

# **STRATEGIC RECOMMENDATIONS**

*For Improving Environmental Practices*

# **IN CONSTRUCTION INDUSTRY**



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Industri Pembinaan Malaysia

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Environmental Practices in Construction Industry  
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## FOREWORD

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The construction industry has a crucial role to play in assisting the efforts of the government to achieve development that is sustainable by the year 2020. Sustainable development requires a balance between economic growth, social expansion and environmental protection. In order to pursue sustainable development, the construction industry itself has to be sustainable and give emphasis to environmental matters, in addition to economic gains and social obligations.

In this context, I am proud that the Construction Industry Development Board (CIDB) is playing an important role in taking custodianship of the environment, and leading key players in the construction industry to be more sensitive towards environmental protection. Indeed, this is very much in line with the "Construction Industry Master Plan 2006-2015" initiated by CIDB.

CIDB is well aware of the urgency in preparing the industry for the future and providing appropriate, timely information to induce innovation and competitiveness at the global level. This is the reason for embarking on a development programme to promote good environmental practices in the construction industry. The thrust of the programme is to enhance compliance to existing regulatory controls and increase the use of voluntary measures to improve environmental management in the construction industry. Through Technical Committee on Good Environmental Practices in the Construction Industry, Working Groups have been established to develop guidelines that promote good environmental practices known as Strategic Recommendations for Improving Environmental Practices in Construction Industry. These efforts have contributed to making CIDB an important focal point for disseminating information, strengthening the capacity and increasing the awareness of relevant stakeholders in improving environmental performance of the construction industry.

The Strategic Recommendations to promote good environmental practices are focused on five main issues. These are strengthening the development approval process, enhancing law and enforcement, promoting self-regulation, increasing capacity and public awareness as well as addressing knowledge gaps. The Strategic Recommendations will be implemented by relevant stakeholders. In implementing the Strategic Recommendations priority will be given to important and critical issues related to erosion and siltation associated with construction activities as well as waste management. Where possible, the success of implementing the Strategic Recommendations will be reported and this information will be disseminated to all stakeholders. CIDB will also look into existing options and mechanisms to encourage construction industry stakeholders, in particular the registered contractors, to improve their environmental performance.

I strongly believe that commitment from all stakeholders can transform the Malaysian construction industry into one that is not a threat to the environment, but satisfy the human need for development in harmony with the environment. Development will continue to expand to meet socio-economic obligations, but the focus should be on the quality of the development that is pursued. In this regard, the Strategic Recommendations outlined in this document will serve CIDB in leading the industry to achieve this aspiration.

Datuk Ir. Hamzah Hasan  
Chief Executive  
Construction Industry Development Board of Malaysia  
September 2006

## PREFACE

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In the year 2000, the CIDB Technical Committee on Good Environmental Practices in the Construction Industry established a Working Group to formulate strategies and programmes to promote good environmental practices. Working Group I on Development of Strategies and Programmes for Good Environmental Practices consisted of representatives from government agencies, professional bodies, academia and construction related associations. They represented the breadth of expertise on the environment as it relates to the construction sector.

The Working Group was charged to develop a set of recommendations for strategies and programmes by anticipating broad national and global environmental issues and needs. This included identifying promising new directions to address these needs, and assessing capacity building requirements to meet these needs.

In developing the strategies and programmes, the approval process at the project level and its implications on environmental performance as well as construction practices and new directions in selected developed countries were reviewed. A dialogue was held to elicit issues, challenges and recommendations for implementing good environmental practices. A workshop was held to examine the first draft of recommendations formulated by the Working Group. Through a series of discussions, the Working Group consulted about 70 people, representing various stakeholders in the construction sector. In addition, there were a number of written comments received.

Voluminous input from these sources provided the foundation for identifying strategic recommendations. The CIDB can now systematically prioritize and address the most pressing needs of the construction sector in this decade.

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# INTRODUCTION

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The construction industry makes a significant contribution to the quality of life in the country. Over the past decade, the sector annually accounted for about 3-5% of the Gross Domestic Product and provided employment for about 10% of the total labour force. In addition, the construction industry also realizes many aspects of government policies aimed to develop the nation. Examples include building of houses, schools, hospitals, roads, airports, ports and other transportation infrastructure.

Although the construction sector is vital to the achievement of national socio-economic development goals of providing employment, shelter and infrastructure, it can be a significant source of negative impacts on the physical environment. Among the major impacts associated with the industry are soil erosion and sedimentation, flash floods, destruction of vegetation and dust pollution. Other impacts associated with the industry include depletion of natural resources and the use of building materials harmful to human health.

The construction industry has a crucial role to play in assisting the efforts of the government to achieve sustainable development, where there is a balance between economic growth, social expansion and environmental protection. In order to pursue sustainable development, the construction industry itself has to be sustainable. There are many elements to a sustainable construction sector. The economic dimension includes increased profitability and competitiveness. The social dimension covers aspects such as the delivery of buildings and structures that meet the satisfaction of its users as well as respect and fair treatment for all stakeholders. Environmental considerations are also important and include concerns such as protection of natural ecosystems as well as minimization of environmental impacts and consumption of energy and natural resources.

Environmental sustainability must be considered at each phase of the construction industry. In Malaysia, a building project begins with Land Conversion Approval. This is followed by Layout Plan Approval, Planning Permission, Architectural, Structural and Infrastructure Design Approval, which includes the selection of construction material to be used, Building Plan Approval, Contract Documentation and Tendering Process. The actual Construction Activity precedes the issuance of Certificate of Fitness and Occupancy Approval and Post Construction Monitoring and Maintenance.

The Environmental Impact Assessment (EIA) is one form of regulatory control, which is used to manage the environment at the project level. Numerous guidelines and regulations are used by the local authorities and government agencies to make development activities more environmental friendly. These are being increasingly complemented by voluntary measures such as the Environmental Management System, which is commonly used at the organizational level and allows certification to MS ISO 14001.

## RECOMMENDATION A

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### Strengthening the Development Approval Process

There are 8 aspects had been aligned under the Strengthening the Development Approval Process issue. The aspects are as the following:

- Notification of new development,
- Community participation,
- Consideration of environmental factors,
- Take account environmental impacts in the DPR for conversion,
- Space for collection of recyclable waste,
- Guideline for collection and separation of waste,
- Requirement for maintenance management plan and
- The need for qualified technical staff/officer.

#### A1. Notification of New Development

Neighbouring residents and owners are not effectively notified of a new development in their vicinity. There is currently no standard mechanism of disclosure other than the prescribed forms in the section 21, Act 172, Town and country (General) Rules and the notification method varies among the local authorities.

All neighbouring land owners should be informed of a new development project in their vicinity irrespective of whether a gazetted local plans exists for that area.

NO	RECOMMENDATIONS	TO
A1.1	Request that local authorities and the land office notify adjacent owners in writing regarding a proposed development project in their vicinity, if the land use differs from adjacent lots and there is a marked increase in the density of the area.	State Governments & Ministry of Housing and Local Government
A1.2	Define neighbouring landowners (request local authority to define and standardize the definition of neighbouring resident and landowner) as described in Section 21(8), Act 172, Town and Country (General) Rules	Ministry of Housing and Local Government

## **A2. Community Participation**

Many development projects have been approved without the knowledge of the community. The recent amendment to the Town and Country Planning Act requires that neighbouring landowners be informed of any development projects. However, this has not been effectively implemented and limits the participation of the affected community in the approval of development projects.

<b>NO</b>	<b>RECOMMENDATIONS</b>	<b>TO</b>
A2.1	Develop guidelines for community participation to address social impacts at the local authority level before approval of all development projects.	State Governments & Ministry of Housing and Local Government
A2.2	Revise the Town and Country Planning Act to take into account appeals by third parties, in addition to appeals by neighbouring landowners.	Ministry of Housing and Local Government
A2.3	Ensuring adequate community participation in the approval of development projects.	Local authorities

## **A3. Consideration of Environmental Factors**

Decision-makers in the government should be made aware of and take into account the environmental problems and long-term safety of sensitive zones such as hilly and coastal areas. Some government projects such as schools and research institutes are located in these sensitive areas.

The consideration of approval of land for projects must take into account information contained in geotechnical and geological reports to ensure the suitability of the site.

<b>NO</b>	<b>RECOMMENDATIONS</b>	<b>TO</b>
A3.1	Development guidelines should be formulated, with a checklist containing detailed technical aspects for proper site appraisal of such projects.	CIDB
A3.2	Request that local authorities obtain geotechnical and geological reports before considering the approval of projects in areas: <ul style="list-style-type: none"> <li>i) with gradient <math>\geq 25^\circ</math> and/or</li> <li>ii) of gradient <math>\geq 15^\circ</math> and consist of colluvium or geologically sensitive material/area and/or</li> <li>iii) of gradient less than <math>15^\circ</math> but consists of colluvium or geologically sensitive material/area with signs of slope instability.</li> </ul>	State Governments & Ministry of Housing and Local Government
A3.3	Gazette Structure Plans and Local Plans.	State Governments

#### **A4. Take Account Environmental Impacts in the DPR for Conversion**

Development Proposal Report (DPR) for land use conversion purposes do not routinely take into account environmental impacts of the proposed conversion.

DPR for land use conversion purposes should take into account environmental impacts.

NO	RECOMMENDATIONS	TO
A4.1	Increase awareness among the local authorities on the need to take into account environmental impacts in the DPR for land use conversion purposes.	State Governments & Ministry of Housing and Local Government
A4.2	Request developers to submit integrated and comprehensive plans, from the land use conversion stage to the post-construction stage.	State Governments & Local authorities

#### **A5. Space for Collection of Recyclable Waste**

Planning should allow space for separation and collection for recycling of waste in apartments.

The planning of high-rise apartments should take into consideration the need for space for separation and collection of recyclable waste.

NO	RECOMMENDATIONS	TO
A5.1	The need for space for separation and collection of recyclable waste should be incorporated in the National Standard for Apartments (Standard Kebangsaan Rumah Pangsas) for apartments.	CIDB

#### **A6. Guideline for Collection and Separation of Waste**

The planning authorities currently do not take into consideration the need to ensure that enough space is allocated in housing development for recycling purposes in the future. There is a need to plan for the future in terms of waste management, both in the local building context, and also for a regional area.

**4 STRATEGIC RECOMMENDATIONS FOR  
IMPROVING ENVIRONMENTAL PRACTICES IN CONSTRUCTION INDUSTRY**

A guideline is required for separation and collection of waste for recycling so that adequate space can be allocated for these activities during the design stage of a project.

NO	RECOMMENDATIONS	TO
A6.1	Formulate a guideline to ensure that project proponents allocate adequate space for separation and collection of waste and recycling.	State Governments & Ministry of Housing and Local Government
A6.2	Take into account the allocation of adequate facilities for recycling in the National Policy on Waste Management.	Ministry of Housing and Local Government

**A7. Requirement for Maintenance Management Plan**

A maintenance management plan for completed housing projects are currently not required and as a result post-construction maintenance is not satisfactory in Malaysia.

NO	RECOMMENDATIONS	TO
A7.1	Review the Housing Developers Act to introduce requirements for a property maintenance plan. Such requirement should be indicated during the building plan approval stage, and be submitted and approved before the issuance of a certificate of fitness.	Ministry of Housing and Local Government
A7.2	Ensuring the developers of landed property should include post-construction maintenance management plans in the submission of their proposals.	Local authorities

**A8. The Need for Qualified Technical Staff/Officer**

Local authorities lack competent officers to evaluate reports on environmental aspects submitted with the Development Proposal Plan.

A mechanism should be established whereby another accredited consultant or professional assesses reports submitted to local authorities.

NO	RECOMMENDATIONS	TO
A8.1	Study the possibility of establishing such a mechanism in the interim period.	State Governments & Ministry of Housing and Local Government
A8.2	Increase the capacity of local authorities to address this problem in the long term.	State Governments & Ministry of Housing and Local Government

## RECOMMENDATION B

### Enhancing Law and Enforcement

There are 6 aspects had been aligned under Enhancing Law and Enforcement issue. The aspects are as the following:

- Enforcement of earthwork-by-law and hill slopes development guidelines,
- Enforcement of river front development guidelines,
- Enforcement of Tree Preservation Order (Act 172),
- Guidelines for stage-construction,
- Effective Erosion and Sedimentation Control (ESC) during construction, and
- Introducing policy statements for construction wastes.

#### B1. Enforcement of Earthwork-By-Law and Hill Slopes Development Guidelines

The Earthwork-By-Law and related Hill Slopes Development Guidelines are currently not effectively enforced. The conventional approach of maximizing earthworks to pack in maximum density of development without much consideration to contours should be reviewed. Developers need to be persuaded to build according to contours and to retain the natural streams. All developers are required to submit earthwork plans, which also include sediment and erosion control. Developments in sensitive areas especially in hilly areas should be done in phases to reduce the environmental impacts during earthworks.

Enforcement of the Earthwork-By-Law and related Hill Slopes Development Guidelines has to be improved.

NO	RECOMMENDATIONS	TO
B1.1	In line with the decision by MNKT on 13.10.05, all approval to begin earthworks should strictly comply with a proper Erosion and Sediment Control Plan (ESCP).	Local authorities
B1.2	Strongly recommend capacity building in ESCP as contained in the MSMA by DID through collaboration with DID and training of all enforcement officers.	Local authorities
B1.3	Making the Chief Executive Officer of the respective developers equally accountable for contraventions against the Earthwork-By-Law.	Ministry of Housing and Local Government

B1.4	Increase the penalty for contraventions against the Earthwork-By-Law.	Local authorities
B1.5	Increase institutional regulation by ensuring that all professionals sign the development proposal report.	Relevant professional bodies
B1.6	Implement a code of practice for environmental protection.	Relevant professional bodies

## **B2. Enforcement of River Front Development Guidelines**

The requirement of set-back from the river has not been consistently enforced in all states. The Drainage and Irrigation Department guideline gives provision for building setback for development near rivers as such buildings are prone to fluvial disasters that threaten the safety of the occupants. The setback requirement is based on the types of sites and its setting, in either urban or rural areas.

A standard norm should be enforced uniformly throughout the country so that rivers can be maintained in its original state without undue environmental degradation.

NO	RECOMMENDATIONS	TO
B2.1	Increase awareness and enforcement among local authorities regarding the River Front Development Guidelines.	State Governments & Ministry of Housing and Local Government

## **B3. Enforcement of Tree Preservation Order (Act 172)**

The enforcement of Tree Preservation Order (Act 172) is not satisfactory. Selangor is the only state to take action to gazette the tree preservation order and prevent certain trees from being cut. This order has yet to be adopted by other states.

Tree Preservation Order (Act 172) should be adopted and enforced uniformly in all states.

NO	RECOMMENDATIONS	TO
B3.1	Increase awareness and enforcement among local authorities regarding the Tree Preservation Order (Act 172).	State Governments & Ministry of Housing and Local Government

#### B4. Guidelines for Stage-Construction

Developments should be done in phases to reduce environmental impacts during the earthwork stage. The completed earthwork should not be left exposed and undeveloped for a long period which can cause siltation and soil erosion.

A guideline on stage-construction is required so that earthwork is carried out in phases to reduce environmental impacts.

NO	RECOMMENDATIONS	TO
B4.1	Phased earthworks as part of the Best Management Practices (BMPs) to be emphasized in line with MSMA guidelines. ESCP to be submitted for each phase of earthworks.	Local Authorities

#### B5. Effective Erosion and Sedimentation Control (ESC) during construction

Silt traps and other ESC measures have been found to be ineffective and do not perform the functions that they have been designed for. For example, effective silt traps are those that are constructed in a series where any failure of the silt trap will result in sediments being captured at the retention pond.

Effective construction, maintenance and operation of silt traps are required to reduce silt trap failures. This could be achieved by implementing the concept of CPD (Continuous Professional Development) hours through BMPs.

NO	RECOMMENDATIONS	TO
B5.1	Best Management Practices (BMPs) on ESCs to be disseminated to relevant parties (developers, consultants and contractors) for adoption.	MBAM
B5.2	Effective ESC measures to be included in tender and contract documents (Conditions of Contracts, Specifications, Preambles, Bills Of Quantities, Drawings etc.)	CIDB
B5.3	BMPs as specified in MSMA to be targeted for routine implementation by 2007. Incentives and disincentives to be put in place and the whole construction industry widely informed.	CIDB

#### B6. Introducing Policy Statements for Construction Wastes

At present there is no policy statement on environmental targets for recycling of construction waste at the local level. The existence of such targets would encourage project proponents to recycle and ultimately reduce construction waste.

Regulators should introduce policy statements on environmental targets and encourage project proponents to help them achieve the target through legislative measures.

NO	RECOMMENDATIONS	TO
B6.1	Incorporate policy statements for construction waste management in the proposed Solid Waste Management Policy.	Ministry of Housing and Local Government
B6.2	Introduce construction waste recycling programmes in government infrastructure projects.	Ministry of Public Works

## RECOMMENDATION C

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### Promoting Self-Regulation

There are 5 aspects had been aligned under Promoting Self-Regulation issue. The aspects are as the following:

- Increasing self-regulation within the construction industry,
- Accountability of all professionals' involved,
- Environmental issue as a business opportunity,
- Recognition and encouragement, and
- Corporate Social Responsibility (CSR).

#### C1. Increasing Self-Regulation within the Construction Industry

At present, environmental management in the construction industry is mainly regulated by legislative measures. There is a need for increased self-regulation within the construction industry to improve its environmental performance. All types of development should have mitigation plans for adverse environmental impact. This plan will be useful, especially for contractors, to comply with acceptable levels for a safe environment as well as to reduce long- term costs.

Environmental performance in the construction industry should be improved through the introduction of appropriate programmes to increase self-regulation.

NO	RECOMMENDATIONS	TO
C1.1	A registration scheme should be introduced to gradually register contractors to MS ISO 14001 as part of the effort to increase self-regulation in the construction industry.	CIDB
C1.2	Various incentives should be considered to encourage contractors to be certified MS ISO 14001.	CIDB

#### C2. Accountability of All Professionals Involved

At the moment, not all consultants involved in the preparation of reports and plans are regulated by their respective boards. For instance, consultants involved in the preparation of environmental and geological reports are not registered under a specific professional board and thus, are not liable or accountable for their reports and plans.

All professionals involved in the preparation of reports and plans in the construction industry must be made accountable and should practice the highest level of professional ethics.

NO	RECOMMENDATIONS	TO
C2.1	Ensure that all the professionals involved in the construction industry be regulated by their respective professional boards to ensure accountability.	Relevant government departments
C2.2	Encourage the setting up of boards or equivalent bodies for professionals involved in the construction industry that are currently not regulated.	Relevant government departments
C2.3	Implement a code of practice for environmental protection.	Relevant professional bodies

### **C3. Environmental Issues as a Business Opportunity**

Green consumerism has resulted in environmental issues being considered as potential business opportunities by industries. Marketing tools such as eco-labelling, incentives etc. have to be introduced to encourage use and demand for environmentally preferable building products and construction method and technique used.

Consumer awareness should be enhanced in Malaysia so that developers consider environmental issues as a way of life.

NO	RECOMMENDATIONS	TO
C3.1	An eco-labelling scheme for construction industry materials should be introduced as part of the national eco-labelling scheme, with the participation of relevant certification bodies.	CIDB

### **C4. Recognition and Encouragement**

All stake holders in the construction industry (project consultants, contractors and project proponents etc.) should be encouraged to move along that path towards self-regulation and implement environmental management systems within their organisations.

A system of recognition should be established to motivate and recognize the stakeholders for their efforts in environmental management.

NO	RECOMMENDATIONS	TO
C4.1	An award scheme should be developed for recognition of good environmental practices for key stakeholders in the construction industry.	CIDB
C4.2	Incentives should be provided to key stakeholders in the construction industry to encourage their efforts in environmental management (good practices, use of environmental preferable material, design for environment construction method / technique etc.)	CIDB

### **C5. Corporate Social Responsibility (CSR)**

Global reporting initiatives are common in the United States and Europe. Companies annually submit reports that explain their contributions to the society in terms of environmental, community and social improvements. The public can use this report to decide on whether the company is suitable to invest in. In cases where reporting does not indicate that the company is sensitive to the environment, the public may boycott their products.

In view of the impending process of globalization, the Malaysian construction industry must prepare itself to compete with foreign companies and develop a niche in the world market.

NO	RECOMMENDATIONS	TO
C5.1	CSR reporting initiatives should be introduced to encourage the Malaysian construction companies achieves a competitive edge in the world market.	CIDB

## RECOMMENDATION D

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### Increasing Capacity and Public Awareness

There are 6 aspects had been aligned under Increasing Capacity and Public Awareness issue. The aspects are as the following:

- Increasing the number of technical staff at local authorities,
- Awareness among developers and contractors,
- Education and awareness among the community,
- Equity and the environment,
- Introducing national recognition programmes and
- Collective responsibility.

#### **D1. Increasing the Number of Technical Staff at Local Authorities**

The number of competent technical staff at local authorities is insufficient to review and cope with the increased number of application for land use conversion, subdivision and other development related matters.

There is a need to have an adequate number of technically competent staff at the Local Planning Authorities to cope with the increasing workload.

NO	RECOMMENDATIONS	TO
D1.1	Review the current structure in the government service to make it more flexible and enable the secondment of more senior technical staff to local authorities.	Public Service Department

#### **D2. Awareness among Developers and Contractors**

Awareness among contractors and developers on the impacts of their work activities on the environment needs to be enhanced. Developers and contractors should be made aware that good environmental practices can be achieved without adversely affecting their contractual performance and profits.

There is a need to create awareness among developers and contractors on the impacts of their work activities on the environment and on the ways to help them minimise their negative impacts.

NO	RECOMMENDATIONS	TO
D2.1	Environmental awareness programmes should be increased to enhance the awareness of contractors and developers regarding the importance of environmental management.	CIDB
D2.2	Awareness programmes should be designed to target specific groups, ranging from the highest level of decision-makers to professionals and contractors.	CIDB

### **D3. Education and Awareness among the Community**

Public apathy regarding the environment is a serious problem in Malaysia. One of the reasons for the failure of recycling programmes is poor engagement and participation of the community due to lack of understanding. The low level of environmental awareness and commitment hinders the success of environmental programmes in Malaysia.

There is a need to engage and educate the community and increase its awareness regarding the environment.

NO	RECOMMENDATIONS	TO
D3.1	Introduce programmes to increase environmental awareness and counter the culture of public apathy within the framework of their Local Agenda 21 Programme.	Ministry of Housing and Local Government
D3.2	Incorporate environmental awareness and responsibility, particularly regarding recycling of waste, into the school curriculum.	Ministry of Education

### **D4. Equity and the Environment**

The issue of equity and environmental management has not been adequately understood and addressed in Malaysia. The community has to be aware of the need to cross subsidize the high-end and low cost houses, without compromising environmental standards, to ensure sustainable social development.

There is a need to highlight and educate the community on the subject of equity and the environment.

NO	RECOMMENDATIONS	TO
D4.1	Formulate policies, which ensure that recognized environmental and quality standards are met in all categories of low, medium and high cost houses.	Ministry of Housing and Local Government

### **D5. Introducing National Recognition Programmes**

There is presently no national level programme that recognizes developers who are selling environmentally preferable products and provides them with opportunities to promote their products. The introduction of such programmes will encourage developers to produce environmentally friendly products.

Developers who are selling environmentally preferable products should be given opportunities to promote their products through national level programmes.

NO	RECOMMENDATIONS	TO
D5.1	Work in conjunction with the Department of Environment, to develop criteria for environmentally preferable products from developers and establish a mechanism to recognise these products.	Ministry of Housing and Local Government & Department of Environment

### **D6. Collective Responsibility**

There is very little appreciation of the fact that good environmental practice in the construction industry is a collective moral responsibility. As a result, only certain parties, particularly the contractors, are perceived to be the cause for poor environmental practices, when in reality all stakeholders (developers, consultants, professionals etc.) are similarly responsible.

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IMPROVING ENVIRONMENTAL PRACTICES IN CONSTRUCTION INDUSTRY

Widespread acknowledgment of the collective responsibility of all stakeholders in good environmental practices will reduce negative perceptions and encourage self-regulation for sustainable environmental management in the construction industry.

NO	RECOMMENDATIONS	TO
D6.1	Dissemination of information regarding the collective responsibility of all stakeholders in environmental management should be increased to enhance public expectation and awareness among industry players.	CIDB

## RECOMMENDATION E

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### Addressing Knowledge Gaps

There are 6 aspects had been aligned under Addressing Knowledge Gaps issue. The aspects are as the following:

- Updated guidelines and regulations among contractors and developers,
- Internalizing the cost of the environment,
- Need for auditable practices,
- Creating a market for C&D materials,
- Research on environmentally preferable products and
- Identification of hazardous building materials.

#### **E1. Updated Guidelines and Regulations among Contractors and Developers**

Contractors and developers should be made aware of the latest guidelines and regulations of the various technical departments that are applicable to the construction industry. This is to encourage the implementation of MS ISO 14001 within the construction industry as legal requirements need to be identified so that it can be audited.

Contractors and developers need to be regularly updated on the numerous guidelines and regulations applicable to the construction industry.

NO	RECOMMENDATIONS	TO
E1.1	A checklist of guidelines and regulations applicable to the construction industry should be developed and be continually updated.	CIDB

#### **E2. Internalizing the Cost of the Environment**

The cost of implementing good environmental practices has yet to be incorporated into the total cost of the development project. Appropriate and accurate financial allocation for each aspect of the Environmental Management Plan has not been identified to enable the cost of the environmental management to be internalised.

Guidelines should be established to identify appropriate and accurate financial allocations for each aspect of the Environmental Management Plan so that the cost of the environmental management is internalised.

NO	RECOMMENDATIONS	TO
E2.1	To facilitate the development of Guidelines, sufficient funds should be allocated to conduct R&D on the financial aspect of environmental management and the Bill of Quantities should be modified accordingly.	CIDB

### **E3. Need for Auditable Practices**

Current practices relating to site preparation of the construction phase are not auditable. As a result, it is difficult to implement effective practices to improve environmental management.

There is a need for detailed minimum requirement for every project, which are auditable on site.

NO	RECOMMENDATIONS	TO
E3.1	The possibility of incorporating auditable environmental practices into the Quality Assessment System in Construction (QLASSIC) should be studied, to improve environmental assessment during site preparation.	CIDB

### **E4. Creating a Market for C&D Materials**

Construction and demolition materials are still not very marketable in Malaysia. Appropriate fiscal incentives and strategies should be considered to enable the debris to be introduced as a reusable and cheaper material for construction. In addition, there is no projection on the quantity of construction debris that is discharged into the waste streams.

Efforts should be undertaken to make construction and demolition materials marketable in Malaysia.

NO	RECOMMENDATIONS	TO
E4.1	Sufficient funds should be allocated to conduct R&D and establish a database on reusable materials from construction industry waste to support the national recycling programme.	CIDB
E4.2	Incentives should be identified to encourage recycling programmes involving construction industry waste material.	CIDB

## **E5. Research on Environmentally Preferable Products**

Research institutions should work closely with construction stakeholders to do research on various environmentally preferable construction materials and products as well as the suitability of eco-construction systems. Results from the studies will be useful to both the local authorities and the consumers.

Research should be undertaken on various environmentally preferable construction materials and products.

<b>NO</b>	<b>RECOMMENDATIONS</b>	<b>TO</b>
E5.1	Appropriate mechanisms should be established to conduct R&D on the identification of environmentally preferable construction materials, products and systems.	CIDB
E5.2	Sufficient funds should be allocated to conduct R&D on technologies to replace current conventional approaches.	CIDB
E5.3	The effective dissemination of R&D results to all relevant stakeholders should be increased in the construction industry.	CIDB

## **E6. Identification of Hazardous Building Materials**

The Malaysian construction industry should identify and review the use of materials that are potentially hazardous. The usage of hazardous materials should be replaced by alternatives. Developers as well as contractors have to be made aware of their responsibility to the long-term safety of the occupants, and not focus only on the cost when selecting building materials.

Research should be undertaken on construction materials that are currently used in the country.

<b>NO</b>	<b>RECOMMENDATIONS</b>	<b>TO</b>
E6.1	All hazardous materials that are currently being used in Malaysia should be banned.	CIDB
E6.2	Sufficient funds should be allocated to conduct R&D on local construction materials to ensure that no hazardous materials are used, to ensure the long-term safety of the community.	CIDB
E6.3	Standards should be developed on usage of building materials, particularly the finishing, to ensure that they are safe, energy efficient and environmentally friendly.	CIDB

## **CONCLUDING REMARKS**

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The commitment from all stakeholders can transform the Malaysian construction industry into one that is not a threat to the environment, but meets the human need for development in harmony with the nature. Development will continue to expand to meet socio-economic obligations, but the focus should be on the quality of the development that is pursued. In this context, the Strategic Recommendations outlined in this document will contribute to encourage development that minimizes its impact on the environment.