



PENANG
2030

PENANG IN NUMBERS

Green Data



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PENANG IN NUMBERS – GREEN DATA

Green Data is a selected compilation of environmental conscious data series of Penang state that accommodates the Sustainable Development Goals that aims to act as a data reference that assisted Penang Green Council in the formulation process of the Penang Green Agenda 2030 and also made accessible for public use. The chosen 8 SDGs would be as below:

- **Goal 2 – Zero Hunger**
- **Goal 6 – Water**
- **Goal 7 – Energy**
- **Goal 11 – Sustainable Cities**

- **Goal 12 – Responsible Consumption and Production**
- **Goal 13 – Climate Action**
- **Goal 14 – Marine**
- **Goal 15 – Biodiversity.**

These data are collected from various sources; they will be updated from time to time for the use and view of general public as well as to serve as a reference for government departments, agencies, students and stakeholders for the development of Penang. We have identified 80 data sets for Penang so far that we think is useful for Penang to be a green and liveable city. Be reminded that, we will not confine the Sustainability Indicators of Penang within this 80 data, we will discover more relevant data in future and it will be updated again. Finally, we would like to convey our gratitude to all agencies that have contributed to this Green Data.

GOAL 6– WATER

Description

It is forecasted that at least one in four people will be troubled by water shortages in 2050. Mitigating water shortages becomes increasingly important especially in Penang where water resource mostly depends on Sungai Muda. Mitigation also means protecting water source ecosystem such as forests and rivers as well as investing on water efficiency and treatment technologies.

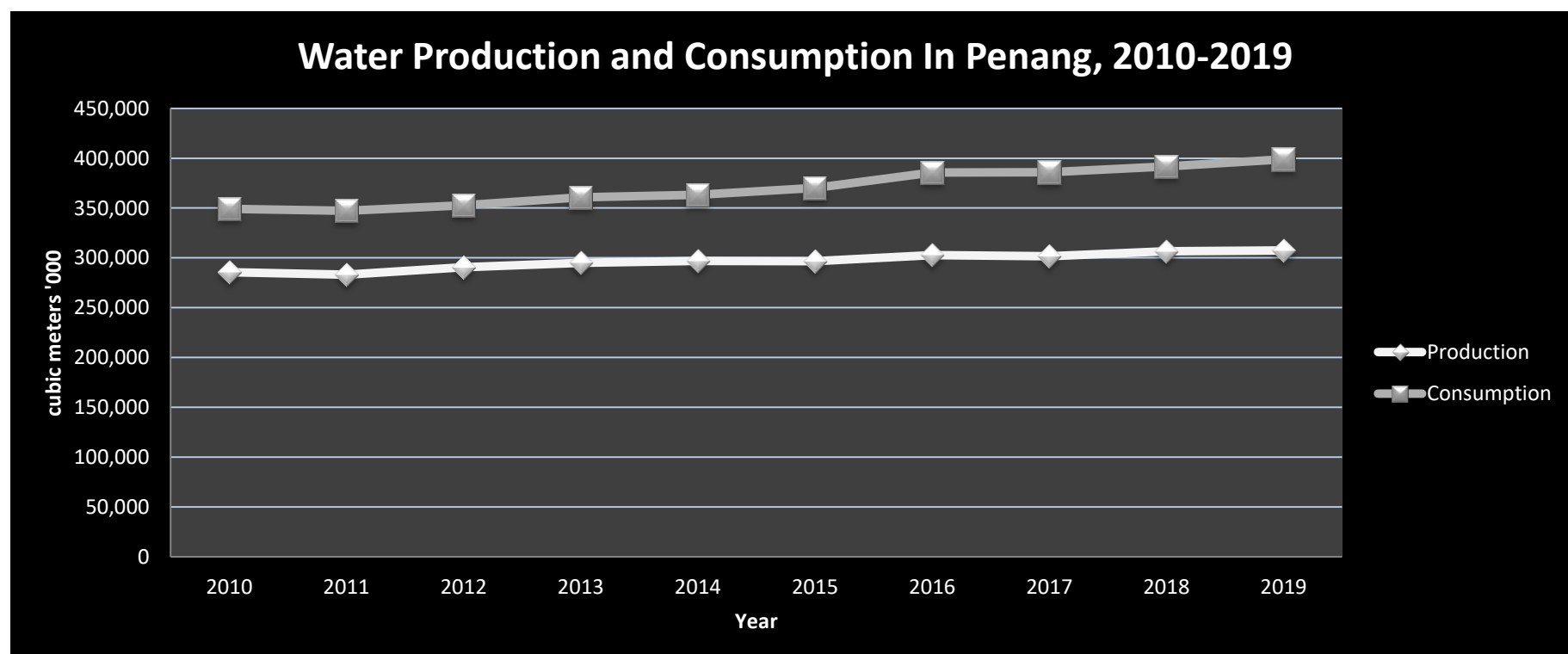
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1 Water Consumption & Production Rate (cubic meters, '000 cu.m), Penang 2010 – 2019

Type	YEARS									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Consumption	285,584	283,159	290,625	295,109	296,898	296,662	302,627	301,617	306,574	307,532
Production	349,123	347,123	352,762	360,709	363,198	370,286	385,641	386,052	391,652	398,976

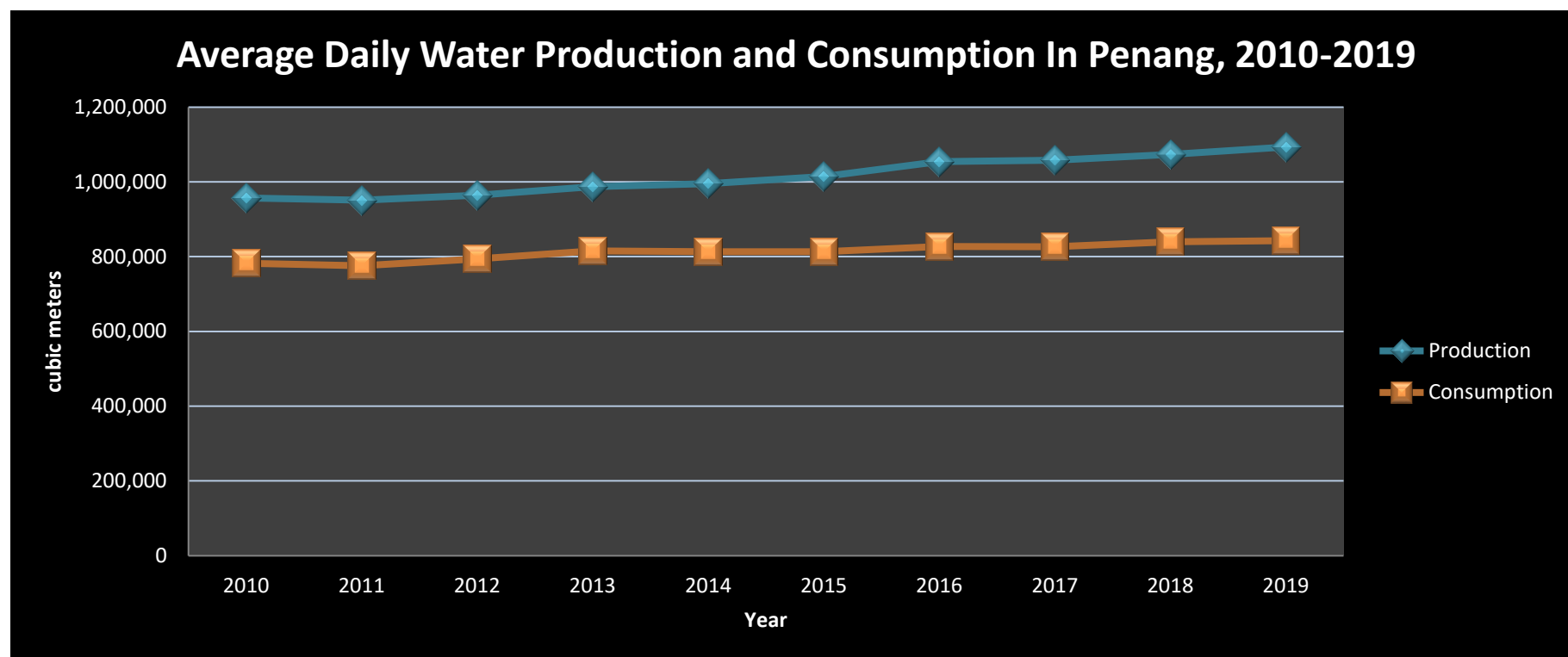
I. Source: Perbadanan Bekalan Air Pulau Pinang annual report II. Notes : Slight differences may occur due to round off



2 Average Daily Water Consumption & Production Rate (**cubic meters, cu.m**), Penang 2010 – 2019

Type	YEARS									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Consumption	782,421	775,779	794,000	815,000	813,420	813,000	827,000	826,300	839,900	842,600
Production	957,053	951,022	964,000	987,000	995,060	1,014,000	1,054,000	1,057,700	1,073,000	1,093,100

I. Source: Perbadanan Bekalan Air Pulau Pinang annual report II. Notes : Slight differences may occur due to round off



3 Total Registered Consumers, Penang 2010-2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	506,989	520,374	533,916	546,749	561,811	575,747	589,797	604,547	616,082	631,250

I. Source : Perbadanan Bekalan Air Pulau Pinang annual report

4 Number of treatment plants, Penang 2010-2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	10	10	10	10	9	9	9	9	9	9

I. Source : Perbadanan Bekalan Air Pulau Pinang annual report

5 Average water quality (river), Penang 2010-2017

Year	2010	2011	2012	2013	2014	2015	2016	2017
Water Quality Index	63	69	67	71	70	68	69	73

I. Source : DOE Penang

II. Average water quality (river)

IQA - Water Quality Index
 IQA 81-100 : Good
 IQA 60-80 : Moderate
 IQA 0-59 : Unhealthy

6 Proportion of water samples treated for good water quality, Penang 2010 – 2019

Type	YEARS									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of samples	3,377	NA	NA	3,338	3,202	3,125	3,157	567	3,182	3,150

I. Source : Perbadanan Bekalan Air Pulau Pinang annual report

7 Number of dams in Penang, 2010 – 2019

Type	YEARS									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of dams	6	6	6	4	4	4	4	4	4	4

I. Source: Perbadanan Bekalan Air Pulau Pinang annual report

II. Note: Nearly 20% of water is being sourced out from Penang dam for the usage of Penang peoples

8 Total raw water storage capacity (million litre), Penang 2010 – 2019

Type	YEARS									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Storage Capacity (million litre)	46,013	46,013	46,013	45,758	45,758	45,758	45,758	46,768	46,768	107,106

I. Source: Perbadanan Bekalan Air Pulau Pinang annual report

II. Note: Sungai Muda supplies 80% of Penang raw water daily that can sustain till the year 2020

9 Water treatment plants design capacity, Penang 2010 – 2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Million Litres per day (MLD)	1,273	1,387	1,387	1,497	1,497	1,479	1,617	1,617	1,599	1,599

I. Source: Perbadanan Bekalan Air Pulau Pinang annual report

II. The increase of water treatment plant design capacity is due to the addition of new plant and expansion of present plant design. The decrease would be because closing of plants and temporary closure of water treatment plant (will be reopened when needed)

10 Supply of raw water from storage dams in Penang, 2010 – 2018 in million litres per day (MLD)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Million Litres per day (MLD)	78	75	83	79	79	76	91	101	95

- I. Source: Suruhanjaya Perkhidmatan Air Negara (SPAN) - Peninsular Malaysia & FT Labuan Water and Sewerage Statistic 2019

11 Water Quality Status of Clean River, Penang 2010 – 2017

(Source :Department of Environment - Environmental Quality Report 2017)

Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2010	Pinang	Air Terjun	1	94	I	C
		Air Itam	5	53	III	P
		Dondang	3	43	IV	P
		Jelutong	1	34	IV	P
		Pinang	1	52	III	P
	Kluang	Ara	2	80	II	SP
		Relau	1	65	III	SP
	Perai	Kulim	4	81	II	C
		Jarak	5	67	III	SP
		Kereh	2	49	IV	P
		Keladi	1	76	III	SP
		Perai	2	59	III	P
		Pertama	1	55	III	P
	Jawi	Junjong	3	94	I	C
		Machang Bubok	1	79	II	SP
		Jawi	1	52	III	P
	Juru	Kilang Ubi	5	65	III	SP
		Juru	2	52	III	P
		Pasir	1	51	IV	P
		Rambai	2	44	IV	P
	Bayan Lepas	Bayan Lepas	1	60	III	SP
		Tiram	2	74	III	SP

I. Average water quality (river)

IQA - Water Quality Index
 IQA 81-100 : Good
 IQA 60-80 : Moderate
 IQA 0-59 : Unhealthy

Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2011	Pinang	Air Terjun	1	87	II	C
		Air Itam	5	57	III	P
		Dondang	1	42	IV	P
		Jelutong	1	43	IV	P
		Pinang	1	44	IV	P
	Kluang	Ara	2	87	II	C
		Relau	1	68	III	SP
	Perai	Kulim	2	82	II	C
		Jarak	3	65	III	SP
		Keladi	1	75	III	SP
		Kereh	2	45	IV	P
		Perai	2	55	III	P
		Pertama	1	50	IV	P
	Jawi	Junjong	1	91	II	C
		Machang Bubok	1	77	II	SP
		Jawi	1	42	IV	P
	Juru	Kilang Ubi	4	71	III	SP
		Juru	2	54	III	P
		Pasir	1	63	III	SP
		Rambai	1	52	III	P
	Bayan Lepas	Bayan Lepas	1	62	III	SP
		Tiram	2	75	III	SP

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 IQA 81-100 : Good
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 IQA 0-59 : Unhealthy

Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2012	Pinang	Air Terjun	1	92	II	C
		Air Itam	5	59	III	P
		Dondang	1	61	III	SP
		Jelutong	1	36	IV	P
		Pinang	1	56	III	P
	Kluang	Ara	2	86	II	C
		Relau	1	74	III	SP
	Perai	Kulim	2	85	II	C
		Jarak	3	72	III	SP
		Keladi	1	79	II	SP
		Kereh	2	50	IV	P
		Perai	2	62	III	SP
		Pertama	1	47	IV	P
	Jawi	Junjong	1	90	II	C
		Machang Bubok	1	79	II	SP
		Jawi	1	44	IV	P
	Juru	Kilang Ubi	4	69	III	SP
		Juru	2	47	IV	P
		Pasir	1	61	III	SP
		Rambai	1	53	III	P
	Bayan Lepas	Bayan Lepas	1	67	III	SP
		Tiram	2	74	III	SP

I. Average water quality (river)

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Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2013	Pinang	Air Terjun	1	92	II	C
		Air Itam	5	67	III	SP
		Dondang	1	67	III	SP
		Jelutong	1	35	IV	P
		Pinang	1	60	III	SP
	Kluang	Ara	2	88	II	C
		Relau	1	76	III	SP
	Perai	Kulim	2	85	II	C
		Jarak	3	73	III	SP
		Keladi	1	79	II	SP
		Kereh	2	52	III	P
		Perai	2	60	III	SP
		Pertama	1	48	IV	P
	Jawi	Junjong	1	90	II	C
		Machang Bubok	1	74	III	SP
		Jawi	1	55	III	P
	Juru	Kilang Ubi	4	71	III	SP
		Juru	2	55	III	P
		Pasir	1	63	III	SP
		Rambai	1	57	III	P
	Bayan Lepas	Bayan Lepas	1	73	III	SP
		Tiram	2	72	III	SP

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 IQA 0-59 : Unhealthy

Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2014	Pinang	Air Terjun	1	89	II	C
		Air Itam	5	61	III	C
		Dondang	1	61	III	C
		Jelutong	1	37	IV	P
		Pinang	1	61	III	C
	Kluang	Ara	2	84	II	C
		Relau	1	74	III	SP
	Perai	Kulim	2	81	II	C
		Jarak	3	73	III	SP
		Keladi	1	80	II	SP
		Kereh	2	53	III	P
		Perai	2	63	III	SP
		Pertama	1	51	IV	P
	Jawi	Junjong	1	84	II	C
		Machang Bubok	1	72	III	SP
		Jawi	1	51	IV	P
		Tengah	NA	NA	NA	NA
	Juru	Kilang Ubi	4	73	III	SP
		Juru	2	54	III	P
		Pasir	1	65	III	SP
		Rambai	1	55	III	P
	Bayan Lepas	Bayan Lepas	1	61	III	SP
		Tiram	2	71	III	SP

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Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2015	Pinang	Air Terjun	1	87	II	C
		Air Itam	5	67	III	SP
		Dondang	1	66	III	SP
		Jelutong	1	49	IV	P
		Pinang	1	54	III	P
	Kluang	Ara	2	87	II	C
		Relau	1	79	II	SP
	Perai	Kulim	2	82	II	C
		Jarak	3	77	II	SP
		Keladi	1	81	II	C
		Kereh	2	56	III	P
		Perai	2	63	III	SP
		Pertama	1	50	IV	P
	Jawi	Junjong	1	90	II	C
		Machang Bubok	1	78	II	SP
		Jawi	1	50	IV	P
	Juru	Kilang Ubi	4	71	III	SP
		Juru	2	63	III	SP
		Pasir	1	70	III	SP
		Rambai	1	52	III	P
	Bayan Lepas	Bayan Lepas	1	68	III	SP
		Tiram	2	75	III	SP

I. Average water quality (river)

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Year	River Basin	River	No of Stations	Water Quality Index	Class	Category
2016	Pinang	Air Terjun	1	89	II	C
		Air Itam	5	65	III	ST/SP
		Dondang	1	69	III	ST/SP
		Jelutong	1	44	IV	T/P
		Pinang	1	56	III	T/P
	Kluang	Ara	2	84	II	C
		Relau	1	67	III	ST/SP
	Perai	Kulim	2	79	II	ST/SP
		Jarak	3	74	III	ST/SP
		Keladi	1	71	III	ST/SP
		Kereh	2	55	III	T/P
		Perai	2	58	III	T/P
		Pertama	1	49	IV	T/P
	Jawi	Junjong	1	90	II	C
		Machang Bubok	1	77	II	ST/SP
		Jawi	1	47	IV	T/P
	Juru	Kilang Ubi	4	69	III	ST/SP
		Juru	2	58	III	T/P
		Pasir	1	63	III	ST/SP
		Rambai	1	55	III	T/P
	Bayan Lepas	Bayan Lepas	1	68	III	ST/SP
		Tiram	2	72	III	ST/SP

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		Air Itam	5	67	III	ST/SP
		Dondang	1	69	III	ST/SP
		Jelutong	1	49	IV	T/P
		Pinang	1	57	III	T/P
	Kluang	Ara	2	80	II	ST/SP
		Relau	1	69	III	ST/SP
	Perai	Kulim	2	79	II	ST/SP
		Jarak	3	68	III	ST/SP
		Keladi	1	70	III	ST/SP
		Kereh	2	50	IV	T/P
		Perai	2	57	III	T/P
		Pertama	1	49	IV	T/P
	Jawi	Junjong	1	70	III	ST/SP
		Machang Bubok	1	71	III	ST/SP
		Jawi	1	44	IV	T/P
	Juru	Kilang Ubi	4	63	III	ST/SP
		Juru	2	53	III	T/P
		Pasir	1	62	III	ST/SP
		Rambai	1	49	IV	T/P
	Bayan Lepas	Bayan Lepas	1	65	III	ST/SP
		Tiram	2	69	III	ST/SP

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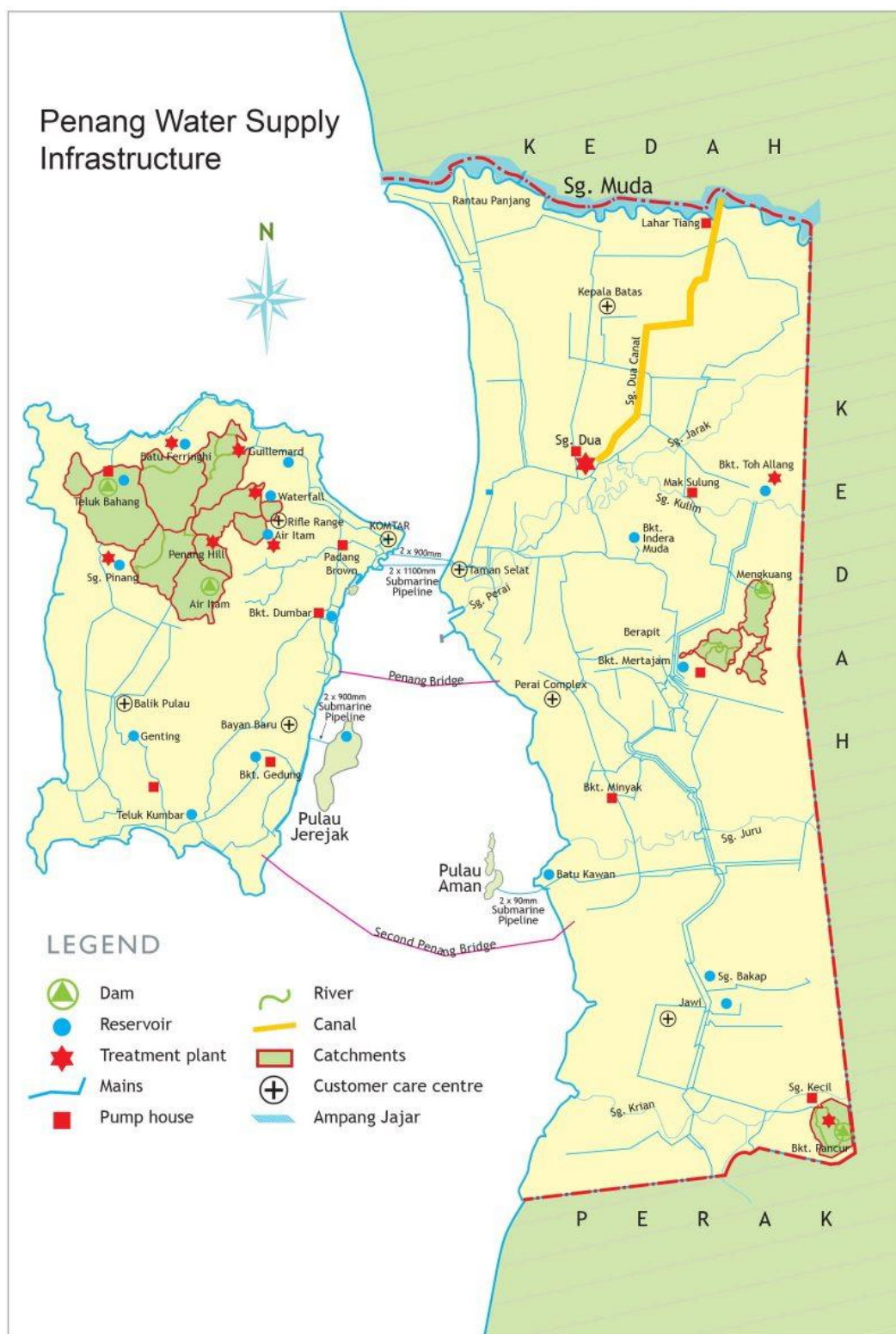
12 Dam capacity (Last updated – 28/03/2022)

Dams	Year				
	2018 (02/01/2018)	2018 (18/01/2018)	2018 (23/02/2018)	2020 (14/09/2020)	2022 (28/03/2022)
Air Itam	90.5%	96.2%	83.0%	34.5%	41.5%
Teluk Bahang	97.5%	98.2%	95.4%	18.6%	74.0%
Mengkuang	21.8%	23.2%	23.6%	88.3%	91.8%

I. Source: Perbadanan Bekalan Air Pulau Pinang website

13 Penang Water Supply Infrastructure

(Source : Perbadanan Bekalan Air Pulau Pinang (PBAPP) Website)



14 Penang Monthly rainfall (mm) at 3 Dams, 2010 – 2020 (as of Aug 2020) (Source : Perbadanan Bekalan Air Pulau Pinang (PBAPP))

Air Itam Dam Rainfall (mm)													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2010	57	112	182	191	186	414	242	248	185	171	424	269	2681
2011	99	57	358	181	288	93	160	240	322	463	241	96	2598
2012	57	236	326	225	287	237	239	222	467	304	248	212	3060
2013	128	145	108	381	137	273	232	170	573	526	258	67	2998
2014	24	14	45	274	374	163	213	289	370	383	213	230	2592
2015	80	32	72	200	161	211	264	373	486	346	430	138	2793
2016	98	24	57	135	210	271	212	107	669	500	631	182	3096
2017	268	127	221	291	339	139	104	256	788	156	521	134	3344
2018	415	23	136	170	179	123	263	243	238	422	258	232	2702
2019	86	85	300	226	801	181	336	378	131	272	268	31	3095
2020	2	58	143	117	277	180	216	98					1091

Teluk Bahang Dam Rainfall (mm)													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2010	43	99	311	484	299	612	355	415	245	153	432	380	3828
2011	32	34	410	312	248	113	143	324	334	391	391	241	2973
2012	58	325	319	416	354	198	387	172	701	287	314	116	3647
2013	158	202	157	303	187	288	464	346	640	628	310	48	3731
2014	23	7	40	239	312	47	239	621	905	729	929	667	4758
2015	335	115	124	955	340	651	678	757	1118	485	738	257	6553
2016	115	57	184	293	603	401	1305	470	1506	924	1042	568	7468
2017	461	338	545	659	477	393	316	879	1162	551	729	231	6741
2018	602	187	310	321	631	461	344	331	568	703	537	782	5777
2019	170	14	483	378	913	337	266	373	461	561	622	88	4666
2020	16	140	292	754	904	195	131	143					2574

Mengkuang Dam Rainfall (mm)													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2010	130	84	153	230	260	371	216	115	318	113	377	193	2560
2011	102	147	415	223	230	102	162	211	249	542	358	128	2869
2012	58	341	265	306	187	106	180	216	364	346	297	256	2922
2013	167	236	144	172	157	184	143	264	405	505	323	187	2885
2014	41	3	71	260	376	268	107	294	434	445	340	357	2996
2015	209	38	110	372	293	242	286	235	409	507	691	205	3597
2016	267	92	53	96	463	131	183	65	571	310	579	299	3109
2017	211	145	246	217	232	80	100	260	1305	195	1381	297	4669
2018	1021	173	720	304	1089	379	482	243	777	804	1010	610	7612
2019	234	268	128	129	1400	564	240	501	392	1443	1276	454	7029
2020	16	218	219	796	1026	646	669	356					3946