

**COMMON PROBLEMS ENCOUNTERED BY
MALAYSIAN DREDGING STAKEHOLDERS, THE
RECOMMENDATION AND RELATION TO THE
ENVIRONMENT**

By

**NORPADZLIHATUN BINTI MANAP
GS 17886**

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**MASALAH KEBIASAAN YANG DIHADAPI OLEH PIHAK YANG
TERLIBAT DALAM PROJEK Pengerukan DI MALAYSIA,
CADANGAN PEMBAIKAN DAN HUBUNGKAIT DENGAN
PERSEKITARAN**

Oleh

NORPADZLIHATUN BINTI MANAP

November 2008

Penyelia: Norzima Zulkifli, PhD

Fakulti: Kejuruteraan

Kajian deskripsi ini dijalankan untuk mengenalpasti masalah yang dihadapi oleh pihak yang terlibat didalam sesebuah projek pengerukan di Malaysia serta cadangan mereka dalam menyelesaikan masalah berdasarkan pengalaman masing-masing. Sesi temubual telah dilaksanakan dengan pengurus pelabuhan, wakil kerajaan, kontraktor pengerukan, environmentalis dan ketua kampung. Hasil daripada sesi temubual tersebut, masalah kebiasaan yang dihadapi adalah pencerobohan tanah rezab, kadar gantirugi yang tinggi, kekurangan pengalaman dalam operasi pengerukan, aduan orang awam yang tidak berasas, pengawalan keija subkontraktor, pemilihan kapal korek yang bersesuaian, kepupusan hidupan laut serta kekurangan punca pendapatan nelayan. Beberapa cadangan telah dikemukakan berdasarkan pengalaman pihak yang terlibat serta berdasarkan kajian literatur yang telah dijalankan. Antaranya adalah; melaksanakan komunikasi matrix, membentuk organisasi pengerukan dengan mengambil contoh organisasi di Eropah, mengadakan jurnal pengerukan khusus untuk projek pengerukan di Malaysia serta mengikut garispandu Eropah.

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CHAPTER 1

INTRODUCTION

1.1 Background of the research

Dredging can be defined as a process of removal and transport of underwater soil from one place to another for propose of deepening or making profitable use of the removed soil. It is also a process of excavating and removing unwanted soil from the bottom of harbors and waterways, in keeping them navigable (Herbich, 1975).

Dredging project is needed for development of a country, however its activity will effect the physical, biological and socio-economic aspects which resulted both in short term and long term of environmental impacts.

Direct or indirect environmental and socio-economic effects may be associated with any element of the dredging process - excavation, transport and disposal. The effects may be positive or negative, short term or long term and may include, amongst others, impacts on:

- 4> Habitats and natural areas, e.g. habitat enhancement or creation, removal or destruction of benthos, smothering;
- 4- Local communities, e.g. the effects of noise; increased labour opportunities;
- 4* Physical processes, e.g. waves, currents, or drainage, and hence erosion or deposition;
- 4 Economic activities, e.g. commercial fishing; improved infrastructure.

A study should be done to identify common problems and how to solve it for future reference. Thus, this descriptive research is being done to identify problems commonly faced by dredging stakeholders and their recommendation on how to solve the problems.

By focusing on every aspects of a dredging project seen from the perspectives of Malaysian dredging stakeholders, it will find the best possible way to avoid environmental impact as well as serving as a guide for a succesful dredging project management based on each stakeholder's experience.

1.2 Objective of research

The objective of this descriptive research is as summarized below;

- (i) To identify client's perspective of managing and monitoring a dredging project, the problem that they faced and their recommendation on how to solve the problem
- (ii) To identify contractor's perspective of running a dredging project, the problem that they faced and their recommendation on how to solve the problem
- (iii) To identify public's assessment of a dredging project near their surrounding area, the problem that they faced and their recommendation on how to solve the problem

- (iv) To analyze the results of interviews in determining the most common problems and the best recommendation extracted from dredging stakeholder's experience and desktop studies.

1.3 Scope of research

The scope of this research includes dredging and reclamation works being done in Malaysia that covers the purpose in deepening channel, basin, rivers and ports which being done by dredging practitioners in Malaysia. Among dredging stakeholders for this research includes the Government of Malaysia representative bodies, dredging contractors who are being provided with government concessions, port administrators and public who are directly affected by dredging projects. Interviews will be held with these dredging practitioners. The dredging project being focused are the projects owned by the government and port administrators which are large in scale and are the highest risk of impacts to environment.

1.4 Benefit of research

The benefit of this research are summarized as below;

- 4 As for clients, this research will be a basis on considering a guideline that focus on dredging and environment. By acknowledging the perspective of

contractors as well as public, it helps to develop a guideline as well as getting an efficient investment through a well manage project.

- 4 As for contractors, this research will be a reference to the new comers in this industry so that the experience of seniors can be learnt.
- 4- As for public, this research will help them to know what are the steps that have been taken by other group of public that have succesfully handled the common problems.



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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Dredging

Dredging is the operation of removing material from underwater by floating plant known as a dredger. The dredging process includes loosening the material, lifting it to the water surface, transporting it to the site where it is to be relocated, and the relocation again (Riddel, 2003).

In Malaysia, the use of dredging concept has been introduced since 1913 in tin mining industry at Kuala Lumpur, which a Cutter Suction Dredger with capacity of 750 m³/hour being used. The model of this historic dredger can be found at National Museum, Kuala Lumpur.

Capital dredging, maintenance dredging and land reclamation can all have significant consequences for the marine and coastal environment. The dredging operation, the material relocation and the completed works may all cause adverse effects. The impact has to be adequately investigated and quantified. Approvals and consents may have to be obtained from international, national and local agencies. There may be strong objections from local people or environmental groups and the planned dredging or reclamation may be severely restricted, delayed or modified by environmental concern. In very sensitive areas work may not be possible. This aspect of dredging is now one of the key design considerations (Riddell, J.F., 2003).

Pictures below showing some of the typical types of dredger being used worldwide to excavate underwater soil and how it operates while dredging.



FIGURE 1 : The world's largest Trailer Suction Hopper Dredger (WD Fairway)

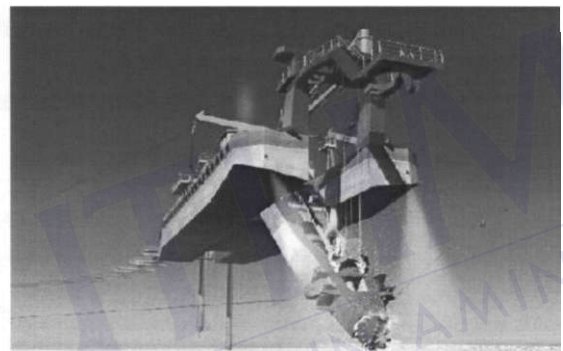
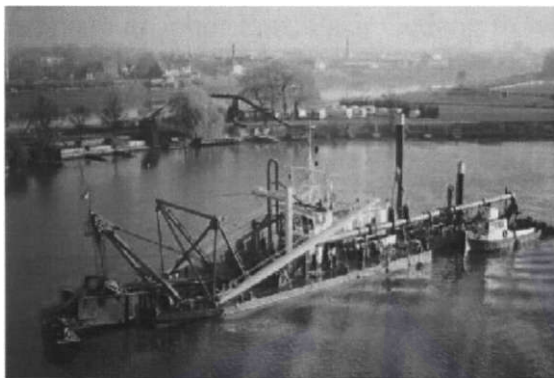


FIGURE 2 : The Cutter Suction Dredger (Vlanderren XV)

2.1.1 Objectives and exercises of dredging concept

Dredging has been proved at every corner of the world as one of the infrastructural improvements that contributes to the economy of any nation. The basic objectives of dredging are for navigation purpose, flood control, construction and reclamation, trenches for underwater cable and pipeline, mining, beach nourishment and environmental remediation.

Some 75 percent of the world's population lives at the water or close to the water, along the coast, be it an ocean or a sea, or by the banks of a lake, a river or a canal. The next century will be the age of the truly global economy: more trade,

more transportation of raw materials and finished goods, and increased need. There will be a greater need for airports on artificial islands or reclaimed land, for industrial parks along the coast where there now is water, for large waterfront infrastructure works (Bray, 1998).

Responding to that, Malaysia is exercising objective of dredging concept through Malaysian Government's Vision 2020 in port development at Tanjung Pelepas, Johor. This construction is being made to cater the compressed capacity problem at Johor Port, Pasir Gudang in which the Malay peninsular's most southern tip in the state of Johor, has been chosen as the location of the new port facility.

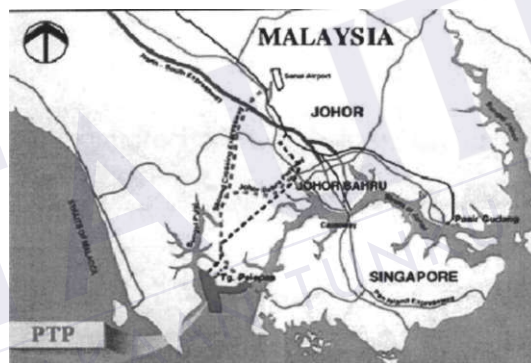


FIGURE 3 : Port Tanjung Pelepas site location (Courtesy of IEM Magazine, 1999)

The benefits of constructing the container berths together with dredging of access channel shown by the changing of typical Johor state, from the quite oil palm plantation area to a new developed area facilitate with excellent infrastructure and industrial development (Kinlan and Renkema, 2000) that will attract merchandisers from world wide, which remind us the history of Melaka as once upon a time the most recognized port worldwide. Figure 4 below showing the photographs of the Port of Tanjung Pelepas, Johor.



FIGURE 4 : Views of model of Port Tanjung Pelepas site
(Courtesy of IEM Magazine, 1999)

Currently servicing as a container port, Port of Tanjung Pelepas aims to be 'the container port of the future' (IEM, 1999). Officially launch on March, 2000 by honorable Tun Dr. Mahathir Mohamad, the port are creating its own mark by being the choice alternative to Singapore Port which have driven Singapore's economy and sustainability for almost two centuries now. With Maersk Sealand and Evergreen Marine Corporation, the world largest and second largest container ship operator as the clients (Wikipedia, 2007), Port of Tanjung Pelepas have gained investor's trust to its efficient transshipment operations.

Equipped with five phase planning scheduled to be completed by year 2020, dredging are one of the major element being scheduled. With RM2.8 billion cost of the first phase launched from March 1997 to January 2000, dredging and reclamation package has been done by Malaysian engineers; Engineering and Environmental Consultants Sdn. Bhd. (Renkema and Kinland, 2000) and Ballast Nedam-SKS JV as the main dredging contractor (IEM, 1999).

Continuing to the first phase, as reported by Asia Pulse 2005, Integrated Marine Works Sdn. Bhd. (IMW) has been awarded the RM4.6 Million worth of dredging contract to clear high spots in berth and navigation channel. IMW, as the

only company approved by Malaysian Government to do dredging works at nation major ports, would commence the 60 days of work started from December 2006. The dredging work ensures a smooth operation without disturbance by high spots that could delay the transshipment operation.

Another example of dredging exercise can be seen in the project of Ennore Breakwater in India where the dredging activities are supporting the construction of new port known as Ennore Coal Port. The construction of the new port requires breakwaters to protect the future coal harbor and incoming ships from waves and sedimentation problem (Bijen, 2000).

The dredging concept being used to dredge and backfill the breakwater location before placing the rocks to build the breakwaters and also providing the access channels for the incoming ships. Figure 5 below showing a Trailer Hopper Suction Dredger being used to support the construction of Ennore Coal Port.



FIGURE 5 : Alexander Von Humbolt (TSHD) commissioned to the Ennore Port Project to dredge the access channel (June 2000)

The largest dredging and reclamation works in South America in terms of channel length and physical condition can be found at the Rosario-Victoria Fixed Link; across the Rio Parana Fluvial Valley. The dredging project is essential for local and international road transport from East to West and back.

The project comprises dredging activities namely the dredging of overburden of the borrow pits, dredging of the sand and the construction of the embankments, dredging of a 30km lateral service channel for logistic purposes along the link and dredging of the access channels from the service channel (Dresken, Pool, Mumelter and Uelman, 2000).

The Figure 6 below showing the dredging activity by a Cutter Suction Dredger and a completed embankment at the Rosario-Victoria Fixed Link .

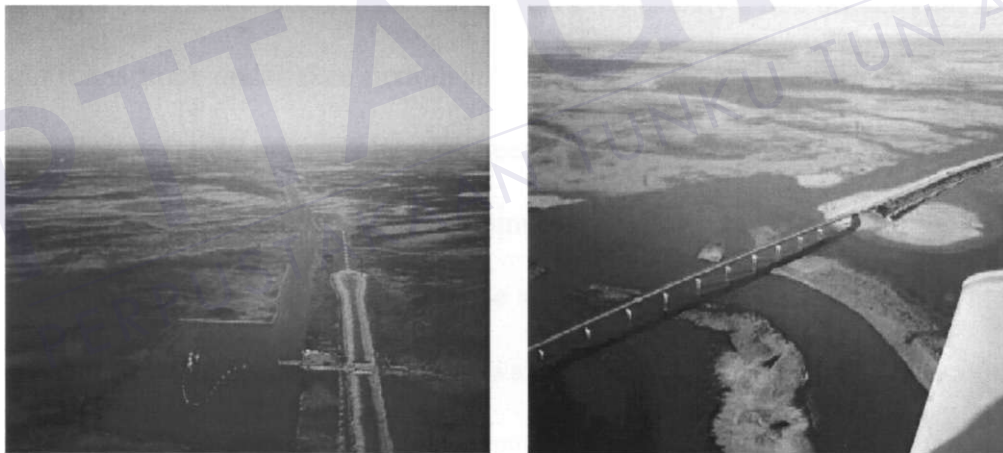


FIGURE 6 : A Cutter Suction Dredger in action at left and a complete embankment the right

2.1.2 Types of dredging works

When the objective of dredging is to provide increased water depth or underwater area, dredging can be broadly divided into Capital dredging and

Maintenance dredging. Capital dredging is the initial deepening of an area, for example the excavation of a new canal or the deepening of a port entrance channel or container berth. Capital dredging projects are usually unique and every possible type of natural material may be encountered. Because capital dredging projects are very different and 'one-off' activities, they are often designed by a specialist consultant and undertaken by a specialist dredging contractor. Capital dredging projects may be eligible for grants or loans from such organizations as the European Community, Asian Development Bank and the World Bank.

Maintenance dredging is the removal of material from an area which has previously been deepened, but where the depth has reduced because of the deposition of sediment. Examples are the removal of silt and sand from harbours, reservoirs and rivers. Maintenance dredging is not usually a one off activity. In most ports it has to be undertaken periodically. In some harbours this may be once every five or ten years. In others it may be needed two or three times each year. In some ports maintenance dredging has to continue every day. Unlike capital dredging, the materials to be dredged comprises loose soils such as silt, sand or gravel which are moved by river and tidal currents and waves. Clay and rock cannot be encountered in maintenance dredging. If such hard material is encountered in a project described as maintenance there is the basis for a claim by the contractor.

Because maintenance dredging is a repeated activity in a particular area, it may be undertaken by dredgers owned by the port or waterway authority or government department with responsibility for the dredging of the area. Because of the very high cost of modern, efficient dredging equipment, it is now usual for most maintenance dredging to be undertaken by a local, national or international dredging contractor. Only where a port has a very large and near continuous dredging

commitment, or is remote from the main areas of normal dredging activity, it is likely to prove beneficial to operate its own dredger.

Maintenance dredging can account for a significant proportion of the expenditure of a port there are seldom grants or other financial assistance available to assist with the cost of maintenance dredging and the work usually has to be paid for out of revenue earned.

The creation of new land from the sea by reclamation may be undertaken as part of a capital or maintenance dredging project, or as an objective in itself. The most important point to appreciate is that from the client's perspective the objective moves from the creation of an underwater space to the creation of the fill area. Thus while the plant and equipment may be similar for all three activities - capital dredging, maintenance dredging and reclamation - aspects of risk, specification and supervision change significantly (Riddell, J.F., 2003).

2.1.3 Dredging practitioners

Major dredging practitioners being mentioned are including the client, the engineers, the contractor and the suppliers of the equipment. For any governments, the state is the agency for constructing ports and maintaining the required depths in public harbors and their entrance channels (Bishoff and Villot, 1984). In Malaysia, the Transport Ministry under the administration of Dato' Chan Kong Choy (2007) are responsible to administer the channel at ports and estuaries, by delegating to Jabatan Laut and Jabatan Pengairan dan Saliran as Government representative bodies for any dredging work in Malaysia.

In recent years, the Government of Malaysia has granted the dredging works to private companies with concession for certain number of years. For estuaries and river entrance, the Government of Malaysia has granted Malaysian Maritime & Dredging Corporation (MMDC) a 15 years of concession, while the dredging of major ports to Integrated Marine Works Sdn. Bhd..

As for the Argentine Government, starting from 1990s, they have contracted out a concession of the maintenance dredging to private enterprises, which the dredging previously done by public sector and degenerated to a precariously low level, mainly owing to a poor management and lack of funds (Lievens, 1997).

The distinguished oil and gas company of Malaysia, Petronas usually using the dredging services to do the trenches for their cable and pipeline, and therefore dredging services is required to do the job. So are for the soil and aggregate consumers, for example the buyer of river sand for concrete mixtures of building, where the dredging service provider will provide the required sand by using the sand pump to fulfill the needs of the buyer.

The reclamation for development of near shore which requires tons of aggregates usually will need not only one working dredger, but double or triple for timely manner. So, any dredging service provider will merge up and joint-venture to meet the client's need.

2.1.4 Nature of communication

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The basic nature of communication is by meetings by respective parties in concern to a dredging project. Taking into consideration the experience of

Malaysian Maritime and Dredging Corporation Sdn. Bhd. (MMDC) as a local dredging contractor, a technical meeting which being called by respective government bodies will be held with attendee of the engineers to discuss technical specification of a dredging project.

Following to that, a meeting then is held by Jabatan Alam Sekitar at respective state with attendee from other government body which will be directly affected by a dredging company such as the Lembaga Kemajuan Ikan Malaysia (LKIM), who run the property along the river banks which will be affected by dredging activities near the river bank.

Despite to the conventional way of doing a dredging business exercised by MMDC as discussed above, the worldwide dredging community will gather every three years to exchange information about their activities through paper presentation and seminars which professionals including ship owners, port authorities, private dredgers and public agencies, universities and researchers exchanging their notes. The gathering is also for the purpose of interaction and communication to attract one another to engage their services.

The International Maritime Exhibition has been held at Kuala Lumpur Convention Centre on January 2007, which exhibitors from international dredging community including the Vosta LMG, IADC (International Associations of Dredging Companies), Westport Malaysia, Johor Port and also UTM (University of Technology Malaysia) have taken the opportunity to exhibit their products and services for potential customers.

Apart from seminars and exhibitions, the literature of technical and scientific information first held by non-profit organization back on 1967 known as World Organization Dredging Association (WODA) have increases significantly the

written manuscript regarding dredging technology (Bray, Bates and Land, 1995). The Terra et Aqua journal are also one of the mode of interaction to and from dredging customers and providers that constantly providing state of the art technologies discussed in dredging forums and proceedings.

Taking the word from Mr. Peter Hamburger, the Secretary of the International Associations of Dredging Companies (IADC) 1998; *"77re most challenging job for a dredging company to possess any dredging job worldwide was to interact with the non-technical target groups which directly involved in decision making processes "*.

The non-technical group that comprises the politicians, policy makers, environmentalists, the opinion-shapers and also the general public which unfortunately often having misconception that dredging brings the ecological disaster instead of offering the environmental solutions. To encounter this problem, dredging community has to team up and educates the non-technical target group via more common communication approach which will easily be understood by any target group. Hence, a lot of effort has been driven to encounter this problem. Environmental steering committees have been set up and declaration in controlling the dredging works from continuously polluting the environment has been engaged.

2.1.5 The dredging market

To identify potential markets for dredging, study on two driving forces; trade and environment has to be carried out. In particular, the environmental solutions to developments necessitated by trade may give some useful pointers in determining

the market. Trade encourages people to move goods around the world and leads to the need for new ports, deeper ports, industrial ports, infrastructure, new land and leisure facilities.

While environmental legislation affects the way projects are carried out. It controls use and disposal of dredged material. It also affects the methods of dredging and the way engineering is carried out and this, in turn, may determine whether dredging is required or not, and how it may be executed.

2.1.5.1 The trade force

Over the last five years the dredging market has been dominated by activities in South East Asia, particularly in Hong Kong, where reclamation works associated with the Port and Airport Development Strategy and Metroplan have involved the movement of around one billion cubic metres of dredged material. There are plans for further massive land reclamation works in Singapore, Malaysia and Taiwan, with one such project requiring around 200 million m³ of fill.

Moving parallel with Vision 2020, Johor Port; Pasir Gudang in which the Malay Peninsula's most southern tip in the state of Johor, has being chose as the location of the new port facility in Malaysia. The benefits of constructing the container berths together with dredging of access channel shown by the changing of typical Johor state, from the quite oil palm plantation area to a new developed area facilitate with excellent infrastructure and industrial development (Kinlan and Renkema, 2000) that will attract merchandisers from world wide, which remind us the history of Melaka as the most recognized port in 1900s.

2.1.5.2 The environment force

The main concerns have been environmental issues such as the disturbance of contaminated sediments, turbidity while dredging, and disposal of dredged materials. Today's dredging industry has met the challenge and has carefully addressed these issues with large investments in technology and equipment. Consequently, at the start of the new millennium, the opportunities for environmentally sound dredging are increasing steadily (Riddel, 1998).

It might not be too strange in the future to find environmental scientists in the research and development departments of major dredging companies. This would then enable teams to put forward comprehensive solutions to development needs, by introducing new techniques which have been evolved against an environmentally sound background (Bray, 1998).

2.1.6 Common environmental issues in dredging

Dredging activities that includes excavation and disposal phases of the operation may affect the marine environment through physical impact and also through releasing of possible contaminants. It is than understandable that environmental issues are the most common issues that arise whenever dredging being done. A high turbidity parameter, coastal erosion and noise are some of the disturbance factors that uphold dredging practitioners and urge them to upgrade their technology by all means.

Dredging may also give rise to impacts both in short term and long term, chiefly as a result of changes in the hydraulic regime because of altered bathymetry and coastal form. Giving a thought of Malaysian Maritime & Dredging Corporation's experience, one of the major disturbance was the undetected water cables which have been crossed over when dredging is being done. The case has been brought over to court and the company has been sued and given penalty of a big bulk.

Other than the environment issues, dredging activities may result in increased marine traffic which, in some cases, may be disruptive to existing traffic or which may be hindered by existing traffic. In either case, it is necessary to review the existing marine traffic, preferably in consultation with the local maritime or river authority, and to estimate whether or not conflicts are likely to arise. If conflicts are identified, it may be necessary either to restrict or control the activities of the dredging contractor in some manner or to arrange the re-routing of existing local traffic.

Generally arrangements can be made whereby commercial traffic can interact with dredging activity without undue difficulty. Problems may arise with recreational sailors who lack the knowledge and experience of professional mariners. Hence traffic due to recreational craft, such as yachts and power boats, windsurfers and water skiers should be assessed carefully (Bray, 1979).

2.1.7 Key environmental elements

2.1.7.1 Turbidity

The water quality of any dredged area will be affected as a result of suspension and transport of sediment during the dredging works. Total Suspended Solid (TSS) may increase due to the natural acts of the dredger. This will eventually result in the increase of turbidity level of the water body. Not only it will affect the immediate dredging channel, it will also subsequently affect the turbidity level of surrounding areas. The turbidity associated with the dredger will probably be restricted largely to the bottom and below the surface of the hopper dredger. During pumping, the rise of both the Total Suspended Solid (TSS) and turbidity levels will be more evident.

2.1.7.2 Toxicity

The increase of heavy metals content in water can also be expected as an implication of dredging activities. This phenomenon is due to the act of churning of the sediments by the dredger. Non-toxic heavy metals in the dredged sediments may become soluble in the water body, which in turn become toxic.

2.1.7.3 Biological

Dredging will definitely result in the physical removal or destruction of most of the benthos and habitat along the operational path. The effect of dredging on marine life may extend well beyond the immediate area of work. Turbidity from dredging activities may affect sensitive marine organisms and removal of the seabed may deplete the area of important forms of marine life which are an essential part of the food chain, or have a local, regional or international rarity value.

2.1.7.4 Aesthetic

Taking into account Malaysian Maritime & Dredging Corporation Sdn. Bhd. dredging project at Sungai Dinding, Lumut, Perak which it is the main gateway to the famous Pangkor Island, the dredging project may temporarily impact the industry. There maybe concern about the visual impact of the dredger operating in close proximity to the shore. This will be exacerbated if turbidity plumes are visible from the shore.

2.2 Environmental Rules and Regulations

2.2.1 Malaysian Environmental Requirement

The Government of Malaysia has established the necessary legal and institutional arrangements such that environmental factors are considered at the early

stages of project planning. The legislation that is related to the prevention, abatement, control of pollutant and enhancement of the environment in Malaysia is the Environmental Quality Act, 1974 (Act 127). The act restricts the discharge of wastes into the environment in contravention of the acceptable conditions (Department of Environment, 2000).

Every Malaysian dredging activities proposal should be examined to see whether an environmental impact assessment (EIA) need to be conducted. Dredging activities has been listed in the Environmental Quality (Prescribed Activities)(Environmental Impact Assessment) Order 1987, under clause 11c Mining, which the clause stating sand dredging involving an area of 50 hectares or more. Therefore, the calculation of effective dredging area need to be done to determine whether an environmental impact assessment (EIA) is needed which an early determination will save a lot of operation time and cost.

If the effective dredging area is less than 50 hectares, than an option to environmental impact assessment (EIA) that is the environmental assessment (EA) have to be done, which the processess and procedures are simpler than an environmental impact assessment (EIA) and also it is a one-off environment control activity. Whether or not an environmental impact assessment (EIA) has to be done, an environment monitoring plan (EMP) and environmental monitoring and auditing (EM&A) have to be implement as part of the dredging operation. Figure 7 below showing the environment control of a dredging operation in Malaysia.

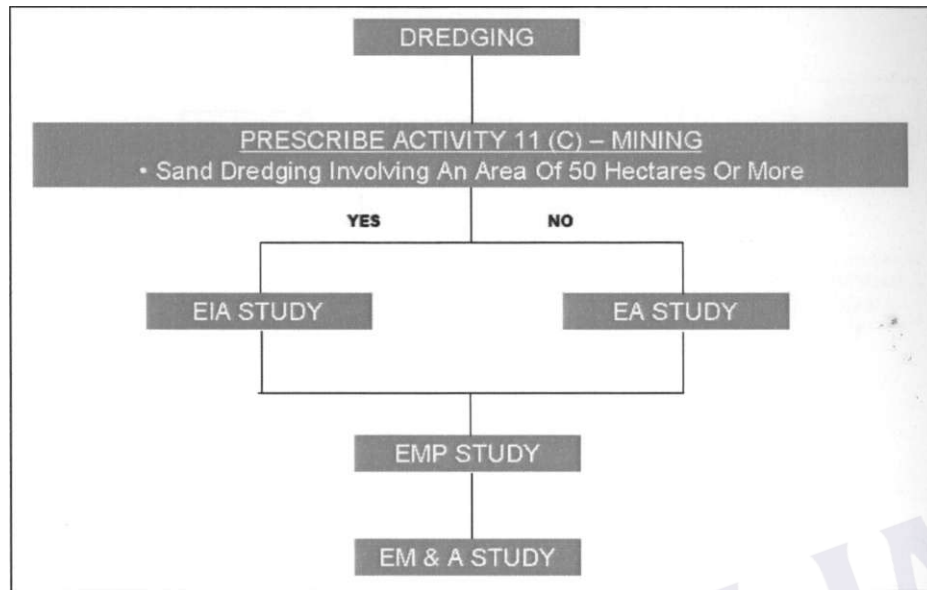


Figure 7 : Malaysian Environmental Requirement

2.2.2 International Environment Control

International conventions that have been ratified by most countries in the environmental control of dredging activities are the London Convention (Formerly the London Dumping Convention, 1972). The disposal of dredged material at sea falls within the remit of this convention and it was introduced primarily to regulate the dumping of noxious substances such as chemical waste in the oceans.

Guidelines have been developed for the London Convention to aid the interpretation of the convention for the disposal of dredged material. It also give consideration to the development of a Dredged Material Assessment Framework which have been adopted since 1991. The framework is shown in Figure 8.

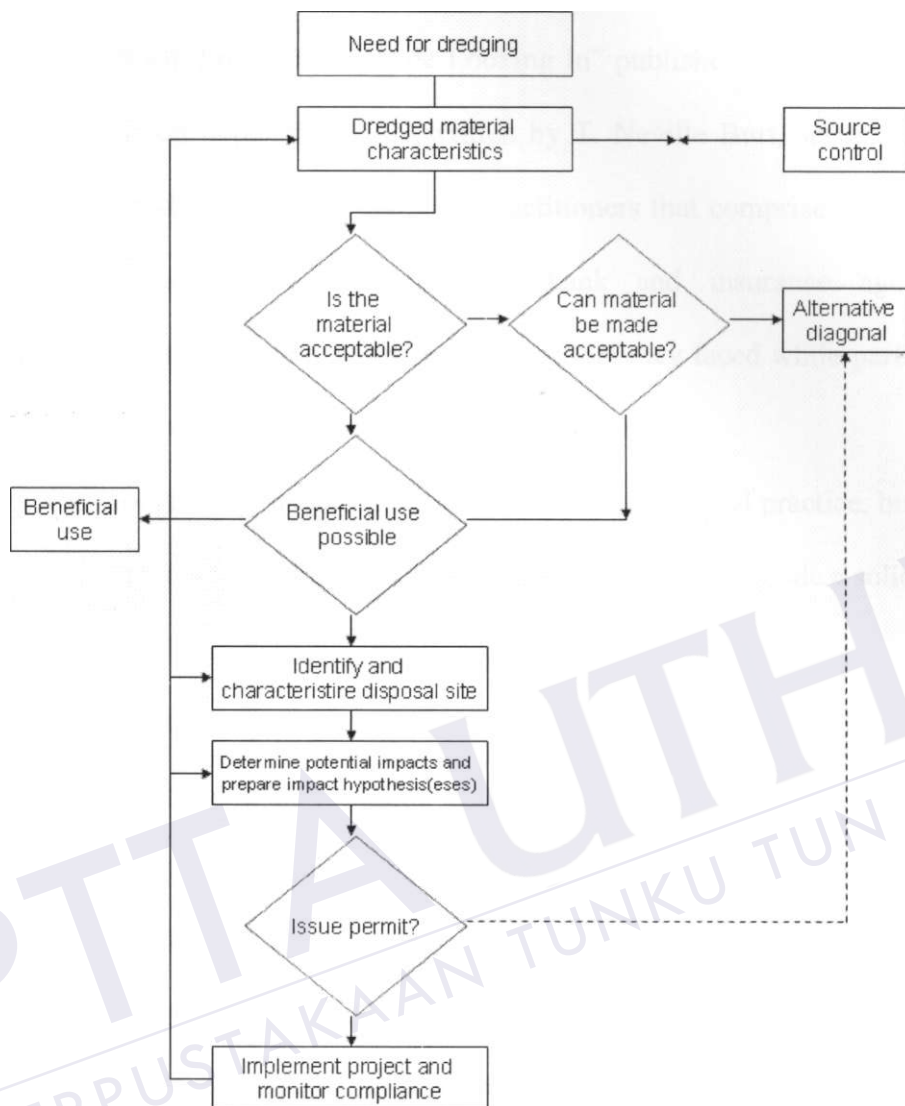


Figure 8 : Dredged Material Assessment Framework

2.3 Studies that relates to Dredging Contractors

2.3.1 So What Do They Think Of Us? Dredging Seen, From The Outside

Looking In

Before going in too deep to the roots of the problems being faced by dredging parties in Malaysia, an insight to the common problems faced by international dredging parties will be a good step to better understand and being

prepared. For this purpose, a technical journal entitled "So What Do They Think Of Us? Dredging Seen, From The Outside Looking In" published by Terra et Aqua, at The Netherlands on September 2002 written by T. Neville Burt, served well as a basis to understand what are the dredging practitioners that comprise of the clients, licencing officials to port authorities to bank and insurance agents and environmentalists think and their usual problems that they faced while participating in a dredging project.

Even though that this journal implies to the international practice, but it does served a lot of insight to our Malaysian dredging industry and provide a solid base to this research.

The journal emphasized on the views of three parties namely the client, the environmentalist and also the public perception. Below are summarized views of the three parties;

A. The client

- 4 Contractors do not comply with the tender
- 4 Bidding price are too conservative
- 4 Competitive tendering was not always competitive
- 4 Contractors manipulating the project so that they can bid bigger part of other project
- 4 Contractor do not like lump sum contracts
- 4 Contractor do not involve earlier in defining the dredging works
- 4 Tendering procedure that exclude contractors in the beginning process should be change
- 4 Modification of existing dredging equipment should be done to reduce dredging impacts on the environment

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