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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,

WESTERN ZONE BENCH, PUNE

ORIGINAL APPLICATION NO. 77 / 2023

Banda Nagaraj Kumar & Anr.Applicants

V/s

Maharashtra Maritime Board & Ors.Respondents

**REPLY AFFIDAVIT BY RESPONDENT NO. 2,
MAHARASHTRA COASTAL ZONE MANAGEMENT
AUTHORITY**

I, Abhay Madhukar Pimparkar, Member Secretary & Director,
Environment and Climate Change Department, Government of
Maharashtra do hereby state on solemn affirmation as under –

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I am well conversant with the facts of the present case and I am competent to swear this Affidavit based upon the records available with this office.

1. The present application pertains to the alleged illegal construction work of anti sea erosion measures, done by Respondent no. 1, Maharashtra Maritime Board, in the CRZ I lands on Aksa Beach, Madh Island, Malad, Mumbai Suburban.
2. At the outset it is submitted that the present application in its current form is not maintainable. The applicants have invoked provisions of Sec. 14, 15, 16, 18 & 20 of the NGT Act together. No combined proceeding can be filed under sec. 14 & 15 on one side and sec. 16 on the other side. Under Sec. 14 & 15 of the Act, the Hon'ble Tribunal can grant substantive relief. And, under Sec. 16 of the Act, an appellant can challenge any order which is passed under the enactments listed under Schedule I of the Act. No applicant can seek substantive reliefs under Sec. 14 & 15 as well as reliefs under Sec. 16 of the Act in a common proceeding. Therefore, unless the present application is amended suitably, it cannot be held



to be maintainable and on this ground itself, the present application needs to be rejected.

3. It is further submitted, that the present application is barred by limitation. MMB for the first time had made application for the present project to the MCZMA in the year 2017. CRZ Clearance to the project has been granted by SEIAA on 5th March, 2019. On perusal of the averments and the prayers of the present application, it is evident, that the Applicants under the garb of filing this original application, under sec. 14 & 15 are trying to seek reliefs, by praying directions to the MCZMA and SEIAA to revoke the CRZ clearance dated 5th March, 2019, which the Applicants can seek only by filing a separate appeal under Sec. 16 of the NGT Act. Hence, the cause of action to file the present application first arose on 5th March, 2019 whereas the present application has been filed quite at late i.e., on 10th May, 2023 which is beyond the period of limitation stipulated under sec. 14(3) of the NGT Act.
4. Neither the present applicants nor any other person/s have challenged the CRZ clearance dated 5th March, 2019 and and

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under the garb of filing the present application the said clearance cannot be assailed.

5. Applicant no. 2, had raised a similar issue against the anti-sea erosion bund in Village Versova, Mumbai in Original Application No. 64/2021 *Zoru Daryus Bhathena v State of Maharashtra* which was rejected by this Hon'ble Tribunal vide final order and judgment dated 23rd May, 2023. Applicant no. 2 had prayed therein for directions to *inter ali* stop the construction of anti-sea erosion bund on sandy beach and demolish the said construction and restore the site.
6. This Hon'ble Tribunal while rejecting the said application had held that anti-sea erosion bund had been clearly permitted by the SEIAA which was completed to a large extent. It was further observed that the said project is of public importance and therefore it opined not to pass any adverse order impacting upon the project in question. It was further observed that construction of anti-sea erosion bund is a permissible activity under the CRZ Notification and is a necessity considering the situation at the ground level. A similar anti-sea erosion bund is being constructed in public interest in the present case, by



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the MMB, which is a Government Authority and not a private entity.

7. Firstly, application made by the MMB was considered by the MCZMA in their 115th Meeting held between 17th - 18th January 2017. The MMB had proposed construction of Gabion Wall. MCZMA instructed the MMB to explore other options such as ecosystem based solutions for beautification, instead of solid construction on beach. MCZMA after deliberation decided to reject the proposal from CRZ point of view. Copy of MCZMA 115th MoM dated 17th - 18th January 2017 is annexed as Annexure 1.
8. Thereafter in the year 2018, the MMB made an application for construction of anti-sea erosion measures. The project involved repairs of old bund, construction of pathway, construction of parapet wall, providing solar street lights.
9. MCZMA considered the above proposal in their 127th Meeting dated 2nd November, 2018, wherein it was observed that the proposal involves repairs of old bund, construction of pathway, construction of parapet wall. Solar street light. After deliberation, the MCZMA decided to recommend the proposal



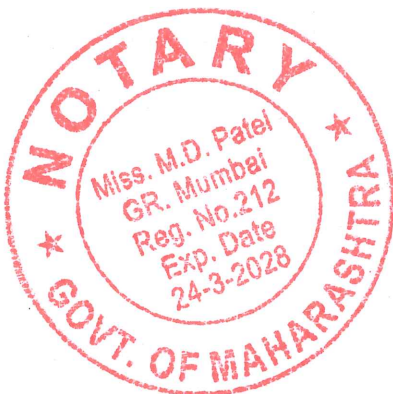
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of anti-sea erosion bund to SEIAA with subject to the following conditions –

- 1) *MMB to ensure that no construction is allowed in intertidal or beach area i.e., CRZ area. Solid construction should be restricted to landward side of the HTL.*
- 2) MMB to ensure that construction debris is not dumped in the beach and CRZ area.
- 3) Mangroves, if any should not be destroyed / cut.
- 4) All other required permission from different statutory authorities should be obtained.
- 5) In case of presence of mangroves, no construction should be undertaken in mangroves & its 50 meters buffer zone.

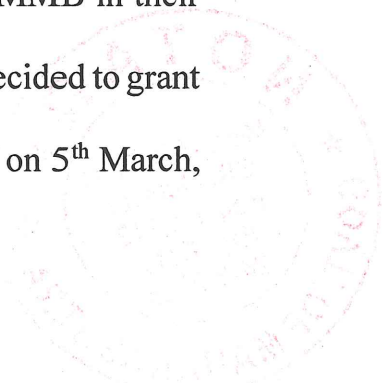
Copy of MCZMA 127th MoM dated 2nd November, 2018 is annexed as Annexure 2.

10. Thereafter, SEIAA considered the proposal of MMB in their 158th Meeting held on 27th February, 2019 and decided to grant CRZ clearance to the MMB which was granted on 5th March, 2019.



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11. Thereafter, on 27th August, 2020, the MMB made an application to MCZMA for amendment in CRZ clearance dated 5th March, 2019 proposing activities a) Garden for senior citizens and children play area, b) entrance and parking c) food plaza, d) lawns and toilets, e) gym and space for yoga, f) wooden shacks and steps, g) bamboo shades and steps and h) volley ball courts.

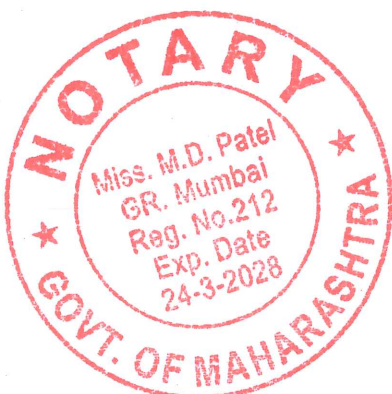
12. MCZMA in its 148th meeting held on 24.11.2020 discussed the proposal and noted that MMB needs to superimpose the layout of the project on approved CZMP layout of 2011 in 1:4000 scale in order to ascertain the project activities viz its CRZ status and accordingly decided to defer the proposal. Copy of MCZMA 148th MoM dated 24th November 2020 is annexed as Annexure 3.

13. Thereafter, the MMB vide their letter dated 30-03-2021 submitted the superimposition of layout of the project on the approved CZMP, 2011 in 1:4000 scale and stating that activities are in CRZ-II area. This was considered by MCZMA in their 155th meeting held between 10th - 11th June, 2021.



14. MCZMA in its 155th meeting deliberated the proposal and observed that the project site is along the Aksa Beach and MMB has proposed certain activities like plaza / restaurant / gym / wooden shacks on seaward side, which is not permissible as per the provisions of the CRZ Notification, 2011. However, the landscaping, playground / recreational ground / garden could be allowed in CRZ II area. MMB to strictly ensure that no construction is allowed on Aksa Beach. Accordingly, the MCZMA decided to grant recommendation to the proposed activities of landscaping, playground / recreational ground / garden only from CRZ point of view to the planning authority. MCZMA further decided that activities like plaza / restaurant / gym / wooden shack on seaward side are not permissible as per the provisions of CRZ notification, 2011. MCZMA MoM 155th meeting held between 10th - 11th June, 2021 are annexed as Annexure 4.

15. In pursuance to the above, MCZMA granted recommendation on 30th June, 2021 to the proposed activities of landscaping, playground / recreational ground / garden from CRZ point of view. Copy of recommendation dated 30th June 2021 is annexed as Annexure 5.



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16. Thereafter, on 28th June, 2023, MMB addressed a letter to MCZMA seeking to specific condition no. I put forth by the MCZMA recommendation and SEIAA clearance for the proposed project pertaining to the construction of the anti-sea erosion bund and other works. The said condition stated –

I) MMB to ensure that no construction is allowed in intertidal or beach area i.e., CRZ area. Solid construction should be restricted to landward side of the HTL.

The MMB requested to delete the above said condition I. Expert Member, MCZMA asked MMB whether any scientific studies from erosion point of view from competent organisation has been carried out in the matter recommending the necessity of the bund at site proposed by MMB. MMB agreed to submit the same. Accordingly, MCZMA decided to defer the matter for want of above information. MCZMA 168th MoM dated 10th August, 2023 is annexed as Annexure 6.

17. The present application was heard in detail and a detailed order dated 1st December, 2023 has been passed by the Hon'ble Tribunal, wherein it observed –

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11. We are of the view that whether this condition needs to be deleted from the CRZ clearance or not, a decision has to be taken by the MCZMA at their end, which is pending for a long time. Therefore, we direct the MCZMA to decide this matter within a period of one month positively. This matter cannot be kept open ended for indefinite period. The respondent No.1 shall also provide whatever kind of study it wants to place before the MCZMA within a period of 20 days from today and within a week thereafter, the MCZMA shall file reply affidavit and a copy of the same shall also be served upon all other parties, who may file rejoinder affidavit against the same, if any, within one week thereafter.

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18. Subsequent to passing of the above direction, MMB engaged the expert services of IIT, Mumbai who have submitted a report titled Shoreline Studies to ascertain the coastal erosion For Aksa Beach, Mumbai, Maharashtra, dated 21st December, 2023. The said report of the IIT Bombay was received by MCZMA, copy of the same is marked and annexed as

Annexure 7.



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19. The said report was considered by the MCZMA in their 172nd meeting dated 5th February, 2024 pursuant to the directions of the Hon'ble Tribunal dated 1st December 2023. MCZMA observed the following –

- The MMB also submitted report dated 21.12.2023 on the shoreline studies to ascertain the coastal erosion for Aksa beach by IIT, Mumbai. The IIT report summaries that the MMB is proposing shoreline studies to ascertain coastal erosion / accretion pattern at Aksa Beach. In this regard, mathematical modelling studies were carried out using 2- Dimensional modelling to study wave transformation and morphological changes near Aksa Beach. The report summaries the wave climate characteristics at offshore and near proposed location. The wave transformation study shows that the waves predominantly come from South- West. The study shows net erosion at Aksa Beach with landward shift of shoreline. Based on the site visit and satellite image analysis, it is observed that Aksa Beach is an eroding site, and the existing structures are already affected by



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erosion. Hence, there is a need to provide anti-sea erosion bund to protect the facilities being developed.

- IIT report concludes that, Morphology study by using coupled tide, wave and sediment transport models is performed from the Aksa coast. The Analysis shows that predominantly waves come from SW direction. The sediment analysis shows the erosion along the Aksa Beach and accretion near offshore of Aksa Beach. The flat region above high tide line is mostly likely prone to erosion during storm and monsoon weather. Erosion protection measures should be implemented to protect the beach and infrastructure adjoining the beach.
- The Chief Engineer, MMB stated that there are existing electric poles on site and part of Anti Sea Erosion bund constructed along the said existing electric poles as per recommendation of CWPRS cross section.
- The authority noted the Order passed by Hon. National Green Tribunal, (WZ), Pune on 01.12.2023 in the matter of Mr. Banda Nagraj Kumar & Anr. Vs Maharashtra Maritime Board & Ors. (Original Application No.77/2023(WZ)).

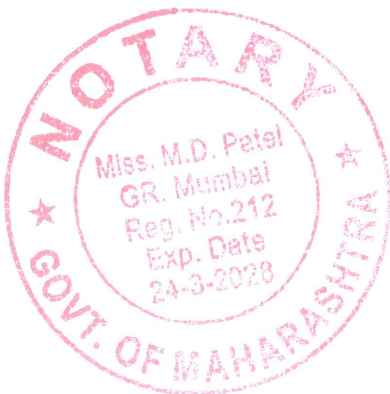


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- The Authority noted that at the time of recommendation in 127th meeting, the CRZ Notification, 2011 and approved CZMP under it was in force. As per the para 4(i)(f) of CRZ Notification, 2011, “erosion control measures” are permissible activity in CRZ area.
- At the relevant time, the Authority while deliberating the proposal exercised extra caution and felt to put a condition that “no construction is allowed in intertidal or beach area i.e. CRZ area. Solid construction should be restricted to landward side of the High Tide Line”
- However, from the reports of IIT and CWPRS submitted by the MMB, it is observed that the seawall is aligned with the existing electric pole. The alignment chosen to construct the anti-sea erosion measure seem appropriate as the existing electric poles were collapsing due to erosion.
- As per IIT report, the study shows net erosion at Aksa Beach with landward shift of shoreline. Based on the site visit and satellite image analysis, it is observed that Aksa Beach is an eroding site, and the existing structures are already affected by erosion. Hence, there

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is a need to provide anti-sea erosion bund to protect the facilities being developed. The flat region above high tide line is mostly likely prone to erosion during storm and monsoon weather. Erosion protection measures should be implemented to protect the beach and infrastructure adjoining the beach.

- Taking into account the above said reports, due to site constraints and electric pole present near the site and need to protect the infrastructure adjoining the beach, the Authority is of the the view that above said condition stipulated in earlier MCZMA recommendation requires modification.
- It was further deliberated that before construction, MMB was required to put a request to MCZMA informing the Non Feasibility to construct the seawall on landward side of the HTL, due to constrains of the site conditions and hence, requires deletion / amendment. Now, it came to the notice of the Authority from the representation of MMB and various report of IIT & CWPRS called by the Authority; that there are constraints and seawall could not be restricted on



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landward side of HTL. After detailed deliberation and considering various reports, the Authority opines that above said condition requires amendment.

- The Authority deliberated that construction of seawall to occupy certain area of beach for construction, however, seawall is necessary in order to protect the considerable area of beach.
- Furthermore, the Authority observed that CRZ Notification, 2019, has also allows anti-sea erosion measures in intertidal area i.e. CRZ IB area. The Authority noted that presently, the CRZ Notification, 2019 and approved CZMP under it is applicable. As per approved CZMP of Mumbai, 2019 the anti-Sea Erosion Bund is partly falls in CRZ-IB & partly in CRZ-II area. As per para 5.1.2(i) (d) and 5.2 (i) of CRZ Notification, 2019, measures for control of erosion is permissible activity in CRZ-IB & partly in CRZ-II area.
- The Authority after detailed deliberation felt that the project of anti sea erosion measure implemented by the MMB is vital public interest project with an objective



to protect the coastline from eroding and for protection of infrastructure /properties present near the beach.

- In view of above, the Authority observed that the above said condition mentioned in earlier MCZMA recommendation could not be deleted entirely as per request of the MMB. However, the Authority is of the view that the above said conditions needs modification.

20. In the light of above, the Authority after deliberation decided to recommend the proposal to SEIAA for modification of the specific condition no. (I) as follows:

“MMB to ensure that Anti Sea Erosion bund shall occupy minimum intertidal area which is necessary”

Copy of the Minutes of the 172nd meeting of the MCZMA held on 5th February, 2024 is marked and annexed as **Annexure 8.**

21. In light of the above averments, this respondent craves leave to file any additional reply as and when required. It is respectfully prayed that Environment Department shall abide by any orders and directions issued by the Hon'ble Tribunal.



Whatever is stated above is true and correct to the best of my knowledge, ability and belief and I affirm it to be true.

Place: Mumbai

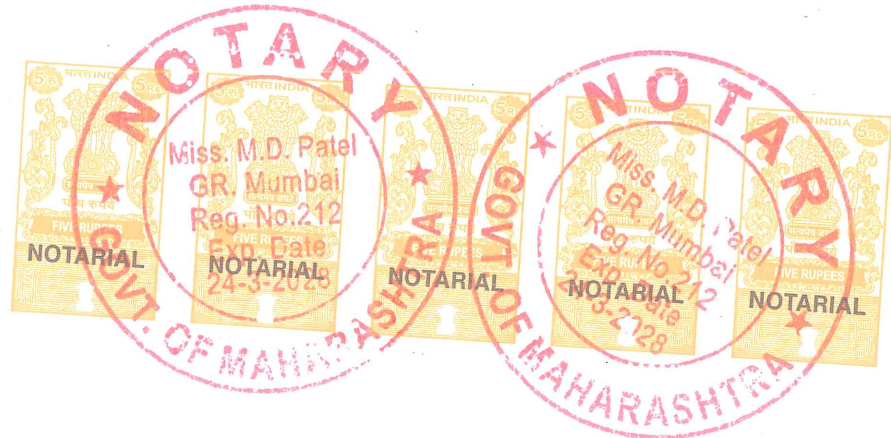
(Abhay Madhukar Pimparkar)

Deponent

Director, Env&CC Department and

Member Secretary, MCZMA

Date: 22.02.2024



VERIFICATION

I, Abhay Madhukar Pimparkar, Age 49 years, Director, Environment and Member Secretary of the Maharashtra Coastal Zone Management Authority, having my office address at 15th Floor, New Administrative Building, Mantralaya Mumbai, do hereby verify & declare that statements made in the aforesaid Paras are true and correct to the best of my knowledge and information and I believe the same to be true and that nothing material has been concealed therefrom.

Verified at Mumbai on this ^{22nd} day of February, 2024

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Abhay Madhukar Pimparkar

(Abhay Madhukar Pimparkar)

Director, Environment & CC

and MS, MCZMA

Deponent

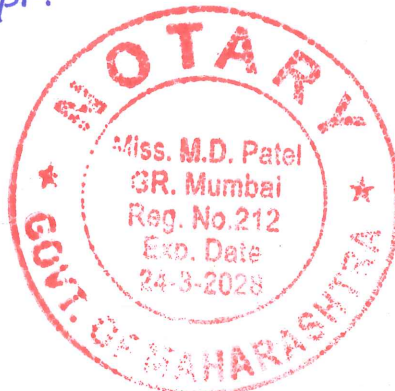
Identified by

Chaudhary
(Chaudhary Anu vibhute)
Sci - I & Deputy Secretary,
Environment & CC Dept.

BEFORE ME

M. D. Patel
22-2-2024
Sr. No. 52
Bk. No. 1

MISS M. D. PATEL
ADVOCATE & NOTARY
Kohiar House,
4, Dhuswadi, Dhobitalao,
MUMBAI - 400 002.



Minutes of the 115th meeting of Maharashtra Coastal Zone Management
Authority held on 17th & 18th January, 2017

The authority noted that, the proposal is for beautification and approach on existing bund at Rajodi, Tal. Vasai, Dist. Palghar. Length of the bund is 700 m. and falls in CRZ II area. The authority after deliberation and discussion decided to defer the matter as the proposal submitted by PP is incomplete. PP to submit detail impact assessment analysis of the proposed activities along with ecosystem based remedial measures.

✓ Item No. 23: Proposed beautification of Aksa Beach at Madh, Mumbai by MMB

Officials from Maharashtra Maritime Board presented the proposal of beautification of Aksa Beach at Madh, Mumbai Suburban. The proposal involves construction of Gabion wall at Aksa Beach. The Authority instructed MMB to explore other options such as ecosystem based solutions for beautification of Aksa Beach, instead of solid construction on beach. The Authority felt that beach may be eroded due to solid construction on beach. Further solid construction on beach is not permissible as per the CRZ Notification 2011.

The Authority after deliberation decided to reject the proposal from CRZ point of view.

Item No. 24: Proposed beautification of Gorai Beach Promenade at Gorai, Mumbai by MMB

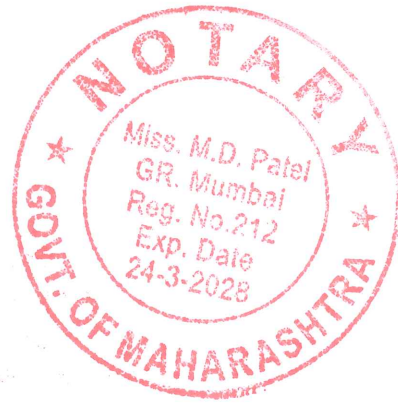
Officials from Maharashtra Maritime Board presented the proposal before the Authority. The proposal is for beautification of Gorai Beach Promenade at Gorai, Mumbai Suburban.

The Authority felt that instead of proposing the solid structures on Gorai beach, which is a CRZ I area, the MMB need to explore other options for beautification of Gorai Beach, Promenade on beach along with cost benefit analysis & revert. The Authority after deliberation decided to defer the proposal.


Member Secretary


Chairman





Minutes of the 127th meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) held on 02nd November, 2018

After details discussion and deliberation, the Authority decided the followings:

1. A site inspection to be carried out by Mangrove Cell and expert members of MCZMA for ascertaining the existence of mangrove at Devbaug and Karli. Whether the project activities are proposed in mangroves or its 50 m buffer zone area.
2. Shoreline at Devbaug and Karli is not stable and shows eroding nature. The MMB to get the Scientific report done by competent expert Govt agency (like NCSCM, Chennai) on erosion status of the Devbaug & karli and Impact of the jetties during construction & operation phase on erosion of the coastline at devbaug and Karli.
3. MMB to submit cost benefit analysis of the project.

The Authority decided to defer the proposal for compliance as stated above.

Item No.27: Proposed redevelopment of Worli Koliwada Municipal Primary School on plot bearing C. S. No. 2/224 of Worli division in G/s Ward, Mumbai by MCGM.

The MCGM officials during the meeting informed that revised proposal may be submitted by the MCGM pertaining to construction of primary school on vacant plot under reference. The Authority decided to delist the present proposal from records of MCZMA. The Authority shall consider the revised proposal.

Item No.28: Proposed construction of various bridges on Ulwe River diversion Channel for Navi Mumbai International Airport, Navi Mumbai.

The Authority noted that new CZMP of Navi Mumbai under CRZ Notification, 2011 is at finalization stage. Till that time, the proposal is deferred.

✓ **Item No.29:** Proposed beautification of Aksa Beach at Madh, Mumbai Subarban by MMB

The MMB officials presented that the proposal is for construction of Anti Sea Erosion Measure at Aksa Beach. The project involves repairs of old bund, construction of pathway, construction of parapet wall, providing solar


Member Secretary

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Chairman

Minutes of the 127th meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) held on 02nd November, 2018

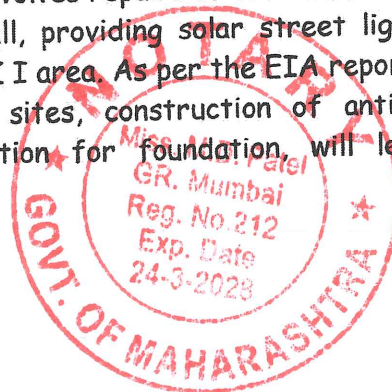
street light, length 300 m. The proposed project is situated in CRZ I area. As per the EIA report submitted, clearing, stripping and levelling of sites, construction of anti-sea erosion measures, earth filling and excavation for foundation, will lead to some disturbances to the habitat. The MCZMA in its 115th meeting held on 17th & 18th January, 2017 observed that solid construction on beach may erode the beach and discouraged the proposal. However, the MMB officials presented that considering the erosion problem of the Aksa Beach, Solid construction in the form of anti-sea erosion bund is required. The MMB further assured that Solid construction will be restricted to landward side of the High Tide Line and beach area will not be used for construction and no construction debris will be dumped on beach.

After deliberations, the Authority decided to recommend the proposals of anti-sea erosion bund to SEIAA with subject to following conditions:

1. MMB to ensure that no construction is allowed in intertidal or beach area i.e. CRZ area. Solid construction should be restricted to landward side of the High Tide Line.
2. MMB to ensure that construction debris is not dumped in the beach and CRZ area.
3. Mangroves, if any should not be destroyed/ cut.
4. All other required permission from different statutory authorities should be obtained.
5. In case of present of mangrove, no construction should be undertaken in mangroves & its 50 m buffer zone.

Item No.30: Proposed beautification of Gorai Beach Promenade at Gorai, Mumbai by MMB

The MMB officials presented the proposal is for construction of anti -sea erosion bund at Gorai in order to protect people, livestock and agricultural field from the Sea coast erosion. Project involves repairs of old bund, construction of pathway, construction of parapet wall, providing solar street light, length is around 530 m. The project site in CRZ I area. As per the EIA report submitted, clearing, stripping and levelling of sites, construction of anti-sea erosion measures, earth filling and excavation for foundation, will lead to some disturbances to the habitat.




Member Secretary

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Chairman

Minutes of the 148th meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) held on 24th November, 2020

the projects not attracting EIA Notification, 2006, clearance from SEIAA is required based on the recommendation from MCZMA.

The Authority discussed that installation of flood gates could be allowed being a vital infrastructure project as flood control measure for the city. Expert Members of the MCZMA suggested that access for maintenance of the flood gates should be from the landward side and not from the mangrove side.

In the light of above, the Authority after deliberation decided to recommend the proposal from CRZ point of view to SEIAA with subject to following conditions:

1. PP should ensure that proposed activities in CRZ areas are as per provisions of CRZ Notification, 2011 (amended time to time).
2. No mangroves should be disturbed / cut during construction and operation of the project.
3. MCGM to obtain the NoC from the mangrove Cell for the project.
4. Prior High Court permission should be obtained since, the project is proposed in 50 m mangrove buffer zone area.
5. MCGM to ensure that maintenance of the flood gates should be from the landward side and not from the mangrove side.
6. Debris generated during the project activity should not be dumped in CRZ area. It should be processed scientifically at a designated place.
7. All other required permissions should be obtained before the commencement of the project.

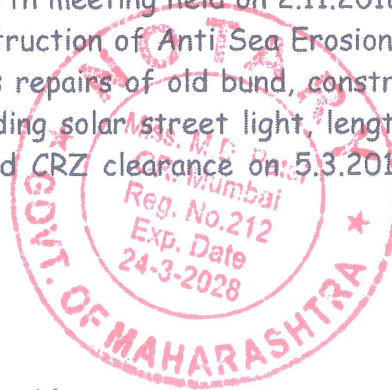
Item No.8:

Proposal for amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksa beach, Madh, Mumbai Suburban by MMB

The MMB officials presented the proposal before the Authority. The MMB presented that earlier, the MCZMA in its 127th meeting held on 2.11.2018 granted the recommendation to the proposal of construction of Anti Sea Erosion Measure at Aksa Beach, Mumbai. The project involves repairs of old bund, construction of pathway, construction of parapet wall, providing solar street light, length 300 m. Subsequently, the said proposal has received CRZ clearance on 5.3.2019 by the SEIAA as per 158th meeting of the SEIAA.


Member Secretary


Chairman



Minutes of the 148th meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) held on 24th November, 2020

Now, the MMB has proposed amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksa beach, Madh, Mumbai Suburban.

The proposed activities involves a) Garden for senior citizens and children play area, b) Entrance and parking, c) Food Plaza, d) Lawns & Toilets, e) Gym and space for yoga, f) Wooden Shacks and steps, g) Bamboo Shades and steps and h) Volley ball Courts.

The Authority discussed the proposal and noted that activities are proposed along the Aksa Beach. The Authority felt that the MMB need to superimpose the layout of the project on approved CZMP, 2011 in 1:4000 scale in order to ascertain the project activities viz a viz its CRZ status. Accordingly, the Authority decided to defer the proposal for compliance by MMB as stated above.


Item No.9: Proposed construction of passenger jetty & allied facilities at Balkum, Dist: Thane by Maharashtra Maritime Board (MMB)

The MMB officials presented the proposal before the Authority. It was presented that there is existing jetty at the site at Balkum, Dist: Thane. MMB has now proposed the strengthening and extension of the jetty in the creek by 20 meter.


Member from the Mangrove Cell submitted that a site visit needs to be carried out in order to verify whether the proposed extension of the jetty would affect mangrove vegetation. The Authority further discussed the Rapid EIA report submitted by the MMB and requested MMB to submit the executive summary of the potential impacts of the project and its mitigation measures. MMB agreed to submit the same at the earliest.

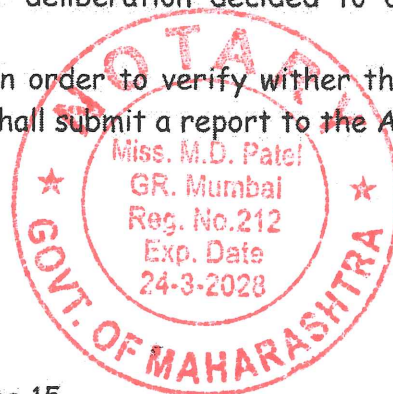
In the light of above, the Authority after deliberation decided to defer the proposal for the compliances as follows:

- Mangrove Cell shall make a site visit in order to verify wither the project will disturb mangroves. Mangrove Cell shall submit a report to the Authority.


Member Secretary

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Chairman



Minutes of the 155th meeting of Maharashtra Coastal Zone Management Authority (MCZMA) held on 10th & 11th June, 2021

proponent there mangroves are seen outside the footing. Hence trees will not be destroyed during execution of the project.

4. The project proponent has to obtain permission from Hon. High Court Mumbai before the commencement of the project.

The Authority asked the TMC officials to explain the purpose behind connecting bridge from Agasan Road to Kalyan Road, as google image shows no habitation around the project site. The TMC officials informed that the proposed bridge will connect to ring road of City. The Authority directed TMC officials to show the alignment of the ring road on DP plan or google image and how proposed road is part of the ring road connectivity. The TMC officials agreed to submit the said information to MCZMA at the earliest.

Accordingly, the Authority after deliberation decided to defer the matter for the submission of the above said compliance as stated above.

Item No.6: Proposal for sea front development & beatification at Aksa beach, Madh, Mumbai Suburban by MMB

Chief Engineer, MMB presented the proposal before the Authority. The MMB presented that earlier, the MCZMA in its 127th meeting held on 2.11.2018 granted the recommendation to the proposal of construction of Anti Sea Erosion Measure at Aksa Beach, Mumbai. The project involves repairs of old bund, construction of pathway, construction of parapet wall, providing solar street light, length 300 m. Subsequently, the said proposal has received CRZ clearance on 5.3.2019 by the SEIAA as per 158th meeting of the SEIAA.

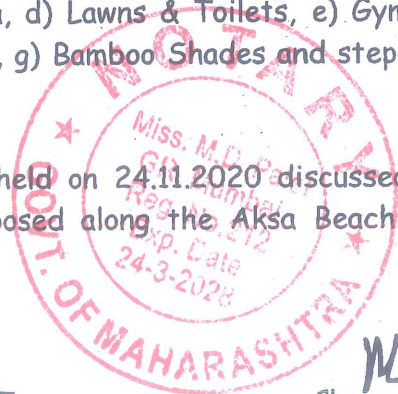
Now, the MMB is seeking amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksa beach, Madh, Mumbai Suburban.

The proposed activities involves a) Garden for senior citizens and children play area, b) Entrance and parking, c) Food Plaza, d) Lawns & Toilets, e) Gym and space for yoga, f) Wooden Shacks and steps, g) Bamboo Shades and steps and h) Volley ball Courts.

Earlier the Authority in its 148th meeting held on 24.11.2020 discussed the proposal and noted that activities are proposed along the Aksa Beach. The


Member Secretary


Chairperson



Minutes of the 155th meeting of Maharashtra Coastal Zone Management Authority (MCZMA) held on 10th & 11th June, 2021

Authority felt that the MMB need to superimpose the layout of the project on approved CZMP, 2011 in 1:4000 scale in order to ascertain the project activities viz a viz its CRZ status. Accordingly, the Authority decided to defer the proposal for compliance by MMB as stated above.

MMB vide letter dated 30.03.2021 submitted the superimposition of layout of the project on approved CZMP, 2011 in 1:4000 scale and stating that, proposed activities in CRZ-II area.

The Authority deliberated the proposal and observed that the project site is along the Aksa Beach and MMB has proposed certain activities like plaza/ restaurant/ Gym/ wooden shack on seaward side, which is not permissible as per the provisions of the CRZ Notification, 2011. However, the landscaping, playground/ recreational ground/garden could be allowed in CRZ II area. MMB to strictly ensure that no construction is allowed on Aksa Beach.

In the light of above, the Authority after deliberation decided to grant recommendation to the proposed activities of landscaping, playground/ recreational ground/garden only from CRZ point of view to planning Authority.

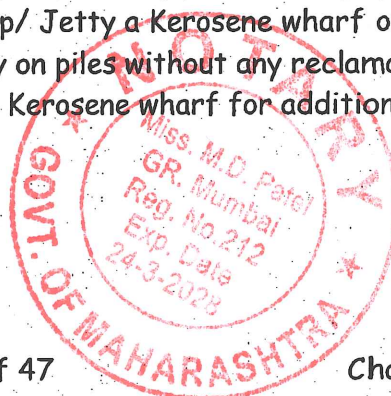
The Authority further decided that activities like plaza/ restaurant/ Gym/ wooden shack on seaward side are not permissible, as per the provisions of the CRZ Notification, 2011.

Item No.7: Proposal for extension of jetty for maneuvering Self Propelled Modular Transporter (SPMT) swept path and repair of existing jetty at Kerosene wharf, Sewri for MTHL by MMRDA

The officials of the MMRDA presented the proposal before the Authority. MMRDA is constructing the Mumbai Trans Harbour Link Project which is a connectivity between Mumbai Island to the Navi Mumbai. For the said project, the MMRDA has proposed the following activities:

- 1) Widening/ extension of existing ramp/ Jetty at Kerosene wharf on its left side for erection of temporary Jetty on piles without any reclamation.
- 2) Extension of existing ramp/ jetty at Kerosene wharf for additional 230 m at its mouth


Member Secretary




Chairperson

MAHARASHTRA COASTAL ZONE MANAGEMENT AUTHORITY

Tel. No. : 2202 9388
E-mail : dir1.mev-mh@nic.in
Website: <https://mczma.gov.in/>

No. CRZ 2020/CR 95/TC 4
Office of the -
Maharashtra Coastal Zone Management Authority,
Environment & Climate Change Department,
15th Floor, New Administrative Building,
Mantralaya, Mumbai- 400 032
Date: 30th June, 2021

To,
Chief Executive Officer,
Maharashtra Maritime Board
Indian Mercantile Chamber,
3rd Floor, Ballard Estate, Mumbai - 01



Subject: Proposal for sea front development & beatification at Aksha beach, Madh, Mumbai Suburban by MMB

The Maharashtra Coastal Zone Management Authority in its 148th & 155th meeting held on 24th November, 2021 and 10th & 11th June, 2021 respectively deliberated the proposal of sea front development & beatification at Aksha beach, Madh, Mumbai Suburban.

2. The Authority noted that the MMB presented that earlier, the MCZMA in its 127th meeting held on 2.11.2018 granted the recommendation to the proposal of construction of Anti Sea Erosion Measure at Aksha Beach, Mumbai. The project involves repairs of old bund, construction of pathway, construction of parapet wall, providing solar street light, length 300 m. Subsequently, the said proposal has received CRZ clearance on 5.3.2019 by the SEIAA as per 158th meeting of the SEIAA.

3. Now, the MMB is seeking amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksha beach, Madh, Mumbai Suburban. The proposed activities involves a) Garden for senior citizens and children play area, b) Entrance and parking, c) Food Plaza, d) Lawns & Toilets, e) Gym and space for yoga, f) Wooden Shacks and steps, g) Bamboo Shades and steps and h) Volley ball Courts.

4. Earlier the Authority in its 148th meeting held on 24.11.2020 discussed the proposal and noted that activities are proposed along the Aksha Beach. The Authority felt that the MMB need to superimpose the layout of the project on approved CZMP, 2011 in 1:4000 scale in order to ascertain the project activities viz a viz its CRZ status. Accordingly, the Authority decided to defer the proposal for compliance by MMB as stated above. MMB vide letter dated 30.03.2021 submitted the superimposition of layout of the project on approved CZMP, 2011 in 1:4000 scale and stating that, proposed activities in CRZ-II area.

5. The Authority deliberated the proposal and observed that the project site is along the Aksha Beach and MMB has proposed certain activities like plaza/ restaurant/ Gym/ wooden shack on seaward side, which is not permissible as per the provisions of the CRZ Notification, 2011. However, the landscaping, playground/ recreational ground/garden could be allowed in CRZ II area. MMB to strictly ensure that no construction is allowed on Aksha Beach.

6. In the light of above, the Authority after deliberation decided to grant recommendation to the proposed activities of landscaping, playground/ recreational ground/garden only from CRZ point of view to planning Authority.

7. The Authority further decided that activities like plaza/ restaurant/ Gym/ wooden shack on seaward side are not permissible as per the provisions of the CRZ Notification, 2011.

8. Agenda item & minutes of the meeting is available on the website of MCZMA i.e. <http://mczma.gov.in>.

(Narendra Toke)

Director, Environment & MS, MCZMA

Copy for information to:

1. **PS (Environment) & Chairperson, (MCZMA),** Environment & CC Department, Room No. 217 (Annex), Mantralaya, Mumbai -32.
2. **Director (IA-III),** Coastal Zone Regulation, Government of India, Ministry of Environment, Forests & Climate Change, Indira Paryavaran bhavan, Jor Bagh Road, New Delhi - 110 003.
3. **Member Secretary, Maharashtra Pollution Control Board,** Kalpataru Point, 3rd and 4th floor, Road No. 8, Sion Cir, opp. PVR Theater, Mumbai -400022
4. **District Collector Mumbai Suburban,** 10th Floor, New Administrative Building, Near Chetna College, Bandra East, Mumbai - 51
5. **Select File-TC 4**



Minutes of the 168th meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) was held on 10th August, 2023

Item No.16: Proposal for amendment in CRZ Clearance for Anti Sea Erosion Measures at Aksa beach, Madh, Mumbai Suburban by MMB

INTRODUCTION:

The Chief Engineer, MMB presented the matter before the Authority. The MMB presented that the MCZMA in its 127th meeting held on 2nd November, 2018 deliberated the proposal of Anti sea erosion bund and recommended the proposal from CRZ point of view to SEIAA subject to certain conditions. The SEIAA vide letter dated 5th March, 2019 granted the clearance for the project.

The MMB vide letter dated 28.06.2023 has requested to delete the following specific condition No.1 of the MCZMA recommendation and SEIAA clearance:

- I) *MMB to ensure that no construction is allowed in intertidal or beach area i.e. CRZ area. Solid construction should be restricted to landward side of the High Tide Line.*

DELIBERATION:

The MMB during the meeting presented that there are existing poles and proposed public facilities immediately along the beach and there are existing private properties nearby, hence, it is not possible to keep anti sea erosion bund on landward side of HTL.

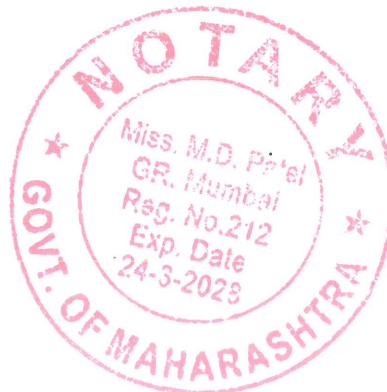
Hence, the MMB requested to delete above said conditions no. I.

Expert Member asked MMB whether any scientific studies from erosion point of view from competent organisation has been carried out in the matter recommending the necessary of the bund at site proposed by MMB. MMB agreed to submit the same.

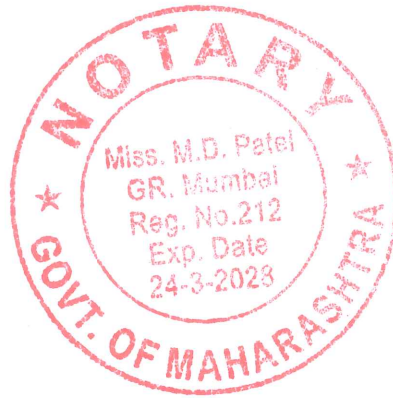
DECISION:

In the light of above, the Authority after deliberation decided to defer the matter, for want of above information.


Member Secretary




Chairman





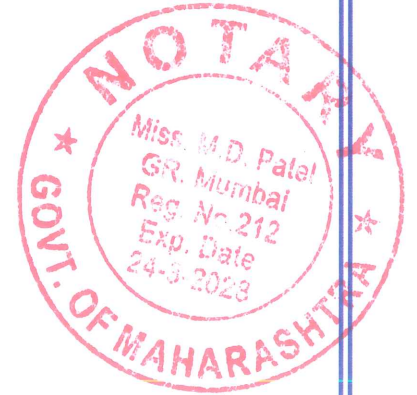
PROJECT TITLE: SHORELINE STUDIES TO ASCERTAIN THE COASTAL EROSION FOR AKSA BEACH, MUMBAI, MAHARASHTRA.

CLIENT:

MAHARASHTRA MARITIME BOARD

Submission Date: 21 December 2023

Report No: IITB/AKSA/2023-Report001



Submitted by:



Prof. Manasa Ranjan Behera

Ocean Engineering

Department of Civil Engineering

Indian Institute of Technology Bombay

Powai, Mumbai – 400076

Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay

EXECUTIVE SUMMARY

Maharashtra Maritime Board is proposing shoreline studies to ascertain coastal erosion/accretion pattern at Aksa Beach. In this regard, mathematical modelling studies were carried out using 2-Dimensional modelling suite to study wave transformation and morphological changes near Aksa beach. This report summarizes the wave climate characteristics at offshore and near proposed location. The wave transformation study shows that the waves predominantly come from South-West. The study shows net erosion at Aksa beach with landward shift of shoreline. Based on the site visit and satellite image analysis, it is observed that Aksa beach is an eroding site, and the existing structures are already affected by erosion. Hence, there is a need to provide anti-sea erosion bund to protect the facilities being developed.

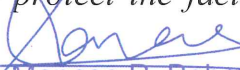

Prof. Manasa R. Behera
Ocean Engineering
Department of Civil Engineering
IIT Bombay





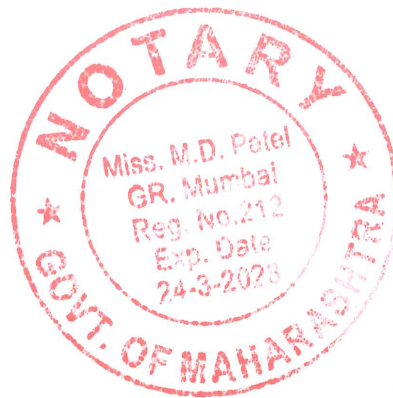
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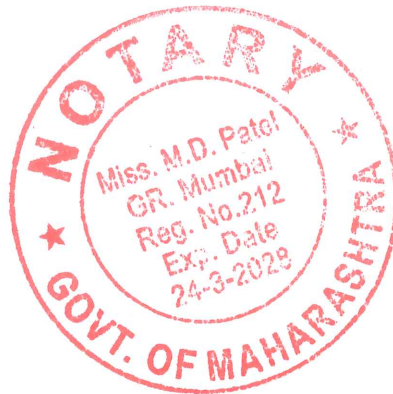
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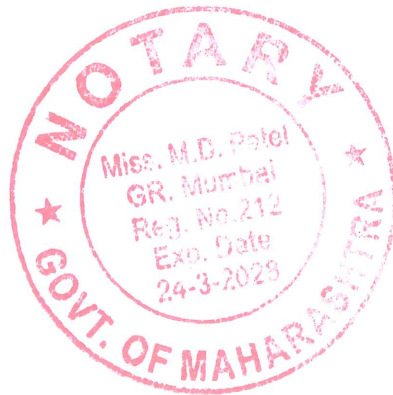
Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay

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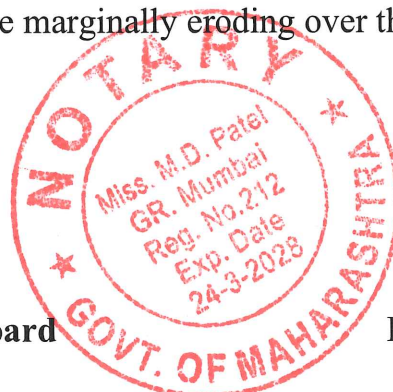
PROJECT BACKGROUND

Maharashtra Maritime Board (MMB), Home Department (Ports & Transport), Govt. of Maharashtra; vide letter no MMB/CEO/Engg-2/4813 dated 10.10.2023; requested Prof. Manasa R. Behera, Indian Institute of Technology Bombay (IITB), Powai, Mumbai to carry the Shoreline change analysis to ascertain the coastal erosion at Aksa beach. With reference to the above letter, Prof. Manasa R. Behera accepted the MMB request on 09.11.2023.

The scope of works is limited to the following technical points;

- One visit to coastal sites for field condition assessment
- Analysis of available/supplied data
- Modelling of hydrodynamics of the region
- Modelling of morphodynamics of region
- Shoreline erosion/accretion assessment based on modelling study
- A comprehensive report based on the field visit, supplied/available data, and modelling study

The Aksa beach is located at Mumbai Suburban, Maharashtra, India. The google earth images (Fig. 1) show that there is a sandy beach present from Aksa beach to Marve beach. The sediment cell is located along the mouth of the Manori creek on its right. The images in Fig. 1 are shown from 2004 to 2022. It can be observed that the Aksa beach profile varies seasonally as well as annually. The beach is found to be marginally eroding over the years.



Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay

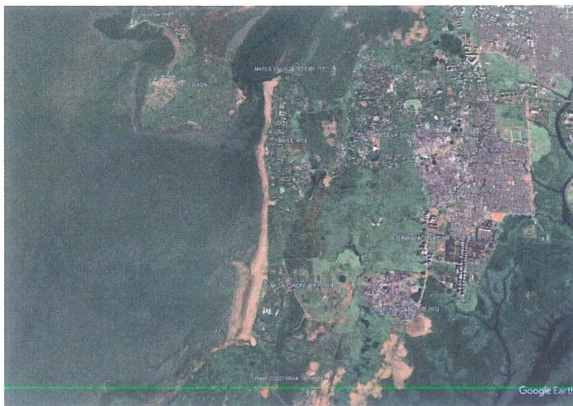
April 2004



Nov 2004



Oct 2009



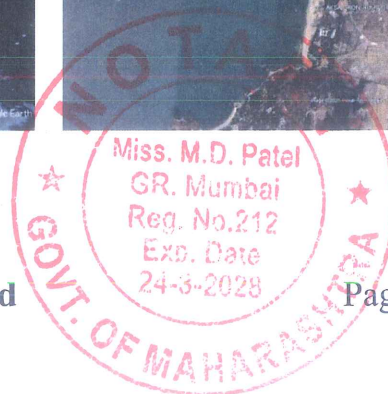
Apr 2011



April 2012



March 2014



Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



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Department of Civil Engineering, IIT Bombay

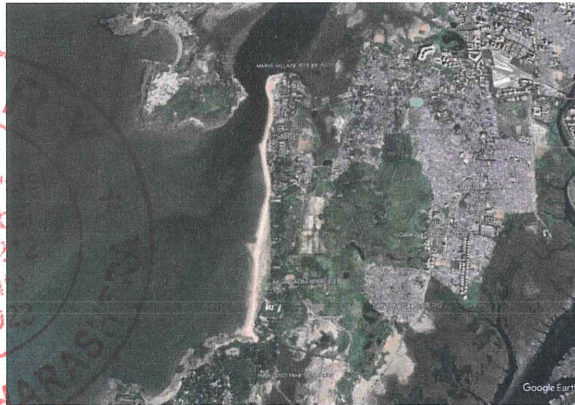
Oct 2018



Oct 2019



Oct 2021



Dec 2022

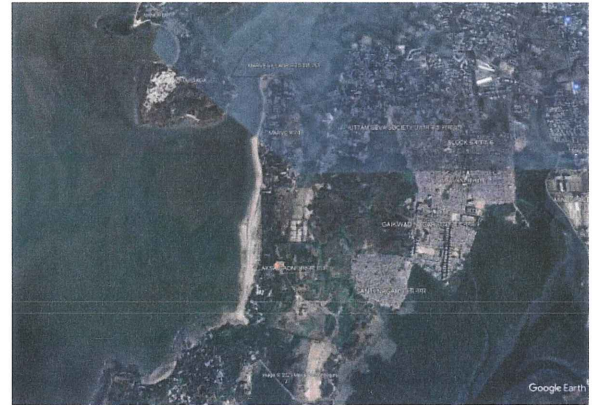


Figure 1 Google earth images showing Aksa to Marve beach profile from 2004 to 2022

Earlier Maharashtra Maritime Board (MMB), Home Department (Ports & Transport), Govt. of Maharashtra; vide letter no MMB/CEO/Engg-3/Aksa beach/1653 dated 06.04.2023; requested Prof. Manasa R. Behera, Indian Institute of Technology Bombay (IITB), Powai, Mumbai to provide expert opinion about the appropriability of location of placement of anti-sea bund along Aksa beach, as planned by MMB. MMB informed through the above

NOTA
Miss. M.D. P.
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GOVT. OF MAHARASHTRA



letter that the above-mentioned work of anti-sea erosion measures and tourist facilities at Aksa beach in Mumbai Suburban is being executed through District Planning Commission (DPC) Mumbai Suburban funds by MMB. CWPRS, Pune has already carried out detailed mathematical model study for protection measures for Aksa beach and submitted their report to MMB. MMB requested Prof. Manasa R. Behera (IITB) to visit the site, verify all the reports & documents, and submit the expert opinion report to MMB. Based on the site visit and information provided, Prof. Manasa R. Behera found that Aksa beach is an eroding site and the existing structures are affected by erosion, as shown in Fig 2. Hence, there is need to provide anti-sea erosion bund to protect the facilities being developed. The alignment chosen to construct the anti-sea erosion measure seem appropriate as the existing electric poles were collapsing due to erosion.



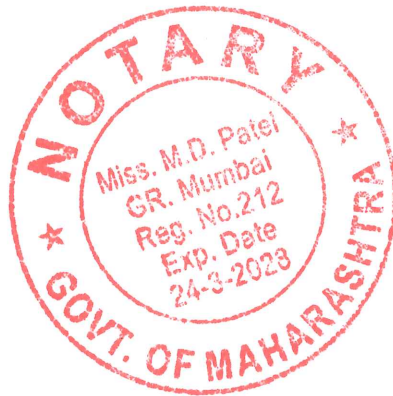
Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay



Figure 2 Erosion at Aksa beach and falling of the electric poles due to erosion.





WAVE TRANSFORMATION STUDY

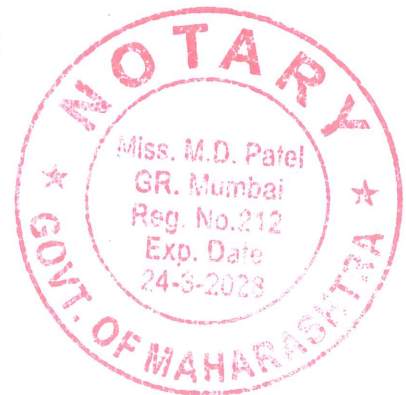
1.1 Introduction

This section briefly summarizes the wave transformation study. The long-term wave records play a major role in understanding the wave climate off study region and for coastal protection measure. Since the observed wave buoy records are not available for long period, we need to hindcast the wave climate. The numerical spectral wave model is calibrated and validated with observed wave climate from buoy, and long-term wave climate is hindcasted.

1.2 Data

The following datasets were employed in this study:

- Bathymetry survey data of the project site
- GEBCO bathymetry
- ERA5 wind climate
- Versova Buoy data



1.3 Global wave model

This study hindcasted the past 41 years of wave climate by forcing the European Centre for Medium-Range Weather Forecasts (ECMWF ERA5) wind climate to global numerical wave model. The computational domain used for global wave modelling is shown in Fig 3.

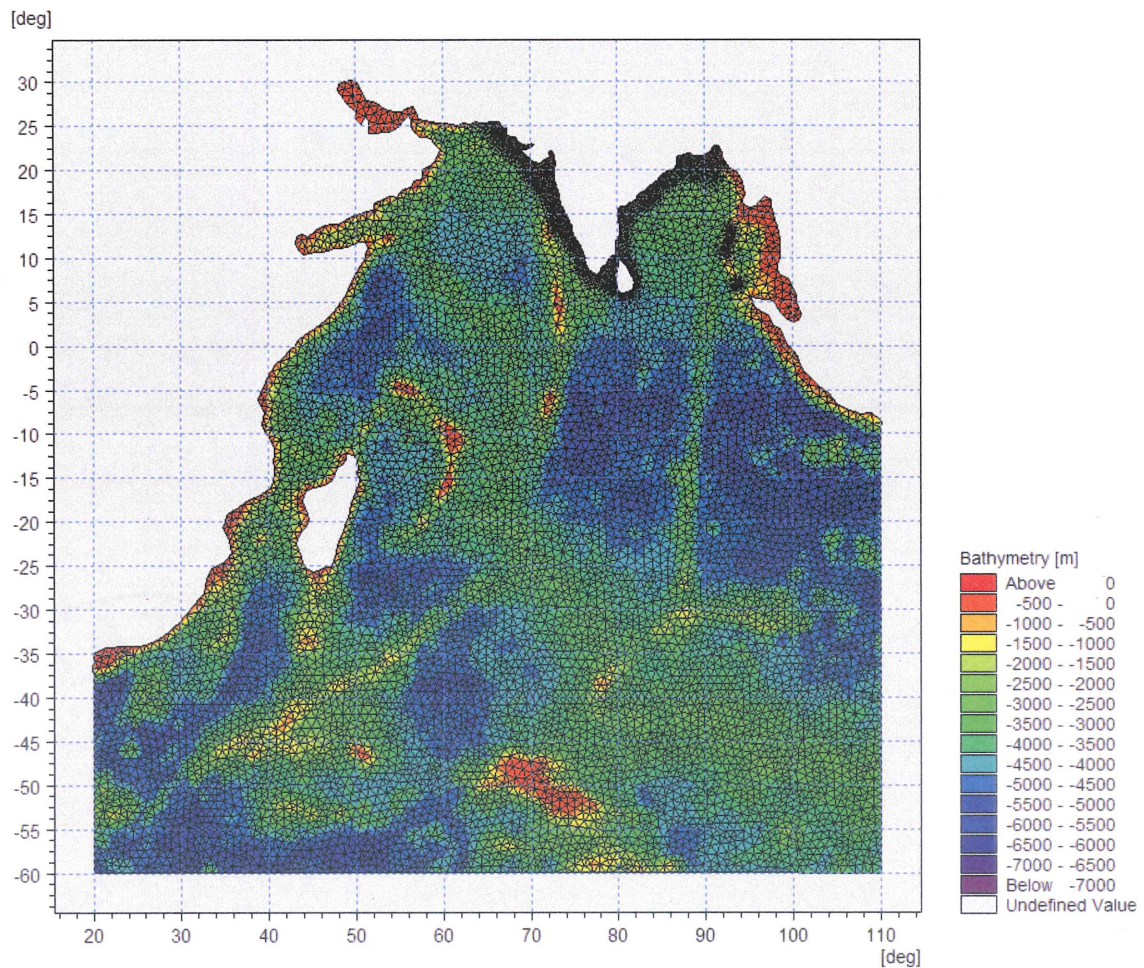


Figure 3 The computational domain of global wave model

The global wave model calibrated and validated with the buoy wave climate (deep and shallow water), as tabulated in Table-1. The global wave model is performing better in representing the hindcasted daily mean wave significant wave height ($r > 0.92$) and mean wave period ($r > 0.8$) over different climate variable scales. The Mean Absolute bias of wave climate is within acceptable range. The Fig. 4 shows the complete statistics of model performance.

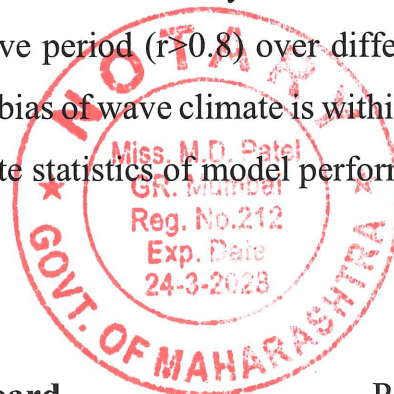
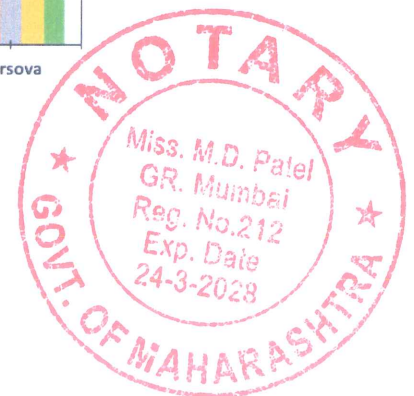
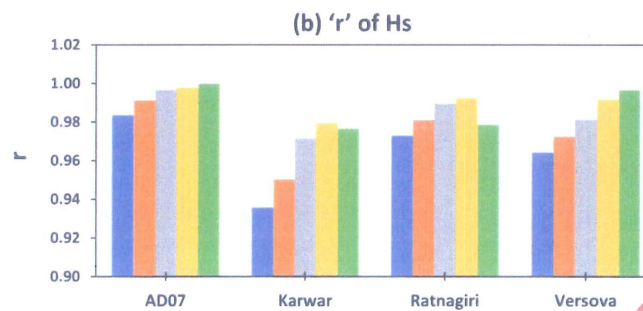
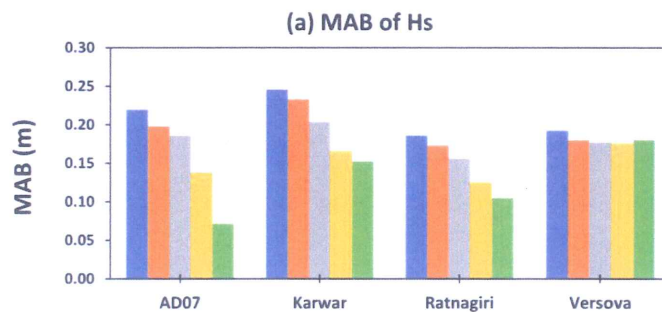




Table 1 Buoy data attributes

Buoy Name	Period of Availability	No of days
AD07	2014, 2015, 2016	939
Karwar	2012-2019	2278
Ratnagiri	2012-2019	2201
Versova	2016-2019	1151



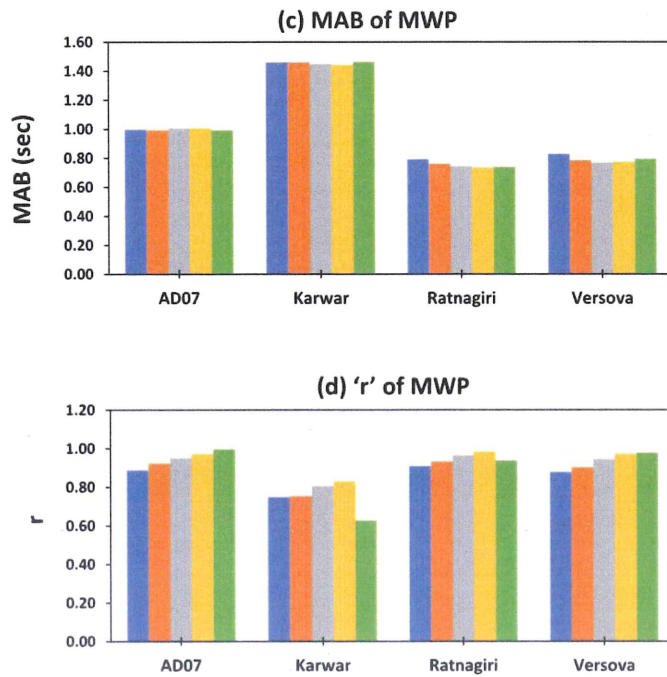


Figure 4 Validation of Global Wave model

1.4 Offshore wave and wind climate

Offshore wave and wind climate of the project site at 72.7°N and 19.16°E in the form of parametric quantities (Significant wave height (H_s), Peak period (T_p), Mean wave direction) for 41 continuous years (1979-2019) has been hindcasted from global wave model. Fig. 5 shows the location of the offshore point and nearshore point at Aksa.



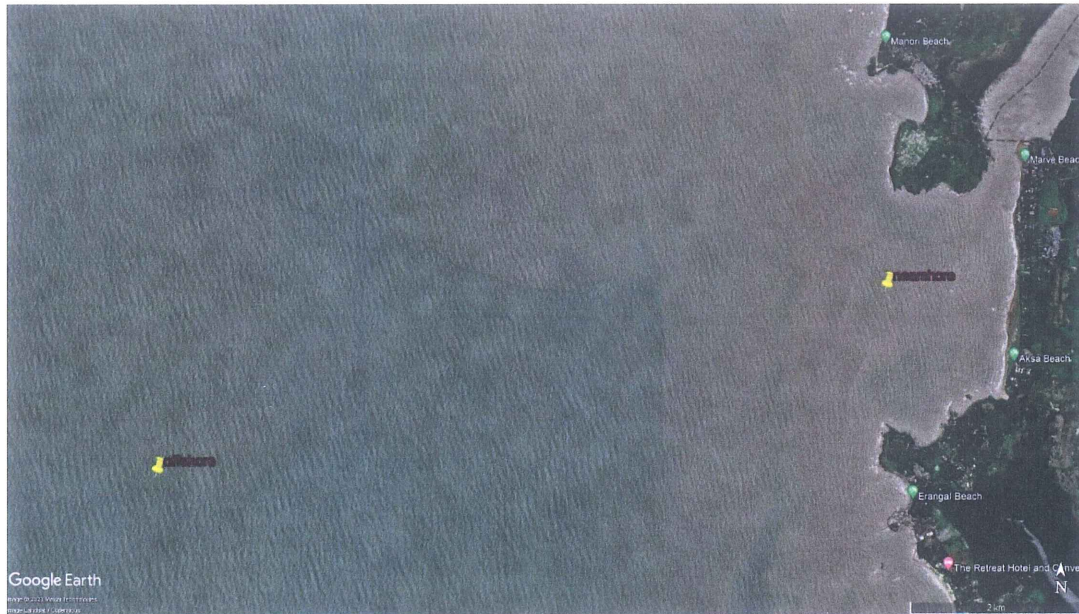
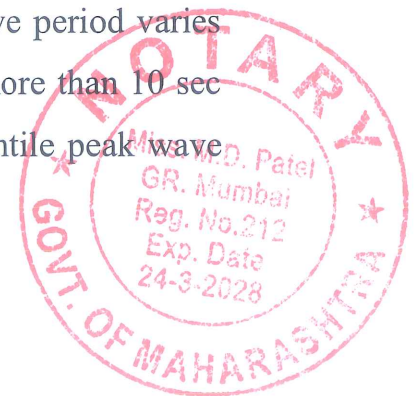


Figure 5 Location map of the offshore and nearshore points

The offshore wave climate derived from the global wave model at 72.7°N and 19.16°E is presented in the form of a wave rose. Fig. 6 and Fig. 7 show the wave height rose plot and the wave period rose plot at offshore of Aksa respectively. Predominantly waves come from South-West and they are observed to be swells (wave period greater than 10). Cumulative distribution of significant wave height is shown in Fig. 8. The significant wave height varies from 0.2m to 6m. The 25th, 50th and 75th percentile wave heights are 0.68m, 0.89m and 1.44m, respectively. Fig. 9 shows the probability of occurrence of wave periods. It has observed that peak wave period varies between 4 and 22 seconds. Spectral peak wave period is more than 10 sec for about ~75% of the time. The 25th, 50th and 75th percentile peak wave periods are 9.77sec, 11.22sec and 12.8sec, respectively.



Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay

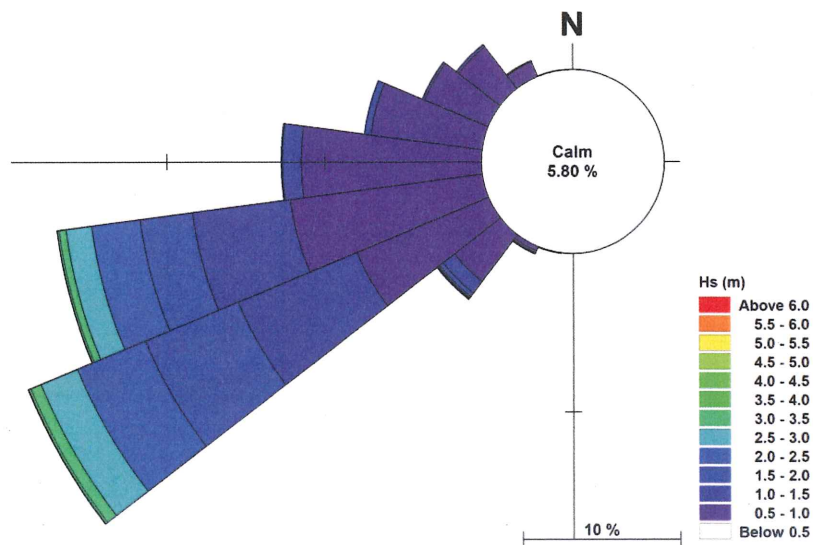


Figure 6 Rose plot of significant wave height at offshore (72.7°N and 19.16°E) at Aksa.

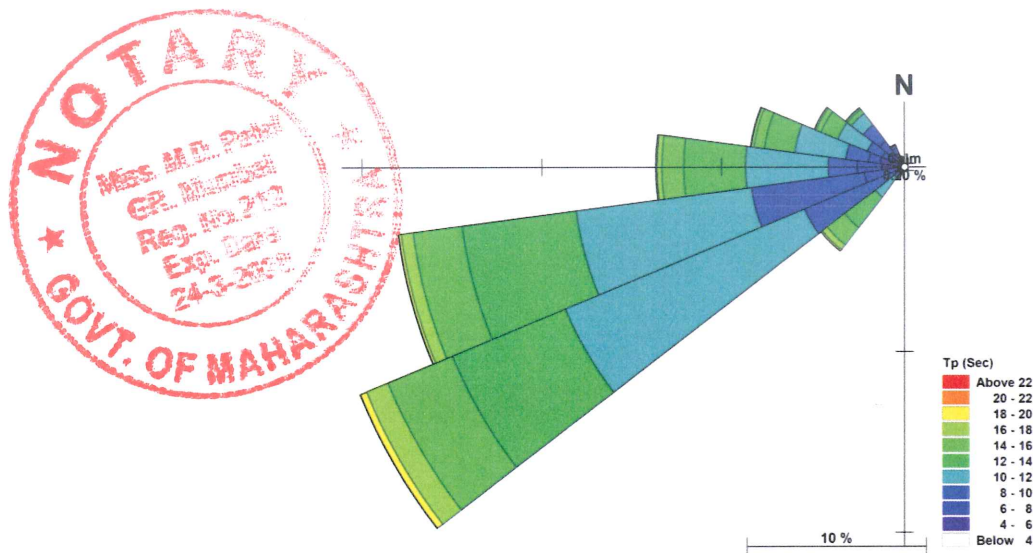
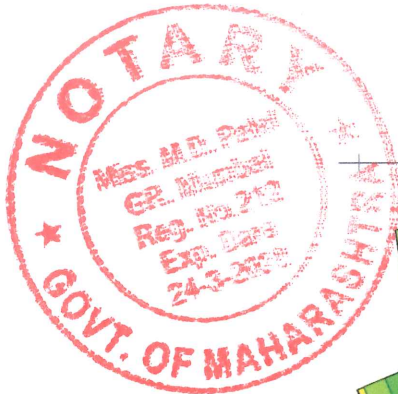


Figure 7 Rose plot of peak wave period at offshore (72.7°N and 19.16°E) of Aksa



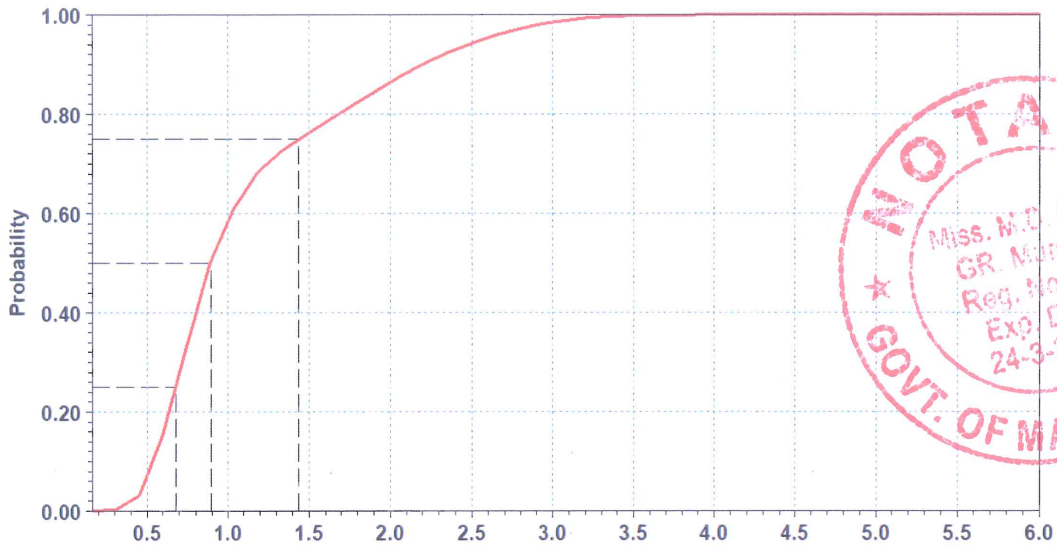


Figure 8 Cumulative Distribution Function (CDF) of offshore wave height.

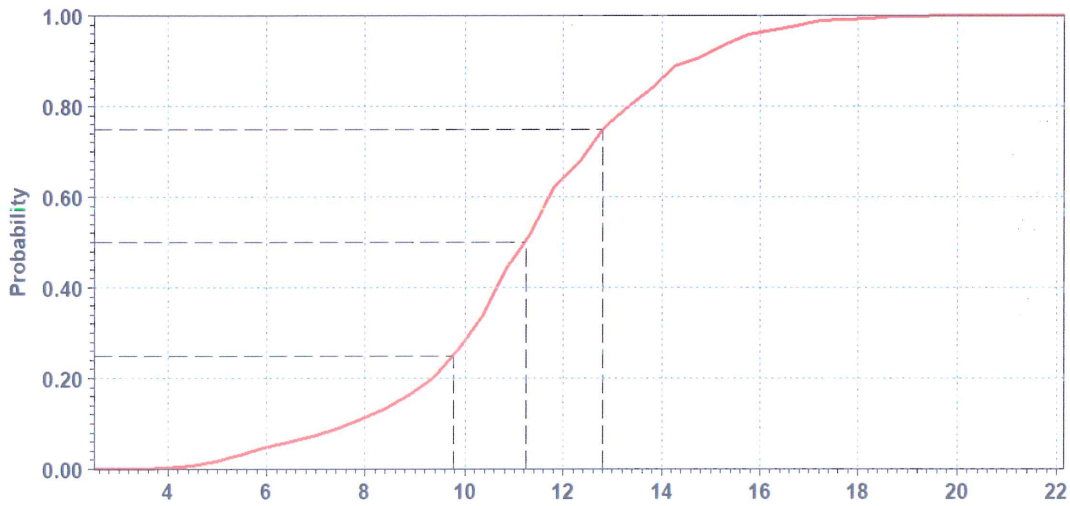


Figure 9 Cumulative Distribution Function (CDF) of offshore peak wave period



1.5 Nearshore wave climate

The offshore wave climate was transformed to the project site by numerical wave model. Numerical wave model solves the wave action balance equation and provides the wave parameters like significant wave height, mean wave period, peak wave period and mean wave direction.

1.5.1 Bathymetry

Bathymetry is an important parameter in wave modelling studies. Proper care should be taken in the bathymetry schematization particularly along the shelf and in the nearshore. The depth information for the present wave model has been imported from bathymetry data provided by MMB. Fig. 10 presents the bathymetry used for the wave transformation study.

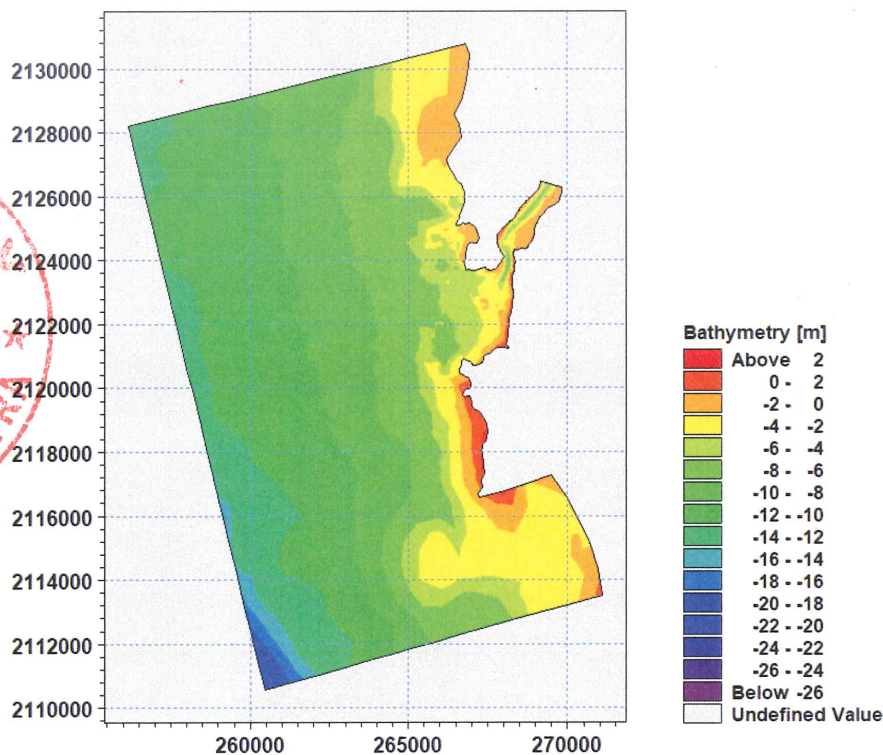


Figure 10 Bathymetry map



1.5.2 Computational domain

The study domain was discretized with varying unstructured triangular mesh elements. The model mesh has totally 13931 numbers of elements and 7246 numbers of nodes. Near the Aksa the grid resolution varies from 25-50m in 1.5 km zone, 100m in 1.5-3km of domain, 250m resolution in 3-4.5km, 500m resolution in 4.5-6km and finally 1000m resolution in 6-10 km. The Fig. 11 shows the computational domain mesh used for wave transformation study.

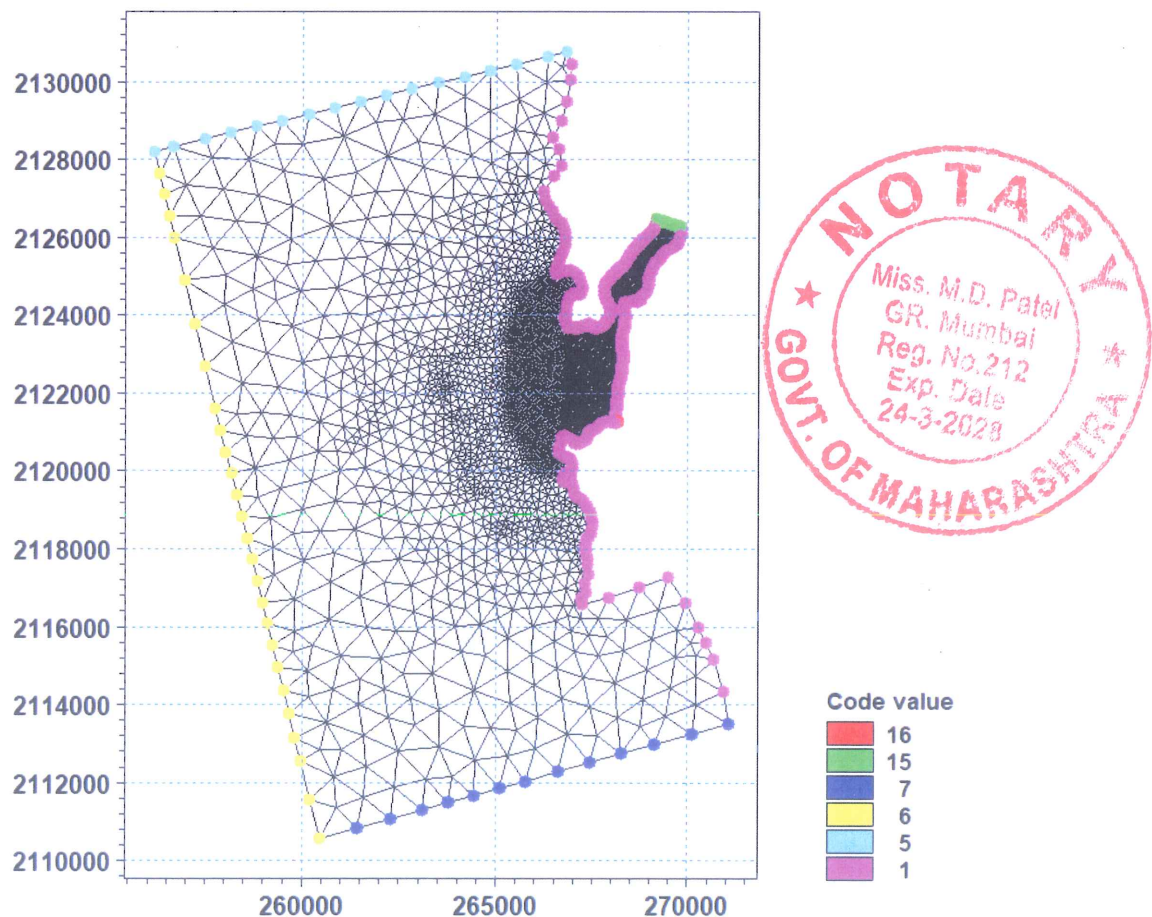


Figure 11 Numerical wave model mesh. Boundary with code value 1 is land boundary and remaining are open boundaries



1.5.3 Transformed nearshore wave climate

Offshore wave climate was transformed to nearshore (72.781°N , 19.182°E). Transformed wave climate was presented in the form of rose plots. Fig. 12 shows the transformed wave height characteristics at nearshore point and similarly the peak wave period rose plot is shown in Fig. 13. The nearshore wave climate is representative for the project site.

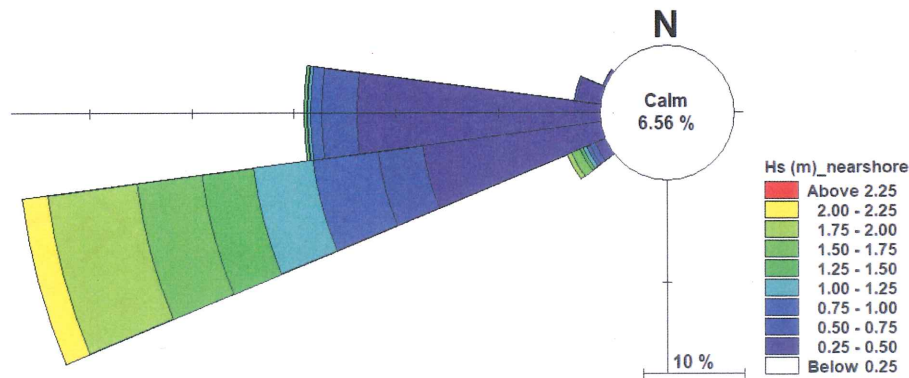


Figure 12 Rose plot of significant wave height nearshore off Aksa

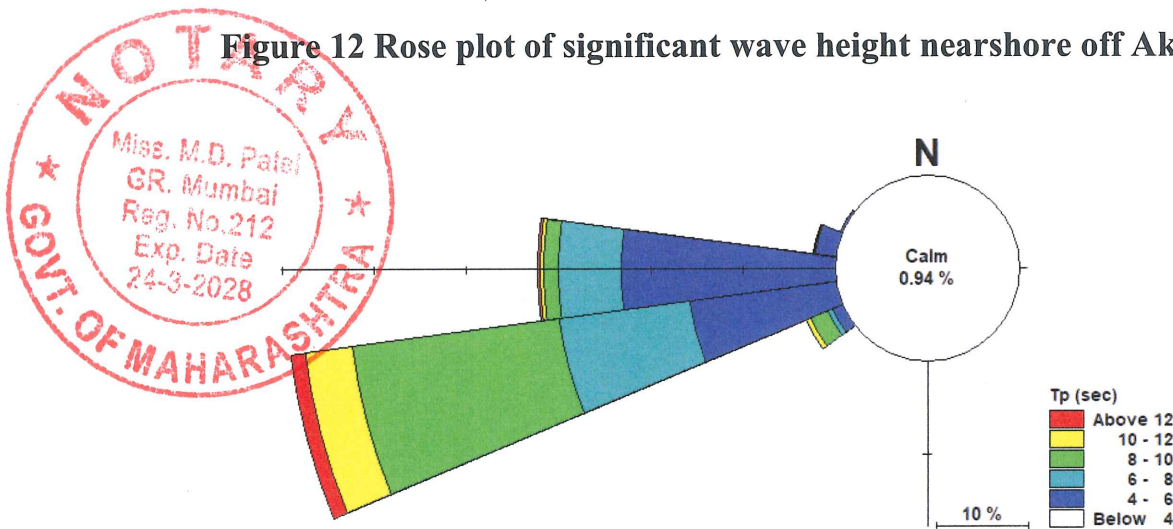


Figure 13 Rose plot of peak wave period nearshore off Aksa



Predominantly waves coming from SW. Probability exceedance of significant wave height is presented in Fig. 14. The peak wave period rose plot shows that the higher wave period waves predominantly coming from SW. Typical peak wave period distribution at nearshore point close to Aksa is shown in Fig. 15. The significant wave height varies from 0.2m to 2.15m. The 25th, 50th and 75th percentile wave heights are 0.3m, 0.47m and 1.25m respectively.

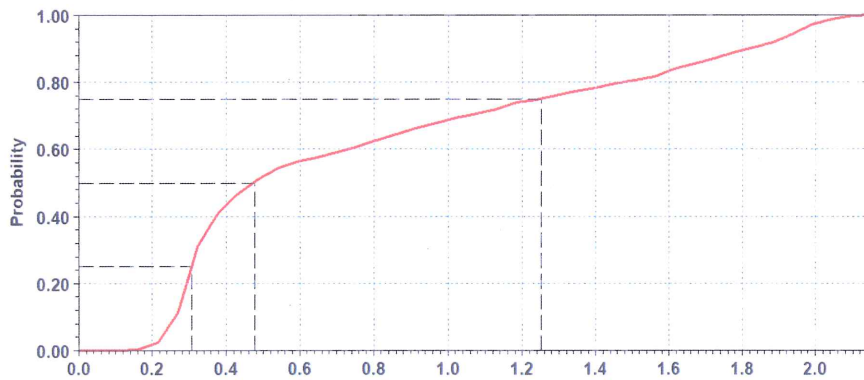
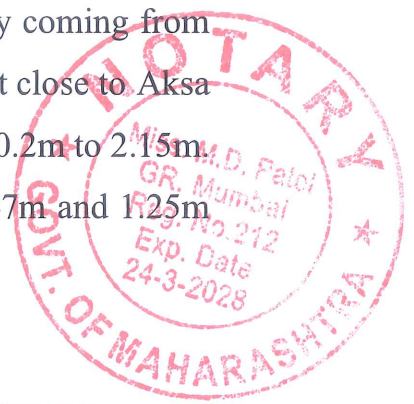


Figure 14 Cumulative Distribution Function of wave height at nearshore point close to Aksa

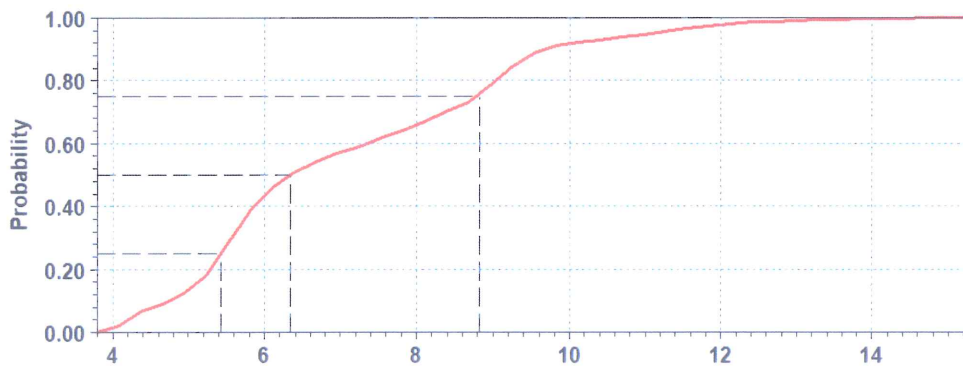
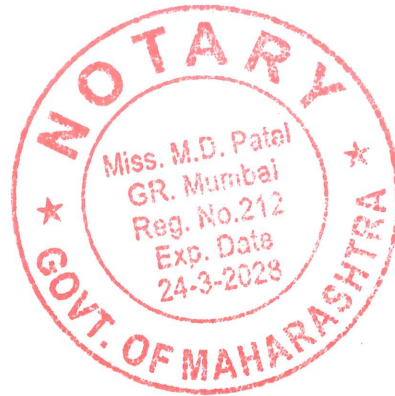


Figure 15 Typical peak wave period distribution at nearshore point close to Aksa



1.6 Summary of wave transformation study

Wave transformation study is performed for the Aksa coast. The analysis shows that predominantly waves come from SW direction, and they are swells. The transformed nearshore significant wave height varies from 0.2m to 2.15m. The 25th, 50th and 75th percentile nearshore wave heights are 0.3m, 0.47m and 1.25m respectively, for the representative year of 2017.





SEDIMENT TRANSPORT STUDY

2.1 Introduction

Keeping in view of prevailing conditions at site in order to assess the existing sediment transport changes at Aksa, MMB entrusted to investigate the probable change in hydrodynamic behavior and sedimentation pattern in the area numerical modelling techniques. Technical findings based on 2-Dimensional numerical model studies pertaining to assessment of hydrodynamic changes and estimation of sedimentation at Aksa is discussed in the following paragraphs.

2.2 Project datum and conventions

Units

The SI System of Units has been used throughout the studies.

Coordinate system

All coordinates are in Universal Transverse Mercator (UTM) Zone 43 North and are based on the World Geodetic System 84 (WGS84) spheroid.

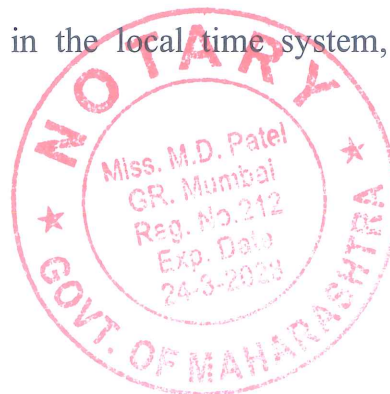
Vertical Reference Level

All elevations are in meters and referenced to MSL unless otherwise noted.

Time Reference

All data related to time are given in the local time system, which are GMT+5:30 hours.

Direction Convention





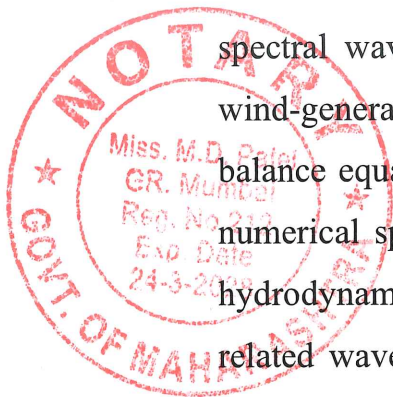
Flow: Flow directions refer to the direction towards which the flow occurs. Directions of the flow are always given clockwise with respect to north. The unit is degrees.

Wave direction: The direction from which the wave is coming (i.e. coming from convention), and is measured clockwise from true north. A wave with a direction of 0° is coming from the north, and 90° is coming from the east etc.

Wind direction: The direction from which the wind is blowing (i.e. coming from convention), and is measured clockwise from true north. A wind with a direction of 0° is coming from the north, and 90° is coming from the east, etc.

2.3 Methodology of studies

Numerical simulations were carried out by means of the coupling the spectral wave model, hydrodynamic and sand transport models. The numerical spectral wave model simulates the growth, decay and transformation of wind-generated waves and swell from offshore areas by solving wave action balance equation. The wave climate and radiation stresses calculated from numerical spectral model is given as input to hydrodynamic model, then hydrodynamic model calculate the wave propagation toward coast and related wave current. The calculated wave and current parameters, along with user defined cross-shore profile with spatial varying sediment properties are given as input to sediment transport model to calculate the sediment transport rate. The final new bed changes are estimated by morphological model, further, this new updated bathymetry can be given as input to numerical models to study the shoreline evolution over the long





term. Hence, full feedback of the bed level changes on the waves and flow calculations can be included.

2.4 Model Setup

The study domain was discretized with varying unstructured triangular mesh elements. The model mesh has totally 13931 numbers of elements and 7246 numbers of nodes. Near the Aksa the grid resolution varies from 25-50m in 1.5 km zone, 100m in 1.5-3km of domain, 250m resolution in 3-4.5km, 500m resolution in 4.5-6km and finally 1000m resolution in 6-10 km. The Fig. 16 shows the computational domain mesh used for sediment transport study.

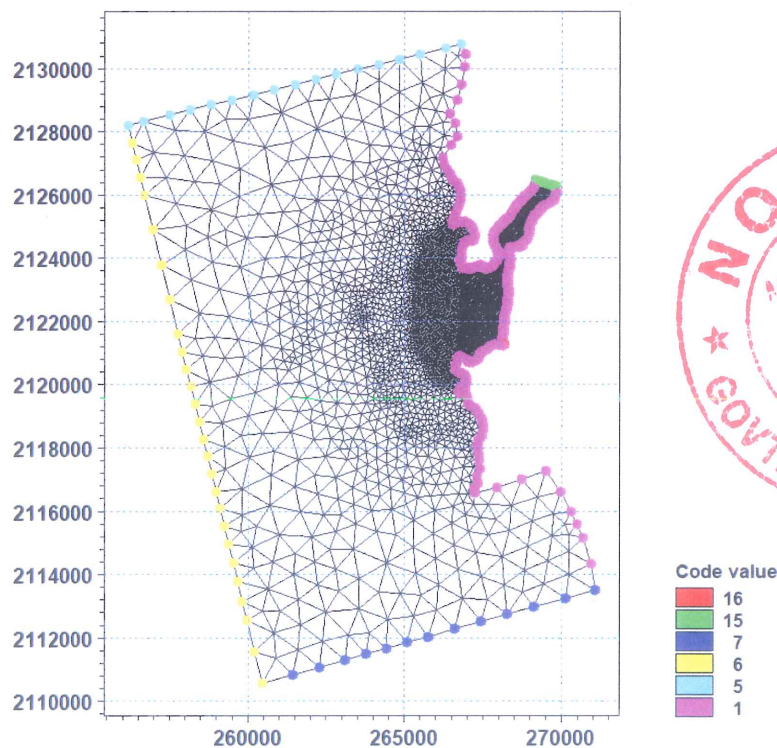
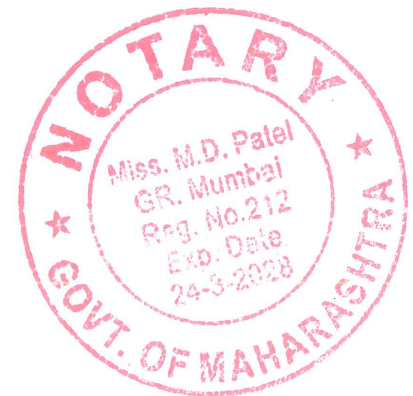


Figure 16 Computational mesh





The bathymetry for the model was interpolated to the computational grid. For the present project, depth information was compiled from bathymetry survey. For the areas that are not covered by the bathymetry/topography surveys, elevation information from GEBCO is utilized. For the model, MSL is taken as the reference level, which is at +2.509 m from CD. The seabed elevations are corrected to MSL. Fig. 17 shows the model bathymetry used for the present study.

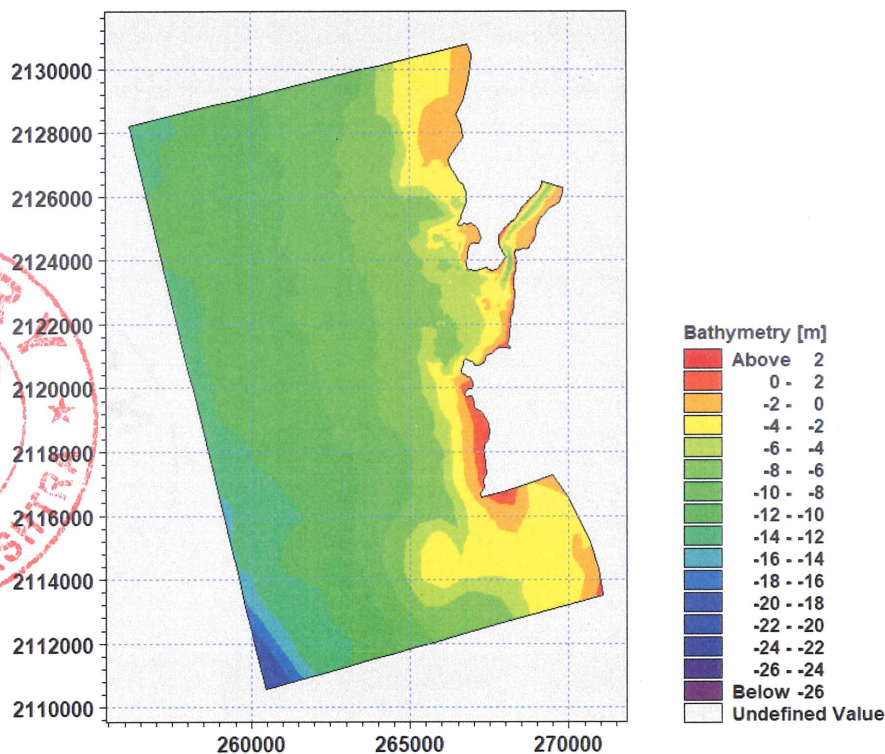


Figure 17 Bathymetry of study region

2.5 Initial and Boundary Conditions

At the start of the simulation, the wave climate, currents, and water levels are set to zero in the whole area. The flow conditions at open boundaries are specified as time varying water level. Wind forcing is included throughout



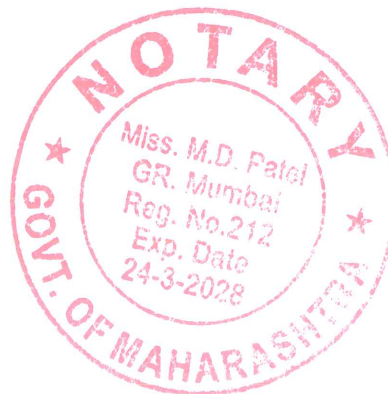
the domain and wave climate is forced from offshore boundary. The closed boundary condition is applied at land.

2.6 Results and discussion

Modelling studies were carried, during model simulation, calibration parameters related to bottom friction, wave breaking, eddy viscosity and bed resistance were adjusted in the model.

2.6.1 Waves and Currents

In model simulations, effect of waves was also accounted by using spectral wave numerical model. Model computations were carried out based on offshore wave climate (significant wave height, peak wave period and mean wave direction) as boundary conditions. With these boundary conditions, wave transformation has been performed from offshore to nearshore. Fig. 18 shows the typical wave height variation along Aksa coastline during monsoon. The waves are coming from SW, the typical offshore wave height is of 3-3.25m, when it travels to the nearshore of Aksa, wave dissipate energy and becomes 1-1.5m. The Fig. 19 shows the typical spatial variation of tidal current over the domain. The highest high tide and lowest low tide is +2.3 m and -2.6 m with respect to MSL, respectively. The current speed is in the order of 0.4-0.6 m/s near the entrance of estuary and 0.25-0.4 m/s in surf zone.



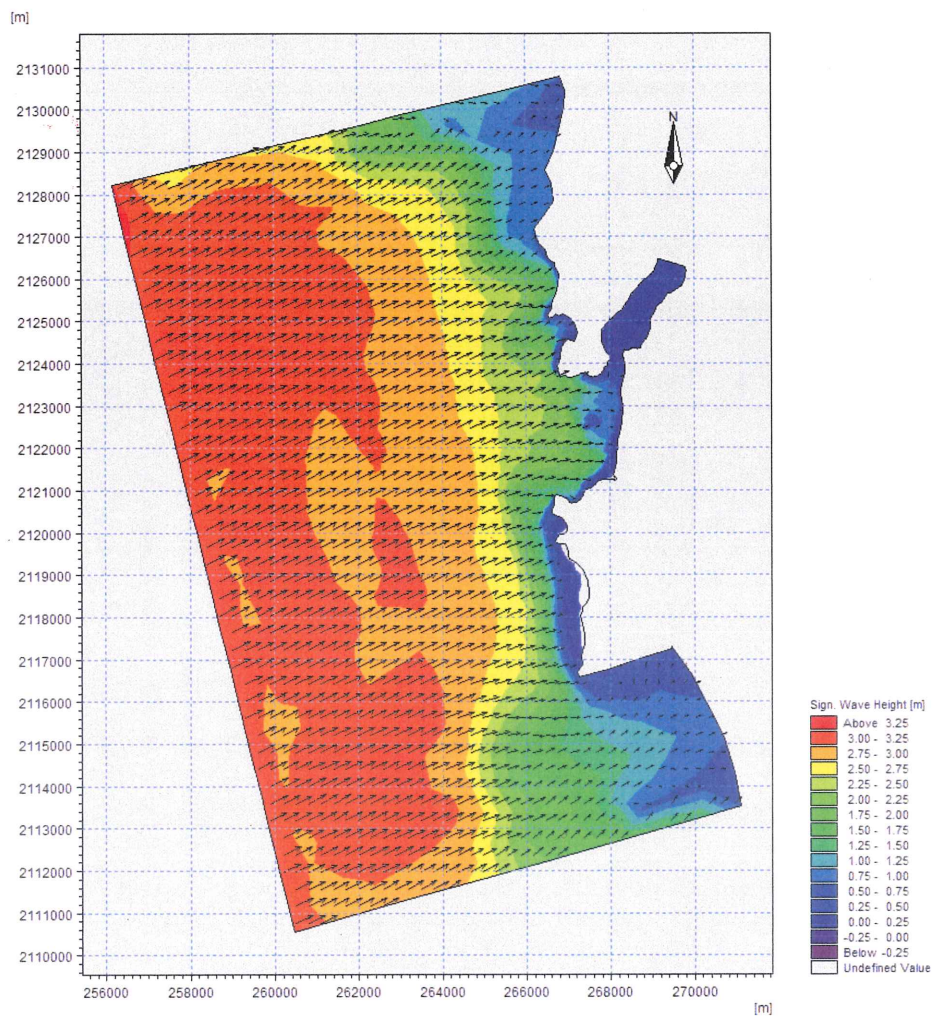
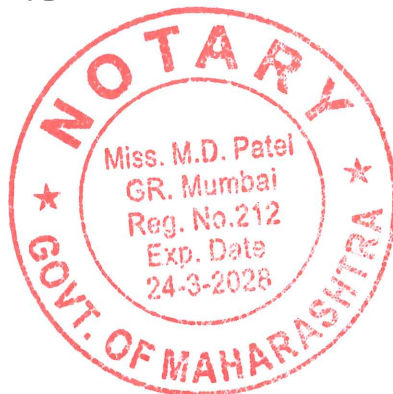


Figure 18 Typical wave climate during monsoon



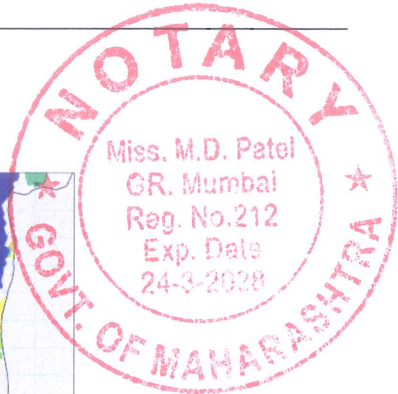
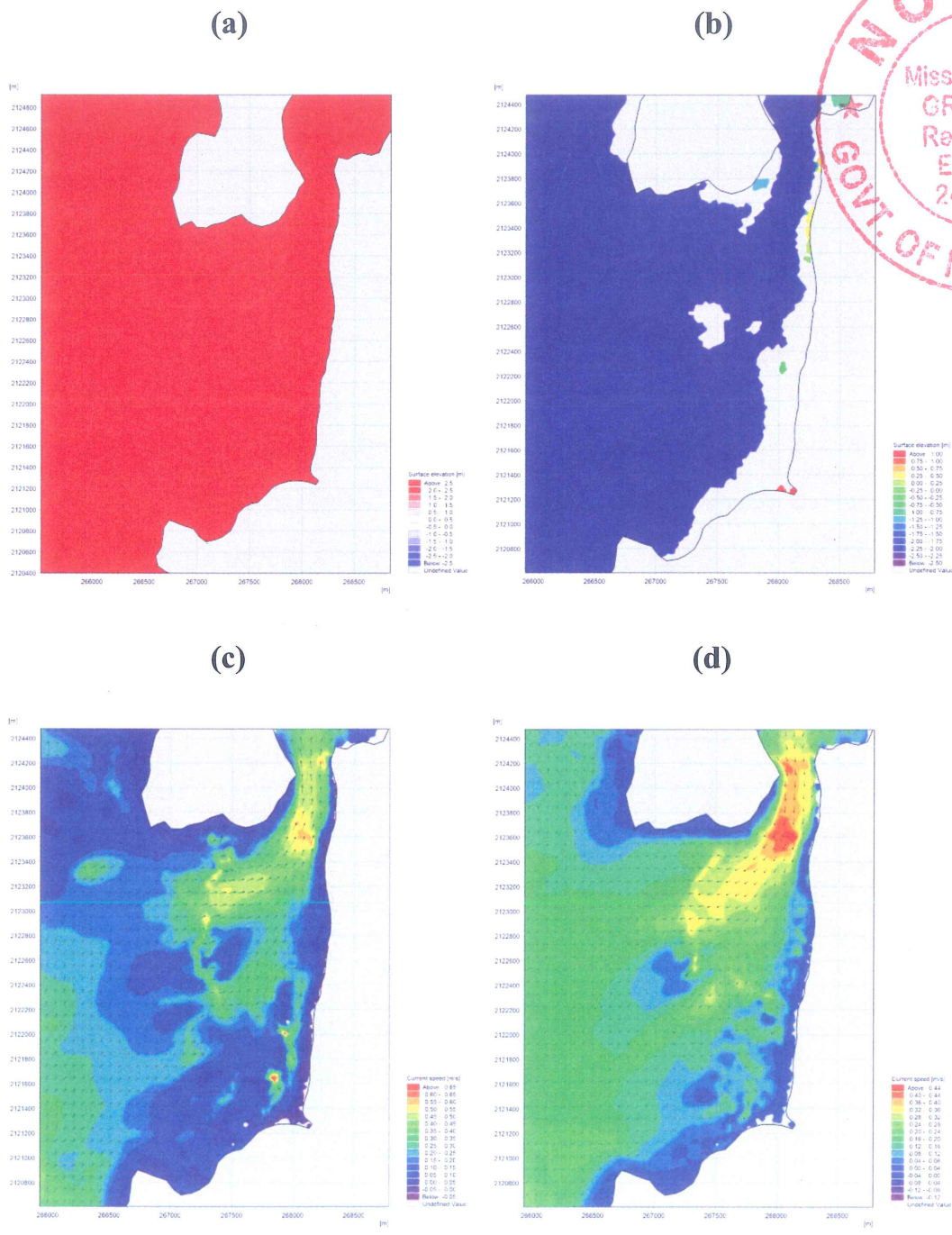
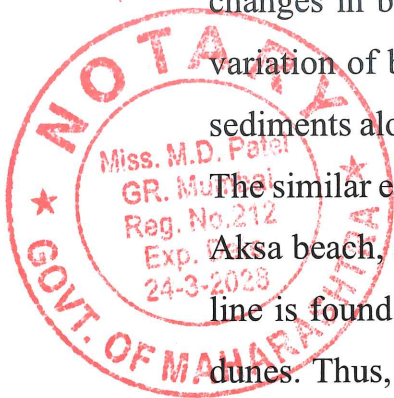


Figure 19 Typical tide hydrodynamics off Aksa, (a) High tide (b) Low tide (c) Flood tidal current (d) Ebb tidal current



2.6.2 Sediment Transport

The coupled hydrodynamic, wave and sediment transport model simulation were undertaken for one year and five years. The sediments over the study region are mainly driven by the tide and waves present. The tidal currents and wave induced currents are the major drivers for longshore and cross shore sediment transport. The loss or gain of sediments to the coast lead to erosion or accretion, respectively. The typical changes in shoreline after one year is shown in Fig. 20. The baseline represented with white dashed line is the initial shoreline (zero-meter contour), as shown in Fig. 20a, and the typical changes in shoreline after one year is shown in Fig. 20b (marked with red dashed line). It is observed that the shoreline moves landward, means erosion along the Aksa beach. On an average the 25-50m landward shift of shoreline is observed along Aksa beach. Along with changes in shoreline the changes in bed levels are also investigated. The Fig. 21 shows the spatial variation of bed level change after one year and five years. The erosion of sediments along Aksa beach is observed after one year, as shown in Fig. 21a. The similar erosion pattern has been observed in long-term (five years) along Aksa beach, as shown in Fig. 21b. The portion of beach above the high tide line is found to be very flat unlike other locations where it is protected by dunes. Thus, these areas are prone to inundation and flooding during storm conditions and monsoon weather. The flooding could also lead to erosion of earth material/sand undermining the foundation of the developed facilities. Any facility developed in these areas should be protected from erosion by providing suitable erosion protection measures.



Shoreline studies to ascertain the coastal erosion for Aksa beach, Mumbai, Maharashtra.



Prof. Manasa R. Behera, Ocean Engineering
Department of Civil Engineering, IIT Bombay

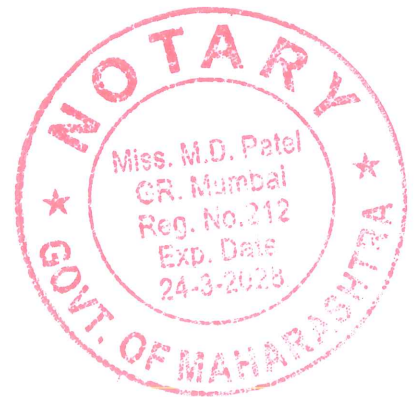
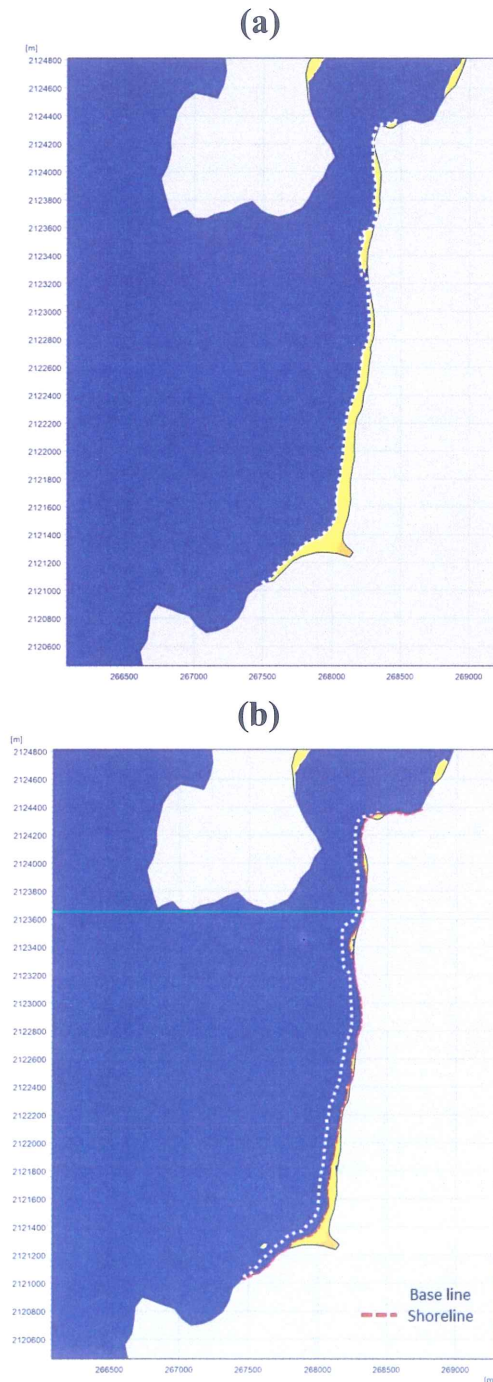
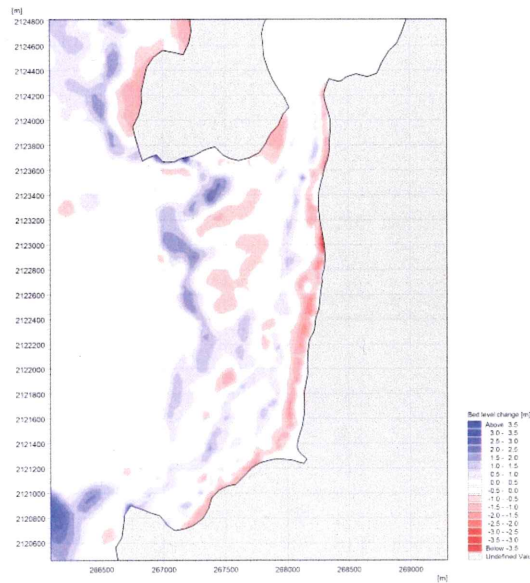


Figure 20 Typical changes in shoreline (zero-meter contour, marked with white dash line) (a) Initial (b) after one year



(a)



(b)

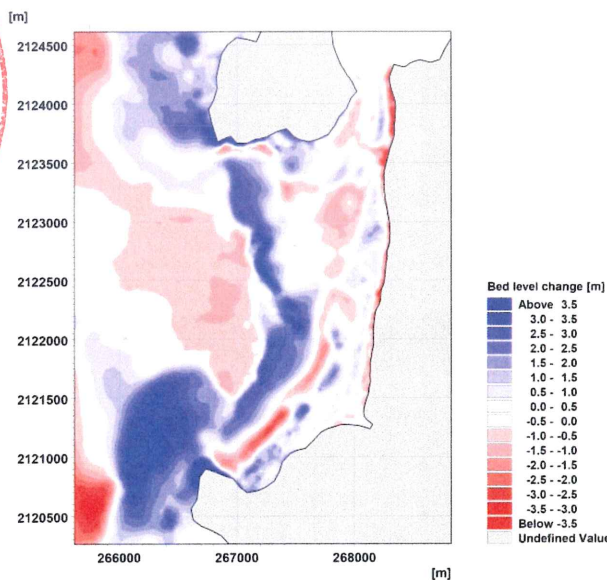
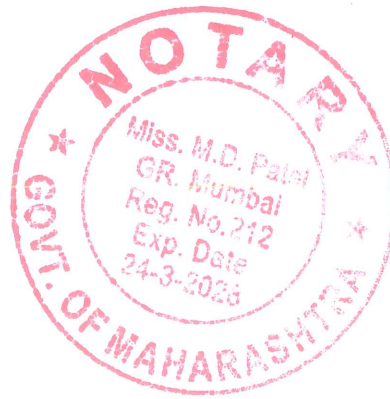


Figure 21 Changes in bed morphology/levels after (a) one year (b) five years



2.7 Summary of sediment transport study

Typical changes in shoreline morphology off Aksa beach is summarized. The erosion along the Aksa beach is observed in a short and long-term time scale. The erosion rate varies depending on the wave and current conditions in different years. However, the extreme wave climate condition was considered for the yearly study and shows severe erosion at the site. In addition, the along-term modelling study also show significant eroding pattern at the Aksa Beach which is substantiated by the satellite image analysis.

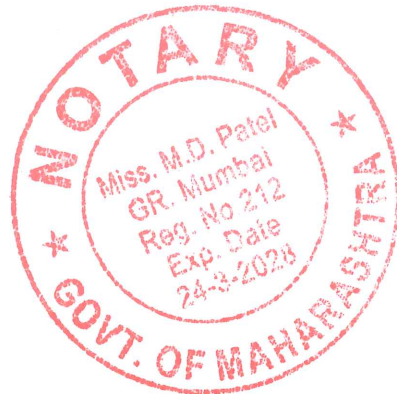




3 CONCLUSIONS

Morphology study by using coupled tide, wave and sediment transport models is performed for the Aksa coast. The analysis shows that predominantly waves come from SW direction. The sediment analysis shows the erosion along the Aksa beach and accretion near offshore of Aksa beach. The flat region above high tide line is mostly likely prone to erosion during storm and monsoon weather. Erosion protection measures should be implemented to protect the beach and infrastructures adjoining the beach.

Prof. Manasa R. Behera
Ocean Engineering
Department of Civil Engineering
IIT Bombay



Minutes of the 172nd Meeting of Maharashtra Coastal Zone Management Authority held on 05th February, 2024

The 172nd meeting of the Maharashtra Coastal Zone Management Authority (MCZMA) was held under the Chairmanship of Principal Secretary (Environment and Climate Change), through Videoconferencing technology on Cisco WebEx platform on 05th February, 2024. List of members present in the meeting is at Annexure-I.

Confirmation of minutes of 171st meeting:

The Authority confirmed the minutes of 171st meeting of the MCZMA held on 15.12.2023 & 29.12.2023 without any change.

Item No. 1: Proposal for amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksa beach, Madh, Mumbai Suburban by MMB

Introduction:

The Chief Engineer, MMB presented the proposal before the Authority. The matter pertains to request of MMB for amendment in CRZ Clearance for Anti Sea Erosion Measures to sea front development & beatification at Aksa beach, Madh, Mumbai Suburban.

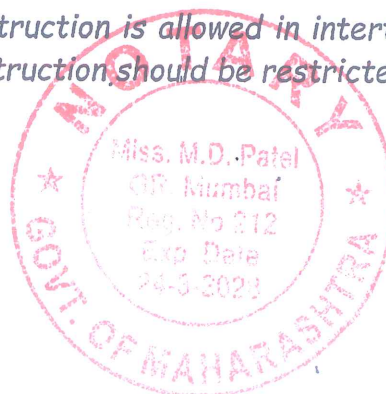
Earlier, the MCZMA in its 127th meeting held on 02nd November, 2018 deliberated the proposal of Anti sea erosion bund of 900 m and recommended the proposal from CRZ point of view to SEIAA subject to certain conditions.

Thereafter, the SEIAA vide letter dated 5th March, 2019 granted the clearance for the project.

The MMB during the meeting presented that there are existing poles and proposed public facilities immediately along the beach and there are existing private properties nearby, hence, it is not possible to keep anti sea erosion bund on landward side of HTL. The MMB has requested to delete the following specific condition No.1 of the MCZMA recommendation and SEIAA clearance:

- I) MMB to ensure that no construction is allowed in intertidal or beach area i.e. CRZ area. Solid construction should be restricted to landward side of the High Tide Line.

Member Secretary


Chairman

Minutes of the 172nd Meeting of Maharashtra Coastal Zone Management Authority held on 05th February, 2024

In the 168th meeting, Expert Member asked MMB whether any scientific studies from erosion point of view from competent organisation have been carried out in the matter recommending the necessity of the bund at site proposed by MMB. The proposal was deferred for want of above information.

Deliberation:

The Chief Engineer, MMB presented that assessment of location of placement of Anti Sea Erosion Bund and shoreline studies to ascertain the coastal erosion for Aksa beach has been carried out by IIT, Mumbai and desk studies for design of coastal protection works carried out by CWPRS, Pune.

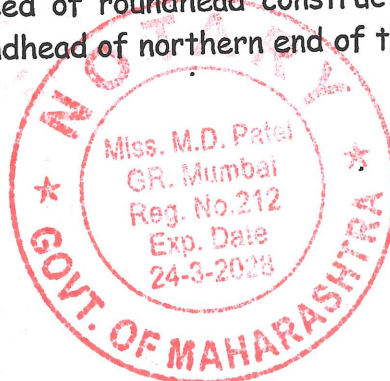
The MMB has submitted report dated 17.04.2023 on Assessment of location of placement of Anti Sea Erosion Bund by IIT, Mumbai. As per the report, it is found that Aksa beach is an eroding site and the existing structures are affected by erosion. Hence there is need to provide Anti Sea Erosion bund to protect the facilities being developed. The alignment chosen to construct the anti sea erosion measure seem appropriate as the existing electric poles were collapsing due to erosion.

The MMB has submitted report dated 12.05.2023 on desk studies for design of coastal protection works by CWPRS, Pune.

- a) The constructed seawall is aligned with the existing electric pole. The alignment of the wall is in between High & Low water line, which is a permissible activity in CRZ-1B. The seawall /Toe-berm protection was necessary to protect boundary wall & the proposed beautification. During the visit there was a flood tide (about 3.0 m water level) and the measured distance between toe-berm of the seawall to water line was about 50 m.
- b) It is recommended to provide roundhead on both sides of the seawall to reduce flanking effect on either side of seawall. However, the roundhead at the entrance (southern side of Seawall) may cause hinderance to the public visiting Aska beach. Hence, it is advised to monitor the effect of flanking on the southern side of seawall for 2-3 years and then the decision regarding the need of roundhead construction (southern side) may be taken-up. The roundhead of northern end of the seawall should be constructed immediately.

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Member Secretary



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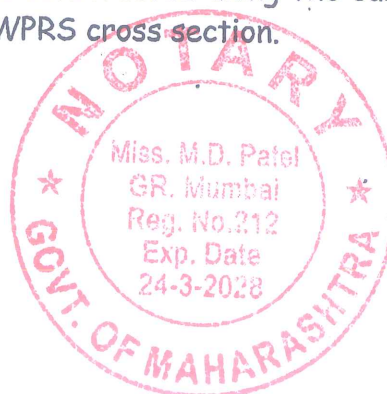
- c) The constructed seawall is a flexible structure made up of rubble mound and it is essential to monitor and maintain them regularly. It is advisable to compile the beach profile data Infront of the constructed seawall upto the LWL or 80m (whichever is lower) at least for 3 years to compare the changes of the beach profiles.
- d) The drainage pipes on the landward side of the seawall needs regular checking for clogging, etc. and cleaning is required in case of chocking of pipes.
- e) Proper monitoring is required to check the performance of the seawall at least in 2-3 years especially during monsoon..

The MMB also submitted report dated 21.12.2023 on the shoreline studies to ascertain the coastal erosion for Aksa beach by IIT, Mumbai. The IIT report summaries that the MMB is proposing shoreline studies to ascertain coastal erosion / accretion pattern at Aksa Beach. In this regard, mathematical modelling studies were carried out using 2- Dimensional modelling to study wave transformation and morphological changes near Aksa Beach. The report summaries the wave climate characteristics at offshore and near proposed location. The wave transformation study shows that the waves predominantly come from South- West. The study shows net erosion at Aksa Beach with landward shift of shoreline. Based on the site visit and satellite image analysis, it is observed that Aksa Beach is an eroding site, and the existing structures are already affected by erosion. Hence, there is a need to provide anti-sea erosion bund to protect the facilities being developed.

IIT report concludes that, Morphology study by using coupled tide, wave and sediment transport models is performed from the Aksa coast. The Analysis shows that predominantly waves come from SW direction. The sediment analysis shows the erosion along the Aksa Beach and accretion near offshore of Aksa Beach. The flat region above high tide line is mostly likely prone to erosion during storm and monsoon weather. Erosion protection measures should be implemented to protect the beach and infrastructure adjoining the beach.

The Chief Engineer, MMB stated that there are existing electric poles on site and part of Anti Sea Erosion bund constructed along the said existing electric poles as per recommendation of CWPRS cross section.


Member Secretary




Chairman

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The authority noted the Order passed by Hon. National Green Tribunal, (WZ), Pune on 01.12.2023 in the matter of Mr. Banda Nagraj Kumar & Anr. Vs Maharashtra Maritime Board & Ors. (Original Application No.77/2023(WZ)).

"11. We are of the view that whether this condition needs to be deleted from the CRZ clearance or not, a decision has to be taken by the MCZMA at their end, which is pending for a long time. Therefore, we direct the MCZMA to decide this matter within a period of one month positively. This matter cannot be kept open ended for indefinite period. The respondent No.1 shall also provide whatever kind of study it wants to place before the MCZMA within a period of 20 days from today and within a week thereafter, the MCZMA shall file reply affidavit and a copy of the same shall also be served upon all other parties, who may file rejoinder affidavit against the same, if any, within one week thereafter.

12. We further make it clear that till then, no further construction would be done."

The Authority noted that at the time of recommendation in 127th meeting, the CRZ Notification, 2011 and approved CZMP under it was in force. As per the para 4(i)(f) of CRZ Notification, 2011, "erosion control measures" are permissible activity in CRZ area.

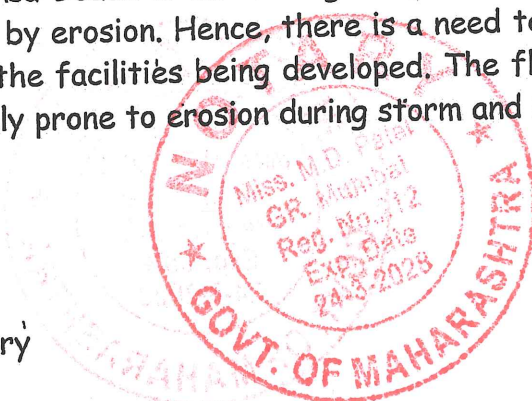
At the relevant time, the Authority while deliberating the proposal exercised extra caution and felt to put a condition that "no construction is allowed in intertidal or beach area i.e. CRZ area. Solid construction should be restricted to landward side of the High Tide Line"

However, from the reports of IIT and CWPRS submitted by the MMB, it is observed that the seawall is aligned with the existing electric pole. The alignment chosen to construct the anti-sea erosion measure seem appropriate as the existing electric poles were collapsing due to erosion.

As per IIT report, the study shows net erosion at Aksa Beach with landward shift of shoreline. Based on the site visit and satellite image analysis, it is observed that Aksa Beach is an eroding site, and the existing structures are already affected by erosion. Hence, there is a need to provide anti-sea erosion bund to protect the facilities being developed. The flat region above high tide line is mostly likely prone to erosion during storm and monsoon weather. Erosion

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Minutes of the 172nd Meeting of Maharashtra Coastal Zone Management Authority held on 05th February, 2024

protection measures should be implemented to protect the beach and infrastructure adjoining the beach.

Taking into account the above said reports, due to site constraints and electric pole present near the site and need to protect the infrastructure adjoining the beach, the Authority is of the view that above said condition stipulated in earlier MCZMA recommendation requires modification.

It was further deliberated that before construction, MMB was required to put a request to MCZMA informing the Non Feasibility to construct the seawall on landward side of the HTL, due to constrains of the site conditions and hence, requires deletion / amendment. Now, it came to the notice of the Authority from the representation of MMB and various report of IIT & CWPRS called by the Authority; that there are constraints and seawall could not be restricted on landward side of HTL. After detailed deliberation and considering various reports, the Authority opines that above said condition requires amendment.

The Authority deliberated that construction of seawall to occupy certain area of beach for construction, however, seawall is necessary in order to protect the considerable area of beach.

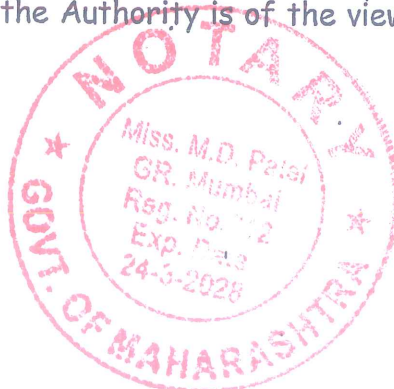
Furthermore, the Authority observed that CRZ Notification, 2019, has also allows anti-sea erosion measures in intertidal area i.e. CRZ IB area. The Authority noted that presently, the CRZ Notification, 2019 and approved CZMP under it is applicable. As per approved CZMP of Mumbai, 2019 the anti-Sea Erosion Bund is partly falls in CRZ-IB & partly in CRZ-II area. As per para 5.1.2(i) (d) and 5.2 (i) of CRZ Notification, 2019, measures for control of erosion is permissible activity in CRZ-IB & partly in CRZ-II area.

The Authority after detailed deliberation felt that the project of anti sea erosion measure implemented by the MMB is vital public interest project with an objective to protect the coastline from eroding and for protection of infrastructure /properties present near the beach.

In view of above, the Authority observed that the above said condition mentioned in earlier MCZMA recommendation could not be deleted entirely as per request of the MMB. However, the Authority is of the view that the above said conditions needs modification.



Member Secretary



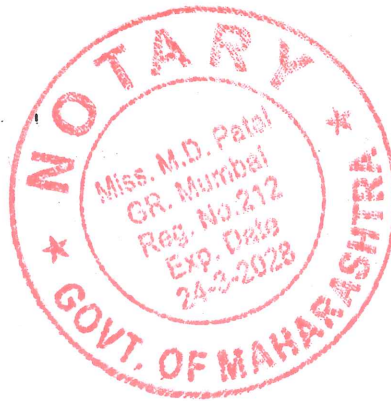

Chairman

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Authority held on 05th February, 2024

Decision:

In the light of above, the Authority after deliberation decided recommend the proposal to SEIAA for modification of the specific condition no. (I) as follows:

"MMB to ensure that Anti Sea Erosion bund shall occupy minimum intertidal area which is necessary"



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Member Secretary

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Chairman