED OXYGEN	AMMONIA TIDAK TERION/ UNIONIZED AMMONIA	FAECAL COLIFORM	JUMLAH PEPEJAL TERAMPAI/ TOTAL SUSPENDED SOLID	NITRAT/ NITRATE	FOSFAT/ PHOSPHATE
Pahang	Muara Sungai / Estuary	Kuala Sungai Balok	MMCE005	41	Poor	91	88	8	92	46	75
P. Pinang	Muara Sungai / Estuary	Kuala Sungai Juru	MMPE002	47	Poor	96	87	8	86	87	51
P. Pinang	Muara Sungai / Estuary	Kuala Sungai Pinang	MMPE004	47	Poor	65	90	8	92	91	60
Selangor	Muara Sungai / Estuary	Kuala Sungai Selangor	MMBE008	49	Poor	98	100	8	84	55	86
Melaka	Muara Sungai / Estuary	Kuala Sungai Lereh	MMME008	49	Poor	97	45	8	88	87	91



Rajah 4.11: Trend Stesen Pengawasan Kualiti Air Marin mengikut Status,2020- 2024
Figure 4.11: Trend of Marine Water Quality Monitoring Stations, 2020-2024

Jadual 4.14: Indeks Stesen Pengawasan Kualiti Air Marin dengan Status Kategori Tercemar, 2020-2024
Table 4.14: List of Marine Water Quality Monitoring Stations under the Category of Poor Status and Index for year 2020 - 2024

NEGERI/ STATE	KLASIFIKASI STESEN / STATION CLASSIFICATION	LOKASI/ LOCATION	ID STESEN/ STATION ID	IKAMM/MMWQI					
				2020	2021	2022	2023	2024	STATUS (2024)
Pahang	Muara Sungai / Estuary	Kuala Sungai Balok	MMCE005	59	55	65	54	41	Poor
P. Pinang	Muara Sungai / Estuary	Kuala Sungai Juru	MMPE002	30	42	53	55	47	Poor
P. Pinang	Muara Sungai / Estuary	Kuala Sungai Pinang	MMPE004	53	52	54	48	47	Poor
Selangor	Muara Sungai / Estuary	Kuala Sungai Selangor	MMBE008	45	43	51	55	49	Poor
Melaka	Muara Sungai / Estuary	Kuala Sungai Lereh	MMME008	57	55	56	53	49	Poor

PENGAWASAN KUALITI AIR MARIN AUTOMATIK

Rangkaian Pengawasan Kualiti Air Marin Automatik (CMWQM) bertujuan untuk menyediakan data kualiti air marin hampir waktu sebenar bagi sepuluh (10) lokasi stesen yang ditetapkan.

Jadual 4.15 menyenaraikan lokasi stesen-stesen pengawasan kualiti air marin automatik dan kategori kelas kegunaan air marin berdasarkan SKAMM manakala **Rajah 4.12** menunjukkan lokasi Stesen CMWQM.

Pada tahun 2024, median untuk parameter kualiti air marin yang dipantau di semua stesen CMWQM menunjukkan kadar pematuhan yang tinggi mengikut kelas kualiti air marin seperti yang ditetapkan di dalam SKAMM, kecuali bagi paras oksigen terlarut di CM11Q Santubong, Sarawak. Seperti tahun-tahun yang lalu, kadar kepatuhan oksigen terlarut yang rendah di stesen tersebut adalah disebabkan oleh sifat muara secara semulajadi, bukan berpunca daripada kesan pencemaran.

Kepekatan parameter kualiti air laut yang direkodkan di stesen-stesen CMWQM adalah selari dengan keadaan semula jadi, dengan mengambil kira semua faktor yang mempengaruhi di persekitaran stesen. Sementara itu, kualiti air laut di seluruh rangkaian CMWQM turut terkesan dengan kedua-dua monsun Timur Laut dan monsun Barat Daya.

Tahap kualiti air marin bagi stesen CMWQM dipengaruhi oleh Monsun Timur Laut yang disebabkan oleh hujan lebat dan juga perubahan arah angin utama, yang mana turut memberi kesan terhadap arus laut. Stesen CM01K Pulau Langkawi, Kedah, CM04J Tanjung Piai, Johor, CM10L Wilayah Persekutuan Labuan dan CM14S Teluk Sepanggar, Sabah merekodkan bacaan kemasinan yang lebih tinggi semasa Monsun Timur Laut, petanda kepada kesan arus laut semasa musim tengkujuh terhadap kualiti air marin di stesen tersebut.

Selain daripada kesan monsun, kualiti air marin di sekitar stesen CMWQM turut menerima kesan daripada input muara sungai yang berhampiran. Kualiti air marin di stesen CM11Q yang terletak di Santubong, Sarawak menunjukkan pengaruh pasang surut yang jelas disebabkan oleh interaksi yang kompleks antara air tawar dan air laut yang seterusnya membentuk ciri hidrologi Muara Sungai Santubong. Selain Stesen CM11Q, kualiti air marin di CM05J Tanjung Pengelih, CM04J Tanjung Piai dan CM14S Teluk Sepanggar turut menerima kesan daripada muara sungai yang berhampiran.

CONTINUOUS MARINE WATER QUALITY MONITORING

The Continuous Marine Water Quality Monitoring (CMWQM) network aims to provide near real-time marine water quality data in ten (10) designated locations.

Table 4.15 lists the location of the continuous marine water quality monitoring stations and their respective class categories based on MMWQS while Figure **4.12** shows the location of the CMWQM stations.

In 2024, median of all marine water quality parameters monitored by the CMWQM network showed high degree of conformance with their respective MMWQS marine water quality classes, except for the dissolved oxygen level at CM11Q Santubong, Sarawak. The lower degree of dissolved oxygen was due to the natural estuary characteristics, rather than pollution event.

The concentrations of marine water quality parameters recorded at the CMWQM stations were characteristic of natural conditions, taking into account all nearby influencing factors. Meanwhile, the marine water quality across the CMWQM network was affected by both North East and South West monsoons.

The marine water quality of the CMWQM stations was affected by the North-East Monsoon due to increased volume of precipitation and the shift in the prevailing wind direction. CM01K Pulau Langkawi, Kedah, CM04J Tanjung Piai, Johor, CM10L Wilayah Persekutuan Labuan, and CM14S Teluk Sepanggar, Sabah recorded higher salinity during the North East Monsoon, an obvious sign of the effect of sea currents on marine water quality during the rainy season.

Other than the monsoonal effect, the marine water quality of the CMWQM station was also impacted by nearby estuarine inputs. The marine water quality of CM11Q in Santubong, Sarawak shows a clear tidal influence due to the complex interaction between freshwater and seawater, which shaped the hydrological characteristics of Santubong Estuary. Besides CM11Q, the marine water quality of CM05J Tanjung Pengelih, CM04J Tanjung Piai, and CM14S Teluk Sepanggar were also impacted by nearby estuary.

Dari segi pematuhan MMWQS bagi Oksigen Terlarut (DO), Jumlah Pepejal Terampai (TSS) dan Hidrokarbon Aromatik Polisiklik (PAHs), ketidakpatuhan DO tertinggi diperhatikan di CM11Q Santubong, berkemungkinan disebabkan oleh perubahan ciri hidrologi yang dipengaruhi oleh kitaran pasang surut. Selain CM11Q Santubong, stesen CM02M Pulau Undan, CM12A Pulau Mentagor dan CM13T Pulau Kapas turut mencatatkan kadar pematuhan DO di bawah 90%. Ketidakpatuhan DO di semua stesen disebabkan oleh keadaan semula jadi, tanpa sebarang bukti yang menunjukkan kejadian pencemaran di sekitar stesen.

Pada tahun 2024, TSS dan PAHs mencatatkan lebih daripada 90% pematuhan terhadap SKAMM di semua stesen CMWQM.

Jadual 4.16 menunjukkan tahap pematuhan stesen CMWQM terhadap kelas masing-masing pada tahun 2024.

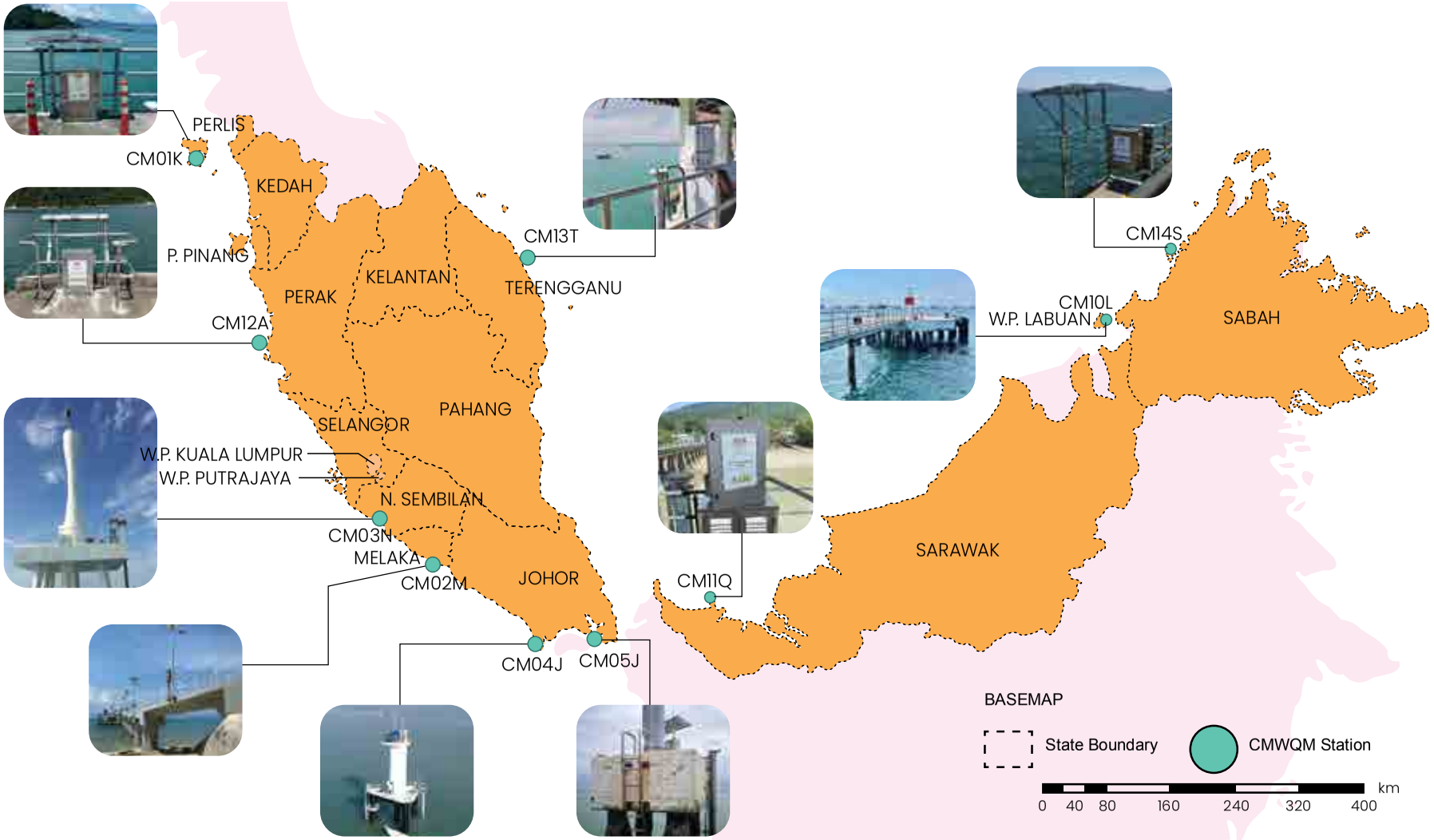
With regard to compliance with the MMWQS for Dissolved Oxygen (DO), Total Suspended Solids (TSS), and Polycyclic Aromatic Hydrocarbons (PAHs), the highest DO non-compliance was observed at CM11Q Santubong, likely due to changes in hydrological characteristics influenced by the tidal cycle. In addition to CM11Q Santubong, stations CM02M Pulau Undan, CM12A Pulau Mentagor, and CM13T Pulau Kapas also recorded DO compliance rates below 90%. The DO non-compliance at all stations was attributed to natural conditions, with no evidence indicating a pollution event.

In 2024, TSS and PAHs recorded more than 90% compliance with the MMWQS in all the CMWQM stations.

Table 4.16 shows the compliance level of CMWQM stations with their respective classes in 2024.

Jadual 4.15: Stesen Pengawasan Kualiti Air Marin Automatik
Table 4.15: Continuous Marine Water Quality Monitoring Stations

BIL. / NO.	LOKASI STESEN / STATION LOCATION	ID STESEN / STATION ID	STRUKTUR / STRUCTURE	KATEGORI STESEN / STATION CATEGORY	KEGUNAAN BERFAEDAH / BENEFICIAL USES
1	Pulau Langkawi, Kedah	CM01K	Jeti / Jetty	Kelas 2 / Class 2	Perikanan (Termasuk Marikultur / Fisheries (Including Mariculture)
2	Pulau Undan, Melaka	CM02M	Jeti / Jetty	Kelas 1 / Class 1	Habitat Sensitif Marin / Sensitive Marine Habitats
3	Port Dickson, N. Sembilan	CM03N	Beacon	Kelas 2 / Class 2	Perikanan (Termasuk Marikultur) / Fisheries (Including Mariculture)
4	Tanjung Piai, Johor	CM04J	Beacon	Kelas 2 / Class 2	Perikanan (Termasuk Marikultur) / Fisheries (Including Mariculture)
5	Tanjung Pengelih, Johor	CM05J	Jeti / Jetty	Kelas 3 / Class 3	Industri, Aktiviti Komersial & Kawasan Kediaman Pesisir Pantai / Industrial, Commercial Activities & Coastal Settlements
6	W.P. Labuan	CM10L	Jeti / Jetty	Kelas 3 / Class 3	Industri, Aktiviti Komersial & Kawasan Kediaman Pesisir Pantai / Industrial, Commercial Activities & Coastal Settlements
7	Santubong, Sarawak	CM11Q	Jeti / Jetty	Kelas E3 / Class E3	Muara Sungai (Rangkaian Kompleks) / Estuaries (Complex Distributary Network)
8	Pulau Mentagor, Perak	CM12A	Jeti / Jetty	Kelas 2 / Class 2	Perikanan (Termasuk Marikultur) / Fisheries (Including Mariculture)
9	Pulau Kapas, Terengganu	CM13T	Jeti / Jetty	Kelas 1 / Class 1	Habitat Sensitif Marin / Sensitive Marine Habitats
10	Teluk Sepanggar, Sabah	CM14S	Jeti / Jetty	Kelas 3 / Class 3	Industri, Aktiviti Komersial & Kawasan Kediaman Pesisir Pantai / Industrial, Commercial Activities & Coastal Settlements



Rajah 4.12: Lokasi Stesen Pengawasan Kualiti Air Marin Automatik
Figure 4.12: Location of Continuous Marine Water Quality Monitoring Stations

Jadual 4.16: Peratusan Pematuhan Parameter DO, TSS dan PAHs mengikut Kelas (SKAMM)
Table 4.16: Percentage of DO, TSS, and PAHs Parameters Compliance according to Station Classes (MMWQS)

NEGERI / STATE	LOKASI STESEN / STATION LOCATION	ID STESEN / STATION ID	KELAS / CLASS	PERATUSAN PEMATUHAN (%) / PERCENTAGE OF COMPLIANCE (%)		
				OKSIGEN TERLARUT / DISSOLVED OXYGEN (DO)	JUMLAH PEPEJAL TERAMPAI / TOTAL SUSPENDED SOLID (TSS)	HIDROKARBON AROMATIK POLISIKLIK (PAHs) / POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)
Kedah	Pulau Langkawi	CM01K	2	94.33	99.81	100
Melaka	Pulau Undan	CM02M	1	87.62	99.99	100
N. Sembilan	Port Dickson	CM03N	2	99.53	100	100
Johor	Tanjung Piai	CM04J	2	99.60	98.39	100
	Tanjung Pengelih	CM05J	3	100	99.92	100
W.P. Labuan	W.P. Labuan	CM10L	3	100	99.98	100
Sarawak	Santubong	CM11Q	E3	42.89	98.45	98.62
Perak	Pulau Mentagor	CM12A	2	79.46	99.91	100
Terengganu	Pulau Kapas	CM13T	1	66.06	99.67	100
Sabah	Teluk Sepanggar	CM14S	3	99.95	99.90	100

Pantai Teluk Cempedak, Pahang

5 Bab/ Chapter

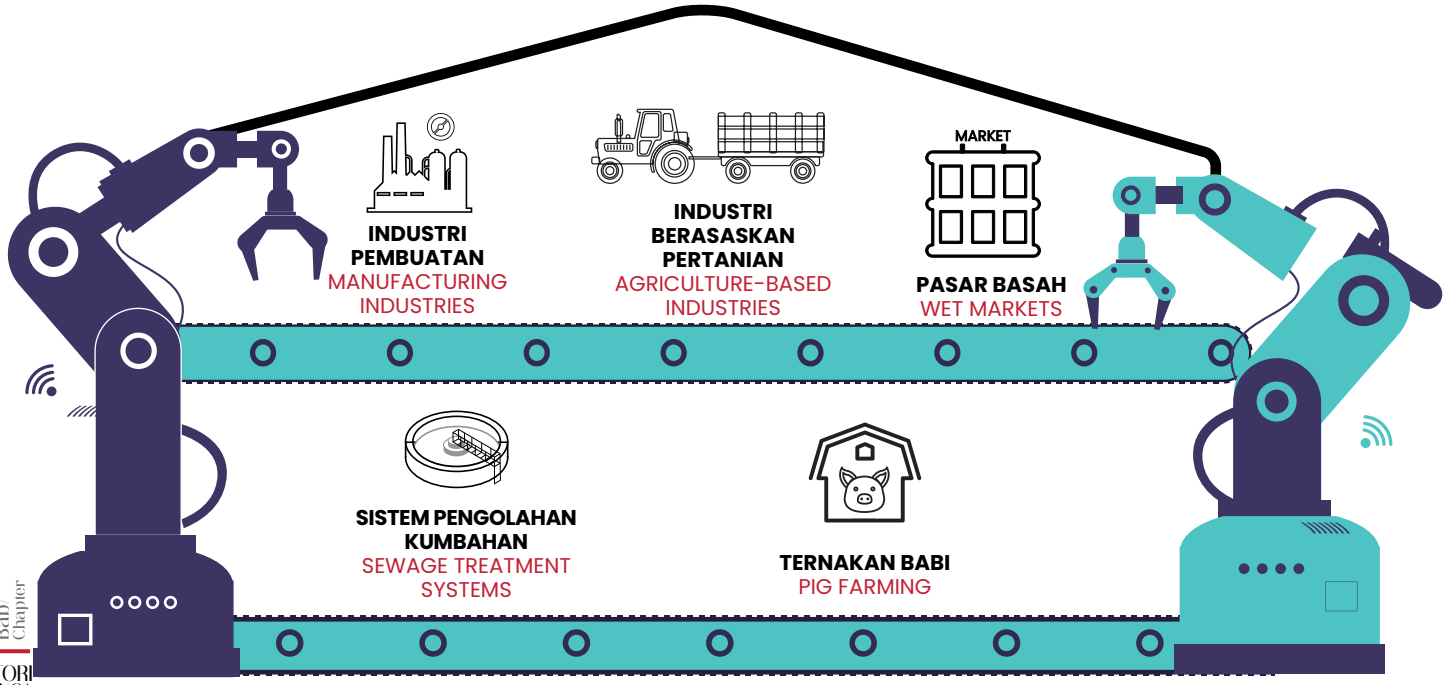
INVENTORI PUNCA PENCEMARAN

Inventory of Pollution Sources

INVENTORI PUNCA PENCEMARAN
Inventory of Pollution Sources

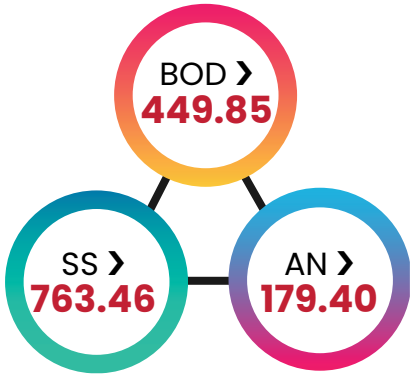
PUNCA UTAMA PENCEMARAN AIR ›
MAIN SOURCES OF WATER POLLUTION

5



Parameter Parameters	Punca Utama / *Main Sources*
BOD & AN	Sistem Pengolahan Kumbahan / *Sewage Treatment Systems*
SS	Ternakan Babi *Pig Farming*

Jumlah Beban dalam Tan/Hari
Total Load in Tonnes/Day



3

Parameter Utama
Main Parameters

BOD

SS

AN

KUALITI UDARA / AIR QUALITY

65 **Stesen Pengawasan Kualiti Udara Automatik / Automatic Air Quality Monitoring Stations**

4 **Punca Utama Pencemaran Udara**
Main Sources of Air Pollution

- Loji Janakuasa / Power Plants
- Industri / Industry
- Kenderaan Bermotor / Motor Vehicle
- Lain-Lain / Other

4 **Parameter Utama**
Main Parameters

SO_2	PM
NO_2	CO

Parameter / Parameters	Punca Utama / Main Sources
SO_2	Loji Janakuasa / Power Plants
NO_2	Loji Janakuasa / Power Plants
PM	Industri / Industry Loji Janakuasa / Power Plants
CO	Kenderaan Bermotor / Motor Vehicle

Jumlah Beban dalam Tan Metrik / Total Load in Metric Tonnes

CO	NO_2	SO_2	PM
2,363,345	1,098,992	271,064	33,307

5 Bab / Chapter
INVENTORI PUNCA PENCEMARAN / Inventory of Pollution Sources

Buangan Terjadual *Scheduled Wastes*

5,378,977.55 MT
Buangan Terjadual yang Terhasil / Scheduled Wastes Generated

Debu, sanga, dros atau abu merupakan kategori buangan yang dihasilkan dengan kuantiti tertinggi iaitu = **47.35%**

Jumlah BT yang mengaplikasikan konsep 4R (Reduce, Reuse, Recycle, Recover) = **3.08 MT x 10^6**

Dust, slag, dross or ash is the category of waste produced with the highest quantity which is 47.35%

Total BT that applies the 4R concept (Reduce, Reuse, Recycle, Recover) = 3.08 MT x 10^6

Pengurangan sebanyak 7.92% berbanding 5,841,596.82 tan metrik yang dilaporkan pada 2023

A reduction of 7.92% compared to the 5,841,596.82 metric tonnes reported in 2023

INVENTORI PUNCA PENCEMARAN / Inventory Of Pollution Sources

BEBAN PENCEMARAN AIR

Sungai merupakan antara ekosistem utama yang mempunyai keupayaan asimilasi untuk mengurangkan kesan pencemaran melalui proses penguraian, penyebaran dan pelarutan. Walau bagaimanapun, keupayaan ini mempunyai had dan jika melebihi had tersebut, kualiti air sungai akan merosot.

Keupayaan asimilasi sungai ini berkait rapat dengan beban pencemaran yang dilepaskan ke dalam sungai pada sesuatu masa. Ia dipengaruhi oleh kadar aliran jasad air dan kepekatan bahan pencemar yang dibawa oleh jasad air.

Beban pencemaran air merupakan salah satu kriteria penting dalam menentukan strategi dan perancangan tindakan untuk mencegah dan mengawal pencemaran air. Pelaksanaan kawalan beban pencemaran air merupakan usaha untuk meningkatkan kualiti air sungai demi mengekalkan kegunaan berfaedah sungai sebagai sumber bekalan air, rekreasi, akuakultur, pertanian serta menampung keperluan sistem ekologi.

Punca beban pencemaran air terbahagi kepada dua (2) kategori iaitu punca tetap dan punca tidak tetap. Punca tetap beban pencemaran air adalah punca yang mempunyai takat pelepasan yang tetap dan tidak berubah dalam tempoh masa yang singkat. Sektor seperti industri pembuatan, ternakan dan sistem pengolahan kumbahan adalah termasuk di dalam kategori ini.

Manakala punca tidak tetap pula merupakan punca yang tidak mempunyai takat pelepasan yang tetap dan sering berubah-ubah yang menyukarkan anggaran pelepasan beban pencemaran. Aktiviti pertanian, kerja tanah, perlombongan dan kumbahan bukan najis (air cucian dapur dan bilik air selain kumbahan) merupakan punca bagi kategori ini. Pada masa ini, kajian berkaitan beban pencemaran dari sumber bagi kategori ini masih belum banyak tersedia sebagai rujukan, khususnya di Malaysia.

WATER POLLUTION LOAD

Rivers are one of the ecosystems that have the assimilation capacity to reduce the impacts from pollution through the processes of degradation, dispersion, and dilution. However, this ability has a limit and if exceeded, the quality of river water will deteriorate.

The assimilation capacity of the river is closely related to the pollution load discharged into the river at a certain time. It is influenced by the flow rate of the water body and the concentration of pollutants carried by the water body.

The water pollution load is one of the important criteria in determining strategies and planning for actions to prevent and control water pollution. The implementation of water pollution load control is one of the efforts to enhance the river water quality in order to maintain the beneficial uses of the river as a source of water supply, recreation, aquaculture, agriculture as well as to sustain the needs of the ecological system.

The sources of water pollution load can be divided into two (2) categories which are point sources and non-point sources. Point sources are pollution sources that have specific identifiable discharge points and do not change in a short period of time. Sectors such as manufacturing industries, livestock, and sewage treatment system fall into this category.

On the other hand, non-point sources are the sources that do not have specific identifiable discharge points, and the locations are varied which makes it difficult to estimate the amount of pollution loads discharged. Agricultural activities, earthworks, mining, and sullage (domestic wastewater other than sewage such as kitchen and bathroom wastewater) are the sources under this category. Currently, studies related to the pollution load from sources for this category are not widely available for reference particularly in Malaysia.

PENGIRAAN BEBAN PENCEMARAN AIR

Beban pencemaran air yang dilaporkan adalah berdasarkan kepada lima (5) jenis punca pencemaran iaitu industri pembuatan, industri berasaskan pertanian, sistem pengolahan kumbahan, ternakan babi dan pasar basah yang mempunyai aktiviti penyembelihan.

Sumber data industri pembuatan diperolehi daripada Jabatan Alam Sekitar (JAS) Negeri dan industri berasaskan pertanian diperolehi daripada laporan yang dikemukakan oleh pihak industri melalui sistem atas talian (*Online Environmental Reporting, OER*) yang dibangunkan oleh JAS manakala bagi sistem pengolahan kumbahan pula, data yang diperolehi adalah daripada pihak operator loji iaitu Indah Water Konsortium Sdn. Bhd., Jabatan Perkhidmatan Pembentungan Sabah, Jabatan Perkhidmatan Pembentungan Sarawak, JAS Negeri Sarawak dan melalui sistem OER. Data berkaitan aktiviti ternakan babi diperolehi daripada Jabatan Perkhidmatan Veterinar manakala data berkaitan pasar basah adalah diperolehi daripada Kementerian Perumahan dan Kerajaan Tempatan.

Pengiraan beban pencemaran air adalah berdasarkan kepada tiga (3) parameter yang memberikan kesan ketara kepada kualiti air sungai iaitu Keperluan Oksigen Biokimia (BOD), Pepejal Terampai (SS) dan Ammoniakal Nitrogen (AN).

WATER POLLUTION LOAD CALCULATION

The water pollution load reported is based on five (5) types of pollution sources, namely manufacturing industries, agriculture-based industries, sewage treatment system, pig farming, and wet market which have slaughtering activities.

The sources of data for manufacturing industry are obtained from the Department of Environment (DOE) State offices and data for agricultural-based industries are obtained from the report submitted by the industry through the online system (Online Environmental Reporting, OER) developed by DOE while data for sewage treatment system are from plant operators namely Indah Water Konsortium Sdn. Bhd., Sabah Sewerage Services Department, Sewerage Services Department Sarawak, DOE Sarawak, and through OER system. Data related to pig farming activity is acquired from the Department of Veterinary Services, while data related to wet markets is obtained from the Ministry of Housing and Local Government.

The calculation of water pollution load is based on three (3) parameters that have significant impact on river water quality, namely Biochemical Oxygen Demand (BOD), Suspended Solids (SS), and Ammoniacal Nitrogen (AN).

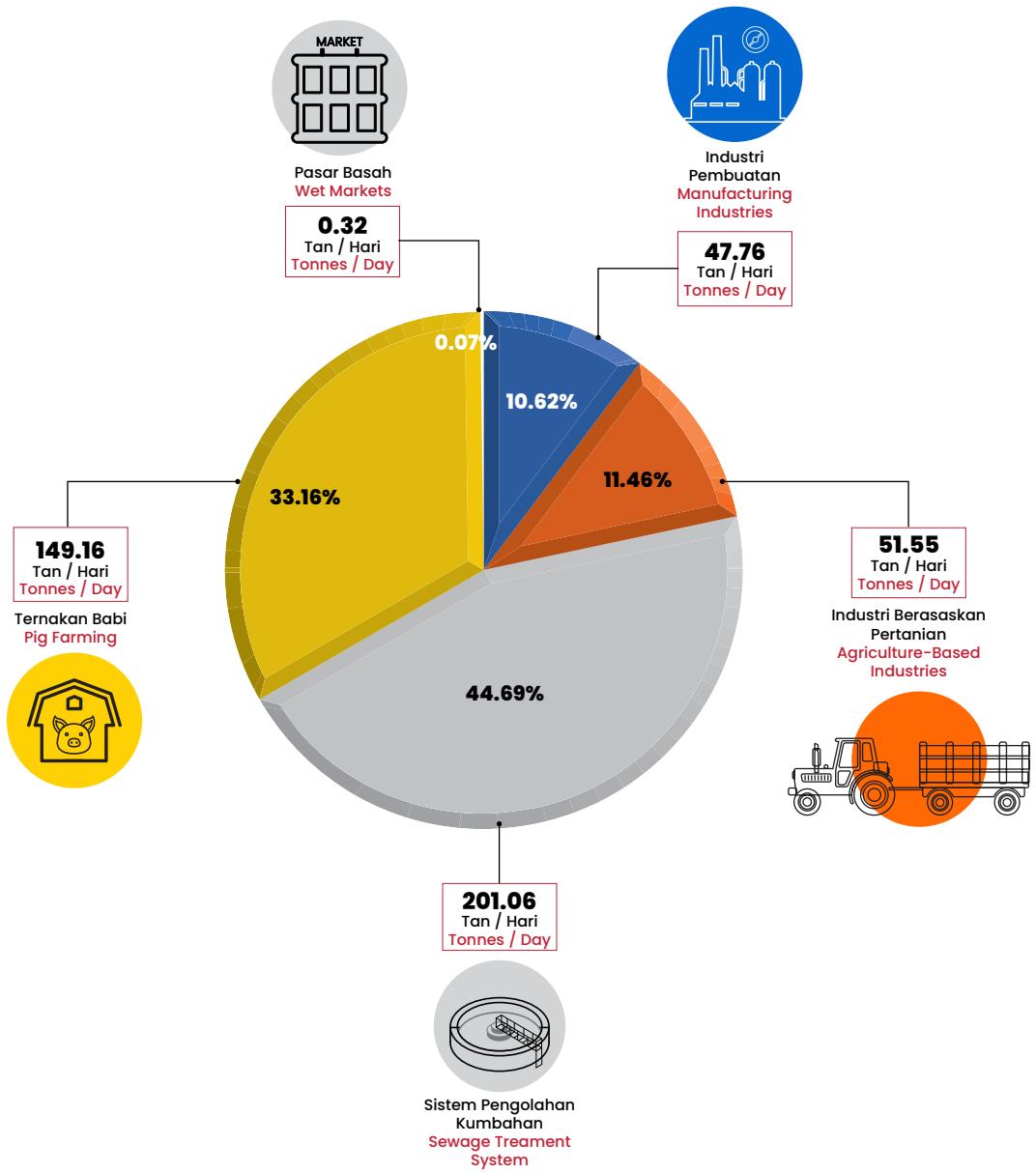
Air Terjun Sungai Pandan, Pahang

Beban Keperluan Oksigen Biokimia

Pada tahun 2024, anggaran jumlah beban pencemaran bagi BOD yang dilepaskan ke sungai adalah sebanyak 449.85 tan/hari. Pelepasan daripada sistem pengolahan kumbahan adalah penyumbang beban pencemaran BOD tertinggi iaitu sebanyak 201.06 tan/hari (44.69%), diikuti dengan aktiviti ternakan babi 149.16 tan/hari (33.16%), industri berasaskan pertanian 51.55 tan/hari (11.46%), industri pembuatan 47.76 tan/hari (10.62%) dan pasar basah 0.32 tan/hari (0.07%) (**Rajah 5.1**).

Biochemical Oxygen Demand Load

In year 2024, the estimated total pollution load for BOD discharged into the river was 449.85 tonnes/day. Discharge from sewage treatment system was the highest BOD load contributor with a total load of 201.06 tonnes/day (44.69%), followed by pig farming activities 149.16 tonnes/day (33.16%), agriculture-based industries 51.55 tonnes/day (11.46%), manufacturing industries 47.76 tonnes/day (10.62%), and wet markets 0.32 tonnes/day (0.07%) (**Figure 5.1**).



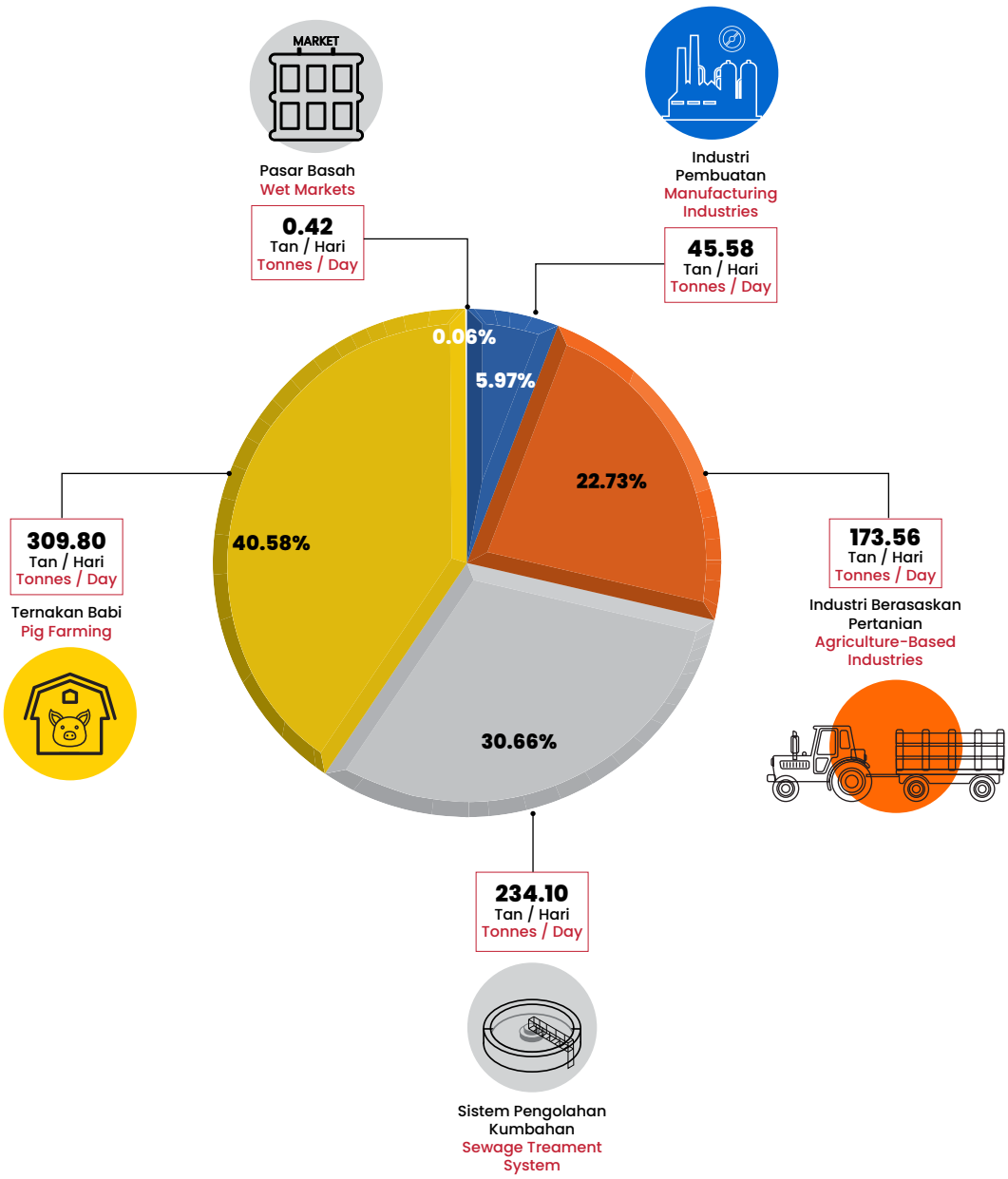
Rajah 5.1: Anggaran Beban BOD (tan/hari) mengikut Punca Pencemaran Air, 2024
Figure 5.1: Estimation of BOD Load (tonnes/day) by Sources of Water Pollution, 2024

Beban Pepejal Terampai

Pada tahun 2024, anggaran jumlah beban pencemaran bagi SS yang dilepaskan ke sungai adalah sebanyak 763.46 tan/hari. Pelepasan daripada ternakan babi adalah penyumbang beban pencemaran SS tertinggi iaitu sebanyak 309.80 tan/hari (40.58%), diikuti dengan sistem pengolahan kumbahan 234.10 tan/hari (30.66%). Industri berasaskan pertanian pula menyumbang sebanyak 173.56 tan/hari (22.73%) diikuti industri pembuatan 45.58 tan/hari (5.97%) dan pasar basah 0.42 tan/hari (0.06%) (**Rajah 5.2**).

Suspended Solids Load

In year 2024, the estimated total pollution load for SS discharged into the river was 763.46 tonnes/day. Discharge from pig farming activities showed the highest SS load contributor with a total load of 309.80 tonnes/day (40.58%), followed by sewage treatment system with 234.10 tonnes/day (30.66%). agriculture-based industries contributed 173.56 tonnes/day (22.73%) followed by manufacturing industries 45.58 tonnes/day (5.97%), and wet market 0.42 tonnes/day (0.06%) (**Figure 5.2**).



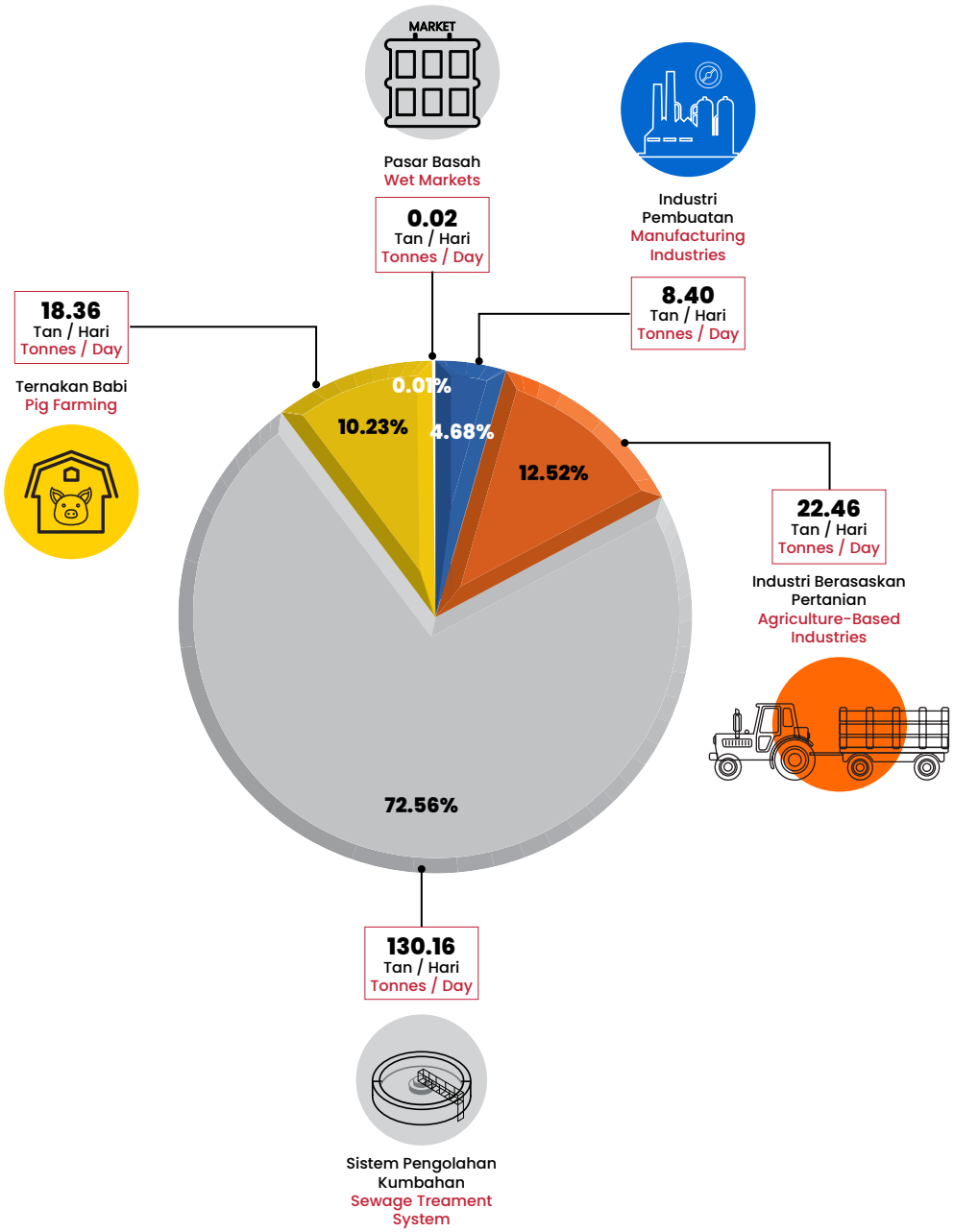
Rajah 5.2: Anggaran Beban SS (tan/hari) mengikut Punca Pencemaran Air, 2024
Figure 5.2: Estimation of SS load (tonnes/day) by Sources of Water Pollution, 2024

Beban Ammoniakal Nitrogen

Pada tahun 2024, anggaran jumlah beban pencemaran bagi AN yang dilepaskan ke sungai adalah sebanyak 179.40 tan/hari. Pelepasan daripada sistem pengolahan kumbahan adalah penyumbang beban pencemaran AN tertinggi iaitu sebanyak 130.16 tan/hari (72.56%), diikuti industri berasaskan pertanian 22.46 tan/hari (12.52%), ternakan babi 18.36 tan/hari (10.23%), industri pembuatan 8.40 tan/hari (4.68%) dan pasar basah 0.02 tan/hari (0.01%) (**Rajah 5.3**).

Ammoniacal Nitrogen Load

In year 2024, the estimated total pollution load for AN discharged into the river was 179.40 tonnes/day. Discharge from sewage treatment system showed the highest AN load contributor with a total load of 130.16 tonnes/day (72.56%), followed by agriculture-based industries with 22.46 tonnes/day (12.52%), pig farming activities 18.36 tonnes/day (10.23%), manufacturing industries 8.40 tonnes/day (4.68%), and wet markets 0.02 tonnes/day (0.01%) (**Figure 5.3**).



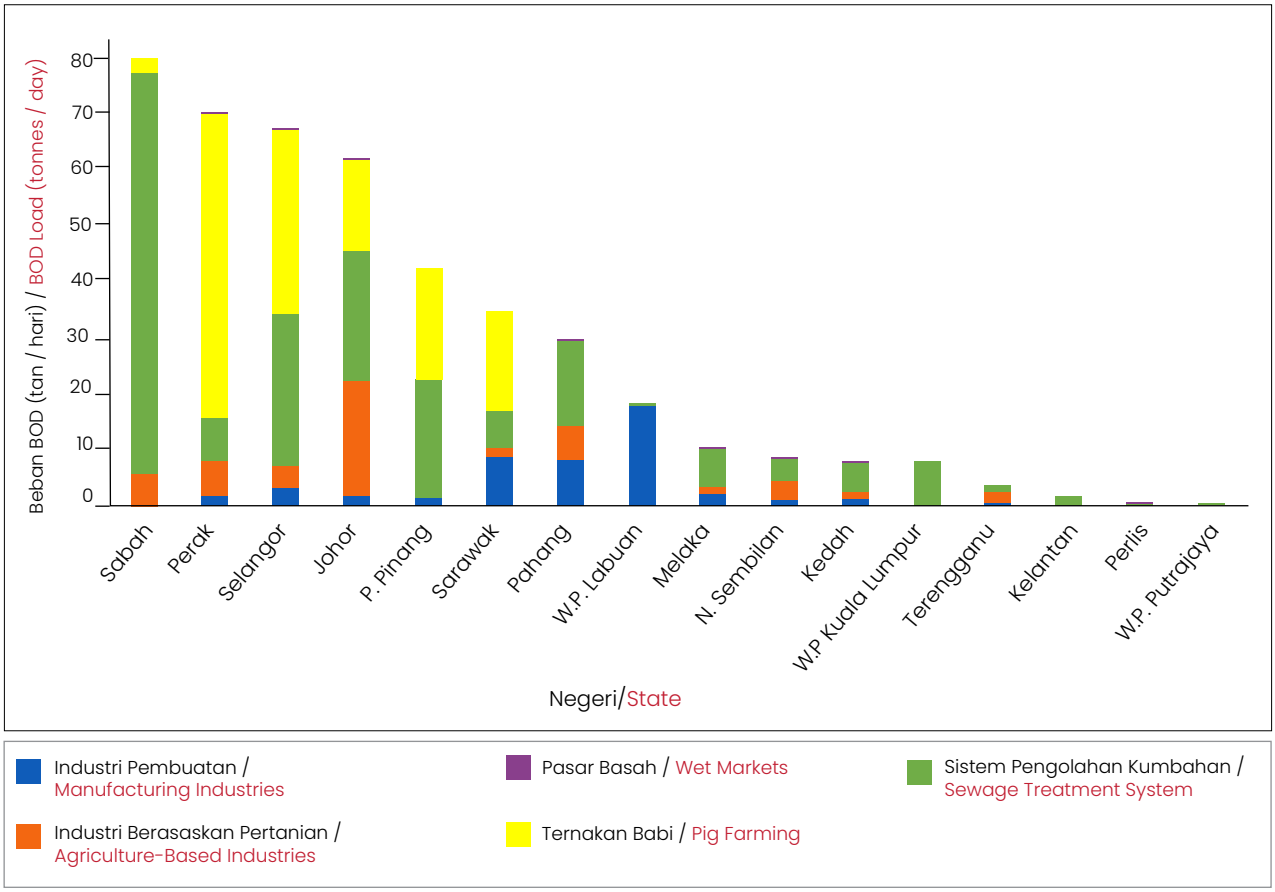
Rajah 5.3: Anggaran Beban AN (tan/hari) mengikut Punca Pencemaran Air, 2024
Figure 5.3: Estimation of AN Load (tonnes/day) by Sources of Water Pollution, 2024

Beban Pencemaran Keperluan Oksigen Biokimia mengikut Negeri

Pada tahun 2024, negeri yang melepaskan beban pencemaran BOD ke sungai yang tertinggi adalah Sabah iaitu sebanyak 84.21 tan/hari, diikuti oleh Perak 69.70 tan/hari, Selangor 67.40 tan/hari, Johor 61.59 tan/hari dan Pulau Pinang 43.08 tan/hari. Beban BOD bagi lain-lain negeri termasuk Wilayah Persekutuan Labuan dan Putrajaya adalah kurang daripada 40.00 tan/hari. Beban pencemaran BOD mengikut negeri ditunjukkan pada **Rajah 5.4**.

Biochemical Oxygen Demand Load by States

In 2024, the state that discharge the highest BOD pollution load into the river was Sabah with 84.21 tonnes/day, followed by Perak 69.70 tonnes/day, Selangor 67.40 tonnes/day, Johor 61.59 tonnes/day, and Pulau Pinang 43.08 tonnes/day. The BOD load for other states including the Federal Territory of Labuan and Putrajaya was less than 40.00 tonnes/day. The BOD pollution loads by states are shown in **Figure 5.4**.



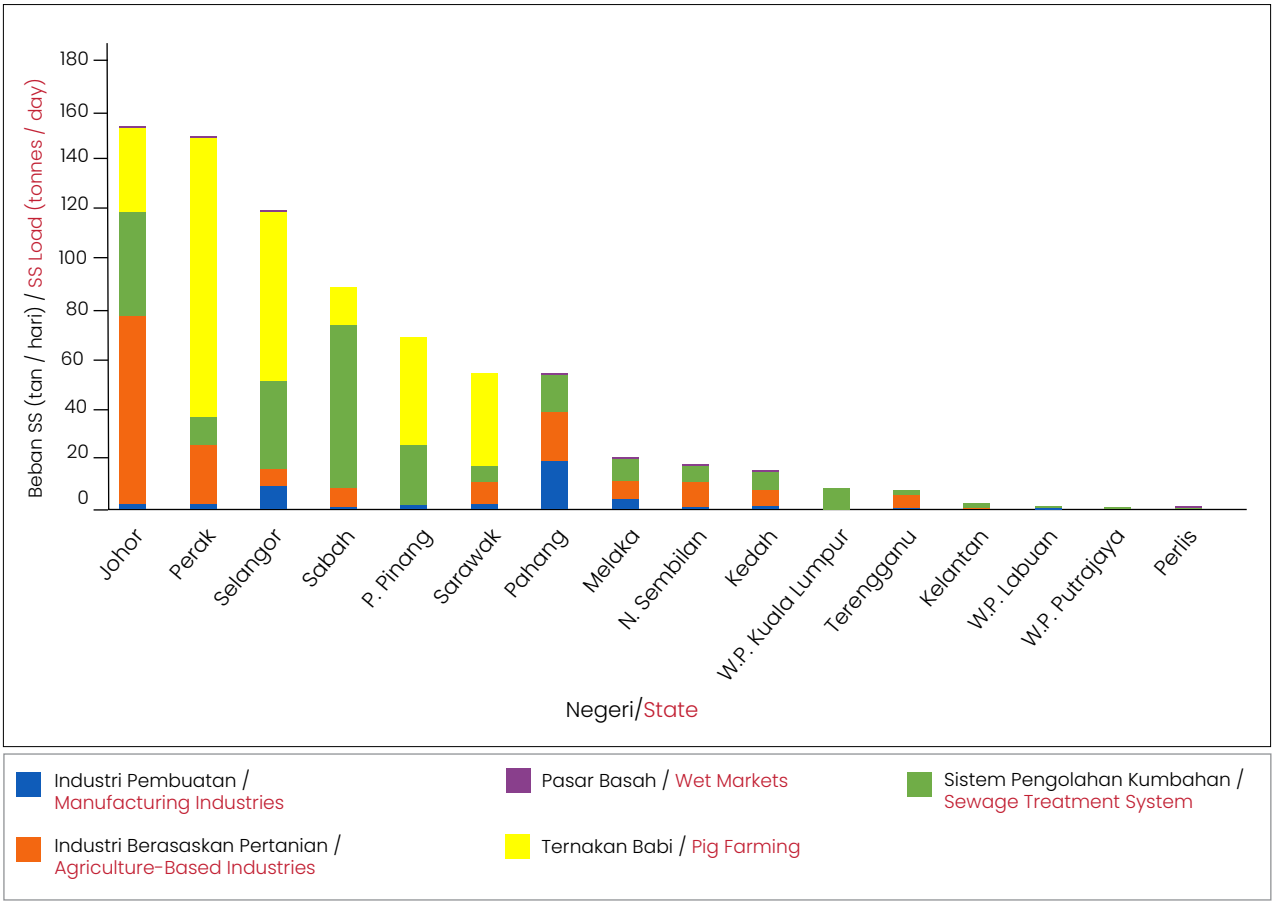
Rajah 5.4: Taburan Anggaran Beban BOD (tan/hari) dan Punca Pencemaran Air mengikut Negeri, 2024
Figure 5.4: Estimation Distribution of BOD Load (tonnes/day) and Sources of Water Pollution by States, 2024

Beban Pencemaran Pepejal Terampai mengikut Negeri

Anggaran pelepasan beban pencemaran SS ke sungai di Johor adalah yang tertinggi iaitu sebanyak 153.11 tan/hari, diikuti oleh Perak 149.17 tan/hari, Selangor 120.09 tan/hari, Sabah 89.22 tan/hari dan Pulau Pinang 68.77 tan/hari. Beban pencemaran SS bagi lain-lain negeri termasuk Wilayah Persekutuan Labuan dan Putrajaya adalah kurang daripada 60.00 tan/hari. Beban pencemar SS mengikut negeri ditunjukkan di dalam **Rajah 5.5**.

Suspended Solids Load by States

The estimated SS pollution load discharged to the river in Johor was the highest which was 153.11 tonnes/day, followed by Perak 149.17 tonnes/day, Selangor 120.09 tonnes/day, Sabah 89.22 tonnes/day, and Pulau Pinang 68.77 tonnes/day. The SS pollution load for other states including the Federal Territory of Labuan and Putrajaya was less than 60.00 tonnes/day. The SS pollution loads by states are shown in **Figure 5.5**.



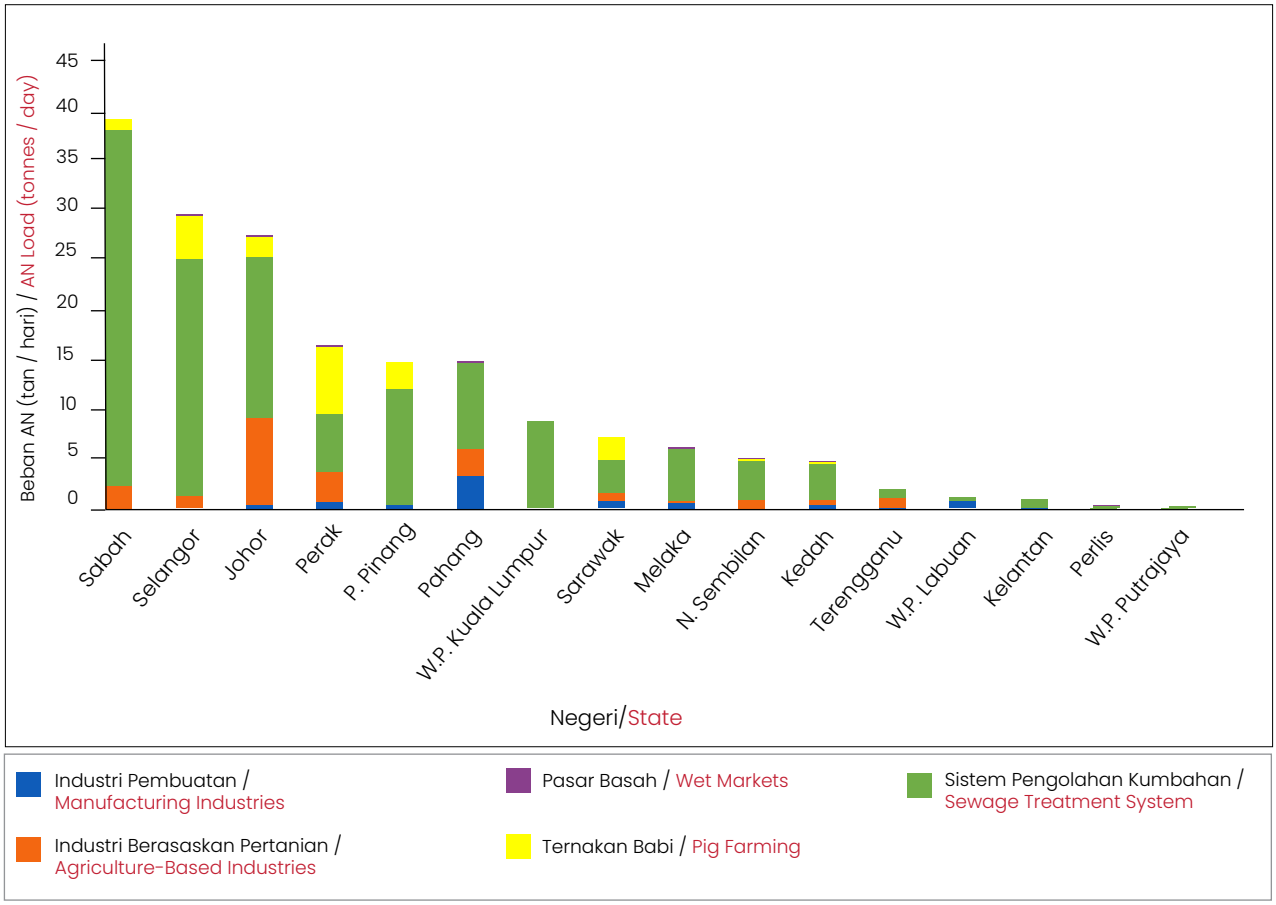
Rajah 5.5: Taburan Anggaran Beban SS (tan/hari) dan Punca Pencemaran Air mengikut Negeri, 2024
Figure 5.5: Estimation Distribution of SS Load (tonnes/day) and Sources of Water Pollution by States, 2024

Beban Pencemaran Ammoniakal Nitrogen mengikut Negeri

Anggaran pelepasan beban pencemaran AN ke sungai di Sabah adalah yang tertinggi iaitu sebanyak 39.05 tan/hari, diikuti Selangor 29.48 tan/hari, Johor 27.43 tan/hari, Perak 16.55 tan/hari dan Pulau Pinang 15.05 tan/hari. Beban pencemaran AN bagi lain-lain negeri termasuk Wilayah Persekutuan Labuan dan Putrajaya adalah kurang daripada 15.00 tan/hari. Beban pencemaran AN mengikut negeri ditunjukkan di dalam **Rajah 5.6**.

Ammoniacal Nitrogen Load by States

The estimated AN pollution load discharge to the river in Sabah was the highest at 39.05 tonnes/day, followed by Selangor 29.48 tonnes/day, Johor 27.43 tonnes/day, Perak 16.55 tonnes/day, and Pulau Pinang 15.05 tonnes/day. The AN pollution load for other states including the Federal Territory of Labuan and Putrajaya was less than 15.00 tonnes/day. AN pollution loads by states are shown in **Figure 5.6**.



Rajah 5.6: Taburan Anggaran Beban AN (tan/hari) dan Punca Pencemaran Air mengikut Negeri, 2024
Figure 5.6: Estimation Distribution of AN Load (tonnes/day) and Sources of Water Pollution by States, 2024

PUNCA-PUNCA PENCEMARAN UDARA

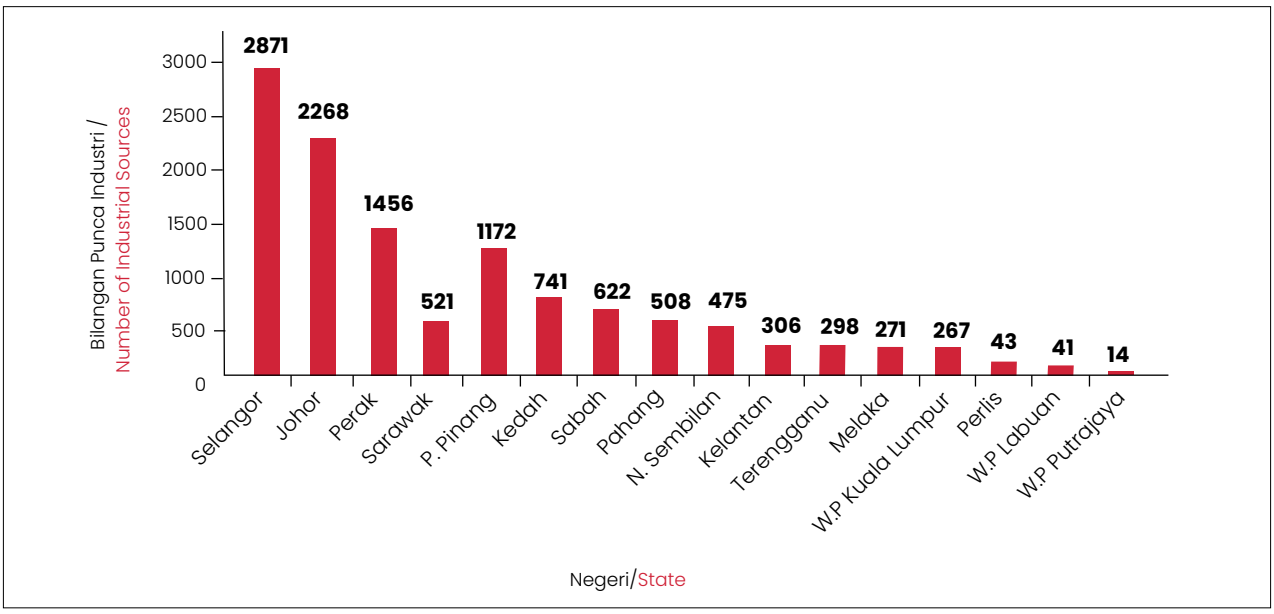
Peningkatan punca industri perlu dirancang dan dikawal secara sistematik untuk mengurangkan pencemaran udara. Pemasangan sistem kawalan pencemaran udara yang sesuai adalah penting bagi setiap punca baharu yang berpotensi melepaskan pencemar udara.

Sehingga Disember 2024, jumlah punca industri yang melepaskan bahan pencemar ke udara adalah sebanyak 11,874. Bilangan punca pencemar yang tertinggi didapati di Selangor (2,871 : 22.5%), diikuti oleh Johor (2,268 : 17.8%) dan Perak (1,456 : 11.4%) seperti yang ditunjukkan dalam **Rajah 5.7**.

SOURCES OF AIR POLLUTION

The growth of industrial sources should be systematically planned and controlled to reduce air pollution. The installation of suitable air pollution control equipment is essential for every potential new source of emission.

As of December 2024, a total of 11,874 industrial sources were emitting air pollutants. The highest pollution sources were in Selangor (2,871 : 22.5%), followed by Johor (2,268 : 17.8%), and Perak (1,456 : 11.4%) as indicated in **Figure 5.7**.



Rajah 5.7 : Punca Pencemaran Udara Industri mengikut Negeri Tahun 2024
Figure 5.7 : Industrial Air Pollution Sources by State in Year 2024

Kenderaan Bermotor

Malaysia merupakan salah satu pasaran besar di Asia Tenggara bagi sektor kenderaan, dengan jumlah jualan kenderaan yang terus meningkat dari tahun ke tahun. Senario kenderaan aktif di Malaysia menunjukkan perkembangan yang pesat dengan pelbagai jenis kenderaan yang digunakan dalam rutin seharian termasuk kenderaan persendirian, pengangkutan awam, kenderaan perdagangan dan komersial, hingga kenderaan berteknologi canggih seperti kenderaan elektrik. Peningkatan dalam penggunaan kenderaan juga membawa kepada keperluan untuk mempertingkatkan pemantauan beban pencemaran dan peningkatan aktiviti penguatkuasaan.

Motor Vehicles

Malaysia is one of the largest markets in Southeast Asia for the automotive sector, with vehicle sales continuing to increase year by year. The scenario of active vehicles in Malaysia shows rapid development with various types of vehicles being used in daily routine, including private vehicles, public transportation, commercial and freight vehicles, as well as advanced technology vehicles such as electric cars. The rise in vehicle usage leads to the need to enhance monitoring of pollution loads and enforcement activities.

Pada tahun 2024, terdapat peningkatan bagi jumlah terkumpul keseluruhan kenderaan bermotor di jalan raya yang berdaftar berbanding tahun sebelumnya. Jumlah terkumpul keseluruhan kenderaan bermotor di jalan raya yang berdaftar bagi tahun 2024 adalah sebanyak 37,274,187, sementara tahun 2023 adalah sebanyak 35,888,209. Motosikal, motokar dan kenderaan barangan masing-masing menunjukkan peningkatan sebanyak 4.25%, 3.7% dan 1.94%. Bilangan terkumpul kenderaan bermotor yang berdaftar yang direkodkan oleh Jabatan Pengangkutan Jalan pada tahun 2023 dan 2024 adalah seperti yang ditunjukkan dalam **Rajah 5.8**.

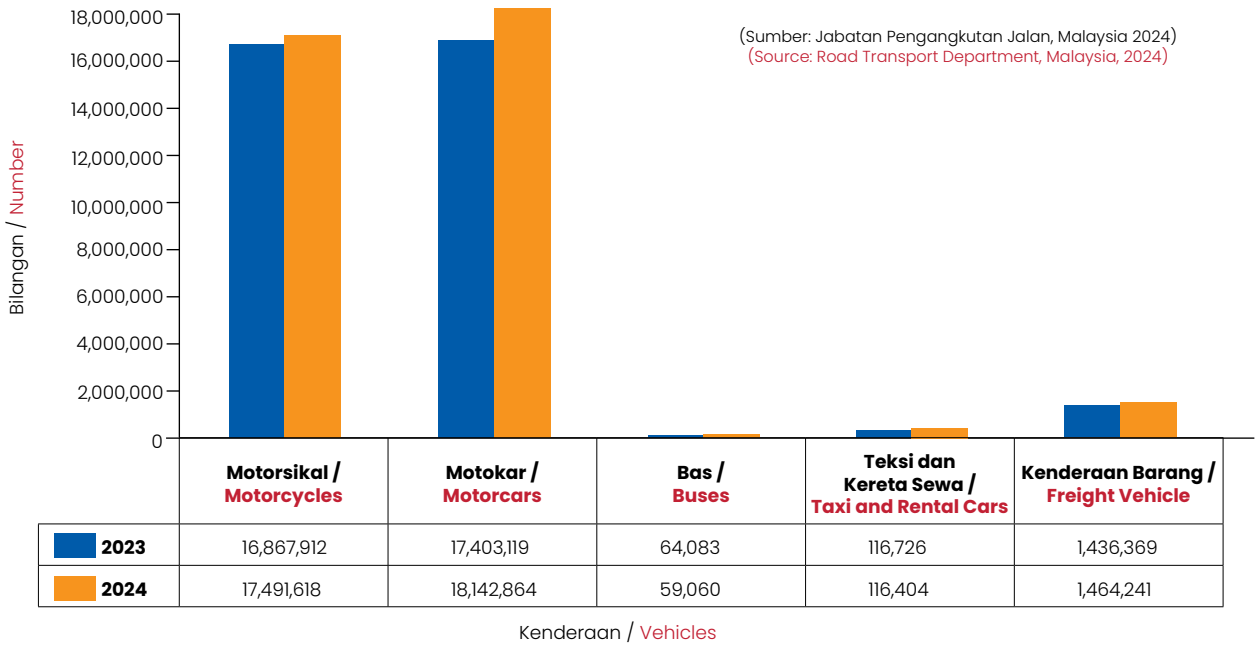
In 2024, there was an increase in the overall number of cumulative registered motor vehicles compared to 2023. Total cumulative registered motor vehicles for 2024 were 37,274,187 units compared to 2023 which were 35,888,209 units. Registered motorcycles, motorcars, and freight vehicles increased by 4.25%, 3.7%, and 1.94%. The cumulative number of registered motor vehicles recorded by the Road Transport Department in 2023 and 2024 is as shown in **Figure 5.8**.

Sementara itu, jumlah bilangan pendaftaran kenderaan baru menunjukkan sedikit peningkatan pada tahun 2024 iaitu sebanyak 1,533,667 unit dengan bilangan tertinggi adalah kategori kenderaan jenis motokar iaitu 833,218 unit. Pada tahun sebelumnya, jumlah bilangan pendaftaran kenderaan baru adalah sebanyak 1,533,332 unit dengan bilangan pendaftaran tertinggi juga dari kategori motokar dengan bilangan 821,634 unit.

The total number of new vehicle registrations was also found to slightly increase, where for the year 2024, the number was shown as 1,533,667 units - the highest number was 833,218 units from motorcar registration. Compared to the total number of new vehicle registrations for the previous year which was 1,533,332 units with the highest number was too from motorcar registration of 821,634 units.

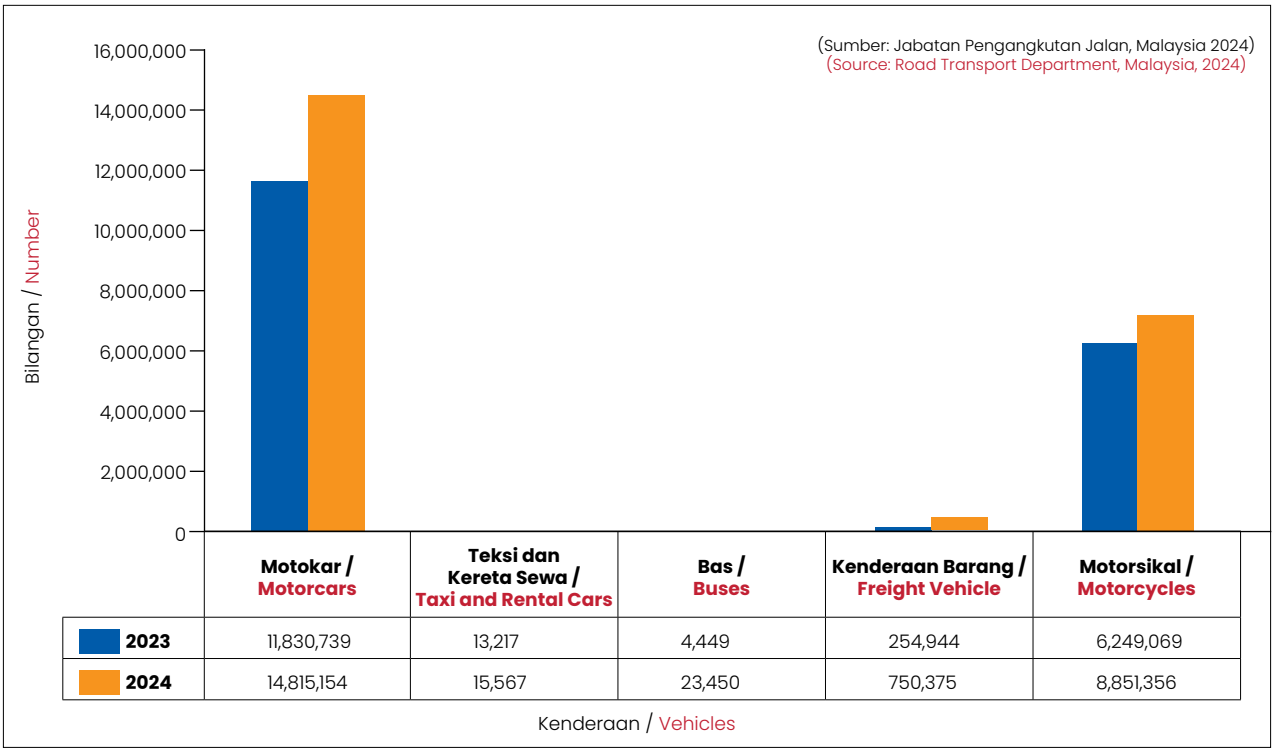
Jumlah kenderaan berdaftar yang sedang digunakan (aktif) didapati meningkat sebanyak 33.26% berbanding dengan tahun 2023 di mana jumlah kenderaan berdaftar aktif yang dilaporkan pada tahun 2024 adalah sebanyak 24,455,902 unit sementara tahun sebelumnya pula dilaporkan sebanyak 18,352,418 unit. Peningkatan bilangan kenderaan aktif ini merangkumi semua kategori kenderaan. Bas menunjukkan kenaikan tertinggi iaitu sebanyak 23,450 unit bas aktif bagi tahun 2024 berbanding 4,449 unit bas yang aktif pada tahun sebelumnya diikuti dengan kenderaan barangan yang merekodkan sebanyak 750,375 unit bagi tahun 2024 berbanding 254,944 unit pada tahun sebelumnya. Motosikal pula menunjukkan jumlah sebanyak 8,851,356 unit aktif pada tahun 2024 berbanding 6,249.069 unit bagi tahun 2023. Bilangan kenderaan berdaftar yang sedang digunakan (aktif) adalah seperti yang ditunjukkan dalam **Rajah 5.9**.

Meanwhile, the number of registered in-use (active) vehicles also increased by 33.26% compared to the year 2023 where number of registered in-use vehicles in 2024 were 24,455,902 units compared to 2023 which were 18,352,418 units. The increase in the number of active vehicles covers all vehicle categories. Buses showed the highest increment, which were 23,450 units active buses in 2024 compared to 4,449 units in the previous year, followed by freight vehicles which recorded a total number of 750,375 active units in 2024 compared to 254,944 units in 2023. Motorcycles recorded a total number of 8,851,356 active units compared to 6,249,069 units in 2023. The number of registered in-use vehicles (active) are shown in **Figure 5.9**.



	Motorsikal / Motorcycles	Motokar / Motorcars	Bas / Buses	Teksi dan Kereta Sewa / Taxi and Rental Cars	Kenderaan Barang / Freight Vehicle
2023	16,867,912	17,403,119	64,083	116,726	1,436,369
2024	17,491,618	18,142,864	59,060	116,404	1,464,241

Rajah 5.8 : Bilangan Kenderaan Berdaftar Terkumpul, 2023-2024
Figure 5.8 : Number of Registered Vehicle, 2023-2024



	Motokar / Motorcars	Teksi dan Kereta Sewa / Taxi and Rental Cars	Bas / Buses	Kenderaan Barang / Freight Vehicle	Motorsikal / Motorcycles
2023	11,830,739	13,217	4,449	254,944	6,249,069
2024	14,815,154	15,567	23,450	750,375	8,851,356

Rajah 5.9 : Bilangan Kenderaan Berdaftar Yang Sedang Digunakan (Aktif), Tahun 2023-2024
Figure 5.9 : Number of Registered in-Use Vehicle (Active), 2023-2024

BEBAN PENCEMARAN PENCEMAR UDARA

Beban Pencemaran Secara Menyeluruh

Dianggarkan pada tahun 2024, keseluruhan beban pencemaran yang terkumpul bagi pencemar karbon monoksida (CO) adalah 2,363,345 tan metrik, 1,098,992 tan metrik bagi nitrogen dioksida (NO_2), 271,064 tan metrik bagi sulfur dioksida (SO_2) dan 33,307 tan metrik bagi jirim zarahan (PM). Perbandingan keseluruhan beban pencemaran bagi tahun 2022, 2023 dan 2024 adalah seperti yang ditunjukkan dalam **Rajah 5.10**.

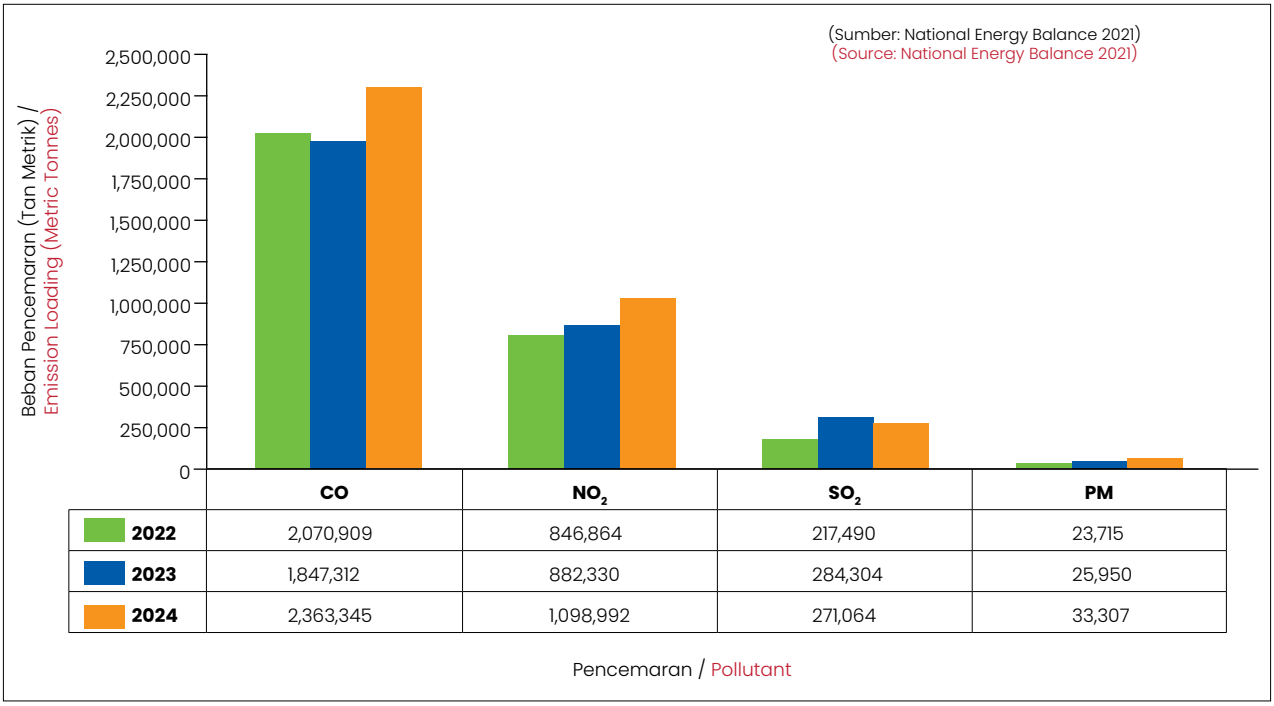
Secara keseluruhan, beban pencemar bagi parameter CO, NO_2, dan PM meningkat pada tahun 2024 kecuali bagi parameter SO_2 yang menunjukkan penurunan. Peningkatan adalah sebanyak 36.22% bagi beban pencemar NO_2. Manakala beban pencemar CO menunjukkan peningkatan sebanyak 27.93% dan beban pencemar PM menunjukkan peningkatan sebanyak 47.30% berbanding dengan tahun 2023.

AIR POLLUTION EMISSION LOAD

Overall Emission Load

It was estimated that in 2024 the overall cumulative air pollutant emission load was 2,363,345 metric tonnes of carbon monoxide (CO), 1,098,992 metric tonnes of nitrogen dioxide (NO_2), 271,064 metric tonnes of sulphur dioxide (SO_2), and 33,307 metric tonnes of particulate matter (PM). A comparison of the combined air pollutants emission load in 2022, 2023, and 2024 is shown in **Figure 5.10**.

Overall, there was an increase in emission loads for CO, NO_2 and PM. However, SO_2 emissions decreased slightly during that period. The increment of emission load for NO_2 was 36.22%, while emission load of CO pollutants increased by up to 27.93%, and PM pollutants had increased by up to 47.30% compared to the year 2023.



	CO	NO_2	SO_2	PM
2022	2,070,909	846,864	217,490	23,715
2023	1,847,312	882,330	284,304	25,950
2024	2,363,345	1,098,992	271,064	33,307

Rajah 5.10 : Beban Pencemaran Bahan Pencemar Udara dari Semua Punca, 2022-2024
Figure 5.10 : Air Pollutant Emission Load from All Sources, 2022-2024

Punca Beban Pencemaran

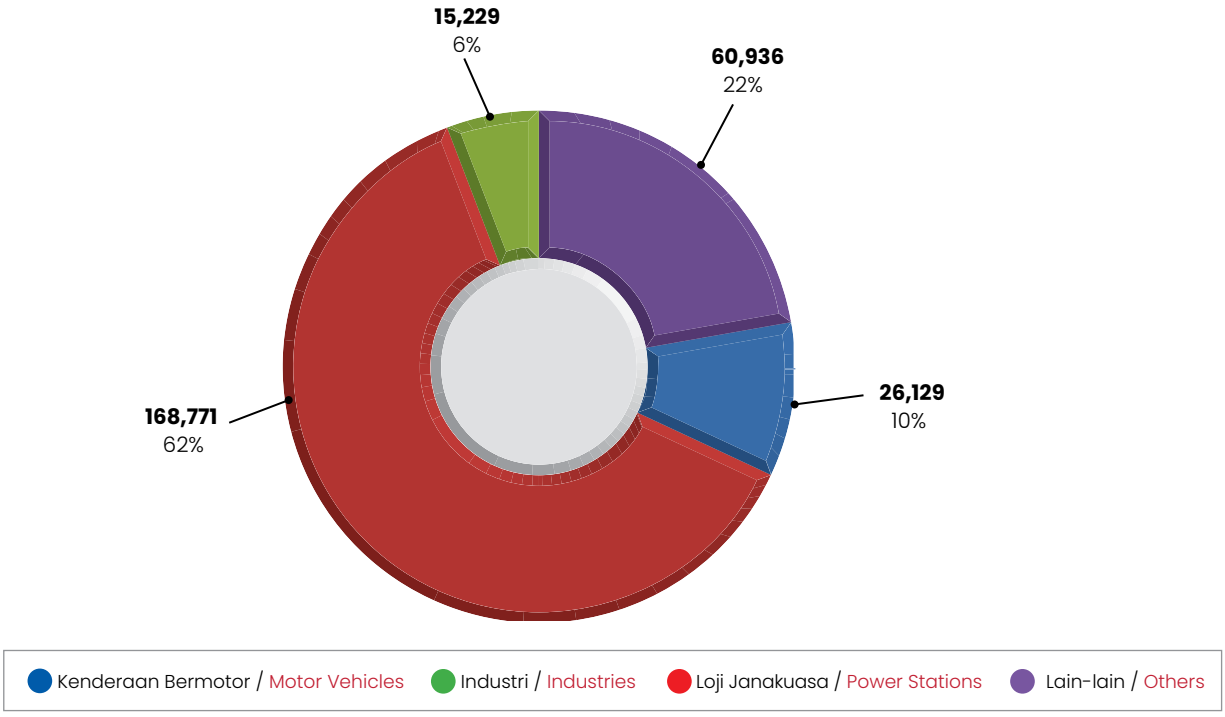
Loji janakuasa merupakan penyumbang utama kepada beban pencemar SO_2 (62%), diikuti dengan lain-lain kategori (22%), industri (6%) dan kenderaan bermotor (10%) (**Rajah 5.11**). Bagi beban pencemar PM pula, penyumbang terbesar adalah daripada loji janakuasa (30%), industri (23%), diikuti kenderaan bermotor (33%) dan lain-lain kategori (14%) (**Rajah 5.12**).

Penyumbang terbesar bagi NO_2 adalah daripada loji janakuasa (55%) diikuti kenderaan bermotor (35%), industri (7%) dan lain-lain kategori (3%) (**Rajah 5.13**). Walau bagaimanapun, kenderaan bermotor masih merupakan penyumbang terbesar kepada CO (95%) (**Rajah 5.14**). Punca-punca bagi kategori 'Lain-lain' yang dinyatakan di dalam rajah-rajah adalah merupakan pelepasan bahan pencemar udara dari kawasan perumahan, komersial dan penggunaan bukan tenaga. Anggaran pencemaran yang dihasilkan oleh beban pencemar udara daripada kenderaan bermotor iaitu HC, CO, PM, NO_2 dan SO_2 pada tahun 2020 hingga 2024 ditunjukkan dalam **Rajah 5.15**.

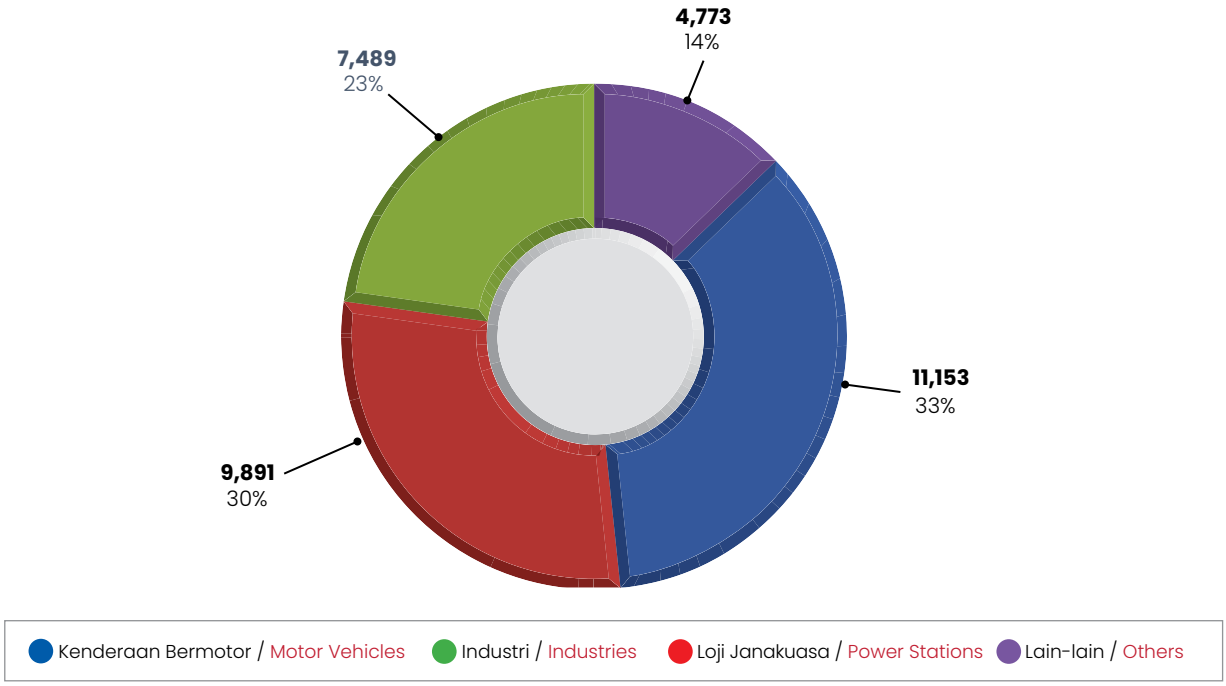
Emission Load by Sources

Power plants contributed the highest SO_2 emission load (62%), followed by other categories (22%), industries (6%), and motor vehicles (10%) (**Figure 5.11**). As for PM, the highest contributors were power plants (30%), followed by industries (23%), motor vehicles (33%), and others (14%) (**Figure 5.12**).

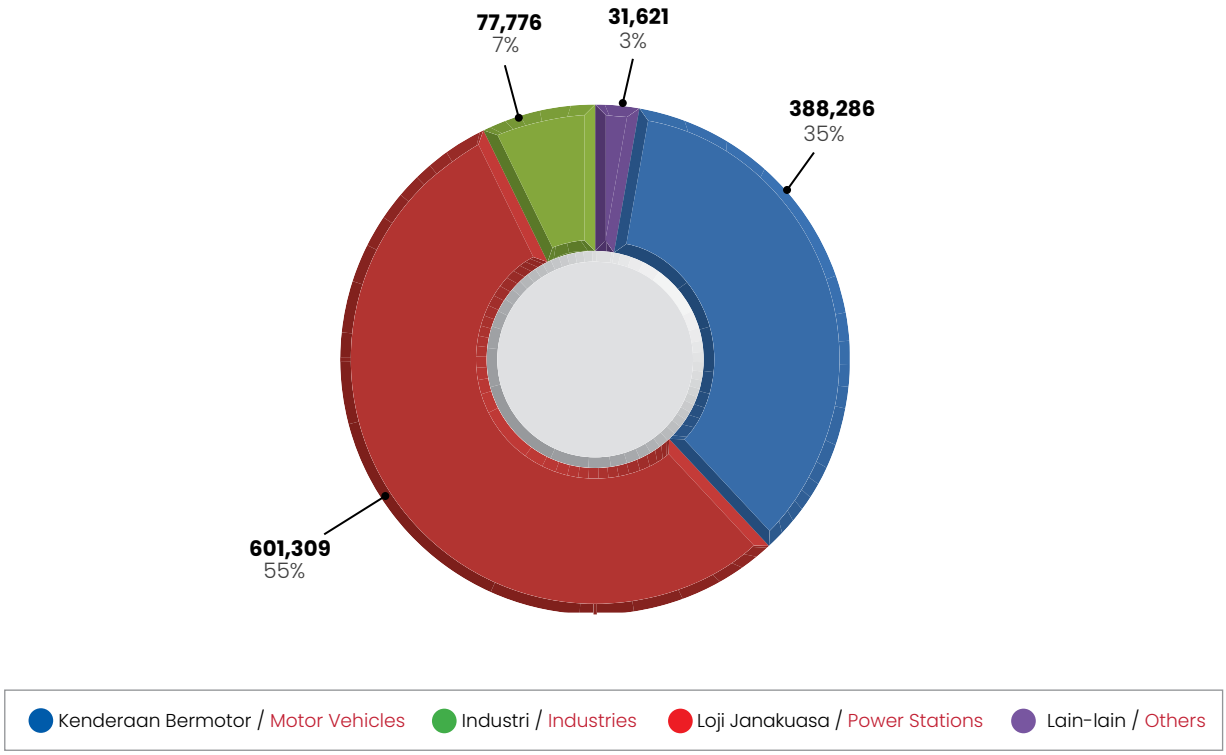
The highest contributors of NO_2 were power plants (55%) followed by motor vehicles (35%), industries (7%), and others (3%) (**Figure 5.13**). However, motor vehicles remained the highest contributor of CO (95%) (**Figure 5.14**). 'Others' in the figures represent air pollutant emissions from residential, commercial, and non-energy use sources. The estimated annual air pollutant emission loads of HC, CO, PM, NO_2, and SO_2 from motor vehicles for 2020 until 2024 are shown in **Figure 5.15**.



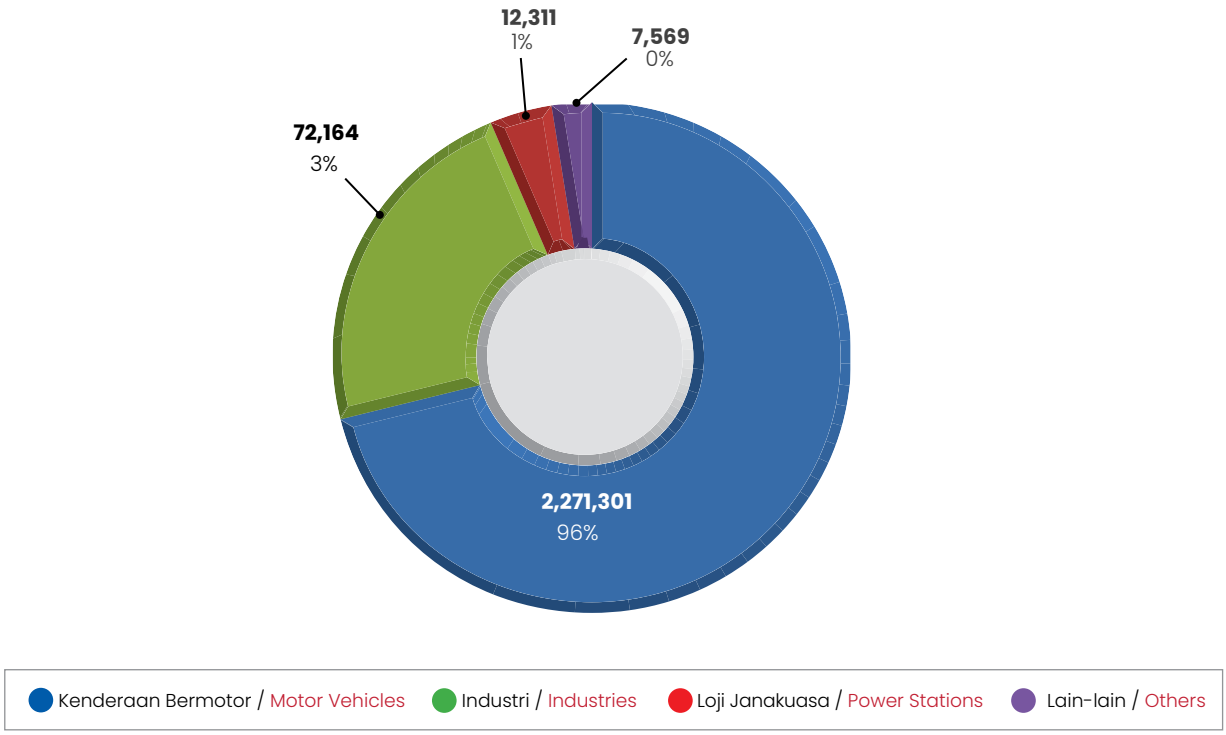
Rajah 5.11 : Punca Beban Pencemaran SO_2 (Tan Metrik), 2024
Figure 5.11 : SO_2 Emission Load by Sources (Metric Tonnes), 2024



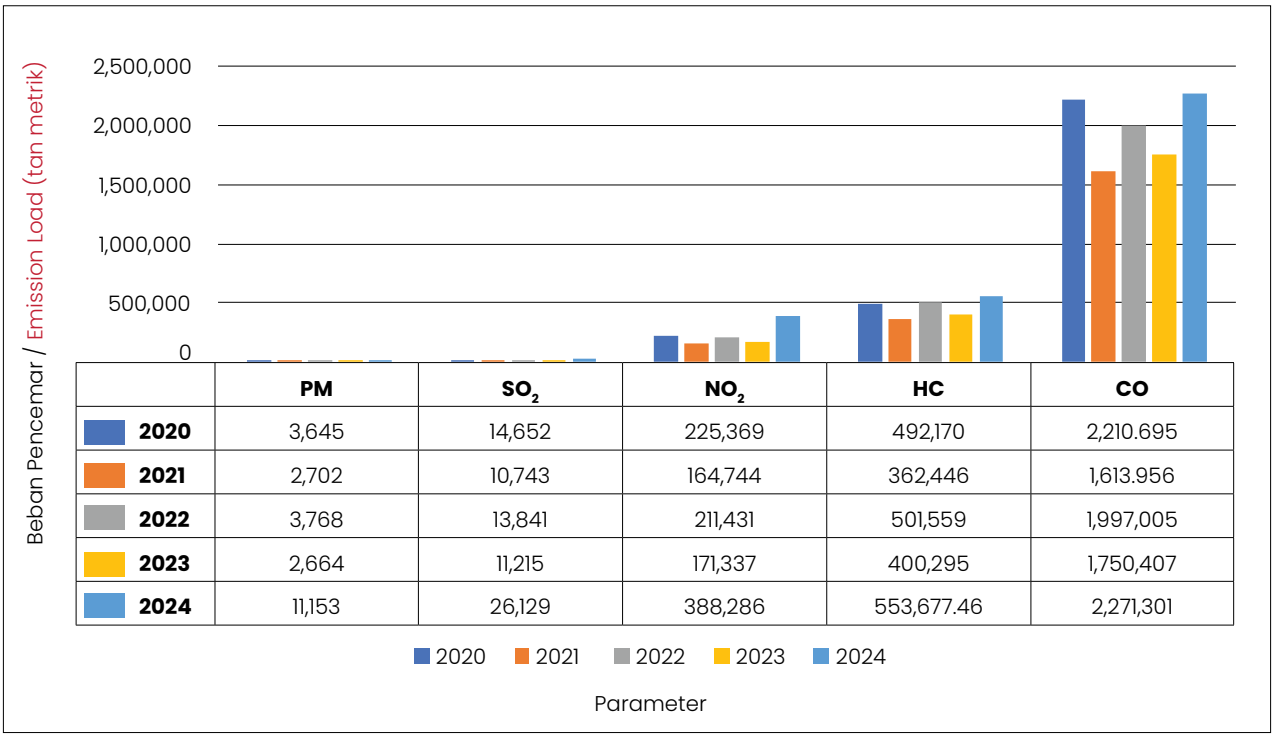
Rajah 5.12 : Punca Beban Pencemaran PM (Tan Metrik), 2024
Figure 5.12 : PM Emission Load by Sources (Metric Tonnes), 2024



Rajah 5.13 : Punca Beban Pencemaran NO_2 (Tan Metrik), 2024
Figure 5.13 : NO_2 Emission Load by Sources (Metric Tonnes), 2024



Rajah 5.14 : Punca Beban Pencemaran CO (Tan Metrik), 2024
Figure 5.14 : CO Emission Load by Sources (Metric Tonnes), 2024



	PM	SO_2	NO_2	HC	CO
2020	3,645	14,652	225,369	492,170	2,210.695
2021	2,702	10,743	164,744	362,446	1,613.956
2022	3,768	13,841	211,431	501,559	1,997,005
2023	2,664	11,215	171,337	400,295	1,750,407
2024	11,153	26,129	388,286	553,677.46	2,271,301

Rajah 5.15 : Beban Pencemar Udara dari Kenderaan Bermotor, 2020-2024 (Metrik Tan)
Figure 5.15 : Air Pollutant Emission Load from Motor Vehicles, 2020-2024 (Metric Tonnes)

INVENTORI BUANGAN TERJADUAL

Pada tahun 2024, sebanyak 5,378,977.55 tan metrik buangan terjadual telah dihasilkan di Malaysia. Ini merupakan pengurangan sebanyak 7.92% berbanding 5,841,596.82 tan metrik yang dilaporkan pada 2023. Buangan dros/ sanga/ klinker/ abu yang dikategorikan sebagai buangan terjadual kod SW 104 merupakan penyumbang tertinggi kepada penghasilan buangan terjadual di Malaysia iaitu sebanyak 2,546,939.56 tan metrik diikuti buangan gipsum (SW 205) sebanyak 546,530.42 tan metrik dan enap cemar logam berat (SW 204) sebanyak 366,108.89 tan metrik (**Jadual 5.1**).

Berdasarkan kategori penghasilan buangan terjadual mengikut negeri di Malaysia, Selangor merupakan negeri dengan penghasilan buangan terjadual tertinggi iaitu sebanyak 1,678,148.20 tan metrik (31.2%) diikuti oleh Pahang sebanyak 1,224,856.20 tan metrik (22.77%), Johor sebanyak 644,831.71 tan metrik (11.99%), Sarawak sebanyak 421,708.36 tan metrik (7.84%), Kedah sebanyak 267,120.05 tan metrik (4.97%) dan diikuti negeri-negeri lain seperti ditunjukkan dalam **Rajah 5.16**.

Rajah 5.17 menunjukkan penghasilan buangan terjadual mengikut kumpulan buangan terjadual seperti di dalam Jadual Pertama, Peraturan 2, Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005. Kumpulan SW 1 menyumbang sebanyak 2,611,081.56 tan metrik iaitu pengurangan sebanyak 2.91% berbanding 2,689,416.61 tan metrik yang dilaporkan pada tahun 2023. Ini diikuti dengan Kumpulan SW 2 iaitu penghasilan sebanyak 1,235,299.63 tan metrik, pengurangan sebanyak 12.33% berbanding 1,409,002.32 tan metrik seperti yang dilaporkan pada tahun 2023.

Berdasarkan kategori penghasilan buangan terjadual mengikut industri di Malaysia (**Jadual 5.2**), loji jana kuasa kekal dominan sebagai industri yang menyumbang jumlah tertinggi buangan terjadual iaitu sebanyak 1,816,379.62 tan metrik, namun terdapat pengurangan sebanyak 30.46% berbanding 2,611,858.21 tan metrik seperti yang dilaporkan pada tahun 2023. Ini diikuti dengan industri pengilangan logam yang menjana buangan terjadual sebanyak 706,829.07 tan metrik dengan pengurangan sebanyak 36.59% berbanding 1,114,619.21 tan metrik pada tahun 2023.

SCHEDULED WASTES INVENTORY

In 2024, a total of 5,378,977.55 metric tons of scheduled waste was generated in Malaysia. This represents a reduction of 7.92% compared to 5,841,596.82 metric tons reported in 2023. Dross/ slag/clinker/ash waste, categorized under scheduled waste code SW 104, was the largest contributor to scheduled waste in Malaysia, totalling 2,546,939.56 metric tons, followed by gypsum waste (SW 205) with 546,530.42 metric tons, and heavy metal sludge (SW 204) with 366,108.89 metric tons (**Table 5.1**).

Based on the generation of scheduled waste by state in Malaysia, Selangor recorded the highest amount at 1,678,148.20 metric tons (31.2%), followed by Pahang with 1,224,856.20 metric tons (22.77%), Johor with 644,831.71 metric tons (11.99%), Sarawak with 421,708.36 metric tons (7.84%), Kedah with 267,120.05 metric tons (4.97%), and other states as shown in **Figure 5.16**.

Figure 5.17 shows the generation of scheduled waste by waste group as categorized in the First Schedule, Regulation 2 of the Environmental Quality (Scheduled Wastes) Regulations 2005. Group SW 1 contributed 2,611,081.56 metric tons, a reduction of 2.91% compared to 2,689,416.61 metric tons reported in 2023. This was followed by Group SW 2, which generated 1,235,299.63 metric tons, a decrease of 12.33% compared to 1,409,002.32 metric tons reported in 2023.

Based on scheduled waste generation by industry (**Table 5.2**), power plants remain the dominant contributor with 1,816,379.62 metric tons, although this marks a 30.46% reduction compared to 2,611,858.21 metric tons in 2023. This was followed by the metal manufacturing industry, which generated 706,829.07 metric tons of scheduled waste - a 36.59% decrease compared to 1,114,619.21 metric tons in 2023.

Jadual 5.1: Jumlah Buangan Terjadual yang Dihasilkan mengikut Kod Kategori Buangan Terjadual, 2024
Table 5.1 : Quantity of Scheduled Wastes Generated by Scheduled Waste Category Code, 2024

BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
1	Debu, sanga, dros atau abu yang mengandungi arsenic, raksa, plumbum, kadmium, kromium, nikel, kuprum, vanadium, berilium, antimony, tellurium, talium, atau selenium, tidak termasuk sanga daripada kilang besi dan keluli / Dust, slag, dross or ash containing arsenic, mercury, lead, cadmium, chromium, nickel, copper, vanadium, beryllium, antimony, tellurium, thallium or selenium excluding slag from iron and steel factory	SW 104	2,546,939.56	47.35
2	Buangan gypsum yang terhasil daripada proses industri kimia atau loji janakuasa/ Waste gypsum arising from chemical industry or power plant	SW 205	546,530.42	10.16
3	Enap cemar yang mengandungi satu atau beberapa logam termasuklah kromium, kuprum, nikel, zink, plumbum, kadmium, aluminium, timah vanadium dan berilium / Sludges containing one or several metals including chromium, copper, nickel, zinc, lead, cadmium, aluminium, tin, vanadium and beryllium	SW 204	366,108.89	6.81
4	Buangan atau enap cemar getah atau lateks yang mengandungi pelarut organic atau logam berat / Rubber or latex wastes or sludge containing organic solvents or heavy metals	SW 321	330,367.47	6.14
5	Campuran buangan terjadual dan buangan tidak terjadual / Mixture of scheduled waste & non-scheduled waste	SW 422	257,494.67	4.79
6	Minyak pelincir terpakai / Spent lubricating oil	SW 305	187,252.39	3.48
7	Buangan pelarut organic bukan terhalogen / Waste of non-halogenated solvent	SW 322	167,899.85	3.12
8	Buangan mangkin / Waste catalyst	SW 202	140,473.86	2.61
9	Enap cemar yang mengandungi fluoride/ Sludge containing fluoride	SW 207	92,425.63	1.72
10	Asid tidak organik terpakai / Spent inorganic acids	SW 206	89,275.12	1.66
11	Bekas, beg atau kelengkapan yang dilupuskan yang dicemari dengan bahan kimia, racun mahkluk perosak, minyak mineral atau buangan terjadual / Disposed containers, bags or equipment contaminated with chemicals, pesticides, mineral oil or scheduled wastes	SW 409	89,090.55	1.66

BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
12	Apa-apa sisa daripada pengolahan atau pemerolehan kembali buangan terjadual/ Any residues from treatment or recovery of scheduled wastes	SW 501	82,890.57	1.54
13	Emulsi minyak mineral-air terpakai / Spent mineral oil-water emulsion	SW 307	58,479.46	1.09
14	Buangan daripada pemasangan elektrikal dan elektronik yang mengandungi komponen seperti akumulator, suis raksa, kaca daripada tiub sinar katod dan kaca teraktif atau kapasitor bifenil terpoliklorin yang lain, atau yang dicemari dengan kadmium, raksa, plumbum, nikel, kromium, kuprum, litium, perak, mangan, atau bifenil terpoliklorin / Waste from electrical and electronic assemblies containing components such as accumulators, mercury-switches, glass from cathode-ray tubes and other activated glass or polychlorinated biphenyl-capacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyl	SW 110	55,470.10	1.03
15	Kain buruk, plastik, kertas atau turas yang dicemari dengan buangan terjadual / Rags, plastics, papers or filters contaminated with scheduled wastes	SW 410	48,465.86	0.90
16	Buangan patogenik, buangan klinikal atau bahan yang dikuarantinkan / Pathogenic wastes, clinical wastes or quarantined materials	SW 404	46,734.86	0.87
17	Buangan dakwat, cat, pigmen, lakuer, perwarna atau varnis / Waste of inks, paints, pigments, lacquer, dye or varnish	SW 417	46,439.37	0.86
18	Produk dakwat, cat, pigmen, lakuer, perwarna atau varnish yang terbuang atau yang tidak mengikut spesifikasi yang mengandungi pelarut organic / Discarded or off-specification inks, paints, pigments, lacquer, dye or varnish products containing organic solvent	SW 418	36,065.16	0.67
19	Campuran minyak-air seperti air ballast / Oil-water mixture such as ballast water	SW 309	26,579.19	0.49
20	Enap cemar mineral termasuklah enap cemar kalsium hidroksida, enap cemar pemfosfatan, enap cemar kalsium sulfit dan enap cemar karbonat / Mineral sludges including calcium hydroxide sludges, phosphating sludges, calcium sulphite sludges and carbonates sludges	SW 427	21,906.36	0.41

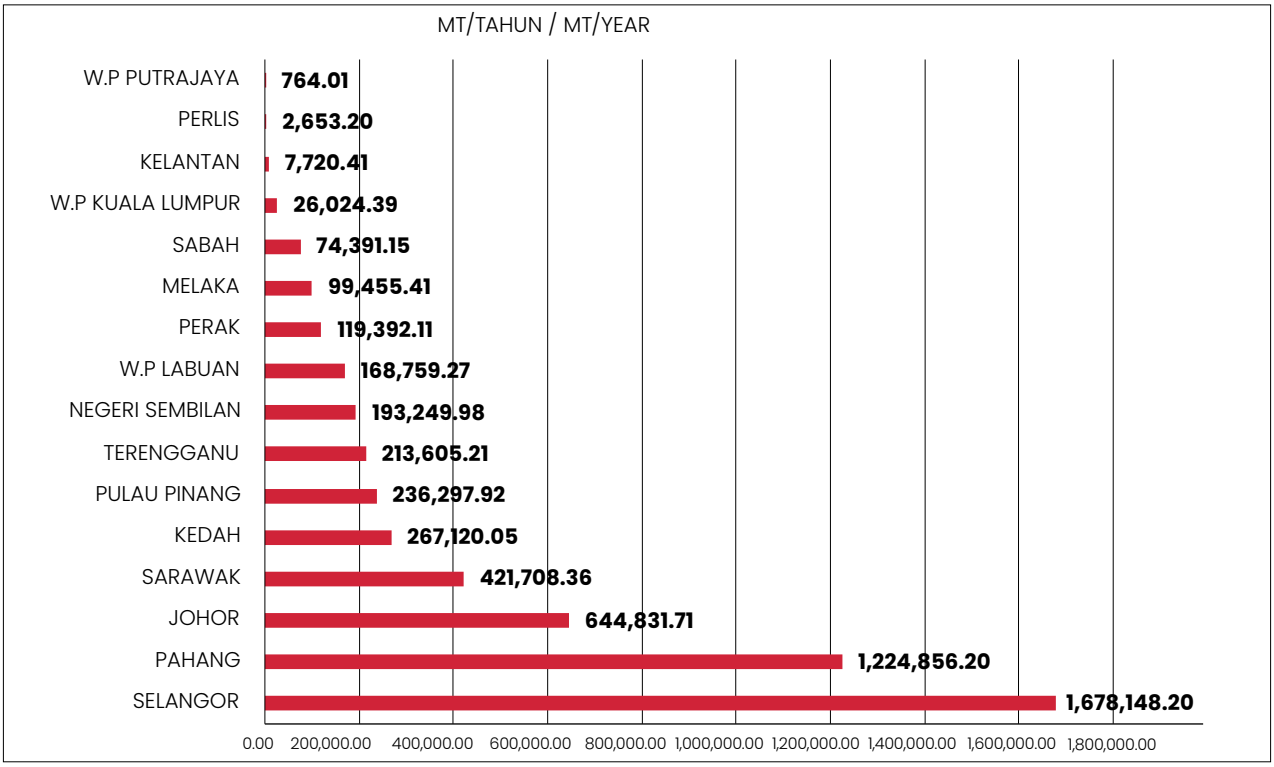
BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
21	Larutan pemprosesan terpakai, bahan kimia fotografi terbuang atau buangan fotografi terbuang / Spent processing solution, discarded photographic chemicals or discarded photographic wastes	SW 423	20,892.73	0.39
22	Enap cemar dakwat, cat pigmen, lakuer, perwarna atau varnis / Sludges of inks, paints, pigments, lacquer, dye or varnish	SW 416	19,660.40	0.37
23	Bahan kimia yang terbuang atau tidak mengikut spesifikasi / Chemicals that are discarded or off-specification	SW 429	16,660.91	0.31
24	Alkali terpakai yang mengandungi logam berat / Spent alkalis containing heavy metals	SW 401	9,447.79	0.18
25	Buangan pelarut organik terhalogen / Waste of halogenated organic solvents	SW 323	7,219.33	0.13
26	Sisa berminyak dari bengkel automotif, stesen servis minyak atau perangkap gris/ Oily residue from automotive workshop, service station, oil or grease interceptor	SW 312	6,996.38	0.13
27	Alkali terpakai dengan pH yang lebih daripada atau sama dengan 11.5 yang mengakis atau berbahaya / Spent alkalis with pH more or equal to 11.5 which are corrosive or hazardous	SW 402	6,026.96	0.11
28	Buangan bateri asid plumbum dalam bentuk sempurna atau hancur / Waste of lead acid batteries in whole or crushed form	SW 102	5,882.08	0.11
29	Minyak hidraulik terpakai / Spent hydraulic oil	SW 306	5,739.89	0.11
30	Buangan pelekat atau glu yang mengandungi pelarut organic tidak termasuk bahan polimer pepejal / Adhesive or glue waste containing organic solvents excluding solid polymeric materials	SW 303	4,659.95	0.09
31	Buangan cecair terma (pemindahan haba) seperti glikol etilena / Waste of thermal fluids (heat transfer) such as ethylene glyco	SW 327	4,623.38	0.09
32	Campuran buangan terjadual / A mixture of scheduled wastes	SW 421	4,584.89	0.09
33	Klinker, sanga, abu, dari penunu buangan terjadual / Clinker, slag and ashes from scheduled wastes incinerator	SW 406	4,526.38	0.08
34	Tanah, puing, atau bahan tercemar yang terhasil daripada pembersihan tumpahan bahan kimia, minyak mineral, atau buangan terjadual / Contaminated soil, debris or matter resulting from cleaning-up of a spill of chemical, mineral oil or scheduled wastes	SW 408	4,078.21	0.08

BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
35	Karbon teraktif yang terpakai tidak termasuk karbon daripada pengolahan air boleh diminum dan proses industri makanan dan penghasilan vitamin / Spent activated carbon excluding carbon from the treatment of potable water and processes of the food industry and vitamin production	SW 411	3,670.13	0.07
36	Buangan resin tidak matang yang mengandungi pelarut organic atau logam berat termasuklah resin epoksi dan resin fenolik / Uncured resin waste containing organic solvents or heavy metals including epoxy resin and phenolic resin	SW 325	3,129.34	0.06
37	Minyak atau enap cemar daripada operasi penyenggaraan loji penapisan minyak / Oil or sludge from oil refinery plant maintenance operation	SW 314	2,304.14	0.04
38	Buangan yang mengandungi raksa atau sebatiannya / Waste containing mercury or its compound	SW 109	1,558.94	0.03
39	Larutan alkali berair terpakai yang mengandungi sianida / Spent aqueous alkaline solution containing cyanide	SW 414	1,479.05	0.03
40	Enap cemar dari tangki penyimpanan minyak mineral / Sludge from mineral oil storage tank	SW 310	1,250.68	0.02
41	Buangan minyak atau enap cemar berminyak / Waste oil or oily sludges	SW 311	1,250.68	0.02
42	Buangan bateri yang mengandungi kadmium dan nikel atau raksa atau litium/ Waste of batteries containing cadmium and nickel or mercury or lithium	SW 103	1,065.80	0.02
43	Asid organic terpakai dengan pH yang kurang daripada atau sama dengan 2 yang mengakis atau berbahaya / Spent organic acids with pH less or equal to 2 which are corrosive or hazardous	SW 301	798.24	0.01
44	Dadah terbuang yang mengandungi bahan psikotrofik atau yang mengandungi bahan yang bertoksik berbahaya, karsinogenik, mutagenik atau teratogenik / Discarded drugs containing psychotropic substances or containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic	SW 403	713.03	0.01
45	Buangan yang mengandungi formadehid / Waste containing formaldehyde	SW 320	697.39	0.01
46	Buangan yang terhasil daripada penyediaan dan pengeluaran barangan farmaseutikal / Waste arising from the preparation and production of pharmaceutical product	SW 405	564.70	0.01

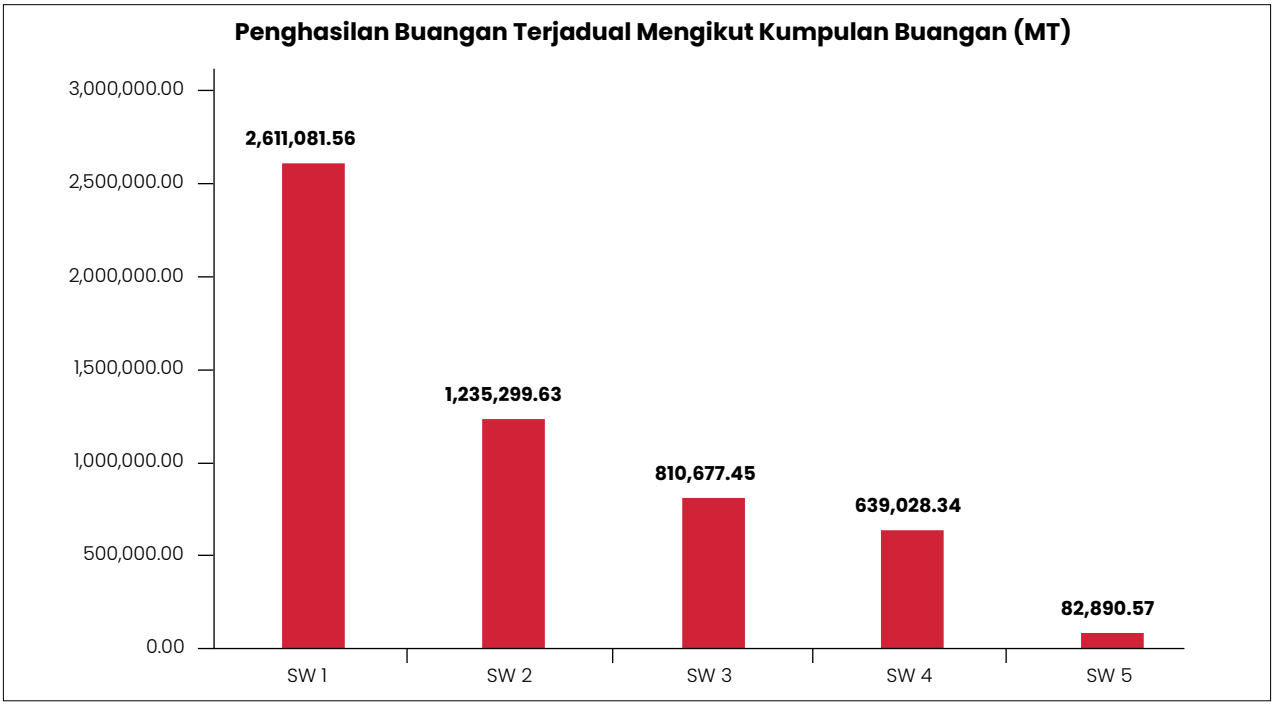
BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
47	Tar atau sisa bertar dari loji penapisan minyak atau loji petrokimia / Tar or tarry residues from oil refinery or petrochemical plant	SW 315	424.42	0.01
48	Buangan sisa penyulingan tidak berair terhalogen atau bukan terhalogen yang terhasil daripada proses permeolehan kembali pelarut organik / Waste of halogenated or unhalogenated non aqueous distillation residues arising from organic solvents recovery process	SW 324	411.86	0.01
49	Bahan kimia makmal yang usang / Obsolete laboratory chemicals	SW 430	347.31	0.01
50	Buangan asbestos dalam bentuk enap cemar, debu atau gentian / Asbestos wastes in sludges, dust or fibre forms	SW 201	305.96	0.01
51	Tanah yang dicemari minyak daripada penapisan semula minyak pelincir terpakai / Oil contaminated earth from re-refining of used lubricating oil	SW 313	259.49	0.00
52	Buangan fluks yang mengandungi campuran asid organic, pelarut atau sebatian ammonium klorida / Flux waste containing mixture of organic acids, solvents or compounds of ammonium chloride	SW 302	182.58	0.00
53	Buangan terjadual tidak boleh bergerak termasuklah enap cemar yang ditetapkan secara kimia, dikapsulkan, dipejalkan atau distabilkan / Immobilized scheduled wastes including chemically fixed, encapsulated, solidified or stabilized sludges	SW 203	179.75	0.00
54	Enap cemar dari tangki minyak / Oil tankers sludges	SW 308	122.08	0.00
55	Sisa daripada pemerolehan kembali likuor penjerukan asid / Residues from recovery of acid pickling liquor	SW 106	99.57	0.00
56	Buangan yang mengandungi arsenic atau sebatiannya / Waste containing arsenic or its compound	SW 101	63.44	0.00
57	Diisosianat terpakai dan sisa sebatian isosianat tidak termasuk bahan berpolimer pepejal daripada proses pengilangan busa / Spent di-isocyanates and residues of isocyanate compounds excluding solid polymeric material from foam manufacturing process	SW 419	59.68	0.00

BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
58	Buangan daripada pengeluaran, formulasi, perdagangan atau penggunaan racun mahkluk perosak, racun herba atau biosid / Wastes from the production, formulation, trade or use of pesticides, herbicides or biocides	SW 425	50.07	0.00
59	Produk yang tidak mengikut spesifikasi daripada pengeluaran, formulasi, perdagangan, atau penggunaan racun mahkluk perosak, racun herba, atau biosid / Off-specification products from the production, formulation, trade or use of pesticides, herbicides or biocides	SW 426	27.73	0.00
60	Buangan yang mengandungi, yang terdiri daripada, atau yang dicemari dengan peroksida / Waste containing, consisting of or contaminated with, peroxides	SW 432	25.77	0.00
61	Enap cemar asid / Acid sludges	SW 316	17.18	0.00
62	Agen pengoksidaan terpakai / Spent oxidizing agent	SW 424	14.53	0.00
63	Buangan fenol atau sebatian fenol termasuklah klorofenol dalam bentuk cecair atau enapcemar / Waste of phenols or phenol compounds including chlorophenol in the form of liquids or sludges	SW 319	11.09	0.00
64	Sisa larutan resap daripada pemprosesan zink dalam bentuk debu dan enap cemar / Leaching residues from zinc processing in dust and sludges form	SW 108	1.06	0.00
65	Sanga daripada pemprosesan kuprum bagi pemprosesan lanjut atau penapisan yang mengandungi arsenic, plumbum, atau kadmium / Slags from copper processing for further processing or refining containing arsenic, lead or cadmium	SW 107	1.01	0.00
66	Garam terpakai yang mengandungi sianida / Spent salt containing cyanide	SW 413	0.96	0.00
67	Buangan sebatian fosforus organik / Waste of organic phosphorus compound	SW 326	0.89	0.00
68	Enap cemar yang mengandungi sianida/ Sludges containing cyanide	SW 412	0.28	0.00
69	Sebatian organologam terpakai termasuklah plumbum tetraetil, plumbum tetrametil dan sebatian organotimah/ Spent organometallic compounds including tetraethyl lead, tetramethyl lead and organotin compounds	SW 317	0.10	0.00
70	Buangan yang mengandungi dioksin dan furan / Waste containing dioxins or furans	SW 407	0.02	0.00
71	Enap cemar galvani / Galvanic sludges	SW 105	0.00	0.00

BIL/NO.	NAMA BUANGAN/WASTE NAME	KOD KATEGORI BUANGAN / WASTE CATEGORY CODE	KUANTITI BUANGAN / QUANTITY OF WASTE	
			(MT / TAHUN) / (MT / YEAR)	PERATUSAN (%) / PERCENTAGE (%)
72	Kek tekan daripada prapengolahan lai sabun gliserol / Press cake from pretreatment of glycerol soap lye	SW 304	0.00	0.00
73	Buangan, bahan dan artikel yang mengandungi atau yang dicemari dengan bifenil terpoliklorin (BFT) atau trifenil terpoliklorin (TFT) / Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCB) or polychlorinated triphenyls (PCT)	SW 318	0.00	0.00
74	Minyak pelindapan terpakai yang mengandungi sianida / Spent quenching oils containing cyanides	SW 415	0.00	0.00
75	Larutan resap dari tapak pelupusan buangan terjadual / Leachate from scheduled waste landfill	SW 420	0.00	0.00
76	Buangan daripada operasi pengawetan kayu yang menggunakan garam tidak organik yang mengandungi kuprum, kromium, atau arsenik daripada sebatian fluoride atau yang menggunakan sebatian yang mengandungi fenol berklorin atau kreosot / Wastes from wood preserving operation using inorganic salts containing copper, chromium or arsenic of fluoride compounds or using compound containing chlorinated phenol or creosote	SW 428	0.00	0.00
77	Buangan daripada pengilangan atau pemprosesan atau penggunaan bahan letupan / Waste from manufacturing or processing or use of explosives	SW 431	0.00	0.00
JUMLAH/ TOTAL			**5,378,977.55**	**100.00**



Rajah 5.16: Penghasilan Buangan Terjadual (Tan Metrik) mengikut Negeri 2024
Figure 5.16: Distribution of Scheduled Waste (Metric Tonnes) generated by State 2024



SW 1	Buangan logam dan buangan berasaskan logam
SW 2	Buangan yang mengandungi terutamanya juzuk tidak organik yang mungking mengandungi logam dan bahan organik
SW 3	Buangan yang mengandungi terutamanya juzuk organik yang mungkin mengandungi logam dan bahan tidak organik
SW 4	Buangan yang mungkin mengandungi sama ada juzuk tidak organik atau organik
SW 5	Buangan lain

Rajah 5.17: Jumlah Penghasilan Buangan Terjadual mengikut Kumpulan Buangan dalam Jadual Pertama, Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005
Figures 5.17: Total Scheduled Wastes Generation according to the First Scheduled Environmental Quality (Schedule Wastes) Regulations 2005

Jadual 5.2: Jumlah Buangan Terjadual yang Dihasilkan mengikut Jenis Industri 2024
Table 5.2: Quantity of Scheduled Wastes Generated by Industry 2024

BIL/ NO.	JENIS INDUSTRI / TYPE OF INDUSTRIES	MT/TAHUN / MT/YEAR	PERATUSAN (%) / PERCENTAGE (%)
1	Loji Jana Kuasa / Power Plant	1,816,379.62	33.77
2	Pengilangan Logam / Metal Refinery	706,829.07	13.14
3	Industri Kimia / Chemical Industry	566,012.93	10.52
4	Premis Buangan Terjadual (PYDT) / Scheduled Waste Treatment And Disposal Facilities	421,203.89	7.83
5	Elektrik dan Elektronik / Electric and Electronic	336,130.62	6.25
6	Penapisan Petroleum / Petroleum Refinery	251,081.84	4.67
7	Kenderaan / Vehicle	192,802.11	3.58
8	Jentera / Machinery	192,119.26	3.57
9	Berasaskan Getah / Rubber Base	182,828.06	3.40
10	Penyudahan Logam dan Sadur Elektrik / Metal Finishing and Coating	133,484.90	2.48
11	Bengkel / Workshop	133,190.82	2.48
12	Galian Bukan Logam / Excavation Non Metal	83,087.79	1.54
13	Kertas / Paper	60,728.02	1.13
14	Lain-lain / Others	53,335.24	0.99
15	Percetakan / Printing	49,566.12	0.92
16	Perubatan / Health Care Services	46,734.86	0.87
17	Loji Rawatan Air / Water Treatment Plant	34,636.59	0.64
18	Fabrikasi Logam / Metal Fabrication	26,276.11	0.49
19	Penapisan Minyak Makan / Edible Oil Refinery	17,777.68	0.33
20	Makanan dan Minuman / Food and Drink	14,011.41	0.26
21	Gudang / Warehouse	12,615.31	0.23
22	Plastik / Plastic	9,577.44	0.18
23	Tekstil / Textiles	7,195.14	0.13
24	Kilang Kelapa Sawit (PYDT) / Palm Oil Mill	5,406.71	0.10
25	Kuari / Quarry	4,330.56	0.08
26	Pertanian / Agriculture	3,352.78	0.06
27	Simen / Cement	3,332.59	0.06
28	Berasaskan Kayu / Wood Base	2,986.85	0.06
29	Perlombongan / Mining	2,721.90	0.05
30	Pembuatan Payung dan Lain-lain Industri Pembuatan / Other Manufacturing	2,442.86	0.05
31	Kilang Getah (PYDT) / Rubber Factory	1,501.61	0.03
32	Kilang Padi / Rice Mill	1,304.78	0.02
33	Tapak Pelupusan Sampah / Sanitary Landfill	1,265.07	0.02
34	Peralatan Sukan Dan Permainan / Sports Equipment and Games	1,160.61	0.02

BIL/ NO.	JENIS INDUSTRI / TYPE OF INDUSTRIES	MT/TAHUN / MT/YEAR	PERATUSAN (%) / PERCENTAGE (%)
35	Perkhidmatan / Services	1,068.86	0.02
36	Peralatan Pejabat dan Alat Tulis / Office Supplies and Stationery	190.20	0.00
37	Loji Pengolahan Kumbahan (IWK, Majari, PBT) / Sewage Treatment Plant (IWK, Majari, PBT)	135.67	0.00
38	Loji Pengolahan Kumbahan Persendirian / Private Sewage Treatment Plant	67.77	0.00
39	Makanan Ternakan / Livestock Food	44.16	0.00
40	Kulit / Leather	34.50	0.00
41	Hotel / Hotel	15.75	0.00
42	Rokok dan Tembakau / Cigarettes and Tobacco	7.47	0.00
43	Perhutanan / Forestry	1.35	0.00
44	Perikanan / Fishery	0.42	0.00
45	Restoran / Restaurant	0.21	0.00
46	Penternakan / Husbandry	0.05	0.00
JUMLAH / TOTAL		**5,378,977.56**	**100.00**

Bab 5
INVENTORI PUNCA PENCEMARAN
Inventory of Pollution Sources

Kuala Langat Power Plant, Selangor

PENGURUSAN BUANGAN TERJADUAL DI MALAYSIA

Sebanyak 5,378,977.56 tan metrik buangan terjadual dihasilkan di Malaysia pada tahun 2024. Daripada jumlah tersebut, sebanyak 1,998,481.64 tan metrik buangan terjadual masih ditempatkan di stor di dalam premis pada fasa enam bulan kedua sebelum dilupuskan kepada penerima buangan yang dilesenkan pada tahun 2025 memandangkan peruntukan undang-undang membenarkan pengeluar buangan untuk menyimpan buangan terjadual di dalam stor tidak melebihi 180 hari (6 bulan). Sebanyak 1,879,787.20 tan metrik buangan terjadual telah dikendalikan di bawah pengurusan khas di mana buangan tersebut digunakan semula oleh pihak industri sebagai sebagai bahan api atau bahan mentah atau buangan tersebut dilupuskan di tapak pelupusan sanitari seperti yang dipaparkan dalam **Rajah 5.18**.

Pengolahan dalam tapak merupakan salah satu kaedah bagi rawatan buangan terjadual di mana buangan tersebut diolah sendiri oleh pengeluar buangan. Pada tahun 2024, sebanyak 801,344.09 tan metrik buangan terjadual telah diolah di dalam tapak oleh premis pengeluar buangan terjadual manakala 458,641.27 tan metrik buangan terjadual yang dihasilkan telah di hantar ke premis penerima buangan bagi tujuan pemerolehan kembali dan menghasilkan produk bernilai tinggi bagi pasaran tempatan dan antarabangsa.

Melihat kepada pengurusan buangan terjadual selain buangan sisa klinikal di Kemudahan-Kemudahan Pengurusan Buangan Terjadual Bersepadu, sebanyak 190,010.46 tan metrik telah kendalikan secara pembakaran, dilupuskan di tapak pelupusan selamat, dirawat secara fizikal dan kimia dan juga secara solidifikasi. Ini merupakan kenaikan sebanyak 4.42% seperti dilaporkan pada tahun 2023. Kenaikan ini sejajar dengan pertambahan Kemudahan Pengurusan Buangan Terjadual Bersepadu di Malaysia.

Buangan sisa klinikal dikategorikan sebagai buangan terjadual SW 404 dimana buangan ini dijana dari pusat-pusat penyedia perkhidmatan kesihatan seperti klinik dan hospital. Buangan sisa klinikal terus meningkat pada tahun ini iaitu dengan penghasilan sebanyak 46,734.86 tan metrik, kenaikan sebanyak 10.57% atau bersamaan 4,940.61 metrik tan.

SCHEDULED WASTE MANAGEMENT IN MALAYSIA

A total of 5,378,977.56 metric tons of scheduled waste was generated in Malaysia in 2024. Out of this amount, 1,998,481.64 metric tons of scheduled waste remained stored on-site at premises during the second six-month phase before being disposed to licensed waste receivers in 2025, as legal provisions allow waste generators to store scheduled waste for up to 180 days (6 months). A total of 1,879,787.20 metric tons of scheduled waste was managed under special management, where the waste was reused by industries as fuel or raw material, or was disposed of at sanitary landfill sites, as shown in **Figure 5.18**.

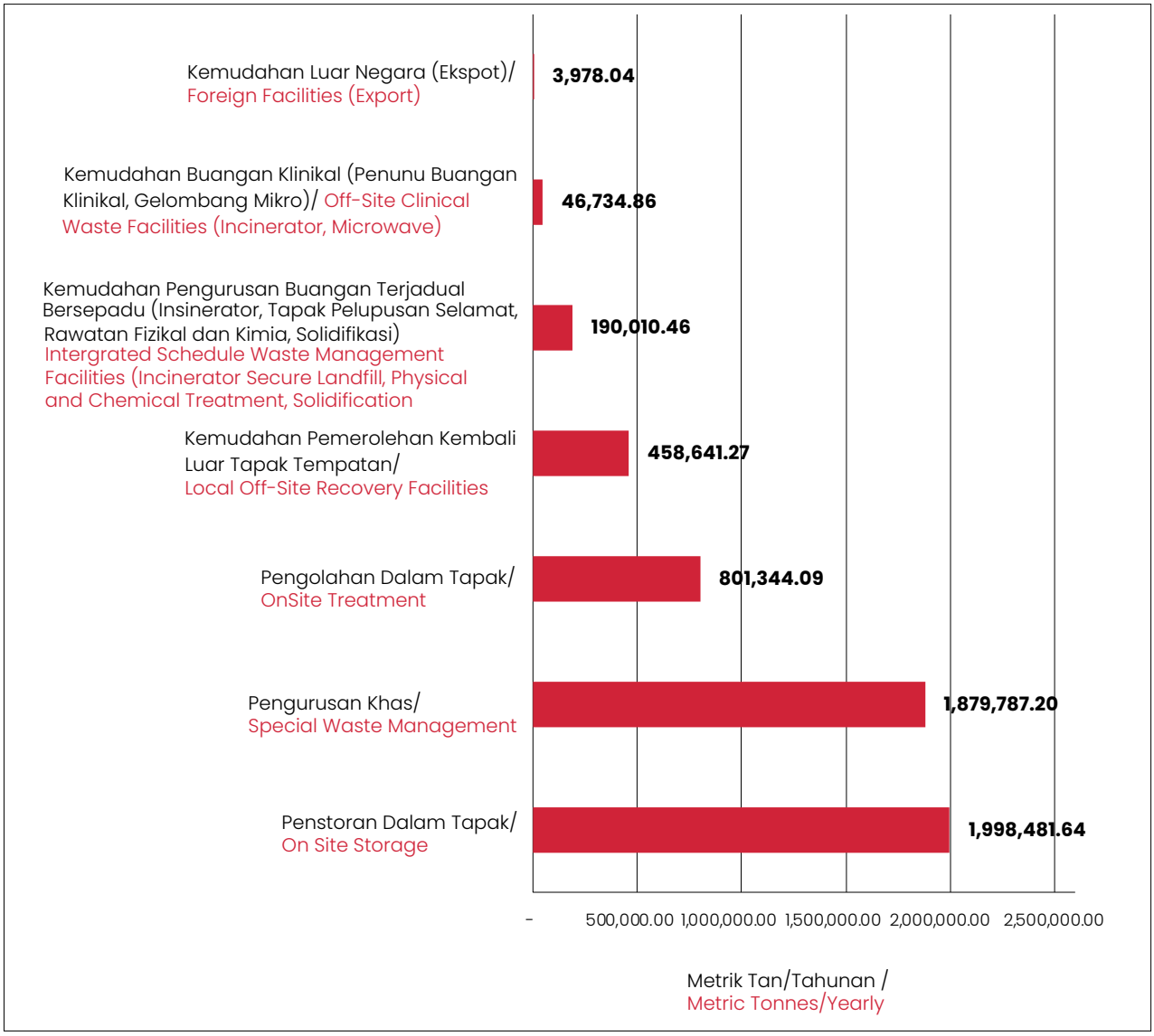
On-site treatment is one of the methods of handling scheduled waste, where the waste is treated by the waste generator themselves. In 2024, a total of 801,344.09 metric tons of scheduled waste was treated on-site by scheduled waste-generating premises, while 458,641.27 metric tons of scheduled waste were sent to waste receiving premises for the purpose of resource recovery and the production of high-value products for both local and international markets.

Looking at the management of scheduled waste, excluding clinical waste, at the Integrated Scheduled Waste Management Facilities, a total of 190,010.46 metric tons was managed through incineration, safe landfill disposal, physical and chemical treatment, and solidification. This represents an increase of 4.42% compared to what was reported in 2023. This increase aligns with the growth in the number of Integrated Scheduled Waste Management Facilities in Malaysia.

Clinical waste is categorized as scheduled waste SW 404, generated by healthcare service providers such as clinics and hospitals. Clinical waste continued to rise this year, reaching 46,734.86 metric tons, an increase of 10.57% or 4,940.61 metric tons.

Polisi negara membenarkan pengeskportan buangan terjadual bagi tujuan pemerolehan kembali buangan-buangan tertentu disebabkan ketiadaan teknologi yang terkini dalam negara bagi memproses buangan tersebut. Oleh yang demikian, buangan tersebut dieksport ke luar negara yang mempunyai kemudahan dengan kadar pemerolehan kembali yang tinggi berbanding kemudahan yang ada di Malaysia. Sebanyak 3,978.04 tan metrik buangan terjadual telah dieksport ke luar negara dengan pengurangan sebanyak 92.26% berbanding 51,409.00 tan metrik pada tahun 2023.

The national policy allows the export of scheduled waste for the purpose of recovery of certain wastes due to the lack of advanced technology in the country to process such waste. As a result, the waste is exported to countries that have facilities with higher recovery efficiency compared to those available in Malaysia. A total of 3,978.04 metric tons of scheduled waste was exported abroad, marking a reduction of 92.26% compared to 51,409.00 metric tons in 2023.



Rajah 5.18: Kemudahan Mengendalikan Buangan Terjadual 2024
Figure 5.18: Facilities Handling Scheduled Wastes 2024

PENGURUSAN KHAS BUANGAN TERJADUAL

Jumlah buangan terjadual yang dikendalikan secara pengurusan khas bertambah sebanyak 25.88% daripada 1,393,270.17 tan metrik pada tahun 2023 kepada 1,879,787.21 tan metrik pada tahun 2024. **Jadual 5.3** menunjukkan pecahan kuantiti buangan terjadual yang dikendalikan secara khas mengikut kod buangan dan punca buangan. Buangan terjadual kod SW 104 merupakan buangan utama yang diberi kelulusan bersyarat di bawah pengurusan khas di mana sebanyak 1,775,127.57 tan metrik telah digunakan semula sebagai bahan mentah bagi pembuatan produk. Kelulusan bersyarat tersebut telah diberikan kepada pengeluar buangan terjadual terutamanya daripada loji jana kuasa elektrik yang menggunakan arang batu dan juga pemain industri lain. Berdasarkan kepada jumlah tersebut, 1,166,660.45 tan metrik buangan SW 104 daripada loji jana kuasa elektrik dan 608,467.12 tan metrik daripada industri lain telah dikendalikan secara khas.

Buangan terjadual kod SW 204 iaitu enap cemar yang mengandungi logam berat merupakan kod buangan kedua tertinggi yang diuruskan secara khas di mana sebanyak 60,132.67 tan metrik telah dilupuskan di tapak pelupusan sanitari dan 36,893.33 tan metrik digunakan semula sebagai bahan mentah bagi pembuatan produk. Manakala sebanyak 23.38 tan metrik buangan daripada pengilangan atau pemprosesan atau penggunaan bahan letupan yang dikategorikan sebagai buangan terjadual kod SW 431 telah dikendalikan dengan kaedah letupan.

SPECIAL MANAGEMENT OF SCHEDULED WASTE

The amount of scheduled waste handled under special management increased by 25.88%, from 1,393,270.17 metric tons in 2023 to 1,879,787.21 metric tons in 2024. **Table 5.3** shows the breakdown of scheduled waste quantities managed under special provisions by waste code and source. Scheduled waste under code SW 104 was the primary type granted conditional approval under special management, with a total of 1,775,127.57 metric tons being reused as raw materials for product manufacturing. Conditional approval was granted mainly to scheduled waste producers, especially coal-fired power plants, as well as other industry players. From this amount, 1,166,660.45 metric tons of SW 104 waste came from power plants and 608,467.12 metric tons from other industries, all managed under special management.

Scheduled waste under code SW 204, which refers to sludge containing heavy metals, was the second highest type of waste managed under special management. A total of 60,132.67 metric tons was disposed of in sanitary landfills, while 36,893.33 metric tons was reused as raw materials in product manufacturing. Meanwhile, 23.38 metric tons of waste from the manufacturing, processing, or use of explosives, categorized as scheduled waste code SW 431, was handled using the detonation method.

Stesen Janakuasa Sultan Azlan Shah, Perak

Jadual 5.3: Buangan Terjadual yang Diuruskan di bawah Pengurusan Khas 2024
Table 5.3: Scheduled Waste Managed under Special Waste Management 2024

NO.	WASTE CATEGORY	WASTE CODE	SOURCE	TONNES	PERCENT (%)	METHOD OF DISPOSAL
1	Enap cemar yang mengandungi satu atau beberapa logam termasuklah kromium, kuprum, nikel, zink, plumbum, kadmium, aluminium, timah vanadium dan berilium / Sludges containing one or several metals including chromium, copper, nickel, zinc, lead, cadmium, aluminium, tin, vanadium and beryllium	SW 204	Loji Rawatan Air Minuman / Drinking Water Treatment Plant	56,687.61	3.02	Tapak Pelupusan Sanitari / Sanitary Landfill
				3,445.06	0.18	
			Industri / Industry	36,893.33	1.96	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
2	Debu, sanga, dros atau abu yang mengandungi arsenic, raksa, plumbum, kadmium, kromium, nikel, kuprum, vanadium, berilium, antimony, tellurium, talium, atau selenium, tidak termasuk sanga daripada kilang besi dan keluli / Dust, slag, dross or ash containing arsenic, mercury, lead, cadmium, chromium, nickel, copper, vanadium, beryllium, antimony, tellurium, thallium or selenium excluding slag from iron and steel factory	SW 104	Loji Janakuasa Arang Batu / Coal-Fired Power Plant	1,166,660.45	62.06	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
			Industri / Industry	608,467.12	32.37	
3	Buangan yang mengandungi formadehid/ Waste containing formaldehyde Buangan resin tidak matang yang mengandungi pelarut organic atau logam berat termasuklah resin epoksi dan resin fenolik / Uncured resin waste containing organic solvents or heavy metals including epoxy resin and phenolic resin Produk dakwat, cat, pigmen, lakuer, perwarna atau varnish yang terbuang atau yang tidak mengikut spesifikasi yang mengandungi pelarut organic / Discarded or off-specification inks, paints, pigments, lacquer, dye or varnish products containing organic solvent	SW 320 SW 325 SW 418	Industri / Industry	0.00	0.00	Tapak Pelupusan Sanitari / Sanitary Landfill
4	Klinker, sanga, abu, dari penunu buangan terjadual / Clinker, slag and ashes from scheduled wastes incinerator	SW 406	Industri / Industry	0.00	0.00	Tapak Pelupusan Sanitari / Sanitary Landfill

NO.	WASTE CATEGORY	WASTE CODE	SOURCE	TONNES	PERCENT (%)	METHOD OF DISPOSAL
5	Bekas, beg atau kelengkapan yang dilupuskan yang dicemari dengan bahan kimia, racun mahkluk perosak, minyak mineral atau buangan terjadual / Disposed containers, bags or equipment contaminated with chemicals, pesticides, mineral oil or scheduled wastes	SW409	Industri / Industry	0.00	0.00	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
6	Karbon teraktif yang terpakai tidak termasuk karbon daripada pengolahan air boleh diminum dan proses industri makanan dan penghasilan vitamin / Spent activated carbon excluding carbon from the treatment of potable water and processes of the food industry and vitamin production	SW411	Industri / Industry	5,040.00	0.27	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
7	Campuran buangan terjadual / A mixture of scheduled wastes	SW 421	Industri / Industry	0.00	0.00	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
8	Enap cemar mineral termasuklah enap cemar kalsium hidroksida, enap cemar pemfosfatan, enap cemar kalsium sulfit dan enap cemar karbonat / Mineral sludges including calcium hydroxide sludges, phosphating sludges, calcium sulphite sludges and carbonates sludges	SW 427	Industri / Industry	0.00	0.00	Reuse as neutralizing agent
9	Buangan daripada pengilangan atau pemprosesan atau penggunaan bahan letupan/ Waste from manufacturing or processing or use of explosives	SW431	Industri / Industry	23.38	0.00	Kaedah Pembakaran / Burning Method
10	Buangan gypsum yang terhasil daripada proses industri kimia atau loji janakuasa / Waste gypsum arising from chemical industry or power plant	SW205	Industri / Industry	2,018.38	0.11	Guna semula sebagai bahan mentah pembuatan produk/ Reuse as raw material for product
11	Buangan resin tidak matang yang mengandungi pelarut organic atau logam berat termasuklah resin epoksi dan resin fenolik / Uncured resin waste containing organic solvents or heavy metals including epoxy resin and phenolic resin	SW325	Industri / Industry	551.88	0.03	Tapak Pelupusan Sanitari / Sanitary Landfill
JUMLAH/TOTAL				**1,879,787.21**	**100.00**	

TREND PENGURUSAN BUANGAN TERJADUAL 2024

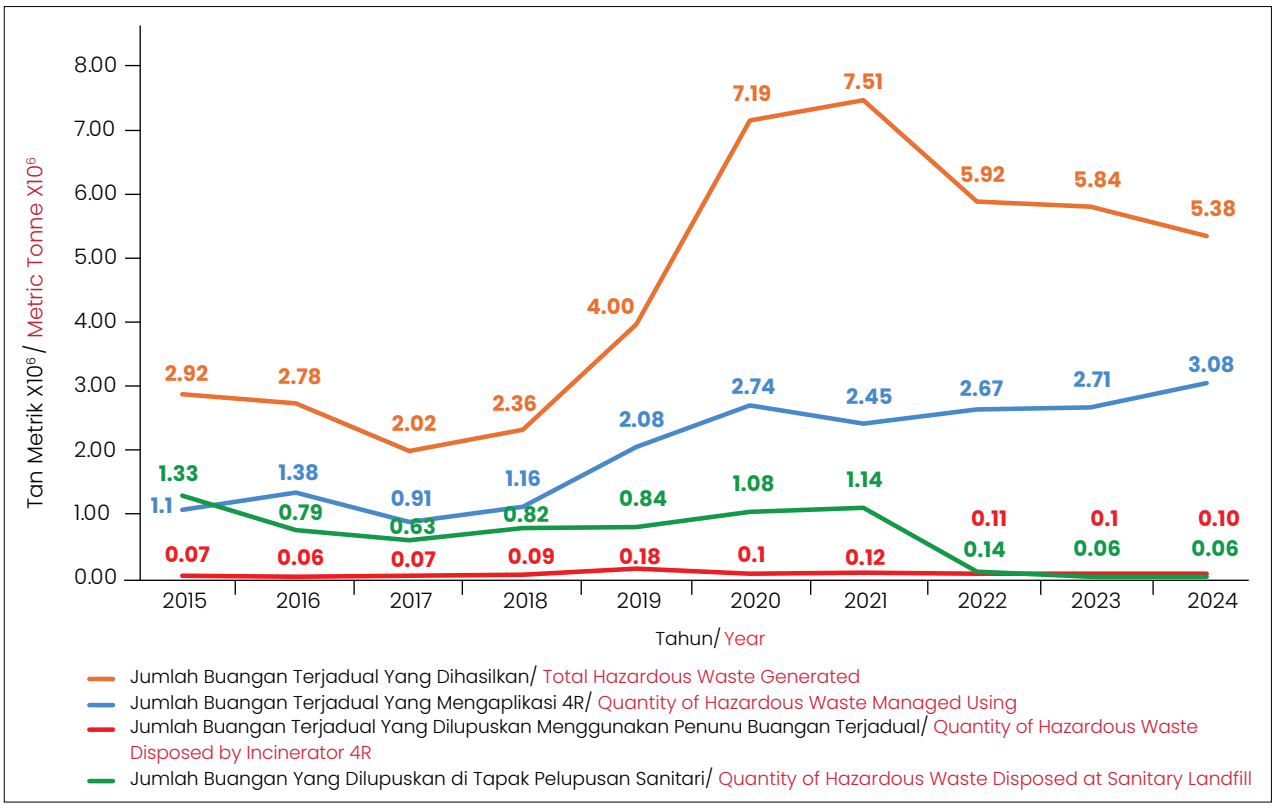
Berdasarkan kepada trend pengurusan buangan terjadual seperti ditunjukkan dalam **Rajah 5.19,** didapati penghasilan buangan terjadual di Malaysia terus menurun sejak dari tahun 2021. Perbezaan ketara yang ditunjukkan dari trend tersebut disebabkan oleh pengurangan secara penghasilan buangan sisa klinikal selepas wabak COVID-19 yang melanda Malaysia. Walaupun begitu, buangan terjadual yang mengaplikasikan 4R iaitu *Reduce, Reuse, Recycle and Recovery* terus meningkat berbanding pada tahun-tahun sebelumnya iaitu sebanyak 3.08 juta tan metrik pada tahun 2024. Peningkatan ini disebabkan oleh konsep *cradle to cradle* yang diperkenalkan oleh Jabatan Alam Sekitar kepada industri bagi mengurangkan pelupusan buangan terjadual di tapak-tapak pelupusan dan menggalakkan penggunaan semula buangan tersebut sebagai bahan mentah bagi pembuatan produk.

Buangan yang dikendalikan secara pembakaran menggunakan penunu buangan terjadual khususnya buangan sisa klinikal dan buangan-buangan lain kekal pada purata 0.1 juta tan metrik selama lima tahun berturut-turut bermula tahun 2020. Buangan terjadual yang dilupuskan ke tapak pelupusan sanitari melalui kebenaran pengurusan khas kekal sebanyak 0.6 juta tan metrik pada tahun 2024. Secara keseluruhan, pada tahun 2024, sambutan bagi mengaplikasikan konsep 4R dikalangan pengeluar buangan terjadual di Malaysia adalah sangat menggalakkan.

SCHEDULED WASTES MANAGEMENT TREND 2024

Based on the trend of scheduled waste management shown in **Figure 5.19**, it is observed that the generation of scheduled waste in Malaysia has continued to decline since 2021. The significant difference shown in the trend is mainly due to the reduction in clinical waste generation following the COVID-19 pandemic that affected Malaysia. However, scheduled waste managed under the 4R principles — Reduce, Reuse, Recycle, and Recovery - has continued to increase compared to previous years, reaching 3.08 million metric tons in 2024. This increase is attributed to the "cradle-to-cradle" concept introduced by the Department of Environment to industries, aimed at reducing the disposal of scheduled waste at landfills and promoting the reuse of waste as raw materials in product manufacturing.

Waste managed through incineration using scheduled waste incinerators, particularly clinical waste and other related wastes, has remained at an average of 0.1 million metric tons for five consecutive years since 2020. Scheduled waste disposed of at sanitary landfills under special management approval has remained constant at 0.6 million metric tonnes in 2024. Overall, in 2024, the adoption of the 4R concept among scheduled waste generators in Malaysia was very encouraging.



Rajah 5.19: Trend Pengurusan Buangan Terjadual 2015-2024
Figure 5.19: Scheduled Waste Management Trend 2015-2024

ANNEX

Pengiraan Indeks Pencemar Udara (IPU) / Air Pollutant Index (API) Calculation

Pengiraan IPU ini berdasarkan kaedah Pollution Standard Index (PSI) yang diterimapakai di peringkat antarabangsa oleh United States Environmental Protection Agency (USEPA).
API calculation is based on Pollution Standard Index (PSI) method that has been accepted at the international level by United States Environmental Protection Agency (USEPA).

PENGUKURAN 6 PARAMETER PENCEMAR / MEASUREMENT OF 6 POLLUTANT PARAMETERS

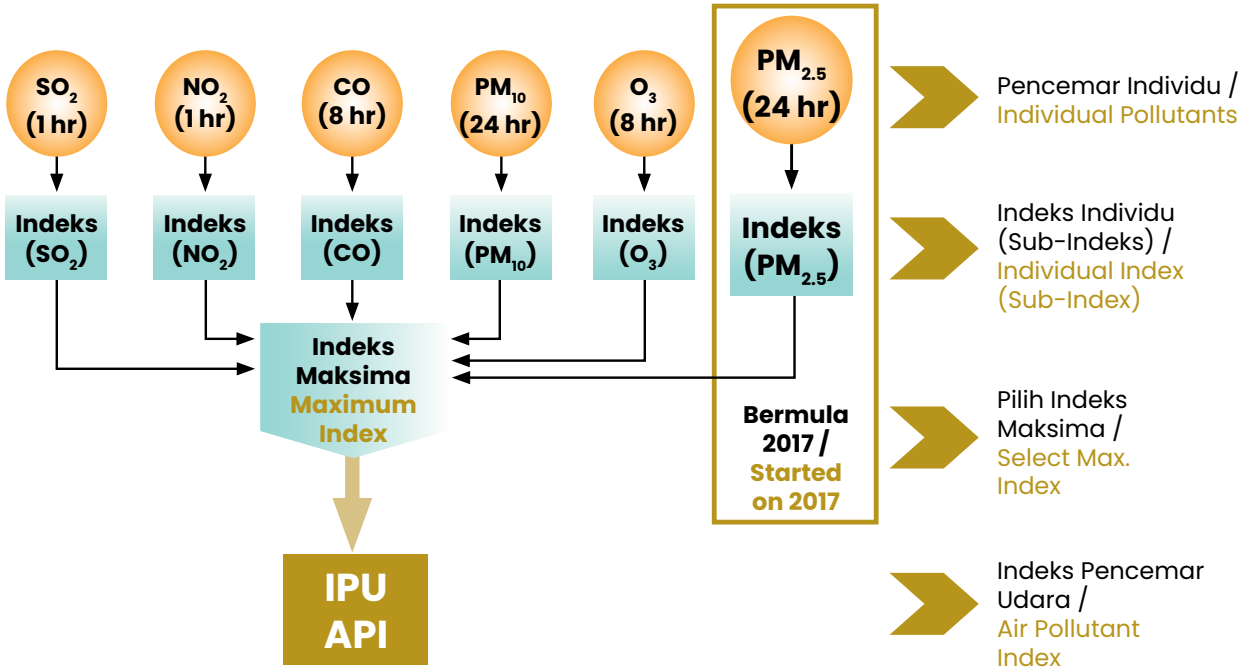
- Sulfur Dioksida / Sulphur Dioxide
- Habuk Halus (PM_{10}) / Particulate Matter (PM_{10})
- Habuk Halus ($PM_{2.5}$) / Particulate Matter ($PM_{2.5}$)
- Ozon / Ozone
- Nitrogen Dioksida / Nitrogen Dioxide
- Karbon Monoksida / Carbon Monoxide

- Kiraan purata bagi setiap parameter diambil mengikut tempoh masa berlainan.
  The average calculation for each parameter is taken at different range of periods.
- Hal ini kerana had tempoh pendedahan yang berlainan yang boleh diterima oleh manusia.
  This is because they have different exposure periods that are acceptable to humans.

PARAMETER PENCEMAR / *POLLUTANT PARAMETERS*	TEMPOH PURATA / *AVERAGING PERIOD*
Sulfur Dioksida / Sulphur Dioxide	1 Jam / 1 Hour
Habuk Halus (PM_{10}) / Particulate Matter (PM_{10})	24 Jam / 24 Hours
Habuk Halus ($PM_{2.5}$) / Particulate Matter ($PM_{2.5}$)	24 Jam / 24 Hours
Ozon / Ozone	8 Jam / 8 Hours
	1 Jam / 1 Hour
Nitrogen Dioksida / Nitrogen Dioxide	1 Jam / 1 Hour
Karbon Monoksida / Carbon Monoxide	8 Jam / 8 Hours

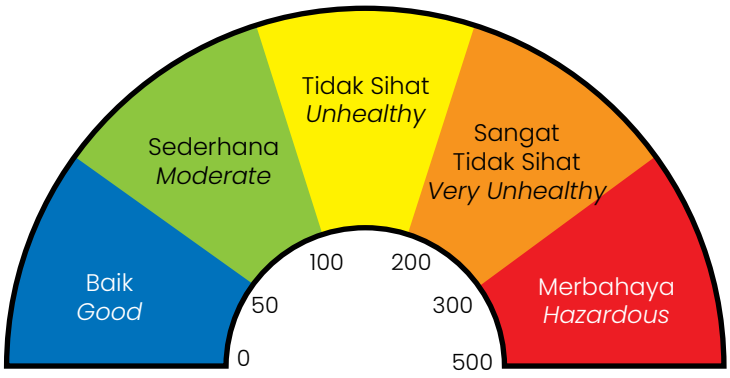
- Purata kepekatan bagi setiap pencemar mengikut tempoh yang tertentu ini seterusnya diseragamkan menggunakan formula matematik khusus bagi menghasilkan satu nilai yang tidak berunit yang dinamakan sebagai **SUB-INDEKS**.
  The average concentration of each pollutant over a given period is then standardized using a specific mathematical formula to produce a non-unitary value called **SUB-INDEX**.
- Setiap pencemar akan menghasilkan sub-indeks tersendiri.
  Each pollutant will produce its sub-index.
- Sub-index tertinggi secara relatif akan diambilkira sebagai bacaan IPU.
  The highest relative sub-index will be considered as API reading.
- Lazimnya, bacaan IPU adalah ditentukan oleh **kepekatan habuk halus** yang merupakan pencemar dominan pada kebanyakan masa terutamanya semasa berlakunya jerebu di Malaysia.
  Usually, API readings are determined by the **concentration of particulate matter** that is the dominant pollutant most of the time especially during haze in Malaysia.

PENENTUAN PENGIRAAN INDEKS PENCEMAR UDARA (IPU) / DETERMINATION OF AIR POLLUTANT INDEX (API) CALCULATION



FORMULA SUB-INDEKS BAGI $PM_{2.5}$ YANG TELAH DIMODIFIKASI MENGIKUT STANDARD USEPA
SUB-INDEX FORMULA FOR $PM_{2.5}$ THAT HAS BEEN MODIFIED ACCORDING TO USEPA STANDARD

API	BREAKPOINT OF CONCENTRATION	EQUATION FOR API
X = $PM_{2.5}$ (24 h average, unit: µg/m³)		
0 - 50	0 ≤ X ≤ 12.0	API = 4.1667 x X
51 - 100	12.1 ≤ X ≤ 75.5	API = 0.7741 x (X - 12.1) + 51
101 - 200	75.5 ≤ X ≤ 150.4	API = 1.3218 x (X - 75.5) + 101
201 - 300	150.5 ≤ X ≤ 250.4	API = 0.9909 x (X- 150.5) + 201
301 - 400	250.4 ≤ X ≤ 350.4	API = 0.9909 x (X - 250.5) + 301
401 - 500	350.5 ≤ X ≤ 500.4	API = 0.6604 x (X - 350.5) + 401



PETUNJUK STATUS KUALITI UDARA
AIR QUALITY STATUS INDICATION

National Water Quality Standards for Malaysia

PARAMETER	UNIT	CLASS				
		I	IIA/IIB	III#	IV	V
Al	mg/l	NATURAL LEVEL OR ABSENT	-	(0.06)	0.5	LEVEL ABOVE IV
As	mg/l		0.05	0.4 (0.05)	0.1	
Ba	mg/l		1	-	-	
Cd	mg/l		0.01	0.01* (0.001)	0.01	
Cr (VI)	mg/l		0.05	1.4 (0.05)	0.1	
Cr (III)	mg/l		-	2.5	-	
Cu	mg/l		0.02	-	0.2	
Hardness	mg/l		250	-	-	
Ca	mg/l		-	-	-	
Mg	mg/l		-	-	-	
Na	mg/l		-	-	3 SAR	
K	mg/l		-	-	-	
Fe	mg/l		0.3	1	1 (Leaf) 5 (Others)	
Pb	mg/l		0.05	0.02* (0.01)	5	
Mn	mg/l		0.1	0.1	0.2	
Hg	mg/l		0.001	0.004 (0.0001)	0.002	
Ni	mg/l		0.05	0.9*	0.2	
Se	mg/l		0.01	0.25 (0.04)	0.02	
Ag	mg/l		0.05	0.0002	-	
Sn	mg/l		-	0.004	-	
U	mg/l		-	-	-	
Zn	mg/l		5	0.4*	2	
B	mg/l		1	(3.4)	0.8	
Cl	mg/l		200	-	80	
Cl_2	mg/l		-	(0.02)	-	
CN	mg/l		0.02	0.06 (0.02)	-	
F	mg/l		1.5	10	1	
NO_2	mg/l		0.4	0.4 (0.03)	-	
NO_3	mg/l		7	-	5	
P	mg/l		0.2	0.1	-	
Silica	mg/l		50	-	-	
SO_4	mg/l		250	-	-	
S	mg/l		0.05	(0.001)	-	
CO_2	mg/l		-	-	-	
Gross- α	Bq/l		0.1	-	-	
Gross- β	Bq/l		1	-	-	
Ra-226	Bq/l		< 0.1	-	-	
Sr-90	Bq/l		< 1	-	-	
CCE	µg/l		500	-	-	-
MBAS/BAS	µg/l		500	5000 (200)	-	-
O & G (Mineral)	µg/l		40; N	N	-	-
O & G (Emulsified Edible)	µg/l		7000; N	N	-	-
PCB	µg/l		0.1	6 (0.05)	-	-
Phenol	µg/l		10	-	-	-
Aldrin/Dieldrin	µg/l		0.02	0.2 (0.01)	-	-
BHC	µg/l		2	9 (0.1)	-	-
Chlordane	µg/l		0.08	2 (0.02)	-	-
t-DDT	µg/l		0.1	(1)	-	-
Endosulfan	µg/l		10	-	-	-
Heptachlor/Epoxide	µg/l		0.05	0.9 (0.06)	-	-
Lindane	µg/l		2	3 (0.4)	-	-
2,4-D	µg/l		70	450	-	-
2,4,5-T	µg/l		10	160	-	-
2,4,5-TP	µg/l		4	850	-	-
Paraquat	µg/l		10	1800	-	-

Notes:
* = At hardness 50 mg/l CaCO
# = Maximum (unbracketed) and 24-hour average (bracketed) concentrations
N = Free from visible film sheen, discolouration and deposits

NATIONAL WATER QUALITY STANDARDS FOR MALAYSIA

PARAMETER	UNIT	CLASS					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6.5 - 8.5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/100 ml	10	100	400	5000 (20000)[a]	5000 (20000)[a]	-
Total Coliform	count/100 ml	100	5000	5000	50000	50000	> 50000

Notes:
N : No visible floatable materials or debris, no objectional odour or no objectional taste
* : Related parameters, only one recommended for use
** : Geometric mean
a : Maximum not to be exceeded

ANNEX II

WATER CLASSES AND USES

CLASS	USES
Class I	Conservation of natural environment. Water Supply I – Practically no treatment necessary. Fishery I – Very sensitive aquatic species.
Class IIA	Water Supply II – Conventional treatment required. Fishery II – Sensitive aquatic species.
Class IIB	Recreational use with body contact.
Class III	Water Supply III – Extensive treatment required. Fishery III – Common of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

DOE WATER QUALITY CLASSIFICATION BASED ON WATER QUALITY INDEX

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand (BOD)	91 - 100	80 - 90	0 - 79
Ammoniacal Nitrogen (NH_3- N)	92 - 100	71 - 91	0 - 70
Suspended Solids (SS)	76 - 100	70 - 75	0 - 69
Water Quality Index (WQI)	81 - 100	60 - 80	0 - 59

DOE WATER QUALITY INDEX CLASSIFICATION

PARAMETER	UNIT	CLASS				
		I	II	III	IV	V
Ammoniacal Nitrogen	mg/l	< 0.1	0.1 – 0.3	0.3 – 0.9	0.9 – 2.7	> 2.7
Biochemical Oxygen Demand	mg/l	< 1	1 – 3	3 – 6	6 – 12	> 12
Chemical Oxygen Demand	mg/l	< 10	10 – 25	25 – 50	50 – 100	> 100
Dissolved Oxygen	mg/l	> 7	5 – 7	3 – 5	1 – 3	< 1
pH	-	> 7	6 – 7	5 – 6	< 5	> 5
Total Suspended Solid	mg/l	< 25	25 – 50	50 – 150	150 – 300	> 300
Water Quality Index (WQI)		> 92.7	76.5 – 92.7	51.9 – 76.5	31.0 – 51.9	< 31.0

WQI FORMULA AND CALCULATION

Formula

WQI = (0.22 * SIDO) + (0.19 * SIBOD) + (0.16 * SICOD) + (0.15 * SIAN) + (0.16 * SISS) + (0.12 * SIpH)

where;

SIDO = Subindex DO (% saturation)
SIBOD = Subindex BOD
SICOD = Subindex COD
SIAN = Subindex NH_3-N
SISS = Subindex SS
SIpH = Subindex pH
$0 \leq WQI \leq 100$

Best Fit Equations for the Estimation of Various Subindex Values

Subindex for DO (in % saturation)

SIDO = 0 for $x \leq 8$
SIDO = 100 for $x \geq 92$
$SIDO = -0.395 + 0.030x^2 - 0.00020x^3$ for $8 < x < 92$

Subindex for BOD

SIBOD = 100.4 - 4.23x for $x \leq 5$
SIBOD = 108*exp(- 0.055x) - 0.1x for $x > 5$

Subindex for COD

SICOD = - 1.33x + 99.1	for x ≤ 20
SICOD = 103*exp(- 0.0157x) - 0.04x	for x > 20

Subindex for NH_3 -N

SIAN = 100.5 - 105x	for x ≤ 0.3
SIAN = 94*exp(- 0.573x) - 5 * I x – 2 I	for 0.3 < x < 4
SIAN = 0	for x ≥ 4

Subindex for SS

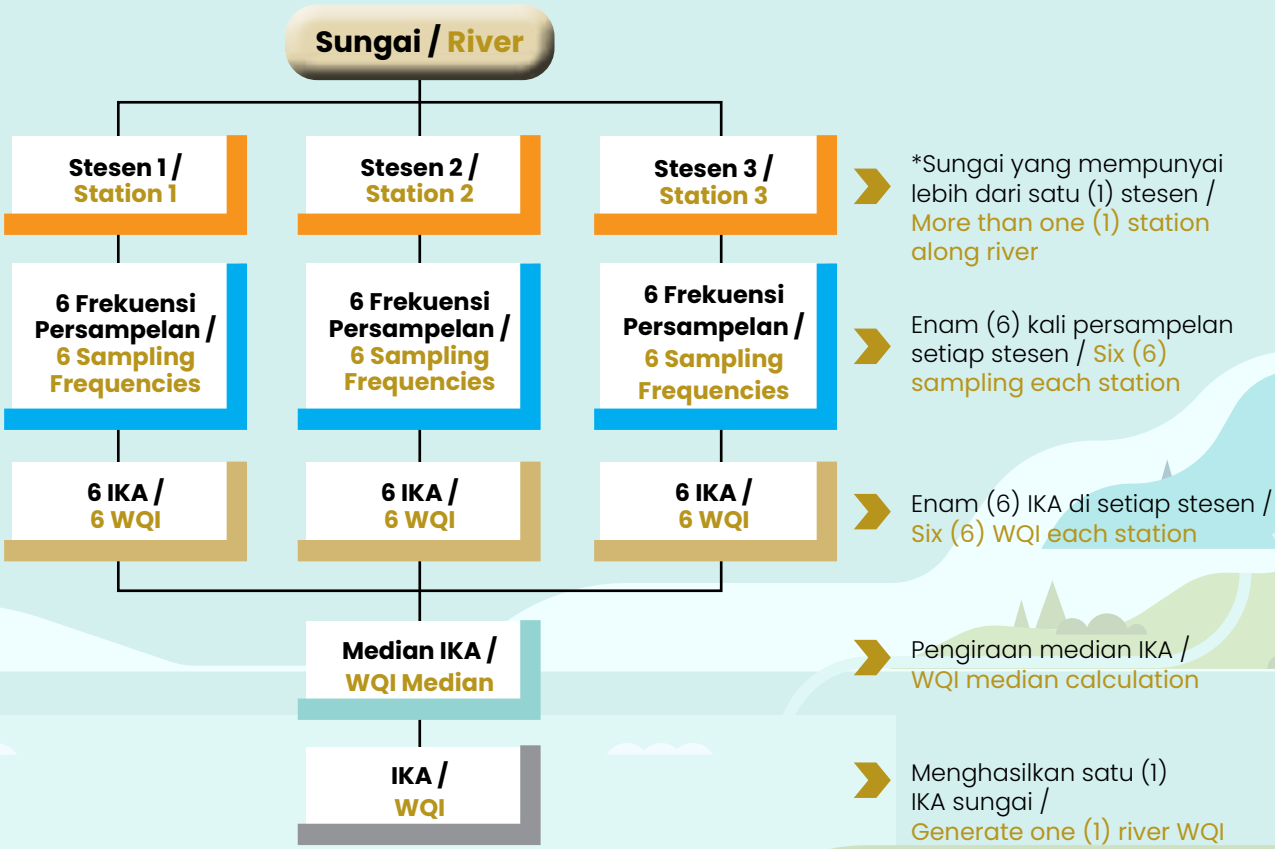
SISS = 97.5*exp(- 0.00676x) + 0.05x	for x ≤ 100
SISS = 71*exp(- 0.0016x) - 0.015x	for 100 < x < 1000
SISS = 0	for x ≥ 1000

Subindex for pH

SIpH = 17.2 - 17.2x + 5. $02x^2$	for x < 5.5
SIpH = - 242 + 95.5x - $6.67x^2$	for 5.5 ≤ x < 7
SIpH = - 181 + 82.4x - $6.05x^2$	for 7 ≤ x < 8.75
SIpH = 536 - 77.0x + $2.76x^2$	or x ≥ 8.75

Note:
*means multiply with

PENENTUAN INDEKS KUALITI AIR MENGIKUT SUNGAI / DETERMINATION OF WATER QUALITY INDEX BY RIVER



* Bilangan stesen adalah berbeza mengikut sungai yang dipantau. Bagi contoh ini, pengiraan median adalah ke atas 18 data IKA /
* The number of stations varies according to the river monitored. For this example, the median calculation is on 18 WQI data

ANNEX II

PENENTUAN INDEKS KUALITI AIR MENGIKUT STESEN / DETERMINATION OF WATER QUALITY INDEX BY STATION

Stesen Sungai / River Station

Stesen 1 / Station 1 → Stesen pengawasan sungai / River monitoring station

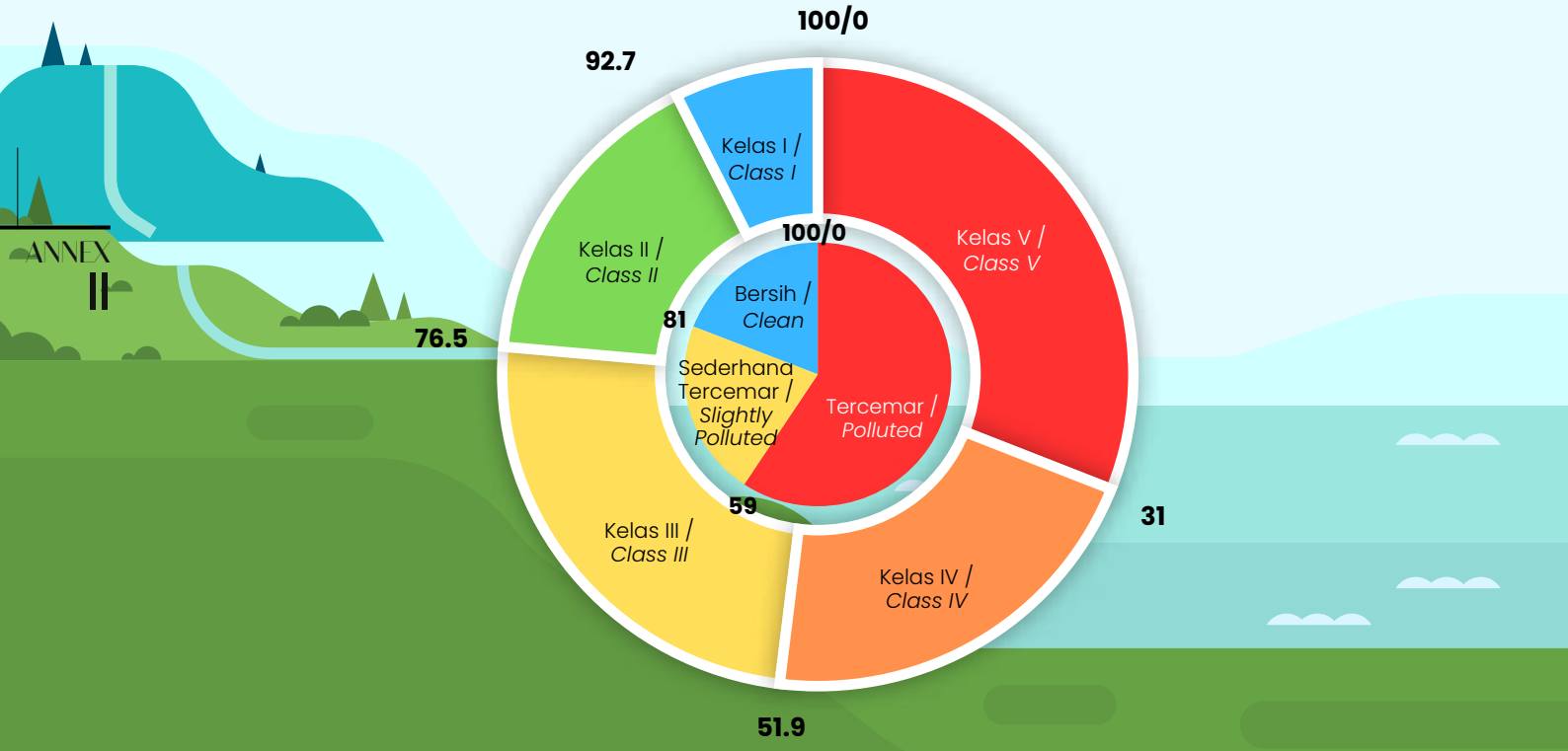
6 Frekuensi Persampelan / 6 Sampling Frequencies → Enam (6) kali persampelan setiap stesen / Six (6) sampling each station

6 IKA / 6 WQI → Enam (6) IKA di setiap stesen / Six (6) WQI each station

Median IKA / WQI Median → Pengiraan median IKA / WQI median calculation

IKA / WQI → Menghasilkan satu (1) IKA stesen / Generate one (1) WQI by station

PENGKELASAN SUNGAI BERDASARKAN INDEKS KUALITI AIR (IKA) / RIVER CLASSIFICATION BASED ON WATER QUALITY INDEX (WQI)



GROUNDWATER QUALITY STANDARDS FOR CONVENTIONAL RAW WATER TREATMENT (DRINKING WATER)

PARAMETER	STANDARD (mg/L)
Total coliform	5000 MPN/100 ml
E coli	5000 MPN/100 ml
Kekeruhan	1000 NTU
Warna	300 TCU
pH	5.5-9.0
Suhu	Normal ± 2^0C
Konduktiviti	1000 µS/cm #
Jumlah Pepejal Terlarut	1500
Klorida	250
Ammonia	1.5
Nitrat	10
Besi	1.0
Fluorida	1.5
Kekerasan	500
Mangan	0.2
COD	10
MBAS	1.0
BOD	6
Nitrit	0.4 #
Raksa	0.001
Kadmium	0.003
Arsenik	0.01
Sianida	0.07
Plumbum	0.05
Kromium	0.05
Kuprum	1.0
Zink	3.0
Natrium	200
Sulfat	250
Selenium	0.01
Perak	0.05
Magnesium	150
Minyak	0.3
Racun Perosak (Pesticides)	0.00003-0.03*
Fenol	0.002
Nikel	0.05
Gross alpha	0.1 Bq/l
Gross beta	1.0 Bq/l

* Aldrin / Dieldrin, DDT, Heptachlor, Methoxychlor, Lindane, Chlordane, Endosulfan, Hexachlorobenzene, 2,4,5 -T, 2,4 -D, 2, 4 -DB, Alachlor, Aldicarb, Carbofuran, MCPA, Permethrin

 # Diambil dari Class IIA, National Water Quality Standards

GROUNDWATER QUALITY INDEX (GWQI) FORMULA AND CALCULATION

To calculate the GWQI, the additive equation is used as follows:
$GWQI = \Sigma W_i q_i$

or

GWQI = 0.13Si (pH) + 0.17Si (Fe) + 0.17Si (*E. coli*) + 0.04Si (TDS) + 0.09Si (SO_4^{2-}) + 0.22Si (NO_3) + 0.17Si (Phenol)

The sub-indices of all the parameters used for generating the GWQI are as follows

pH Sub Index

pH	Si(pH)	
<3.0	0	Acidic
3 – 4	10	
4 – 5.5	30	
5.5 – 9	100	
9 – 10	30	Alkaline
10 – 11	10	
>11.0	0	

Iron Sub Index

Si (Fe) = (1 - C_i /5.0) x 100

Si (Fe) = 0, if Ci exceeds 5.0 mg/L; Ci is the concentration of iron determined in the groundwater sample.

Nitrate Sub Index

Si (NO_3^-) = (1 - C_i /100) x 100

Si (NO_3^-) = 0, if C_i exceeds 100 mg/L; C_i is the concentration of nitrate determined in the groundwater sample.

Phenol Sub Index

Si (Phenol) = (1 - C_i /0.015) x 100

Si (Phenol) = 0, if Ci exceeds 0.015 mg/L; Ci is the concentration of phenol determined in the groundwater sample.

Total Dissolved Solid Sub Index

Si (TDS) = (1 - C_i /3000) x 100

Si (TDS) = 0, if Ci exceeds 3000 mg/L; Ci is the concentration of total dissolved solid determined in the groundwater sample.

Sulfate Sub Index

Si (SO_4^{2-}) = (1 - C_i /1000) x 100

Si (SO_4^{2-}) = 0, if Ci exceeds 1000 mg/L; C_i is the concentration of sulfate determined in the groundwater sample.

***E.coli* Sub Index**

Si (*E.coli*) = (1 - C_i /5000) x 100

Si (*E.coli*) = 0, if Ci exceeds 5000 MPN/100ml; Ci is the MPN *E.coli* measured in the groundwater sample.

MALAYSIAN MARINE WATER QUALITY STANDARDS

PARAMETER (µg/l) UNLESS OTHERWISE STATED	CLASSIFICATION					
	CLASS 1	CLASS 2	CLASS 3	INTERIM CLASS E1	INTERIM CLASS E2	INTERIM CLASS E3
	SENSITIVE MARINE HABITATS	FISHERIES (INCLUDING MARICULTURE)	INDUSTRY, COMMERCIAL ACTIVITIES & COASTAL SETTLEMENTS	ESTUARIES		
				COASTAL PLAIN	LAGOON	COMPLEX DISTRIBUTARY NETWORK
Dissolved Oxygen (mg/l)	>6.0	>5.0	>3.0	>5.0	>5.0	>5.0
Suspended Solids (mg/l)	25.0	50.0	100.0	30.0	30.0	30.0
Phosphate	5.0	75.0	670.0	100.0	180.0	180.0
Nitrate	10.0	60.0	700.0	200.0	570.0	430.0
Ammonia	35.0	50.0	320.0	5.0	10.0	10.0
Mercury	0.04	0.04	0.04	0.04	0.04	0.04
Cadmium	0.50	2.00	3.00	1.00	1.00	1.00
Chromium (VI)	0.14	10.00	20.00	10.00	10.00	10.00
Copper	1.30	2.90	8.00	1.00	1.00	1.00
Cyniade	2.00	7.00	14.00	5.00	5.00	5.00
Lead	2.20	8.50	12.00	1.30	2.00	2.00
Zinc	7.00	50.00	100.00	16.00	5.00	5.00
Arsenic (III)	1.00	3.00	3.00	3.00	1.00	1.00
Aluminium	27.00	27.00	55.00	27.00	27.00	27.00
TBT	0.001	0.010	0.050	0.002	0.002	0.002
PAH	100.0	200.0	1000.0	5.0	5.0	5.0
Total Phenol	1.0	10.0	100.0	10.0	10.0	10.0
Oil & Grease (mg/l)	0.01	0.14	5.00	1.00	1.00	1.00
Faecal Coliform (cfu/100ml)	70	70	70	70	70	70
Temperature (°C)	≤ 2 °C increase over maximum ambient					
pH	6.5 - 9.0					
Marine Litter	Free from marine litter					

ANNEX IV

MALAYSIAN MARINE WATER QUALITY INDEX (MMWQI) FORMULA AND CALCULATION

$$\textbf{MMWQI*} = q_{i\,DO}^{0.18} \times q_{i\,FC}^{0.19} \times q_{i\,NH3}^{0.15} \times q_{i\,NO3}^{0.16} \times q_{i\,PO4}^{0.17} \times q_{i\,TSS}^{0.15}$$

whereby;

$q_{i\,DO}$ = Subindex Dissolved Oxygen
$q_{i\,FC}$ = Subindex Faecal Coliform
$q_{i\,NH3}$ = Subindex Unionized Ammonia
$q_{i\,NO3}$ = Subindex Nitrate
$q_{i\,PO4}$ = Subindex Phosphate
$q_{i\,TSS}$ = Subindex Total Suspended Solids

*Salinity of the marine water quality data shall be higher than 10 ppt

Best Fit Equations for the Estimation of Various Subindex Values

Dissolved Oxygen (DO) in mg/l

$q_{i\,DO}$ = - 85.816 + 55.4768(DO) - 4.142(DO^2)

If DO is less than (<) 3 mg/l, or more than (>) 10 mg/l, $q_{i\,DO}$ = 10

Faecal Coliform (FC) in cfu/100ml

$q_{i\,FC}$ = 100*EXP$^{(-0.005(\text{Faecal Coliform}))}$

If FC is more than (>) 500 cfu/100ml, $q_{i\,FC}$ = 8

Unionized Ammonia (NH_3) in µg/l

$q_{i\,NH3}$ = 100*EXP$^{(-0.0046(\text{Unionized Ammonia}))}$

If Ammoniacal Nitrogen (NH_3-N) is measured, convert the value into unionized ammonia.

Nitrate (NO_3) in µg/l

$q_{i\,NO3}$ = 94.8*EXP$^{(-0.00035(\text{Nitrate}))}$

Phosphate (PO_4) in µg/l

$q_{i\,PO4}$ = 95.2*EXP$^{(-0.002(\text{Phosphate}))}$

If PO_4 is more than (>) 900 µg/l, $q_{i\,PO4}$ = 10

Total Suspended Solids (TSS) in mg/l

$q_{i\,TSS}$ = 95.8*EXP$^{(-0.0043(\text{Total Suspended Solid}))}$

If TSS is more than (>) 100 mg/l, $q_{i\,TSS}$ = 20

Unionized Ammonia Calculation

In order to convert the concentration of total ammoniacal nitrogen into unionized ammonia, calculate (a), (b), (c) and (d). Substitute the results into equation 1.

a. Calculation of Ionic Strength (IS)

$$IS = \frac{19.9273 * Salinity}{(1000 - 1.005109 * Salinity)}$$

Salinity in part per thousand (ppt)

b. Calculation of PKa

$$PKa = (0.0901821 + \frac{2729.92}{(Temp + 273.15)} + IS(0.1552 - 0.000314 * Temp)$$

Temperature in °C

c. Calculation of working pH

pHsw = pH − (0.0007 x IS) − 0.131

d. Calculation of mole fraction for unionized ammonia

Mole Fraction =

equation 1:

Ammoniacal nitrogen (NH_3-N) x mole fraction x 17/14

Ammoniacal nitrogen should be measured in µg/l

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