

Strategic EIA for Identification of Potential Sites for Marinas, Ski Lanes and Bathing Areas for Mauritius

FINAL TECHNICAL REPORT

Executive Summary

1. INTRODUCTION

From 1991 to 2004, the number of tourists that visited the Island of Mauritius increased from 300,000 per annum to more than 700,000 per annum. This represents an increase of more than 100%. During that same period, the number of large hotels on the island jumped from 80 to 103. Practically all of these hotels are located on or close to the beach.

This rapid increase in the number of tourist arrivals has led to an increase in the demand for sea sports activities such as water skiing, diving, big game fishing and bathing, since the great majority of the tourists that come to Mauritius do so to enjoy the sea. The local population, too, more and more would like to enjoy the sea and feel the thrill of sea sports.

Today, the number of pleasure craft registered with the Authorities exceeds 3,000. However, despite the great number of pleasure crafts, there are no marinas to service their needs (except for larger boats which can use Port Louis harbour and a few others which scramble for shelter at Caudan Basin during cyclonic conditions). Meanwhile, the other activities are carried out without proper regulations and planning. There is, therefore, a need for the construction of a few marinas, as well as for proper zoning of the lagoons to clearly demarcate ski lanes, snorkelling sites and bathing areas in order to satisfy the expectations of the tourists and the local population.

However, if these developments are not properly planned, they will inevitably lead to the degradation of an already stressed marine environment, which would not only be detrimental to the country in general, but would jeopardize the tourism industry. Indeed, the tourism industry in Mauritius depends to a large extent on its coastal and marine resources. The environmental degradation of the beaches and the lagoons, which are currently the main assets of the tourism industry, would have a negative impact on the number of tourist arrivals.

In line with the policy of the Government to preserve the environment and, at the same time, respond to the rapidly growing demand of the tourists and the local population for sea sports facilities, the Ministry of Environment (MoE) commissioned a study to conduct a Strategic Environmental Impact Assessment (SEIA) to identify sites where marinas, ski lanes and bathing areas could be developed with least possible negative impacts on the environment and the marine ecosystem.

2. DEFINITION OF STRATEGIC EIA

A Strategic Environmental Impact Assessment (SEA) is a process for identifying and addressing the environmental, social and economic dimensions, effects and consequences of policies, plans and programmes (PPPs) and other high-level initiatives. The SEA should take place before decisions are made and preferably as a contribution to the formulation and development of plans or policies, rather than focusing only on the impact of their implementation. SEA aims at ensuring that environmental aspects are addressed and incorporated at decision-making levels prior to, or above, the project level i.e. at strategic decision-making levels.

3. AIMS AND OBJECTIVES OF STUDY

The overall aim of the project is to identify the best potential sites where marinas, ski lanes and bathing areas may be established, and to identify sensitive or vulnerable sites where such developments should not be permitted.

The objectives of the study were identified in the Terms of Reference as being:

- To identify the need and demand for marinas, ski lanes and bathing areas in Mauritius,
- To select the most appropriate sites where such facilities could be established with the least environmental disturbances taking into account socio-economic factors, and,
- To determine and assess the likely environmental impacts and to propose measures to mitigate the negative impacts and to maximise the benefits of such projects.

4. PROJECT TEAM

This SEIA study of marinas, ski lanes and bathing areas was carried out by a multi-disciplinary consortium comprising Mega Design Ltd of Mauritius (civil engineers), in association with Entech Consultants (Pty) Ltd (coastal engineers) and WSP Walmsley (Pty) Ltd (environmental scientists).

5. OVERVIEW OF MARINAS, SKI LANES AND BATHING AREAS

5.1 MARINAS

The concept of “marinas” sometimes also termed “small craft harbours”, is quite varied.

Marinas vary from large protected water bodies containing hundreds of boats to a ‘dry’ marina consisting of boat launching facilities and dry standing or boat garages only. Associated facilities are sometimes from the bare essentials to boat yards, boat repair services, boat sales etc. Marinas can also form part of a much larger development including residential and commercial components to dense waterfront development.

For initial classification and study purposes, marinas in Mauritius were classified into three categories as follows:

5.1.1 LARGE MARINA OR SMALL CRAFT HARBOUR

Typically this is a harbour of refuge where boats can remain during all weather conditions including cyclone events. Boats are typically moored on fixed or floating jetties. Consideration for efficient boat launching and retrieval will be necessary as well as a host of services. The water depth should typically be 4m chart datum to accommodate large yachts/keel boats. This marina should be fully protected by marine works such as breakwaters or natural protection i.e. closed embayment or estuary.



(Source: Granger Bay, V&A Waterfront, Cape Town – Entech Coastal Engineers)

5.1.2 MEDIUM MARINA

Typically, this marina is limited to shallow draft boats. This type of marina can typically be associated with resort development and has limited boat related service facilities. Ideally systems for launching and retrieval of boats are provided as well as possible dry storage. The typical depth should preferably be 2m and not less than 1.5m chart datum. Marina protection works could be limited to minor structures or existing natural embayments.



Marina at St. Gilles, Réunion Island

5.1.3 SMALL MARINA

This marina essentially could consist purely of a well-designed boat ramp for launching and retrieval of boats and dry standing/garage or stacking racks for boats. This marina could be club operated and could make provision for trailer launching of speedboats and small yachts with retractable keels. Water depth could be shallow but preferably not less than 1 m chart datum.



Marina at Trou Fanfaron, Port Louis

The typical components of a fully-fledged marina are as follows:

- A basin of sufficient depth protected either by natural means or manmade breakwaters, land reclamation, dredging or extensive reshaping of the land environment.
- Within the basin a marina normally has fixed or floating docks for the mooring of boats.
- The docks provide a range of services such as electricity, fresh water, communications, cable TV, fire fighting, locker boxes, solid waste containers and sometimes sewage pump out.
- At a central location further services for boats include fuelling, sewage pump out, water supply, gas supply, slops removal.
- Further facilities for boats include launching ramps, finger jetties for straddle carrier or other lift out mechanism e.g. derrick crane.
- Land facilities related to boats specifically include boat storage, boat yard, repair shops, hull cleaning, carpentry shop, rigging shop, electronic sales and repair etc.
- Additional land facilities typically consist of an extensive variety of facilities, shops and services.



Floating docks for boat mooring

5.2 SKI LANES

Water skiing is both a leisure activity as well as an established and recognised sport. For competition skiing, i.e. slalom courses, jump events, trick skiing and /or bare foot skiing, very special requirements are needed which are normally only feasible on specially constructed inland lakes to provide ideal conditions. For competition and specialty skiing areas it is thus considered highly unlikely to find such locations within the lagoon areas of Mauritius.



Water Skiing

The typical components and requirements of ski lanes are summarized as follows:

- Calm water area with a minimum size of some 5 ha and preferably 10 to 15 ha, protected from wind and with no underwater obstructions;
- Suitable length and width of relatively shallow water for exclusive use of skiers and preferably zoned as such;
- A minimum water depth of 1m chart datum but preferably 1.5m.
- All amenities related to power boating such as clubhouse, boat launching, boat storage, parking, etc.

5.3 BATHING AREAS

Going to the beach or to the sea means a lot of different things to different people. For some it is a family outing, for some it may be a chance to swim and snorkel, for others it is a chance to exercise. Clean water of optimum depth is only one parameter constituting a good bathing area.

The typical components of a bathing area are:

- A water activity area bounded by the water line and the 1.5 m depth contour. This is the depth at which most people are still able to touch bottom and feel safe.
- A dry recreational area bounded by water line and backshore edge, often defined by the vegetation line or hummock dunes and pioneer plants.
- Backshore area from dry recreational area to the next natural or manmade boundary such as a fence or road providing space for parking, amenities and picnic areas.



Bathing Area at Blue Bay

The physical requirements for bathing areas can be summarized as follows:

- Bathing area at least 30 m wide, preferably no more than 60 m
- Bottom free from dangerous obstacles or sharp objects
- Bottom firm but ideally soft to touch (like sand)
- Dry recreational area typically some 30 m wide with minimum width 10 m
- Backshore area typically some 120 m wide
- Average carrying capacity for public beaches vary from 4 to 6 persons per meter length of beach (i.e. 5 to 8 m² per person for 30 m wide beach)
- Capacity depends on combination of swimmers, 'dry beach' users and backshore capacity, i.e. picnic area
- Density of use can be regulated by limiting the provision of parking

6. STUDIES UNDERTAKEN AND METHODOLOGY USED

In order to achieve the study objectives, the following activities were undertaken over a period of one year:

- A national survey was conducted to ascertain and quantify the current and expected demand for marinas, ski lanes and bathing areas.
- A comprehensive data collation programme was undertaken in order to obtain as much baseline environmental data as possible. This included published and unpublished reports and documents, maps and aerial photographs and images. The corollary to the data collation programme was a gap analysis to identify areas with no or insufficient data.
- A situation analysis was undertaken of the existing marinas, ski lanes and bathing areas.
- A legal and policy review was carried out to identify the relevant Acts and Policies;
- A Geographic Information System (GIS) was set up to map the baseline data for the coast as well as to graphically illustrate the existing infrastructure relating to marinas, ski lanes and bathing areas. This system will be transferred to MoE to assist with future planning.

6.1 MARINAS

For marinas, a systematic process of site selection was adopted, which involved the following tasks:

- Obtain a short list of potential sites based on key criteria such as passes, navigation, natural shelter, water depth and land availability. This resulted in a list of 22 sites, including the existing harbour facilities at Port Louis and the proposed development at Anse Jonchée;
- The MoE requested the study team to add a further 8 and later another 4 sites to the short list, as sites for which proposals have been received, giving a total short list of 34;
- Field surveys were undertaken by the multi-disciplinary study team of the short listed sites and each site was evaluated in terms of a number of criteria under the broad headings of marine engineering, infrastructure (including land availability), socio-economics, marine ecology and terrestrial environment;
- The coastal area was divided into six 'envelopes' to ensure that marinas would be provided at strategic locations, roughly equidistant from each other around the coast.
- A scoring and weighting system was adopted to provide a relative score for each site and the sites were ranked;
- The highest ranked site in each envelope was identified as one of the six candidate sites;
- The selected six sites plus Anse Jonchée were then analysed in greater detail, to take into account *inter alia*, the hydrodynamics and actual/potential risk of erosion both *in situ* and on nearby islets and beaches, the geomorphology of shoreline, the marine and terrestrial habitats and a coastal evaluation including a general bathymetry, bottom sedimentation study, water quality, etc.

- Conceptual plans were developed for each site, (except for Anse Jonchée, for which the developer's plans were used), together with a discussion regarding the site's sensitivity and vulnerability. In addition, a Preliminary Environmental Impact Assessment was prepared for each site to highlight the key issues and to make broad recommendations for the studies required in a full EIA and EMP if the site were to be developed.

6.2 SKI LANES

For ski lanes, the process of site identification, assessment and recommendation involved the following tasks:

- The presence of existing ski lanes was established.
- At existing ski lanes the back up services and types of activities undertaken was determined.
- It was established that the ski lane sites are linked to the hotel industry and in close proximity to a specific hotel or group of hotels.
- Site observations were made and discussions held in order to evaluate the existing ski lanes.
- The ski lanes were evaluated in terms of a number of criteria.
- A scoring and weighting system was adopted to provide a relative score for each site and the sites were ranked.

6.3 BATHING AREAS

For bathing areas the following methodology was used for site identification, assessment and recommendation:

- A site reconnaissance was undertaken to gain a general perspective of the beaches and related bathing areas.
- Specific details of all the existing proclaimed public beaches were obtained in the form of 1:2500 map extracts.
- Field surveys were undertaken of all 88 proclaimed beaches to assess a broad range of criteria.
- The beaches were then rated on a number of criteria and on the overall beach quality as well as on bathing quality.
- An overall classification of beaches into different classes was subsequently carried out and recommendations made to improve infrastructures and safety.

7. REPORTING

Reporting comprised the following:

- Preparation of a Technical Report, plus supporting information in appendices.
- Preparation of separate guidelines on:
 - Construction and implementation of marina projects;
 - EIA and EMP report preparation for marinas, ski lanes and bathing areas;
 - How to assess EIA reports;

- Dredging;
- Cyclone protection.

8. FINDINGS AND RECOMMENDATIONS

The main findings of the study and recommendations made have been expounded in the main report under the following headings:

- Baseline Data
- National Survey and Demand
- Strategic Assessment of Potential Sites
- Site Specific Assessments
- EIA of Anse Jonchée
- Guidelines for Project Implementation

8.1 FINDINGS FROM DATA COLLECTION AND NATIONAL SURVEY

- (a) From the site reconnaissance and desk studies, it was possible to collate sufficient background data for the strategic identification and assessment of marinas, ski lanes and bathing areas.
- (b) For the site-specific assessment, detailed surveys have been undertaken at selected locations and where information was inconclusive or non-existent.
- (c) From the development strategy and policy statements, it is quite clear that development should concentrate on the upgrading and refurbishment of existing infrastructure prior to considering green field sites especially in the coastal zone.
- (d) It is also apparent that there is a general presumption against major new developments along the open coast unless in the national interest or unless suitable alternatives cannot be found.
- (e) In addition, the policy statements state that it is an absolute requirement that all development in the coastal zone and outside existing residential and / or tourism zones shall be subject to a full Environmental Impact Assessment in terms of the Act.
- (f) Existing infrastructure for boats is mostly informal and generally limited. Cyclone shelter for boats is practically non-existent. Port Louis is the only recognized shelter for boats by the insurers.
- (g) There are only two formal and zoned ski lanes in Mauritius. There are, however, several areas where water skiing takes place. This is strongly related to the hotel industry and location of the hotels.
- (h) There are many proclaimed public beaches around Mauritius. The quality of bathing conditions, however, varies considerably with some existing beaches without access to bathing waters. The hotels along the coast also have beaches with bathing conditions

of varying quality. Hotels, however, have generally large swimming pools at the beachfronts.

- (i) The total registered boat population of Mauritius is estimated at 7800. Of these some 3200 boats are registered with the Ministry of Tourism and 4600 boats are registered with the Ministry of Fisheries. By far the greater majority of boats are considered less than 6m in length.
- (j) A major climatic condition which influences boating in Mauritius is the occurrence of cyclones and the accompanying strong winds and rise in water levels. Waves are generally depth limited because of the extensive fringing reef around Mauritius.
- (k) From a marine ecological point of view, the most sensitive habitats are coral, seagrasses and mangroves. Development in/or near these habitats should be avoided.
- (l) Carrying capacity for boating has not reached saturation point, but should be subjected to controls and management. Carrying capacity with regards to ski lanes and bathing areas is mostly self-regulating.
- (m) There is a large demand for improved facilities from boat owners around Mauritius, with a pronounced demand in the north of the island.
- (n) A market may be created for foreign yachts if marinas with desirable amenities are constructed.
- (o) There is, however, a large variance in the type of facilities that are in demand.
- (p) Presently there are several very large IRS projects being initiated and which incorporate 'marina' concepts mostly aimed at tourism and foreign investment.
- (q) There is also a pressing demand for improved facilities for local boat owners and especially fishermen.
- (r) There is a growing demand for skiing facilities among tourists who are no longer content just sitting on the beach.
- (s) There is also a demand among local residents, specially the younger ones for skiing to be made available and affordable to them; this sport being at present almost the exclusivity of hotels catering for foreign tourists.
- (t) There is a demand for improved bathing areas especially on the southern seaboard of Mauritius.

9. CURRENT AND EXPECTED DEMAND FO MARINAS, SKI LANES AND BATHING AREAS

Ensuing from the national survey, the statistical demand for marinas, ski lanes and bathing areas has been established as follows:-

9.1 MARINAS

Current & Expected Demand for Marinas according to Water Depths

Current Demand according to drafts- Year 2003					Expected Demand according to drafts-Year 2010			
Boat type	AF&SC	AX, AY & PB	AZ & BY	BG & BZ	AF&SC	AX, AY & PB	AZ & BY	BG & BZ
Depth of marina	1.5m	1.5m	2m	4m	1.5m	1.5m	2m	4m
Appellation	Small	Small	Medium	Large	Small	Small	Medium	Large
North West	348	317	15	14	529	387	18	17
North	217	1290	87	37	330	1574	106	45
North East	486	492	27	6	739	600	33	7
East	501	672	32	11	762	820	39	13
South East	674	839	41	28	1024	1024	50	34
South	29	30	8	0	44	37	10	0
South West	415	1124	66	36	631	1371	81	44
Total	2670	4764	276	132	4059	5813	337	160
Grand Total				7842				10369

Note: AF - Boats owned by professional fishermen
 SC - Sand carriers
 AX - Boat less than 6m long operating within 8 nautical miles
 AY - Boat 6 – 12m long operating within 8 nautical miles
 PB - Pleasure boats
 AZ - Boat greater than 12m operating within 8 nautical miles
 BY - Boat 6 – 12m long operating beyond 8 nautical miles
 BG - Big game
 BZ - Boat greater than 12m operating beyond 8 nautical miles

9.2 SKI LANES

Current and Expected Demand for Ski Lanes

	Daily Demand (Ski trips)		Supply	Additional Requirements (Ski trips)	
	2003	2010		2003	2010
Local	600	600	Nil	600	-
Tourists	3,430	6,860	1,800	1,630	3,430
Total	4,030	7,460	1,800	2,230	3,430

9.3 BATHING AREAS

Current and Expected Space Requirements for Bathing Areas

Coastal District	Existing Space Requirements (m)						
	Existing Seafront Space (m)	2003			2010		
		Locals	Tourists	Totals	Locals	Tourists	Total
Port Louis	198	Nil	Nil	Nil	Nil	Nil	Nil
Pamplemousses	5,814	6,230	205	6435	6,860	410	7,270
Riv du Rempart	6,060	590	20	610	650	40	690
Flacq	7,150	3,260	110	3370	3,590	220	3,810
Grand Port	5,172	7,120	230	7350	7,840	460	8,300
Savanne	5,973	3,560	120	3680	3,920	240	4,160
Black River	8,703	8,900	290	9190	9,800	580	10,380
Total	39,070	29,660	975	30,635	32,660	1,950	34,610

10. POTENTIAL SITES IDENTIFIED FOR MARINAS

From an extensive site selection, assessment, ranking and weighting exercise, the marina sites were evaluated as given below, based on the following criteria:

- Coastal physical characteristics
- Accessibility and land space
- Socio-economic considerations
- Marine ecological factors
- Environmental factors

Sites	Rank	Suitability for marina development (Good, Fair, Poor, Very poor, Fatal flaw)
(i) North		
Grand Baie NE	1	Good
Grand Baie SW	3	Good
Grand Gaube	14	Fair
(ii) North East		
Poste du Flacq	16	Fair
Trou d'Eau Douce	18	Fair
Pointe des Lascars North	22	Poor
Pointe des Lascars South	27	Poor
Trou d'Eau Douce Montague	28	Very Poor
Roches Noires	-	Fatal Flaw
(iii) South East		

Sites	Rank	Suitability for marina development (Good, Fair, Poor, Very poor, Fatal flaw)
Grand Rivière Sud Est River	4	Good
Grand Rivière Sud Est	7	Good
Bois des Amourettes	8	Good
Mahebourg Ville Noire	9	Good
Mahebourg Barachois	13	Fair
Pointe d'Esny	17	Fair
Treize Cantons	25	Poor
Anse Jonchée	29	Very Poor
Anse Bambou	31	Very Poor
(iv) South		
Souillac	6	Good
Baie du Cap	19	Fair
Bel Ombre	21	Poor
Beau Champs	24	Poor
La Prairie	26	Poor
St Felix	32	Very Poor
(v) South West		
Grand Rivière Noire	10	Good
Petite Rivière Noire	11	Fair
Baie du Tamarin	15	Fair
Les Salines	30	Very Poor
(vi) North West		
Port Louis	-	Existing facilities
GRNW Bay East	2	Good
GRNW Bay West	5	Good
Baie du Tombeau	12	Fair
Mon Choisy	20	Poor
Albion	23	Poor
Baie aux Tortues	-	Fatal Flaw

- Six of these sites were identified for more detailed assessment. The six sites chosen are not necessarily the six best sites determined by ranking. They are the best sites located at each of the strategic envelopes around Mauritius.

Marina location	Coastal envelope	Rank (out of 34)
Grand Baie NE	North	1
Grand Baie SW	North	3
Poste du Flacq	North east	16
Anse Jonchée	South east	29
Mahebourg Ville Noire	South east	9
Souillac	South	6
Grand Rivière Noire	South west	10

- Some of the marina sites identified for more detailed assessment are also sites for which there are presently proposals with the Ministry of Environment, e.g. Grand Baie SW, Grand Baie NE and Grande Rivière Noire.
- Many of the marina sites identified could also be developed for smaller facilities limited to launching boats. This would cover the large demand for boat owners who do not need permanent moorings on water.

- The six marina sites chosen, depending on final requirements and details, could be developed with nominal environmental risks, provided that proper mitigation measures and EIA processes are implemented.

11. POTENTIAL SITES FOR SKI LANES

- Only two ski lanes have a formal status located in the two marine parks of Mauritius.
- There are many existing informal ski lanes around Mauritius, which are strongly related to the hotel industry. New ski lanes have been identified for specific assessment at Flic en Flac, Mont Choisy, Belle Mare, Pointe Jerome and Le Morne and the IRS projects at Riambel, St. Felix, Bel Ombre and Les Salines.
- The quality of the ski lanes varies and some require deepening through dredging.
- New ski lanes should preferably be located near existing or envisaged boating back-up facilities.
- New ski lanes could ideally form extensions to the planned nautical centers envisaged around Mauritius.

12. POTENTIAL SITES FOR BATHING AREAS

- There are many proclaimed beaches around Mauritius. The bathing quality at these beaches, however, varies considerably. At some beaches, safe bathing is not possible at all but the beach remains popular for camping and relaxation purposes.
- Most coastal hotels have beaches, which are also of varying quality with regard to bathing. Hotels generally have large swimming pools for their guests. Some hotels have also imported sand and removed loose rocks in order to improve bathing conditions.
- There is no shortage of beach space as such; only the most popular beaches are overcrowded during week-ends. Bathing areas in the south and south east coast and at Pointe aux Piments are not, however, attractive to swimmers either due to lack of sufficient depths, poor water quality, rocky sea bed or proliferation of marina organisms.
- A range of improvements can be considered and recommended at such locations, such as access jetties to deeper water, removing loose rocks, importing sand, and building small enclosing structures demarcating safe bathing areas with buoys and life saving devices and facilities for life savers.
- Based on demand, new sites were identified, assessed and proposed. At the south east coasts, overland swimming pools on the coast and enclosed bathing areas within the lagoon have been recommended. Thus new bathing sites have been proposed at Pointe aux Piments, the South East Coast, Pte Jerome, Riambel, St. Felix and Bel Ombre.

13. ASSOCIATED ENVIRONMENTAL IMPACTS

13.1 MARINAS

Environmental impacts associated with a marina development will occur both during construction of the infrastructure, when significant disturbance will take place, and on an ongoing basis as a result of waste disposal practices, potential for fuel spillages, leakages etc. Typical impacts will include:

- Destruction of habitats, erosion etc resulting from access provision, infrastructure, parking;
- Damage to beach ecosystems from trampling, construction activities, littering etc;
- Visual impacts;
- Dredging impacts on marine life;
- Changes in water quality and movement due to structures below high water mark;
- Changes in sediment regimes;
- Damage to marine ecosystems resulting from waste disposal, fuel spills and physical damage during construction, anchoring etc.;
- Reduced beach access;
- Limitation of area available for fishing;
- Traffic congestion;
- Noise;
- Influx of people (e.g. tourists into a local area);
- Increased revenue opportunities for local residents (positive);
- Clustering of activities (positive).

13.2 SKI LANES

The nature of land impacts will be directly related to the infrastructure to be developed for the ski lanes. If no facilities are provided, the terrestrial impacts will be minimal. Ongoing impacts will be related to noise emissions, and the physical action of the increased wave action on the beaches as well as fuel and waste management both onshore and in the water.

The typical environmental impacts associated with ski lanes may be identified as being:

- Destruction of habitats, erosion etc resulting from infrastructure provision;
- Damage to beach ecosystems from trampling, littering etc;
- Shoreline erosion as a result of increased wave action;
- Changes in water quality (wastes and fuel);
- Damage to marine ecosystems resulting from waste disposal, fuel spills and anchoring etc;
- Impacts associated with turbulence;
- Limitation of area available for fishing and bathing;
- Influx of people (e.g. tourists into a local area);
- Increased revenue opportunities for local residents (positive);

- Clustering of activities (positive);
- Noise and disturbance to surrounding residents.

13.3 BATHING AREAS

The amount of disturbance associated with bathing areas will be directly related to the infrastructure to be constructed in the vicinity of the beach. However, the ongoing impacts are likely to be more significant from a socio-economic perspective, with issues relating to *inter alia* parking, noise and littering. Typical impacts include:

- Destruction of habitats, erosion etc resulting from infrastructure provision;
- Damage to beach ecosystems from trampling, littering etc;
- Waste disposal impacts (sewage, litter etc);
- Impacts associated with trampling of the reef, collection of marine resources etc;
- Influx of people;
- Increased revenue opportunities for local residents (positive);
- Clustering of activities (positive);
- Noise and disturbance to surrounding residents;
- Traffic congestion.

14. SITE SPECIFIC ASSESSMENTS

- The assessment of the sites chosen cannot be considered as full EIAs and should not be submitted as such for approval. All promoters should provide proper details and perform a full EIA on their projects based on the guidelines provided in Appendix V.
- Specifically, details regarding primary engineering aspects need careful assessment. In particular, the following considerations are highlighted.
 - Protection structures against wave action.
 - The need for dredging and dealing with dredged material. This applies for both capital and maintenance dredging.
 - Facilities for safety during cyclone events. All marinas should have adequate facilities to ensure safety. These provisions should be enforced on all marina developments.
 - Engineered facilities to ensure water quality is not at risk due to marina development, e.g. fuelling points, sewage disposal and treatment.
- Promoters should be required to submit full details with specialist studies where required in order to properly assess environmental impacts and to implement measures to mitigate these impacts.

- The EIAs submitted by the various marina promoters for some of the sites assessed in this study, are considered inadequate. All promoters should follow guidelines as prepared and provided in the Appendices.
- Similarly, all other development proposals for ski lanes and bathing areas should follow guideline documentation as provided in Appendix VI and VII respectively.

15. EIA OF ANSE JONCHÉE

- This is a major potential project with significant impacts, both positive and negative.
- The data and project details were insufficient to properly assess the proposal.
- The project can potentially have serious negative environmental impacts on the marine environment. This is especially the case with regard to dredging and disposal and / or reclamation to create an island.
- The promoter has not provided any conclusive evidence through core recoveries that the dredged material can be used for reclamation. Sub-surface samples recovered through coring at a similar estuarine site revealed a thick layer of soft alluvium.
- The stability of the island as indicated is not considered feasible and will erode.
- The stability of the access channel in the longer term is considered uncertain, more so in view of the amount of sediment being transported into it through erosion.
- The closest and highly rated site for a marina development is at Bois des Amourettes located some 2 km to the south.
- Should the promoter insists on having a marina next to his proposed development in spite of all the drawbacks, several specialist studies will have to be undertaken in order to properly assess the proposal, some of which are considered as follows:
 - Dredging and the nature of the materials to be dredged.
 - Determination of usability of the dredged material for reclamation to create an island. If not usable, it will be necessary to determine an alternative disposal strategy for dredged material, and to find another source of material to create an island.
 - Specialist study to determine the stability of the island and source of material to create a beach.
 - Specialist study to determine the stability of the dredged channel and the need for maintenance dredging and disposal of material.
 - Specialist study on rehabilitation of mangrove stands.

- It is recommended that an Environment Management Plan is also put in place should approval be given and a mechanism set up to specifically ensure that compliance is monitored and enforced.

16. GUIDELINES

- It was possible to assemble as part of the appendices a whole series of guideline documentation to properly approach the potential development of marinas, ski lanes and bathing areas from an environmental perspective.
- It is considered vital that the guideline documents are made available to promoters and other interested parties. It should be stressed, however, that these guidelines are generic and that each site may have specific requirements which may not be listed in these general guidelines. Conversely, some aspects listed in the guidelines may not be relevant to all developments. It will therefore be incumbent on the developer to ensure that a competent environmental consultant is commissioned to do the EIA and EMP.
- As a Strategic Environmental Assessment, this report provides MoE with a valuable tool to:
 - Screen all incoming proposals for marina, developments and to reject those sites that have been assessed as being poor from a technical, environmental and socio-economic perspective;
 - Set terms of reference for EIAs and EMPs for those marina developments which have been rated as being fair, based on the Preliminary EIAs for the six selected sites and/or the generic guidelines provided;
 - Screen all incoming proposals for ski lane developments in terms of the current location of existing facilities, the recommended siting for new ski lanes and the demand for such facilities;
 - Set terms of reference for EIAs and EMPs for any ski lane development proposals based on the generic guidelines provided in the Appendices;
 - Screen all incoming proposals for bathing area developments in terms of the current location of existing facilities recommended methods for improving poor bathing areas and the localised demand for such facilities;
 - Set terms of reference for EIAs and EMPs for any bathing area proposals based on the generic guidelines provided in the Appendices;
 - Critically review the EIAs and EMPs received for marina, ski lane and bathing area proposals using the guidelines provided in the Appendices.

17. CONSOLIDATED LOCATION OF MARINAS, SKI LANES AND BATHING AREAS

The siting of existing and proposed marinas, ski lanes and bathing areas is indicated in the figure which follows. The same information is given to a larger scale in Figure 1. An exhaustive list is given hereunder:

MARINAS		SKI LANES		BATHING AREAS	
EXISTING 	PROPOSED STRATEGIC 	EXISTING 	PROPOSED 	EXISTING See Separate Table and Figure 5.4.12	PROPOSED 
1. Port Louis*	1. Grand Baie SW	1. Pte Aux Piments(Portion 1)*	1. Flic-en-Flac		1. Pointe Aux Piments
2. La Cuvette	2. Grand Baie NE	2. Pte Aux Piments(Portion 2)	2. Mon Choisy		2. South East Coast
3. Le Morne	6. Poste De Flacq	3. Trou Aux Biches(Near Police Stn)	3. Belle Mare		3. Pointe Jerome
4. Les Salines	15. Mahebourg-Ville Noire	4. Trou Aux Biches(Opp. Casuarina)	4. Pointe Jerome		4. Riambel/Pomponette
	16. Mahebourg-La Chauv	5. Mon Choisy	5. Riambel/Pomponette		5. St Felix
* Trou Fanfaron and Caudan Waterfront	18. Souillac-Battelage	6. Pte Aux Canonniers	6. St Felix		6. Bel Ombre
	24. Petite Riviere Noire	7. Grand Baie	7. Bel Ombre		
	26. Grande Riviere Noire	8. North of La Cuvette	8. Le Morne		
	31. Port Louis (Caudan)	9. Cap Malheureux	9. Les Salines		
	<i>OTHER POTENTIAL SITES</i>	10. Grand Gaube			
		11. Part of P.G Choisy			
		12. Belle Mare I (St Geran)			
		13. Belle Mare II			
	9. G.R.S.E-River	14. Belle Mare III			
	10. G.R.S.E	15. Belle Mare IV/Palmar			
	13. Bois Des Amourettes	16. Trou D'Eau Douce			
	29. G.R.N.W-Bay West	17. Trou D'Eau Douce			
	30. G.R.N.W-Bay East	18. Pointe D'Esny			
	<i>SATELLITES (Small)</i> 	19. Le Chaland/Blue Bay*			
	3. Grand Gaube	20. Le Morne Brabant			
	4. Pte Lascars North	21. P.G Le Morne- Le Pavillon			
	5. Pte Lascars South	22. Le Morne- Paradis			
	6. Poste De Flacq South	23. Walmar I- Sands			
	7. Trou D'Eau Douce-Montague	24. Walmar II- Hilton			
	8. Trou D'Eau Douce- <small>Beau Rivage</small>	25. Walmar III- La Pirogue			
	11. Anse Bambou	26. Flic-en-Flac/Walmar			
	12. Anse Jonchee	<i>Note:</i>			
	14. Treize Cantons	* Formal Ski Lane			
	17. Mahebourg-Pte Jerome				
	19. St Felix				
	20. Beau Champs				
	21. Bel Ombre				
	22. Baie Du Cap				
	23. La Prairie				
	25. Les Salines				
	27. Baie Tamarin				
	28. Albion				
	33. Tombenu Bay				

EXISTING BATHING AREAS AND THEIR RATINGS

EXISTING BATHING AREAS AND THEIR RATINGS											
PAMPLEMOUSSES		Riv. du REMPART		FLACQ		GRANDPORT		SAVANNE		BLACK RIVER	
1. Le Coulet	G	15. Grand Baie	S	29. Poste La Fayette	S	45. Grand Sables	X	60. Terracine	X	66. La Prairie (Exclusive of R/R-S Coast Road)	S
2. Ville Valio	P	16. La Cuvette	G	30. Poste La Fayette	S	46. Pointe Du Diable	X	61. Gris Gris	X	69. P.G L'Embrazure	S
3. Pte Aux Piments (Portion 1)	S	17. Pereybere	G	31. Poste La Fayette	P	47. Pointe Des Bambous	X	62. Telfair	P	70. Le Morne Brabant	S
4. Pte Aux Piments (Portion 2)	P	18. Bain Boeuf	P	32. Bras D'Eau	G	48. Bois Des Amourettes	X	63. Surinam	X	71. P.G Le Morne	G