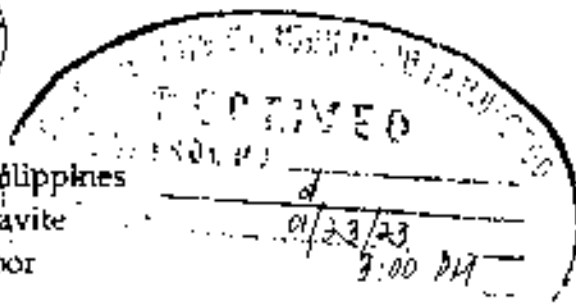




Republic of the Philippines  
 Province of Cavite  
 City of Bacoor



**5<sup>th</sup> SANGGUNIANG PANLUNGSOD**

COMMITTEE/S		TITLE OF PROPOSED MEASURE	CONTROL NUMBER
Committee on Environment and Natural Resources		A RESOLUTION ENDORSING THE SCIENTIFIC STUDY COMMISSIONED BY DIAMOND EXPORT CORPORATION FOR THE CONSIDERATION OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES-BIODIVERSITY MANAGEMENT BUREAU (DENR-BMB) ON THE POSSIBLE IMPACT OF THE PROPOSED THREE-KILOMETER BUFFER ZONE FOR THE LAS PIÑAS-PARAÑAQUE CRITICAL HABITAT AND ECOTOURISM AREA (LPPCHEA) TO THE RECLAMATION PROJECTS OF THE CITY OF BACOR, CAVITE	PCR 116-2022
VENUE	Sangguniang Panlungsod Session Hall		DATE/TIME October 10, 2022/ 1:00 PM

**COMMITTEE REPORT  
 NO. ENR 005-S-2022**

The 15<sup>th</sup> Regular Session of the 5<sup>th</sup> Sangguniang Panlungsod of the City of Bacoor, Cavite. The Committee on Environment and Natural Resources Chairman Hon. Levy M. Tela To endorse the scientific study commissioned by the Diamond Export Corporation for the consideration of the Department of Environment and Natural Resources (DENR) Biodiversity Management Bureau (BMB) on the potential impact of the creation of a three-kilometer buffer zone for the Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) to the reclamation projects of the Bacoor City Government

**RECOMENDATION:**

The reclamation projects of the City of Bacoor will have no adverse effect on the environment and on LPPCHEA. The Committee respectfully recommends for this subject matter and seconded by the members present to be **APPROVED**.

**WE HEREBY CERTIFY** that the contents of the foregoing report are true and correct.



Republic of the Philippines  
Province of Cavite  
City of Bacoor

**5<sup>th</sup> SANGGUNIANG PANLUNGSOD**

Signed this 23<sup>rd</sup> day of January, 2023, at the City of Bacoor, Cavite

*Committee on Environment and Natural Resources*

  
**HON. LEVY M. TELA**  
Chairman

  
**HON. REYNALDO M. FABIAN**  
Vice-Chairman

  
**HON. REYNALDO D. PALABRICA**  
Member

  
**HON. ADRIELITO G. GAWARAN**  
Member



Republic of the Philippines  
Province of Cavite  
City of Bacoor

Handwritten notes and stamps: "01/23/23" and "9:00 PM".


**5<sup>th</sup> SANGGUNIANG PANLUNGSOD**


COMMITTEE/S	TITLE OF PROPOSED MEASURE	CONTROL NUMBER
Committee on Environment and Natural Resources	A RESOLUTION ENDORSING THE SCIENTIFIC STUDY COMMISSIONED BY DIAMOND EXPORT CORPORATION FOR THE CONSIDERATION OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES-BIODIVERSITY MANAGEMENT BUREAU (DENR-BMB) ON THE POSSIBLE IMPACT OF THE PROPOSED THREE-KILOMETER BUFFER ZONE FOR THE LAS PIÑAS-PARAÑAQUE CRITICAL HABITAT AND ECOTOURISM AREA (LPPCHEA) TO THE RECLAMATION PROJECTS OF THE CITY OF BACOOR, CAVITE	PCR 116-2022
VENUE Sangguniang Panlungsod Session Hall		DATE/TIME October 10, 2022/ 1:00 PM

**MINUTES OF COMMITTEE HEARING  
NO. ENR 005-S-2022**

The Regular Session started at 1:00 PM. The Presiding Officer Vice Mayor Hon. Rowena Bautista-Mendiola referred the subject matter to Hon. Levy M. Tela Chairman on Committee on Environment and Natural Resources. Hon. Tela said the Bacoor City Government learned that the DENR's Biodiversity Management Bureau (DENR-BMB) is currently contemplating the creation of a Three-kilometer buffer zone at the Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA). The reclamation projects of the City of Bacoor will have no adverse effect on the environment and on LPPCHEA.

Hon. Tela moved for the approval of the said Resolution and was unanimously seconded by all the members present.

Prepared by:  
  
**ELENA B. SOMBRANO**  
Clerk

Attested by:  
  
**HON. LEVY M. TELA**  
Chairman



PCR 118-2022 A RESOLUTION ENDORSING THE SCIENTIFIC STUDY COMMISSIONED BY DIAMOND EXPORT CORPORATION FOR THE CONSIDERATION OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES-BIODIVERSITY MANAGEMENT BUREAU (DENR-BMB) ON THE POSSIBLE IMPACT OF THE PROPOSED THREE-KILOMETER BUFFER ZONE FOR THE LAS PIÑAS-PARAÑAQUE CRITICAL HABITAT AND ECOTOURISM AREA (LPPCHEA) TO THE RECLAMATION PROJECTS OF THE CITY OF BACCOOR, CAVITE.



Republic of the Philippines  
Province of Cavite

**CITY OF BACCOOR**

*Office of the Mayor*

October 5, 2022

**HON. ROWENA BAUTISTA-MENDIOLA**  
Vice Mayor, City of Bacoor  
Bacoor Government Center  
Bacoor City, Cavite



**THRU:** Atty. Khalid Atega, Jr.  
Sangguniang Pangungod Secretary

**SUBJECT:** Endorsement Letter

Dear Hon. Bautista-Mendiola,

I hereby endorse to your good office the letter, dated October 5, 2022, by Engr. Augusto Natividad, President of Diamond Export Corporation, concerning its request for support endorsing Diamond Export Corporation's study to the DENR-EMB to be considered in the discussion for the determination of a buffer zone for LPPCHEA.

Attached herewith is the abovementioned letter, together with its attachments, for your immediate reference.

In this regard, I am requesting your good office and the members of the Sangguniang Pangungod to take the necessary action regarding this matter.

Respectfully yours,

  
**STRIKE B. REVILLA**  
City Mayor





**CITY RESOLUTION NO.**  
Series of 2022

**A RESOLUTION ENDORSING THE SCIENTIFIC STUDY COMMISSIONED BY DIAMOND EXPORT CORPORATION FOR THE CONSIDERATION OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES-BIODIVERSITY MANAGEMENT BUREAU (DENR-BMB) ON THE POSSIBLE IMPACT OF THE PROPOSED THREE-KILOMETER BUFFER ZONE FOR THE LAS PINAS-PARAÑAQUE CRITICAL HABITAT AND ECOTOURISM AREA (LPPCHEA) TO THE RECLAMATION PROJECTS OF THE CITY OF BACOR, CAVITE.**

Sponsored by:

**Hon. Levy M. Tala**  
(Chairperson, Committee on Environment and Natural Resources)

Co Sponsored by:

(ALL)

**WHEREAS**, the local government of the City of Bacoor, Cavite is presently embarking on two reclamation projects along Bacoor Bay, namely, the 230-hectare Bacoor Reclamation and Development Project and the 100-hectare Diamond Reclamation and Development Project.

**WHEREAS**, both projects were approved the Philippine Reclamation Authority (PRA) and have been issued with the requisite Environmental Clearance Certificate (ECC) by the Department of Environment and Natural Resources' (DENR) Environment Management Bureau (EMB);

**WHEREAS**, the Bacoor City Government learned that the DENR's Biodiversity Management Bureau (DENR BMB) is currently contemplating the creation of a three kilometer buffer zone at the Las Pinas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA)

**WHEREAS**, Diamond Export Corporation — the joint venture partner of the Bacoor City Government in the Diamond Reclamation and Development Project -- commissioned a scientific study on the possible impact of the creation of the LPPCHEA buffer zone on the reclamation projects mentioned above and submitted the same to the Office of the City Mayor. The said study shows that the reclamation projects of the City of Bacoor will have no adverse effect on the environment and on LPPCHEA. A copy of the said study is attached hereto as Annex "A" and is made an integral part hereof.

**WHEREAS**, the City Mayor informed the Sangguniang Panlungsod about the aforementioned developments and requested the latter to pass a resolution endorsing the said scientific study for the consideration of the DENR BMB.

**WHEREAS**, the Sangguniang Panlungsod deliberated on the City Mayor's request and unanimously decided to approve the same.

**NOW THEREFORE**, upon motion of Hon. Levy M. Tala unanimously seconded by the rest of the Body, **BE IT RESOLVED AS IT IS HEREBY RESOLVED** to endorse the scientific study commissioned by the Diamond Export Corporation for the consideration of the Department of Environment and Natural Resources' (DENR) Biodiversity Management Bureau (BMB) on the potential impact of the creation of a three-kilometer buffer zone for the Las Pinas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) in the reclamation projects of the Bacoor City Government.



**RESOLVED LASTLY**, to furnish the Office of Congresswoman Lani Mercado-Revilla, the Office of the City Mayor, the DENR-BMB, the Diamond Export Corporation, the University of the Philippines-Office of the National Administrative Register (UNAR), and other governmental agencies concerned with copies of this Resolution.

**APPROVED** this ... day of October 2022 at the City of Bacor, Cavite

I hereby certify that the foregoing Resolution was duly approved by the 5<sup>th</sup> Sangguniang Panglungsod of the City of Bacor, Cavite in accordance with law

Certified by,

**HON. ROWENA BAUTISTA-MENDIOLA**  
*City Vice Mayor/Presiding Officer*

Attested by

**ATTY. KHALID A. ATEGA JR.**  
*Sangguniang Panglungsod Secretary*

Approved by

**HON. STRIKE B. REVILLA**  
*City Mayor*  
Date of Approval \_\_\_\_\_



## DIAMOND EXPORT CORPORATION

101 NORTH BAY BOULEVARD ANKONGAS METRO MANILA - 400 PHILIPPINES  
TEL NO'S 281-2708 (IN) 0917-1111 (INT'L) 281-3140

October 5, 2022

Hon. Strike B. Revilla  
Mayor  
City of Bacoor

Dear Mayor Strike

We write with urgency in relation to our joint venture project for the 230 has Bacoor Reclamation and Development Project and the 100 has Diamond Reclamation and Development Project ("Bacoor Reclamation Projects")

We received information that the Department of Environment and Natural Resources-Biodiversity Management Bureau ("DENR-BMB") is in discussion for a possible 3km buffer zone for LPPCHEA.

We have undertaken studies regarding this subject and based on expert advice and opinions, the Bacoor Reclamation Projects do not impact the protected area. We attach herewith the results of the studies conducted by our foreign consultants.

We seek the support of the City of Bacoor as our reclamation partner through a Sanggunian Resolution endorsing our study to the DENR-BMB to be considered in their discussion for the determination of a buffer zone for LPPCHEA.

We also seek your endorsement for the LGU of Bacoor to be officially invited in these discussions as it affects our projects and other developments of the city.

Should you need our team to present the attached studies further, we are ready at your convenience.

Thank you

Engr. Augusto C. Natividad  
President  
Diamond Export Corporation



### Buffer Zone Determination Study for Las Piñas-Paranaque Critical Habitat and Ecotourism Area (LPPCHEA)

The Diamond Reclamation & Development Project and the Bacoor Reclamation & Development Project (collectively, the "Projects") are economic development projects being developed by the LGU of Bacoor in collaboration with its private partners, Diamond Export Corporation and Friselle Foods Corporation, respectively. Both Projects are situated within the legal boundaries of Bacoor Bay and have been subjected by the Bacoor LGU and its private partners to extensive technical and scientific studies to ascertain the best location and landform that will meet its development goals without making any negative impact to the environment.

We respectfully submit the results of these studies to the Department of Environment and Natural Resources ("DENR") in order to assist the agency in determining the appropriate buffer zone for the Las Piñas-Paranaque Critical Habitat and Ecotourism Area ("LPPCHEA"). The succeeding sections of this document summarize the various studies undertaken in relation to the Projects, which collectively indicate that the Projects have no adverse impact on the environment, including LPPCHEA. Specifically, we find that:

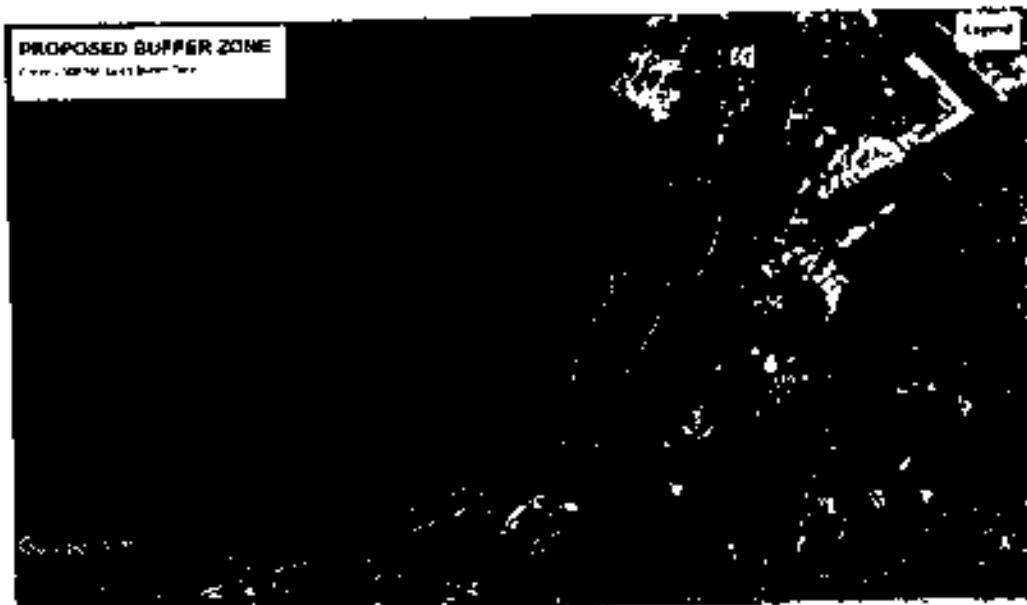
- the Projects have no flooding impact on both adjacent communities and LPPCHEA
- On water circulation in the area of the land reclamation will force the currents to run alongside the western and northern part of the land reclamation, and not towards LPPCHEA.
- The results of oceanographic modeling indicate that the currents are in the direction away from the LPPCHEA. This signifies that in an event of accidental spills of oil or wastewater these pollutants will not reach the LPPCHEA.
- On particle transport modeling. At the LPPCHEA it is, based on the model results, very unlikely that sediments will be transported from a spill to the mangrove areas. The tidal current pattern transports the suspended sediment towards the Cavite spit and will not give any impact at LPPCHEA.
- No impacts are expected for Zapote river, Las Piñas river, and Las Piñas-Paranaque Critical Habitat to the east of the project, and Imus river and west Bacoor Bay to the west of the project.
- On sediment dispersion. The maximum concentration of suspended sediment during the simulation period shows the following:
  - o Particle concentrations of more than 2 mg/l will be confined within an area of approx. 2 km westwards and 2.5 km northwards of the discharge source.
  - o Concentration of suspended particles are much less than 2 mg/l (visible limit) at LPPCHEA.
- LPPCHEA will benefit from the relocation efforts of the Bacoor LGU to clean up Bacoor Bay with the assistance of the private proponent. The relocation of informal settlers along the coastline of Bacoor Bay will help reduce pollutants such as solid waste, plastics, chemicals like detergents, soaps, kerosene, and the like. The relocation of informal settlers will address pollution issues in the area and improve water quality.
- on biodiversity, results show:
  - o no effects on the food supply for the birds
  - o no disturbance of the habitats, including the mangroves
  - o no deterioration of the water quality within the bird sanctuaries
  - o no direct damage to the avian population which may result from accidents during travel of sea vessels.

As such, the results of these studies suggest the Projects' location is far enough from LPPCHEA and can therefore be outside the buffer zone being deliberated by the DENR. Specifically, these results indicate that a buffer of 500 hectares is sufficient and that projects outside this distance do not pose a threat to LPPCHEA.





Below is the suggested 500 hectares Buffer Zone around LPPCHEA in relation to our project



Below map shows the distance of our project in relation to LPPCHEA.

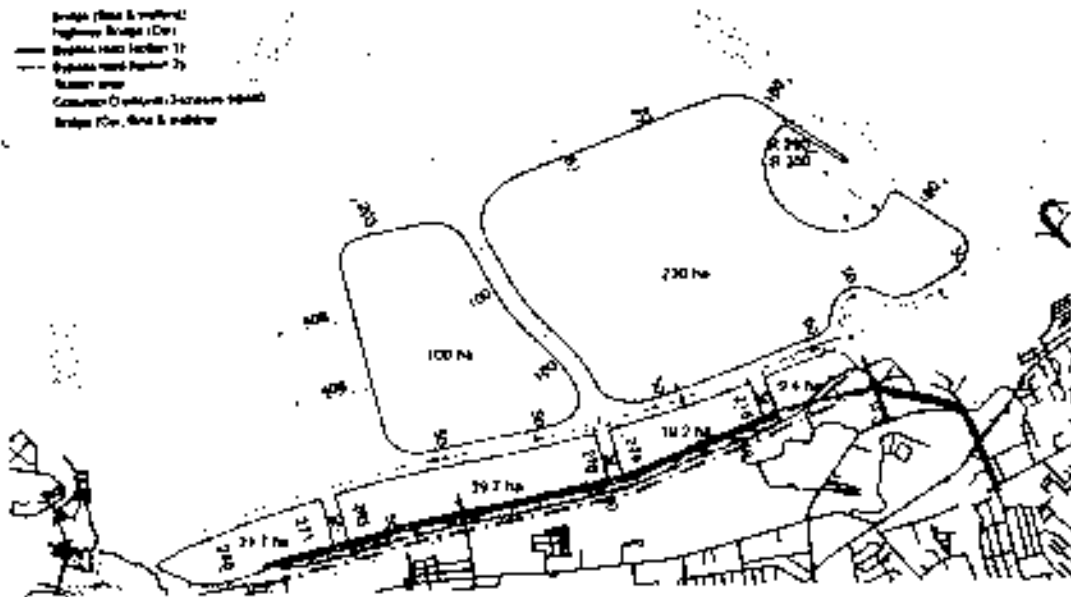




The reclamation project has sufficiently distanced from LPPCHEA and shall not cause significant impacts.



Furthermore, the configuration of these islands included mitigating measures that were done to ensure that it will not block the waterways and not contribute to flooding in the area.



The reclamation project will act as a shield for the surrounding coastal areas, and hence, will lessen the impact of natural hazards such as storm surge and tsunamis.

#### BUFFER ZONE

According to E-NIPAS ACT R.A. 110381, " ( c ) Buffer zones refer to identified areas outside the boundaries of and immediately adjacent to designated protected areas that need special development control in order to avoid or minimize harm to the protected area "

Under DENR DAO 2019-05 in relation to the Implementing Rules and Regulations (IRR) of the E-NIPAS Act of 2018, Rule 8.2 states that one or more of the following criteria may be used in the identification and designation of a buffer zone, Economic Criteria, Social Criteria and Ecological Criteria. Based on the characteristics and nature of the buffer zone setting, in this case, the Ecological Criteria qualifies as the basis to determine and designate a buffer zone.

Rule 8.1. One (1) or more of the following criteria may be used in the identification and designation of a buffer zone:

- Ecological criteria - the capability of the site to serve as an additional layer of protection, by extending habitats or corridors for wildlife, and other ecological services.
- Economic criteria - the capacity of the site to host enterprises or provide gainful employment, and sustainable sources of livelihood for local communities, to deflect pressure away from the protected area.
- Social criteria - the capacity of the site to provide a social fence, against the threat of encroachment by communities residing near or adjacent to the protected area.



Ecological Criteria is defined as "the capability of the site to serve as an additional layer of protection, by extending habitats or corridors for wildlife and other ecological services". The project does not affect the ecology of LPPCHEA and has no impact on the Social and Economic Criteria of the protected area. In fact, it is advantageous for the Project to preserve the LPPCHEA as it is an integral part of the planned development as an Eco-Tourism destination.

### Water Circulation Study

The Project's impact on water circulation was undertaken by Ramboll as part of our EIS, a leading engineering, design and consultancy company based in Denmark. Analysis was carried out using MIKE 21 HD, a state of the art software solution developed by DHI and is widely considered as the gold standard of water professionals around the world.

A summary of the analysis and results are as follows:

- Both High and Low tide seasons have been investigated
- Flow towards Ebb and towards Flood have been analyzed.
- Baseline case (existing situation) have been compared to the case with post-reclamation (land reclamation implemented)
- The results of oceanographic modeling indicate that the currents are in the direction away from the LPPCHEA. The total impact on the circulation in the area is deemed minimal when considering the magnitude of changes in current speeds.
- It can be concluded, therefore, that the reclamation projects will generally not impact negatively on the currents of the Bay. The change in the current patterns in the LPPCHEA area is insignificant.
- Current velocities are affected by the land reclamation as follows:
  - o Wind forcing and tidal forcing are applied to the hydrodynamic model.
  - o During High tide the current velocities are practically unaffected by the land reclamation in distances of more than 1 km from the reclamation and the change in current velocity is less than 5 cm/s in distances above 0.5 km.
  - o During Low tide the change in current velocity is less than 5 cm/s in distances above 1 km;
  - o In either case the change in current velocity caused by the land reclamation is less than 2.5-5 cm/s at the LPPCHEA which is located more than 1 km from the reclamation area.



HABAGAT

HABAGAT - towards flood

Baseline



Post



HABAGAT towards EBB

Baseline



Post





Habagat difference in current speed: compared to baseline

Flood



Ebb



AMIHAN

AMIHAN, Towards flood

Baseline



Post





## Particle Transport Modeling

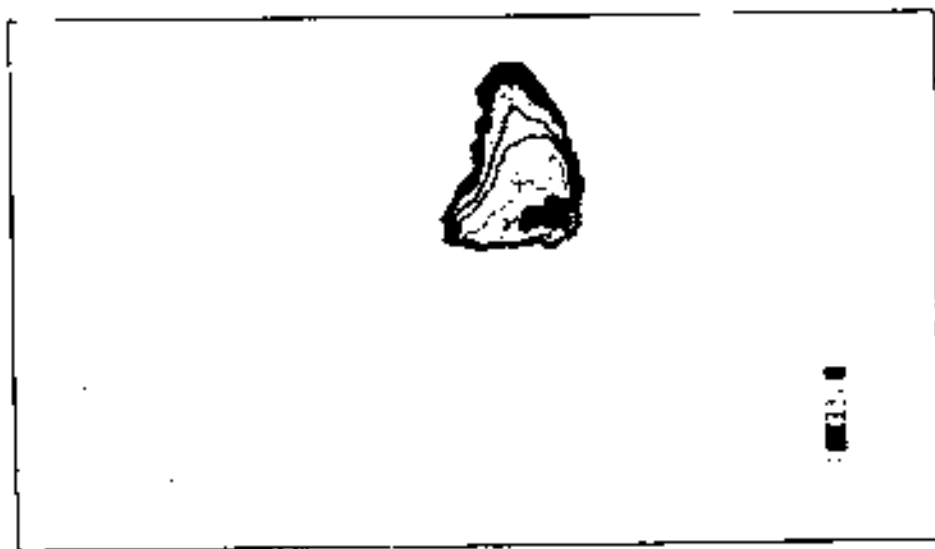
Ramboll also performed particle transport modelling using DHI's MIKE 3 software. Overall, it can be said that the sheltered nature of the project area minimizes the impact on the current pattern and consequently the sediment spill. Specifically, the results indicate that:

- Sediments with a grain size of 20.2 mm will settle close to the source and not be dispersed, whereas smaller grains with infinitesimal settling velocities are capable of being transported to Canacao Bay and Secor Bay and ultimately the greater part of Manila Bay.
- Simulations show that it is very unlikely that sediment dispersion originating from a sediment spill during the construction activities should reach LPPCHEA and the mangrove areas at LPPCHEA.
- Based on the model results, it is very unlikely that sediments will be transported from a spill to the mangrove areas.
- The current tidal pattern transports the suspended sediment towards the Cavite spit and will not give any impact at LPPCHEA.
- The areas east of the reclamation project are not expected to be impacted by a sediment spill during calm wind conditions when currents are tide-dominated.

## Sediment dispersion study

(particle transport modelling, using MIKE 3 HD and PT):

- A conservative construction case has been modeled. Land reclamation using rammed earth technique without any measures to mitigate the sediment dispersion.
- A 19 days period covering both spring tide and neap tide has been modeled.
- Constant sediment discharge with a constant sediment spill throughout the simulation period have been anticipated.
- A content of fines (corresponding to the spill) of 2% have been anticipated.
- The maximum concentration of suspended sediment during the simulation period shows the following:
  - Particle concentrations of more than 2 mg/l will be confined within an area of approx. 2 km westwards and 2.5 km northwards of the discharge source.
  - Concentration of suspended particles are much less than 2 mg/l (visible limit) at LPPCHEA.





- The sediment spill scenarios are modified for a period of 18 days, covering 14/12/2017 - 2/1/2018. It is given as concentrations relative to a reference concentration, so in principle it has no unit. The reference concentration is given as 1, and the concentrations are scalable, so if a sediment spill leads to an initial concentration of for example 10 mg/l, all concentrations in a figure should be multiplied with 10 mg/l to give the actual concentrations. This is because the discharge or spill of sediment is unknown in the sediment spill scenarios.
- Furthermore, DAO 2016-08 gives the guidelines for sediments in terms of Total Suspended Solids of 20 mg/l for Class SB marine waters.

#### Conclusions from Ramboll Report as part of the EIS.

Impact on water circulation from BACOUR project development	Ramboll has prepared modelling
Sediment dispersion during land reclamation works (SUTAP project development)	Ramboll has prepared modelling

## FLOODING

(Reference: DHI Hydraulic Study for Bacoor Bay, Final Report)

In addition to the studies undertaken by Ramboll, the Project's proponents also engaged DHI, which is the company that developed the MIKE software used by Ramboll and other engineering consultancies all over the world. DHI has over 50 years of dedicated research and real world experience, with 30 offices across the globe and projects in over 140 countries.

Two main flooding conditions were modeled in this study:

1. Inland flooding caused by extreme rainfall runoff
2. Coastal flooding caused by extreme storm (typhoon) surge

#### Parameters

1. Hydrodynamic Modelling used was the DHI Mike 2D Flexible Mesh flow mode. The model can be used to simulate a wide range of hydraulic and related items, including tidal exchange, currents and storm surges. The full extent of the model domain encompassing the whole Manila Bay is shown in Figure 2.1 with a mesh resolution ranging from 20m at the project site to 1000m at the boundaries.
2. Bathymetry data set applied in the project vicinity is the overall contour and spot elevation plan surveyed by EGS Asia Inc. as commissioned by Frabelle.
3. The area outside of the project site is extracted by bathymetry data from MIKE C-MAP, which provides access to digital nautical charts from Jeppesen Norway. All bathymetric data are in MSL (Mean Sea Level).
4. For the coastal flooding assessment, wind forcing was included in the simulations.
5. The flood impact assessment was based on numerical simulations assuming the worst-case scenario, when the highest astronomical tide (HAT) coincides with an extreme rainfall runoff event (100-year return period) or an extreme storm surge induced by typhoons.
6. The maximum water levels at the river mouths were compared between baseline (pre-development) and post-reclamation scenarios.





Table 2.1 Impact criteria based on changes in maximum water level due to development (adapted from Singapore studies)

Change in maximum water level	Flood impact due to proposed reclamation
Below 5 cm	No Impact
5 to 10 cm	Slight Impact

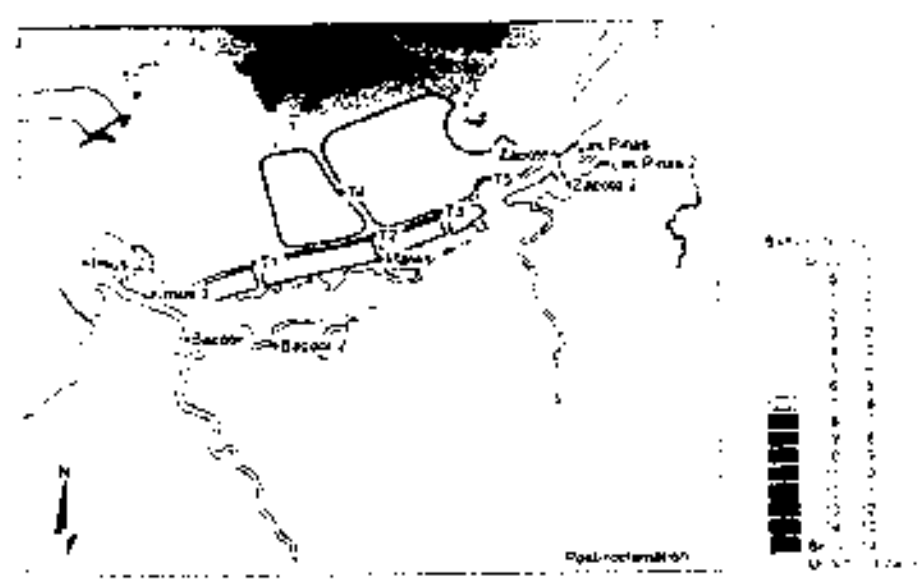


Figure 2.1. Gauging points at five reaches, two tributaries and channels, and the level impact assessment.

- The study shows the difference in maximum water level during hinterland flooding conditions, (where representing difference within + or - 1cm compared to baseline)
- The study shows the maximum water levels extracted at several locations in the LPPCHEA. Table shows incremental reduction in maximum water levels within 1 to 2 cm which is negligible and undetectable at the field
- The study shows that the Bacoor Reclamation, with or without the diversion channel, does not cause any increased risk of flooding at LPPCHEA during extreme hinterland and coastal flooding scenarios.
- During an extreme hinterland flooding scenario (HAT + extreme rainfall runoff 100-year return period), the proposed Bacoor reclamation as well as mitigation measures show negligible impact to flooding, based on changes in maximum water level.
- Incorporating Bacoor diversion channel with a discharge of 85-90 m<sup>3</sup>/s and even a hypothetical extreme discharge of 472.5 m<sup>3</sup>/s results in small variations in incremental changes up to 4 cm, which still falls under "no impact" category
- During an extreme coastal flooding scenario (HAT + Typhoon Nesat), the proposed Bacoor reclamation causes an increase in maximum water level of 4-5 cm, which falls in the border between "no impact" and "slight impact" category



- The proposed mitigation scenario reduces this potential increase in maximum water level to 3.4 cm, bringing it down to "no impact" category. This category remains the same whether the planned Bacoor diversion channel is included or not, as no change is shown in the incremental difference in maximum water level between these two scenarios.

### Evaluation [Typhoon Nesat]

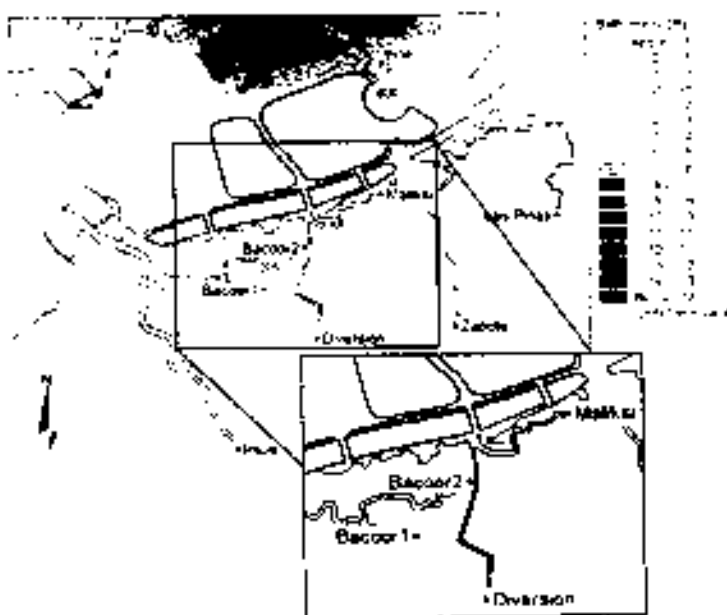
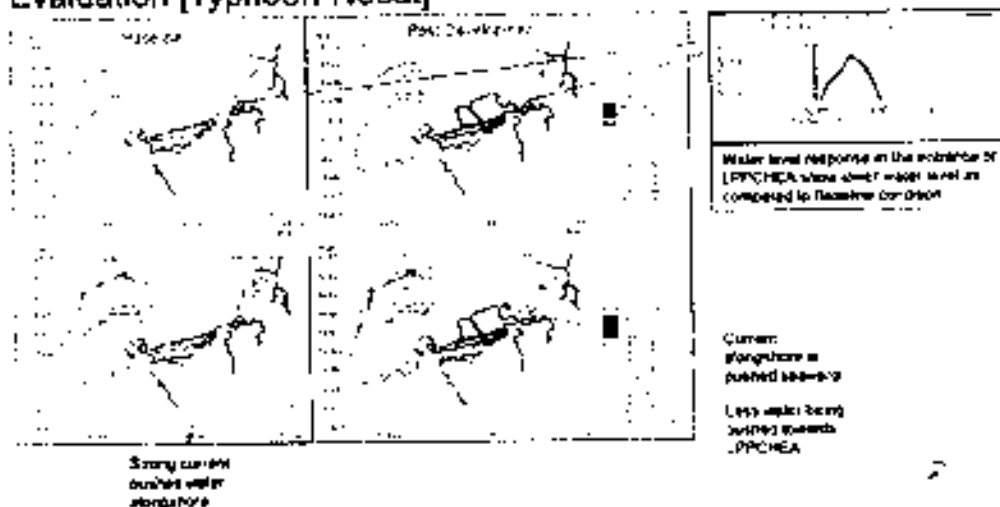


Figure 2 Bathymetry of Bacoor for the mitigation scenario. Contour interval is 1 meter. Values are in meters.



#### Watershed Flooding

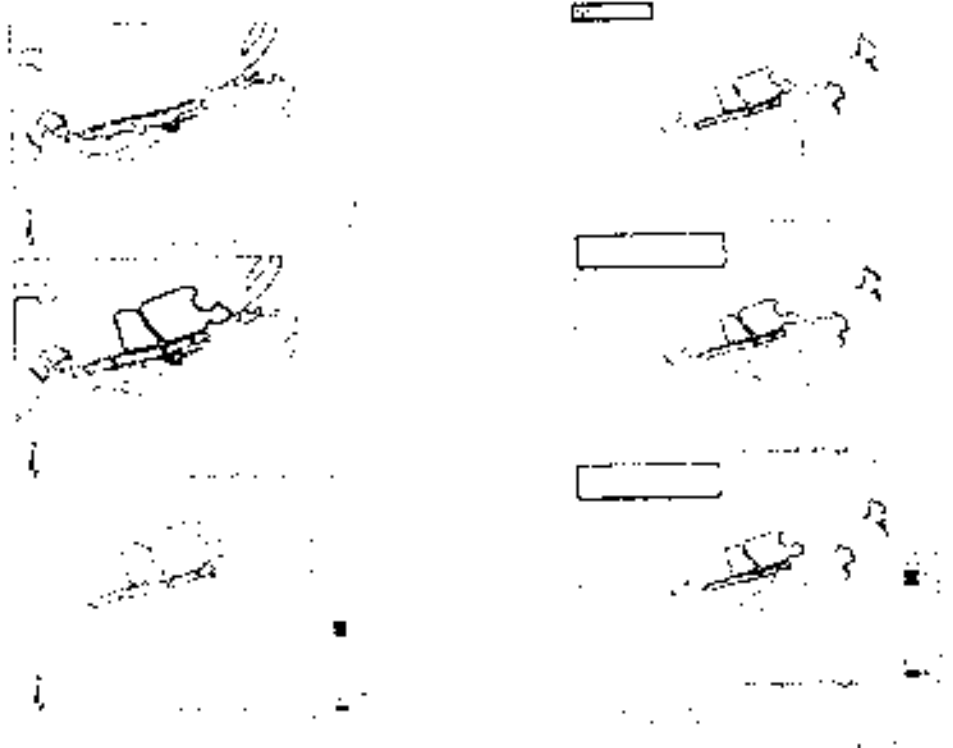
##### 1. Extreme runoff discharges

Table 3.2 shows the peak river discharges at upstream end of the river channels.

Table 3.2 Peak river discharges in m<sup>3</sup>/s applied at upstream end of river channels for hazard and flooding assessment

River	Without diversion channel	With diversion channel
Inus		472.5 (100-year event)
Bacoor 1	77.3 (100-year event based on (4))	11.4
Bacoor 2		11.4 (100-year event)
Makus/Talaba		19.8 (100-year event)
Zapote		410.0 (100-year event)
Las Pitas		183.0 (100-year event)
Diversion	0	85+60 (25-year pipe capacity), or 472.5 (hypothetical extreme discharge), see (3)

Figures show the water level during watershed flooding conditions (HAT + extreme runoff 100-year RP) for the 3 scenarios.



The Color White showing the difference water level to be Zero between baseline case and the post-reclamation scenario. Table 3.3 shows the incremental change in maximum water level due to the developments from baseline condition for highland flooding condition (HAT + extreme runoff 100-year RP), measured at the identified critical points  
Flood Impact Category: No Impact



Table 1.10: Change in maximum water level (m) due to development (with and without mitigation) for various locations

Location	Change in maximum water level (Development Base line, mMSL)				Flood Impact Category
	Post-reclamation	Mitigation without diversion	Mitigation Diversion 45% of inflow	Mitigation Diversion 47.5% of inflow	
Imog	-0.001	0.001	-0.001	-0.001	No Impact
Imog 2	-0.001	0.000	0.000	0.000	
Bacoor	-0.001	-0.001	-0.001	-0.001	
Bacoor 2	-0.001	-0.001	-0.001	-0.001	
Majuba	0.000	-0.001	0.000	0.000	
T1	-0.001	-0.001	-0.001	0.000	
T2	-0.001	-0.001	-0.001	-0.005	
T3	-0.001	-0.001	0.002	0.023	
T4	-0.001	-0.001	-0.002	-0.015	
T5	-0.003	-0.003	-0.002	-0.003	
Zapote	0.000	-0.002	0.002	-0.001	
Zapote 2	-0.002	-0.001	0.001	-0.001	
Las Pintas	-0.001	-0.001	-0.002	-0.000	
Las Pintas 2	-0.002	0.001	-0.001	-0.001	

#### Coastal Flooding - Extreme Storms

Storm surges together with tidal variations were captured in water level measurements from tidal stations. Historical typhoons that happened around the project area between 1964 and 2014, and the corresponding maximum residual water level recorded at Manila South Harbor, Typhoon Nesis-PEDRING (2011) tops the list. Typhoon Nesis-Pedring is considered the "worst case" coastal surge scenario.

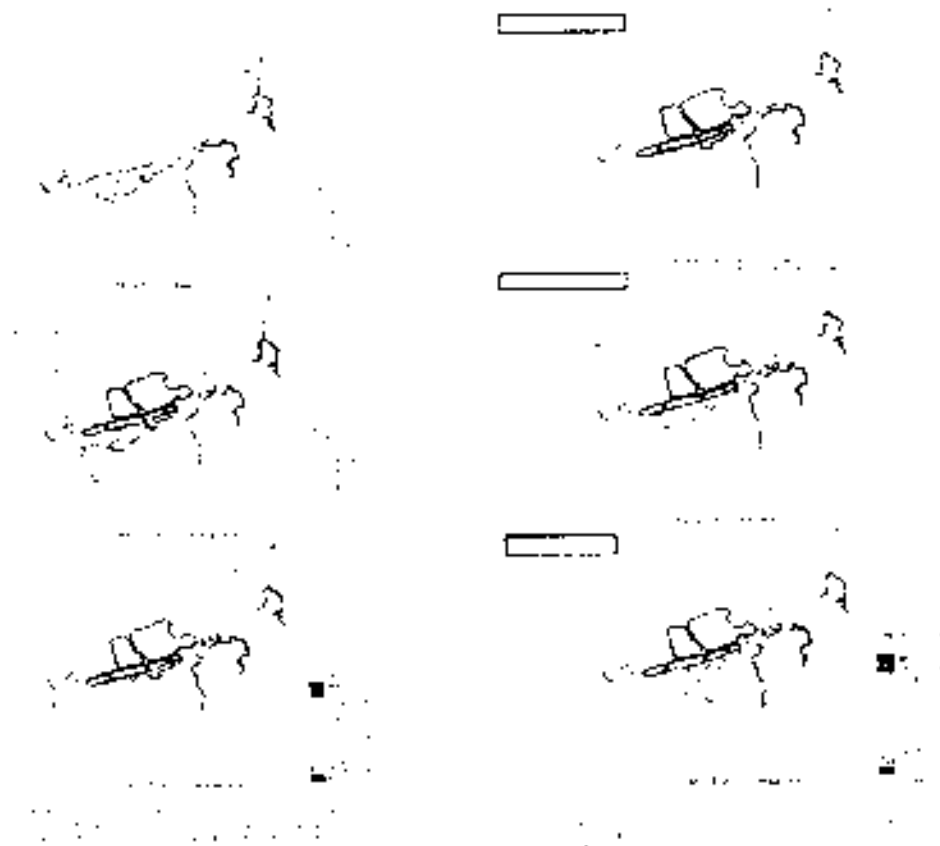


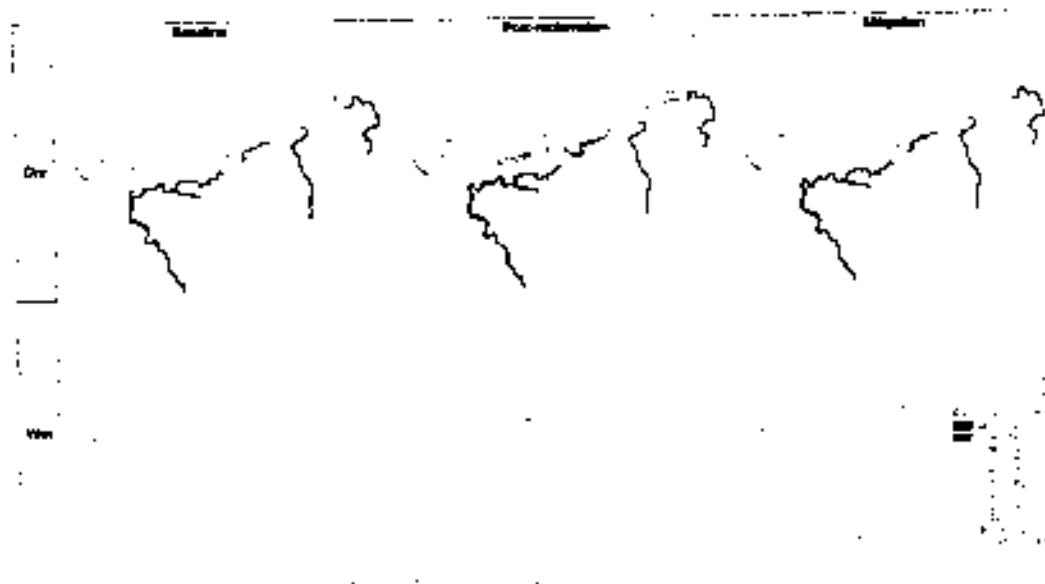
Table 3.7 shows the incremental change in maximum water level due to the developments from baseline condition on coastal flooding condition (HAT+typhoon Nesat) / Impact Category is No Impact.



Table 1.1.1. Change in maximum water level due to development of the project

Location	Change in maximum water level: Development-Base-line (MPSL)			Impact category
	Post-reclamation	Diversion without diversion	Diversion with diversion	
Imus	0.001	0.001	0.001	
Imus 2	0.007	0.006	0.006	
Bacoor	0.001	0.001	0.002	
Bacoor 2	0.002	0.007	0.002	
Makhu	-0.008	-0.001	-0.003	
T1	0.023	0.024	0.024	
T2	-0.006	-0.002	0.002	No Impact
T3	0.000	0.015	0.015	
T4	0.006	0.006	0.006	
T5	0.005	0.004	0.004	
Zapote	-0.015	-0.019	-0.020	
Zapote 2	-0.019	-0.020	-0.021	
Las Pinas	-0.020	-0.021	-0.021	
Las Pinas 2	-0.015	-0.015	-0.020	

## FLUSHING



### Modelling Approach



- Simulate flushing capacity using conservative tracer for baseline & post-reclamation

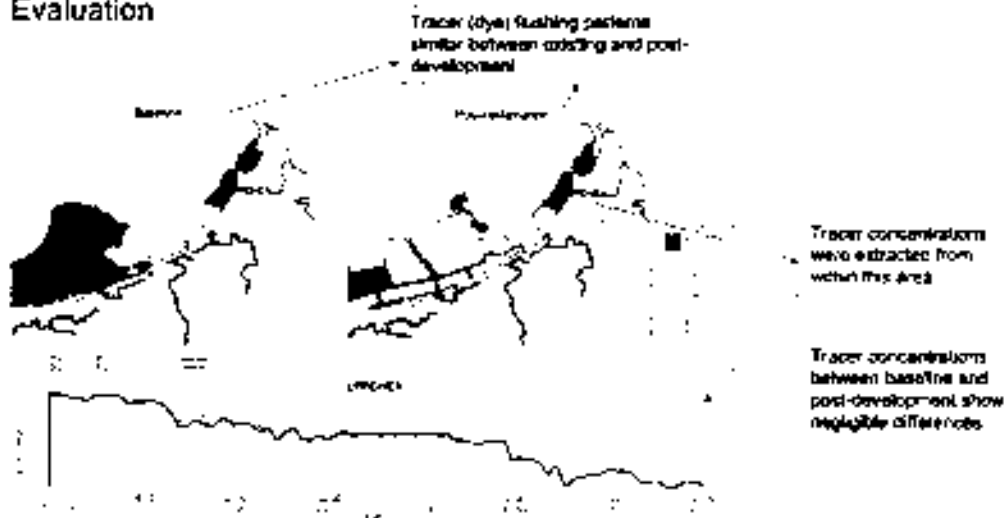
- One can imagine releasing colour dye in the water and see how the dye spreads

Dry season = tide + zero river discharge





## Evaluation

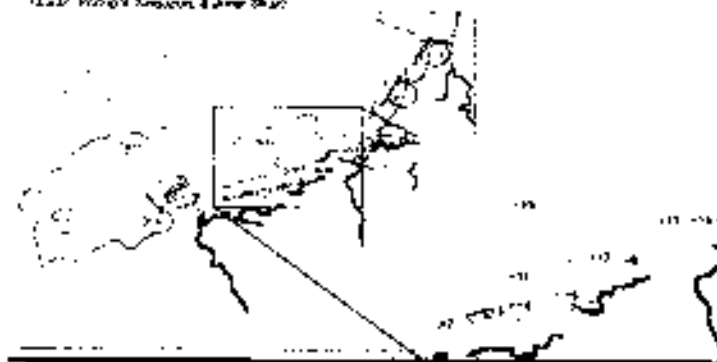


## Marine flushing criteria

Retention time to 10% of a 100% retention	Flushing capacity	Retention time to 50% of a 100% retention
Below 7 days	Very good	Very low
7 to 12 days	Good	Low
12 to 17 days	Moderate	Moderate
Above 17 days	Poor	High

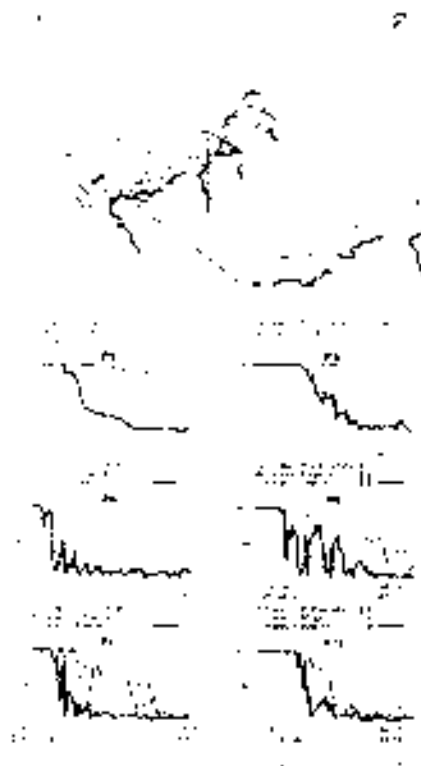
NOTE: Retention times were adapted from average conditions and shown (US Coast Guard, 2000, & Jettie 2002)

Point	Baseline	Post-Development
1	Good	Good
2	Good	Good
3	Good	Good
4	Good	Good
5	Good	Good
6	Good	Good
7	Good	Good
8	Good	Good
9	Good	Good
10	Good	Good
11	Good	Good
12	Good	Good
13	Good	Good
14	Good	Good
15	Good	Good
16	Good	Good
17	Good	Good
18	Good	Good



Flushing capacity outside Sacto reclamation project, primarily in not affected points, called in red have no change in flushing capacity for baseline, post-reclamation and mitigation

Figure 4.2 and Figure 4.3 shows the time series comparisons of tracer concentration between existing and post-development scenarios at several locations



Location	Season	Dry season			Wet season		Original
		Baseline	Post-Development	Baseline	Post-Development	Baseline	
1. Las Pifas	Bas	Poor	Poor	Poor	Poor	Very good	
2. Zapote	Bas	Poor	Poor	Poor	Poor	Poor	Very good
3. Las Pifas	Wet	Poor	Poor	Moderate	Moderate	Poor	Moderate
4. Zapote	Wet	Poor	Poor	Moderate	Good	Very good	Moderate
5. Las Pifas	Wet	Poor	Poor	Good	Very good	Very good	Moderate
6. Zapote	Wet	Moderate	Moderate	Good	Good	Poor	Very good
7. Las Pifas	Wet	Poor	Poor			Very good	
8. Zapote	Wet	Poor	Poor			Very good	
9. Las Pifas	Wet	Poor	Poor			Poor	
10. Zapote	Wet	Moderate	Good	Good	Good	Poor	Good
11. Las Pifas	Wet	Good	Good	Good	Good	Good	Moderate
12. Zapote	Wet	Poor	Poor	Good	Good	Good	Moderate
13. Las Pifas	Wet	Poor	Poor	Good	Good	Good	Moderate
14. Zapote	Wet	Poor	Poor	Good	Very good	Good	Good
15. Las Pifas	Wet	Poor	Poor			Very good	
16. Zapote	Wet	Poor	Poor			Very good	
17. Las Pifas	Wet	Poor	Poor			Very good	

Table 4.3 shows the resulting flushing capacity category at these locations

It shows no changes in category across the baseline and post-development conditions. During the dry season flushing capacity remains poor under both conditions and remains moderate during wet seasons. Flushing conditions in the protected wetland Las Pifas-Paranaque Critical Habitat are not affected by the Bacoor reclamation project.

**Conclusions from DHI Report**

Overall, the small variations in potential flooding and flushing capacity as a result of Bacoor reclamation project are considered as "no impact" and are very local. No impacts are expected for Zapote river, Las Pifas river, and Las Pifas-Paranaque Critical Habitat to the east of the project and Imus river and west Bacoor Bay to the west of the project.

## Evaluation

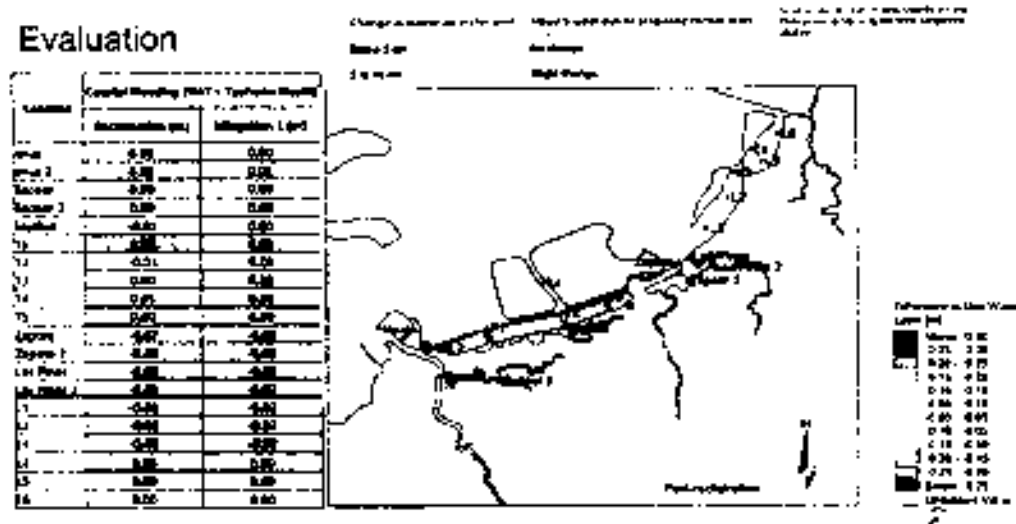


Figure 2.4 shows the areas where "localized flooding" occurs. The subject areas are titled privately-owned properties that are possible to be reconstructed / reclaimed in which case the localized flooding will disappear.

By: *[Signature]*

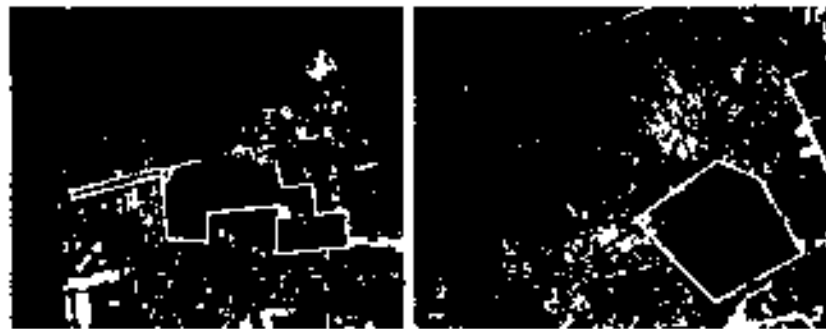


Figure 2.4. Representative sketch of pond located south of Area 11 and proposed ponds to allow water exchange in the post-flooding (Area 11 and 13) and south of Area 13 (right).



## **DPWH-JICA Bacoor River Improvement Project**

(Reference Feasibility Study of the Urgent Bacoor River Improvement Project in the province of Cavite)

In addition to the studies undertaken by the consultants hired by the Project's proponents, studies done by other government agencies relevant to the project area were also considered in order to ensure collaboration and coordination in this regard. Project's technical plans also considered the findings of DPWH and JICA in relation to the development of a river improvement project in Bacoor.

One of the primary objectives of the DPWH and JICA project is to determine an urgent river improvement for the urbanized area downstream from the Bacoor Retarding Basin.

Flood simulation was made in 3 steps, calculation of flood runoff from the sub-basins, flood routing along the rivers and flood inundation on the flood plains. The MIKE Flood software by DHI Water and Environment was used in combinations of Mike 11 for the river channels flow and Mike 21 for the flood plains flows.

Figures 4.3.4 and 4.3.7 from their study, showing simulated inundation Depths for present condition and with the proposed river improvement project which include the Bacoor River Diversion Channel respectively.

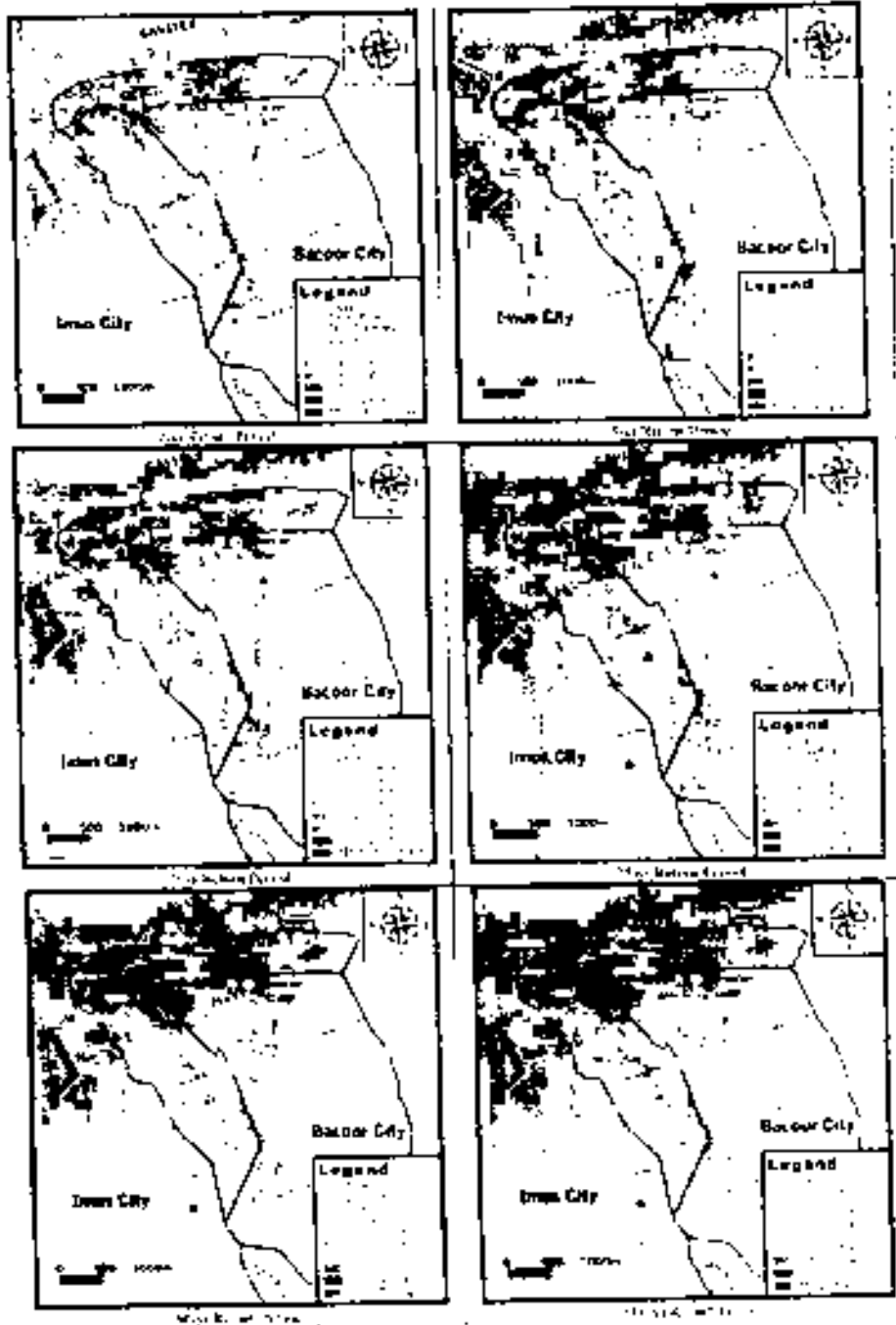


Figure 4.3.4 Simulated Foundation Depths for Present Condition (Case-1)

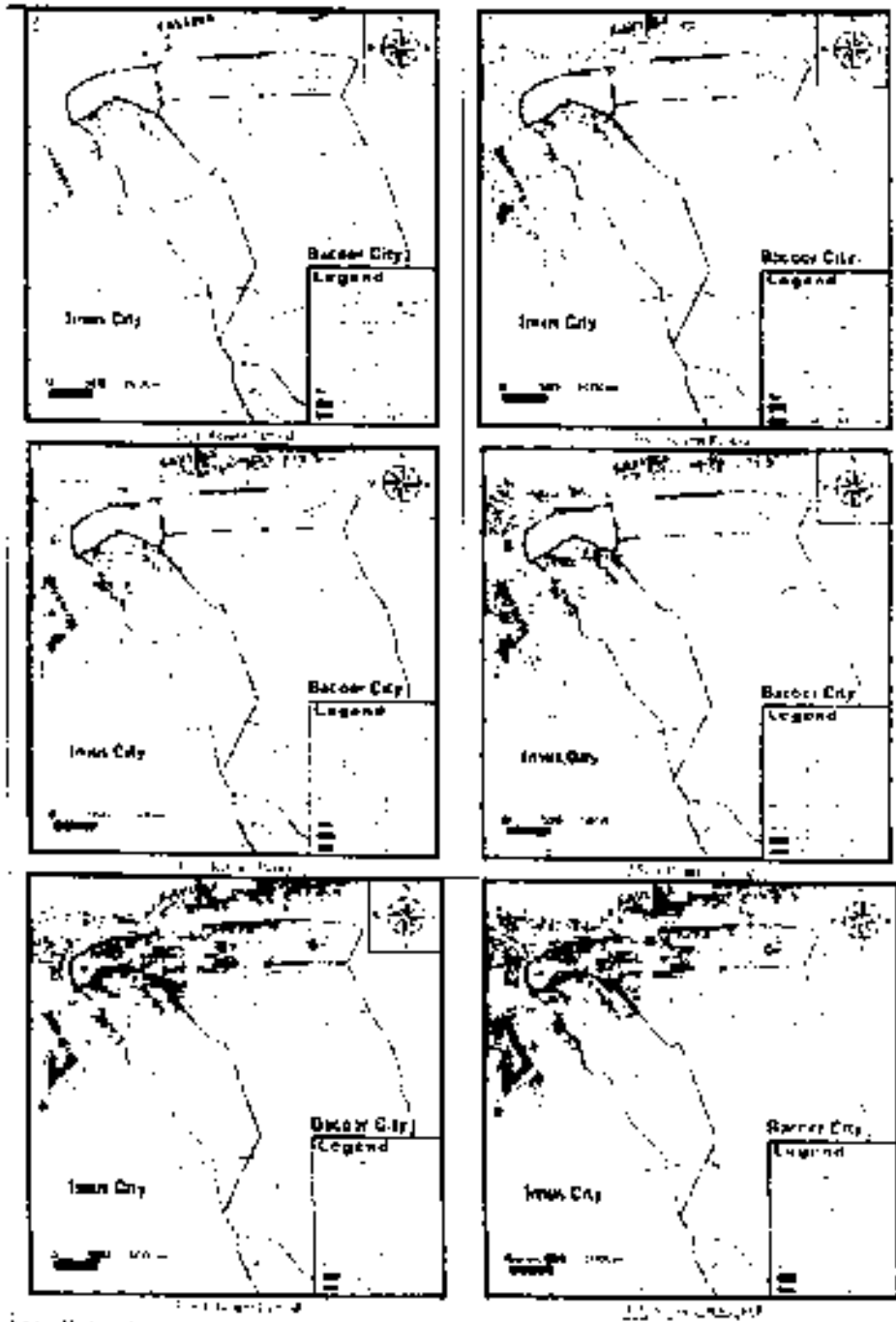


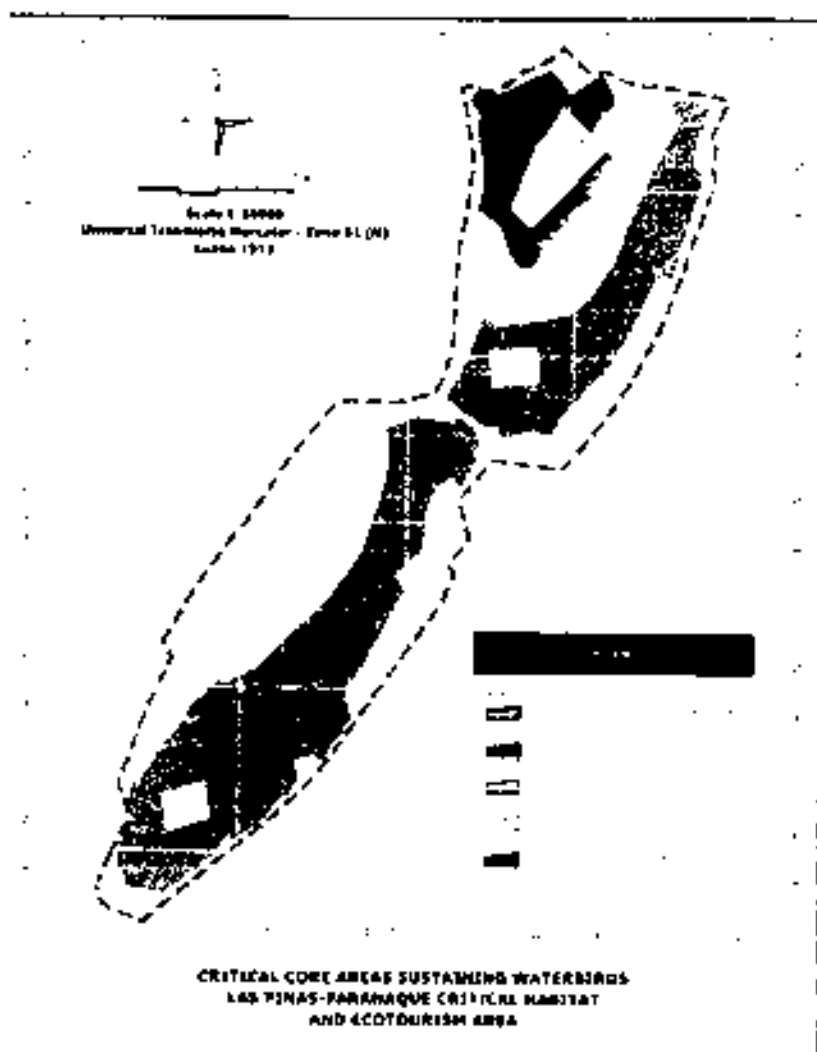
Figure 4.5. Simulated Inundation Depths with Proposed River Improvement Project (Case 4)

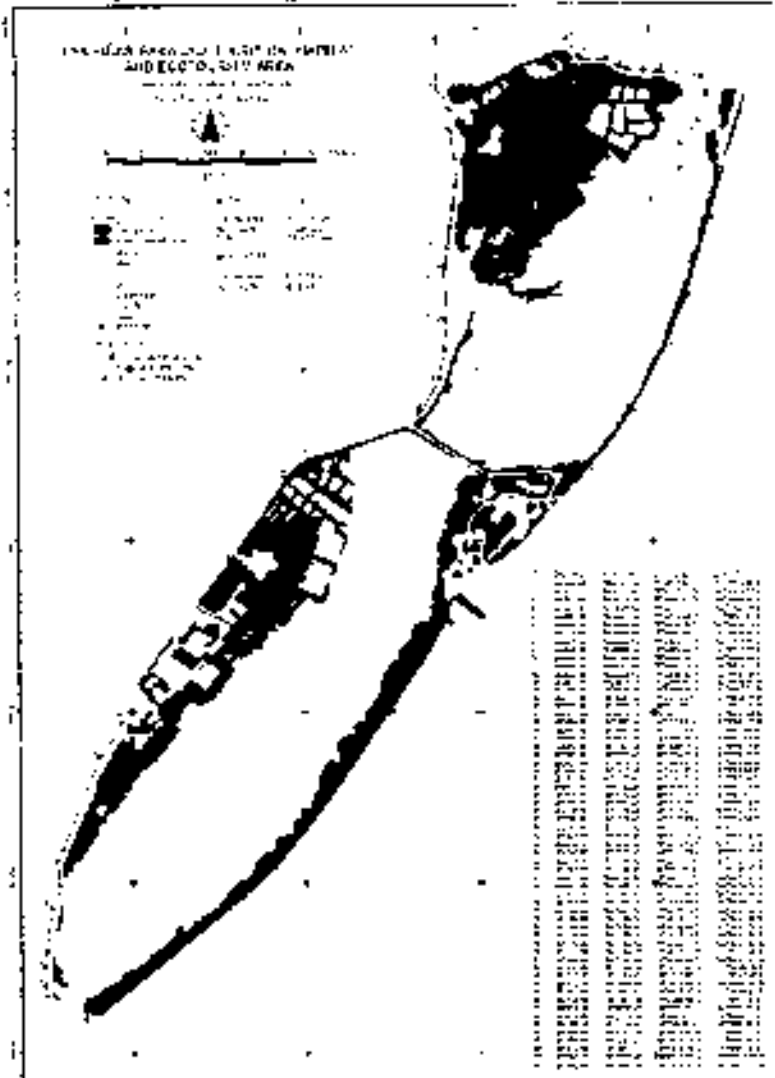


The Legend on the lower left showing water level for every specified return period shows how effective the proposed DPWH - JICA project is in addressing inland flooding. All plans and studies undertaken by the Bacor LGU have taken these into consideration and are supportive of the plans prepared by DPWH and JICA.

### BIODIVERSITY of the project (in our EIS Report)

The project area's marine biodiversity was studied, the models done for this reclamation project show that we do not impact the current state of LPPCHEA, as such we do not impact its biodiversity. There are no NIPAS-declared protected or proclaimed areas/sites within the project location. As mentioned above, LPPCHEA also known as the Las Pinas-Paranaque Wetland Park is more than 500 meters northwest from the site of the Projects.





Note. The coordinates and the habitat maps already set the protected areas within the 181.63 hectares of LPPCHEA provided in the ENRPA Law of 2018. Additionally, Proclamation No. 1412 s. 2007 "Establishing a Critical Habitat and Ecotourism Area within the Coastal Lagoon of Las Pallas and Paranaque" indicates only 175,307 hectares.

The studies discussed above all indicate that the Projects have no significant impacts on LPPCHEA. As such, conditions in LPPCHEA stay the same and continue to be supportive of the biodiversity that exists on site. Specifically, unchanged conditions in LPPCHEA mean that there are:

- no effects on the food supply for the birds
- no disturbance of the habitats including the mangroves
- no deterioration of the water quality within the bird sanctuaries





- no direct damage to the avian population which may result from accidents during travel of sea vessels.

#### Benthic Life Forms (as covered in our EIS Report)

To validate the presence or absence of benthic life forms - substrate characterization, validation of corals and coral-associated fauna, two (2) methods were employed to characterize benthic habitats and validate the occurrence of corals.

1. *Broad Area Manta Tows* - though numerous manta tows, a description of the substrate, habitat types and their distribution over large impact areas and over longer stretches of coastal waters can be determined accurately.
2. *Spot Dives and Sediment Sampling* - Due to limited visibility in the water column resulting from turbid waters, numerous spot dives were employed to supplement manta tow/stack dives where the nature of the seabed cannot be discerned.

#### Mangroves

Mangrove stands of mostly reforested patches occur in the Bacoor River Estuary, which is almost four (4) kilometers away from the western boundary of the proposed reclamation project. On the eastern side, mangroves are found in the Las Piñas-Parolaque Critical Habitat and Ecosystem Area (LPPCHEA), more than 500 meters away from the reclamation project's eastern boundary. Closer observation of the nearest areas of the LPPCHEA reveal that the trees in the southwestern tip of the LPPCHEA are mostly composed of "bronia" and "takeay" trees. Dense mangroves occur at the opposite side of the LPPCHEA (northeast) along the vicinity of the Parolaque coastal highway, about three (3) kilometers from the proposed reclamation in Bacoor.



- An existing condition is that there is silt that emanates from the Bacoor, Zapote, and Las Piñas Rivers, and silt is carried downstream from the Cavite shoreline and Canacao Bay. This reclamation project will not contribute to the further degradation of this existing condition.
- The complete absence of corals and reef-associated benthic life forms across the proposed reclamation project in Bacoor Bay is essentially due to the fact that the soft, turbid substrate cannot host coral colonies or macro-algae communities as there is no firm substrate for settlement of coral planulae.
- Moreover, waters that are acutely turbid are not conducive to coral growth. Eutrophic conditions and low dissolved oxygen in the lower column of coastal waters due to extreme turbidity has also delayed settlement of corals, seagrass, and algae communities.



- This fishing ground is outside the boundaries of the reclamation project and will continue to exist despite the reclamation. The targets are seasonal surges in small pelagic species coming close to the shore to graze on plankton. Commonly, these include sardines, mackerel shed, and ponyfishes.

### Conclusion

- The studies above clearly indicate that the Bacor Projects do not contribute any negative impact on the LPPCHEA protected area.
- The models made by 3 independent experts using international standards AMH Philippines, Rambot and Danish Hydraulic Inc conclude that the projects are at a safe distance and that the buffer zone does not need to reach the Projects' location based on the ecological criteria.
- The Projects have no incremental flooding impact on both adjacent communities and LPPCHEA.
- Water circulation and currents move away from the LPPCHEA, thereby minimizing possibility of accidental pollutants reaching LPPCHEA.
- Particle transport modelling shows that sediments are unlikely to reach mangrove areas and that tidal current pattern transports the suspended sediment away from LPPCHEA.
- On biodiversity, we have done marine biodiversity study in our project site, but we understand that LPPCHEA current biodiversity are mostly birds. Nonetheless results show no disturbance of their habitats, including the mangroves, no deterioration of the water quality within the bird sanctuaries, as such no direct damage to the avian population.
- In addition, LPPCHEA will benefit from the relocation efforts of the Bacor LGU to clean up Bacor Bay.
- As such, the results of these studies suggest the Projects' location is far enough from LPPCHEA and can therefore be outside the buffer zone being deliberated by the DENR. Specifically, these results indicate that a buffer of 500 hectares around the boundary of LPPCHEA is sufficient and that projects outside this distance do not pose a threat to LPPCHEA.