SAINT PAUL'S BAY

CY 2021

CLASSIFICATION REPORT

Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU
MIMAROPA Region

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Contents

I. Executive Summary

Philippines is an archipelago surrounded by different bodies of water. The country is considered as one of the most biodiverse countries in Asia. Its marine and fresh water is the most diverse resource of the country.

Water is the most abundant resource of the planet. This resource is needed in everyday activities. Only three percent of the total ground water resource can be used for drinking. Due to various usage of water, it is the most threatened resource in the planet. Everyday water quality decline continuously, because of lack of environmental awareness of humans. Continuous water quality monitoring is done to ensure that a body of water complies on specified water quality guidelines. But only few understand the value of conservation and protection of this valuable resource. Environmental scientists around the world work tirelessly to conserve, protect and preserve this valuable resource. New effective methods on water quality monitoring were established to help the government implement their environmental laws and policies. They also work on new technologies that can help reduce and mitigate the negative impacts of human activities in a water body.

In the Philippines, the National Government, LGUs, and private sectors work together to educate people about the relevance and effects of human activities in water quality. Hence, the Republic Act 9275 otherwise known as “Philippine Clean Water Act” was enacted by the Congress. It is stated that the characteristics of water which define its use in terms of physical, chemical, biological, bacteriological or radiological characteristics by which the acceptability of the water is evaluated. It aims to assess, monitor and classify water bodies of the country, and create policies to improve the existing quality of water. It also aims to increase the environmental awareness of every individual in the country.

Different water quality has different impact on humans, animals and environment. For an instance, sufficient concentration of phosphate and nitrate is good for irrigation and aquaculture but not for drinking. Another example is that high concentration of coliform in water can cause disease and illness to living organisms, and has poor water quality in terms of biological property. Measurement of biological,

chemical and physical properties determines the quality and classification of body of water. A good water quality can sustain its beneficial use and a poor water quality cannot sustain its beneficial use.

Classification of a water body is being monitored quarterly for a period of one year. This also includes human activities, history of the water body and laboratory analyses in determining the appropriate classification of a water body. Public consultation is done to provide information to the public and to solicit their comments and suggestions.

The final proposed classification of St. Paul's Bay is class SA in Malipien Station and class SB in the other stations. The intended beneficial uses of Class SA waters based on DAO 2016-08 are **Protected Waters** – Waters designated as national or local marine parks, reserves, sanctuaries, and other areas established by law (Presidential Proclamation 1801 and other existing laws), and/or declared as such by appropriate government agency, LGUs, etc. **Fishery Water Class I –** Suitable for shellfish harvesting for direct human consumption.

Furthermore, the intended beneficial uses of Class SB waters based on DAO 2016-08 are, 1) **Fishery Water Class II –** Water suitable for commercial propagation of shellfish and intended respawning areas for milkfish (*Chanos chanos*) and similar species. 2)**Tourist Zone –** For ecotourism and recreational activities 3) **Recreational Water Class I** – Intended for primary contact recreation (bathing, swimming, skin diving, and etc.)

II. Brief Introduction

Puerto Princesa, officially known as the City of Puerto Princesa is a 1st class highly urbanized city in the MIMAROPA region of the Philippines. According to the 2020 census, it has a population of 307,079 people.

It is a city located in the western Philippine province of Palawan and is the westernmost city in the Philippines. Though the seat of government and capital for the province, the city itself is one of 38 independent cities within the Philippines not controlled by the province in which it is geographically located and is therefore an independent area located within Palawan.

It is the least densely populated city in the Philippines with 110 inhabitants per square kilometer. In terms of land area, the city is the second largest geographically after Davao City with an area of 2,381.02 square kilometers. Puerto Princesa is the location of the Philippines' Western Command headquarters. Puerto Princesa is a tourist city with many beach resorts and seafood restaurants. It has been acclaimed several times as the cleanest and greenest city in the Philippines.

The City of Puerto Princesa in Palawan, Philippines is located 306 nautical miles southwest of Manila, 205 nautical miles from Panay and about 250 nautical miles from Zamboanga. It is bounded on the North by the Municipality of San Vicente and Roxas and on the South by the Municipality of Aborlan. Its western side faces the South China Sea while in its eastern coast lays the Sulu Sea

Puerto Princesa City has a total land area of 253,982 hectares making it the largest City in the country. The city is comprised of 35 urban barangays and 31 rural barangays. The total area of the urban barangays is 14,716 hectares or only 5.7941% of the total land area of the city. The largest land area of the city is comprised of the rural barangays with a total land area 239,266 hectares or 94.2059% of the total land area of the city.

HISTORICAL BACKGROUND

Legend attributes the name "Puerto Princesa" to a princess-like maiden who in the early days is said to have roamed around the place on certain nights of the year. On the other hand, practical people attribute the name to the geographical advantages of the place as a seaport – naturally protected the whole year round and endowed with a depth that can accommodate any size of shipping – a royal heaven for vessels or a virtual princess of ports as thus indicated by Spanish Colonizers on the country's map.

Historically, the place was named after Princess Asunción, born in 1864 to Queen Isabella II and her consort, Francisco de Cádiz. When the princess suffered an untimely death, the Queen changed the name to Puerto de la Princesa. Eventually, the name was reduced to Puerto Princesa as it is known today.

Spanish Colonizers founded the settlement on 4 March 1872 in the course of their exploration of the province. As they scanned the Palawan shoreline for a capital site, they came upon a hill with steep declivity. Rowing to shore, they surveyed the hill and discovered an extensive plateau which they decided as ideal for settlement.

Soon after, Fr. Antonio Muro levelled a portion of the hill to make way for a chapel. (That section is now occupied by the Catholic Cathedral, the P.C. Barracks and the Rizal Park. The Old Municipal Building used to be there, as well as an Elementary School). The first mass celebrated in Puerto Princesa took place at a site where a marker now stands.

In May 1872, the Port of Puerto Princesa became the center of Spanish Naval Operations in the area because the Bay met all the Navy's requirements. Royal Decrees later provided incentives to settlers, and by 1883 the settlement had flourished into a town of twelve roads, a hospital and well-built port.

In 1894, Puerto Princesa was recognized by government authorities as one of the most beautiful towns in the country by virtue of the orderly distribution of streets, buildings and houses as well as the cleanliness of the community.

In 1911, the New American Administration made Puerto Princesa the seat of the Palawan Provincial Government with Major John Brown as Lieutenant Governor.

In 1951, the barrios of Tinitian, Caramay, Rizal, Del Pilar, Malcampo, Tumarbong, Taradungan, Ilian, and Capayas were separated to form the town of Roxas.

In 1955, the sitios of Materingen, Tandayag, Nasedoc, and Panlawagan were separated from the barrio of Maroyogon and elevated into a barrio.

In 1956, the sitios of Calagbenguen, Tarabanan, Bendoyan, Talabigan, Tagbuan, and Langogan were constituted into the barrio of Concepcion. In 1957, the barrio of Tapul was renamed to Salvacion.

The town was converted into a city on 1 January 1970 under R.A. 5906 as amended by P.D. 437, through the effort of then Congressman Ramon V. Mitra, Jr. Feliberto R. Oliveros, Jr. became the first City Mayor.

Since its foundation, Puerto Princesa has been the nerve center of activities in Palawan. Aside from being the seat of public administration, it is the heart of trade, commerce, service, and industry in the province.

ST. PAUL'S BAY

St. Paul Bay is located at northwestern section of Puerto Princesa City in the province of Palawan. This is the gateway to the Puerto Princesa City Subterranean River. The main feature is the 8.2 km underground river as well as the spectacular limestone formations. St. Paul Cave is very impressive, with huge passages and enormous chambers. The biggest chamber is 120 meters wide and 60 meters high, the length is hard to define since limited areas are only allowed for entry. St Paul Cave was known to local Batak people ever since the ancient times. According to legend, it was inhabited by a spirit that prevented anybody from entering the cave. At present, only 200-250 Batak people survived, the surrounding area is now inhabited by Tagbanua communities, who are Christianized.

III. Objectives of Classification

The main objective of water body classification is to maintain the body of water in a safe and satisfactory condition according to its best usage. The secondary objectives are as follows:

- ❖ To determine the present quality of water body in relation to DENR's water quality criteria.
- ❖ To determine the actual best usage potential and dominant water utilization of the water body.
- ❖ To establish classification of water body as an important component in the water quality management and as a guide in the enforcement of general effluent standards as provided by the DENR AO 08 series of 2016 and DENR AO 19 series of 2019: and
- ❖ To maintain the minimum condition necessary to assure the suitability of the water for its designated use or classification

WATER BODY CLASSIFICATION AND USAGE OF MARINE SURFACE WATER

CLASSIFICATION	INTENDED BENEFICIAL USE
CLASS SA	1. **Protected Waters** – Waters designated as national or local marine parks, reserves, sanctuaries, and other areas established by law (Presidential Proclamation 1801 and other existing laws), and/or declared as such by appropriate government agency, LGUs, etc. 2. **Fishery Water Class I –** Suitable for shellfish harvesting for direct human consumption
CLASS SB	1. **Fishery Water Class II –** Water suitable for commercial propagation of shellfish and intended respawning areas for milkfish (*Chanos chanos*) and similar species. 2. **Tourist Zone –** For ecotourism and recreational activities 3. **Recreational Water Class I –** Intended for primary contact recreation (bathing, swimming, skin diving, and etc.)
CLASS SC	1. **Fishery Water Class III –** For the propagation and growth of fish and other aquatic resources intended for commercial and sustenance fishing. 2. **Recreational Water Class II –** For boating, fishing, or similar activities. 3. Marshy and/or mangrove areas declared as fish and wildlife sanctuaries.
CLASS SD	Navigable Waters.

IV. Methodology

Methodology for classifying a water body was based on the provisions of Department Administrative Order (DAO) No. 08 series of 2016 as the Water Quality Guidelines and General Effluent Standards of 2016. The process of classification was divided into six (6) phases namely:

A. Ocular Inspection
B. Establishment of sampling stations and collection of water samples
C. Analysis and interpretation of data
D. Conduct public hearing
E. Submission of classification report
F. Publication

The significant parameters for St. Paul Bay were selected based on the existing and potential sources of pollution found in the vicinity. The bay was tested for its physical and chemical properties. A total of eight (8) monitoring stations were established each representing the entire coastal area of St. Paul Bay.

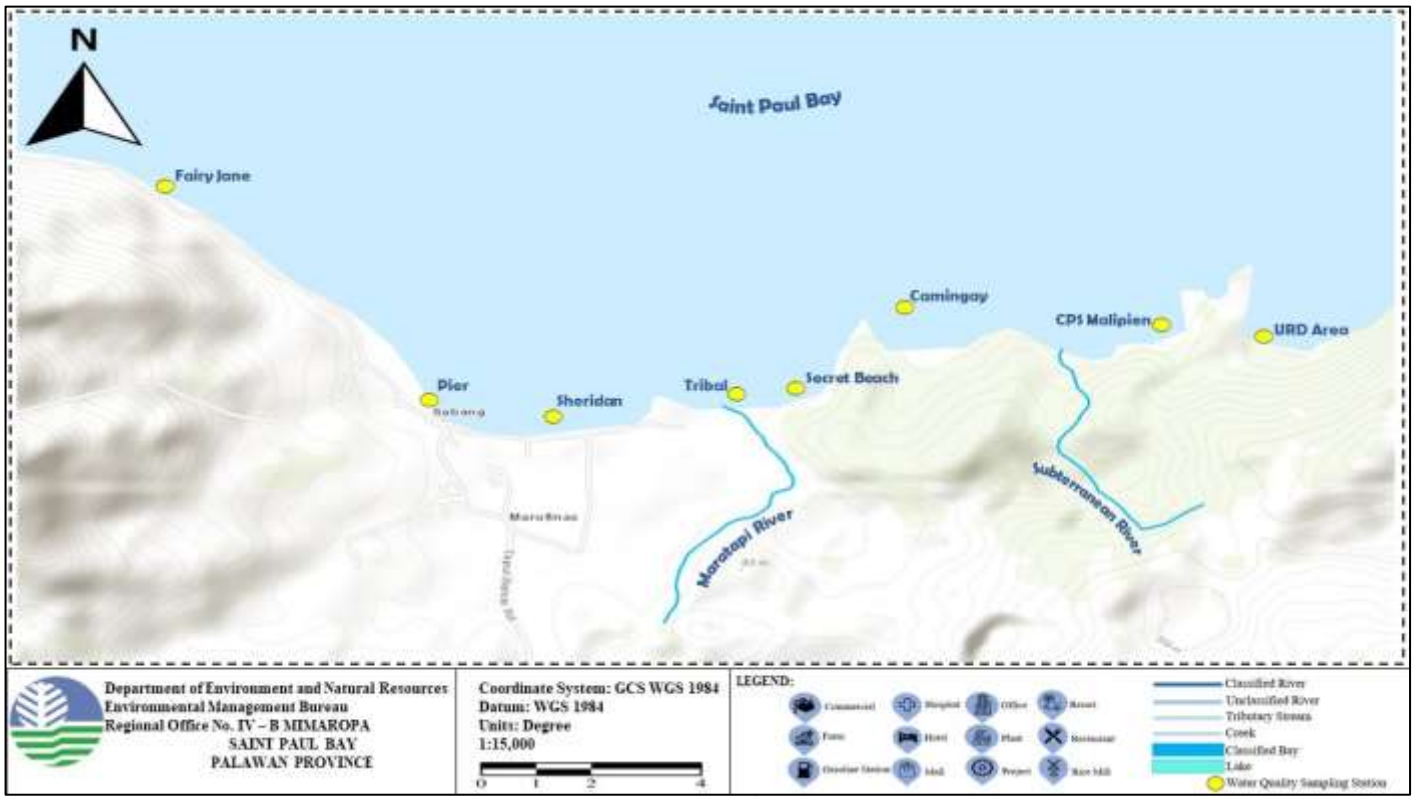
Samples were collected using grab sampling method. Measurements for pH, temperature, salinity, total dissolved solids (TDS), conductivity and dissolved oxygen (DO) were taken in-situ using the YSI multi-parameter water quality checker. Prior to transport, samples were maintained at low temperature by packing it with ice to maintain uniform temperature of 4˚C before the laboratory analysis of color, total suspended solids (TSS), nitrates, phosphates and fecal coliform. All methods used for analysis were based on the approved method of analyses set forth in EMB MC No. 012 series of 2016 or the "EMB Approved Methods of Analysis for Water and Wastewater."

Secondary data was acquired from local government unit and other national government agencies concern. Interviews with residents, barangay officials and stakeholders were conducted to gather pertinent information on the actual and potential beneficial usage of St. Paul Bay. In-situ and laboratory results data were presented through public consultation. Final classification report will be submitted to EMB Central Office for final evaluation, approval, and publication.

The eight (8) established monitoring stations with its corresponding GPS coordinates are presented on the succeeding section. The coordinates were plotted using ArcGIS to map the whole stretch of St. Paul Bay.

WATER QUALITY MONITORING STATIONS

Station No.	Station Identification	GPS Coordinates North	GPS Coordinates East
1	Fairy Jane	10.20896ºN	118.88261ºE
2	Wharf	10.19785ºN	118.89365ºE
3	Sheridan	10.19804ºN	118.89702ºE
4	Tribal	10.19873ºN	118.90612ºE
5	Secret Beach	10.20011ºN	118.90624ºE
6	CPS Malipien	10.20347ºN	118.91153ºE
7	Camingay	10.20241ºN	118.92075ºE
8	Underground river docking area	10.20168ºN	118.9247ºE



ArcGIS Plot of the Established Monitoring Stations of St. Paul Bay

V. Results and Discussion

Parameters Monitored with Corresponding Analytical Data

The significant parameters for the water quality measurement of the water of St. Paul Bay are color, pH, dissolved oxygen, temperature, total suspended solids, nitrates, phosphates and fecal coliform. The results of both in-situ and laboratory analyses conducted during the twelve (12) sampling periods of CY 2021 are presented in the succeeding sections.

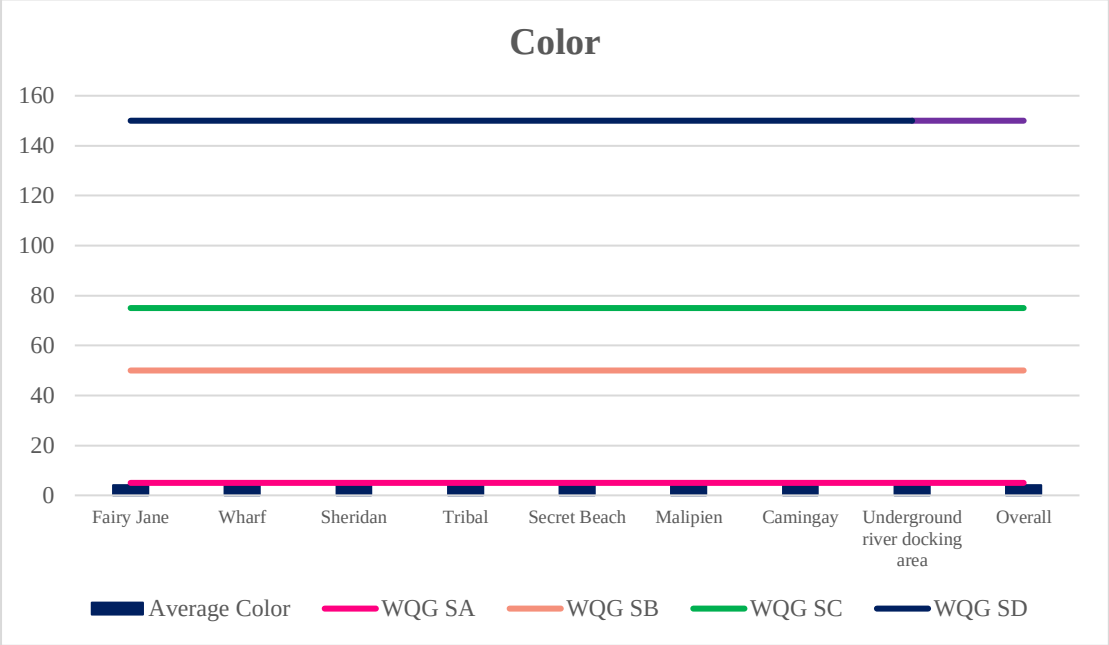
1. Color

In water quality, color is defined as the materials decayed from organic matter namely, vegetation and inorganic matter such as soil, stones and rocks. Humic matter consists of humic and fulvic acids; both causes yellow-brown color. Humic acid gives more intense color, and the presence of iron intensifies the color through the formation of more soluble ferric humates. Suspended particles, especially colloidal-size particles such as clays, algae, iron and manganese oxides, gives waters and appearance of color i.e. the brownish color of water is due to the presence of iron and the greenish color in the water is due to the presence of organic substances including algae. Color is measured by comparing the water sample with standard color solutions or colored glass disks. The Platinum-Cobalt Method of measuring color is the standard method, the unit of color is the standard method, unit of color being that produced by 1mg platinum/L in the form of chloroplatinate ion.

Table 1: Results for Color

Station Identification	February 18, 2021	March 08, 2021	April 05, 2021	May 25, 2021	July 27, 2021	August 16, 2021	Septembe r 14, 2021	Septembe r 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021	December 06, 2021
Fairy Jane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**5**
Wharf	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sheridan	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tribal	5.0	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Secret Beach	<5	<5	<5	<5	<5	5.0	<5	<5	<5	<5	<5	<5
Malipien	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Camingay	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Underground river docking area	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Overall	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**

Station Number	Station Identification	Average	Minimum	Maximum	Water Quality Guidelines DAO 08 s. 2016			
					SA	SB	SC	SD
1	Fairy Jane	<5	<5	5	5	50	75	150
2	Wharf	<5	<5	<5				
3	Sheridan	<5	<5	<5				
4	Tribal	<5	<5	5				
5	Secret Beach	<5	<5	5				
6	Malipien	<5	<5	<5				
7	Camingay	<5	<5	<5				
8	Underground river docking area	<5	<5	<5				
Overall		**<5**	<5	<5				



Color is the most immediate and most obvious sign of water pollution. Pure water is technically colorless and clear. This is the parameter that is easily perceived by humans through the naked eye. The judgement can be easily made through the color that humans see. The color of a waterbody speaks much of its organic and inorganic components present. Color is greatly affected by the vegetation present near the banks

or shores as well as the erosion of sediments. Color also adds to the aesthetic appeal especially bathing waterbodies.

Based on the graph, the waters of St. Paul Bay remain below the lowest detected color unit by the method used for analysis. The lowest color unit that the method can detect is 5 color unit. The bay has a color of lower than 5 color unit. Hence, the waters of St. Paul Bay passed the water quality guidelines set for all the four classifications of marine waterbodies.

2. pH

In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. It is an actual measurement of the potential activity of hydrogen ions in that solution. Pure water is said to be neutral, with a pH close to 7.0 at 25 °C. Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline. A solution of a strong acid, such as hydrochloric acid, at concentration 1 mol/L has a pH of 0. A solution of a strong alkali, such as sodium hydroxide, at concentration 1 mol/L, has a pH of 14. Thus, measured pH values will lie mostly in the range 0 to 14. Since pH is a logarithmic scale, a difference of one pH unit is equivalent to a tenfold difference in hydrogen ion concentration. In other words, pH 6.0 is ten times more acidic than pH 7.0 and pH 5 is one hundred times more acidic than pH 7.0.

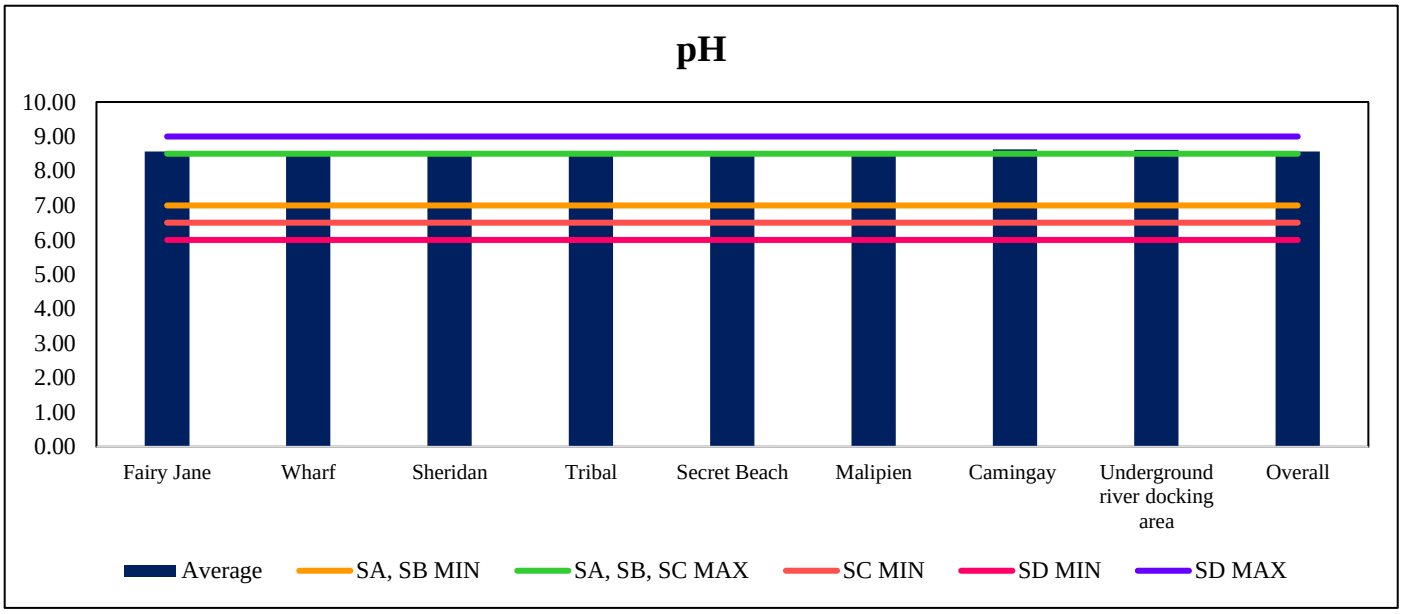
The pH of a body of water is affected by several factors. One of the most important factors is the bedrock and soil composition through which the water moves, both in its bed and as groundwater. Some rock types such as limestone can, to an extent, neutralize the acid while others, such as granite, have virtually no effect on pH. Another factor which affects the pH is the amount of plant growth and organic material within a body of water. When this material decomposes carbon dioxide is released. The carbon dioxide combines with water to form carbonic acid. Although this is a weak acid, large amounts of it will lower the pH. Dumping of chemicals into the water by individuals, industries, and communities would definitely affect the pH of a water body. Shampoo rinse water is actually a chemical brew and can affect the pH along with other chemical parameters of water. Many industrial processes require water of exact pH readings and thus add chemicals to change the pH to meet their needs. After use, this altered pH water is discharged as an effluent, either directly into a body of water or through the local sewage treatment plant. Acid precipitation that falls in the watershed is also another factor. Acid rain is caused by nitrogen oxides (NOx) and sulfur dioxide (SO_2) in the air combining with water vapor. These pollutants are primarily from automobile and coal-fired power plant emissions. Acid rain is responsible for many of our first order streams becoming acidic. Lastly, iron sulfide, a mineral found in and around coal

seams, combines with water to form sulfuric acid is another great factor. Combined with the problem of acid rain, the pH of some stream waters can be drastically lowered.

Table 2: Results for pH

Station Identification	February 18, 2021	September 14, 2021	September 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021
Fairy Jane	8.04	8.11	8.29	8.12	9.29	9.50
Wharf	7.80	8.18	8.31	8.13	9.29	9.66
Sheridan	7.80	8.29	8.53	8.17	9.29	8.80
Tribal	7.88	8.3	8.65	8.12	9.29	9.24
Secret Beach	7.91	8.24	8.22	8.14	9.29	9.66
Malipien	7.91	8.24	8.36	8.13	8.96	9.67
Camingay	8.00	8.31	8.38	8.13	9.29	9.66
Underground river docking area	7.97	8.27	8.35	8.09	9.29	9.66
Overall	**7.91**	**8.24**	**8.39**	**8.13**	**9.25**	**9.48**

Station Number	Station Identification	Average	Minimum	Maximum	Water Quality Guidelines DAO 08 s. 2016			
					SA	SB	SC	SD
1	Fairy Jane	8.56	8.04	9.50	7.0 – 8.5	7.0 – 8.5	6.0 – 8.5	6.0 – 9.0
2	Wharf	8.56	7.80	9.66				
3	Sheridan	8.48	7.80	9.29				
4	Tribal	8.58	7.88	9.29				
5	Secret Beach	8.58	7.91	9.66				
6	Malipien	8.55	7.91	9.67				
7	Camingay	8.63	8.00	9.66				
8	Underground river docking area	8.61	7.97	9.66				
Overall		**8.57**	7.91	9.48				



Aquatic organisms have low tolerance for pH. Humans has high tolerance for pH ranging from 4 to 11 pH units. Temperature has direct effect in pH and salinity. Increase in temperature will cause pH levels to decrease and salinity to increase. Salinity also have impact to pH. pH levels increase when salinity increases. Extremes in pH can make a marine water inhospitable to life. Low pH is especially harmful to immature fish and insects. Acidic water also speeds the leaching of heavy metals harmful to fish. And it also creates an itchy feeling when in contact with human skin.

Based on the graph above, the bay has an average of 8.57 pH units. pH level recorded the highest during November 2021 sampling episode. The high pH level in this sampling episode is caused by warm surface temperature. The optimum range in marine aquatic life in terms of pH is close to 8.20. Based on the graph, it falls within the acceptable range of water quality guidelines set forth by the DENR through DAO 2016-08 in all the four classifications of marine waters.

3. Dissolved Oxygen (DO)

Oxygen saturation or dissolved oxygen (DO) in the environment generally refers to amount of oxygen that is dissolved or carried in the soil or water body. It can be measured with a dissolved oxygen probe such as an oxygen sensor or an opt ode in water. DO is measured either in milligrams per liter (mg/L) or "percent saturation." Milligrams per liter is the amount of oxygen in a liter of water. Percent saturation is the

amount of oxygen in a liter of water relative to the total amount of oxygen that the water can hold at that temperature.

The physical factors that influence DO are temperature, altitude, salinity, and stream structure. Temperature inversely controls the solubility of oxygen in water. As temperature increases, oxygen is less soluble. In contrast, there is a direct relationship between atmospheric pressure and DO. As the pressure increases due to weather or elevation changes, oxygen solubility increases. Salinity also reduces the solubility of oxygen in water. Stream structure also influences DO concentrations. Atmospheric oxygen becomes mixed into a stream at turbulent, shallow riffles, resulting in increased DO levels. Because there is less surface interaction between water and air in slow-moving water and deep sections of a stream, DO concentrations often decrease between surface and bottom measurement.

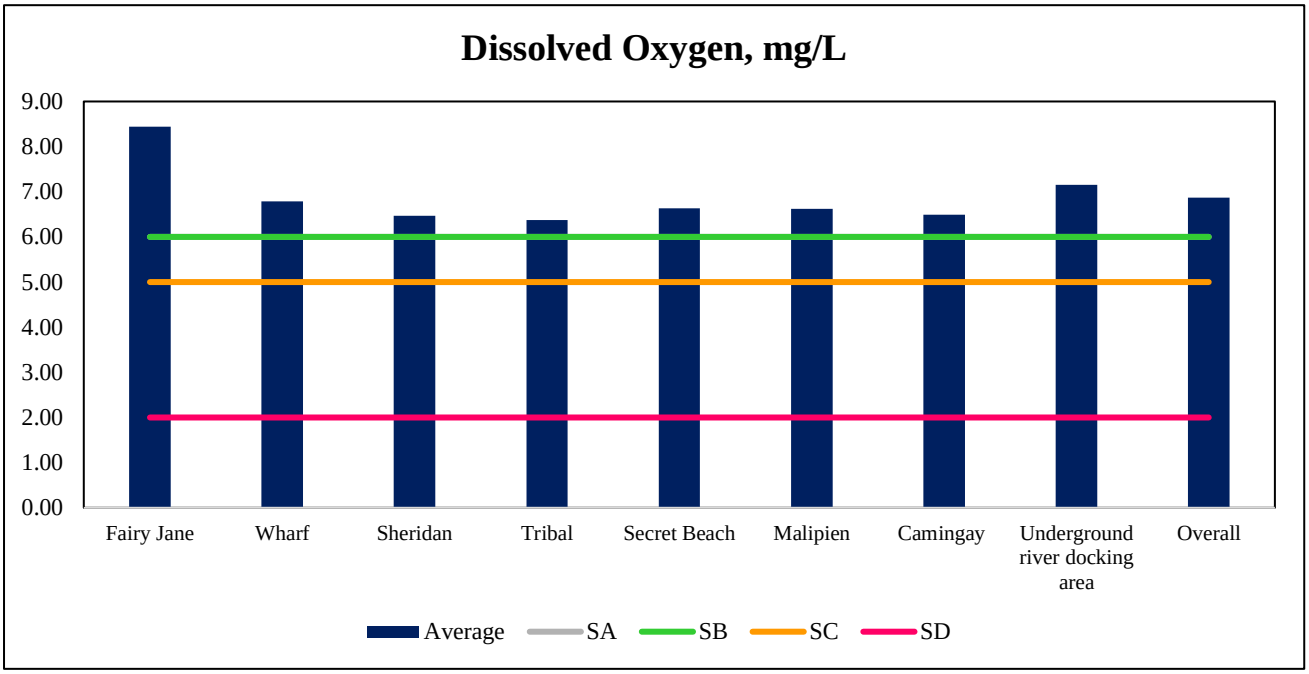
Total dissolved gas concentrations in water should not exceed 110 percent. Concentrations above this level can be harmful to aquatic life. Fish in waters containing excessive dissolved gases may suffer from "gas bubble disease". However, this is a very rare occurrence. The bubbles or emboli block the flow of blood through blood vessels causing death. External bubbles (emphysema) can also occur and be seen on fins, on skin and on other tissue. Aquatic invertebrates are also affected by gas bubble disease but at levels higher than those lethal to fish.

Table 3: Results for Dissolved Oxygen, mg/L

Station Identification	February 18, 2021	August 16, 2021	September 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021
Fairy Jane	Inaccurate DO measurement	6.24	4.71	7.23	6.32	6.09
Wharf	8.01	6.18	Inaccurate DO measurement	7.25	6.32	6.16
Sheridan	8.01	6.38	Inaccurate DO measurement	6.44	5.38	6.16

Tribal	7.93	3.61	Inaccurate DO measurement	7.77	6.36	6.21
Secret Beach	8.30	5.82	Inaccurate DO measurement	6.29	6.34	6.44
Malipien	7.57	6.28	Inaccurate DO measurement	6.82	6.23	6.19
Camingay	7.59	6.15	Inaccurate DO measurement	6.18	6.42	6.14
Underground river docking area	Inaccurate DO measurement	5.54	Inaccurate DO measurement	6.85	8.36	7.87
Overall	**23.56**	**5.78**	**4.71**	**6.85**	**6.47**	**6.41**

Station Number	**Station Identification**	**Average**	**Water Quality Guidelines DAO 08 s. 2016**			
			SA	**SB**	**SC**	**SD**
1	Fairy Jane	8.44	6.00	6.00	5.00	2.00
2	Wharf	6.78				
3	Sheridan	6.47				
4	Tribal	6.38				
5	Secret Beach	6.64				
6	Malipien	6.62				
7	Camingay	6.50				
8	Underground river docking area	7.16				
Overall		**6.87**				



Adequate dissolved oxygen is necessary for good water quality. Oxygen is a necessary element to all forms of life. From the atmosphere oxygen can diffuse across the surface or from wind (creating waves). Oxygen is also produced by rooted aquatic plants and algae as a product of photosynthesis. The lower the temperature of a waterbody the higher the dissolved concentration it can hold. A dissolved oxygen level of less than 6 mg/L can be harmful to the ecosystem of water bodies. Temperature, sea waves and salinity have direct impact to dissolved oxygen. An increase in temperature will increase salinity levels and decrease dissolved oxygen. As dissolved oxygen levels in water drop below 5.0 mg/l, aquatic life is put under stress. The lower the concentration, the greater the stress. Oxygen levels that remain below 1-2 mg/l for a few hours can result in large fish kills.

Based on the graph above, the bay has an overall dissolved concentration of 6.87 mg/L, slightly higher required for Class SA and SB in marine waterbody classification. There is a decreasing trend in dissolved oxygen concentration during the last quarter of sampling episodes, while there is an increase in surface temperature of water. Based on DAO 2016-08, the bay is within the optimum range for dissolved oxygen in all categories of waterbody classification for marine water.

4. Temperature

The most common physical assessment of water quality is the measurement of temperature. Temperature impacts both the chemical and biological characteristics of surface water. It affects the dissolved oxygen level in the water, photosynthesis of aquatic plants, metabolic rates of aquatic organisms, and the sensitivity of these organisms to pollution, parasites and disease.

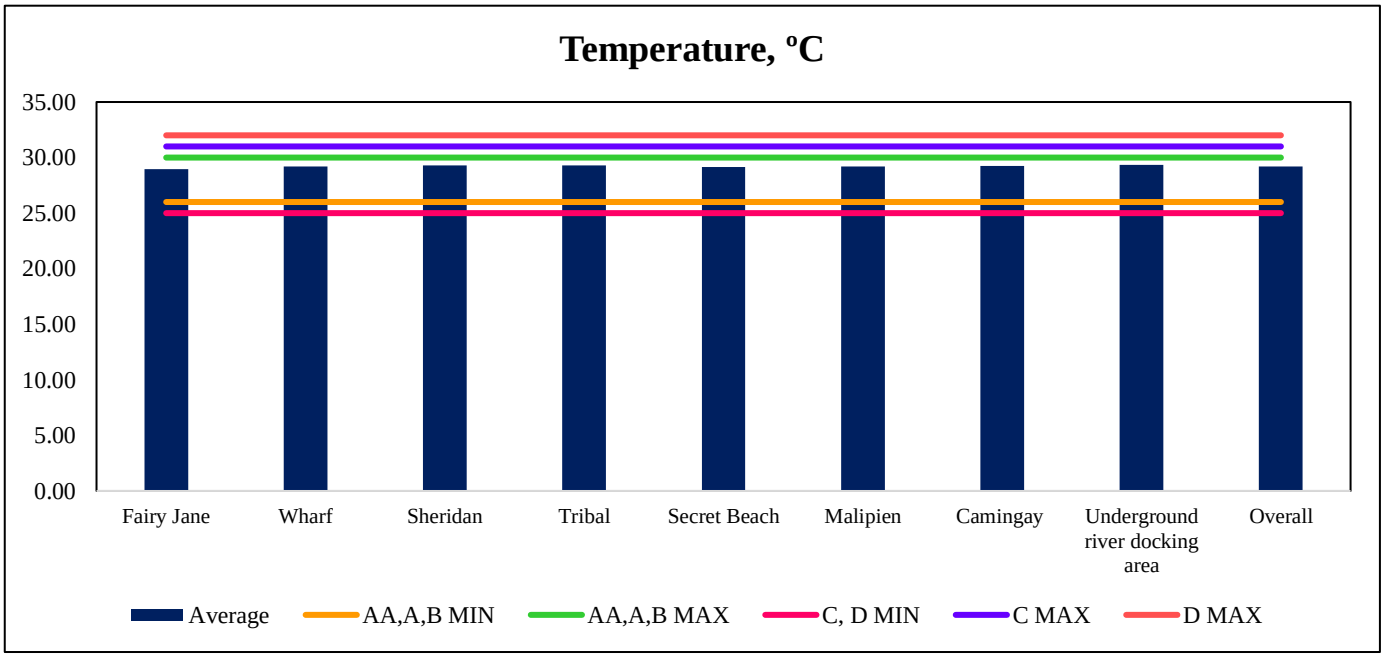
Thermal pollution is the introduction of water that is warmer than the body of water into which it flows. It generally occurs near power plants. In other non-industrial areas, urban runoff is the main source of thermal pollution. This is water that has been heated as it flowed over parking lots, streets and sidewalks. Plowing near streams or the removal of the forest canopy during construction also contributes to thermal pollution by decreasing shade, thereby increasing solar heating of the water's surface. In addition to increasing the amount of solar radiation reaching the water's surface, removal of vegetation near streams often results in increased erosion and increased amounts of sediments in the water. The sediments absorb heat from sunlight rather than reflect it. This heats the water further. Warm water is less capable of holding dissolved oxygen. For this reason, temperature should be measured at the same place within the marine water at which dissolved oxygen is measured. This allows the correlation between the two parameters to be observed.

The problem of low dissolved oxygen levels is magnified by the fact that the metabolic rates of aquatic plants increase as water temperature rises, thus increasing their biochemical oxygen demand. Low dissolved oxygen levels leave aquatic organisms in a weakened physical state and more susceptible to disease, parasites, and other pollutants.

Table 4: Results for Temperature, °C

Station Identification	February 18, 2021	August 16, 2021	November 08, 2021	November 22, 2021
Fairy Jane	27.01	30	29.50	29.3
Wharf	27.45	30.6	29.50	29.3
Sheridan	27.45	30.4	29.80	29.6
Tribal	27.49	30.4	29.90	29.4
Secret Beach	27.42	30.1	29.80	29.3
Malipien	27.24	30	30.10	29.4
Camingay	27.61	30.01	29.90	29.4
Underground river docking area	27.55	30.5	29.90	29.5
Overall	**27.40**	**30.25**	**29.80**	**29.4**

Station Number	Station Identification	Average	Water Quality Guidelines DAO 08 s. 2016			
			SA	SB	SC	SD
1	Fairy Jane	28.95	26°C – 30°C	26°C – 30°C	25°C-31°C	25°C-32°C
2	Wharf	29.21				
3	Sheridan	29.31				
4	Tribal	29.30				
5	Secret Beach	29.16				
6	Malipien	29.19				
7	Camingay	29.23				
8	Underground river docking area	29.36				
Overall		**29.21**				



Temperature impacts the rates of metabolism and growth of aquatic organisms, rate of plants' photosynthesis, solubility of oxygen in river water and organisms' sensitivity to disease, parasites, and toxic materials. At a higher temperature, plants grow and die faster, leaving behind matter that requires oxygen for decomposition. Temperature is a crucial factor that affects the other water quality parameters. Turbidity, amount of sunlight, and thermal pollution have direct impact to the increase and decrease of temperature. As water temperature increases, the conductivity of water also increases, where TDS in water is directly related to conductivity. For each 1°C increment,

conductivity rise by 2–4%. Temperature influences conductivity by increasing ions mobility and additionally the dissolvability of many salts and minerals.

Based on the graph above, the bay has an overall temperature of 29.21°C. This is still within the optimum range of temperature in marine ecosystem. Therefore, the bay is within the acceptable range of temperature in all four categories of classification for marine water based on DAO 2016-08.

5. Total Suspended Solids (TSS)

Total Suspended Solids (TSS) is a measure of concentration of all suspended particles obtained by separating these particles from a water sample using a filter. However, TSS cannot pass through a sieve of two micrometers and yet are indefinitely suspended in solution.

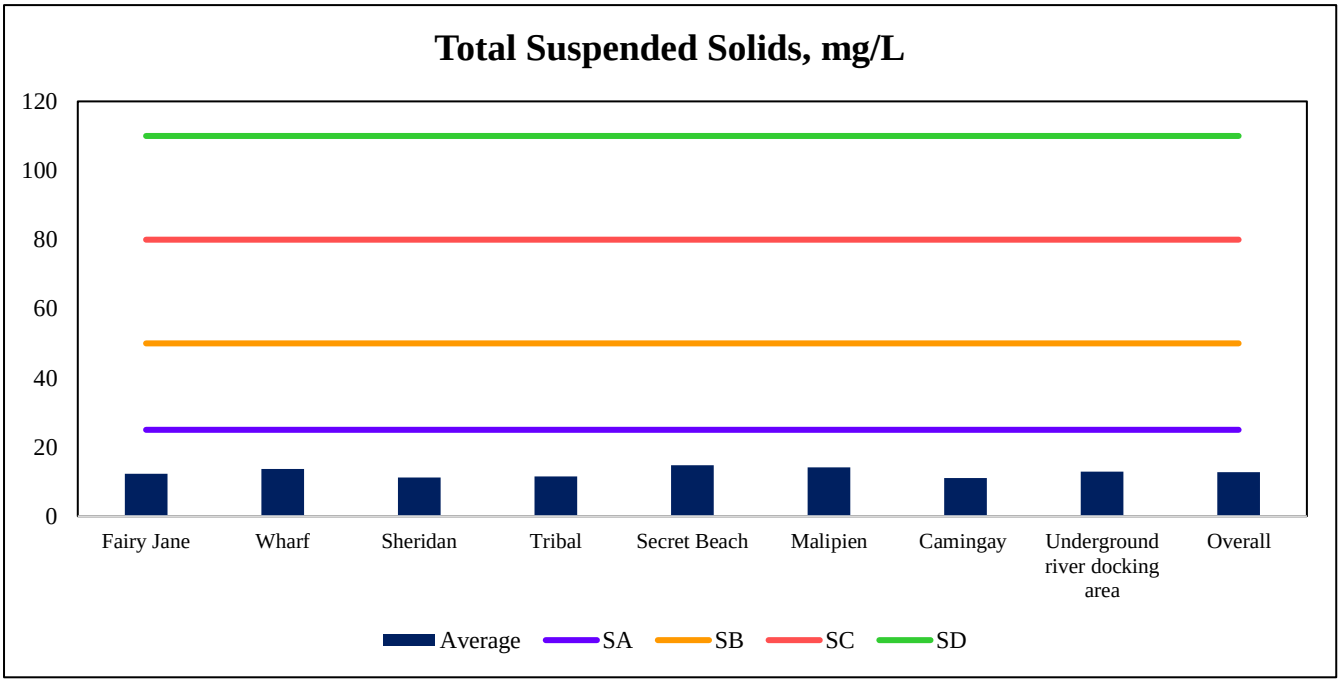
Suspended solids can result from erosion from urban runoff and agricultural land, industrial wastes, bank erosion, bottom feeders, algae growth or wastewater discharges. As levels of TSS increase, a water body begins to lose its ability to support a diversity of aquatic life. Suspended solids absorb heat from sunlight, which increases water temperature and subsequently decreases levels of dissolved oxygen (warmer water holds less oxygen than cooler water). Some cold-water species, such as trout and stoneflies, are especially sensitive to changes in dissolved oxygen. Photosynthesis also decreases since less light penetrates the water. As less oxygen is produced by plants and algae, there is a further drop in dissolved oxygen levels.

TSS can also destroy fish habitat because suspended solids settle to the bottom and can eventually blanket the riverbed. Suspended solids can smother the eggs of fish and aquatic insects and can suffocate newly hatched insect larvae. Suspended solids can also harm fish directly by clogging gills, reducing growth rates, and lowering resistance to disease. Changes to the aquatic environment may result in a diminished food source, and increased difficulties in finding food. Natural movements and migrations of aquatic populations may be disrupted.

Table 5: Results for Total Suspended Solids, mg/L

Station Identification	February 18, 2021	March 08, 2021	April 05, 2021	July 27, 2021	August 16, 2021	September 14, 2021	September 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021	December 06, 2021
Fairy Jane	14	23	13	14	10	10	8	15	<2	15	**11**
Wharf	16	32	9	19	10	3	12	18	<2	11	**18**
Sheridan	7	34	11	5	10	6	6	12	<2	11	**19**
Tribal	19	27	7	10	7	9	7	13	<2	9	**16**
Secret Beach	23	40	12	18	9	7	13	11	<2	14	**14**
Malipien	15	41	15	18	9	7	6	17	<2	12	**14**
Camingay	<2	24	11	18	9	10	6	13	<2	11	**15**
Underground river docking area	4	32	15	22	8	9	10	11	<2	14	**15**
Overall	**12**	**32**	**12**	**16**	**9**	**8**	**9**	**14**	**<2**	**12**	**15**

Station Number	Station Identification	Average	Water Quality Guidelines DAO 08 s. 2016			
			SA	SB	SC	SD
1	Fairy Jane	12	25	50	80	110
2	Wharf	14				
3	Sheridan	11				
4	Tribal	11				
5	Secret Beach	15				
6	Malipien	14				
7	Camingay	11				
8	Underground river docking area	13				
Overall		**13**				



Total suspended solids refer to the particles present in waters. These suspended particles can come from soil erosion, runoff, discharges, stirred bottom sediments or algal blooms. High turbidity usually equates to high total suspended solids concentration. Elevated suspended particles have many impacts including making coastal water look muddy, affecting aesthetics and swimming. Sedimentation can restrict the areas where fish spawn, limit biological diversity and keep coastal water cloudy, reducing potential for the growth of healthy aquatic plants.

Based on the graph above, the bay has overall TSS concentration of 23 mg/L which is still below the maximum allowable limit of 25mg/L for Class SA. Therefore, the bay is within the acceptable water quality guidelines in all four-waterbody classification category for marine water.

6. Phosphate (PO_4)

Phosphorus in small quantities is essential for plant growth and metabolic reactions in animals and plants. It is the nutrient in shortest supply in most fresh waters, with even small amounts causing significant plant growth and having a large effect on the aquatic ecosystem. Phosphate-induced algal blooms may initially increase dissolved oxygen via photosynthesis, but after these blooms die more oxygen is consumed by bacteria aiding their decomposition.

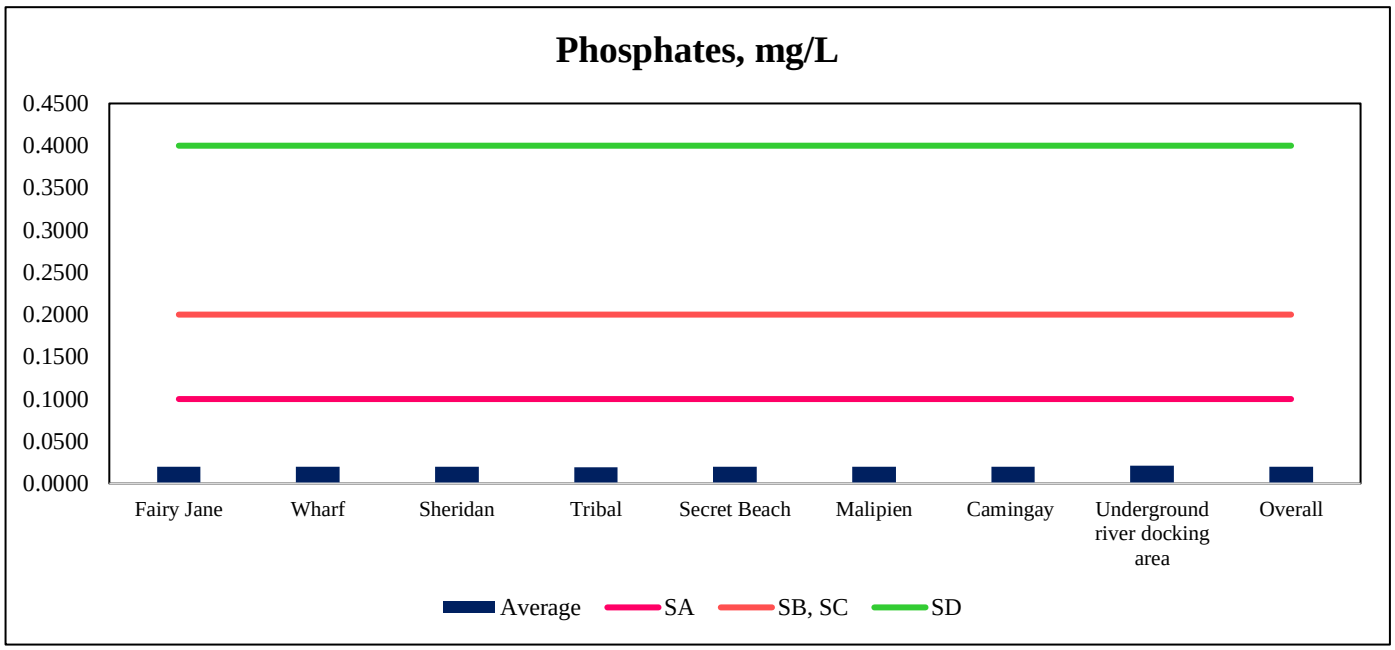
This may cause a change in the types of plants which live in an ecosystem. Sources of phosphate include animal wastes, sewage, detergent, fertilizer, disturbed

land, and road salts used in the winter. Phosphates do not pose a human or health risk except in very high concentrations. It is measured in mg/L. The natural background of seawater for P as phosphate is 0.1mg/L. Higher concentration than 0.1mg/L may pose risk to aquatic ecosystem.

Table 6: Results of Phosphates, mg/L

Station Identification	February 18, 2021	March 08, 2021	April 05, 2021	May 25, 2021	July 27, 2021	August 16, 2021	Septembe r 14, 2021	September 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021	December 06, 2021
Fairy Jane	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02	<0.02	<0.02	<0.02	<0.02
Wharf	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02	<0.02	<0.02	<0.02	<0.02
Sheridan	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02	<0.02	<0.02	<0.02	<0.02
Tribal	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02
Secret Beach	<0.02	<0.02	<0.02	<0.02	<0.02	0.020	0.030	0.020	<0.02	<0.02	<0.02	<0.02
Malipien	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02	<0.02	<0.02	<0.02	<0.02
Camingay	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.030	<0.02	<0.02	<0.02	<0.02	<0.02
Undergrou nd river docking area	<0.02	<0.02	<0.02	<0.02	<0.02	0.020	0.030	0.030	<0.02	<0.02	<0.02	<0.02
Overall	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**0.030**	**0.021**	**<0.02**	**<0.02**	**<0.02**	**<0.02**

Station Number	Station Identification	Average	Water Quality Guidelines DAO 19 s. 2021			
			SA	SB	SC	SD
1	Fairy Jane	<0.020	0.1	0.2	0.2	4
2	Wharf	0.020				
3	Sheridan	<0.020				
4	Tribal	<0.020				
5	Secret Beach	0.020				
6	Malipien	<0.020				
7	Camingay	<0.020				
8	Underground river docking area	0.021				
Overall		**0.020**				



Phosphorus is one of the nutrients necessary for the growth of plants, planktons and animals. However, man-made sources such as septic systems, fertilizer runoff and improperly treated wastewater could disrupt the natural course of the biogeochemical cycle resulting to increased phosphate levels in receiving ambient waters. The phosphates enter the water as the result of surface run-off and bank erosion. High concentration of phosphates and nitrates may cause eutrophication in any waterbody. Phosphates concentration greater than 0.5 mg/L and nitrate concentration greater than 3 mg/L may induce macroalgal bloom.

As it can be deduced from the graph, the bay has an average phosphate concentration 0.020 mg/L. Therefore, the whole stretch of St. Paul Bay is within the acceptable levels in the four waterbody classification categories for marine water.

7. Fecal Coliform

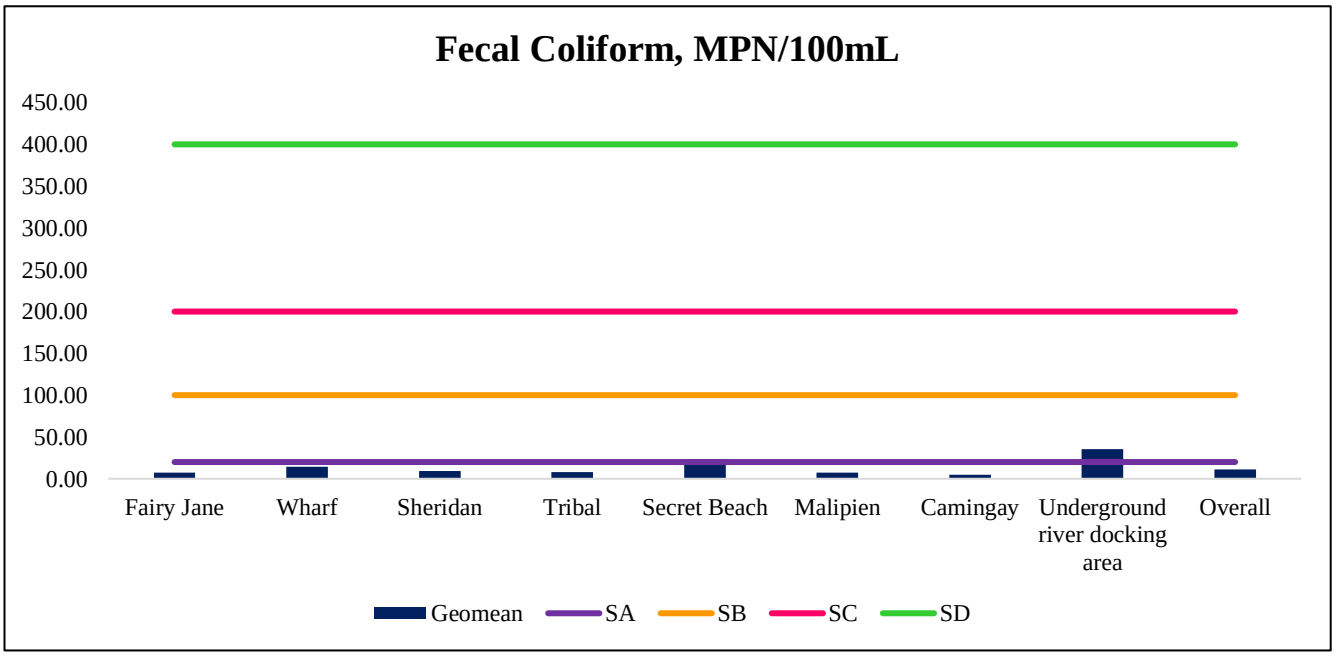
Coliforms are bacteria that are always present in the digestive tracts of animals, including humans, and are found in their wastes. They are also found in plant and soil material. Fecal coliforms are present specifically in the gut and feces of warm-blooded

animals. Because the origins of fecal coliforms are more specific than the origins of the more general total coliform group of bacteria, fecal coliforms are considered a more accurate indication of animal or human waste than the total coliforms. The presence of fecal coliform bacteria in aquatic environments indicates that the water has been contaminated with the fecal material of man or other animals.

Table 7. Results for Fecal Coliform

Station Identification	February 17, 2021	March 08, 2021	May 25, 2021	July 27, 2021	August 16, 2021	September 14, 2021	September 28, 2021	October 26, 2021	November 08, 2021	November 22, 2021	December 06, 2021
Fairy Jane	10.8	35.5	18.30	<1.8	39	2	240	<1.8	2	<1.8	<1.8
Wharf	11.0	45.2	6.20	8.3	17	350	39	2	13	<1.8	25
Sheridan	9.8	62.4	40.20	<1.8	7.8	4.5	24	2	<1.8	33	7.8
Tribal	74.8	16.1	7.30	<1.8	13	4.5	11	2	2	4	49
Secret Beach	26.5	8.6	35.50	<1.8	21	240	170	<1.8	<1.8	>16,000	2
Malipien	9.8	27.2	3.10	<1.8	<1.8	27	540	<1.8	<1.8	<1.8	13
Camingay	1	3.1	5.20	<1.8	4.5	2	<1.8	22	49	1.8	34
Underground river docking area	14.6	17.3	12.80	<1.8	220	350	34	49	6.8	94	240
Overall	**11.61**	**19.42**	**11.18**	**2.07**	**14.86**	**22**	**44**	**4**	**4**	**14**	**16**

Station Number	Station Identification	Geomean	Water Quality Guidelines DAO 19 s. 2021			
			SA	SB	SC	SD
1	Fairy Jane	7.07	20	100	200	400
2	Wharf	14.63				
3	Sheridan	8.98				
4	Tribal	7.91				
5	Secret Beach	23.28				
6	Malipien	7.08				
7	Camingay	4.75				
8	Underground river docking area	35.36				
Overall		**10.93**				



The presence of fecal coliform in aquatic environments may indicate that the water has been contaminated with the fecal material from humans or other animals. Fecal coliform bacteria can enter a waterbody through direct discharge of waste from mammals and birds, from agricultural and storm runoff, and from human sewage. However, their presence may also be the result of plant material, and pulp or paper mill effluent.

In the case of St. Paul Bay, the overall geomean is 10.93 MPN/100mL. This value is below the maximum allowable levels for the highest classification for marine waters which is Class SA. Hence, the bay passed all the water quality guidelines set forth in all of the four classifications for marine waters.

VI. Recommendations

The coastal waters of St. Paul Bay in Brgy. Sabang, Puerto Princesa City, Palawan were monitored for a period of one (1) year for the purpose of waterbody classification. This program aims to categorize waterbodies according to its most beneficial usage.

The results of the water quality monitoring shows that all the established stations were within the acceptable levels as compared to the set water quality guidelines in all the four marine waterbody classification. The parameters monitored are as follows: Color, Dissolved Oxygen, pH, Temperature, Phosphates, Total Suspended Solids and Fecal Coliform.

The results and initial assessment were presented to the public through a consultation. This was conducted by EMB MIMAROPA through the PEMU Palawan and was attended by Community-Based Tourism officers, barangay captains within the jurisdiction of the bay and their respective councilors.

Based on the public consultation, the current usage of the entire St. Paul Bay is for tourism and recreational purposes. Parts of it is also used as docking area for boats going to World's Famous Puerto Princesa Underground River (PPUR), one of the New 7 Wonders of Nature.

The proposed classification of St. Paul Bay is Class SB waterbody. Initially, the locals asked the advantages and disadvantages of having a Class SA classification and Class SB classification. The EMB MIMAROPA Personnel discussed every detail so that the stakeholders can better decide and choose the most appropriate classification to be assigned to St. Paul Bay.

To further protect and preserve the Puerto Princesa Underground River (PPUR), Class SA was proposed to be assigned at the CPS Malipien Station since this is the entrance portion to PPUR.

Therefore, two classifications were proposed: Class SA for CPS Malipien Station while Class SB for the rest of the bay.

Based on DAO 2016-08, Class SA waterbodies are ***Protected Waters*** – *Waters designated as national or local marine parks, reserves, sanctuaries, and other areas established by law (Presidential Proclamation 1801 and other existing laws), and/or declared as such by appropriate government agency, LGUs, etc.* ***Fishery Water Class I*** *– Suitable for shellfish harvesting for direct human consumption*.

Class SB ***Fishery Water Class II*** *– Water suitable for commercial propagation of shellfish and intended respawning areas for milkfish (Chanos chanos) and similar species.* ***Tourist Zone*** *– For ecotourism and recreational activities,* ***Recreational***

Water Class I *– Intended for primary contact recreation (bathing, swimming, skin diving, and etc.)*

Hereunder are the recommendations for an effective management of St. Paul Bay in Puerto Princesa City, Palawan.

1) An information, education, and communication (IEC) campaign should be implemented by Environmental Management Bureau – MIMAROPA, to disseminate the results and findings of the sampling activities among the Local Government units (LGUs), Non-Governmental Organization (NGOs) and the concerned local communities. This is to make them aware of the situation and identify for themselves the necessary steps/actions in achieving a sustainable coastal management for St. Paul Bay with the assistance from Environmental Management Bureau – MIMAROPA Regional Office.

2) Periodic water quality monitoring of St. Paul Bay in coordination with concerned NGAs, LGUs and private sector.

3) Identification and monitoring of tributaries, creeks and canals discharging directly to the bay.

4) Advise every residential establishment to construct adequate water-tight septic tanks and STP for commercial establishments.

5) Cooperation of DENR, DOH, DILG and LGUs to construct/provide centralize siphoning and wastewater treatment services.

6) The Local Government Unit must delineate the metes and bounds of the protected area near the PPUR

VII. Annexes and Attachments

1. Photo Documentation of Activities
2. Monitoring data sheet
3. Minutes of Public Hearing
4. Attendance Sheet of Public Hearing
5. Sources of Pollution

Prepared by:

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Chief, Environmental Monitoring and Enforcement Division

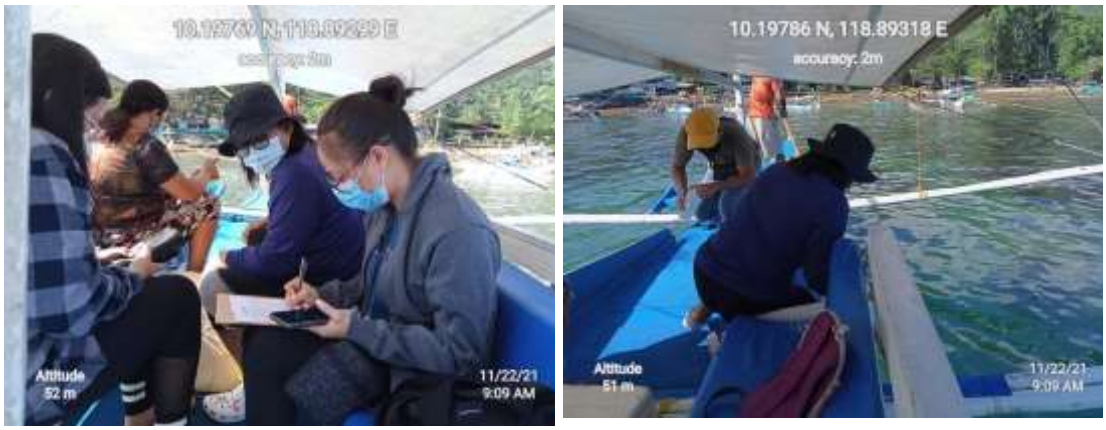
Approved by:

JOE AMIL M. SALINO
Regional Director

Digitally signed by EMB MIMAROPA REGION OFFICE OF THE REGIONAL DIRECTOR
Date: 2022.10.25 15:17:08 +08'00'

1. Photo Documentation of Activities

Public Consultation conducted



Water sampling activities conducted

2. Monitoring data sheet

SUMMARY REPORT OF WATER QUALITY MONITORING DATA

SUBMITTED BY THE REGIONAL OFFICES

CY 2021

St. Paul's Bay

for Classification 2021

Region	Parameter	Stn	Station ID	18-Feb-21	08-Mar-21	05-Apr-21	25-May-21	27-Jul-21	16-Aug-21	14-Sep-21	28-Sep-21	01-Oct-21	01-Nov-21	22-Nov-21	06-Dec-21	Ave/ Geomean	Min	Max	GUIDELINES
	DO mg/L	1	Fairy Jane	inaccurate data	no data	no data	no data	no data	6.24	no data	4.71	7.23	6.32	6.08	no data	6.12	4.71	7.23	
		2	Wharf	8.01	no data	no data	no data	no data	6.18	no data	32.9	7.25	6.32	6.16	no data	11.14	6.16	32.9	
		3	Sheridan	8.01	no data	no data	no data	no data	6.38	no data	15.82	6.44	5.38	6.16	no data	8.03	5.38	15.82	
		4	Tribal	7.95	no data	no data	no data	no data	3.61	no data	11.77	7.77	6.36	6.23	no data	7.28	3.61	11.77	SA: 6
		5	Secret Beach	8.3	no data	no data	no data	no data	5.82	no data	12.92	6.29	6.34	6.44	no data	7.69	5.82	12.92	SB: 6
		6	Malipiex	7.57	no data	no data	no data	no data	6.28	no data	14.56	6.82	6.23	6.19	no data	7.94	6.19	14.56	SC: 5
		7	Cannigay (CPS)	7.59	no data	no data	no data	no data	6.15	no data	13.5	6.18	6.42	6.14	no data	7.66	6.14	13.5	SD: 2
		8	Underground river docking area	inaccurate data	no data	no data	no data	no data	5.54	no data	inaccurate data	6.85	8.36	7.87	no data	7.16	5.54	8.36	
			Overall	7.90	no data	no data	no data	no data	5.78	no data	15.17	6.85	6.47	6.41	no data	8.10	5.78	15.17	
																#DIV/0!			
	TSS mg/L	1	Fairy Jane	14	23	13	no data	14	10	10	8	15	<2	15	no data	13.56	8.00	23.00	
		2	Wharf	16	32	9	no data	19	10	3	12	18	<2	11	no data	14.44	3.00	32.00	
		3	Sheridan	7	34	11	no data	5	10	6	6	12	<2	11	no data	11.33	5.00	34.00	
		4	Tribal	19	27	7	no data	10	7	9	7	13	<2	9	no data	12.00	7.00	27.00	
		5	Secret Beach	25	40	12	no data	18	9	7	13	11	<2	14	no data	16.33	7.00	40.00	SA: 25
		6	Malipiex	15	41	15	no data	18	9	7	6	17	<2	12	no data	15.56	6.00	41.00	SB: 50
		7	Cannigay (CPS)	<2	24	11	no data	18	9	10	6	13	<2	11	no data	12.75	6.00	24.00	SC: 80
		8	Underground river docking area	4	32	15	no data	22	8	9	10	11	<2	14	no data	13.89	4.00	32.00	SD: 110
			Overall	14	32	12	no data	16	9	8	9	14	<2	12	no data	13.75	7.63	31.63	

SUMMARY REPORT OF WATER QUALITY MONITORING DATA
SUBMITTED BY THE REGIONAL OFFICES
CY 2021

Parameter	Stn	Station ID	18-Feb-21	08-Mar-21	05-Apr-21	25-May-21	27-Jul-21	16-Aug-21	14-Sep-21	28-Sep-21	01-Oct-21	01-Nov-21	22-Nov-21	06-Dec-21	Ave/ Geomean	Min	Max	GUIDELINES
St. Paul's Bay																		
for Classification 2021																		
pH	1	Fairy Jane	8.04	no data	no data	no data	no data	inaccurate pH measurement	8.11	8.29	8.12	9.29	9.5	no data	8.56	8.04	9.50	SA: 7.0 – 8.5 SB: 7.0 – 8.5 SC: 6.5 – 8.5 SD: 6.0 – 9.0
	2	Wharf	7.80	no data	no data	no data	no data	inaccurate pH measurement	8.18	8.31	8.13	9.29	9.66	no data	8.56	7.80	9.66	
	3	Sheridan	7.80	no data	no data	no data	no data	inaccurate pH measurement	8.29	8.53	8.17	9.29	8.8	no data	8.48	7.80	9.29	
	4	Tribal	7.88	no data	no data	no data	no data	inaccurate pH measurement	8.3	8.65	8.12	9.29	9.24	no data	8.58	7.88	9.29	
	5	Secret Beach	7.91	no data	no data	no data	no data	inaccurate pH measurement	8.24	8.22	8.14	9.29	9.66	no data	8.58	7.91	9.66	
	6	Malipion	7.91	no data	no data	no data	no data	inaccurate pH measurement	8.24	8.36	8.13	8.96	9.67	no data	8.55	7.91	9.67	
	7	Cannigay (CPS)	8.00	no data	no data	no data	no data	inaccurate pH measurement	8.31	8.38	8.13	9.29	9.66	no data	8.63	8.00	9.66	
	8	Underground river docking area	7.97	no data	no data	no data	no data	inaccurate pH measurement	8.27	8.35	8.09	9.29	9.66	no data	8.61	7.97	9.66	
		Overall	7.91	no data	no data	no data	no data	inaccurate pH measurement	8.24	8.39	8.13	9.25	9.48	no data	8.57	7.91	9.48	
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Temp. °C	1	Fairy Jane	27.01	no data	no data	no data	no data	30	no data	no data	no data	29.5	29.3	no data	28.95	27.01	30.00	SA: 26 – 30 SB: 26 – 30 SC: 25 – 31 SD: 25 – 32
	2	Wharf	27.45	no data	no data	no data	no data	30.6	no data	no data	no data	29.5	29.3	no data	29.21	27.45	30.60	
	3	Sheridan	27.45	no data	no data	no data	no data	30.4	no data	no data	no data	29.8	29.6	no data	29.31	27.45	30.40	
	4	Tribal	27.49	no data	no data	no data	no data	30.4	no data	no data	no data	29.9	29.4	no data	29.30	27.49	30.40	
	5	Secret Beach	27.42	no data	no data	no data	no data	30.1	no data	no data	no data	29.8	29.3	no data	29.16	27.42	30.10	
	6	Malipion	27.24	no data	no data	no data	no data	30	no data	no data	no data	30.1	29.4	no data	29.19	27.24	30.10	
	7	Cannigay (CPS)	27.61	no data	no data	no data	no data	30.01	no data	no data	no data	29.9	29.4	no data	29.23	27.61	30.01	
	8	Underground river docking area	27.55	no data	no data	no data	no data	30.5	no data	no data	no data	29.9	29.5	no data	29.36	27.55	30.50	
		Overall	27.40	no data	no data	no data	no data	30.25	no data	no data	no data	29.80	29.40	no data	29.21	27.40	30.25	

SUMMARY REPORT OF WATER QUALITY MONITORING DATA															
SUBMITTED BY THE REGIONAL OFFICES															
CY 2021															
Station ID	18-Feb-21	08-Mar-21	05-Apr-21	25-May-21	27-Jul-21	16-Aug-21	14-Sep-21	28-Sep-21	01-Oct-21	01-Nov-21	22-Nov-21	06-Dec-21	Ave/ Geomean	Min	Max	GUIDELINES
St. Paul's Bay																
for Classification 2021																
													#DIV/0!			
Fairy Jane	30.75	no data	no data	no data	no data	32.21	no data	no data	no data	31.59	31.45	no data	31.50	30.75	32.21	NONE
Wharf	30.61	no data	no data	no data	no data	32.23	no data	no data	no data	31.4	31.38	no data	31.41	30.61	32.23	
Sheridan	30.61	no data	no data	no data	no data	32.29	no data	no data	no data	31.52	31.6	no data	31.51	30.61	32.29	
Tribal	30.44	no data	no data	no data	no data	32.29	no data	no data	no data	31.22	31.48	no data	31.36	30.44	32.29	
Secret Beach	30.49	no data	no data	no data	no data	32.28	no data	no data	no data	31.62	31.7	no data	31.52	30.49	32.28	
Malipien	30.73	no data	no data	no data	no data	32.28	no data	no data	no data	31.43	31.4	no data	31.46	30.73	32.28	
Caningay (CPS)	30.61	no data	no data	no data	no data	32.31	no data	no data	no data	31.59	31.4	no data	31.48	30.61	32.31	
Underground river docking area	30.03	no data	no data	no data	no data	31.98	no data	no data	no data	31.25	31.15	no data	31.10	30.03	31.98	
Overall	30.53	no data	no data	no data	no data	32.23	no data	no data	no data	31.45	31.45	no data	31.42	30.53	32.23	
Fairy Jane	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	5.00	SA: 5 SB: 50 SC: 75 SD: 150
Wharf	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Sheridan	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Tribal	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	5.00	
Secret Beach	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Malipien	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Caningay (CPS)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Underground river docking area	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	<5	<5	<5	
Overall	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	no data	5.00	<5	5.00	

SUMMARY REPORT OF WATER QUALITY MONITORING DATA

SUBMITTED BY THE REGIONAL OFFICES

CY 2021

St. Paul's Bay

for Classification 2021

Region	Parameter	Stn	Station ID	18-Feb-21	08-Mar-21	05-Apr-21	25-May-21	27-Jul-21	16-Aug-21	14-Sep-21	28-Sep-21	01-Oct-21	01-Nov-21	22-Nov-21	06-Dec-21	Ave/ Geomean	Min	Max	GUIDELINES
	NO3-N mg/L	1	Fairy Jane	1.65	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.65	1.65	1.65	SA: 10 SB: 10 SC: 10 SD: 15
		2	Wharf	1.55	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.55	1.55	1.55	
		3	Sheridan	1.53	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.53	1.53	1.53	
		4	Tribal	1.51	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.51	1.51	1.51	
		5	Secret Beach	1.56	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.56	1.56	1.56	
		6	Malipien	1.6	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.60	1.60	1.60	
		7	Camingay (CPS)	1.87	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.87	1.87	1.87	
		8	Underground river docking area	1.75	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.75	1.75	1.75	
			Overall	1.63	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	1.63	1.63	1.63	
	PO4-P mg/L	1	Fairy Jane	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	SA: 0.1 SB: 0.2 SC: 0.2 SD: 5
		2	Wharf	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
		3	Sheridan	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
		4	Tribal	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	no data	0.02	<0.02	0.02	
		5	Secret Beach	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.03	0.02	<0.02	<0.02	<0.02	no data	0.02	<0.02	0.03	
		6	Malipien	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
		7	Camingay (CPS)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
		8	Underground river docking area	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.03	0.03	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
			Overall	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.029	0.025	<0.02	<0.02	<0.02	no data	0.03	<0.02	0.03	
	Fecal Coliform, MPN/ 100mL	1	Fairy Jane	10.8	35.5	no data	18.3	<1.8	39	2	240	<1.8	2	<1.8	<1.8	15.95	2.00	240.00	SA: 20 SB: 100 SC: 200 SD: 400
		2	Wharf	11	45.2	no data	6.2	8.3	17	350	39	2	13	<1.8	25	18.14	2.00	350.00	
		3	Sheridan	9.8	62.4	no data	40.2	<1.8	7.8	4.5	24	2	<1.8	33	7.8	13.01	2.00	62.40	
		4	Tribal	74.8	16.1	no data	7.3	<1.8	13	4.5	11	2	2	4	49	9.22	2.00	74.80	
		5	Secret Beach	26.5	8.6	no data	35.5	<1.8	21	240	170	<1.8	<1.8	>16,000	2	28.11	2.00	240.00	
		6	Malipien	9.8	27.2	no data	3.1	<1.8	<1.8	27	540	<1.8	<1.8	<1.8	13	23.22	3.10	540.00	
		7	Camingay (CPS)	1	3.1	no data	5.2	<1.8	4.5	2	<1.8	22	49	1.8	34	5.97	1.00	49.00	
		8	Underground river docking area	14.6	17.3	no data	12.8	<1.8	220	350	34	49	6.8	94	240	47.90	6.80	350.00	
			Overall	11.61	19.42	no data	11.18	8.30	20.25	22.44	69.35	6.13	7.04	12.22	21.36	16.84	6.13	69.35	

3. Minutes of Public Hearing

MINUTES OF MEETING
Public Hearing on Waterbody Classification of St. Paul Bay

Date: March 10, 2022

Starting Time: 0940H

Venue: Barangay Hall of Brgy. Cabayugan, Puerto Princesa, Palawan

Attendance: Mercedita B. Almorfe, Samantha Margarita Q. Danganan, Swin R. Tanduyan, Kier Ceasar L. Dela Cruz, Peter G. Abobot, Brgy. Officials of Cabayugan, Officers of the Community-Based Tourism (CBST), DepEd teachers, and some residents.

Agenda: Classification of Water Body on the Surrounding Waters of St. Paul Bay

I. Opening Prayer was led by Ms. Brigida C. Moyano, member of the Community Based Sustainable Tourism (CBST) assigned in Mangrove Development.

II. Opening Remarks by Brgy. Counselor Feliberto Cañedo.

III. Brief Introduction on Waterbody Classification conducted by For. Mercedita Almorfe

- Importance and Objective of Classification/Re-classification of Waterbody.
- Process of the Classification
- General Provisions of Water Classification
- DAO 2016-08: Water Quality Guidelines and General Effluent Standards of 2016

IV. Presentation of Results from the Water Sampling Conducted on St. Paul Bay

- Present the laboratory result from all monitoring stations for each parameter such as pH, Fecal Coliform Concentration, Phosphates, Dissolved Oxygen, Total Suspended Solids, and other more.
- It was also presented the factor limit for each classification to further distinguish the applicable classification for the results presented.
- Showing that as of January 2022, one hundred two (102) water bodies in the MIMAROPA region are officially classified.

V. Discussion

- EMB proposed to designate a Classification "SB" on St. Paul Bay based on the result of water sampling.

- Discussed the intended beneficial used of Classification SB which is appropriate in the community, and the purpose to maintain and improve the current water quality.
- Asked current activities, industries, and establishment located in the coastal area.
- A barangay official asked if the acquired results were affected by Typhoon Rai (Odette PH) devastation in Palawan.
- All participants including local officials agreed on the proposed classification "SB" of St. Paul Bay and in all monitoring stations.

VI. End of Public Hearing

- Provision of Snacks on the Attendees and Photo Documentations.

End Time: 1040H

Prepared by:

SAMANTHA MARGARITA Q. DANGANAN
PPMO

SWIN R. TANDUYAN
Planning / EMED Staff

Pictures Taken March 10, 2022

4. Attendance Sheet of Public Hearing

Department of Environment and Natural Resources
Environmental Management Bureau
MIMAROPA Region

June 10, 2022
09:40 AM

SOCOTEC ISO 9001:2015

PUBLIC CONSULTATION ON WATERBODY CLASSIFICATION OF ST. PAUL'S BAY

NO.	NAME	ADDRESS	OFFICE/POSITION	GENDER	CONTACT NUMBER	SIGNATURE
	SHIELA MAE B. NOLLAN	BGY. CABAYUGAN PPC	CABAYUGAN ELEM. SCHOOL	F	0968-618-8628	
	MARIA FATIMA V. DABLER	BGY. CABAYUGAN P.P.C	CABAYUGAN ELEM. SCHOOL	F	09127592266	
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	KIER CESAR L. DELACRUZ	BGY. STA. MONICA	DENR-EMB ENMO	M	09481500808	
	ISABELO E. CONDE	BGY. STA. MONICA	DRIVER	M	09360137299	
	PETER ABOBOT	BGY. TANGLAW, PPC	EMB - PALAWAN	M	09121457889	
	MERCEDITA ALMORFE	BGY. SICSICAN, PPC	EMB - PALAWAN	F		
	Analyn L Dadores	Brg Cabayugan Jabang		F	09506859222	
	Khimberly G. Percho	Sta. Monica	EMB/ChemTech I	F	09858820852	
	DANIEL JOHN G. ZABALA	STA. MONICA	EMB/LAB AIDE	M	09775575736	

Department of Environment and Natural Resources
Environmental Management Bureau
MIMAROPA Region

SOCOTEC ISO 9001:2015

March 10, 2023
09:40 am

PUBLIC CONSULTATION ON WATERBODY CLASSIFICATION OF ST. PAUL'S BAY

NO.	NAME	ADDRESS	OFFICE/POSITION	GENDER	CONTACT NUMBER	SIGNATURE
	Brigida C. Mayano	Bgy Cabayugan PPC	Mangrove Tour	F.	09951243929	BMayano
	ELGIN P. LAMASAN	Bgy. Cabayugan PPC	KAGAWAD	M	09679444633	
	REYNALDO C. DADORES	BGY. CABAYUGAN PPC	KAGAWAD	M	09059606514	
	Marissa A. Serna	Bgy. Cabayugan PPC	SSMPC	F	09675475999	
	Angelita F. Daforca	Bgy. Cabayugan PPC	SSMPC	F.	09266022416	Angelita
	Richyl R. Pinces	Bgy. Cabayogan PPC	~~SSMPC~~ Sabwell Ass.	F	09651977837	
	Salvacion B. apid	Bgy cabayogan P.PC.	Sabwell Ass	F	09659075219	
	Ma. Nelen Q. Veneracion	Brgy. Cabayogan PPC	Sabwell Ass.	F	09958517781	
	Celistino A. Santander	" Cabayugan PPC	President Sabang Mangrove	M	09356893919	
	ROBBIN REBECCA C. LISONDRO	BRGY. SANTA MONICA	CHEMIST	F	09088561993	

Department of Environment and Natural Resources
Environmental Management Bureau
MIMAROPA Region

SOCOTEC ISO 9001:2015

March 17, 2022
09:40 am

PUBLIC CONSULTATION ON WATERBODY CLASSIFICATION OF ST. PAUL'S BAY

NO.	NAME	ADDRESS	OFFICE/POSITION	GENDER	CONTACT NUMBER	SIGNATURE
	RENEL G RELOVA	TAGNIPA CARAYUGAN		LALAKI	09555325513	
	Aihan G. Banita	manturon		babae		
	Jessa T. Morte	So. Sngod- 1	BHW	Female	09354043166	
	Roman + Billones	So. Dalampratagan 1	Maintenances	Male	09354124347	
	Andrea A Cupin	So. Sngod-1				
	Rey B. Catalan	So. SABANG		LALAKI		
	ALICE R. DAGOHOY	So. MANTURON	BCWPC	Babae	09066910358	
	ALBERTO M. CAÑEDO	PAG-ASA	P/K	M	09053551231	
	Olivia E Tacob	So. Sabang		Babae	09363131323	
	ARMANDO G. CALINOG	11 11	TANOD	M	0905-6472423	

Department of Environment and Natural Resources
Environmental Management Bureau
MIMAROPA Region

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PUBLIC CONSULTATION ON WATERBODY CLASSIFICATION OF ST. PAUL'S BAY

NO.	NAME	ADDRESS	OFFICE/POSITION	GENDER	CONTACT NUMBER	SIGNATURE
	Jeffrey G. Pallaya	Sta. Monica	DENR-EMB MIS STAFF	M	09306236564	
	Gina Lodonia	Sta. monica	PMED	F	09562956638	
	Bianca Roldan	Manila	EMB MIMAROPA	F	09954274037	
	[illegible]	Sta- monica	chief, PEMD	F	09273710715	
	Jasmin Cuils	manila	EMB-MIMAROPA	F	09165452479	
	Oliver C. Barrettos	"	EMS II	M	09173064370	
	Marilyn C. Bonalde	Sta. Monica	[illegible]	F		
	Tracy Joy Monserate	"	Admin. & Financial Officer	F	09351933579	
	Phebe Anne Fortillas	Sta. Monica	DENR- EMB	F	09079953581	
	Mary Rose Viscara	San Jose	DENR-EMB	F	09675945513	