STRATEGIC ENVIRONMENTAL ASSESSMENT POLICY SYSTEMS MODEL FOR SOLID WASTE MANAGEMENT IN MALAYSIA

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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ABSTRACT

This study has examined the Strategic Environmental Assessment (SEA) policy framework for integrating environmental requirements in solid waste management (SWM) policies, plans and programmes (PPP) in Malaysia. The key problem the study frames is the lack of environmental policy integration for SWM. Currently, environmental issues are mainly addressed during the environmental impact assessments (EIA) of SWM facilities, which have resulted in environmental pollution, public protest and public litigation. The primary objective was to determine the potential for SEA integration in SWM while the secondary objective was to determine the mechanism for SEA implementation for SWM based on the SEA Behaviour Models (SBM) and the analytical SEA (ASEA) framework. The methodology of the study consisted of a SEA policy analysis, SEA stakeholder/public survey with the development of SBM based on structural equation modelling as well as the operationalization of the ASEA framework based on the United Nations SEA Protocol. Finally, SEA policy recommendations were formulated based on the SBM and ASEA framework using the environmental management system (EMS) elements. The SEA policy analysis and SBM survey indicates significant SEA policy integration potential though the existing environmental management emphasis is still on EIA. The SBM also indicate that the key drivers in the SEA stakeholder model are perception of benefits, barriers and enablers while the key drivers in the SEA public model are perception of benefits, enablers and existing environmental attitude. The general policy implication is that the SBM provides empirical strategic behaviour models for SEA policy integration initiatives. The specific policy implications indicate the need for strategic public participation, SEA capacity building and a strategic transformation of the environmental planning framework, which includes a SEA Legislation, SEA Blueprint, SEA Declaration and a SEA Commission.

Meanwhile, the ASEA findings highlight minimal level of environmental integration at the strategic level for SWM. The operationalization of the ASEA framework on the National Strategic Plan (NSP) for SWM indicate that 51% of its SWM facility siting is within environmental sensitive areas including water catchment areas. The general policy implication is that the ASEA provides a customized SEA framework for SWM based on Malaysia's environmental system. The specific policy implications indicate the need for the adoption of the ASEA framework and a review of the NSP as well as the establishment of a SEA Management Unit, Environmental Information System, SEA Steering Committee and a SEA Governance Centre. Finally, this study has formulated SEA policy recommendations based on the SEA policy analysis, SBM and ASEA framework (Figure 1). The SEA policy recommendations' five environmental thematic areas are SEA Scope, SEA Policy Planning, SEA Operational Implementation, SEA Monitoring Audit and SEA Governance. In conclusion, the study indicates significant potential of SEA integration for SWM in Malaysia, which ultimately will require a synergism of the SBM and ASEA framework as part of a dynamic SEA policy systems model.

IMPACT ON SEA		Moderate	High
	High	**2** • SEA Legislation • SEA Blueprint • SEA Public Participation • SEA Governance Centre	**1** • ASEA Framework • SEA Capacity Building
	Moderate	**4** • SEA Commission • SEA Steering Committee	**3** • SEA Declaration • Environmental Information System • SEA Management Unit • SEA SWM PPP Review

IMPLEMENTATION PROBABILITY

Figure 1 : SEA Policy Recommendations Priority Quadrant

ABSTRAK

Kajian ini telah memeriksa rangka kerja Penilaian Alam Sekitar Strategik (SEA) untuk mengintegrasikan keperluan alam sekitar dalam pengurusan sisa pepejal (SWM) dasar, rancangan dan program (PPP) di Malaysia. Masalah utama yang dikaji adalah kekurangan integrasi alam sekitar untuk SWM semasa perancangan dasar. Pada masa kini, isu-isu alam sekitar ditangani di peringkat penilaian kesan alam sekitar (EIA) kemudahan SWM yang telah menyebabkan pencemaran alam sekitar, bantahan awam dan tindakan undang-undang. Objektif utama adalah menentukan potensi penerapan SEA dalam SWM manakala objektif kedua adalah menentukan mekanisma pelaksanaan SEA untuk SWM berdasarkan model tingkah laku (SBM) SEA dan pengoperasian rangka kerja analisa SEA (ASEA). Metodologi kajian terdiri daripada analisa dasar SEA, kaji selidik pihak berkepentingan/orang awam dan pembangunan model tingkah laku SEA berdasarkan pemodelan struktur serta pengoperasian rangka kerja analisis khas SEA berdasarkan Protokol SEA Bangsa-Bangsa Bersatu. Justeru itu, cadangan dasar SEA telah dirangka berdasarkan elemen sistem pengurusan alam sekitar (EMS). Penemuan analisa dasar SEA dan kaji selidik SBM menunjukkan potensi pengintegrasian SEA yang signifikan walaupun penekanan pengurusan alam sekitar masa kini masih pada EIA. Penemuan model SBM juga menunjukkan pemandu utama untuk model tingkah laku pihak berkepentingan SEA terdiri daripada persepsi faedah, halangan dan pemboleh manakala dalam model orang awam tingkah laku SEA terdiri daripada persepsi faedah, pemudah dan sikap alam sekitar. Implikasi dasar umum adalah SBM menyediakan model tingkah laku empirik untuk inisiatif penerapan dasar SEA. Implikasi dasar khusus adalah keperluan penyertaan awam strategik, peningkatan kapasiti SEA dan transformasi strategik rangka kerja perancangan alam sekitar yang termasuk perundangan SEA, Pelan Tindakan SEA, Deklarasi SEA dan Suruhanjaya SEA.

Sementara itu, kajian rangka kerja ASEA menunjukkan Rancangan National Strategik (NSP) untuk perancangan SWM di Malaysia mempunyai pertimbangan alam sekitar yang minimum di peringkat strategik. Umumnya, 51% daripada kemudahan SWM yang dirancang adalah dalam kawasan sensitif alam sekitar termasuk kawasan tadahan air. Implikasi dasar umum adalah ASEA menyediakan suatu rangka kerja analisa SEA yang disesuaikan untuk SWM berdasarkan sistem alam sekitar Malaysia. Implikasi khusus adalah keperluan pemakaian rangka kerja ASEA dan penyemakan NSP serta penubuhan Unit Pengurusan SEA, Sistem Maklumat Alam Sekitar, Jawatankuasa Pemandu SEA dan Pusat Pentadbiran SEA. Akhir sekali, kajian ini telah merumuskan cadangan dasar SEA berdasarkan analisa dasar SEA, SBM dan rangka kerja ASEA (Rajah 1). Lima tema alam sekitar cadangan dasar adalah Skop SEA, SEA Perancangan Dasar, SEA Pelaksanaan Operasi, Audit Pemantauan SEA dan Tadbir Urus SEA. Kesimpulannya, kajian menunjukkan potensi signifikan pengintegrasian SEA untuk SWM di Malaysia yang akan memerlukan pergabungan SBM dan rangka kerja ASEA sebagai sebahagian model sistem dasar SEA yang dinamik.

IMPAK KEPADA SEA		
Tinggi	**2** • Perundangan SEA • Pelan Tindakan SEA • SEA Penyertaan Awam • Pusat Pentadbiran SEA	**1** • Rangka Kerja ASEA • Kesedaran & Latihan SEA
Sederhana	**4** • Suruhanjaya SEA • Jawatankuasa Pemandu SEA	**3** • Deklarasi SEA • Sistem Maklumat Alam Sekitar • Unit Pengurusan SEA • Semakan SEA SWM PPP
	Sederhana	Tinggi

KEBARANGKALIAN PELAKSANAAN

Rajah 1 : Cadangan Dasar SEA Kuandran Keutamaan

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ABBREVIATIONS

ABC	Attitude-Behaviour-Context
ADB	Asian Development Bank
API	Air Pollutant Index
APS	Air pollution sources
ASEA	Analytical Strategic Environmental Assessment
ATT	Attitude Towards Behaviour
AVE	Average variance extracted

AWA	Environmental Awareness
BAR	Perceived SEA Barriers
BEA	Benefit, Enabler, Attitude
BEN	Perceived SEA Enablers
BOD	Biochemical Oxygen Demand
CAP	Consumers Association of Penang
CBD	Convention on Biological Diversity
CEI	Cumulative Environmental Impact
CIA	Cumulative Impact Assessment
COD	Chemical Oxygen Demand
DANIDA	Danish International Development Assistance
DG	Director General
DOE	Department of Environment
DOESP	DOE Strategic Plan
DSM	Department of Survey and Mapping
DSWM	Department of Solid Waste Management
DTCP	Department of Town and Country Planning
EA	Environmental Assessment
EET	Existing Environmental Attitude
EIA	Environmental impact assessment
EIS	Environmental Information System
EMS	Environmental management system
ENB	Perceived SEA Enablers
EPI	Environmental policy integration
EPL	Environmental Pollution Load
EPR	Extended producer responsibility

EPU	Economic Planning Unit
EQA	Environmental Quality Act
ESA	Environmental Sensitive Area
ESR	Environmental Sensitive Receptor
ETP	Economic Transformation Programme
EU	European Union
GIS	Geographical Information System
GOM	Government of Malaysia
GPT	Gross pollutant traps
HIA	Health Impact Assessment
IAPG	Inter-Agency Planning Group
IAPG	Inter-Agency Planning Group
IPA	Integrated policy appraisal
JICA	Japanese International Cooperation Agency
LLS	Landfill leachate sources
MHLG	Ministry of Urban Wellbeing, Housing and Local Government
MNRE	Ministry of Natural Resources and the Environment
MOE	Ministry of Environment
MRF	Material Recovery Facility
MWM	Master Plan on Waste Minimization
NCLG	National Council for Local Governments
NDSP	National Dairy Support Project
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NIMBY	Not In My Backyard
NPBD	National Policy on Biological Diversity

NPC	National Planning Council
NPCC	National Policy on Climate Change
NPE	National Policy on the Environment
NPP	National Physical Plan
NRE	Natural Resources and Environmental
NSP	National Strategic Plan
NSWMP	National Solid Waste Management Policy
OSA	Official Secrets Act
PA	Protected Areas
PBC	Perceived behavioural control
PDCA	Plan, Do, Check and Act
PEIS	Programmatic Environmental Impact Statement
PI	Public involvement
PPC	Public perception concern
PPM	Public policy model
PPP	Policies, plans and programmes
PPSP	Solid Waste Management and Public Cleansing Corporation
PSN	Perceived subjective norm
PWD	Public Works Department
RIA	Regulatory impact assessment
ROL	River of Life
SBM	SEA Behavioural Model
SEA	Strategic Environmental Assessment
SEM	Structural equation model
SESA	Strategic Environment and Social Assessment
SGC	SEA Governance Centre

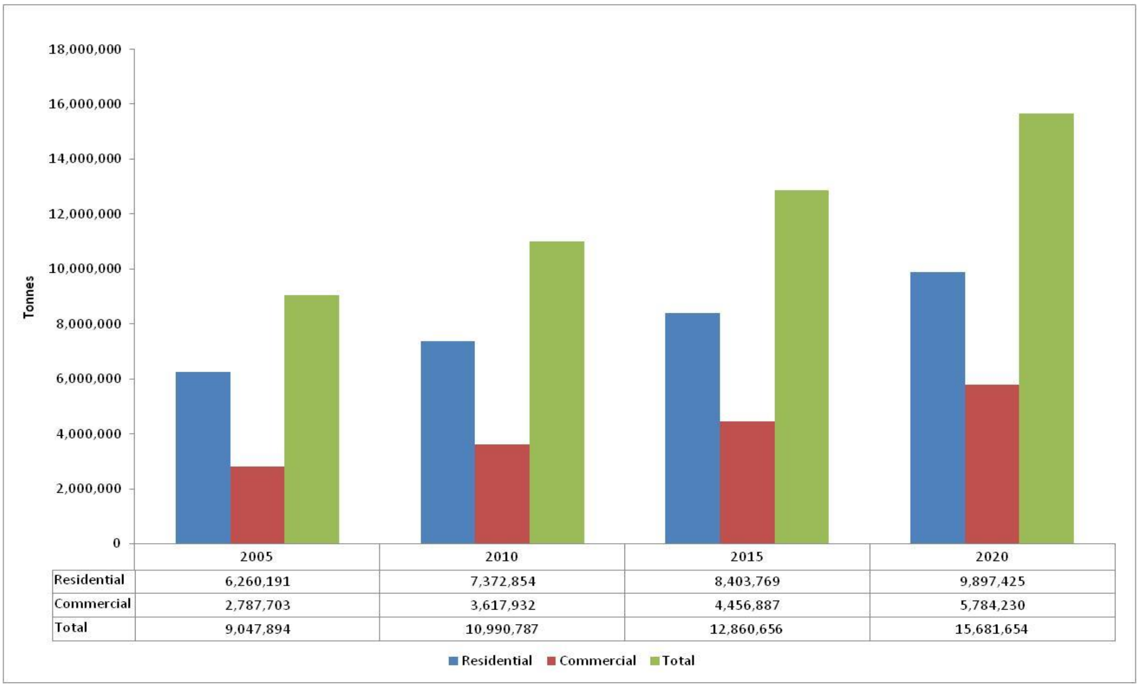
SLF	Sanitary Landfill
SMU	SEA Management Unit
SPA	SEA Protection Areas
SPM	Stakeholder policy model
SS	Suspended Solids
SSC	SEA Steering Committee
STP	Sewage treatment plants
SWCA	Solid Waste and Public Cleansing Management Corporation Act
SWM	Solid waste management
SWMA	Solid Waste and Public Cleansing Management Act
SWMCSP	SWM Corporation Strategic Plan
SWOT	Strength, weakness, opportunities and threats
TFS	Transfer Stations
TPB	Theory of planned behaviour
TPD	Tonnes/Day
TTP	Thermal Treatment Plants
UNCED	United Nations Conference on Environment and Development
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCC	United Nations Framework Convention on Climate Change
WQI	Water Quality Index
WTP	Water treatment plant
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

1.1 Research Background

Solid waste generation in Malaysia has been increasing drastically where solid waste was projected to increase from 9.0 million tonnes in 2000 to about 10.9 million tonnes in 2010 and finally to 15.6 million tonnes in 2020. Nevertheless, the national recycling rate is estimated to be only about 3-5 % (Agamuthu & Dennis, 2011a). The projected waste generation rates for Malaysia for 2010 - 2020 are about 4.3% per annum which is mainly due to population growth and urbanization patterns that are linked to increased consumption and waste generation (Ministry of Housing & Local Government, 2006) (Figure 1.1). This increasing rate of solid waste generation is expected to degrade the country's environmental quality as evidenced by the contamination of water catchments areas by landfill leachate and the deteriorating river water quality levels (Figure 1.2) (Lau, 2010; Tan, 2006). Consequently, these trends suggest to policy makers of a potential 'flashpoint' in terms of environmental sustainability for Malaysia unless policy goals and gaps are addressed in a strategic manner (Aliman, 2012).

Meanwhile, international trends in SWM indicate that global solid waste generation in urban areas are projected to increase from 1.3 billion tonnes in 2012 to 2.2 billion tonnes in 2025 (Hoornweg & Bhada-Tata, 2012). This global explosion in solid waste generation is compounded by environmental degradation and pollution and has resulted in a reduction in environmental sustainability (World Bank, 2012). Ultimately, these problems and challenges in SWM and sustainability have highlighted the importance of addressing these issues at a strategic policy level by moving from traditional static approaches to innovative dynamic solutions.



	2005	2010	2015	2020
Residential	6,260,191	7,372,854	8,403,769	9,897,425
Commercial	2,787,703	3,617,932	4,456,887	5,784,230
Total	9,047,894	10,990,787	12,860,656	15,681,654

Figure 1.1 : Estimated Solid Waste Generation 2005-2020

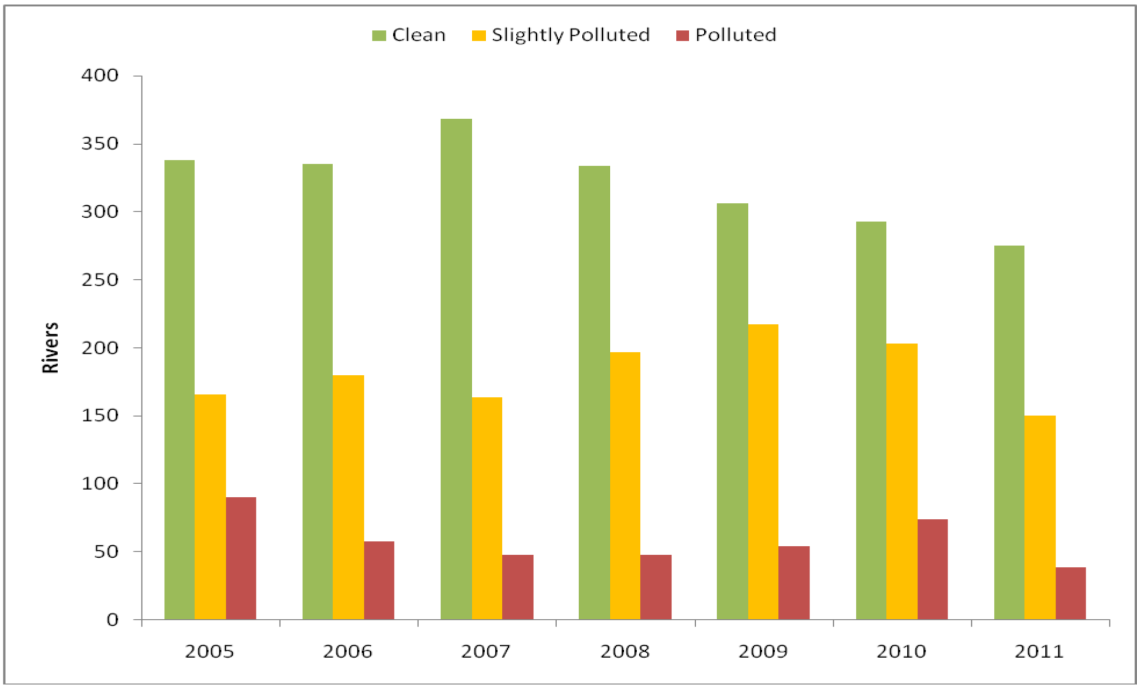


Figure 1.2 : Malaysian River Water Quality Trends

1.2 Research Problem

Environmental and solid waste management (SWM) policies in Malaysia have evolved from simple informal policies to national level strategies and legislation (Agamuthu & Dennis, 2011a, 2011b). Nevertheless, this policy evolutionary pathway has also resulted in a potentially systemic problem which is the proliferation of policies and plans that may not necessarily translate into environmental practice, promote integrated environmental management or foster public support for SWM initiatives (Agamuthu & Dennis, 2013; Dennis & Agamuthu, 2012a, 2012b). This has resulted in environmental integration of SWM confined mainly to the environmental impact assessments (EIA) stage of SWM projects such as landfills or incinerators, which pose obstacles for sustainable SWM in Malaysia. The first obstacle is that environmental integration at the EIA stage provides limited strategic decision making options as most of the project options have already been determined including its location and technologies. This often leads to environmental management limited to pollution control mitigation as opposed to pollution prevention solutions as well as a focus on short-term interest as opposed to long-term investments (Gao et al., 2013; Karmperis et al., 2013; Sutton, 1999). Ultimately, this reactive approach may not lead to an optimal environmental quality as demonstrated by river water quality trends. The second obstacle is that environmental initiatives at the EIA stage precludes a cumulative and integrated assessment of environmental impacts thus resulting in fragmented and piecemeal SWM initiatives without tackling underlying root cause problems. Finally the third obstacle is that environmental integration at the EIA stage provides limited public participation opportunities which are often confined to the project level details (Naddeo et al., 2012; Waghe et al., 2013).

Consequently, this has resulted in public dissatisfaction and opposition at the project level since public support at the policy planning level was limited. A key example of a poorly planned SWM facility in Malaysia is the 0.5 billion USD SWM incinerator project in Broga, Selangor which was initiated in 2001 but revoked by the government in 2007 in response to public protest and public lawsuit against the project (Loong & Cheah, 2007). Subsequently and indicative of a much deeper and systemic problem, the residents in the states of Perak and Johor in Malaysia protested against newly constructed sanitary landfills citing issues of siting and environmental pollution problems (Tan, 2012; The Star, 2013a). Ultimately, the cost, time and resources spent on these projects does not contribute to an efficient and sustainable SWM system.

Research on SWM in Malaysia suggest that the challenges of environmental integration in the existing SWM system is mainly due to a deeper problem in the policy planning and environmental governance in Malaysia. This stems from the existing emphasis on the project based EIA process as the main driving force for environmental integration and the top-down policy planning system. This policy formulation process has often been perceived as highly bureaucratic, lacking public participation with minimal cross-sectoral horizontal environmental policy integration (EPI) (Hezri & Nordin Hasan, 2006). Horizontal EPI enables governments to integrate and prioritize environmental and sectoral policy objectives within the policy planning system (Lafferty & Hovden, 2003). This is because environmental considerations are increasingly perceived as a significant driver for sustainable SWM policy planning (Agamuthu et al., 2009). Thus, there is a growing need for EPI at the strategic policy planning level than the project level, which is expected to prevent or mitigate potential environmental issues at the project level. This requires a fundamental paradigm shift in environmental integration approaches that is preventive and proactive.

Accordingly, this includes addressing both short-term and long-term environmental issues over a wider spatial coverage as well as integrating public considerations in SWM policy planning in Malaysia (Lafferty & Hovden, 2003; Roberts, 2004). Thus, one of the main challenges in Malaysia for SWM is in bridging the gap between policy and practice by proactively instituting a precautionary environmental planning framework in the current SWM system to avoid irreversible consequences if it is addressed too late beyond a certain tipping point.

Consequently, Strategic Environmental Assessment (SEA) has been promoted as a system of incorporating environmental considerations into policies, plans and programmes (PPP) (Figure 1.3). The United Nations Economic Commission for Europe (UNECE) describes SEA as the evaluation of the likely environmental effects of PPP which comprises the preparation of an environmental report and the carrying out of public participation and consultations (United Nations, 2012). SEA was initially promoted as an extension of EIA principles and practice to PPP where it added value by analyzing PPP at an early stage, thus setting the context and framework for EIAs at the Project level (OECD, 2006). The advantage of SEA was that is provided the framework to prevent environmental problems and enable public participation at the policy planning stage. This was mainly due to the inability of EIA to address environmental integration at the strategic levels especially during policy and plan-making since EIA was limited in its ability to account for the cumulative effects of multiple, successive projects in a particular area (Table 1.1) (United Nations, 2003a). Thus, SEA provides an additional layer of of screening at the policy planning stage and complements EIA but does not replace EIA to minimize environmental problems and public protest. Ultimately, this should result in fewer environmentally problematic facilities and EIAs at the project level.

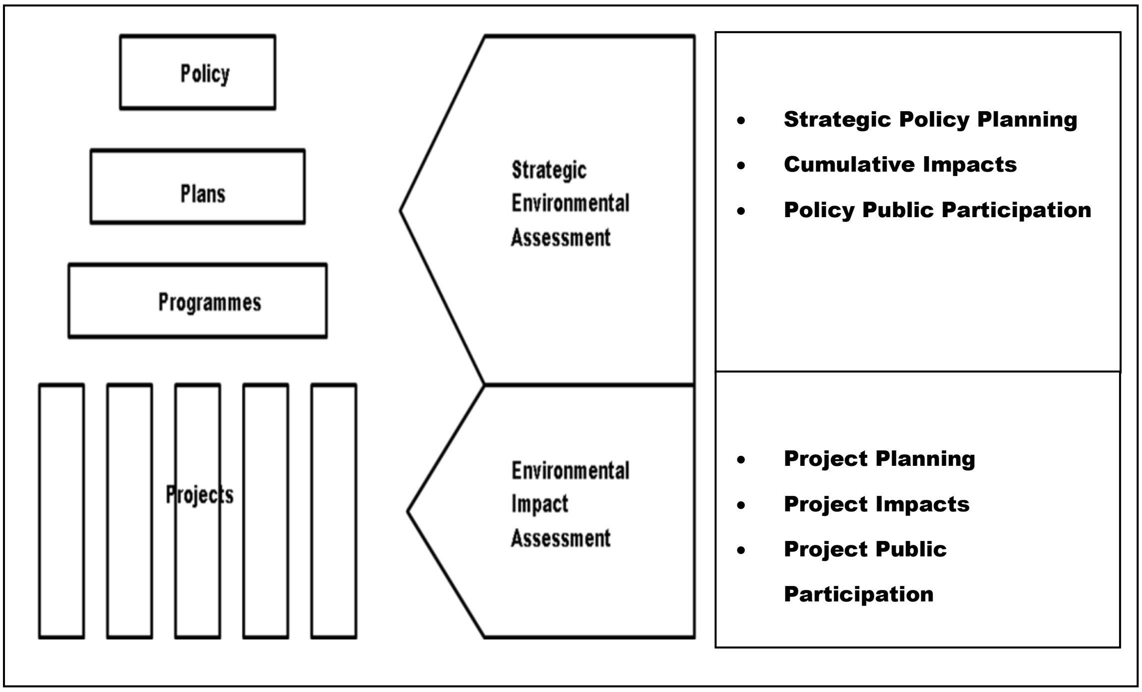


Figure 1.3 : SEA and EIA in PPP (Adapted from OECD, 2006)

Table 1.1 : Comparison of SEA and EIA

EIA	SEA
Applied to specific and relatively short-term (life-cycle) projects and their specifications.	Applied to policies, plans and programmes with a broad and long-term strategic perspective.
Takes place at early stage of project planning once parameters are set.	Takes place at an early stage in strategic planning.
Considers limited range of project alternatives.	Considers a broad range of alternative scenarios.
Conducted and/or funded by the project proponents.	Conducted independently of any specific project proponent.
Focus on obtaining project permission and does not provide feedback to policy, plan or program consideration.	Focus on decision on policy, plan and program implications for future lower-level decisions.
Single-stage well-defined, linear process with clear beginning and end.	Multi-stage, iterative process with feedback loops.
Mandatory preparation of an EIA report with prescribed format and contents.	Non-mandatory preparation of a report and may not be formally documented.
Emphasis on mitigating environmental and social impacts of a specific project with limited opportunities for macro policy planning.	Emphasis on meeting balanced environmental, social and economic objectives in policies, plans and programs.
Provides limited review of cumulative impact and confined to phases of a specific project.	Provides and incorporates consideration of cumulative impacts.

Source : (United Nations, 2012)

There is a significant body of research on SEA in terms of its principles, rationale, benefits, methodologies as well as its practical application over a wide range of sectors and countries (Dalal-Clayton & Sadler, 2004). SEA has been applied in waste management planning especially as a tool to integrate public participation in waste management plans (Desmond, 2009), (Pires et al., 2011).

Furthermore, SEA related studies include stakeholder attitudes (McCarthy, 1996a), status of SEA application in specific sectors or countries, potential of SEA in developing countries (Briffett et al., 2003), SEA legal and institutional frameworks (Alshuwaikhat, 2005; Chaker et al., 2006), motivations and politics of SEA implementation (Zhu & Ru, 2008), conceptual perspectives on SEA, future challenges of SEA (Wallington et al., 2007), SEA lessons learnt, sectoral green growth (Slunge & Loayza, 2012), SEA in climate change plans (Chang & Wu, 2013; Kørnøv & Wejs, 2013), SEA indicators (Gao et al., 2013; Wang et al., 2013a, 2013b) and SEA in policy and governance (Dusik & Xie, 2009).

These studies have broadened the understanding on SEA as well as provided important theoretical and practical knowledge on SEA and its applications. Generally, these SEA studies have adopted a conceptual and qualitative approach to the academic discourse on SEA. Nevertheless, internationally there are limited empirical studies on SEA especially in providing stakeholder and public SEA behaviour models (SBM) as well as operationalizing analytical SEA (ASEA) frameworks for national policy planning especially in the SWM sector.

1.3 Research Objectives

This study aimed to examine the SEA integration framework in SWM policy planning in Malaysia by conducting a SEA policy analysis, empirically modelling stakeholder and public behaviour for SEA integration using SBM as well as operationalizing an ASEA framework on the National Strategic Plan (NSP) for SWM in Malaysia. The primary objective was to determine the potential for SEA integration in SWM while the secondary objective was to determine the mechanism for SEA implementation for SWM based on the SBM and the ASEA framework. Consequently, the study combines the behavioural and technical aspects of SEA to provide SEA policy recommendations for SWM based on the environmental management system (EMS) elements as part of a SEA policy systems model.

This study aims to expand the present SEA knowledge and discipline by linking a theoretical SBM for SEA and an operational ASEA framework for SWM facilities based on Malaysian environmental systems. The theoretical SBM for SEA was adapted from the theory of planned behaviour (TPB) to develop a structural equation model linking stakeholders policy awareness and existing environmental attitudes with perceptions of SEA Benefits, Barriers and Enablers to model the potential for SEA integration in SWM policy planning (Ajzen, 1991). Meanwhile the ASEA framework was adapted from the United Nations (UN) SEA Protocol to utilize six Malaysian customized criteria for its SEA ranking and significance of environmental impacts from the proposed SWM facilities in the NSP. These six ASEA criteria are the environmental sensitive areas (ESA), environmental pollution loading (EPL), environmental sensitive receptors (ESR), Water Quality Index (WQI), Air Pollutant Index (API) and findings of the SEA Public Perception Concern (PPC) survey.

Ultimately, the main objective of this study is to expand the SEA subject knowledge by providing a validated stakeholder and public SBM as well as an operationalized ASEA framework for SWM policy planning in Malaysia. The findings of the SEA policy analysis, SBM and the ASEA was utilized in the formulation of the SEA policy recommendations for SWM policy planning in Malaysia. This is further detailed out by the following sub-objectives :-

1. To conduct a SEA policy analysis of environmental and SWM policies in Malaysia using a strength, weakness, opportunities and threats (SWOT) framework.
2. To assess stakeholders and public awareness on SEA and to empirically validate stakeholder and public SBM models for SEA by identifying significant latent drivers and pathways for SEA integration in SWM policy planning in Malaysia.
3. To operationalize an ASEA framework for SWM based on the NSP for SWM in Malaysia.
4. To formulate SEA policy recommendations based on the findings of the SEA policy analysis, SBM and ASEA framework utilizing the EMS planning elements for the purpose of integrating SEA within the SWM policy planning framework in Malaysia.

1.4 Research Design

The study research design consists of five main stages (Figure 1.4 & Table 1.2) involving literature review, SEA policy analysis, SEA behavioural modelling, analytical SEA framework operationalization and finally SEA policy recommendations.

Stage 1 the is literature review and trend identification stage, which involved a detailed review and analysis of international and Malaysian SEA trends including the identification of problems, progress and prospects in SEA application. Stage 2 is the policy review and analysis stage and involved an analysis of the main environmental and solid waste management policies in Malaysia utilizing a SWOT framework. Stage 3 is the SEA stakeholder and public survey as well as the empirical SEA behavioural modelling stage. This involved surveys and interviews of environmental and SWM policy makers/implementers and a national public survey of 15 major cities in Malaysia. The survey data was used to empirically model stakeholder and public SBM to determine the potential of SEA integration behaviour for SWM in Malaysia. Stage 4 is the ASEA framework operationalization stage. This involved data collection on Malaysia environmental criteria such as ESA, EPL, ESR, WQI, API and PPC. These ASEA criteria and data was used to evaluate the environmental ranking and significance of the 80 SWM facilities proposed in the NSP for SWM in Malaysia. Stage 5 involved synthesizing the findings from the SEA policy analysis, SBM and ASEA policy implications to formulate SEA policy recommendations to enable integration of SEA in the SWM policy planning framework in Malaysia.

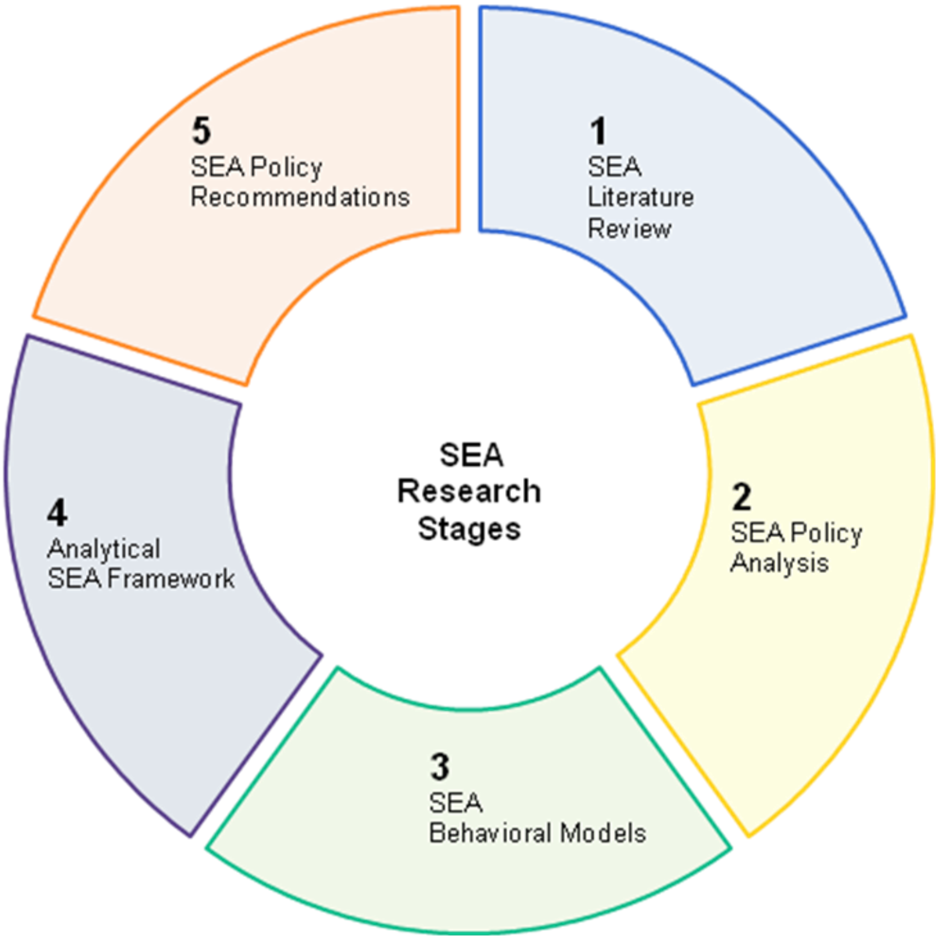


Figure 1.4 : Study Research Design

- **1**
- Review SEA International Application
- Review SEA Malaysian Application
- Collate & Analyze Lessons Learned

- **2**
- Conduct Malaysian Policy Review
- Conduct Malaysia Policy Analysis
- Conduct SWOT Analysis

- **3**
- Conduct Stakeholder & Public Survey
- Develop SEA Behavioral Models (SBM)
- Determine significant SEA drivers and pathways

- **4**
- Customize SEA criteria and environmental data
- Operationalize Analytical SEA Framework (ASEA)
- Determine significance ranking and impacts

- **5**
- Develop SEA thematic areas based on EMS
- Synthesize SEA findings based on SBM and ASEA
- Formulate SEA Policy Recommendations

Table 1.2 : Research Stages & Questions

Stage Task	**Research Questions**
Stage 1 • SEA Literature Review	• What are the international & Malaysian SEA trends? • What are the SEA trends in terms of problems, progress and prospects? • What are the SEA elements in environmental and SWM policies in Malaysia?
Stage 2 • SEA Policy Analysis	• What are the SEA strengths of the existing policies? • What are the SEA weaknesses of the existing policies? • What are the SEA opportunities of the existing policies? • What are the SEA threats of the existing policies? • What are the policy implications of the SEA policy analysis?
Stage 3 • SEA Behavioural Models (SBM)	• What are the SEA and SWM policy awareness levels in Malaysia? • What are the stakeholder and public perceptions on latent benefits of SEA in SWM? • What are the stakeholder and public perceptions on latent barriers of SEA in SWM? • What are the stakeholder and public perceptions on latent enablers of SEA in SWM? • What are the stakeholder and public perceptions on SEA integration in SWM? • What are the policy implications of the SBM findings?
Stage 4 • Analytical SEA (ASEA) Framework	• What are the SEA criteria for SWM in Malaysia? • What are the ASEA findings for the NSP in terms of ranking and significance? • What are the policy implications of the ASEA findings?
Stage 5 • SEA Policy Recommendations	• What are the synthesized SEA policy recommendations based on the SEA policy analysis, SBM and ASEA? What are the SEA policy recommendations priority in implementation?

1.5 Research Contribution

This study is expected to make both theoretical and practical contributions to the SWM policy planning framework in Malaysia. Currently, there are limited empirical based stakeholder and public behaviour models for integrating SEA in policy planning as well as country customized and operational ASEA framework for SWM in policy planning. This study in terms of theoretical contributions is expected to advance the current knowledge of SBM by providing insights into the latent drivers that influence both stakeholders and public behaviour in integrating SEA in policy planning. Furthermore, it also provides a customized and operationalized ASEA framework, which has been validated with the NSP for SWM in Malaysia thus ensuring its local suitability and acclimatization. Finally, the study provides SEA policy recommendations for SEA integration in SWM policy planning in Malaysia by synthesizing the findings from the SEA policy analysis, SBM and ASEA framework.

Consequently, in terms of policy contribution, this study is expected to provide policy makers with an empirically tested and validated alternate policy intervention strategy for SWM in Malaysia. This would be a paradigm shift from the traditional SEA static intervention plans. Finally, the study investigation on the potential SEA application for SWM in Malaysia by itself is a novel field in Malaysia and is expected to initiate and generate awareness among policy makers on its relevance and efficacy in the policy planning field in Malaysia.

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter details the SEA literature review conducted in relation to international trends in Europe and Asia as well as a comprehensive SEA policy review on the provision for SEA in Malaysian international conventions, legislation and policies. The SEA international trends were based on the problems, progress and prospects identified in these countries. Meanwhile the SEA policy review were based on the inclusion of concepts such integrated policy planning, cumulative environmental impacts, public participation, pollution prevention and precautionary principle. Malaysia has ratified numerous international conventions related to the environment and sustainable development as well as formulated abundant legislation on environmental protection, physical planning and solid waste management. Nevertheless, a common concern is that sometimes these international conventions and/or national legislation remain obscure and non-relevant to environmental and solid waste management in the country (Dennis & Agamuthu, 2012a). This chapter is divided into four main sections. Section 1 provides the outline for the chapter and sections. Section 2 provides an overview of international trends in SEA in terms of their problems, progress and prospects. Section 3 conducts a policy review on international conventions and Malaysian legislation/policy/strategy in terms of their relevance to SEA and SWM in Malaysia. Finally, Section 4 concludes the SEA policy review and highlights the policy trends for SWM in Malaysia.

2.2 International Application of SEA

International trends indicate that SEA is applied mainly in developed countries in Europe and North America. However, SEA is also being increasingly explored in developing countries as a result of SEA initiatives by the World Bank. This is required as part of its policy requirement to undertake environmental assessment in all investment projects and extended to sectoral adjustment loans, and finally as a tool for integrating environmental considerations into decision making and planning processes at an early stage (Dusik & Xie, 2009; OECD, 2012; Tetlow & Hanusch, 2012). This is reflected in the World Bank's Environment Strategy 2001 which includes the more systematic use of SEA in its operations to promote mainstreaming of environment by influencing planning and decision making processes at an early stage (Goodland, 2005).

Generally, few counties have a comprehensive SEA application with most SEA application at the plans and programmes level as opposed to the policy level. SEA application is also more widespread in the following sectors of energy, transport, waste and water sectors and on spatial or land use plans (Fischer & Onyango, 2012). An overview of international SEA application of SEA country profiles is provided in the following section.

2.2.1 European Union

In the European Union (EU), the requirement for SEA is enshrined in the European Council Directive (2001/42/EC) on the assessment of the effects of certain plans, programmes on the environment (EC SEA Directive), and has been adopted as part of the UNECEC SEA Protocol. The SEA Directive is required to be transposed into member states' national legislation and it also provides the structure for the 2003 UNECE Protocol on SEA and thereby has influence beyond the EU. The EU SEA Directive and the UNECE SEA Protocol is required for certain plans and programmes but is discretionary for policies. The EU SEA Directive and the UNECE SEA Protocol is applicable for sectors such as for agriculture, forestry, fisheries, energy, industry, transport, waste management, telecommunications, tourism as well as town and country planning. The SEA Directive promulgation was a lengthy and challenging negotiation process and is commonly considered to be a concessions of the minimum due acceptance among member states (Glasson & Gosling, 2001).

Generally, it includes PPP that may be environmentally significant and excludes PPP that does not result in projects, which affect environmentally sensitive areas. Nevertheless, one concern of the SEA Directive is the potential for jurisdictional overlap with other EU Directives that result in uncertainty and non-conformity (Sheate et al., 2005). Finally, the requirements of the SEA Directive are generally flexible enough to be customized for member states specific content (Risse et al., 2003).

1. Austria

Austria has transposed its SEA requirements into national legislation including the Federal Act on Strategic Assessment into the Transport Sector, the EIA Act, Tyrolean Spatial Planning Act and the Salzburg Waste Management Act. Austria has implemented SEA in the Land Use Plan of Weiz, Vienna Waste Management Plan and the Salsburg Waste Management Plan (McDonald & Brown, 1995; Stoeglehner & Wegerer, 2006). A primary problem identified in SEA implementation for Austria has been the lack of SEA screening implementation due to perception that it is an administrative and cumbersome procedure while a secondary problem identified in SEA implementation has been lack of strategic evaluation of alternatives where currently the emphasis is focused only on mitigating negative impacts (Sadler et al., 2011). This incongruity is most likely due to latent pressure to validating pre-decision in the planning (Owens et al., 2004; Stoeglehner, 2010). One argument is that it is equally imperative to comprehend the inner interest and driving forces of key stakeholders in the policy planning process which often may impede the SEA process due to agenda driven interest (Cherp et al., 2007). Meanwhile, notable progress of SEA implementation in Austrian has been the use of participatory round table discussion that includes representatives of planning and environmental agencies and non-governmental organizations (NGO) who attempt to arrive at an agreement via mediation on the integration of SEA within the plan and programme. The SEA roundtable model allows for equal participation of representatives from the SEA objective phase to the SEA report phase in a mutually responsible manner of shared outcomes.

Consequently, the SEA roundtable approach has been commended as moving beyond the minimum requirements of the SEA Directive by proactive stakeholder participation than basic consultation and information dissemination with the ultimate objective of SEA integration by all interest groups (Dalal-Clayton & Sadler, 2004). Finally, SEA prospects seem to be in the area of applying sustainability assessment at the policy and strategy levels.

2. Czech Republic

The Czech Republic has transposed its SEA requirements into national legislation including the Czech EIA Act, which includes SEA for policies and strategies. Czech Republic has implemented SEA in the National Development Plan, National Environmental Policy and Waste Management Plan. A primary problem identified in SEA implementation for Czech Republic has been the indistinct delineation of the scope of SEA and its legal provisions while a secondary problem has been the lack of awareness on the function of SEA and its influence on public policy.

This uncertainty is most likely due to the conceptual nature of applying SEA on policies and strategies, which are often generic, and framework driven as opposed to site-specific spatial development. Similar reflections have been highlighted in previous SEA application at the policy and strategy level (Smutny et al., 2005a). Meanwhile, notable progress of SEA implementation in the Czech Republic has been the mandatory application of SEA for policies at the national and regional level that is currently not widely practice in the EU.

Additional SEA progress includes the formulation of SEA guidance documents for land use planning and the use of a web based environmental depository system that stores and allows access to all documents pertaining to the SEA including SEA notification, reviews and comments. Finally, SEA prospects seem to be in the area of developing capacity building networks for SEA practitioner and benchmarking for SEA excellence as well as the inclusion of health impact in SEA (Dusik & Sadler, 2004a; Dusik & Sulcova, 2001; Dusik et al., 2001; Fischer et al., 2010; Smutny et al., 2005b).

3. Denmark

Denmark has transposed its SEA requirements into national legislation including the Environmental Assessment of Plans and Programmes Act. Denmark has implemented SEA in the North Jutland Regional Plan, budget plans, climate change plans as well as in national legislative bills (Elling, 1997, 2000, 2005a; Jensen et al., 2005; Larsen et al., 2012). A primary problem identified in SEA implementation for Denmark has been the limited SEA scoping of legislative bills by the respective ministries while a secondary problem has been the biased dampening of negative environmental impacts and augmentation of positive environmental impacts. Furthermore, a tertiary problem has been political moderation of SEA findings within ministries, which often result in the expurgation of relevant environmental aspects and impacts (Elling, 2005b). This duality and subtle debilitation of the SEA process is most likely due to the significant consequence of applying SEA on legislative bills, which are often political with potentially cascading impacts on the social and economic structure of countries.

These SEA practices may indicate deeper structural issues in attempting to implement SEA at the apex policy level where data is often limited and environmental magnitude is often wide in spatial coverage. Meanwhile, notable progress of SEA implementation in Denmark has been the application of SEA in legislative bills and other government proposals, which is currently not widely practice in the EU. Additional SEA progress includes the institutionalization of SEA implementation within the government organization with potential benefits of augmenting the environmental discourse and stakeholder engagement in integrating environmental considerations at the highest echelon of policymaking. Finally, SEA prospects seem to be in the area of SEA monitoring at the policy level to ensure its integration and effectiveness within national policy planning framework as well as stabilizing existing public participation processes to minimize extreme interest stakeholder dominance and political short-termism (Chaker et al., 2006).

4. Finland

Finland has transposed its SEA requirements into national legislation including the EIA Procedure Act, Building and Planning Act, SEA Act and Decree on Assessment of the Impact of Authorities' Plans. Finland has implemented SEA in its Oulu Waste Management Plan, Helsinki Transport Plan, National Forestry Programme, Pirkanmaa Waste Management Plan and National Climate Strategy (Hildén & Jalonen, 2005; Hilden et al., 2004; Kaljonen, 2000; Söderman & Kallio, 2009).

A primary problem identified in SEA implementation for Finland has been the limited political will to translate the findings of the SEA into practical implementation within the policy planning process while a secondary problem has the modulation of strong interest groups in the public participation process to ensure a balanced perspective of stakeholders in the SEA process (Hildén, 2005). Furthermore, a tertiary problem has been the perception of SEA as a mere formal administrative procedure for the purpose of producing a report as opposed to a practical flexible tool for strategic planning (Söderman & Kallio, 2009). This predisposition of the SEA process is most likely due to the strong pressure from interest groups in the SEA process and may indicate a strong social desire for policy engagement, persuasion and transformation. Meanwhile, notable progress of SEA implementation in Finland has been the application of SEA in legislative bills and other government proposals where it is a requirement for the inclusion of a specific section on the environment. Finally, SEA prospects seem to be in the area of SEA tools such as SWOT analysis, which has proven effective for SEA of PPP in Finland.

5. France

France has transposed its SEA requirements into national legislation including the Land Use Code, Code of Territorial and Local Authorities, Environmental Code and the Forest Code. France has implemented SEA in its landuse and transportation planning. A primary problem identified in SEA implementation for France has been the difficulty in considering the no-nothing scenario by developers while a secondary problem has been the sporadic development of SEA assessment methods.

Meanwhile, notable progress of SEA implementation in France has been the establishment of an independent commissioner who oversees the quality of public participation of SEAs where the SEA implementation in France is considered beyond the minimum requirements of the SEA Directive (Dalal-Clayton & Sadler, 2004). Additional SEA progress includes the integration of SEA in climate change plans and the mandated and regulated cross-sectoral coordination and consultation of planning authorities with environmental authorities. Consequently, the SEA guidelines requires government agencies to synchronize their initiatives for SEA and EIA, which are conducted concurrently at national or regional levels. This is to ensure precedence for the SEA prior to the EIA as well as the appropriate translation of SEA findings in the EIA. Finally, SEA prospects seem to be in the area of SEA tools such as SEA monitoring using sustainable development indicators or national indicators (Commission, 2009).

6. Germany

Germany has transposed its SEA requirements into national legislation including the EIA Act and the Federal Building Code. Germany has implemented SEA in its urban and regional landuse planning as well as in the Federal Transport Infrastructure Plan (Fischer, 2006; Fischer et al., 2009; Jiricka & Pröbstl, 2008; Wende et al., 2004). A primary problem identified in SEA implementation for Germany has been the lack of SEA application at the policy and plan levels while a secondary problem has been the lack of public participation and transparency.

Furthermore, a tertiary problem has been the ambivalent nature of addressing cumulative impacts and climate change impacts where a potential loophole is in the exclusion of SEA for plans or programmes not required by legislation. These clusters of SEA issues are most likely due to the ambivalent nature of SEA implementation in Germany where they seem to imply a divergence between the aspiration and the apprehension of implementing SEA (Weiland, 2010; Wende et al., 2012a). Meanwhile, notable progress of SEA implementation in Germany has been the streamlining of the SEA and EIA process with a simpler licensing process once the SEA is conducted. Additional SEA progress includes the consolidation of SEA assessment with other evaluation to minimize redundant replication of efforts as well as the simultaneous revision of plans. Finally, SEA prospects seem to be in the area of focused application of SEA confined to environmental issues by avoiding the incursion of social or economic aspects (Commission, 2009).

7. Netherlands

Netherlands has transposed its SEA requirements into national legislation including the Environmental Management Act and the EIA Decree. Netherlands has implemented SEA in its National Waste management Plan. A primary problem identified in SEA implementation for Netherlands has been minimal translation of the EU SEA Directive while a secondary problem has been the deficient mandatory independent review of plans and programmes outside protected areas (Van Buuren & Nooteboom, 2010; van Dreumel, 2005).

Furthermore, a tertiary problem has been the ineffectiveness of the SEA process on legislation via the E-Test compounded by the fact that it does not require the consideration of alternatives even though it is popular with decision makers. This lacklustre application of SEA may be a reflection of the inherent nature of the society, which seeks to influence policy planning. This is often characterized by highly controversial and time consuming stakeholder engagement process in order to achieve consensus and satisfactory outcomes in the SEA process (van Buuren & Nooteboom, 2009). Meanwhile, notable progress of SEA implementation in Netherlands has been the effective application of SEA via Strategic EIA for spatial and sectoral plans such as waste, water and energy management plans even though it is unpopular with decision makers (Dalal-Clayton & Sadler, 2004). Additional SEA progress includes the integration of stakeholders' interest within the SEA process and consideration of climate change issues via carbon capture (Koornneef et al., 2008). Finally, SEA prospects seem to be in the development of hybrid approaches to close the gap between SEA and EIA as well as the development of a new two phased E-Test to mitigate the weaknesses in the earlier system (Arts & Van Lamoen, 2005; van Dreumel, 2005).

8. Poland

Poland has transposed its SEA requirements into national legislation including the Environmental Protection Act, Spatial Planning and Management Act, National Development Plan Act, Development Policy Principles Act and Order of the Minister of Environmental Protection. Poland has implemented SEA in its National Development Plan and spatial land use plans.

A primary problem identified in SEA implementation for Poland has been the availability of environmental data for SEA especially when plans or programmes does not specifically identify the location of the sites in large areas while a secondary problem is that the Polish legislation does not clearly define ‘public’ since it only provides a generic description. Furthermore, a tertiary problem is that the requirements of public participation is discrete for spatial plans compared to other planning documents (Thérivel, 1997). These gaps in the SEA process may indicate that the incompatibility of a one-size fits all SEA approach including the need for adaptive policy systems (Dusik & Sadler, 2004b). Meanwhile, notable progress of SEA implementation in Poland has been the coherent identification of plans and programmes that require SEA in the Polish legislation either through a prescribed list or through a generic criterion. Additional SEA progress includes the integration of cross-sectoral communication where planning authority coordinates with the Environment Authority and the Public Health Authority (Commission, 2009). Finally, SEA prospects seem to be in the development of an evaluation framework for structural funds and the strategic vertical integration of planning systems that utilizes a system of indicators and indices based on a simple rational/maximal model (Cherp & Antypas, 2003; Goncz & Kistowski, 2004; Nitkiewicz, 2009).

9. Spain

Spain has transposed its SEA requirements into national legislation including the SEA Law. Spain has implemented SEA in its Regional Development Plan and Structural Funds Programmes for Andalucia as well as the National Hydrologic Plan (Hedo & Bina, 1999).

A primary problem identified in SEA implementation for Spain has been a weaknesses in the evaluation of environmental aspects while a secondary problem is the lack of methodological guidelines for SEA (Dalal-Clayton & Sadler, 2004). These gaps in the SEA framework may indicate that Spain is still in the development stage of its SEA processes. Meanwhile, notable progress of SEA implementation in Spain has been the integration of biodiversity issues within the SEA framework. Other notable SEA implementation in Spain has been the establishment of an independent environmental body to supervise the integration of environmental considerations as well as the publication of the findings of the SEA prior to the adoption of plans. Spain also has one of the longest public participation periods within the EU of 45 days (Commission, 2009). Finally, SEA prospects seem to be in the development of integrative consolidative linkages between the SEA and EIA Directives to elucidate the interrelationship and practical considerations of implementation. Other prospects are the development SEA screening and analytical tools for sustainable management of biodiversity areas (Diaz et al., 2001; García-Montero et al., 2010; Olazabal et al., 2010; Onate et al., 2003).

10. <u>United Kingdom</u>

The United Kingdom has transposed its SEA requirements into national legislation including the Planning and Compulsory Purchase Act. The United Kingdom has adapted SEA based approaches such as integrated policy appraisal (IPA) and regulatory impact assessment (RIA) and implemented SEA in a wide variety of landuse and sectoral plans including local waste management strategies (Dalal-Clayton & Sadler, 2004; Fischer et al., 2011).

A primary problem identified in SEA implementation for the United Kingdom has been the use of non-legislated forms of SEA, which promotes an adaptable, non-prescriptive framework of policy assessment mainly to avoid encumbering the policy process which has its unique policy making nuances. Nevertheless, this form SEA evaluation is unstructured and weak in methodological robustness. Secondary problems are due to the perception that the SEA guidance documents are bureaucratic rather than pragmatic with reservations that environmental integration may be offset within an immense context. Furthermore, tertiary problems relate to weak establishment of baseline and trends, insubstantial prediction of cumulative effects at the macro level and a latent resistance to SEA promotion of good governance (Bragagnolo et al., 2012; Cooper, 2011; McLauchlan & João, 2012; Scott, 2011). This inherent tension in SEA implementation may be due to the historic approach of policy making in the United Kingdom which is based on selective judgement, consultation, expert opinion and flexible administration (Sadler, 2005).

Meanwhile, notable progress of SEA implementation in the United Kingdom has been the promotion of novel concepts such Green Ministers who will champion environmental considerations in policy decision making and integrating climate change issues in SEA. Finally, SEA prospects seem to be in the development of SEA tools and systems using Geographical Information System (GIS), Cumulative Impact Assessment (CIA), branding of potential positive enhancement opportunities as well as integrating human health considerations within the SEA framework (Douglas et al., 2011; McCluskey & João, 2011; Posas, 2011; Riddlesden et al., 2012; Wende et al., 2012b).

11. SEA Summary of EU

A summary of SEA trends in EU indicate that the SEA Directive application across the EU member states has been diverse both in terms of its institutional and legal framework (Table 2.1). The primary manner of translating the SEA Directive into the national system has been through existing legislation while the secondary manner has been through the formulation of a SEA legislation. A primary problem identified in SEA implementation for the EU member states has been in the evaluation of alternatives since the vast majority of member states have refrained from developing prescriptive guidelines on its application. Nevertheless, a consensus among the member states is the inclusion of the do-nothing scenario as a compulsory requirement in the SEA report. A secondary problem in SEA implementation has been in its limited capability to address cumulative and transboundary environmental impacts in environmental protected and conservation areas. Other problem reported by member states are in the areas of baseline data collection, impact assessment methodologies and monitoring. Meanwhile, notable progress of SEA implementation in member states is in the effective carrying out of public participation and consultation with the authorities where a typical SEA consultation period is between one to two months (Commission, 2009). Successful experimental public participation and consultative process that have been attempted were in the use of roundtable discussions, which is believed to have resulted in superior quality of planning, conflict resolution, implementation facilitation, and solutions oriented integration. Additional SEA progress includes SEA application beyond the minimum requirements of the SEA Directive in some countries such as Czech Republic in policy assessment and the United Kingdom in the area of local plans (Smutny et al., 2005b; Therivel & Walsh, 2006).

Key trends of SEA development indicate that integration into national legislation has been protracted and its implementation in member states varied in scope and quality. SEA has been most frequently executed in spatial and transport planning but least applied in climate change planning while community supported plans is an emergent development area (Fischer, 2007; Sadler et al., 2011). Finally, SEA prospects seem to be in the area of applying SEA at the policy level including national legislation and strategies as well as expanding the public participation and consultative process in a formal framework.

Table 2.1 : Summary of SEA Problems, Progress and Prospects in EU

Country	**Problem**	**Progress**	**Prospect**
Austria	Deficiency in SEA screening.	SEA Roundtable Model.	Sustainability Assessment.
Czech Republic	Ambiguity in SEA scope.	SEA application on policies.	Health impact assessment.
Denmark	Political moderation of SEA findings.	SEA application in legislation.	SEA monitoring.
Finland	Limited political will for SEA implementation.	SEA application in legislation.	SEA SWOT analysis.
Germany	Limited SEA application in policy and plan level.	SEA streamlining with EIA.	SEA focus on environment issues excluding social and economic aspects.
Netherlands	Ineffective SEA application on legislation via E-Test.	SEA via Strategic EIA in spatial and sectoral plans.	SEA hybrid approach with revised E-Test.
Poland	Unavailability of environmental data for SEA.	SEA cross-sectoral communication.	SEA indicator system.
Spain	Lack of SEA methodological guidelines.	Independent body to supervise SEA implementation.	SEA tools for biodiversity management.
United Kingdom	Non-prescriptive SEA framework.	SEA Green Ministers.	SEA tools such as GIS and CIA.

2.2.2 United States of America (USA)

The term SEA is not used in the USA though the National Environmental Policy Act (NEPA, 1969) has a requirement for environmental assessment of "proposals for legislation and other major federal actions significantly affecting the environment" which is interpreted as including PPPs. A derivation of the SEA in the USA is the Programmatic Environmental Impact Statement (PEIS), which has been applied by government departments for a variety of sectors, including land use, integrated resource management, transport, water and waste. A primary problem identified in SEA implementation for the USA has been the limited application of NEPA especially in terms of programmatic and strategic level analysis. A secondary problem has been the perception by policy makers on the need of concrete proposals for the public participation to be effective thus negating the role of SEA at the policy and plan levels. Furthermore, a tertiary problem has been that SEA is still at an early formative stage in the USA with development needs on methodological approaches and institutional frameworks. This lack of SEA embracement in the USA may be due to the litigatious nature of policy making in the USA which is based on case laws and used often as tools to influence national projects (Sadler et al., 2011). Meanwhile, notable progress of SEA implementation in the USA has been its use as a sustainability tools for cost and resource saving in national plans. Finally, SEA prospects seem to be in the development of a tiered approach between projects and macro scale environmental studies as well as differentiation strategies of SEA from programmatic EIA to ensure that it is more desirable to decision makers. Consequently, SEA is expected to be adaptive for policy makers and provide a macro perspective on the dynamic of strategies and plans that in turn are governed by incremental decisions (Andrews, 1997; Bear, 2003; Caldwell, 1998).

2.2.3 Canada

In Canada, SEA is applied as a non-statutory procedure, designed to integrate environmental considerations related to policy and programme proposals. The SEA process was formalized via a Cabinet Directive on SEA due to significant weaknesses in implementation and clarified the obligations of government departments in applying SEA as part of their requirement to implement sustainable development strategies. A primary problem identified in SEA implementation for Canada has been the low level of SEA commitment by the respective agencies while a secondary problem has the lack of transparency and accountability. Furthermore, a tertiary problem has been the deficiency in SEA reporting and tracking (Gachechiladze-Bozhesku, 2012). Consequently, SEA is still regarded as an ex-ante evaluation with limited post PPP influence on addressing implementation aspects (Gachechiladze-Bozhesku & Fischer, 2012a). The weaknesses observed in the current SEA system in Canada may be mainly due to institutional weaknesses due to minimum administration of the SEA which is also a reflection of the transparency and accountability due to the confidential nature of Cabinet customs (Fischer, 2002; Noble, 2003, 2009). SEA in Canada is viewed as an institutional pluralism with varying systems and practices as well as a static input assessment process. Meanwhile, notable progress of SEA implementation in Canada has been in its apex policy formulation and legislative sustainable development strategies (Thompson et al., 2012). Finally, SEA prospects seem to be in the development of SEA legislative reforms at the national level with potential provisions for a SEA legislation. Other SEA prospects is the emergence of Regional SEA as a proactive tool to support decision making via CIAs in land use plans (Canter et al., 2010; Elvin & Fraser, 2012; Fidler & Noble, 2013; Gunn & Noble, 2009; Johnson et al., 2011).

2.2.4 Australia

In Australia, SEA application for PPPs is required via the Australia Environment Protection and Biodiversity Conservation Act (1999). However, the scope of SEA is deemed limited to certain industries such as fisheries and forestry. A primary problem identified in SEA implementation for Australia has been the ad-hoc and para-SEA nature of SEA implementation including the restrictive scope of the Act, which excludes subjects of national environmental significance while a secondary problem has been the underutilization of SEA despite the legislative provisions in Australia. Furthermore, a tertiary problem has been the asymmetrical application of SEA at the local level. This inconsistency in SEA implementation may reflect the diverse socio-cultural locale of the assorted states and territories in Australia each with its own legislative and administration approaches to SEA (Coffey et al., 2011; McCarthy, 1996b; Stoeglehner et al., 2010; Wood, 1992). Meanwhile, notable progress of SEA implementation in Australia has been in the SEA implementation in the marine sector which includes fisheries evaluation, petroleum exploration, regional marine plans and security activities (Harvey, 2000). SEA experience in Australia suggest SEA can be effective via both a mandatory or voluntary framework. Finally, SEA prospects seem to be in the development of SEA trials on non-legally binding regional strategic plans in environmentally sensitive areas and areas of national significance. Other SEA prospects are the trends in integrating and converging sustainability objectives in SEA (Ashe et al., 2011; Morrison-Saunders & Therivel, 2006).

2.2.5 New Zealand

New Zealand does not have a dedicated SEA legislation and pure SEA is not commonly practiced. Generally, New Zealand has attempted to integration environmental considerations into planning legislation implicitly rather than explicitly via a SEA legislation. A primary problem identified in SEA implementation for New Zealand has been the lack of explicit legal provisions for SEA, which has resulted in low level of implementation since it is dependent on the capacity of the professional community in applying elements of SEA. Consequently, this has either resulted in limited levels of implementation or restricted impact assessment systems. Furthermore, SEA practitioners are confronted with the challenge of integrating plans formulated under both resource management and local government purview. This poor SEA implementation may be the result of low prominence accorded to SEA and its integration in policy planning as well as strong interest group influence to dilute potential environmental integration requirements within the planning framework (Glasson, 1995; Jackson & Dixon, 2006). Meanwhile, notable progress of SEA implementation in New Zealand has been the implementation of SEA elements within local government planning even without the support of a national SEA legislation. Finally, SEA prospects seem to be in the development of SEA capacity building among the environmental community at both the Federal and Local government levels as well as removing obstacles to effective public participation. Other SEA prospects are in the development of a formal national SEA legislation to provide the necessary legal backing and resources for SEA implementation (Jackson & Dixon, 2007; Wilson & Ward, 2011; Wood, 1992).

2.2.6 Southern Africa

In Southern Africa, SEA has been translated into national legislation in a number of countries. This includes the EIA Act of Botswana, the Environment Act of Lesotho, the Environmental Management Act of Malawi, the Environment Law of Mozambique, the National Environmental Management Act of South Africa, the Environmental Management Act of Swaziland, the Environmental Management Act of Tanzania and the Environmental Protection and Pollution Control Act of Zambia (Dalal-Clayton & Sadler, 2004). A primary problem identified in SEA implementation for Southern Africa has been the lack of direction due to a broad and insurmountable range of objectives, aspects and ambiguous scoping process. A secondary problem in SEA implementation has been the lack assimilation of technical information within strategic decision making due to information overload. A tertiary problem in SEA implementation has been the lack of a robust assessment process in lieu of planning. This ambitious nature of SEA implementation may be due to a latent drive for sustainability integration without establishing a core environmental focus which often may result in wide but unfocused distribution of resources and strategic thrusts (Nicolson, 2010; Retief, 2007a; Retief et al., 2007, 2008). Meanwhile, notable progress of SEA implementation in Southern Africa has been development of a fundamental SEA policy and legislative framework as well as proactive initiatives to integrate sustainability issues with the SEA framework. Finally, SEA prospects seem to be in the development of pragmatic based SEA frameworks which emphasizes prioritization of thrusts, facilitation of project based EIAs, transboundary perspectives and functional SEAs that are capable of bridging the gap between environment and policy planning (Govender et al., 2006; Retief, 2007a; Rossouw et al., 2000).

2.2.7 Asia

In Asia, SEA is in the process of being translated into national legislation in a number of countries including Hong Kong, China, Korea, Vietnam and Indonesia. The requirement for SEA is based on a mix of legislative, institutional and capacity building via international assistance frameworks.

1. Hong Kong

Hong Kong has transposed its SEA requirements into its national planning framework via a government directive that mandated an EIA for major policies, strategies and plans as well as with its EIA Ordinance. A primary problem identified in SEA implementation for Hong Kong has been the lack of an overarching macro environmental planning policy while a secondary problem has been the pseudo inter-governmental cooperation and unity due to diverse agendas and conflicting agency pursuits. Furthermore, a tertiary problem has been that SEA implementation is rarely applied to significant PPPs and are still mostly development centric with minimal emphasis on evaluating radical structural changes to root cause environmental issues. The trends in SEA implementation may indicate that Hong Kong is at a crossroads of SEA development from its EIA roots that may results in either SEA devolving into a strategic tool for facilitating economic development or SEA evolving into a strategic planning framework for sustainable development (Au, 1998; Au et al., 2004; Ross et al., 2006) .

Meanwhile, notable progress of SEA implementation in Hong Kong has been its early adoption of SEA implementation within the Asian region as well as its potent integration of public participation within its SEA process. This has resulted in a high degree of influence from the public and NGO in their ability to sanction projects with significant environmental impacts. Other progress includes the establishment of a SEA web based knowledge centre and a SEA Manual for the dissemination of SEA information and best practices. Finally, SEA prospects seem to be in the development of sustainability centric SEA application and the concept of continuous public participation resulting in a heightened transparent multi-stakeholder engagement process. This shift towards increased public participation is viewed as the foundation for a transparent and multi-tiered inclusive environmental governance system in line with a sustainable focused society (Ng & Obbard, 2005).

2. China

China has transposed its SEA requirements into its national planning framework via a its regional environmental impact assessment (R-EIA) practices which requires it for the development of river basins, economic zones and urban areas as well as with its EIA Law which requires SEA for strategic planning at national, provincial and sector levels (Dalal-Clayton & Sadler, 2004). A primary problem identified in SEA implementation for China has been the restrictive public participation and sometimes secretive nature of its policies and strategies.

A secondary problem has been the bureaucratic politics between inter-sectoral agencies involved in the policy planning process in China. Furthermore, a tertiary problem has been the perception of non-environmental agencies that SEA is not suitable for a developing country like China especially in the context of practical experience in the region for implementing SEA (Bao et al., 2004a; Che et al., 2002; Zhu et al., 2005). The trends in SEA implementation may indicate that China is still battling its socio-political dynamics of engaging in a policy planning tool such as SEA that requires access to information, public participation in decision making and access to autonomous environmental justice and mediation avenues (Zhu & Ru, 2008). Meanwhile, notable progress of SEA implementation in China has been the distribution of SEA principles, procedures, technical guidelines, environmental indicators and reporting formats for various planning sectors. Other progress includes the establishment of an online database of SEA professionals to assist in the implementation of SEA within sectoral agencies. Finally, SEA prospects seem to be in the development of proposed amendments to the EIA Law to include its application to decision making with potential impacts on the environment. Other prospects are the development of additional sector specific technical guidelines, capacity building for SEA professionals and government agencies, setting up of SEA research and development centres in China as well as integrating climate changes issues in SEA (Bina, 2008; Chang & Wu, 2013; Tao et al., 2007).

3. South Korea

South Korea has transposed its SEA requirements into national legislation including the Prior Environmental Review System, which is designed to identify and minimize environmental impacts of PPPs and realize environmentally sustainable growth. A primary problem identified in SEA implementation for South Korea has been the limited scope of SEA application for the final plan or programme as well as when it is deemed as national security, prohibited by legislation or it may hinder general administration. A secondary problem is the lack cohesive integration of the legislative environmental system in South Korea (Hayashi, 2007; Hayashi et al., 2011; Song & Glasson, 2010). The trends in SEA implementation may indicate that South Korea is resolutely though practically proceeding forward in its SEA implementation (Ahn et al., 2008). Meanwhile, notable progress of SEA implementation in South Korea has been the major improvements to the SEA process by expanding its scope of application, integration timing, stakeholder engagement and a revamped SEA format inclusive of scoping, alternatives and reporting.

Other progress includes the harmonization of SEA in the planning process within the horizontal and vertical hierarchies as well as international and national level policies (Song & Kim, 2007). Furthermore, the revised SEA process interlinks SEA and EIA through a consistent and systematic environmental criterion by down-streaming the SEA baseline results and SEA findings for the EIA. Finally, SEA prospects seem to be in the development of sustainable development indicators and capacity building especially from the local governments (Volkery, 2004).

4. Japan

Japan has not transposed its SEA requirements into national legislation though it is currently establishing the groundwork for a SEA system through research projects commissioned by the Ministry of Environment (MOE) including SEA guidelines formulated for waste management plans and SEA for programmes of projects subject to EIA. A primary problem identified in SEA implementation for Japan has been a lack of legislative framework for SEA. The trends in SEA implementation may indicate that Japan does not perceive the need for SEA as part of its national policy planning process where existing environmental systems may be deemed adequate for addressing environmental issues at a strategic level (Harashina, 1998).

Meanwhile, notable progress of SEA implementation in Japan has been the introduction of SEA in local planning in areas such as Saitama prefecture, Tokyo Metropolitan Area, Hiroshima and Kyoto. Other notable progress has been the initiation of public involvement (PI) system which considers environmental, social and environmental aspects including alternatives for sectoral infrastructure planning such as roads, airports, harbours and river basins. One perception is that the PI system in Japan may mimic the form and function of SEA. Finally, SEA prospects seem to be in the development of discussions on the introduction of a SEA legislative framework into the existing national legislative system in the context of updating the existing EIA legislation (Imura & Schreurs, 2005; Sachihiko, 2001; Uesaka et al., 2000).

5. Taiwan

Taiwan has transposed its SEA requirements into national legislation including the EIA Act, SEA Manual and SEA PPP list. A primary problem identified in SEA implementation for Taiwan has been the lack of a comprehensive SEA scoping process as well as consensus and prioritization of environmental aspects. A secondary problem is the limited competency capacity for SEA implementation due to restricted training and knowledge for environmental and planning agencies in Taiwan. Furthermore, a tertiary problem has been the negligible public participation in SEA implementation, which is characteristically limited to government agencies and approving bodies. The trends in SEA implementation may indicate that Taiwan is still limited in its political will and stakeholder engagement with a bureaucratic top-down policy planning system. Meanwhile, notable progress of SEA implementation Taiwan has been the early adoption of a SEA legislative framework relative to other Asian countries and the experimentation of various SEA mechanism such as Delphi Indicators and Health Impact Assessment (HIA). Other progress include SEA implementation endeavours of the National Scheme for the Location of Industrial Parks, Construction and Management Guidelines for Golf Courses, National Water Resources Development Plan and the Protected Watersheds Reduction Plan (Chen et al., 2011; Kuo & Chiu, 2006; Kuo et al., 2005). Finally, SEA prospects seem to be in the development of capacity building schemes for policy administrators and SEA administrators as well as SEA benchmarking reviews to identify potential parallel and divergent SEA systems within the international community. Other prospects are the introduction of sustainability concepts within the SEA framework via the Taiwan Sustainable Development Indicators (Liou et al., 2003, 2006; Wang et al., 2012).

6. Vietnam

Vietnam has transposed its SEA requirements into national legislation including the Law on Environmental Protection, which includes mandatory SEA requirements for national, provincial and local strategies, programmes and plans. A primary problem identified in SEA implementation for Vietnam has been the lack of SEA knowledge, experience and skills at the ministerial and local levels while a secondary problem has been the lack of a systematic coordinated inter-agency integration and planning. Furthermore, a tertiary problem is the limited influence of the SEA on strategic decision making due to its inherent focus on micro measures as opposed to strategic intervention within the policy planning process. A significant number of SEA were ex-post assessments undertaken after the finalization of strategic plans. The trends in SEA implementation may indicate that Vietnam is implementing SEA at a rapid rate in relation to its SEA capacity building and technical competence development (Clausen et al., 2011; Doberstein, 2004). This is because the drive for SEA implementation in Vietnam has been emerging for more than a decade with key national policy initiatives urging the strategic integration of environmental consideration in PPP to ensure sustainable development and the avoidance of natural resources degradation. This evolution has finally led to the culmination of the introduction of SEA in Vietnam especially in the context of the Comprehensive Poverty Reduction and Growth Strategy (2002), National Strategy for Environmental Protection 2010 and Vision 2020. Meanwhile, notable progress of SEA implementation in Vietnam has been the structural and comprehensive legislative and administrative development of its SEA framework as well as the legislative provisions for public participation where stakeholders including individuals and organizations can provide input into the SEA findings.

Other notable progress includes the requirements for a synchronized implementation and integration of SEA with national development strategies on a temporal scale including the roles, responsibilities of initiators as well as the development of technical guidelines on methodological aspects and the structure of SEA reporting. Interestingly, the guidelines adopt a pragmatic approach for SEA, which includes simple techniques such as matrices, expert judgements and trend analysis with the resulting effect of combining various systematic approaches in cause-effect analysis. Finally, SEA prospects seem to be in the development of inter-sectoral coordination and harmonization on SEA including the formulation of sector specific SEA technical guidelines and streamlining of SEA requirements for various policy planning processes including urban development strategies (Obbard et al., 2002; Partidário et al., 2008; Sekhar, 2005) .

7. Indonesia

Indonesia has transposed its SEA requirements into national legislation including the Environmental Protection and Management which requires mandatory SEA for spatial and development plans at the national, provincial and local levels as well as optional SEA for PPP with potentially significant environmental impacts. A primary problem identified in SEA implementation for Indonesia is the adaptability and efficacy of the newly formulated SEA legislation in the policy planning process while a secondary problem is the perception by the planning agencies and stakeholders that SEA may potentially burden and delay the authorization process of PPP in Indonesia.

Furthermore, a tertiary problem is the potential for economic concerns to supersede SEA implementation and adoption of SEA findings (Dusik & Xie, 2009). The trends in SEA implementation may indicate that Indonesia has evolved from its EIA approach to a SEA framework and is now embarking on its SEA application in practice (Purnama, 2003; Spaling & Vroom, 2007). Meanwhile, notable progress of SEA implementation in Indonesia has been the establishment of its SEA legislative framework, which includes provisions for public participation, and the consideration of carrying capacity of the environment, which is a relatively novel initiate in the region. Furthermore, SEA requirements are currently being further streamlined in SEA regulations and SEA guidance documents. Other notable progress includes the successful application of its SEA consultative method in the palm oil sector and for disaster management (Prasetio et al., 2012). Finally, SEA prospects seem to be in the development of SEA sector specific guidelines for national development and sectoral plans as well as the exploration of integrated SEA frameworks that provides for multi-plan assessment within a single assessment process (Dusik & Kappiantari, 2010; Dusik et al., 2010; Ministry of Environment, Indonesia, 2007).

8. Philippines

Philippines has not transposed its SEA requirements into national legislation though it has implemented in an ad-hoc manner SEA for infrastructure programmes such as transportation and energy as well as via its para-SEA elements within its Local Government Code, Clean Water Act, Clean Air Act, Solid Waste Management Act, National Integrated Protected Areas System, and Indigenous People’s Rights Act.

A primary problem identified in SEA implementation for Philippines has been the reactive approach to SEA implementation in a piece-meal manner as opposed to a proactive approach in an integrated manner while a secondary problem is the unrealized potential and utilization of para-SEA elements within its existing legislative framework. The trends in SEA implementation may indicate that Philippines is still hesitant in evolving from EIA to SEA implementation in a comprehensive manner especially within a legislative framework (Abracosa & Ortolano, 1987; Smith & Van der Wansem, 1995).

Meanwhile, notable progress of SEA implementation in Philippines has been the inclusion of SEA elements within its process for the formulation of the Palawan Sustainable Development Act, Bohol Environment Code and the National Integrated Protected Area Management Systems Act. Other notable progress includes the application of SEA within various regional environmental assessments for river basins, coastal zones and urban planning including the Manila Third Sewerage Project. Finally, SEA prospects seem to be in the development of a SEA framework within the Environmental Assessment Act that would require SEA for PPPs involving multi-component, multi-sector projects and activities (Gilbuena Jr. et al., 2013; Mercado, 2007).

9. Thailand

Thailand has not transposed its SEA requirements into national legislation though it has it has developed a SEA guideline that considers social, economic, environmental and technological assessment of alternatives in the SEA process. A primary problem identified in SEA implementation for Thailand has been the lack of a SEA legislative framework to support SEA implementation though it has been implicitly mentioned in national environmental policies such as the National Environmental Quality Management Plan. Consequently, this has resulted in lack of prioritization for SEA implementation since its implementation is on a voluntary basis. A secondary problem is the limited and minimalistic public participation in SEA implementation where public engagements are conducted as a customary manner to conform to minimum legislative requirements typically towards the tail end of the process when it has the least influence. Thus in theory, there is a legitimate provision for public participation but in practice it has been difficult to operationalize due to stakeholder interest and non-articulation (Bureekul, 2000). The trends in SEA implementation may indicate that Thailand is resiliently predisposed to a top-down planning framework with sombre inherent latent restrictions to public participation in policy planning and decision making (Euamonlachat, 2010; Nishiuraa et al., 2008; Wirutskulshai & Coowanitwong, 2008). Meanwhile, notable progress of SEA implementation in Thailand has been the diverse capacity building initiatives including a series of SEA training and workshops organized by academic institutions in Thailand as well as the various ongoing SEA pilot studies (Lindberg, 2001). Finally, SEA prospects seem to be in the development of universal SEA procedural approaches that are robustly adaptable for different hierarchical levels depending on the individual nature of the initiative (Wirutskulshai et al., 2011).

10. Lao

Lao has not transposed its SEA requirements into national legislation though it has it has conducted World Bank and Asian Development Bank (ADB) supported SEA pilot project (Goodland, 2005). A primary problem identified in SEA implementation for Lao has been the lack of obvious direction for SEA implementation in its policy and legislative framework. The trends in SEA implementation may indicate that Lao is still ambivalent on SEA implementation in the country which mainly has been driven by donor funded SEA projects which are typically required as part of the investment due diligence in supporting regional and sectoral planning in Lao.

Meanwhile, notable progress of SEA implementation in Lao has been SEA implementation for the Nam Theun II Hydropower Project as well as SEA for the Nam Ngum River Basin. The study adopted a CIA to study the environmental and social impacts of multiple hydropower development on infrastructure, agriculture, natural resources and local communities (Jusi, 2011; Keskinen et al., 2012; Vientiane, 2011). Other notable progress includes the realization of public participation initiatives within the context of these donor funded SEA though this view is controversial (Lawrence, 2009; Singh, 2009). Finally, SEA prospects seem to be in the development of capacity building and awareness training for key government agencies (Dusik & Xie, 2009).

11. Bangladesh

Bangladesh has not transposed its SEA requirements into national legislation though it has introduced EIA through its National Environmental Policy and the Environmental Conservation Act as well as the environmental assessment of regional water quality projects (Khan & Belal, 1999; Rahman et al., 2000). A primary problem identified in SEA implementation for Bangladesh has been the lack of a clearly structured comprehensive environmental assessment system that is non-dependant on international donor agency requirements. A secondary problem is the lack of transparency in the decision making system including strategic environmental policy making. Furthermore, a tertiary problem is the deficient public participation in environmental decisions, which is a non-mandatory requirement in Bangladesh. The trends in SEA implementation may indicate that Bangladesh is struggling with the challenges of good governance due to antagonistic politics, invasive corruption and bureaucratic procrastination. Meanwhile, notable progress of SEA implementation in Bangladesh has been an emphasis on incorporating environmental consideration within sectoral policies as well as the development of ministerial sustainable development policies. Finally, SEA prospects seem to be in the development of a more robust environmental legislative and institutional framework, which includes compulsory public participation. Other prospects are the potential conception of an environmental independent body consisting of NGOs, international aid agencies as well as research and development think tanks (Ahammed & Harvey, 2004; Alshuwaikhat et al., 2007; Momtaz, 2002).

12. Pakistan

Pakistan has not transposed its SEA requirements into national legislation though it has introduced EIA through its Environmental Protection Act and Environmental Regulations as well the implementation of SEA for thermal power generation and drainage policies (Naureen, 2009; Slootweg et al., 2007; Wood, 2003). A primary problem identified in SEA implementation for Pakistan has been the low prioritization of SEA within the environmental planning and management system in the country. A secondary problem is the undue influence of environmental aid organizations and the government in the environmental decision making process resulting in weak influence of environmental assessments. Furthermore, a tertiary problem is the limited capacity of the personnel and administration procedures of the environmental assessment process. The trends in SEA implementation may indicate that Pakistan is struggling with the challenges of good governance due to political pressures where the environmental assessment process is used more as a project rationalization tool as opposed to an environmental sustainable decision support system. Meanwhile, notable progress of SEA implementation in Pakistan has been the mandatory inclusion of the public participation requirements in all public sector projects as part of the environmental legislative framework. Finally, SEA prospects seem to be in the development of environmental tribunals and litigation measures to ensure environmental protection and rights as well as government agencies interest in SEA. This is mainly due to capacity building programmes initiated by international organizations (Nadeem & Fischer, 2011; Nadeem & Hameed, 2008; Saeed et al., 2012).

13. India

India has not transposed its SEA requirements into national legislation though it has introduced EIA through its Environmental Protection Act as well as conducted SEA for irrigation projects in Central India, the Indian eco-development project, the Gujerat State Highway Programme and the Gujerat National Dairy Support Project (Garcia et al., 2011; Hirji & Davis, 2009; Singh & Singh, 2011). A primary problem identified in SEA implementation for India has been the low prioritization of SEA as compared to EIA in the environmental assessment process. A secondary problem is the weak environmental assessment procedures and methodologies due to limited assessment of alternatives, unreliable baseline data and incoherent application of assessment tools. Furthermore, a tertiary problem is the non-accountability of environmental agencies and professionals in the disclosure of environmental findings. The trends in SEA implementation may indicate that India is restricted by excessive bureaucracy, inefficiency and potentially corrupt administrative barriers to sustainable environmental governance (Banham & Brew, 1996; Paliwal, 2006; Valappil et al., 1994; Vyas & Reddy, 1998). Meanwhile, notable progress of SEA implementation in India has been the internalization of environmental considerations for a common vision through a systematic participatory process involving multiple stakeholder in the Palar Basin as well as the use of SEA as a diagnostic framework to reframe biodiversity and development priorities. Finally, SEA prospects seem to be in the development of SEA as a solution for streamlining environmental assessment of individual development projects as well as the updating of environmental policy guidelines to abridge procedural measures, strengthen regulatory authority and augment the accountability of environmental professionals (Rajvanshi, 2001, 2003, 2005).

14. Sri Lanka

Sri Lanka has not transposed its SEA requirements into national legislation though it has introduced EIA through its National Environmental Act as well as the SEA for its Tourism Master Plan. A primary problem identified in SEA implementation for Sri Lanka has been the lack of environmental assessment professionals with adequate technical capacity. A secondary problem is the lack of national developments to guide the policy planning as well as the integration of SEA considerations in a cohesive manner. Furthermore, a tertiary problem is the perception that SEA is an alternative to bypass the EIA process as opposed to completing the EIA process with the aim of expediting the project development process. The trends in SEA implementation may indicate that Sri Lanka is in a transition state of unstable political atmosphere with its main priority focused on economic and social development, superseding environmental concerns (Samarakoon & Rowan, 2008; Zubair, 2001). Meanwhile, notable progress of SEA implementation in Sri Lanka has been the growing awareness on the importance of SEA and the current weaknesses in the integration of environmental considerations within the policy planning process. Finally, SEA prospects seem to be in the development of interest in implementing SEA within government agencies in the tourisms, energy, forestry and urban planning sectors (Mackee et al., 2001; Vidyaratne, 2006).

15. Malaysia

Malaysia has not transposed its SEA requirements into national legislation though it has introduced EIA through its Environmental Quality Act and implemented SEA for the Paya Indah Wetlands in Selangor, Selangor State Structure Plan, Perak State Structure Plan, Beaufort and Kuala Penyu Landuse Plan in Sabah and the Natural Water Resources Management Study. The current application of SEA in Malaysia is mainly focused in land use development plans which are spearheaded by the the Department of Town and Country Planning (DTCP) in coordination with the local authorities and the Department of Survey and Mapping (DSM) (Briffett et al., 2004; Memon, 2000). A primary problem identified in SEA implementation for Malaysia has been its limited adoption as a policy planning tool. Nevertheless, the National Policy on the Environment (2002) has stated that ‘environmental considerations will be integrated in policies, programs, plans and project formulation as well as implementation, through a comprehensive assessment process, taking into account social, ecological and health effects’. SEA has also been explicitly referred to in the Ninth Malaysia Plan 2006-2010 where it states that: ‘environmental planning tools such as EIA & SEA will be increasingly applied in evaluating and mitigating environmental impacts on development activities’. A secondary problem is the lack of methodological guidelines and framework for conducting SEA in a consistent and systematic manner where many of the SEA implementation are varied in their definition and integration of environmental considerations in policy planning ranging from simple utilization of rapid EIA screening approaches to descriptive sustainability assessment evaluations.

Furthermore, a tertiary problem is the existing low level awareness on SEA and its potential for policy planning and super-streaming of environmental considerations among environmental agencies and the public. The trends in SEA implementation may indicate that Malaysia is still experimenting with the use of SEA as a policy planning mechanism and is hesitant in embracing SEA due to its traditional top-down policy planning with minimal public participation and cross-sectoral integration as well as its conventional reliance on EIA as its environmental planning mechanism. Meanwhile, notable progress of SEA implementation in Malaysia has been the recent recommendation by the Ministry of Natural Resources and Environmental (NRE) for SEA to be implemented in mainstreaming biodiversity as well as the Economic Planning Unit (EPU) utilization of SEA in its National Water Resources Study. Other notable progress involves the requirements to incorporate SEA within landuse planning as well as the formulation of a SEA manual for development plans. Finally, SEA prospects seem to be in the development of public participation initiatives of national legislation and policies including the Malaysian government circular on the online public engagement of new or revised legislation as well as the utilization of sustainability assessments in land use planning (Government of Malaysia, 2012a; Halimaton, 2007; Marzuki, 2009; Moi, 2007).

16. SEA Summary of Asia

A summary of SEA trends in Asia indicate a proliferation of SEA legislation possibly a mimicking of trends in Europe due to the EU SEA Directive (Briffett et al., 2003; Dusik & Xie, 2009; Hayashi et al., 2011). Meanwhile, SEA implementation range from the use of non-regulatory framework including the use of existing EIA systems to resistance of SEA (Table 2.2). The primary problem of SEA implementation in Asia has been its limited integration and pragmatic implementation in strategic decision making due to existing meta-policy structures. These deeply rooted systems are highly political and sensitive to change even in developed countries with a SEA legislative framework (Hezri, 2004). The secondary problem has been the assimilation of public participation and stakeholder engagement in a truly transparent and inclusive manner with often-mixed results. The tertiary problem has been the development and utilization of a consistent and systematic methodological framework for SEA due to its highly abstract nature as its upstream from the project level to the policy level. These trends indicate that SEA in Asia is still in an evolutionary pathway. Furthermore, the trends also indicate that SEA application can vary within planning levels and different sectors (Tetlow & Hanusch, 2012). Meanwhile notable progress in SEA implementation in Asia has been the global awareness on the need for SEA as a complementary environmental planning mechanism to integrate environmental considerations in a more strategic setting. Finally, SEA prospects in Asia seem to be in the development of a common international regional cooperation on SEA capacity building as well as the integration of sustainability assessments within the SEA framework (White & Noble, 2013).

Table 2.2 : Summary of SEA Problems, Progress and Prospects in Asia

Country	**Problem**	**Progress**	**Prospect**
Bangladesh	Limited transparency in decision making.	Integrating environmental consideration in sectoral policies.	Public participation initiatives.
China	Restrictive public participation.	SEA guidelines and indicators.	Expansion of SEA scope.
Hong Kong	Development centric SEA.	Heightened SEA public participation.	Sustainability centric SEA.
India	Bureaucratic restrictions.	Systematic participatory process.	Augmenting accountability of environmental professionals.
Indonesia	Perception of SEA as a burden by planning agencies.	SEA legislative provisions for public participation.	SEA multi-plan assessments.
Japan	Lack of SEA legislation.	Public involvement system.	SEA legislation.
Lao	Ambivalent SEA implementation.	Public participation initiatives.	SEA capacity building and training.
Malaysia	Top-down policy planning with conventional reliance on EIA.	Promotion of SEA in mainstreaming biodiversity and in land use plans.	Public participation initiatives on new legislation.
Pakistan	Challenges in SEA governance due to political pressure.	Mandatory public participation.	Environmental tribunals.
Philippines	Reactive approach to SEA implementation.	SEA application in regional planning.	SEA inclusion in environmental legislation.
South Korea	Problematic legislative cohesion.	Down-streaming SEA findings to EIA.	SEA sustainable development indicators.
Sri Lanka	Unstable political climate transition.	Growing awareness on SEA.	SEA implementation in agencies.
Taiwan	Limited political will with top-down planning.	SEA systems such as Delphi Indicators and Health Impact Assessment.	SEA capacity building.
Thailand	Lack of SEA legislation with limited public participation.	SEA training and workshops.	Universal SEA procedure for different hierarchical levels.
Vietnam	Limited influence on strategic decision making.	Synchronized SEA implementation with policies.	Inter-sectoral coordination.

2.2.8 SEA Policy Trends

SEA trends around the world indicate an abundance of SEA legislation in Europe mainly due to the EU SEA Directive as well as in Southern Africa and in some parts of Asia especially China, Korea and Indonesia. Meanwhile, SEA implementation in other regions range from the use of non-regulatory framework including the use of existing EIA systems in regions such as Northern America, Australasia and parts of Asia to resistance and pseudo application of SEA merely as a policy endorsement façade (Chaker et al., 2006; Dalal-Clayton & Sadler, 2004; Sadler et al., 2011). The primary challenge of SEA implementation around the world has been its value proposition in the highest policy planning levels. This has been mainly due to the highly complex political and socio-economic dynamic of environmental policy integration including countries in the EU. The secondary areas of challenge has been the over-reliance on SEA legislation to drive implementation and assimilation. Experiences around the world indicate that SEA legislative frameworks alone is insufficient to drive SEA in national policy planning. Other factors such as stakeholder latent strategic behaviours models may be required to transact with the complexity of influencing policy planning in a strategic manner (Dennis & Agamuthu, 2012b). These trends indicate that SEA is still in an evolutionary pathway and should be integrated in the planning and decision making process in a flexible and staged approach. This is because its application is usually constrained by significant data gaps and thus should be simple and robust in the planning process. Furthermore, the trends also indicate that SEA application can vary within the planning levels (policies vs plans) and different sectors and should be supported by appropriate capacity building and tools.

Meanwhile notable progress in SEA implementation has been the global awareness on the need for SEA as a complementary environmental planning mechanism to integrate environmental considerations in a more strategic setting. Finally, SEA prospects seem to be in SEA capacity building, sustainability assessments and health aspects within the SEA framework. The policy implication of these trends is that SEA may require a paradigm shift and coupling with national development agendas including sustainable development and green growth. Nevertheless, potential limiting obstacles for SEA may also include an over-reliance on legislation to drive SEA development and the naive adoption of legislation from developed countries without taking into context the local political, cultural and socio-economic environmental management issues. Furthermore, SEA development may also require customized institutional and knowledge building to establish a robust professional competency and SEA knowledge database that can be cross-regionally applied taking into considerations socio-political dynamics and legislative frameworks of different regions (Bina, 2007; Cherp et al., 2007). In conclusion, SEA trends indicates a sagacious realization that SEA in theory may be a strategic and rationale approach to integrating environmental considerations and preventing environmental problems. Nevertheless, SEA in practice is a complex, dynamic and challenging process that requires substantial political will, legislative framework, transparent public engagement and a robust methodological approach that is a part of a strategic environmental management system linked to the national policy planning process (McLauchlan & João, 2012).

2.3 Malaysian SEA Policy Review

The SEA policy review consisted of a systematic assessment of the current status, gap analysis and SEA elements of environmental and solid waste policies applicable in Malaysia. The approach was adapted from the United Nations Environment Programme (UNEP) manual for integrated environmental policy analysis (UNEP, 2009). Key conventions, legislation and policies relevant to solid waste and environmental management were reviewed with an emphasis on SEA elements within the Malaysian policy timeline (Figure 2.1).

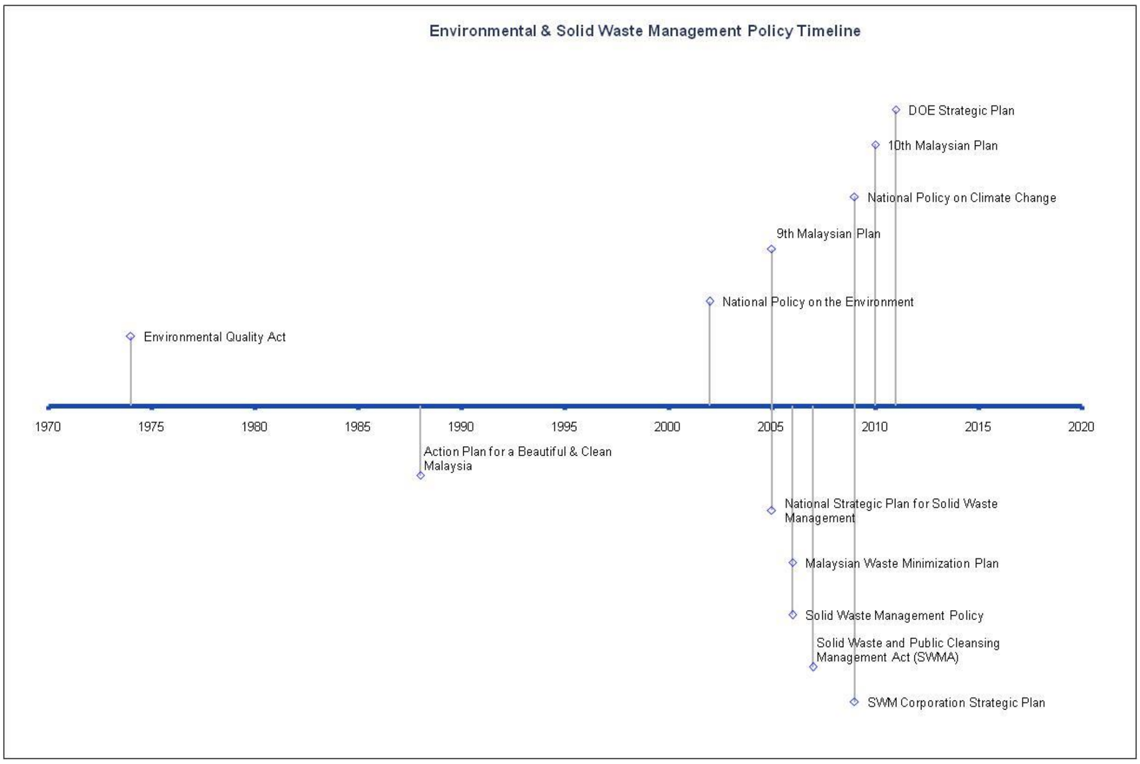


Figure 2.1 : Malaysian Policy Timeline

2.3.1 International Conventions on Environment

1. Agenda 21

Agenda 21 is a comprehensive global programme on sustainable development adopted at the United Nations Conference on Environment and Development (UNCED) held at Rio de Janeiro, Brazil, June 1992. It presents policies, plans and goals that seek to take a balanced and integrated approach between environment and development issues. Agenda 21 addresses the world's main critical environmental problems as well as aims to prepare the world for the challenges of the future. It reflects a global consensus and commitment at the highest level by governments on development and environmental cooperation (United Nations, 1992a). Closely related with Agenda 21 is the Rio Declaration on Environment and Development. The Rio Declaration is a set of principles adopted during the conference to guide future development. These principles define the rights of people to development and their responsibilities to safeguard the common environment. Thus, the Rio Declaration states that the only way to have long-term economic progress is to link it with environmental protection.

SEA Elements

Agenda 21 is one of the most influential policy for environmental management in Malaysia and sets the framework and foundation for the Malaysian National Policy on the Environment and the National Strategic Plan for SWM.

A review of Agenda 21 indicates that there are a number of chapters that are coherent with SEA. This includes sustainable management of human settlements, integrating environment and development in decision making, land use planning, managing fragile ecosystems, conservation of biological diversity and management of water resources. Most notable is the use of key SEA concepts such as public participation, precautionary principle, pollution prevention and integrating environmental planning at the policy, plan and programmes level. This indicates that Agenda 21 has the potential to be supportive of SEA integration in policy planning for Malaysia where international evidence suggest that these international treaties have the potential to drive environmental sustainability (Briffett et al., 2003; Sánchez & Croal, 2012).

2. Convention on Biological Diversity

The Convention on Biological Diversity (CBD) was signed by Malaysia in 1992 and ratified in 1994. The objective of the CBD is the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. This includes appropriate access to genetic resources and transfer of relevant technologies, taking into account all rights over those resources, technologies and funding. The main purpose of the initiation of the CBD was the concern for the loss of species and ecosystems around the world. Conservation of biological diversity is considered critical since a large amount of the world's economy and need of the poor are derived through these biological resources.

The CBD approach to the conservation of biological diversity is considered novel since it has moved from merely protecting threatened species or ecosystems towards reconciling the need for conservation with concern for development. It is also based on considerations for equity and shared responsibility. The CBD functions in accordance with the spirit of the Rio Declaration, which promotes a renewed partnership among countries. Its provisions on scientific and technical cooperation, access to financial and genetic resources and the transfer of ecological sound technologies form the foundation of this partnership (United Nations, 1992b).

SEA Elements

The CBD was a precursor to the formulation of the National Policy on Biological Diversity in Malaysia. A review of the CBD indicates that there are a number of Articles that are coherent with SEA namely Article 6, 13 & 14 which relate to developing national strategies, public participation and environmental impact assessments. However, the CBD does not explicitly mention SEA or any of its key concepts except public participation. Nevertheless, its priority on protecting natural resources in policies, strategies and programmes lends credence that it is the basis for the protected areas network in Malaysia and eventually an element within the Environmental Sensitive Area (ESA) ranking system. This indicates that the CBD has the potential to be supportive of SEA integration in policy planning for Malaysia where SEA has been recognized as a significant tool for biodiversity planning and implementation (Treweek et al., 2005).

3. <u>The Ramsar Convention on Wetlands</u>

The Ramsar Convention or the Convention on Wetlands of International Importance especially Waterfowl Habitat is an intergovernmental treaty on conservation and wise use of wetlands. The Convention came into force in 1975 and has designated about 900 wetlands in the List of Wetlands of International Importance, covering some 65 million hectares. Malaysia ratified the convention in 1994 and has designated the following as Ramsar sites in Malaysia - Tasik Bera in Pahang (1994), Sg Pulai, Tg Piai and Pulau Kukup in Johor (2003), Kuching Wetlands Park in Sarawak (2005) and Lower Kinabatangan-Segama in Sabah (2008). The original convention's emphasis was on the conservation and wise use of wetlands primarily as a habitat for waterbirds. However, over the years, the focus has shifted and broadened to cover all aspects of wetland conservation and wise use. This is because it is recognized that wetlands are ecosystems that are extremely important for biodiversity conservation and for the wellbeing of human communities (United Nations, 1971).

<u>SEA Elements</u>

The Ramsar Convention enabled the establishment of Ramsar sites in Malaysia. A review of the Ramsar Convention indicates Articles 3 is coherent with SEA, which relate to planning. However, the Ramsar Convention does not explicitly mention SEA or any of its key concepts. Nevertheless, its priority on protecting these wetlands is an element within the Environmental Sensitive Area (ESA) ranking system in Malaysia. This indicates that the Ramsar Convention has limited potential to be supportive of SEA integration in policy planning for Malaysia (Briffett et al., 2003; Treweek et al., 2005).

4. United Nations Framework Convention on Climate Change (UNFCC)

The Convention is the global effort to combat global warming which was adopted in Rio in 1992 where its ultimate objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man made interference with the climate. Malaysia ratified the Convention in 1994. The guiding principles of the Convention is the precautionary principle which says that the lack of full scientific certainty should not be used as an excuse to postpone action when there is a threat of serious or irreversible damage. The principle of the "common but differentiated responsibilities" of member countries assigns the lead in combating climate change to developed countries but developing countries have their part as well. Other principles deal with the special needs of developing countries and the importance of promoting sustainable development (United Nations, 1992c).

SEA Elements

The UNFCC was a precursor to the formulation of the National Policy on Climate Change in Malaysia. A review of the UNFCC indicates that Articles 3,4 & 6 is coherent with SEA which relate to the precautionary principle, integration in environmental policies and public participation. However, the UNFCC does not explicitly mention SEA but refers to key SEA concepts such as cumulative impacts, public participation and precautionary principles. This indicates that the UNFCC has the potential to be supportive of SEA integration of policy planning in Malaysia. Nevertheless, in practice climate change and SEA integration has been limited due to a lack of technical guidance and practical experience (Chang & Wu, 2013).

5. The Basel Convention

The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their disposal was adopted in 1989 and was ratified by Malaysia in 1993. The Convention is the response of the international community to the problems caused by the production of hazardous waste in increasingly large quantities. The Basel Convention strictly regulates the transboundary movement of hazardous waste and provides obligations for member countries to ensure that wastes are managed and disposed in an environmentally sound manner. The main principles of the Basel Convention is that transboundary movement of hazardous waste should be reduced to a minimum consistent with their environmentally sound management. Furthermore, hazardous wastes should be treated and disposed of as close as possible to their source of generation as well as should be minimized at source (United Nations, 1989).

SEA Elements

The Basel Convention established the first Scheduled Wastes Treatment and Disposal Facility in Malaysia though it is not directly applicable for solid waste facilities. A review of the Basel Convention indicates that Articles 4 is coherent with SEA, which relates to the siting of disposal facilities. The Basel Convention does not explicitly mention SEA or any of its key concepts. However, its priority on treating and disposing waste as close possible to their source of generation is an important principle in the policy planning of solid waste disposal and treatment facilities in Malaysia. This indicates that the Basel Convention has limited potential to be supportive of SEA integration in policy planning for Malaysia though it has been utilized internationally for the site selection of hazardous waste disposal facilities (Dermol & Kontić, 2011).

2.3.2 Malaysian Legislation

1. Federal Constitution 1957

The Federal Constitution is the apex legislative framework in Malaysia. The Ninth Schedule of the Constitution delineates the jurisdiction between the Federal and State governments. The Federal list consists of matters, which only the Federal government has jurisdiction while the State list consists of matters, which only the State governments has jurisdiction. The Concurrent list consists of matters, which both the Federal and State governments have jurisdiction. Article 76 (1) of the Constitution empowers Parliament to make laws for the purpose of promoting uniformity of the laws of two or more States though the matter comes under the State's jurisdiction. However, such a law will only come into effect in any State if a law made by the State legislature adopts it. Furthermore, Article 91 has provisions for the formulation of a National Land Council consisting of Federal and State government representatives which has the authority to formulate a national policy on land utilization for the purpose of mining, agriculture, forestry or any other purpose. Meanwhile, Article 95A of the Constitution has provision for the formation of the National Council for Local Governments (NCLG). The NCLG acts as a liaison between the Federal and State governments where it is its duty to formulate policies for the promotion, development and control of local governments, which must be followed by the Federal, and State governments. Finally, Article 92 delves on the concept of National Development Plans, which "means a plan for the development, improvement, or conservation of the natural resources of a development area" (Government of Malaysia, 1957).

SEA Elements

The Constitution is the basis for the Environmental Quality Act 1974 and the Solid Waste Management and Public Cleansing Act 2007 in Malaysia. The Constitution does not explicitly mention SEA or any of its key elements though it provisions broadly suggest that the Malaysian government has the provision for introducing policy requirements for promoting uniformity including the concept of National Development Plans for the conservation of natural resources. This indicates that the Constitution has the potential to be supportive of SEA integration in policy planning for Malaysia though its exact mechanism would be subject to the Federal-State jurisdiction in Malaysia (Dennis, 2001).

2. Environmental Quality Act 1974 (Amendment 2012)

The Environmental Quality Act 1974 (EQA) was enacted for the prevention, abatement, control of pollution and enhancement of the environment. It was amended in 2012 to include additional provisions and powers for the Director General of the Department of Environment (DOE). The EQA defines the "environment" as the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics. The EQA provides for the prohibition and control of pollution including specifying limits and guidelines for water, air and noise emission, control of scheduled wastes and the requirement for an EIA report for prescribed activities (Government of Malaysia, 2012b). The EQA also directly empowers the Director General of DOE to require an EIA under section 34A for prescribed activities.

SEA Elements

The EQA is the fundamental legislation for environmental protection and EIA in Malaysia. Consequently, the EQA was amended in 2012 to further empower the DOE to enforce the requirements of environmental management in Malaysia (The Star, 2012a). The EQA requires an EIA for solid waste facilities, which is conducted at the project level where most of the key decisions such as project siting had already been determined. Nevertheless, the EQA has a number of elements, which are significant for SEA namely the requirement for an EIA for 19 categories of prescribed activity, which forms the basis for identifying developments with potential significant environmental impacts.

Furthermore, the EQA also sets the framework for environmental land use controls via its requirements for zoning and siting of industries, which includes provision for buffer zones. The requirements on site selection for prescribed activities state that site selection for prescribed activities under the EQA are required to comply with the development plans, policies or any decisions of the Government of Malaysia prior to the EIA namely the National Physical Plan (NPP). The DOE makes special reference to the ESA system in the NPP and the development constrains associated with each ESA ranking. This indicates that the EQA has limited potential to be supportive of SEA integration in policy planning for Malaysia especially since its main focus is still at the project level even though it has been suggested that macro EIA conducted on a wider spatial coverage may function as a form of SEA (Briffett et al., 2004).

3. Solid Waste and Public Cleansing Management Act (2007) (SWMA)

The SWMA regulates the management of solid waste and public cleansing to ensure the maintenance of proper sanitation in Peninsular Malaysia and the Federal Territories of Putrajaya and Labuan. The SWMA includes the term controlled solid waste to denote the source of the waste and defines solid waste as scrap material or other unwanted surplus substance or rejected products arising from the application of any process but excludes scheduled wastes, sewage and radioactive waste. The SWMA defines recycling as to collect and separate solid waste for the purpose of producing products (Government of Malaysia, 2007a).

SEA Elements

The SWMA is the fundamental legislation on solid waste management in Malaysia. Nevertheless, the SWMA does not mention SEA explicitly though it does allude to planning of policies, plans and strategies with regards to SWM where Section 6 (1a) empowers the Director General (DG) of the Department of Solid Waste Management (DSWM) to propose SWM policies, plans and strategies. This indicates that the SWMA in its current form has limited potential to be supportive of SEA integration in policy planning for Malaysia (Dennis & Agamuthu, 2012a; Fauziah & Agamuthu, 2012).

4. Solid Waste and Public Cleansing Management Corporation Act (2007) (SWCA)

The SWCA establishes the Solid Waste and Public Cleansing Management Corporation with powers to administer and enforce the solid waste and public cleansing management laws (Government of Malaysia, 2007b).

SEA Elements

The SWCA is a key supporting legislation to the SWMA on solid waste management in Malaysia and includes the scope of monitoring the performance of the SWM concessions (Lee, 2012). Nevertheless, the SWCA also does not mention SEA explicitly though it does allude to planning of policies, plans and strategies with regards to SWM where Section 17 empowers the Corporation to propose SWM policies, plans and strategies to the Federal Government. This indicates that the SWCA in its current form has limited potential to be supportive of SEA integration in policy planning for Malaysia (Dennis & Agamuthu, 2012b).

2.3.3 Malaysian Solid Waste Policy, Strategy and Plans

1. Action Plan for a Beautiful and Clean Malaysia (ABC)

Prior to 1988 and the ABC, there was no concerted and formal policy to guide solid waste management in Malaysia. Solid waste management in terms of collection and management were mainly handled by the local authorities without much involvement from the Federal government. The Government of Malaysia (GOM) in 1998 with the assistance of the Japanese International Cooperation Agency (JICA) formulated an Action Plan on Municipal Solid Waste Management or more commonly known as an Action Plan for a Beautiful and Clean Malaysia (ABC) (Ministry of Housing & Local Government Malaysia, 1988). The proposed national policy by ABC was formulated with the aim to produce a national uniform municipal solid waste system that was productive, environmentally sounds and socially acceptable in Malaysia by the year 2010.

SEA Elements

The ABC focus was on basic sanitation and waste management efforts and hence did not explicit state SEA or any of its key concepts except indirectly referring to cumulative impacts via adopting a regional approach to solid waste planning. Nevertheless, the ABC policy was not officially endorsed by the National Council for Local Government as well as implemented completely.

The ABC generally is considered to have been succeeded by the National Strategic Plan on Solid Waste Management in Malaysia officially adopted in 2005 (Agamuthu & Dennis, 2011b). This indicates that the ABC has limited potential to be supportive of SEA implementation of policy planning in Malaysia.

2. National Strategic Plan for Solid Waste Management in Malaysia (NSP)

The National Strategic Plan for Solid Waste Management (NSP) was formulated in 2002 and adopted in 2005 by the GOM and provides the basis for SWM policies and measures in Peninsular Malaysia until 2020. The NSP scope covers municipal solid waste in Peninsular Malaysia. The key strategy of the NSP is to achieve "Sustainable waste management through reduction, reuse and recycling and the use of appropriate technologies, facilities, and equipment to provide a sustainable and comprehensive solid waste management service". The NSP proposed six strategies to guide solid waste legislative, institutional and infrastructural planning and management in Malaysia including an Action Plan to act as a road map for the implementation of the NSP. The Action Plan covers the regulatory and technical services framework for SWM, facilities and services framework for SWM and the supporting infrastructural framework for a sustainable SWM system (Ministry of Housing & Local Government Malaysia, 2005). The NSP established the following service targets to focus plans to improve SWM and to monitor the efficiency of its implementation.

Table 2.3 : National Strategic Plan Targets

Level of Service	Present	2003-2009	2010-2014	2015-2020
Extend collection service	75%	80%	85%	90%
Reduction & Recovery	3-4%	10%	15%	17%*
Closure of dump sites	112 sites	50%	70%	100%
Source Separation (Urban)	None	20%	80%	100%

*The reduction target for 2020 was revised by the GOM to 22%.

Table 2.4 : National Strategic Plan Strategies

NSP Strategy	Element
NSP Strategy 1	The priorities for SWM shall be in the short-term a waste hierarchy suited to Malaysia's conditions and in the long-term towards a more balanced waste hierarchy.
NSP Strategy 2	The Rapid and Comprehensive Development of the necessary Legal and Institutional Framework.
NSP Strategy 3	Development of public participation and technical capabilities in SWM.
NSP Strategy 4	Provision of sustainable technologies to manage solid waste.
NSP Strategy 5	A comprehensive approach to develop waste reduction, reuse and recovery.
NSP Strategy 6	Develop a socially acceptable SWM System.

SEA Elements

The NSP provided the framework for the development of the SWM Legislation, SWM Master Plans, Waste Minimization Master Plans and the SWM Facilities Master Plans. Notwithstanding, some elements of the NSP may need to be reviewed and updated due to the gazetment of the Solid Waste and Public Cleansing Management Act (SWMA) in 2007 as well as taking into consideration the current SWM situation and institutional structure where the NSP is expected to be revised in the near future. Nevertheless, many of the strategies and planning initiatives are being implemented where possible including the infrastructure and education strategies. One of the key features of the NSP is its recycling target of 22% by 2020 (Lee et al., 2010). The NSP does not mention SEA explicitly though it does refer to elements of environmental protection, EIA and public participation. The NSP also states that its purpose is to integrate environmental and developmental decision making processes in SWM. Nevertheless, an interesting aspect of the NSP is that it has deferred the environmental integration component to the EIA stage especially the siting of its SWM facilities in Peninsular Malaysia. This could pose a significant post-NSP challenge in that the environmental integration component was not conducted as part of a SEA process during the NSP formulation stage itself. This indicates that the NSP has limited potential to be supportive of SEA integration in policy planning for Malaysia though an ex-post SEA of the NSP would be required to validate the environmental integrity of the selected SWM facility locations throughout Peninsular Malaysia (Dennis & Agamuthu, 2012a, 2012b).

3. Master Plan on Waste Minimization (2006) (MWM)

The MWM was launched in 2006 with the objective to provide Vision, Strategies and Roles of Stakeholders to minimize the amount of solid waste disposed in Malaysia. The Vision of the MWM is "To realize a Material Cycle Society, where waste minimization activities are systemized and sufficiently enrooted in the behaviour of government, private sector, and the people in Malaysia". The MWM outlined waste minimization strategies, action plans for the Federal Government, action plans for the local authorities and pilot projects including the preparation of guidelines on waste minimization (Ministry of Housing & Local Government, 2006).

SEA Elements

The MWM was launched in 2006 and is the formal waste minimization policy document in Malaysia. The MWM is in the process of formulating and implementing its action plans and pilot projects in Malaysia where one of its targets was to achieve a 11% recycling rate in 2010. The current recycling rate as of 2012 was believed to be less than 5% by the DSWM (Lai, 2012). The MWM also promoted an environmental sustainable society where Strategy 4 emphasizes on strategic education and awareness programmes. Literature reports limited availability on the current status of recycling facilities or database in Malaysia while some even suggest that the recycling is rate is still low in Malaysia (Fauziah & Agamuthu, 2012; Mohamad et al., 2012). Nevertheless, the MWM does not mention SEA explicitly though it does refer to elements of environmental protection and public participation. This indicates that the MWM has limited potential to be supportive of SEA integration in policy planning for Malaysia.

4. National Solid Waste Management Policy (2006) (NSWMP)

The NSWMP is aimed at establishing an integrated solid waste management system that is comprehensive, cost effective, sustainable and accepted by the public, emphasizes environmental protection, selective of affordable technologies and ensures public health. The implementation of the NSWMP will be through the waste management hierarchy with emphasis on waste reduction through 3R activities, intermediate treatment and final disposal (Department of Solid Waste Management, 2006).

SEA Elements

The NSWMP forms the basis for SWM in Malaysia in terms of its objectives and key thrusts, which are expected to be translated into SWM strategic initiatives. Nevertheless, the NSWMP does not mention SEA explicitly though it does promote elements of public education and awareness. This indicates that the NSWMP has limited potential to be supportive of SEA integration in policy planning for Malaysia (Agamuthu & Dennis, 2011b).

5. SWM Corporation Strategic Plan (2009-2013) (SWMCSP)

The SWMCSP has developed a strategic plan in accordance of its role and responsibility established under the SWCA which is to recommend and implement policies, plans and strategies including schemes for SWM (Solid Waste and Public Cleansing Management Corporation, 2009). The strategic plan was developed for 2009 to 2013 and identified seven focus areas.

SEA Elements

The SWMCSP is a key supporting document for the SWMA and NSP for SWM in Malaysia. Nevertheless, it does not mention SEA explicitly though two of its focus areas are in public awareness and establishing an environmentally sustainable SWM. This indicates that the NSWMP has limited potential to be supportive of SEA integration in policy planning for Malaysia.

2.3.4 Malaysian Environmental and Development Policy and Plans

1. National Policy on the Environment (2002) (NPE)

The National Policy on the Environment (NPE) aims at continued economic, social, and cultural progress of Malaysia and enhancement of the quality of life of its people, through environmentally sound and sustainable development (Government of Malaysia, 2002). The NPE is a comprehensive policy translating the key requirements of Agenda 21 into the Malaysian national policy planning (Mohammad et al., 2011).

SEA Elements

A review of the NPE indicates that there are a number of strategies that are coherent with SEA such Strategy 1, 2, 3 & 4 which relates to public participation, environmental sensitive areas, integrating environmental considerations in policy planning and pollution prevention. The NPE does not mention SEA explicitly though it does describe SEA in Strategy 3 where it states that “environmental considerations will be integrated in policies, programmes, plans and project formulation as well as implementation” including promotion of effective consultation and public participation. Nevertheless, provision of public participation in the NPE have not been delved in-depth (Lai, 2013a). The NPE also uses key SEA terms such as precautionary principle and pollution prevention and integrating environmental planning at the policy, plan and programmes level. This indicates that the NPE has the potential to be supportive of SEA integration in policy planning for Malaysia.

2. National Policy on Climate Change 2009 (NPCC)

The NPCC aims to ensure a climate-resilient development that fulfils national aspirations for sustainability (Government of Malaysia, 2009a). The objectives of the NPCC are to achieve mainstreaming of measures to address climate change challenges through strengthened economic competitiveness, wise management of resources, environmental conservation and enhanced quality of life for sustainable development. Furthermore, the NPCC aims for the integration of responses into national policies, plans and programs to strengthen the resilience of development and potential impacts of climate change including the strengthening of institutional and implementation capacity to better harness opportunities in reducing negative impacts of climate change.

SEA Elements

The NPCC was launched with the purpose of ensuring a climate-resilient development to fulfil national aspirations for sustainability. The NPCC is a recent policy translating the key requirements of climate change into the Malaysian national policy planning due to the Malaysian government taking the initiative in climate change issues (Khor, 2013). A review of the NPCC indicates that there are a number of principles that are coherent with SEA such Principle 1, 2, 3, 4 & 5 which relates to sustainable development, natural resources, integrated planning, stakeholder participation and integration into policies and plans. The key thrust of the NPCC involves integrating climate change in planning and implementation via tools such as environmental sensitive areas, strategic environmental assessment, economic evaluation of ecological services and sustainable development indicators. The NPCC also explicitly mentions SEA in its key action areas of KA26-ST6 where it promotes integrated climate change considerations at the planning level by applying tools such as SEA. This indicates that the NPCC has the potential to be supportive of SEA integration in policy planning for Malaysia.

3. National Policy on Biological Diversity (NPBD) 1998

The NPBD launched in 1998 has been formulated to guide biological diversity planning, utilization and management in Malaysia. This reflects Malaysia's commitment both at the national and international (article 6 of the CBD) levels.

The purpose of the policy is to conserve Malaysia's biological diversity and to ensure that its components are utilized in a sustainable manner for the continued progress and socio-economic development of the nation. In its overview of the status of conservation and management of biological diversity in the country, the NPBD highlights the importance of aquatic ecosystems including marine and freshwater ecosystems as well as natural forests. Coral reefs and coastal mangroves have been identified as important habitats in terms of supporting diverse forms of life and productivity while lowland dipterocarp forests, peat swamp forests and freshwater swamps as large reservoirs of genetic diversity. The clearing or destruction of these natural ecosystems leads to irreversible loss of biological diversity and therefore those areas remaining require total protection. Consequently, the vision of the NPBD is ‘To transform Malaysia into a world centre of excellence in conservation, research and utilization of tropical biological diversity by the year 2020’ (Government of Malaysia, 1998).

SEA Elements

The NPBD is the translation of the CBD into Malaysian policy planning. A review of the NPBD indicates that it is extremely focused on issues of biodiversity with limited cross-sectoral integration. Concurrently, Malaysia has also publicly committed in protecting its biodiversity while in pursuit of development (The Star, 2012b). The NPBD does not mention SEA explicitly though it does focus on public awareness and transboundary regional cooperation, which implies addressing cumulative environmental impacts. This indicates that the NPBD has the potential to be supportive of SEA integration in policy planning for Malaysia.

4. National Physical Plan (NPP) 2010 - 2020

The National Physical Plan (NPP) is a written statement of strategic policies on the physical development and conservation throughout Peninsular Malaysia. The NPP was established to provide a standing guideline and framework on the geographical distribution of physical development and conservation areas in Peninsular Malaysia. By providing a spatial dimension to national economic policies, the NPP is intended to help states and local authorities formulate their development plans and strategies, and to identify development projects in a more realistic, focused and co-operative manner. The main goal of the NPP is to 'create an efficient, equitable and sustainable national spatial framework to guide the overall development of the country towards achieving developed nation status by 2020'. The first NPP was approved in 2005 and subsequently reviewed and updated in 2010 as the NPP-2 (Government of Malaysia, 2010).

SEA Elements

The NPP/NPP-2 is a key policy in the translation of the NPE and NPBD into spatial planning including the formulation of the Environmental Sensitive Area (ESA) designation. The ESA in turn is the basis for many of the environmental policy planning in the country though the extent of its use is unknown (Sedek, 2012). A review of the NPP indicates that there are number of sections that are coherent with SEA including section NPP22, NPP36 and NPP37 which relates to the ESA system, integrating planning and management of natural resources areas as well as solid waste facility siting.

The NPP mentions the use of SEA explicitly in section NPP26 as tool for the siting of new dams. This indicates that the NPP has potential to be supportive of SEA integration in policy planning for Malaysia.

5. Ninth Malaysian Plan (9MP) (2005)

The Ninth Malaysian Plan (9MP) is part of Malaysia's five year plans to stimulate the national economy to achieve economic growth and investment. The 9MP has explicitly mentioned SEA and states that environmental planning tools such as SEA will be increasingly applied in evaluating and mitigating environmental impacts of development activities (Economic Planning Unit, 2005). This indicates that the 9MP has limited potential to be supportive of SEA integration in policy planning for Malaysia especially since it has been updated with the 10MP.

6. Tenth Malaysian Plan (10MP) (2010)

The Tenth Malaysian Plan (10MP) is part of Malaysia's five year plans to stimulate the national economy to achieve economic growth and investment. The 10MP does not explicitly mention SEA though it does mention ensuring waste is managed in a sustainable manner and the promotion of public awareness including elements of extended producer responsibility (EPR) (Economic Planning Unit, 2010). This indicates that the 10MP has limited potential to be supportive of SEA integration in policy planning of Malaysia.

7. <u>DOE Strategic Plan (DOESP) (2011)</u>

The DOE Strategic Plan (SP) 2011-2020 outlines its nine strategic thrusts for environmental management. The DOE SP does state SEA in its eight strategic thrust, which is to plan and implement projects in a sustainable manner. This strategy aims to promote a culture of environmental conservation in the planning and implementation of projects (Department of Environment, 2011a). This indicates that the DOESP has the potential to be supportive of SEA integration in policy planning for Malaysia.

2.3.5 Conclusion

International conventions and Malaysian policies related to environmental and solid waste management have evolved from simple informal policies to formal policies. SEA trends of policy and implementation in Malaysian indicate limited provision for SEA concepts such as early environmental policy planning, addressing cumulative environmental impacts and policy public participation. This trend seems to indicate that the Malaysian policy maker’s focus is still on environmental and/or solid waste management at the micro project level with an emphasis on EIA though SEA concepts have been inferred in the National Policy on the Environment, National Policy on Climate Change and the Five Year Malaysian Plans (Agamuthu & Dennis, 2011a).

3.0 SEA POLICY ANALYSIS

3.1 Introduction

This chapter details the SEA policy analysis conducted on solid waste and environmental policies reviewed in Chapter 2. The main purpose of the SEA policy analysis is identify potential elements to facilitate and mitigate SEA policy integration within the existing policy planning framework which also allows matching complementing policy elements and avoiding obstructing policy elements. This is because the abundance of environmental and solid policies that may have resulted in some progress in environmental policy integration may not necessarily complement or facilitate SEA policy integration for SWM in Malaysia (Dennis & Agamuthu, 2013; Hezri & Nordin Hasan, 2006). Consequently, the SEA policy analysis also provides insight in terms of potential mechanism for SEA policy integration based on the conceptual and theoretical provisions as well as highlighting potential gaps in SEA theory and practice within the existing policy planning framework. This chapter is divided into five main sections. Section 1 provides the outline for the chapter and sections. Section 2 details the SEA policy analysis methodology. Section 3 presents and discusses the results of the SEA policy analysis. Section 4 highlights the policy implications of the findings for SWM in Malaysia. Finally, Section 5 concludes and summarizes the key findings of the SEA policy analysis.

3.2 Methodology

The methodology for the SEA policy analysis consisted of a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. A SWOT analysis involved identifying the internal and external factors that are supportive and unsupportive for SEA policy implementation (Ghazinoory et al., 2011). Strengths are internal elements that enable facilitation of policy goals while weaknesses are internal elements that obstruct policy goals. Finally, opportunities are external elements that has the potential to facilitate policy goals while threats are external elements that has the potential to obstruct policy goals. The SWOT analysis on the existing Malaysian policies for SEA policy integration was conducted based on a ranking of high, moderate or low for each convention, legislation and policy (Table 3.1).

Table 3.1 : Solid waste and environmental conventions, legislation and policies

No	Name	Type
1.	Agenda 21	Convention
2.	Convention on Biological Diversity	Convention
3.	The Ramsar Convention On Wetlands	Convention
4.	United Nations Framework Convention On Climate Change	Convention
5.	The Basel Convention	Convention
6.	Federal Constitution	Legislation
7.	Environmental Quality Act	Legislation
8.	Solid Waste and Public Cleansing Management Act	Legislation
9.	Solid Waste and Public Cleansing Management Corporation Act	Legislation
10.	Action Plan for a Beautiful and Clean Malaysia	Policy
11.	National Strategic Plan for Solid Waste Management in Malaysia	Policy
12.	The Master Plan on National Waste Minimization	Policy
13.	National Solid Waste Management Policy	Policy
14.	Solid Waste & Public Cleansing Management Corporation Strategic Plan	Policy
15.	National Policy on The Environment	Policy
16.	National Policy on Climate Change	Policy
17.	National Policy on Biological Diversity	Policy
18.	National Physical Plan	Policy
19.	Ninth Malaysian Plan	Policy
20.	Tenth Malaysian Plan	Policy
21.	DOE Strategic Plan	Policy

3.3 Results and Discussion

The SWOT SEA policy analysis findings is presented below where the ranking of high, moderate or low is reflected in its relative size within the SWOT quadrants (Figure 3.1).

Figure 3.1 : SWOT SEA Policy Analysis

3.3.1 SEA Strengths

The SWOT analysis indicates that the strengths for SEA policy integration are in existing SEA policies, establishment of the ESA system and the existing environmental information system. The first area of potential SEA strength is in the existing policies of Agenda 21, United Nations Framework Convention on Climate Change (UNFCC), National Policy on The Environment (NPE), National Policy on Climate Change (NPCC) and the National Physical Plan (NPP-2). The promotion of SEA in these policies provides a national strategic framework for SEA policy integration.

These policies advocate the key SEA concepts such as policy integration and planning, addressing cumulative and precautionary impacts and public participation in the policy process (Hezri & Nordin Hasan, 2006; Hezri, 2004). The NPE, which is the key environmental policy in Malaysia, has already provided the framework for SEA integration by advocating environmental integration in policy, plans and programmes. The second area of potential strength is in the establishment of the ESA system in the NPP-2, which lays the foundation for SEA implementation at a national and regional level. The ESA system has established a uniform and consistent set of requirements for the protection of environmentally sensitive areas including areas for conservation and controlled development. This has already led to the prioritization of strategic conservation areas in Malaysia (Heng, 2012). Finally, the third area of potential strengths is the growing availability of environmental data for SEA implementation at the national level. The national environmental monitoring programme coupled with the numerous environmental studies commissioned by the government has contributed to the expanding availability of environmental data online. Consequently, baseline environmental information is comparatively more available for SEA implementation though the level of environmental reporting among corporate firms is still considered low (Sumiani et al., 2007). This is further strengthened by recent policies such as the NPCC, which explicitly promote SEA as a tool for integrating ESA in policy planning. This indicates that SEA is already conceptually provided within the existing framework of environmental policy planning and is supported by the ESA and environmental information for its implementation within the existing policy planning framework. Study findings from Europe on environmental spatial data confirms the importance of accessibility of environmental information to SEA and decision making (Craglia et al., 2012). Consequently, the existence of policies, the ESA and environmental information system are considered high enablers for SEA policy integration.

3.3.2 SEA Weaknesses

The SWOT analysis indicates that the weaknesses for SEA policy integration are in the area of existing SWM policies and legislation, SEA political will and SEA public participation. The first area of potential SEA weaknesses is that the existing SWM policies and legislation lack SEA supporting concepts and elements even though these policies and legislation were formulated within the past 10 years when SEA integration in policy planning had already been established in international conventions and in national policies such as the NPE and NPP since 2002. Furthermore, the SWM sector had already experienced the debacle of project level planning with the Broga Incinerator and existing poor siting of landfills in environmentally sensitive areas. Increasingly, Malaysian communities are growing vocal in their dissatisfaction of landfill siting and the associated potential environmental pollution (Tan, 2012). Similar occurrences are being experienced in China where the traditional top-down non-participatory approaches to siting of SWM facilities are proving to be ineffective as the public become increasingly aware of their rights (Johnson, 2013).

Consequently, this also suggest that the recently formulated SWM policies and legislation may not have fully optimized its opportunity in providing strategic elements within its legislative framework in enabling options for implementing SEA in the long-term. One possible explanation is that these SWM policies and legislation were still very much concerned with basic solid waste collection and disposal issues as opposed to strategic policy planning and implementation. The second area of potential SEA weaknesses is the lack of SEA political will to implement provisions within the existing policy framework of the NPE and the 9MP, which had explicitly mentioned SEA.

This gives the impression that SEA integration was merely a paper exercise without any political will for implementation and thus may have resulted in SEA not taken seriously by policy implementation stakeholders. This is glaringly highlighted by the fact that the 10MP does not mention SEA even though it was promoted in the 9MP (Economic Planning Unit, 2005, 2010). Finally, the third area of potential SEA weaknesses is the lack of SEA public participation in the policy formulation process. The current situation is that public participation is limited to selected stakeholders to provide input in the policy formulation process as exemplified by the NPCC stakeholder consultation process. Nevertheless, the original intent of SEA public participation was for the public to be actively involved in the policy process and preferably at a national level.

This was to avoid dissatisfaction and protest by the public at the project level when key decisions and substantial resources had already been invested. Malaysian today tend to demand for greater public participation on environmental issues even to the extent of reforming national policies and plans (Lai, 2013b). The lack of a significant public participation process may give the impression that it is more of a public relations exercise than an in-depth public consultation engagement as part of the decision making process. Ultimately, all of these weaknesses may be indicative of a root-cause problem which is Malaysia may be still reliant on EIA as the dominant environmental management instrument. Consequently, the potential lack of SEA elements in SWM policy/legislation, lack of political will and the lack of public participation are considered policy gaps for SEA policy integration in SWM policy planning in Malaysia.

3.3.3 SEA Opportunities

The SWOT analysis indicates that the opportunities for SEA policy integration are in the area of a new SEA Legislation, SEA mainstreaming in sectoral planning and SEA capacity building. The first area of potential SEA opportunity is in the establishment of a SEA legislation for Malaysia since this is already conceptualized within the existing policy framework of Agenda 21, Federal Constitution, NPE and NPP. This would enable a uniform and systematic implementation of SEA for all policy planning subject to the jurisdiction between the Federal and State governments in Malaysia. A SEA legislation would ensure that all sectoral policies including SWM would go through a legally mandated environmental integration process and thus prevent potential issues at the project level. Furthermore, a SEA legislation would also legally mandate public participation during the policy planning stage and thus ensure that public and stakeholder buy-in is obtained prior to proceeding to the project level.

Literature of SEA trends in Asia indicate a number of countries including South Korea, Hong Kong and Indonesia enacting their own SEA legislation in response to developments in Europe due to the EU SEA Directive (Briffett et al., 2003; Dusik & Xie, 2009; Hayashi et al., 2011). Currently, strategic integration of environmental considerations may be done in an ad-hoc manner in certain sectors or relegated to the EIA during the project stage as in the NSP for SWM in Malaysia. Ultimately, a SEA legislation should be considered as part of a long-term SEA strategy while implementing other short-term solutions so that it functions as an environmental legislative policy instrument, which is both theoretically and practically robust. The second area of potential SEA opportunity is in the mainstreaming of SEA in sectoral planning such as SWM, water resource management and biodiversity planning.

This is in line with recent evidence that suggest that mainstreaming of ecosystem services with SEA has been gaining momentum in Europe (Helming et al., 2013; Kumar et al., 2013). The mainstreaming of SEA in sectoral planning in Malaysia has already been reaffirmed in the documents of "A Common Vision for Biodiversity" and the Natural Water Resources Study (Government of Malaysia, 2011; Ministry of Natural Resources and Environment, 2008). Similarly, the mainstreaming of SEA for SWM should be conducted especially in the review of the NSP, as this would provide the opportunity to integrate SEA in SWM and thus prevent environmental issues at the project level. This would especially be critical for SWM with the implementation of the SWMA and the siting of the SWM facilities such as landfills and thermal treatment plants. Finally, the third area of potential SEA opportunity is in SEA capacity building for technical personnel in sectoral planning including in SWM. It has been demonstrated that SEA facilitates capacity building and significantly increases information sharing (Retief, 2007b).

SEA capacity building would be a short to mid-term initiative and would establish the foundation for a SEA Legislation in the long-term while obtaining buy-in from sectoral technical personnel in the short-term. This would ensure that the SEA core competency is organized for the successful implementation of SEA in policy planning. Consequently, SEA Legislation, SEA Mainstreaming and SEA Capacity Building are considered enablers for SEA integration and represents a policy opportunity for SEA policy integration in SWM policy planning in Malaysia.

3.3.4 SEA Threats

The SWOT analysis indicates that the threats for SEA policy integration are in the area of SEA Integration Gaps, SEA Awareness Gap and SEA Theory and Practice Gap. The first area of potential SEA threat is in the existing gap in cross-sectoral policy integration, which often results in sector centric isolated policy planning. This may results in SEA initiated but with very little consideration for cross-sectoral policy harmony and integration thus resulting in ineffective or protracted policy implementation. Experiences of SEA in Vietnam and Bangladesh support that the potential threat of gaps in cross-sectoral integration where this is also potentially a critical area for intervention to enable cross-sectoral governance networks (Alshuwaikhat et al., 2007; Bonifazi et al., 2011; Partidário et al., 2008). The second area of potential SEA threat is in the SEA Awareness Gap, which is related to the existing low level of SEA awareness among policy stakeholders and the public. Endeavours to implementing SEA integration in policy planning without adequate stakeholder and public awareness on SEA may stall or worse backfire with wasted time and resources.

Finally, the third area of potential SEA threat is in the Theory and Practice Gap of SEA implementation especially in developing countries with a top-down policy planning process such as Malaysia. Implementing, a theoretical SEA based solely on developed countries without taking into consideration local socio-economic cultural issues may result in SEA relegated into an environmental legislative policy instrument which is theoretical but pragmatically non-robust with very little practical effectiveness or influence (Axelsson et al., 2012; Bina, 2007).

This also implies that SEA is a not a ‘silver bullet’ that can be mimicked from other countries but has to be customized and complemented taking into consideration national environmental data availability and systems (Agamuthu & Dennis, 2013). Consequently, the policy gaps in SEA cross-sectoral integration, SEA awareness and SEA Theory and Practice are considered barriers for SEA integration and represents a policy threat for SEA policy integration in SWM policy planning in Malaysia.

3.4 Policy Implications

The SWOT findings indicates that the main strength for SEA policy integration is in existing environmental policies and legislation such as the Agenda 21, Federal Constitution, NPE and NPP. Nevertheless, the SWOT analysis also indicates that there are numerous weaknesses such as the lack of SEA elements in the recent SWM policies and legislation such as the NSP and the SWMA. This also includes the lack of SEA political will for implementation that translates SEA policy commitments to practical reality and SEA public participation that actively engages the public in the policy formulation process. Some of these weaknesses outweigh the strengths of SEA policy integration, which is the existence of formal policies and legislation (Rachid & El Fadel, 2013). Furthermore, the SWOT analysis indicates that in terms of opportunities there exist prospects of establishing a SEA Legislation to promote uniformity and systematically implement SEA across sectoral policy planning. Other SEA opportunities are the mainstreaming of SEA in sector planning and capacity building for technical personnel as a short-term measure to bridge the temporal gap of SEA Legislation implementation. Finally, the SWOT analysis indicates in terms of threats there is a lack of cross-sectoral policy integration, awareness and theory with practice.

The implications of these findings on SEA policy integration are that policy makers should consider matching SEA weaknesses with SEA opportunities to obtain maximum policy implementation advantage. This also relates with the fact that environmental policymaking is highly politicized and policy makers are reluctant to initiate environmental integration which may be rejected by stakeholders and the public (Groot & Schuitema, 2012; Juntti et al., 2009). This entails the rapid formulation and implementation of a SEA Legislation with a complementing SEA Blueprint and SEA Declaration to drive SEA implementation. This also involves matching the SEA weaknesses in political will and public participation with the potential SEA opportunities in sectoral mainstreaming and capacity building. Furthermore, policy makers should consider neutralizing SEA threats with SEA strengths to minimize existing SEA policy threat. This entails actively utilizing the existing SEA policies and ESA system as an initial platform for uniform SEA implementation. This potentially converts SEA threats such as a lack of cross-sectoral integration into an established SEA and ESA system, which minimizes failure of cross-sectoral SEA policy integration.

3.5 Conclusion

In conclusion, the SEA policy analysis indicates significant SEA policy integration potential though the existing environmental management emphasis is still on EIA. The SEA policy analysis also suggest neutralizing or matching potential threats and weaknesses with strengths and potential opportunities. Ultimately, this may require the formulation of a SEA Legislation, SEA Blueprint, SEA Declaration, SEA sectoral mainstreaming, SEA capacity building and SEA utilization of the ESA system as part of a long-term sustainable SEA strategy.

4.0 SEA BEHAVIOURAL MODELS

4.1 Introduction

This chapter details the SEA stakeholder/public survey conducted to develop SEA behaviour models (SBM), which compute the potential for SEA integration within the SWM policy planning framework in Malaysia. Environmental policy making has evolved from conventional top-down prescriptive approaches to a more participatory approach which involves stakeholder and public participation not only in the policy implementation process but more importantly in the policy formulation process. Nevertheless, it is quite often a mystery to policy makers on what are the drivers that influence both stakeholders and the public in the policy process. Conventional approach have often focused on single driver variable using statistical regression analysis. Nevertheless, the drivers to stakeholders and the public are complex and requires an equally multi-dimensional and robust approach such as structural equation modelling to elucidate these policy drivers (Mahmud & Osman, 2010; Ramayah et al., 2012; Tonglet et al., 2004). This chapter is divided into five main sections. Section 1 provides the outline for the chapter and sections. Section 2 provides an overview of the methodology, the theoretical framework, hypothetical SBM and research hypothesis as well as the sampling frame for the stakeholder and public survey and the analytical techniques utilized to develop the SBM. Section 3 presents and discusses the results of the stakeholder/public survey, statistical analysis, comparative analysis, structural equation modelling and SEA model findings. Section 4 synthesizes the SEA model findings and highlights the policy implications of the findings for SWM. Finally, Section 5 concludes and summarizes the key findings of the survey and SBM.

4.2 Methodology

The methodology for the SEA policy survey and structural equation modelling (SEM) utilized face-face interview surveys of 152 SEA stakeholders consisting of policy makers/implementers in government agencies involved in environmental and/or solid waste management as well as a public survey of 1500 public respondents from the general population from 15 major cities in Malaysia. The SEA stakeholder survey utilized a non-probability purposive sampling (Table 4.1). Meanwhile, the SEA public survey utilized a non-probability intercept random sampling and was conducted in commercial areas during the weekends to maximize respondent diversity (Table 4.2). Consequently, both the SEA surveys conformed to the minimum SEM sample size requirements of the “ten times rule of thumb” which is equivalent to ten times the largest number of structural paths directed at a particular latent construct (Hair, 2009; Hair et al., 2012). The SEA survey questionnaires focused on the following concepts a) policy awareness b) existing attitude c) perceived benefits d) perceived barriers e) perceived need for enablers f) potential of SEA integration in policy planning. These constructs were operationalized by a Likert scale with reverse coding and distinctive scales between policy awareness and perception to minimize method bias. The questionnaires were divided into four parts consisting of the demographic profile, policy awareness, SEA perception and stakeholder/public preferences. The questionnaire was administered in both English and Bahasa Melayu and was subject to a pre-test to ensure it was clear and understandable to achieve its intended objective. The SEA stakeholder survey form is provided in Appendix 1 while the SEA public survey form is provided in Appendix 2. The survey findings were analyzed using chi-square analysis and modelled using the exploratory partial least squares SEM (PLS-SEM) to determine key SEA policy drivers for SWM policy planning in Malaysia.

Table 4.1 : SEA Stakeholder Survey Agencies

Agency	Type
Alam Flora (P) Ltd	Solid Waste Management
Department of Environment	Environmental and Policy Planning
Department of Solid Waste Management	Solid Waste Management
Department of Town & Country Planning	Environmental and Policy Planning
Kota Kinabalu City Hall	Solid Waste Management
Economic Planning Unit	Environmental and Policy Planning
E-Idaman (P) Ltd	Solid Waste Management
Lembaga Urus Air Selangor	Environmental and Policy Planning
Alor Star City Council	Solid Waste Management
Ipoh City Council	Solid Waste Management
Johor Bahru City Council	Solid Waste Management
Kuala Terengganu City Council	Solid Waste Management
Kuching Selatan City Council	Solid Waste Management
Melaka City Council	Solid Waste Management
Shah Alam City Council	Solid Waste Management
Ampang Jaya Municipal Council	Solid Waste Management
Kajang Municipal Council	Solid Waste Management
Kota Bahru Municipal Council	Solid Waste Management
Kuatan Municipal Council	Solid Waste Management
Pulau Pinang Municipal Council	Solid Waste Management
Subang Jaya Municipal Council	Solid Waste Management
Ministry of Domestic Trade, Co-Operatives and Consumerism	Environmental and Policy Planning
Ministry of Urban Wellbeing, Housing & Local Government (previously known as Ministry of Housing & Local Government)	Environmental and Policy Planning
Ministry of Natural Resources and Environment	Environmental and Policy Planning
Putrajaya Corporation	Environmental and Policy Planning
Solid Waste Management Corporation	Solid Waste Management

Table 4.2 : SEA Public Survey Cities

City	State
Kuala Lumpur	W - Kuala Lumpur
Subang Jaya	B - Selangor
Malacca City	M - Malacca
Kuantan	C - Pahang
Johor Bahru	J - Johor
Kuala Terengganu	T - Terengganu
Ipoh	A - Perak
Georgetown	P - Pulau Pinang
Seremban	N - Negeri Sembilan
Kota Bahru	D - Kelantan
Kota Kinabalu	S - Sabah
Kuching	Q - Sarawak
Alor Star	K - Kedah
Kangar	R - Perlis
Labuan	L-Labuan

PLS-SEM is a multivariate modelling approach blending factor analysis and multiple regression to simultaneously investigate multiple interrelated relationships between latent constructs. PLS-SEM is advantageous in exploratory and predictive models as well as is robust for small sample size and non-normal data (Hair et al., 2012). The study developed the SBM based on the exploratory PLS-SEM modelling approach and used latent constructs of policy drivers (environmental awareness, existing attitude, perceived benefit, perceived barriers, perceived enablers need and SEA integration behaviour). The SEA stakeholder policy model (SPM) was used to develop parsimonious constructs for the SEA public policy model (PPM) and then both models empirically tested using the exploratory variance based PLS-SEM algorithm (Ringle et al., 2005). The PLS-SEM algorithm utilizes a two-stage approach where the first stage estimates the latent constructs' scores and the second stage calculates the outer weights and loadings as well as the structural model's path coefficients. The PLS-SEM modelling algorithm estimates the coefficients for the partial ordinary least squares regression models in the measurement models and the structural model. In a reflective measurement model, the regression model includes single regressions with each indicator individually being the dependent variable, whereas the latent construct is always the independent variable. In the structural model, the relationships are calculated for each endogenous latent construct, which represents the dependent variable with its latent construct as independent variables in a partial regression model. The final latent construct scores are used to run the ordinary least squares regressions for each construct to determine the structural model relationships' path coefficients. This enabled the simultaneous examining of interrelated dependence relationships among the measured variables and the latent driver constructs as well as between the latent driver constructs (Hair et al., 2012).

Factor analysis was conducted to verify the validity of the latent variables. The measurement models was then assessed for reliability and validity using the Cronbach's alpha coefficients, composite reliability coefficients (CR) [= (square of the summation of the factor loadings)/{(square of the summation of the factor loadings) + (square of the summation of the error variances)}], average variance extracted (AVE) [= (summation of the square of the factor loadings)/{(summation of the square of the factor loadings) + (summation of the error variances)}] and discriminant validity (construct correlation < square root of AVE) (Gefen et al, 2011; Hair et al., 2012; Ringle et al., 2012). The structural models was examined for the coefficient of determination R^2 and the proposed hypotheses tested for statistical significance using bootstrapping in the predicted direction of the structural paths.

4.2.1 Theoretical Framework

Generally, the theory of planned behaviour (TPB) is one of the dominant theories in environmental and waste management behaviour studies especially in waste prevention and recycling (Mahmud & Osman, 2010; Ramayah et al., 2012). TPB conceptualizes that attitude towards behaviour (ATT), perceived subjective norms (PSN), and perceived behavioural control (PBC), are significant and accurate predictors of intentions and behaviour. ATT refers to the positive perception level of the behaviour while PSN refers to the perception level of subjective norm constraints of the behaviour and finally PBC refers to the perception level of behaviour control of the behaviour.

TPB provides a conceptual structured framework that models the main drivers, which influence behaviour especially when it is considered rational. TPB integrates key concepts in the socio-behavioural discipline and allows the modelling of behaviours. TPB also enables the inclusion of additional significant predictors or drivers in behaviour (Ajzen, 1991). An extension of TPB is the Attitude-Behaviour-Context (ABC) theory, which suggests that Attitudes (A) and Behaviour (B) are highly facilitated by the context of the behaviour (Stern, 2000). The ABC theory has also been demonstrated in waste recycling studies where source separation of waste was facilitated by the provision of utilities to increase the convenience of recycling (Olander & Thogersen, 2006). Nevertheless, studies on TPB have also suggested that it requires improvement and modification to the model to increase its predictive ability for behaviour (Armitage & Conner, 2001). These includes removal of the PSN component, further investigation on the role of PBC as well as the inclusion of additional variables such as situational constructs (Tonglet et al., 2004).

4.2.2 Hypothetical SEA Behavioural Policy Model

Based on the theoretical framework, this study developed a hypothetical SBM, which was adapted from the TPB framework. The SBM aims to examine the relationship between perceptions of attitude-control-enablers on the behaviour intentions of integrating SEA in policy planning. The SBM hypothesizes three main drivers (Perceived SEA Benefits, Perceived SEA Barriers, Perceived SEA Enablers Need) with two sub-drivers (Environmental Attitude & Environmental Awareness) for the SEA Integration Behaviour.

Driver 1 : Perceived SEA Benefits (BEN)

The SEA model hypothesizes that attitude towards behaviour (ATT) which is perception on the benefits of SEA is expected to have a positive effect on behaviour intention. ATT refers to the level of positive evaluation of the behaviour and is a significant predictor of behaviour (Ajzen, 1991). Literature indicates that environmental awareness effects positively on environmental behaviour such as waste recycling (Tonglet et al., 2004); (Ramayah et al., 2012). In the SEA stakeholder model, attitude towards SEA is represented by perception benefits (BEN) in terms of early planning, addressing cumulative impacts, increased transparency and informed decision makers while in the SEA public model, it is represented in terms of SEA improving SWM.

Driver 2 : Perceived SEA Barriers (BAR)

The SEA model reframed perceived lack of behaviour control (PBC) as perceived internal barriers to behaviour. PBC refers to the perception on the level of difficulty in performing the behaviour and consist both self-efficacy (PBC-SE) and situational factors (PBC-SF) (Ajzen, 1991). Nevertheless, research indicates the predictive strength of PBC to behaviour is varied (Armitage & Conner, 2001; Mahmud & Osman, 2010; Ramayah et al., 2012). This construct postulates that SEA behaviour intentions is influenced by perception of barriers only within the direct control of the individual or organization (PBC-SE) and excludes external factors such as situational factors (PBC-SF). This distinguishes it from the typical PBC, which includes both self-efficacy and situational factors and is supported in literature on PBC (Armitage & Conner, 2001). In the SEA stakeholder model, PBC is represented by perception of barriers (BAR) in terms of burden to agencies, potential delays, increased cost and limiting options of decision makers while in the SEA public model, it is represented by prioritization of environmental protection.

Driver 3 : Perceived SEA Enablers Need (ENB)

The SEA model absorbed perceived subjective norm (PSN) into the situational factor component of PBC (PBC-SF) to form perceived need for SEA enablers. PSN refers to the perceived social approval on performing a behaviour. Research has suggested that PSN be removed from the framework due to its predictive inconsistency (Armitage & Conner, 2001; Mahmud & Osman, 2010). The merging of PSN into the external factors of PBC (PBC-SF) was derived from previous models that postulates environmental behaviour may be influenced by external factors such as situational constructs (Stern, 2000; Tonglet et al., 2004). This construct postulates that SEA behaviour intentions is influenced by perception for the need of external factors beyond the direct control of the individual or organization. This enables the model to distinguish between internal constraints of PBC such as perceived barriers to behaviour (PBC-SE) from external constraints of PBC (PBC-SF) such situational factors and social participation (PSN). In both the SEA model, this construct is represented by perception of need for SEA enablers (ENB) in terms of the need for legislation, public participation and capacity building for SEA. Initially, this construct also included ‘political will’ but was removed due to low factor loadings.

Sub-Driver A : Environmental Awareness (AWA)

The SEA model hypothesizes that the level of environmental awareness of policy (AWA) has an effect on behaviour intention. This concept has been demonstrated in research where environmental awareness effects positively on environmental behaviour where environmental awareness increases recycling (Ramayah et al., 2012). Nevertheless, other findings have also indicated that environmental awareness has had no significant effect on environmental behaviour (Grob, 1995).

In both the SEA models, environmental awareness (AWA) is represented by the level of knowledge on existing environmental policies and principles.

Sub-Driver B : Existing Environmental Attitude (EET)

The SEA model hypothesizes that attitude on the existing environmental condition has an effect on behaviour intention. This concept is based on research that has postulated that recognition of environmental situation effects environmental behaviour. Findings indicate that recognition of existing environmental problems is strongly correlated with environmental behaviour (Grob, 1995). Findings also indicate that general environmental attitudes are antecedents of specific environmental attitudes towards environmental behaviour as well as general environmental attitudes are an important influence in waste prevention behaviour. In both the SEA models, existing environmental attitude (EET) is represented by perception on the quality of the existing environmental and solid waste planning systems.

SEA Integration Behaviour (SEA)

The SEA model hypothesizes that SEA integration behaviour will increase when the main drivers of perception of benefit increases while perception of barrier decreases with the perception on the need of enablers functioning as an interacting effect from the sub-drivers of Environmental Awareness and Environmental Attitude. In the SEA stakeholder model, SEA behaviour intention is represented by SEA integration behaviour (SEA) defined as the potential of policy actors integrating SEA in policy planning such as SWM policy, SWM legislation, cross-sectoral planning and National Development Plans while in the SEA public model, it is represented by SEA implementation in SWM.

4.2.3 Hypotheses

Thus, the SBM proposed the following hypothesis:-

H1a. Existing environmental attitude (EET) has a direct and positive effect on SEA Integration Behaviour (SEA).

H1b. Existing environmental attitude (EET) has a direct and positive effect on Perceived Environmental Benefits (BEN).

H1c. Existing environmental attitude (EET) has a direct and negative effect on Perceived Need for External Enablers (ENB).

H2a. Environmental Awareness (AWA) has a direct and positive effect on SEA Integration Behaviour (SEA).

H2b. Environmental Awareness (AWA) has a direct and positive effect on Perceived Environmental Benefits (BEN).

H2c. Environmental Awareness (AWA) has a direct and positive effect on Perceived Need for External Enablers (ENB).

H3a. Perceived Environmental Benefits (BEN) has a direct and positive effect on SEA Integration Behaviour (SEA).

H3b. Perceived Environmental Benefits (BEN) has a direct and positive effect on Perceived Need for External Enablers (ENB).

H4a. Perceived Internal Barriers (BAR) has a direct and negative effect on SEA Integration Behaviour (SEA).

H4b. Perceived Internal Barriers (BAR) has a direct and negative effect on Perceived Need for External Enablers (ENB).

H5. Perceived Need for External Enablers (ENB) has a direct and positive effect on SEA Integration Behaviour (SEA).

4.3 Results & Discussion

4.3.1 SEA Stakeholder Survey

1. <u>SEA Stakeholder Respondent Profile</u>

The stakeholder's respondents' gender ratio consisted of 47% male and 53% female while the age ratio consisted of 74% for below 40 years and 26% for 40 years and above. The group ratio consisted of 49% from the solid waste management sector and 51% from the environmental planning and management sector. A majority of the respondents had environmental (84%) and/or 3R related experience (91%).

2. <u>SEA Stakeholder Policy Awareness</u>

The overall SEA stakeholder policy awareness level and chi-square statistical analysis is provided below (Figure 4.1 & Table 4.3).

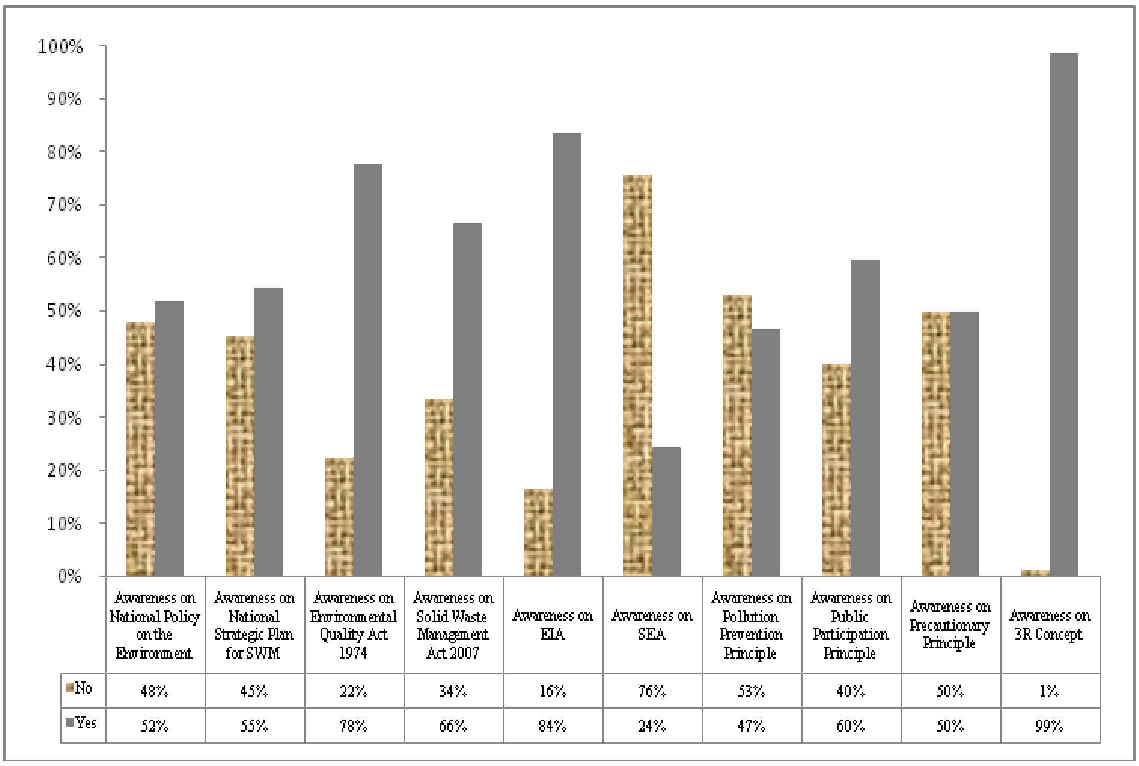


Figure 4.1 : Overall SEA Stakeholder Policy Awareness

Table 4.3 : SEA Stakeholder Policy Awareness Chi-Square Statistics

Policy	**Awareness Level**	**Chi-Square at 95% confidence level**	**Statistical Significance**
National Policy on the Environment (NPE).	Moderate/High	χ^2=0.237;p=0.626	Not significant
National Strategic Plan (NSP).	Moderate/High	χ^2=1.289; p=0.256	Not significant
Environmental Quality Act (EQA).	Moderate/High	χ^2=46.421; p=0.000	Significant
Solid Waste and Public Cleansing Management Act.	Moderate/High	χ^2=16.447; p=0.000	Significant
Environmental Impact Assessment (EIA).	Moderate/High	χ^2=68.447; p=0.000	Significant
Strategic Environmental Assessment (SEA).	No/Low	χ^2=40.026; p=0.000	Significant
Pollution Prevention Principle.	No/Low	χ^2=0.658; p=0.417	Not significant
Public Participation Principle.	Moderate/High	χ^2=5.921; p=0.015	Significant
Precautionary Principle.	Balanced	χ^2=0.000; p=1.000	Not significant
Reduce, Reuse & Recycle (3R) concept.	Moderate/High	χ^2=144.105; p=0.000	Significant

The findings of the SEA stakeholder policy analysis indicates that stakeholders' awareness on environmental and solid waste policies are high and statistically significant except for the National Policy on the Environment, National Strategic Plan, Pollution Prevention Principle and Precautionary Principle. Furthermore, stakeholder policy awareness is not statistically significant by age, gender and sector groups except for the Public Participation Principle between age groups as well as the NSP, SWMA between sector groups. The findings of the stakeholder awareness indicate low levels of awareness on two key policies related to environmental and solid waste management namely the NPE and the NSP. This is surprising as the typical assumption is that stakeholders consisting of policy makers and implementers are expected to have a higher level of policy awareness including cross-sectoral policy knowledge.

One possible explanation of this phenomena is that policy makers are working in isolation with limited cross-sectoral interaction resulting in a kind of apathy of policies not within their purview (Bonifazi et al., 2011; Partidário, 1996). This findings further emphasize the necessity of SEA in policy planning for Malaysia since some authors have theorized that SEA not only increases formal cross-sectoral communication but also enables alternative lines of informal communication with its stakeholder engagement process (Hansen et al., 2013). Another interesting finding is the statistically significant higher levels of awareness on public participation. Public participation is an important element of an effective SEA though it is also one of the major weaknesses of SEA implementation in Asia (Dusik & Xie, 2009). These findings suggest a positive development for SEA in Malaysia where stakeholders have begun to develop public participation awareness potentially due to the existing landuse planning and EIA public dialogues. Furthermore, the new requirement by the government on public participation in new legislation may have also provided them with a framework to operationalize this awareness (Government of Malaysia, 2012a). Finally, policy awareness on SEA is relatively and significantly lower than EIA including those involved in the environmental sectors such as the DOE and DTCP. Policy awareness on key environmental principles such as the pollution prevention principle and precautionary principles are statistically not significant. This corroborates previous findings that there has been limited emphasis on SEA or its principles in the Malaysian environmental management scenario (Briffett et al., 2003). Nevertheless, this may also present considerable opportunities to increase policy awareness and capacity building on the benefits and application of SEA among policy stakeholders. Finally, policy awareness for 3R concepts was significantly high at 99%. Generally awareness on 3R concepts is expected to be higher than other concepts such as the precautionary principle due to the intense recycling awareness campaigns in Malaysia.

3. <u>SEA Stakeholder Perception</u>

The overall SEA perception level and chi-square statistical analysis is provided below (Figure 4.2, Figure 4.3 & Table 4.4).

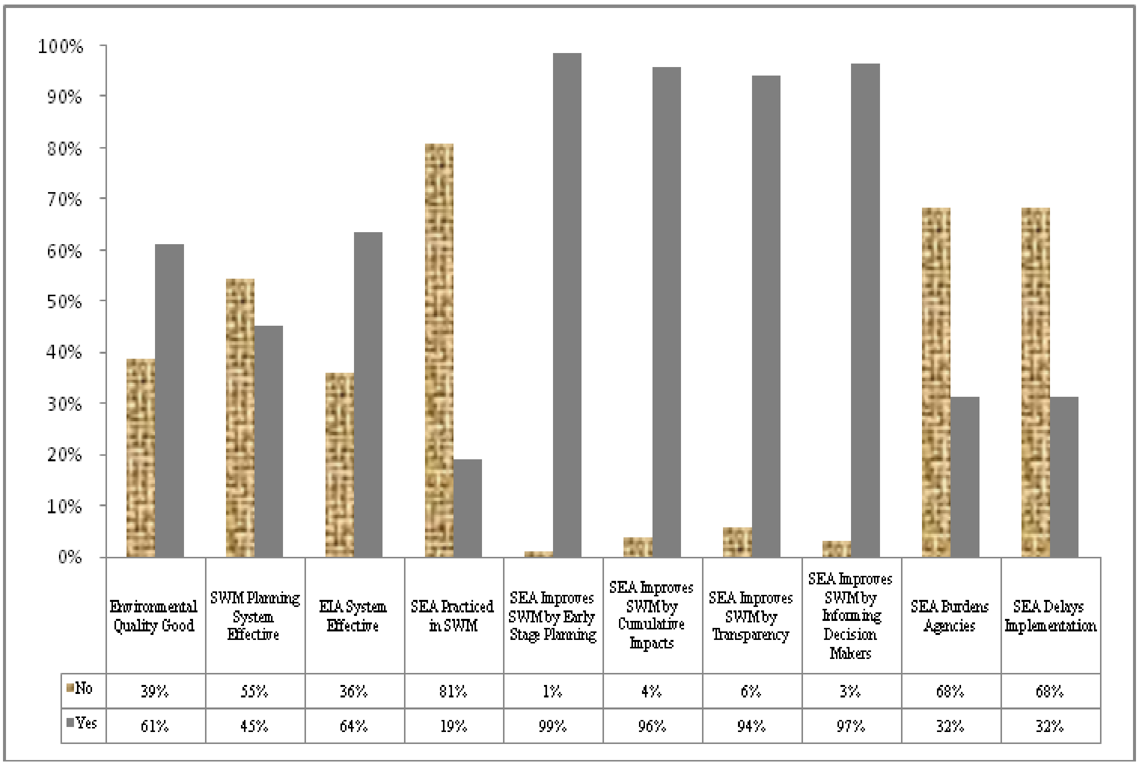


Figure 4.2 : Overall SEA Stakeholder Perception 1

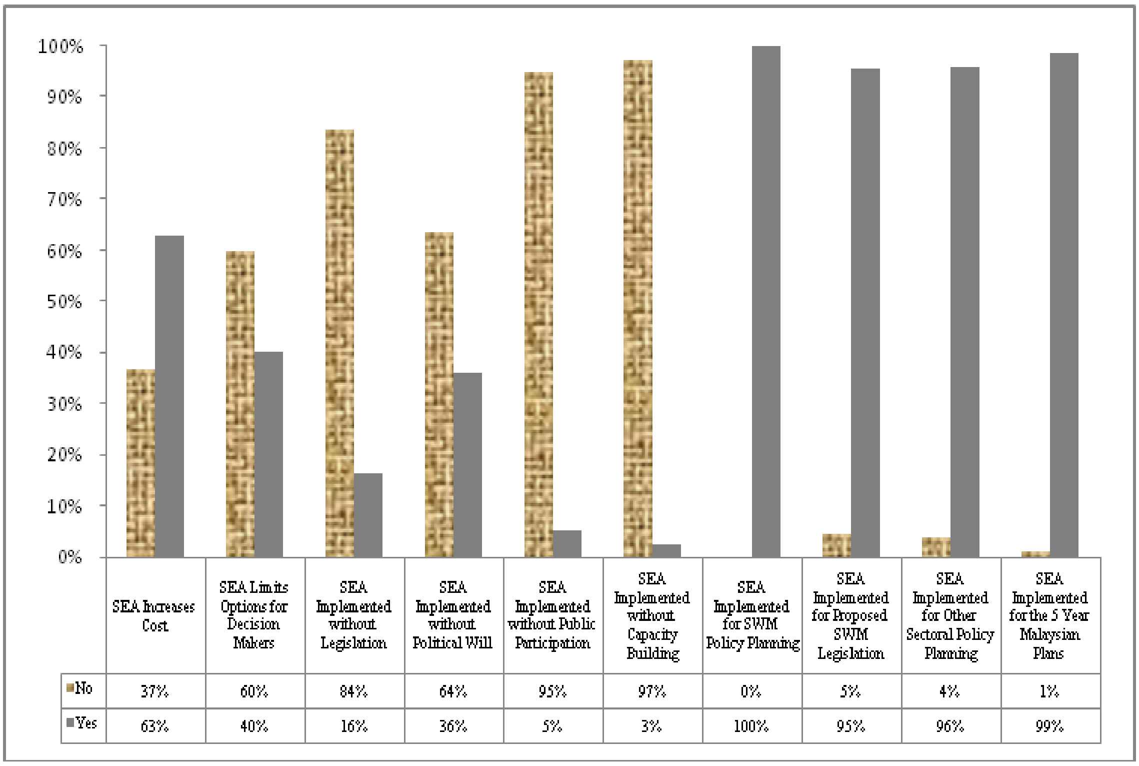


Figure 4.3 : Overall SEA Stakeholder Perception 2

Table 4.4 : SEA Stakeholder Perception Chi-Square Statistics

SEA Perception	Perception Level	Chi-Square at 95% confidence level	Statistical Significance
Existing environmental quality is good.	Agree	χ^2=7.605; p=0.006	Significant
Existing SWM system is effective.	Disagree	χ^2=1.289; p=0.256	Not significant
EIA system for SWM is effective.	Agree	χ^2=11.605; p=0.001	Significant
SEA is currently practiced in SWM.	Disagree	χ^2=58.132; p=0.000	Significant
SEA can improve SWM by early stage planning.	Agree	χ^2=144.105; p=0.000	Significant
SEA can improve SWM by addressing cumulative impacts.	Agree	χ^2=128.947; p=0.000	Significant
SEA can improve SWM by increasing transparency.	Agree	χ^2=118.132; p=0.000	Significant
SEA can improve SWM by improving decision makers understanding.	Agree	χ^2=132.658; p=0.000	Significant
SEA would burden planning agencies.	Disagree	χ^2=20.632; p=0.000	Significant
SEA would delay project implementation.	Disagree	χ^2=20.632; p=0.000	Significant
SEA would increase project cost.	Agree	χ^2=10.526; p=0.001	Significant
SEA would limit options for decision makers.	Disagree	χ^2=5.921; p=0.015	Significant
SEA can be implemented without a SEA legislation.	Disagree	χ^2=68.447; p=0.000	Significant
SEA can be implemented without political will.	Disagree	χ^2=11.605; p=0.001	Significant
SEA can be implemented without public participation.	Disagree	χ^2=121.684; p=0.000	Significant
SEA can be implemented without capacity building.	Disagree	χ^2=136.421; p=0.000	Significant
SEA should be implemented for solid waste policy planning.	100% Agree	*	*
SEA should be implemented for solid waste legislation.	Agree	χ^2=125.289; p=0.000	Significant
SEA should be implemented for other sectoral policy planning.	Agree	χ^2=128.947; p=0.000	Significant
SEA should be implemented for National Development Plans.	Agree	χ^2=144.105; p=0.000	Significant

* Chi-square statistics was not conducted as results indicate a 100% agreement.

The findings of the SEA stakeholder survey indicates that stakeholders perceive SEA Benefits as a positive development and agree it should be integrated for policy planning of SWM in Malaysia. Furthermore, stakeholders perceive the benefits of SEA outweighs the barriers of SEA though they do perceive that SEA will increase the cost of policy planning. Nevertheless, stakeholders also indicate that SEA cannot be implemented in Malaysia without enablers such as legislation, political will, public participation or capacity building. Most studies on SEA implementation have focused on aspects of legislation, institutional aspects and methodological aspects (Gachechiladze-Bozhesku & Fischer, 2012a; Rachid & El Fadel, 2013). One limitation of this approach is that potential barriers and enablers to SEA tend to be overlooked from the perspective of policy makers who will be responsible to implement SEA. Consequently, the findings of the SEA stakeholders indicate that cost is the biggest barrier to SEA implementation in Malaysia. Furthermore, policy makers value enablers such as public participation and capacity building more than enablers such as legislation and political will. This findings is unexpected for a typical top-down policy planning country like Malaysia where aspects of legislation and political will are traditionally considered more important for SEA implementation (Wirutskulshai et al., 2011; Wood, 2003). A possible explanation of this scenario may be that stakeholders have been increasingly influenced from their exposure to public participation in Malaysian landuse plans and detailed EIA studies (Dola & Mijan, 2012; Ramli et al., 2012). One unanticipated findings was the overwhelming 100% support for SEA implementation in SWM policy planning. Furthermore, stakeholders also strongly support the implementation of SEA in other sectoral and national policy planning in Malaysia. This findings suggest that policy makers and stakeholder attitude on the environment is increasingly proactive rather than reactive (Indramalar, 2010).

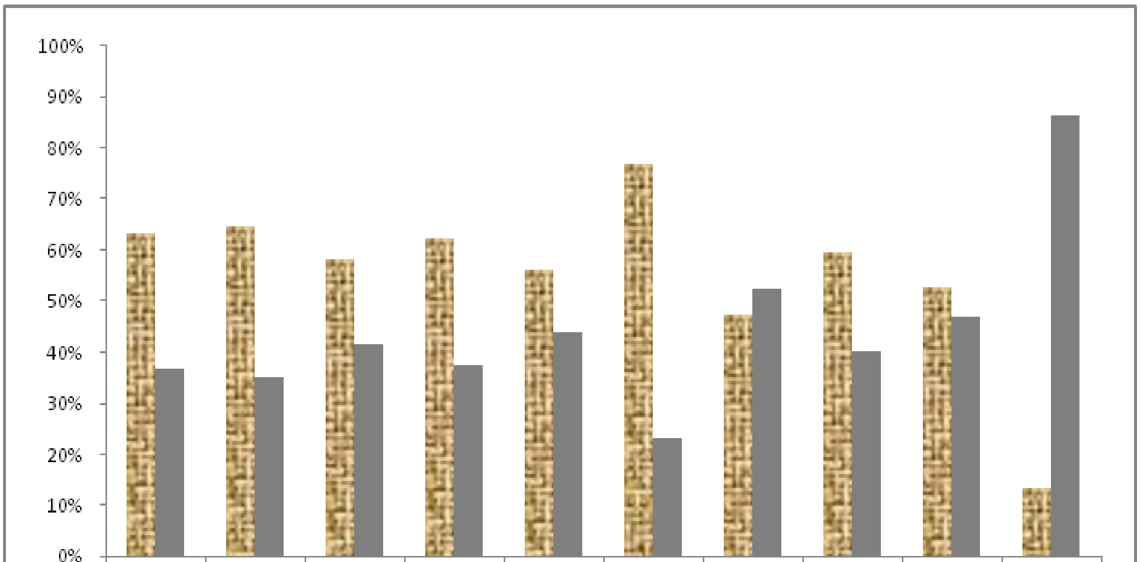
4.3.2 SEA Public Survey

1. Respondent Profile

The public respondent's gender ratio consisted of 50% male and 50% female while the age ratio consisted of 69% below 40 years and 31% 40 years and above. The group ratio consisted of 38% from the government sector and 62% from the private sector. A majority of the respondents had environmental (96%) and/or 3R related experience (87%).

2. SEA Policy Awareness

The overall SEA public policy awareness level and chi-square statistical analysis is provided below (Figure 4.4) & (Table 4.5).



	National Policy on the Environment (2002)	National Strategic Plan for Solid Waste Management (2005)	Environmental Quality Act (1974)	Solid Waste and Public Cleansing Management Act 2007	Environmental Impact Assessment (EIA)	Strategic Environmental Assessment (SEA)	Pollution Prevention Principle	Public Participation Principle	Precautionary Principle	Reduce, Reuse & Recycle Concept (3R)
No	63%	65%	58%	62%	56%	77%	47%	60%	53%	14%
Yes	37%	35%	42%	38%	44%	23%	53%	40%	47%	86%

Figure 4.4 : Public Policy Awareness

Table 4.5 : SEA Public Policy Awareness Chi-Square Statistics

Policy	**Awareness Level**	**Chi-Square at 95% confidence level**	**Statistical Significance**
National Policy on the Environment (NPE).	No/Low	χ^2=105.603; p=0.000	Significant
National Strategic Plan (NSP).	No/Low	χ^2=132.611; p=0.000	Significant
Environmental Quality Act (EQA).	No/Low	χ^2=794.976; p=0.000	Significant
Solid Waste and Public Cleansing Management Act.	No/Low	χ^2=93.251; p=0.000	Significant
Environmental Impact Assessment (EIA).	No/Low	χ^2=22.083; p=0.000	Significant
Strategic Environmental Assessment (SEA).	No/Low	χ^2=430.944; p=0.000	Significant
Pollution Prevention Principle.	Moderate/High	χ^2=4.267; p=0.039	Significant
Public Participation Principle.	No/Low	χ^2=55.843; p=0.000	Significant
Precautionary Principle.	No/Low	χ^2=4.931; p=0.026	Significant
Reduce, Reuse & Recycle (3R) concept.	Moderate/High	χ^2=794.976; p=0.000	Significant

The findings of the SEA public policy analysis indicates that public awareness on environmental and solid waste policies are low and statistically significant except for the Pollution Prevention Principle and 3R Concept. Furthermore, public policy awareness is not statistically significant by age group except for the National Policy on the Environment. However, it is statistically significant between gender and sector groups except for Pollution Prevention Principle and 3R concept in gender and National Strategic Plan, Environmental Impact Assessment and 3R Concept in sector groups. These findings are rather disappointing as it indicates that Malaysian public awareness on environmental and solid waste policies are significantly low. However, the results are not unexpected as the level of public participation in Malaysia has been low even in conventional public participation forums such as landuse plans (Dola & Mijan, 2012). Unfortunately, this trend is also consistent with developing countries in Asia who are on the pathway to SEA (Briffett et al., 2003; Dusik & Xie, 2009).

A more troubling observation is the relatively low levels of awareness on EIA, which has been in practice in the Malaysian scenario for almost four decades. This finding is significant due to two aspects. Firstly, this study was conducted in the context of 1500 public respondents across all the major cities in Malaysia. Thus, its findings is representative of the general population in Malaysia. Secondly, EIA has been touted as the key framework for public engagement in Malaysia. Nevertheless, if the public is relatively unaware of EIA than it indicates a systemic breakdown in the policy planning system. Consequently, this may indicate that while the government in theory may have provided the policy framework for project based environmental management, in practice it has failed to trickle down to the public in awareness. Furthermore, this findings is confirmed by the government's own admission that its environmental agencies has not been spending enough time and resources on raising public awareness on environmental issues (The Star, 2007). Finally, while policy awareness for the SWMA was low, nevertheless policy awareness for 3R concepts was significantly high at 86%. This was expected based on the government intense recycling awareness campaign conducted nationwide though the scope of the awareness may be limited to 3R concepts as opposed to SWM planning. The government has estimated that it spent approximately 2.7 million USD for the period of 2006-2008 on recycling awareness campaigns (Lee et al., 2010). Nevertheless, one major criticism of the government's recycling campaigns is that the high levels of awareness may not translate into recycling practices on the ground as the existing rate of recycling is assumed to be less than 5% (Lai, 2012; The Star, 2010). Another criticism is whether the money spent on recycling campaigns are being utilized efficiently in view of the existing high levels of 3R awareness. Thus, the key question that needs to be addressed is not whether resources should be spent on recycling campaign but how can it be utilized more strategically and efficiently.

3. SEA Public Perception

The overall SEA perception level and chi-square statistical analysis is provided below (Figure 4.5) & (Table 4.6).

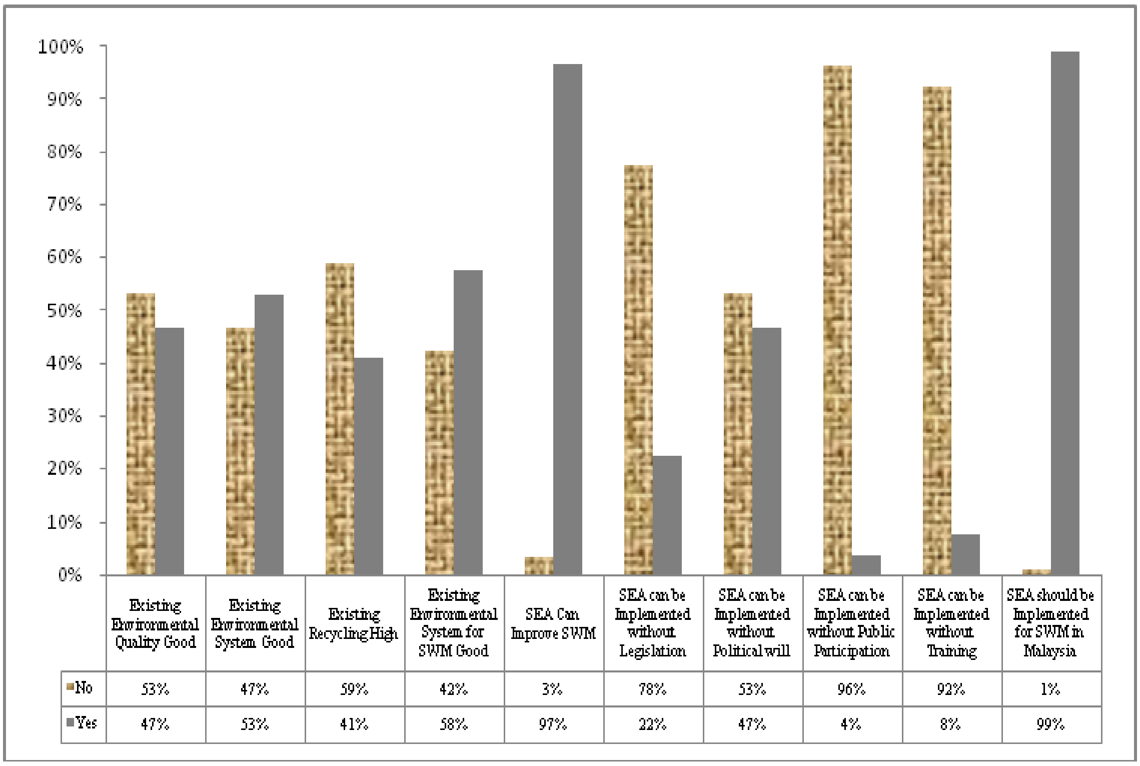


Figure 4.5 : Overall SEA Public Perception

Table 4.6 : SEA Public Perception Chi-Square Statistics

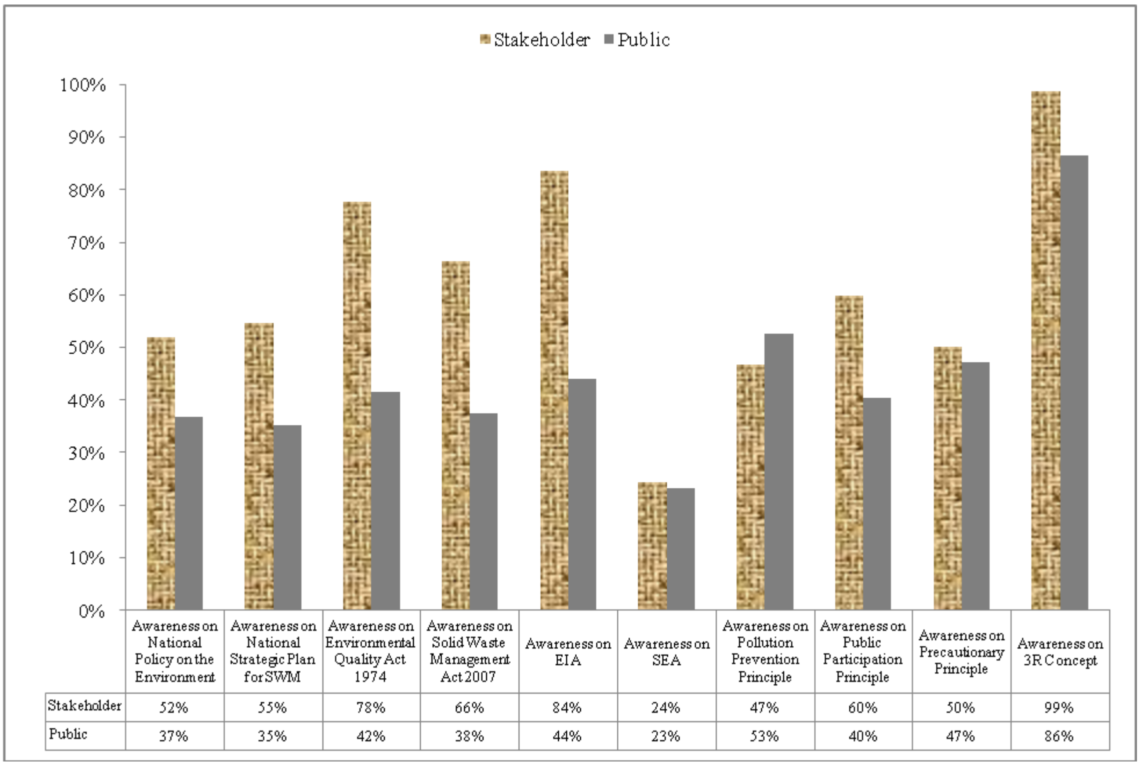
SEA Perception	Perception Level	Chi-Square at 95% confidence level	Statistical Significance
Existing environmental quality is good.	Disagree	χ^2=6.403; p=0.11	Not significant
Existing environmental protection system is good.	Agree	χ^2=5.891; p=0.15	Not significant
Existing solid waste recycling rate is high.	Disagree	χ^2=47.171; p=0.000	Significant
Existing SWM environmental protection is good.	Disagree	χ^2=35.267; p=0.000	Significant
SEA can improve SWM in Malaysia.	Agree	χ^2=1306.66; p=0.000	Significant
SEA can be implemented without SEA legislation.	Disagree	χ^2=454.851; p=0.000	Significant
SEA can be implemented without political will.	Disagree	χ^2=6.936; p=0.000	Significant
SEA can be implemented without public participation.	Disagree	χ^2=1291.77; p=0.000	Significant
SEA can be implemented without training.	Disagree	χ^2=1075.26; p=0.000	Significant
SEA should be implemented for SWM in Malaysia.	Agree	χ^2=1444.52; p=0.000	Significant

The findings of the SEA public policy analysis indicate that the public perceives that the existing environmental protection for SWM and the existing recycling is poor. Furthermore, they perceive SEA Benefits as a positive development and agree it should be integrated for policy planning of SWM in Malaysia. The findings on the support for SEA among the public is extremely encouraging with a 99% of the respondents in support of implementing SEA in Malaysia. Nevertheless, the public also indicate that SEA cannot be implemented in Malaysia without enablers such as legislation, political will, public participation or training. Internationally, public perception and engagement of SEA and its potential integration is an important factor for the success or failure of SEA implementation (Gauthier et al., 2011; Rajvanshi, 2003). Malaysia is also observing a similar public interest in environmental issues where the public is increasingly demanding to be involved and consulted on environmental management (Chan, 2013). Therefore, the findings suggest that SEA implementation in Malaysia would require a paradigm shift from the current top-down approach to a more bottoms-up approach that is inclusive of public participation. In contrast, there is also a perception by the NGO in Malaysia that while the Malaysian public may feel strongly about environmental issues, this does not necessarily translate into pragmatic practice such as proper disposal of waste or recycling. Thus there seems to be a disconnect between the public's desire for environmental protection and their willingness to practice it (The Star, 2013b). One possible explanation may be due to a lack of supporting infrastructure to enable proactive environmental behaviour. This is supported by recycling research that perceived behaviour controls such as the lack of infrastructure and opportunities are as a significant barrier to pro-environmental behaviour (Mahmud & Osman, 2010). Other research however, indicate that this may be more of a cultural attitude based on social norms which is based on what people perceive as acceptable behaviour (Ramayah et al., 2012).

4.3.3 Comparative SEA Policy Awareness

A comparative analysis of both SEA stakeholder and public awareness survey indicates that stakeholders have higher levels of policy awareness than the public except for the public participation principle (Figure 4.6). This was expected since stakeholder would be more exposed to policy related affairs than the public; hence, they would be more familiar with environmental and solid waste policies. The public on the other hand would be more exposed to public participation initiatives and hence their familiarity with the public participation principle. Interestingly, the highest level of policy awareness for both stakeholder and the public was on the 3R concept while the lowest level of policy awareness was on SEA. This suggests environmental awareness in environmental policy planning is relatively lower than recycling awareness which is consistent with Asian countries where public participation is a significant challenge (Agamuthu & Dennis, 2013). Nevertheless, the exceptionally low level of awareness on SEA implies that considerable capacity building and awareness would be required to promote SEA in Malaysia particularly for solid waste management policy planning. One of the most critical differences in policy awareness was on EIA with an awareness level of 84% for stakeholders but only 44% for the public. This is both consistent with the level of exposure of each group as well as troubling since these have a significant impact on the public in terms of environmental protection and solid waste management. The low level of public awareness on these key policies signify that these policies were formulated and implemented in a top-down manner with minimal public participation or public awareness initiatives. This is further emphasizes the systemic policy formulation dilemma which have been previously criticized for being highly bureaucratic, lacking public participation with minimal cross-sectoral horizontal environmental policy integration (Hezri & Nordin Hasan, 2006).

These findings highlight the observation that there is a significant gap in policy awareness between policy stakeholders and the public, which is a noteworthy shortcoming for SEA implementation in Malaysia. This is because SEA by very nature is a consultative and participative policy planning process and relies on policy awareness to drive collective decision making (Hayashi et al., 2011). This is compounded by the fact that the policy awareness level on SEA and existing public participation are both low (Dola & Mijan, 2012). This would than imply that any SEA implementation initiatives in Malaysia would need to tackle these fundamental awareness issues before embarking on an extensive SEA campaign. These findings also suggest that SEA implementation in Malaysia would require both a structural approach that addresses technical issues as well as non-structural approach that addresses behavioural issues for a holistic SEA model for Malaysia (Dennis & Agamuthu, 2013).



	Awareness on National Policy on the Environment	Awareness on National Strategic Plan for SWM	Awareness on Environmental Quality Act 1974	Awareness on Solid Waste Management Act 2007	Awareness on EIA	Awareness on SEA	Awareness on Pollution Prevention Principle	Awareness on Public Participation Principle	Awareness on Precautionary Principle	Awareness on 3R Concept
Stakeholder	52%	55%	78%	66%	84%	24%	47%	60%	50%	99%
Public	37%	35%	42%	38%	44%	23%	53%	40%	47%	86%

Figure 4.6 : Comparative Policy Awareness of Stakeholders and Public

4.3.4 SEA Structural Equation Modelling (SEM)

1. SEA Stakeholder Model

The SEA stakeholder model demonstrated adequate composite reliability, convergent validity and discriminant validity (Table 4.7&Table 4.8) (Hair et al., 2012; Gefen et al, 2011; Ringle et al., 2012). The R^2 value for the relationship between the independent variables and the SEA integration behaviour was 0.27, which indicates that 27% of the variance in SEA integration behaviour can be explained by the independent variables (Figure 4.7). The structural model's standardized path coefficients using bootstrapping indicate the overall influence of each construct on the model which reveal that seven of the eleven proposed relationship are statistically significant (Hypothesis Significant - H1c,H2c H3a, H3b, H4a, H4b, & H5). The SEA stakeholder model indicates that all three of the main drivers of perception of SEA Benefits, perception of SEA Barriers and SEA Enablers were significant direct predictors of the potential of SEA Behaviour intention of integration in SWM policy planning. SEA Barriers (-0.28) was the highest predictor of SEA Behaviour followed by SEA Benefits (0.27) and SEA Enablers (0.25) respectively. Interestingly, the SEA stakeholder model indicates that the two sub-drivers of Environmental Attitude and Environmental Awareness were not significant direct predictors of SEA Behaviour or SEA Benefits but were only indirect predictors of SEA Behaviour via SEA Enablers. The findings of the SEA stakeholder model further expands the field of behaviour modelling in waste management as most of these studies were only focused on public behaviour on waste prevention and recycling as opposed to SEA and waste management by policy makers and implementers (Bortoleto et al., 2012; Tonglet et al., 2004).

Table 4.7 : SEA Stakeholder Model

SEA Constructs	AVE	Composite Reliability	Cronbach's Alpha
Environmental Attitude	0.589	0.811	0.652
Existing Environmental Quality			
Existing Solid Waste Planning			
Existing EIA System for Solid Waste Planning			
Environmental Awareness	0.541	0.875	0.838
National Policy on the Environment			
Environmental Quality Act			
Environmental Impact Assessment			
Pollution Prevention Principle			
Public Participation Principle			
Precautionary Principle			
SEA Benefits	0.675	0.893	0.839
Early Planning			
Addressing Cumulative Impacts			
Increased Transparency			
Informing Decision Makers			
SEA Barriers	0.558	0.833	0.732
Burden Agencies			
Increased Cost			
Delay Implementation			
Limit Options			
SEA Enablers	0.523	0.752	0.562
Need Legislation			
Need Public Participation			
Need Capacity Building			
SEA Behaviour	0.581	0.847	0.760
SEA in SWM Policies			
SEA in SWM Legislation			
SEA in Cross-Sectoral Plans			
SEA in National Development Plans			

Table 4.8 : SEA Stakeholder Model Discriminant Validity

	Attitude	Awareness	Barrier	Benefit	Enabler	SEA
Attitude	0.768					
Awareness	0.072	0.736				
Barrier	-0.101	-0.043	0.747			
Benefit	0.227	0.137	-0.080	0.822		
Enabler	-0.170	0.231	-0.179	0.247	0.723	
SEA	0.038	0.022	-0.345	0.338	0.344	0.762

Diagonal elements are the square root of average variance extracted (AVE) while the off-diagonal elements are correlations between constructs.

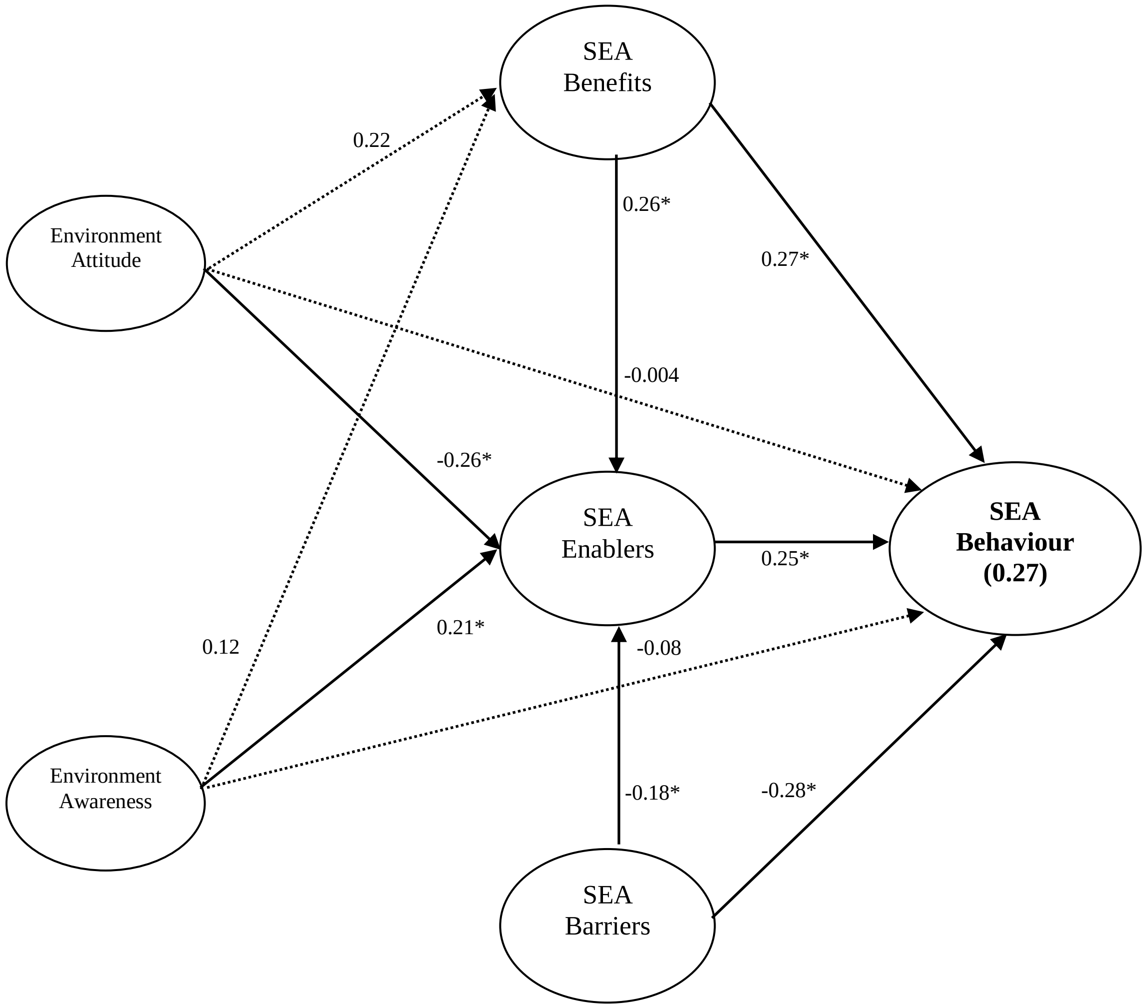


Figure 4.7 : SEA Stakeholder Model (*p<0.05)

Generally, the SEA stakeholder model indicates that the construct driver termed SEA Barriers is the most significant predictor of SEA Behaviour by SWM stakeholders in policy planning followed by SEA Benefits and SEA Enablers. Interestingly, SEA Enablers seems to influence both the main drivers of SEA Benefits and SEA Barriers as well as sub-drivers of Environmental Attitude and Environmental Awareness. Nevertheless, the SEA stakeholder model also predicts that both sub-drivers of Environmental Attitude and Environmental Awareness are not significant predictors of both SEA Benefits and SEA Behaviour.

The SEA stakeholder model's findings predicting the relationship between SEA Benefits and SEA Behaviour is consistent with the general TPB model (Ajzen, 1991; Tang et al., 2010; Wan, 2012). Meanwhile, the findings predicting the relationship between SEA Barriers and SEA Behaviour is ambiguous as previous studies are not consistent with predicting the relationship between barriers and behaviour (Bortoleto et al., 2012; Godfrey et al., 2012; Grob, 1995). The study postulates that this may be due to the difficulty in operationalizing the social norm and perceived behaviour control constructs which in the SEA stakeholder model it has been aggregated as a single construct and termed as SEA Barriers. Furthermore, the SEA stakeholder model findings on the non-significance of a direct relationship between Environmental Attitude and Environmental Awareness on SEA Behaviour is atypical of other studies on environmental behaviour which suggest that the highest predictor of behaviour is either environmental attitude or environmental awareness towards behaviour (Ramayah et al., 2012; Godfrey et al., 2012). Finally, the SEA stakeholder model has also included perception of external constraints as a distinct construct termed SEA Enablers. This enables the model to distinguish between internal constraints which are within the ability of the individual/organization to influence and external constraints outside of the individual/organization sphere of influence but is perceived necessary for the successful integration of the environmental behaviour. In the SEA stakeholder model, this external enabler includes legislation, public participation and capacity building of policy actors/stakeholders for SEA Behaviour in SWM policy planning. One unanticipated findings was the non-significant loading of the need for the 'political will' factor in the SEA Enabler construct which was subsequently removed though previous research have postulated 'political will' as a significant factor in environmental management (Wood, 2003).

2. <u>SEA Public Model</u>

The SEA public model demonstrated adequate composite reliability, convergent validity and discriminant validity (Table 4.9 & Table 4.10). The R^2 value for the relationship between the independent variables and the SEA integration behaviour was 0.23, which indicates that 23% of the variance in SEA integration behaviour can be explained by the independent variables (Figure 4.8). The structural model's standardized path coefficients using bootstrapping indicate the overall influence of each construct on the model, which reveal that six of the eleven proposed relationship are statistically significant (Hypothesis Significant - H1a, H1b, H2b, H3a, H3b, & H5). The SEA public model indicates that only two of the main drivers of perception of SEA Benefits and SEA Enablers were significant direct predictors of the potential of SEA Behaviour intention of integration in SWM policy planning while SEA Barriers was not a significant predictor. SEA Benefits (0.34) was the highest predictor of SEA Behaviour followed by SEA Enablers (0.25). Interestingly, the SEA public model indicates that the sub-driver of Environmental Attitude was a significant predictor of SEA Behaviour, SEA Benefits and SEA Enablers though the relationship between Environmental Attitude and SEA Enablers was reversed in the positive direction. Meanwhile the sub-driver of Environmental Awareness was not a significant predictor of SEA Behaviour or SEA Enablers but only significant predictor of SEA Benefits. The findings of the SEA public model further expands the field of behaviour modelling in waste management especially as most of other studies in Malaysia were limited to smaller homogenous population such as universities and schools as opposed to a wide spectrum and representative population of Malaysia (Mahmud & Osman, 2010; Ramayah et al., 2012).

Table 4.9 : SEA Public Model

SEA Constructs	AVE	Composite Reliability	Cronbachs Alpha
Environmental Attitude	0.577	0.803	0.631
Existing Environmental Quality			
Existing Solid Waste Planning			
Existing EIA System for Solid Waste Planning			
Environmental Awareness	0.559	0.883	0.841
National Policy on the Environment			
Environmental Quality Act			
Environmental Impact Assessment			
Pollution Prevention Principle			
Public Participation Principle			
Precautionary Principle			
SEA Benefits	1.000	1.000	1.000
SEA Potentially Improves SWM			
SEA Barriers	1.000	1.000	1.000
Economic Development Should Be Prioritized over Environment			
SEA Enablers	0.531	0.770	0.565
Need Legislation			
Need Public Participation			
Need Capacity Building			
SEA Behaviour	1.000	1.000	1.000
SEA Should Be Implemented for SWM			

Table 4.10 : SEA Public Model Discriminant Validity

	Attitude	Awareness	Barrier	Benefit	Enabler	SEA
Attitude	0.760					
Awareness	0.168	0.748				
Barrier	0.094	-0.047	1.000			
Benefit	0.085	0.120	-0.071	1.000		
Enabler	-0.194	-0.022	-0.062	0.173	0.729	
SEA	-0.109	0.057	-0.078	0.382	0.331	1.000

Diagonal elements are the square root of average variance extracted (AVE) while the off-diagonal elements are correlations between constructs.

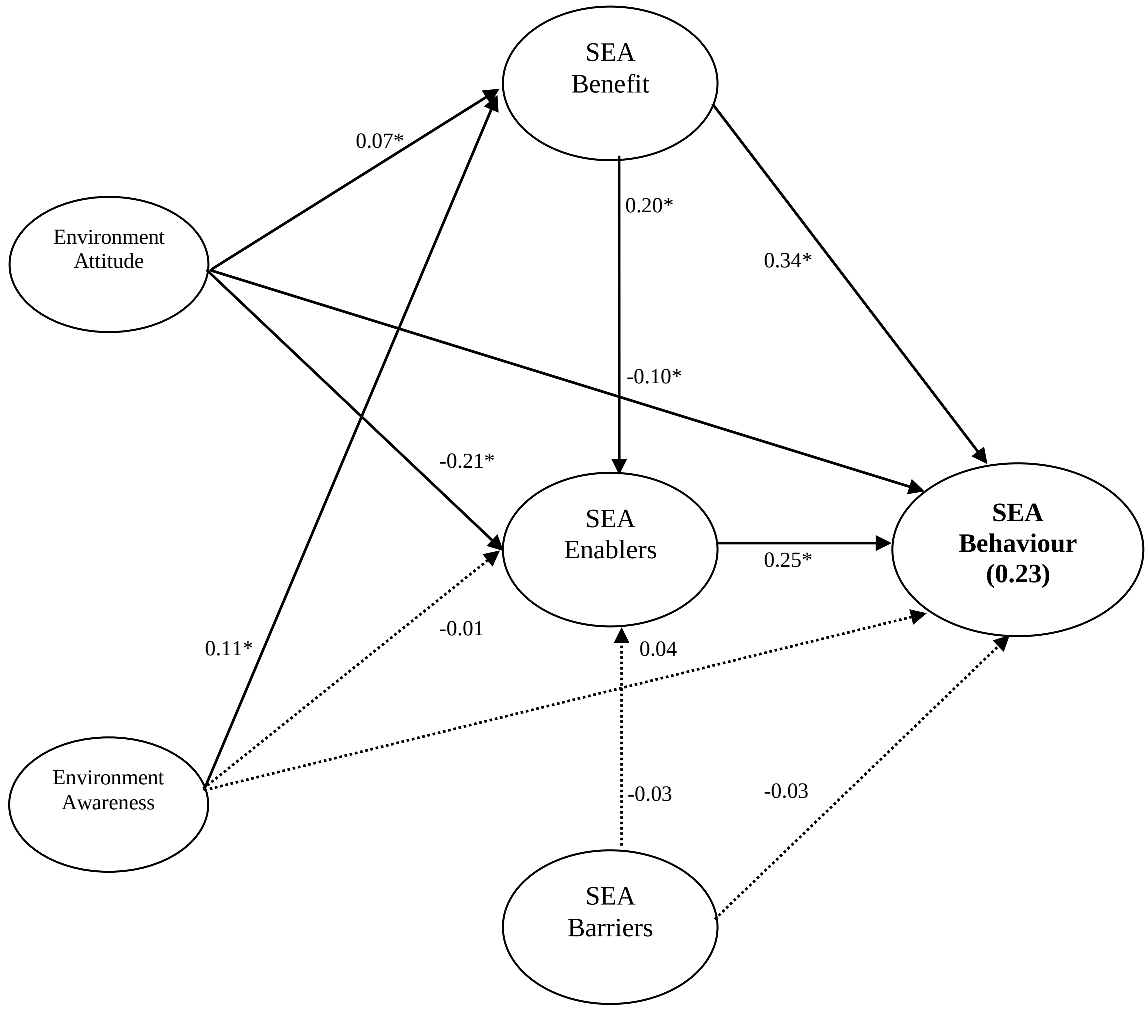


Figure 4.8 : SEA Public Model (*p<0.05)

Generally, the SEA public model indicates that the construct driver termed SEA Benefits is the most significant predictor of SEA Behaviour by SWM stakeholders in policy planning followed by SEA Enablers while the SEA Barriers is not a significant predictor of SEA Benefits. Interestingly, SEA Enablers seems to be only influenced by the driver of SEA Benefits and Environmental Attitude. Furthermore, the SEA public model also predicts that both drivers of Environmental Attitude and Environmental Awareness are significant predictors of SEA Benefits but only Environmental Attitude is a significant direct predictor of SEA Behaviour.

The SEA public model's findings predicting the relationship between SEA Benefits and SEA Barriers with SEA behaviour is consistent with the general TPB model and TPB waste models (Ajzen, 1991; Tang et al., 2010; Wan, 2012). Furthermore, the SEA public model findings on the non-significance of a direct relationship between Environmental Awareness on SEA integration behaviour is also atypical of other studies (Ramayah et al., 2012; Godfrey et al., 2012). Similar to the SEA stakeholder model the 'political will' factor in the 'SEA Enabler' construct was not significant and subsequently removed. Nevertheless, Environmental Attitude was a significant predictor of SEA Benefit and SEA Behaviour unlike the SEA stakeholder model. These findings indicate that while the SEA public model is similar to the SEA stakeholder model in its pathway for SEA Benefit and SEA Enabler it is dissimilar in its pathway for SEA Barriers and Environmental Attitude. This suggests that stakeholders such as policy makers perceive SEA Barriers as more important than their perception of the existing state of the environment. This is the reverse for the public where they perceive the existing state of the environment as more important than SEA Barriers such as cost or delays. This also corroborates other studies that indicate stakeholders such as decision makers and the public have different latent priorities in integrating environmental considerations (Bonifazi et al., 2011; Wang et al., 2013a). This is especially relevant in Malaysia where there is a growing perception that decision makers may be using the environment as a green agenda but latently pursing other priorities (Wong, 2013). The other significant finding is that Environmental Awareness while not a significant predictor of SEA Behaviour is a significant predictor of SEA Benefits which in turn is a significant predictor of SEA Behaviour. This indicates that resources spend on environmental awareness may have to be fine-tuned to emphasize environmental benefits rather than a generic approach of awareness building.

4.3.5 SEA Strategic Behavioral Models

A comparative analysis of the SEA stakeholder model and SEA public model is provided below (Table 4.11).

Table 4.11 : Comparative Analysis of SEA Models

No	**Hypothesis**	**SEA Stakeholder Model**	**SEA Public Model**
H1a	Environmental Attitude has a direct and positive effect on SEA Behaviour.	Not Supported	Supported
H1b	Environmental Attitude has a direct and positive effect on SEA Benefits.	Not Supported	Supported
H1c	Environmental Attitude has a direct and negative effect on SEA Enablers.	Supported	Not Supported
H2a	Environmental Awareness has a direct and positive effect on SEA Behaviour.	Not Supported	Not Supported
H2b	Environmental Awareness has a direct and positive effect on SEA Benefits.	Not Supported	Supported
H2c	Environmental Awareness has a direct and positive effect on SEA Enablers.	Supported	Not Supported
H3a	SEA Benefits has a direct and positive effect on SEA Behaviour.	Supported	Supported
H3b	SEA Benefits has a direct and positive effect on SEA Enablers.	Supported	Supported
H4a	SEA Barriers has a direct and negative effect on SEA Behaviour.	Supported	Not Supported
H4b	SEA Barriers has a direct and negative effect on SEA Enablers.	Supported	Not Supported
H5	SEA Enablers has a direct and positive effect on SEA Behaviour.	Supported	Supported

Both the SEA stakeholder model and the SEA public model support the hypothesis that SEA Benefits and SEA Enablers are direct predictors of SEA Behaviour as well as do not support the hypothesis that SEA Awareness is direct predictor of SEA Behaviour. The main difference between the SEA models is that the SEA Barrier is the highest predictor of SEA Behaviour in the SEA stakeholder model. In contrast, in the SEA public model, SEA Barriers is a non-significant predictor of SEA Behaviour where SEA Benefits is the highest predictor of SEA Behaviour. Other differences in the SEA models include effects of Environmental Attitude and Environmental Awareness. In the SEA stakeholder model, Environmental Attitude is not a direct predictors of SEA Behaviour while in the SEA public model, Environmental Attitude is a direct predictor of SEA Behaviour. Furthermore, in the SEA stakeholder model, Environmental Awareness is not a direct predictor of SEA Benefits while in the SEA public model, Environmental Awareness is a direct predictor of SEA Benefits. This indicates that while the SEA stakeholder and public models share similarities in the main drivers of SEA Benefits and SEA Enablers, they are also different in their interaction between the sub-drivers of Environmental Attitude and Environmental Awareness. These findings suggest that stakeholders such as policy makers and the public will require slightly different approaches in promoting and integrating SEA (Bonifazi et al., 2011). For SEA stakeholders, the optimal pathway to gain support for SEA requires mitigating perceived barriers such as time resources and cost while emphasizing benefits such as early planning and addressing cumulative impacts as well as providing enablers such as legislation, public participation and capacity building. In addition, emphasis on the existing state of the environment or promoting policy awareness may have limited effect on eliciting support for SEA behaviour. This veracity may be counter-intuitive to the existing perception that more environmental awareness is all that is required to solve environmental issues in Malaysia (Aliman, 2012).

In contrast, for the SEA public model, the optimal pathway to gain support for SEA requires promoting the benefits of SEA while providing enablers such as legislation, public participation and capacity building. Furthermore, the public may also require highlighting the potential deterioration of the environment while raising awareness on environmental policies and plans. One unanticipated finding between the SEA models was that SEA Barriers is not a significant predictor of SEA Behaviour in the SEA public model contrary to its role in the SEA stakeholder model. This difference in the SEA models theoretical norm indicates that the public place a higher priority on environmental considerations to the point that it is not statistically significant to function as a barrier to SEA integration. However, critics have also pointed out that there exist a discrepancy in the Malaysian public behaviour between showing concern and translating the concern to responsible environmental behaviour. Research has indicate that while the majority of Malaysian show concern for the environmental, only 25% of them are willing to pay more for environmentally friendly products (The Star, 2011). Nevertheless, this argument fails to take into context the fact in the case of SEA, the burden of implementation is on policy makers and not the public. Hence, SEA potential barriers such as increased cost, time or resources does not really engage the public's concern. This compounded with the findings that the publics' limited knowledge on environmental matters might explain their apathy for potential SEA Barriers (Aliman, 2012). The only potential barrier that might concern the public is the prioritization of economic concerns over environment. Nevertheless, even in this regard the findings indicate that the public in theory place a higher priority on environmental matters over economic concerns. One possible view is that the public may be detached from the national and economic development agenda, which may not concern them on their day-to-day activities. Others however, belief that Malaysian are evolving to a more mature and environmentally responsible citizens worldview (Gurmit, 2010).

Finally, another unexpected finding was the lack of significance for 'political will' in the SEA Enabler construct for both the SEA stakeholder and public model. Generally, countries with a top-down policy planning culture are expected to display significant levels of reliance on enablers such as 'political will' (Briffett et al., 2003; Pillay, 2013). This was also expected in the Malaysia scenario based on the numerous emphases on 'political will' in the media (Stanley, 2013). Nevertheless, the 'political will' factor failed to load significantly within both the SEA models indicating that while stakeholders and the public may perceive that it is required based on the current political climate, they also do not perceive it as an enabler similar with public participation and capacity building. This makes sense when viewed in the perspective that stakeholders and the public in countries with a top-down policy planning culture are in some aspects beholden to the whims of politicians who may not prioritize environmental concerns (Zhu & Ru, 2008). Some politicians are perceived as going as far as hijacking the environmental movement to pursue their political agenda (Wong, 2013). This in turn has resulted in NGOs in Malaysia demanding for politician and political parties to have a green agenda as part of their election manifesto (Chan, 2013). Others, however are sceptical of these initiatives with the failed experience of setting up green political parties in Malaysia and with the view that Malaysians only demand such action from politicians when an environmental crisis occurs (Gurmit, 2010). The non-significance of the 'political will' factor in the SEA Enabler construct in both the SEA models may actually corroborate the perception that this is more of a necessity rather than a need in the current top-down policy planning system in Malaysia. Consequently, in an optimal SEA policy planning framework, the need for political will is not required, as SEA initiatives are driven by the legislative framework coupled with a strong bottoms-up public participation system. Ironically, in such a SEA system the requirements become inversed where it is the 'people's will' which is the driver rather than 'political will'.

Finally, the SBM potential significance is that it provides an empirical based framework for SEA policy integration initiatives among both policy stakeholders and the public. Generally, both SBM suggests that the key drivers of environmental policy integration consists of perceived benefits, barriers and enablers are interrelated in a tripartite pathway interface influencing the policy stakeholders/public decision to support or reject the SEA policy integration in SWM. Furthermore, this tripartite driver interaction has a hierarchy of effect on the behaviour, which are different in the SEA stakeholder model and SEA public model. This infers that in the SEA stakeholder model, the potential for environmental policy integration may be the highest when the tripartite policy drivers are high in enabler and benefit but low in barrier. This conceptual hierarchy is illustrated in the Benefit, Barrier, Enabler (2BE) matrix (Figure 4.9) where the low enabler sector is shaded and the positive, neutral and negative symbols represents the hierarchy of potential environmental policy integration from high to low. However, in the SEA public model, the potential for environmental policy integration may be the highest when the tripartite policy drivers are high in benefit and enabler but negative in attitude. This conceptual hierarchy is illustrated in the Benefit, Enabler, Attitude (BEA) matrix (Figure 4.10) where the low enabler sector is shaded and the positive, neutral and negative symbols represents the hierarchy of potential environmental policy integration from high to low. Consequently, both the SBM surmises that SEA policy integration will also be highly dependent on the implementation of key enablers as policy actors perceive them as prerequisites for effective environmental policy integration within the policy planning framework. This findings reiterate that SEA is a highly complex process with deeply rooted systems that are political and sensitive to change even in countries with a mature environmental system (Hezri, 2004; Juntti et al., 2009).

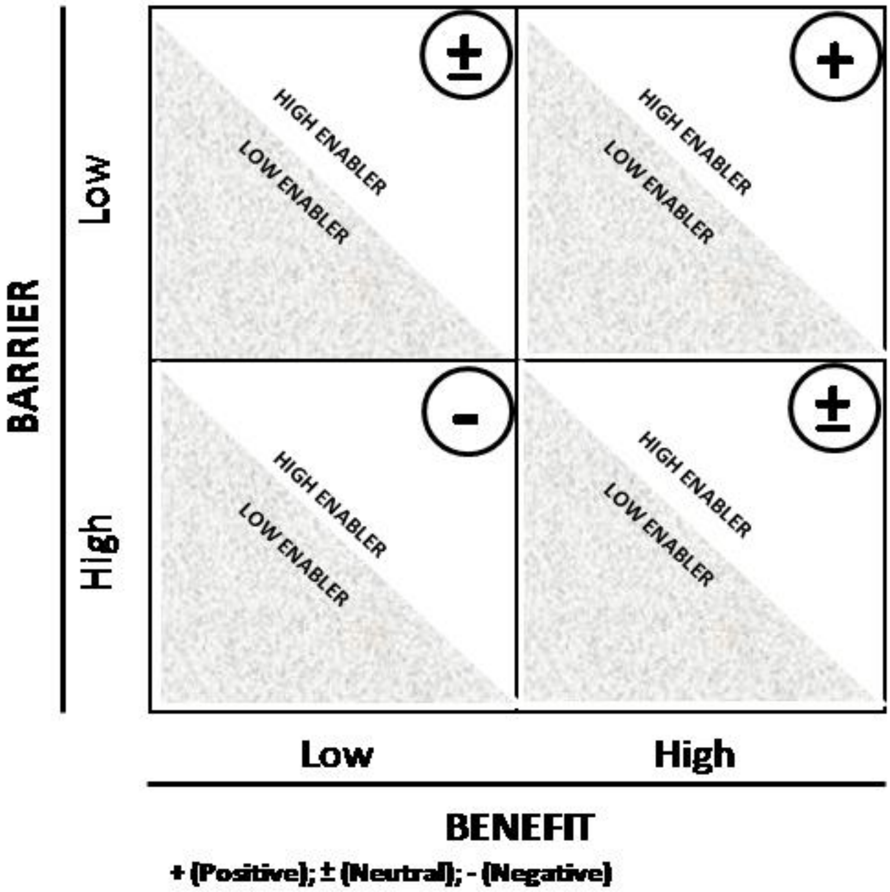


Figure 4.9 : SEA Stakeholder Model Benefit-Barrier-Enabler Matrix

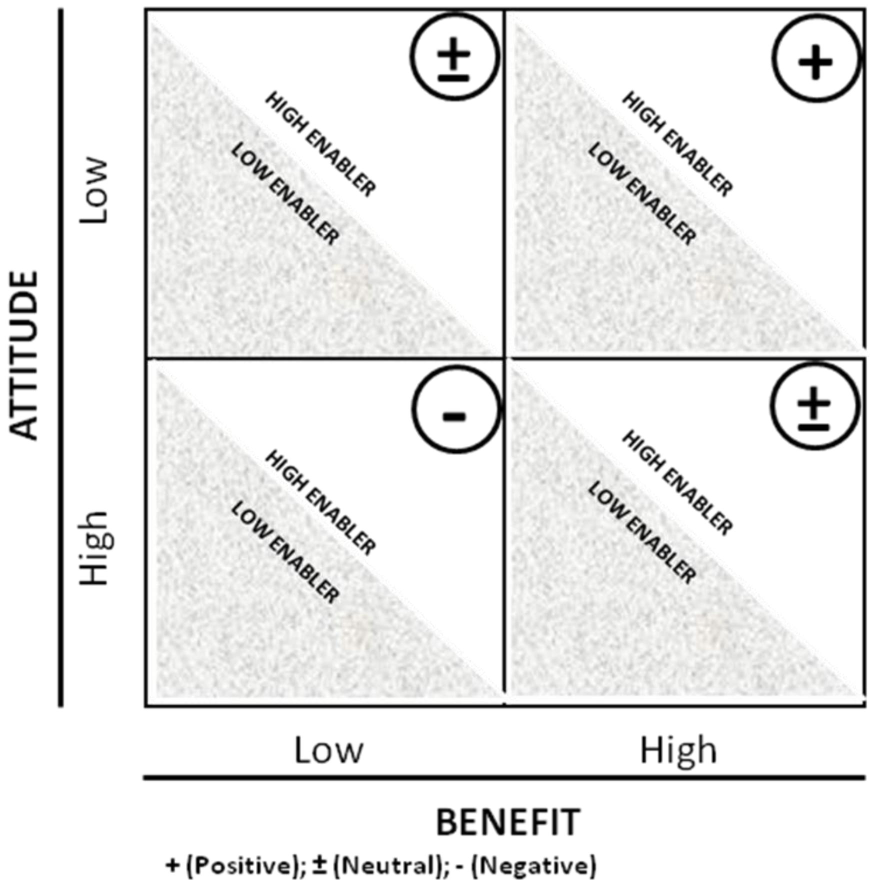
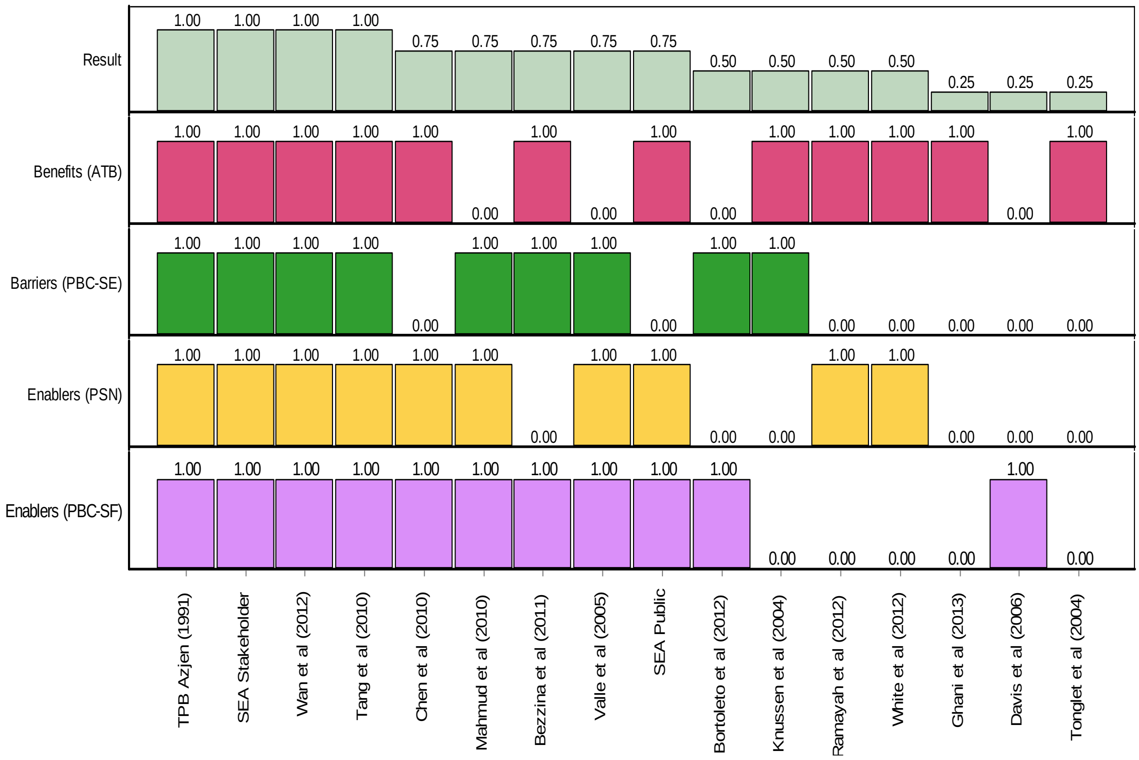


Figure 4.10 : SEA Public Model Benefit-Barrier-Enabler Matrix

4.3.6 Waste Management Behavioural Models

An analysis of the SEA models with the basic TPB model in the application of waste behavioural models utilizing TPB in other countries was conducted in this relatively novel field. The various waste management behavioural models were critically analyzed for the three main constructs of attitude (ATT), perceived social norms (PSN), perceived behaviour controls of self-efficacy (PBC-SE) and perceived behaviour controls of situational factors (PBC-SF) in terms of its significant predictor on pro-environmental behaviour such as waste prevention, recycling and environmental policy integration in SWM. In the SEA models, these were reframed based on the adapted TPB model as SEA Benefits (ATT), SEA Barriers (PBC-SE) and SEA Enablers (PSN and PBC-SF). Generally, most of the waste management behavioural models were on recycling with limited models on waste prevention or source separation and no models on environmental policy integration except for the SEA models (Figure 4.11).



1.00=Construct Significant; 0.00=Construct Non-Significant

Figure 4.11: Analysis of TPB Waste Management Behavioural Models

The findings on the significance of constructs of the TPB indicate that both the SEA models are consistent with the basic TPB model though at different levels. In terms of the construct SEA Benefits (ATT) which indicate the individual perception on the favourability of the behaviour, both the SEA stakeholder and public models were consistent with the TPB model as well as supported by a majority of TPB waste research internationally (Bezzina & Dimech, 2011; Ramayah et al., 2012; White & Hyde, 2011). In terms of the SEA Barriers (PBC-SE) which indicates individual perception of internal barriers controls, only the SEA stakeholder model was consistent with the TPB model. The findings on the significance of PBC-SE were mixed in the literature showing both significant and insignificance results. The lack of significance for the SEA public model may be due to the way SEA functions in policy planning where the burden of the implementation is on policy makers and decision makers and not on the public. Thus, the public may not really perceive any significant barriers on their part for SEA implementation. Furthermore, inconsistent findings in literature may also be due to the way PBC in general has been conceptualized in these studies due to the overlap of the concepts of self-efficacy (PBC-SE) and situational factors (PBC-SF) (Armitage & Conner, 2001). The literature on PBC-SE and PBC-SF also indicated considerable overlaps where studies which indicated significant PBC-SE also indicated significant PBC-SF though there were exceptions for the studies in the United Kingdom (Davis et al., 2006; Knussen et al., 2004). Nevertheless, these observations need to be interpreted with caution due to the limited cases available. This gap is addressed in the SEA models by segregating these two constructs of SEA Enablers (PBC-SE & PBC-SF). Both the SEA models were consistent with the TPB model for PBC-SF which indicates the individual perception on external barrier controls, with a majority of the literature in support of its significance (Bortoleto et al., 2012; Chen & Tung, 2009; Tang et al., 2010).

Interestingly, research on recycling and source separation in Malaysia did find not the PBC-SF as a significant predictor of behaviour. Nevertheless, both these studies were conducted within the context of university respondents and thus pose some limitation on the generalization of these findings to other TPB waste research (Karim Ghani et al., 2013; Ramayah et al., 2012). Finally, in terms of PSN, which indicates the individual perception of social pressure on behaviour, both SEA models were also consistent with the TPB model but literature was inconclusive on the significance of this construct. An interesting observation was that the majority of the countries which did not display significant results for this construct were from the European countries (Bezzina & Dimech, 2011; Bortoleto et al., 2012; Davis et al., 2006; Knussen et al., 2004; Tonglet et al., 2004). Some researchers have theorized based on the cultural dimensions theory this was due to the individualistic nature of the more developed European countries, which are less susceptible to external pressure of society on individual behaviour. This is in contrast with Asian countries who are more collectivistic where member moderate behaviour as part of the larger society and as such are more predisposed to societal influences (Hofstede, 2010). Two of the three TPB waste management studies in Malaysia indicated PSN as a significant predictor demonstrating support for this cultural dimensions theory (Dennis & Agamuthu, 2013; Mahmud & Osman, 2010; Ramayah et al., 2012). The only TPB study in Malaysia, which was the exception for PSN significance, was involved in waste source separation as opposed to recycling which may explain the divergence. Research on TPB waste prevention studies indicate that activities such as waste prevention and as an extension source separation provide significantly less opportunities for social influence as it is more private in nature as opposed to recycling which is more public in nature (Bortoleto et al., 2012; Karim Ghani et al., 2013).

Consequently, an overall analysis on the level of conformance of the research on TPB waste management in the literature with the basic TPB model was conducted (Figure 4.11). The findings indicate that Tier 1 TPB waste models consisted about 20% of the studies where all four main constructs of ATT, PSN, PBC-SE and PBC-SF were significant predictors of pro-environmental behaviour (Results=1.00). Meanwhile Tier 2 TPB waste models consisted about 33% of the studies where only three constructs were significant (Results=0.75). Tier 3 TPB waste models consisted about 27% of the studies where only two constructs were significant (Results=0.50) and finally Tier 4 TPB waste models consisted about 20% of the studies where only one constructs was significant (Results=0.25). The SEA stakeholder model was identified as a Tier 1 TPB waste model while the SEA public model was identified as a Tier 2 TPB waste model.

Tier 1 TPB waste models with the highest significance were in China, Hong Kong and Malaysia. The first Tier 1 TPB recycling model was conducted in China on 756 public respondents and analyzed using structural equation modelling (SEM). The findings indicate that the PBC-SE was the highest significant predictor of behaviour (Tang et al., 2010). This is consistent with the SEA stakeholder model, which also displayed that the SEA Barriers (PBC-SE) construct was the highest significant predictor of SEA behaviour. Nevertheless, an interesting finding of this study was that the environmental awareness construct was a significant predictor of behaviour. This was in contrast with the SEA stakeholder model where the environmental awareness was not a significant predictor of both SEA behaviour and SEA Benefits (ATT). A possible explanation is that stakeholders consisting of policy makers would already have higher levels of environmental awareness than the public and as such, this would not be a significant factor in pro-environmental behaviour unlike the public. This study supports the idea that awareness building in the SEA models should be customized based on stakeholders.

Meanwhile the second Tier 1 TPB recycling research was conducted in Hong Kong on 205 university student/staff respondents and analyzed using SEM. The findings indicate that PSN was the highest significant predictor of behaviour (Wan, 2012). This was not consistent with either the SEA stakeholder or public model. Nevertheless, this was consistent with a similar TPB recycling research conducted in a Malaysian university where the findings also indicated PSN as the highest significant predictor. Some authors have suggested that this may be due to the higher need for acceptance among peers in the adolescent developmental years (Mahmud & Osman, 2010; Ramayah et al., 2012). This study suggests the PSN linkages with behaviour should be seen within the context of its target respondents for SEA models. Generally, the findings of the Tier 1 models in China, Hong Kong and Malaysia supports the findings of PBC-SE as a dominant predictor of behaviour in the SEA stakeholder model.

Tier 2 TPB waste models where only three constructs are significant were in Taiwan, Portugal, Malta and Malaysia. The first Tier 2 TPB recycling model was conducted in Taiwan on 541 public respondents and analyzed using statistical regression analysis. The findings indicate that ATT is the highest significant predictor of behaviour (Chen & Tung, 2009). This was consistent with the SEA public model but not the SEA stakeholder model. This study is significant in corroborating the findings of the SEA public model in terms of its highest predictor as well as non-significant predictor, which is PBC-SE. Furthermore, it also consistent with the literature on TPB waste models of ATT as a dominant significant predictor of behaviour (Bezzina & Dimech, 2011; Karim Ghani et al., 2013; Knussen et al., 2004; Tonglet et al., 2004).

The second Tier 2 TPB recycling model was conducted in Portugal on 2093 public respondents and analyzed using SEM. The findings indicate that PBC-SE is the highest significant predictor of behaviour (Valle, 2005). This is consistent with the SEA stakeholder model but not the SEA public model. This study is important due to its large sample size among the TPB waste studies and as such should provide a representation of the general population. Nevertheless, this study is also perplexing as it found significance on all predictors except for ATT. This is contrary to the general trends of ATT as a significant predictor in the positive direction. One potential rationalization may be due to the limitation of this study in its self-reporting approach and overly lengthy questionnaire utilized in the research. Both these approaches have been reported to present limitations and vulnerabilities on the results (Armitage & Conner, 2001). This study disputes the findings of the SEA models of ATT as a dominant predictor though its sampling instrument disadvantages may limits its validity on the SEA models. The third, Tier 2 TPB recycling model was conducted in Malta on 400 public respondents and analyzed using statistical regression analysis. The findings indicate that ATT is the highest significant predictor of behaviour. This is consistent with the SEA public model but not the SEA stakeholder model (Bezzina & Dimech, 2011). An interesting but expected finding of this study was the non-significance of PSN, which may be explained by the relatively individualistic nature of this society. This study is significant for the SEA models as it supports the notion that PSN is based on the collectivistic or individualistic nature of the culture where the study is conducted. Finally, the fourth Tier 2 TPB recycling research was conducted in Malaysia on 400 student respondents in a secondary public school and analyzed using SEM. The findings indicate that the highest significant predictor of behaviour is PBC-SE while ATT is not significant (Mahmud & Osman, 2010). This is consistent with the SEA stakeholder model but not the SEA public model.

The main weakness with this study is its homogenous sample consisting of students where the potential generalization of the study is limited. This study is similar in findings with the Tier 2 Malta study in terms of PBC as the highest predictor and ATT as a non-significant predictor. Nevertheless, this study supports the findings of the SEA public model of ATT as a dominant predictor. Generally, the findings of the Tier 2 models in Taiwan, Portugal, Malta and Malaysia indicate that ATT is the dominant predictor of behaviour, which is similar to the SEA public model.

Tier 3 TPB waste models where only two constructs are significant were in Brazil, United Kingdom, Australia and Malaysia. The first Tier 3 TPB waste prevention model was conducted in Brazil on 158 public respondents and analyzed using SEM. The findings indicate that PBC-SE is the highest significant predictor of behaviour (Bortoleto et al., 2012). This was consistent with the SEA stakeholder model but not the SEA public model. This study is significant as it is the only TPB waste study on waste prevention and may provide insight to adapting the SEA models. An unexpected finding of this study was the non-significance of ATT as a predictor of behaviour contrary to the SEA stakeholder and public model. Nevertheless, this is rationalized by the authors by differentiating waste prevention models with others waste models such as recycling. The key premise is that waste prevention is a private activity in contrast to recycling or other public environmental behaviour. This premise may have a significant implication on SEA where any intervention on increasing the perceived benefits of SEA would have to be in the context of enhancing its public exposure to ensure its influence on SEA behaviour. The second Tier 3 TPB recycling model was conducted in the United Kingdom on 252 public respondents and analyzed using statistical regression analysis. The findings indicate that ATT is the highest significant predictor of behaviour (Knussen et al., 2004).

This was consistent with the SEA public model but not the SEA stakeholder model. An interesting finding was that PSN was not significant which was consistent with an individualistic society where social pressure is limited on the individual. This study lends support to the importance of ATT within the TPB framework for SEA and suggests that PSN should be viewed based on cultural context in accordance with the cultural dimensions theory (Hofstede, 2010). The third Tier 3, TPB recycling model was conducted in Malaysia on 200 university students and analyzed using SEM. The findings indicate that PSN is the highest significant predictor of behaviour (Ramayah et al., 2012). This was not consistent with both the SEA stakeholder and SEA public model. Interestingly, this study highlights the importance of cultural dimensions for SEA within a collectivistic society such as Malaysia. Nevertheless, the study findings contradict the literature on the relative weak significance of PSN. Furthermore, the generalization of this study for SEA policy planning may be limited due to its relative homogenous student sample, which may not be representative of the general public population. The fourth Tier 3, TPB recycling model was conducted in Australia on 200 public respondents and analyzed using SEM. The findings also indicate that PSN is the highest significant predictor of behaviour (White & Hyde, 2011). This was not consistent with both the SEA stakeholder and SEA public model. The study findings are consistent with the Tier 3 recycling study conducted in Malaysia among university students. Contrary to the theory of cultural dimensions the study findings reports PSN as the highest significant predictor in this relatively individualistic society. The study disputes the idea that PSN is culturally based, but supports the notion in the SEA models that ATT is a significant predictor of behaviour. Generally, the findings of the Tier 3 models in Brazil, United Kingdom, Malaysia and Australia indicate that PBC-SE and PBC-SF are not significant predictors of behaviour.

Tier 4 TPB waste models where only one construct is significant were in Malaysia and the United Kingdom. The first Tier 4 TPB waste separation model was conducted in Malaysia on 204 university staff respondents and analyzed using statistical regression analysis. The findings indicate that ATT is the highest significant predictor of behaviour (Karim Ghani et al., 2013). This was consistent with the SEA stakeholder model and the SEA public model. The study is significant as it is the only TPB study on waste separation in the literature. Surprisingly, the study was not significant for the PSN and PBC-SE predictors, which are dissimilar with the SEA models and the other Malaysian TPB waste models (Dennis & Agamuthu, 2013; Mahmud & Osman, 2010; Ramayah et al., 2012). The study does imply that different type of waste studies including the SEA models may perform differently even under similar cultural context. Nevertheless, a potential criticism of the study is its homogeneous sample, which poses limitation on the external generalization of the study findings. This limitation is also observed in the other two Malaysian TPB waste studies which were conducted in a homogenous school and university settings (Mahmud & Osman, 2010; Ramayah et al., 2012). In contrast, the SEA models were conducted within a diverse heterogeneous setting across 15 cities in Malaysia. This enables the SEA models findings to be generalized for national policy planning initiatives. The second Tier 4 recycling study was conducted in the United Kingdom on 191 public respondents and analyzed using statistical regression analysis. The findings indicate that ATT is the highest significant predictor of behaviour (Tonglet et al., 2004). This study may have comparative significance, as it is one of the pioneer TPB waste management studies as well as its inclusion of the PBC-SF construct within its model. Consequently, this study has been cited in most of the TPB waste management studies but is also controversial because it did not indicate any significance for the constructs of SN, PBC-SE and PBC-SF within the TPB model.

The study disputes the viability of the basic TPB model but does support the segregation of the PBC constructs into PBC-SE and PBC-SF as well as the inclusion of additional constructs within the SEA models. Finally, the third Tier 4 TPB recycling model was conducted in the United Kingdom on 74 public respondents and analyzed using statistical regression analysis. The findings indicate that PBC-SF as the highest significant predictor of behaviour (Davis et al., 2006). This was consistent with the SEA models. This study is an attempt to replicate the previous TPB recycling study in the United Kingdom and is noteworthy for its significance of the PBC-SF construct, which is a key construct within the SEA models. The PBC-SF construct coupled with PSN and termed SEA Enablers is an important concept within the SEA models to describe the latent external barriers outside the control of the individual but which is required to facilitate the behaviour. Nevertheless, a disadvantage of the study is its small sample size in contrast to the general population, which makes its findings difficult to translate for national policy planning. Generally, the findings of the Tier 4 models in Malaysia and the United Kingdom indicate that ATT as a significant predictor of behaviour.

In summary, the analysis of the TPB waste models supports the SEA models findings on the viability of the TPB models as well as the significance of the SEA constructs of SEA Benefits, SEA Barriers and SEA Enablers. Nevertheless, the findings on the significance of constructs also indicate that results may differ across different cultural and waste type studies as is demonstrated by the PSN construct within the theory of social dimensions. Furthermore, the findings dispute the previous meta-analysis research on the weak significance of the PBC and PSN constructs (Armitage & Conner, 2001). Consequently, this suggests that the TPB waste model is an evolving framework and its adaptation should be customized based on the context and culture of its application.

4.4 Policy Implications

Consequently, the significance of the SEA behavioural models (SBM) is that it provides specific insights into strategic interventions in engaging both policy makers and the public. These strategic interventions can be in the form of dissemination of awareness and knowledge, promotion of benefits and barriers as well as provision of enablers. Some may question why this is important or how does it change the current practice in Malaysia. The fundamental answer is that the SEA models highlight which driver is the most important for stakeholders or the public as well as which drivers will have the least impact on stakeholders and public behaviour. This enables decision makers to maximize their resources and achieve optimal results in policy planning. Furthermore, the SEA models provide a customize strategy to tackle policy makers and implementers as well as the public. The specific policy implications of the SBM findings for policy makers and decision makers indicate the following strategic policy implication areas.

1. <u>Strategic Public Participation</u>

The first policy implication is the potential strategic public participation initiatives in three areas by the government in terms of coverage, method and awareness campaigns. The first area is the current public participation coverage, which has been mainly limited to landuse planning and the EIA process. In landuse planning, this is legally mandated through the Town and Country Planning Act, 1972 which allows for public participation in Structure and Local Plans (Tahir & Asmawii, 2012). Meanwhile, in the EIA process, public participation is through perception surveys during the EIA and the public display of the EIA once the report is completed.

Nevertheless, the main weaknesses of this approach is that public participation is only required for detailed EIA as opposed to the typical preliminary EIA (Marzuki, 2009). Detailed EIAs are limited to selected prescribed activities, which require an EIA by the DOE (Department of Environment, 2013). Consequently, the study findings suggest that the existing public participation mechanism needs to be expanding in scope beyond landuse plans and detailed EIA (Indramalar, 2010). This is in line with the SEA Enablers, which suggest that the Malaysian public is evolving in its need for additional public engagement opportunities and perceive public participation as a pre-requisite for SEA in Malaysia. The second area is on the existing public participation method. Currently, the public are invited through newspaper advertisements to review and comment on the environmental planning documents. The documents are on display in selected public libraries or government offices. In addition, supporting avenues are provided through public dialogues and focus group discussion. Nevertheless, research indicates that less than 10% of the local population are involved in the public participation especially in local plans while only about 1% provide some form formal feedback (Tahir & Asmawii, 2012). Consequently, the study findings suggest that the existing public participation method needs to be modified and adapted to suit the collectivistic nature of Malaysian society (Hofstede, 2010). This means adopting a SEA model approach where stakeholder engagement are more latent and strategic as well as means the targeting of selective stakeholders and the public based on SEA behavioural modelling on their perception of benefits, barriers and enablers. Finally, the third area is on the existing public awareness and recycling campaigns by the government. These campaigns drain enormous amount of time and resources and research suggest that the public may not translate this message into practice (Lee et al., 2010).

Consequently, the study findings suggest that the public may be more influenced by awareness campaign on the state of the environment than on general information on the environment. This means formulating an environmental communication strategy that highlights environmental pollution problems in the country and the benefits of pro-environmental behaviour in mitigating these public concerns (The Star, 2010).

2. SEA Capacity Building

The second policy implication is the potential SEA training for the personnel of the DSWM and decision makers. This is because SEA experiences around the world indicate that the success or failure of the SEA process is dependent on the respective departments taking lead of the SEA process instead of environmental agencies or external consultants. This is also to build ownership of the SEA process within the sectoral departments instead of delegating environmental matters to the DOE or environmental consultants. Consequently, this will require SEA technical training for the DSWM who is the lead agency for SWM in Malaysia (Marshall & Farahbakhsh, 2013). This means the SEA process will be implemented by the DSWM with the guidance of the external consultants. SEA training for the DSWM should include basic, intermediate and advanced levels of SEA that covers the SEA evaluation framework and environmental aspects such as biodiversity and ecosystem support functions. Furthermore, basic level SEA training should also extend to decision makers who are elected politicians at the federal and state levels who may oversee solid waste matters. This is because decision makers are the ones who are confronted on the choices of SWM PPP and without the proper SEA technical background may fail to support the SEA findings as a precautionary and preventive decision support tool.

Interestingly, such a training system for decision makers have been implemented in New Zealand with encouraging results. Experience indicates that decision makers who have undergone basic SEA training are more likely to appreciate and be involved in the scope of environmental integration within the decision making process (Leggett, 2006). Unfortunately, SEA experience also indicates that SEA training which are complex and theoretical can be counterproductive and may be perceived at best as irrelevant and a waste of time to technical agencies and decision makers and at worst aggravate existing fears of SEA as a burden (Cherp et al., 2011).

3. Strategic Transformation of the Environmental Planning Framework

The third policy implication is on the strategic transformation of the existing environmental policy planning framework in Malaysia. Currently, environmental considerations are integrated during the EIA but this has proven insufficient (Briffett et al., 2004). The main challenge is due to the existing environmental top-down paradigm in addressing environmental problems and issues in Malaysia. The current approach emphasizes a top-down policy planning approach to drive policy implementation (Mohammad et al., 2011). The approach is prescriptive in nature or a top-down approach where the 'policy maker' decides on how the problem should be handled and then expects the policy to be implemented by the 'implementer'. Policies that fail to achieve their objectives are blamed on the implementer, lack of political will, poor management or shortage of resources but rarely on the policy itself. An important feature of this approach is the lack of public participation or stakeholder engagement in the policy process (Sutton, 1999).

A generalization of the traditional Malaysian policy process begins with the respective Federal or State ministries submitting a proposal on policy issues and problems to the Inter-Agency Planning Group (IAPG). The IAPG in turn formulates the general structure, frames the policy issues of the proposal, and submits it to the EPU secretariat, which then identifies policy priorities, focus and direction. The EPU in turn submits the proposal to the National Development Planning Committee for review, which formulates the proposal into a draft policy to be submitted to the National Planning Council (NPC). The NPC makes the final decision on the whether the draft policy will be submitted to the Cabinet for approval and subsequently to the Parliament for endorsement (Azman, 2001). Once the policy is endorsed, it is implemented via the Federal, State and local authorities. However in the above policy development process, there seems to be a distinct separation between policy formulation and implementation represented by the 'policy makers' and 'policy implementers'. The lack of stakeholder participation is also quite apparent especially in the policy formulation stage. This was demonstrated with the Solid Waste Management and Public Cleansing Act 2007, which was primarily a top-down approach where the SWM policy and legislation were formulated and implemented with limited provisions for integrating public participation or capacity building. This resulted in significant delays in the adoption and implementation of these SWM policies and legislation as well as the non-adoption by state governments in Selangor, Penang and Perak (Lakshana, 2012). This study finding suggests that SWM policy implementation in Malaysia requires a hybrid of structural and non-structural policy instrument approach. This means complementing long-term legislative frameworks with short-term behavioural model drivers to address stakeholder and public concerns as part of a long-term sustainable policy formulation strategy for SWM in Malaysia.

This is consistent with findings by the World Bank on the implementation of SEA in Asia where SEA is promoted as part of a long-term flexible policy planning strategy (Dusik & Xie, 2009). The SEA models provide a flexible non-structural policy instrument framework consisting of the Benefit-Barrier-Enabler matrix for the SEA stakeholders or the Benefit-Enabler-Attitude Matrix for the public. In contrast to the top-down approach, this participatory approach to policy planning emphasizes the need for stakeholder engagement and public participation. This approach is rooted in a criticism of development policy as being ‘top-down’ and not generated from the communities in which polices are implemented. This approach promotes an interaction and sharing of ideas between those who make policy and those who are influenced most directly by the outcome. Consequently, the study findings suggest that the strategic transformation of the environmental planning framework as part of an SEA framework requires three main areas of SEA policy intervention. This includes the formulation of a SEA Legislation, SEA Blueprint & Declaration and a SEA Commission to facilitate capacity building and public participation. The first area of the SEA framework is the potential formulation of a SEA legislation, which would require a mandatory implementation of SEA for potentially high impact PPP such as SWM facilities at a nationwide or regional scale. Typically, SEA development in the international community has been driven by SEA legislation and policies (Partidário, 1996; Wang et al., 2009). The study findings indicate that a high level of support for a SEA legislation with 84% of policy makers and 78% of the perceiving it as a need for SEA implementation. International trends in both Europe and Asia indicate that legislation has been the key driver for SEA implementation. SEA legislation provides for the explicit recognition of environmental integration at the PPP level as well as enable provision of resources, capacity building, public participation and standardization of implementation (Wilson & Ward, 2011).

Nevertheless, there are also studies that caution ambitious SEA legislation without practical implementation is also unhealthy as demonstrated by SEA trends in Asia (Hayashi et al., 2011). The main problem is the disconnect between SEA legislation and the operationalization of public participation especially in countries that have a traditionally top-down policy planning system. Finally, regardless of the challenges of SEA legislation and implementation, it is commonly conceded that legislation is the foundation and starting point for SEA implementation. The second area of the SEA framework is the potential formulation of a National SEA Blueprint and Policy Declaration to translate and implement the vision and mission of implementing SEA in Malaysia. The SEA Blueprint and SEA Declaration would complement the SEA Legislation in operationalizing the macro objectives, targets and mechanism for SEA implementation including the use of policy instruments such as the SBM. Finally, the third area of the SEA framework is the establishment of a SEA Commission to build public participation and monitor SEA implementation in SWM. This is because the SBM findings indicates that public participation is mainly during the post policy planning period in the EIA as opposed to the SEA concept of integrating public participation during the policy planning in formulating SWM policies. Post SEA implementation follow-up has determined that the lack of capacity building and public participation is a significant barrier to SEA implementation (Gachechiladze-Bozhesku & Fischer, 2012b; Gauthier et al., 2011). Potentially, only 25% of the public were aware of SEA and 44% were aware of EIA in Malaysia. Nevertheless, this further highlights the importance in integrating public participation during the early stages SWM facility planning rather than the later stages when the site and other key designs have already been determined. This is especially significant because it has been widely recognized that SWM policy plans that ignore public participation have limited probability of success.

Many scholars argue that the behavioural aspects of SWM are equally as important as the technical and economic aspects of SWM. This is because policy interventions for developing countries may require a more customized phased approach that takes into account local socio-economic conditions (Akenji et al., 2011). The role of the SEA Commission is also important because it has to evolve beyond the traditional public engagement methods of monologue briefing by a technical expert. In contrast, the SEA Commission is envisaged as a SWM public participation that is of the people and for the people where it will consist of representatives of the public who will engage other members of the public on SEA and SWM matters in a non-technical dialogue. Notably, the public must perceive that their participation in the SEA process is essential. The key principles that will govern the SEA Commission are empowerment, transparency, collective action and access to information on the PPP and SEA findings (Zarate et al., 2008).

4.5 Conclusion

In conclusion, the SBM findings indicate overwhelming support of more than 99% from stakeholders and the public on SEA implementation for SWM. The SBM also indicate that the key drivers in the SBM are perception of benefits, barriers and enablers. The SBM policy implications is the need for SEA policy interventions such as strategic public participation, SEA capacity building and a strategic transformation of the environmental planning framework. Ultimately, this enables an alternate policy intervention strategy for SWM in Malaysia. Sustainable SEA policy implementation may require a SEA policy intervention system which take into consideration structural and non-structural policy instruments and their dynamic interaction in facilitating SEA policy integration (Dennis & Agamuthu, 2012b).

5.0 ANALYTICAL SEA FRAMEWORK

5.1 Introduction

This chapter details the analytical strategic environmental assessment (ASEA) framework conducted on the SWM facilities planning of the National Strategic Plan for Solid Waste Management, Malaysia, 2005 (NSP) and its related infrastructure spatial planning as part of the SEA policy system application component of this study. The SEA has been carried ex-post of the NSP and seeks to strategically assess the environmental impacts of NSP SWM facilities site location on the environment for the NSP planning period of 2020. The purpose of the SEA is to evaluate the environmental considerations integrated in the NSP SWM facility siting planning. This chapter is divided into five main sections. Section 1 provides the outline for the chapter and sections. Section 2 provides an overview of the methodology of the ASEA framework in evaluating SWM facility siting. Section 3 presents and discusses the results of the ASEA findings on the NSP SWM facility siting for the main regions in Peninsular Malaysia. Section 4 highlights the policy implications of the findings for SWM in Malaysia. Finally, Section 5 concludes and summarizes the key findings of the ASEA framework.

5.2 Methodology

5.2.1 Analytical SEA Framework

The ASEA methodology utilized in this study was developed from a hybrid approach derived from the UNECE SEA Protocol and the OECD Guidance Document on SEA taking into account Malaysia's key environmental requirements and ESA system. The ASEA is based on the following principles and features :-

- SEA integration of national environmental legislation requirements.
- SEA integration of national and regional environmental sensitive areas.
- SEA integration of key environmental issues identified in international and national level environmental policies such as biodiversity and pollution loading in the environment.
- SEA integration of existing environmental quality components of water and air quality as well as public perception on environmental priority.
- The ASEA is based on an international approach and protocol namely the UNECE SEA Protocol under the purview of the United Nations, which may used as the de-facto SEA standard. The ASEA provides criteria for screening, determining significant environmental effects and reporting.
- The ASEA takes into consideration country specific environmental legislation and standards such as the legal requirement for EIA and the national translation of protected areas or environmental sensitive areas.
- The ASEA takes into consideration country specific environmental policies and issues by translating them into key environmental aspects such as ESA, pollution loading, public receptors, existing environmental quality and public perception.

The ASEA utilized a two tiered assessment of six criteria for environment aspects and impacts and consisted of the following steps :-

1. The SEA provides a screening and description of the NSP, to determine key areas that have a potential significant environmental impact based on whether it would result in projects that would require an EIA within the Malaysian EQA prescribed activity list.
2. The SEA identified the SWM facility planning proposed in the NSP for Malaysia.
3. The SEA collected baseline environmental data on the existing state of the environment in terms of environmental sensitive areas (ESA), environmental pollution loading (EPL), environmental sensitive receptors (ESR), existing water quality index (WQI), air quality index (API), as well as public perception concern (PPC) on SWM facility siting. ESA data were obtained from the NPP of the DTCP, EPL data from the NSP of the DSWM and ESR were identified based on land use maps of the DSM. Existing environmental data such as WQI and API were obtained from the DOE while PPC was obtained from the SEA survey conducted throughout Peninsular Malaysia.
4. The SEA evaluated the environmental impacts of the 80 SWM facility proposed in the NSP in terms of ESA, EPL, ESR, WQI, API and PPC.
5. The SEA ranked the environmental significance of the SWM facility siting for Peninsular Malaysia utilizing the DEFINITE (decisions on a finite set of alternatives decision support) system for environmental evaluation
6. Finally, the SEA identified critical SWM facility in the NSP for preventive and mitigate environmental measures.

The ASEA criteria is based on a two tier hierarchical approach. Tier 1 of the ASEA is the evaluation of the potential impact of SWM sites on protected areas as defined by the NPP ESA ranking, EPL on the environment based on the project capacity and the potential to impact ESR such as built-up areas. Tier 2 of the ASEA is the evaluation of the existing environmental carrying capacity and public perception of the PPP categorized by the WQI, API and PPC. The ASEA scoring and ranking of significant environmental impact is based on a cumulative evaluation of ESA, EPL, ESR, WQI, API and PPC. Each criteria is ranked a standardized score of 1 to 3 as defined in the individual evaluation criteria. Finally, a cumulative environmental impact (CEI) rating is determined by the use of the DEFINITE model, which is a multi-criteria decision making tool (Table 5.1). The DEFINITE model utilized the weighted summation and the expected value method which is based on the transformation of all criteria into a scale of 0 - 1 (Janssen, 2003). The weighted summation method has been used extensively in the environmental management sector due to its simple and transparent computational system (Al-Hadu et al., 2011). The weighted summation method consists of the list of alternative SWM sites (80 NSP sites), evaluation effects (ESA, EPL, ESA, WQI, API and PPC) and effect weights where the standardized values of the effects (0 - 1) are multiplied with the effective weights of the effects (sum of all weights is one) to obtain a CEI score for each NSP site. The model used the following effect rank weights (weightage provided by each criteria) for Tier 1 priority effects (ESA-0.269, EPL-0.269 and ESR-0.269) and Tier 2 priority effects (WQI-0.064, API-0.064 and PPC-0.064) (Table 5.2). The DEFINITE model calculates the individual scoring of the six ASEA criteria (ESA, EPL, ESR, WQI, API and PPC) to obtain the CEI factor with a maximum score of 1.00. CEI factors of below 0.5 are considered low impact, 0.51-0.75 are considered moderate impact and 0.76 to 1.00 are considered as high impact. The detail DEFINITE input and findings of effects is presented in the following sections.

Table 5.1 : ASEA Evaluation Criteria

No	ASEA Criteria	Key Questions & Scoring Environmental Sensitive Area : ESA, Environmental Pollution Loading : EPL Environmental Sensitive Receptor : ESR, Water Quality Index : WQI Air Pollutant Index : API, Public Perception Concern : PPC Cumulative Environmental Impact : CEI
1.	ESA	What is the potential for the PPP's project to be in an ESA? 3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA
2.	EPL	What is the potential PPP's project impact to pollution loading? 3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
3.	ESR	What is the potential PPP's project impact on populated areas? 3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
4.	WQI	What is the existing water quality index (WQI) of the area? 3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
5.	API	What is the existing Air Pollution Index (API) of the area? 3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
6.	PPC	What is the public concern on individual interest in SWM siting? 3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
7.	ASEA CEI	What is the cumulative environmental impact of the PPPs? High : CEI factor of 0.76-1.00 Moderate : CEI factor of 0.51-0.75 Low : CEI factor of below 0.50

Table 5.2 : DEFINITE Input for Effects & Weights

Effects	Standardized Method	Minimum Range	Maximum Range	Effect Rank	Weight
ESA	Maximum	0	3	1	0.269
EPL	Maximum	0	3	1	0.269
ESA	Maximum	0	3	1	0.269
WQI	Maximum	0	3	2	0.064
API	Maximum	0	3	2	0.064
PPC	Maximum	0	3	2	0.064

5.2.2 Proposed NSP SWM Facility

The ASEA was conducted on the proposed SWM facilities identified in the NSP (Figure 5.1), (Table 5.3 & Table 5.4) (Ministry of Housing & Local Government Malaysia, 2005). The detail waste flow, type, capacities and generic location of SWM facilities are provided in Appendix 3**.** The NSP has proposed 80 SWM facilities where the number of SWM facilities required until 2020 are 22 Sanitary Landfill (SLF), 45 Transfer Stations (TFS), 7 Material Recovery Facility (MRF) and 6 Thermal Treatment Plants (TTP) (Ministry of Housing & Local Government Malaysia, 2005). The total projected capacity of these NSP SWM facilities are 48,630 tonnes/day (TPD). Currently, Peninsular Malaysia has 97 operational landfills and 114 non-operational landfills (Department of Solid Waste Management, 2013a). This NSP data indicates that in the future Selangor, Pahang and Johor are expected to have the most number of SWM facilities consistent with their larger population size while Kedah, Pulau Pinang, Perak, Selangor and Pahang are the only states planned for TTP. This suggests that the government is moving away from the existing landfill centric approach to an integrated SWM approach that includes SLF, TFS, MRF and TTP. This approach of moving away from landfills is supported by some studies due to the potential of landfill contamination and land constraints (Ismail et al., 2013). Nevertheless, a key problem that needs to be addressed is to ensure the integration of environmental consideration at a strategic level to avoid previous siting problems of SWM in Malaysia. Increasingly, waste studies in Malaysia are highlighting stakeholders' prioritization of environmental concerns in SWM facility planning (Abba et al., 2013). Consequently, a key concern is whether the NSP, which is the national strategy for SWM, has incorporated these environmental and public concerns in its formulation.

Figure 5.1 : NSP SWM Generic Locations & Waste Flow

Table 5.3 : Proposed NSP SWM Facilities in Malaysia

No	State	Location	Type	TPD
1.	Perlis	Kangar	TFS	130
2.	Kedah	Sg Petani	TFS	740
3.	Kedah	Kulim	TFS	290
4.	Kedah	Langkawi	TTP	16
5.	Kedah	Padang Terap	SLF	1,030
6.	Kedah	Baling	SLF	940
7.	Kedah	Langkawi	SLF	73
8.	Penang	Pulau Pinang TFS	TFS	300
9.	Penang	Seberang Perai Tengah MRF	MRF	750
10.	Penang	Pulau Pinang TTP	TTP	1,120
11.	Penang	Seberang Perai Selatan SLF	SLF	2,220
12.	Perak	Taiping TFS	TFS	710
13.	Perak	Tanjung Malim TFS	TFS	80
14.	Perak	Manjung TFS	TFS	270
15.	Perak	Hilir Perak TFS	TFS	180
16.	Perak	Ipoh MRF	MRF	1,280
17.	Perak	Pangkor TTP	TTP	8
18.	Perak	Kinta SLF	SLF	1,900
19.	Perak	Pulau Pangkor SLF	SLF	1
20.	Selangor/KL	Hulu Selangor TFS	TFS	260
21.	Selangor/KL	Gombak MRF	MRF	1,600
22.	Selangor/KL	Kajang/Putrajaya MRF	MRF	1,540
23.	Selangor/KL	Petaling Jaya MRF	MRF	2,390
24.	Selangor/KL	Klang MRF	MRF	1,220
25.	Selangor/KL	Rawang SLF	SLF	3,460
26.	Selangor/KL	Ulu Langat SLF	SLF	5,030
27.	Selangor/KL	Sabak Bernam SLF	SLF	160
28.	Selangor/KL	Taman Beringin TFS	TFS	1,700
29.	Selangor/KL	Kuala Lumpur TFS	TFS	1,300
30.	Selangor/KL	Kuala Lumpur-Selangor TTP	TTP	1,200
31.	Kelantan	Kota Bahru TFS	TFS	880
32.	Kelantan	Kuala Krai Selatan TFS	TFS	20

Table 5.3 : Proposed NSP SWM Facilities in Malaysia (Continued)

No	State	Location	Type	TPD
33.	Kelantan	Kuala Krai Utara TFS	TFS	60
34.	Kelantan	Jeli TFS	TFS	40
35.	Kelantan	Tanah Merah SLF	SLF	1340
36.	Kelantan	Gua Musang SLF	SLF	60
37.	Terengganu	Dungun TFS	TFS	170
38.	Terengganu	Hulu Terengganu TFS	TFS	70
39.	Terengganu	Setiu TFS	TFS	70
40.	Terengganu	Kemaman TFS	TFS	150
41.	Terengganu	Kuala Terengganu SLF	SLF	840
42.	Terengganu	Besut SLF	SLF	190
43.	Pahang	Bentong TFS	TFS	90
44.	Pahang	Lipis TFS	TFS	60
45.	Pahang	Jerantut TFS	TFS	50
46.	Pahang	Temerloh TFS	TFS	130
47.	Pahang	Maran TFS	TFS	70
48.	Pahang	Bera TFS	TFS	80
49.	Pahang	Pekan TFS	TFS	60
50.	Pahang	Rompin TFS	TFS	10
51.	Pahang	Kuantan TFS	TFS	490
52.	Pahang	Cameron Highlands TTP	TTP	30
53.	Pahang	Pulau Tioman TTP	TTP	6
54.	Pahang	Raub SLF	SLF	235
55.	Pahang	Maran SLF	SLF	330
56.	Pahang	Rompin SLF	SLF	180
57.	Pahang	Kuantan SLF	SLF	640
58.	Pahang	Pulau Tioman SLF	SLF	1
59.	Negeri Sembilan	Jelebu TFS	TFS	40
60.	Negeri Sembilan	Kuala Pilah TFS	TFS	60
61.	Negeri Sembilan	Port Dickson TFS	TFS	140
62.	Negeri Sembilan	Tampin TFS	TFS	70
63.	Negeri Sembilan	Jempol TFS	TFS	80
64.	Negeri Sembilan	Seremban	SLF	1190

Table 5.3 : Proposed NSP SWM Facilities in Malaysia (Continued)

No	State	Location	Type	TPD
65.	Melaka	Jasin TFS	TFS	80
66.	Melaka	Melaka TFS	TFS	550
67.	Melaka	Alor Gajah SLF	SLF	760
68.	Johor	Pasir Gudang TFS	TFS	170
69.	Johor	Kota Tinggi TFS	TFS	140
70.	Johor	Desaru TFS	TFS	40
71.	Johor	Pontian TFS	TFS	170
72.	Johor	Batu Pahat TFS	TFS	450
73.	Johor	Segamat Selatan TFS	TFS	260
74.	Johor	Kluang Utara TFS	TFS	320
75.	Johor	Muar Selatan TFS	TFS	350
76.	Johor	Muar Utara TFS	TFS	110
77.	Johor	Mersing TFS	TFS	80
78.	Johor	Johor Baharu MRF	MRF	1,600
79.	Johor	Johor Baharu (Seelong) SLF	SLF	2,230
80.	Johor	Batu Pahat SLF	SLF	1,490
81.	Total			48,630

Table 5.4 : Summary of Proposed NSP SWM Facilities in Malaysia

State	SLF	TFS	MRF	TTP	Total
Perlis	0	1	0	0	1
Kedah	3	2	0	1	6
P.Pinang	1	1	1	1	4
Perak	2	4	1	1	8
Selangor/KL	3	3	4	1	11
Kelantan	2	4	0	0	6
Terengganu	2	4	0	0	6
Pahang	5	9	0	2	16
N. Sembilan	1	5	0	0	6
Melaka	1	2	0	0	3
Johor	2	10	1	0	13
Total	22	45	7	6	80

5.3 Results and Discussion

The findings of the ASEA on the 80 SWM facilities of the NSP are provided below (Table 5.5) based on the six criteria of the ASEA (ESA, EPL, ESR, WQI, API & PPC), the CEI and its proximity to environmental areas. This includes the nearest ESA (Protected Areas, forest reserve & water catchment), ESR (residential areas) and river system. The findings of the ASEA criteria are presented by discussing the existing baseline environment followed by the ASEA evaluation.

Table 5.5 : DEFINITE Input and ASEA Findings

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
Cumulative Environmental Impact (CEI)	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
R	TFS Kangar	1	2	3	2	2	2	66	59	Kurong Batang	Kg Tok Kayan	Sg Jejawi
K	TFS Sg Petani	1	2	3	2	2	2	65	77	Gunung Jerai	Taman Permai	Sg Merbok
K	TFS Kulim	1	2	2	2	2	2	65	77	Gunung Bongsu	Kg Kelang Baharu	Sg Jarak
K	TTP Langkawi	3	1	1	1	2	2	72	56	Gunung Raya	Taman Harmoni	Sg Ulu Melaka
K	SLF Pdg Terap	2	3	3	1	2	2	82	75	Padang Terap	Kg Baharu	Sg Padang Terap
K	SLF Baling	2	2	3	1	2	2	94	77	Gunung Inas	Kg Gabus	Sg Ketil
K	SLF Langkawi	1	1	2	1	2	2	92	56	Kuala Kisap	Kg Kilim	Sg Kisap
P	TFS P Pinang	1	2	3	2	2	1	62	75	Bukit Gemuruh	Taman Ipeng	Sg Bayan Lepas
P	MRF Sbg Perai	3	2	2	3	2	1	54	74	Bukit Juru	Taman Pelangi	Sg Juru

Table 5.5 : DEFINITE Input and ASEA Findings (Continued)

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
Cumulative Environmental Impact (CEI)	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
P	TTP P Pinang	1	3	3	2	2	1	62	75	Bukit Genting	Bayan Baru	Sg Bayan Lepas
P	SLF Sbg Perai	3	3	1	3	2	1	42	77	Byram	Changkat Kledang	Sg Tengah
A	TFS Taiping	1	2	3	1	2	2	87	65	Kertang	Kg Matang	Sg Batu Tegoh
A	TFS Tg Malim	1	1	3	1	2	2	88	95	Sg Bernam	Taman Bernam Prima	Sg Bernam
A	TFS Manjung	1	2	2	3	2	2	53	64	Gunung Tunggal	Kg Raja Hitam	Sg Raja Hitam
A	TFS Hilir Perak	1	2	2	1	2	2	85	77	Bikam	Kg Bayan Poyan	Sg Bidor
A	MRF Ipoh	1	3	3	2	2	2	68	77	Kledang Saiong	Taman Meru	Sg Pari
A	TTP Pangkor	1	1	2	2	2	2	80	64	Pinang	Sg Pinang Kecil	Sg Perak
A	SLF Kinta	1	3	2	1	2	2	86	77	Kampar	Taman Bina Jaya	Sg Kampar
A	SLF P Pangkor	1	1	2	2	2	2	80	64	Pinang	Sg Pinang Kecil	Sg Perak
B	TFS Hulu Selangor	2	2	2	1	2	2	83	71	Bukit Kutu	Kg Sg Engkak	Sg Selangor
B	MRF Gombak	1	3	3	1	2	2	84	88	Hulu Gombak	Gombak School	Sg Gombak
B	MRF Kajang	2	3	3	2	2	2	75	88	Sg Jelok	Taman Tenaga	Sg Langat
B	MRF Petaling Jaya	1	3	3	2	2	2	61	88	Sg Buloh	Bandar Utama	Sg Klang
B	MRF Klang	1	3	3	2	2	2	61	93	Pulau Tonggok	Methodist Girls School	Sg Klang
B	SLF Rawang	2	3	3	2	2	2	72	71	Kanching	Taman Tun Perak	Sg Sembah
B	SLF Ulu Langat	2	3	2	2	2	2	75	88	Sg Lalang	Taman Titiwangs a	Sg Langat

Table 5.5 : DEFINITE Input and ASEA Findings (Continued)

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
Cumulative Environmental Impact (CEI)	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
B	SLF Sabak Bernam	1	2	3	1	2	2	88	71	Kuala Bernam	Pekan Sg Besar	Sg Bernam
W	TFS Tmn Beringin	1	3	3	2	2	2	77	88	FRIM Forest	Taman Aman Putra	Sg Batu
W	TFS Kuala Lumpur (S)	1	3	3	2	2	2	61	88	Air Hitam	Taman Yarl	Sg Klang
W	TTP KL-Selangor (S)	2	3	2	1	2	2	88	88	Sg Lalang	Bandar Sunway Semenyih	Sg Semnyih
D	TFS Kota Bharu	2	2	3	1	2	2	85	62	Chabang Tongkat	Kg Sg Pinang	Sg Kelantan
D	TFS Kuala Krai (S)	2	1	2	1	2	2	86	72	Relai	Kg Sg Sam	Sg Lebir
D	TFS Kuala Krai (U)	2	1	3	1	2	2	86	72	Ulu Temiang	Kg Pahi	Sg Lebir
D	TFS Jeli	3	1	3	1	2	2	93	72	Pergau Dam	Kg Sg Rual	Sg Pergau
D	SLF Tanah Merah	1	3	3	1	2	2	85	72	Bukit Akar	Kg Banggol Maka	Sg Golok
D	SLF Gua Musang	2	1	1	1	2	2	89	72	Gunung Rabong	Pekan Gua Musang	Sg Galas
T	TFS Dungun	3	2	2	1	2	2	90	57	Bt Bauk	Kg Binjai	Sg Dungun
T	TFS Hulu Terengganu	2	1	2	1	2	2	85	66	Jerangau	Kg Bukit Ara	Sg Terengganu
T	TFS Setiu	1	1	2	1	2	2	88	66	Gunung Tebu	Kg Air Sejuk	Sg Setiu
T	TFS Kemaman	3	2	3	2	2	2	79	69	Kuala Kemaman	Kg Baharu Mak Cili	Sg Cukai

Table 5.5 : DEFINITE Input and ASEA Findings (Continued)

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
Cumulative Environmental Impact (CEI)	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
T	SLF Kuala Terengganu	1	2	2	2	2	2	77	66	Belara	Kg Lingai	Sg Nerus
T	SLF Besut	1	2	3	1	2	2	91	66	Pelagat	Kg Paya Rawa	Sg Besut
C	TFS Bentong	2	1	3	1	2	2	87	55	Klau	Kg Sg Marong	Sg Bentong
C	TFS Lipis	2	1	2	1	2	2	89	55	Terenggun	Kg Tempoyang	Sg Lipis
C	TFS Jerantut	3	1	2	1	2	2	90	55	Taman Negara	Kg Sg Tiang	Sg Tembeling
C	TFS Temerloh	2	2	3	1	2	2	81	55	Kemasul	Taman Bukit Cermin	Sg Semantan
C	TFS Maran	1	1	2	1	2	2	89	63	Berkelah Tambahan	Pekan Maran	Sg Maran
C	TFS Bera	2	1	2	2	2	2	75	63	Chini	Kg Gemuroh	Sg Bera
C	TFS Pekan	1	1	3	1	2	2	85	63	Sg Miang	Kg Alur Pasir	Sg Pahang
C	TFS Rompin	1	1	2	1	2	2	88	63	Ibam	Desa Keranji	Sg Keratung
C	TFS Kuantan	1	2	3	1	2	2	88	63	Berkelah	Kg Pandan Aman	Sg Kuantan
C	TTP Cameron Highlands	2	1	2	1	2	2	85	55	Gunung Siku	Kg Raja	Sg Telum-Sg Jelai
C	TTP Pulau Tioman	3	1	2	1	2	2	84	63	Rizab Tioman	Kg Juara	Tioman
C	SLF Raub	2	2	3	1	2	2	81	55	Bukit Kajang	Kg Sg Penggung	Sg Semantan
C	SLF Maran	1	2	2	2	2	2	80	55	Jengka	Felda Jengka 10	Sg Jengka

Table 5.5 : DEFINITE Input and ASEA Findings (Continued)

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
Cumulative Environmental Impact (CEI)	
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
C	SLF Rompin	1	2	2	2	2	2	80	63	Endau Rompin	Kg Tebu Hitam	Sg Rompin
C	SLF Kuantan	3	2	2	2	2	2	66	63	Balok	Kg Balok	Sg Balok
C	SLF Pulau Tioman	3	1	2	1	2	2	84	63	Rizab Tioman	Kg Juara	Tioman
N	TFS Jelebu	2	1	2	1	2	2	83	90	Triang	Tmn Naga Emas	Sg Triang
N	TFS Kuala Pilah	2	1	3	1	2	2	89	94	Senaling Inas	Kg Sg Layang	Sg Juasseh
N	TFS Port Dickson	1	2	3	2	2	2	*74*	95	Kuala Sepang	Kg Bukit Palong Lukut	Sg Lukut Besar
N	TFS Tampin	3	1	2	1	2	2	85	94	Gemenche h Dam	Kg Hulu Dusun	Sg Gemencheh
N	TFS Jempol	2	1	1	2	2	2	73	94	Jeram Padang Selatan	Kg Rompin	Sg Serting
N	SLF Seremban	2	3	3	1	2	2	93	94	Berembun	Kg Sikamat lama	Sg Batang Benar
M	TFS Jasin	2	1	2	1	2	2	90	81	Bukit Senggeh	Kg Kemendor	Sg Chohong
M	TFS Melaka	1	2	3	2	2	2	78	81	Bukit Beruang	Taman Angkasa Nuri	Sg Melaka
M	SLF Alor Gajah	1	2	2	1	2	2	88	84	Sg Udang	Kg Ramuan China Besar	Sg Rembau
J	TFS Pasir Gudang	1	2	1	1	2	2	84	74	Sg Johor	Taman Kota Masai	Sg Johor
J	TFS Kota Tinggi	2	2	2	1	2	2	91	69	Panti	Kg Bt 4	Sg Pelepah

Table 5.5 : DEFINITE Input and ASEA Findings (Continued)

Environmental Sensitive Area (ESA)	3 : ESA Rank 1&2, 2 : ESA Rank 3, 1: Non-ESA)
Environmental Pollution Loading (EPL)	3 : >1000TPD, 2 : 100-1000TPD, 1 : <100 TPD
Environmental Sensitive Receptor (ESR)	3 : <1km (High), 2 : 1-3km (Moderate), 1 : >3km (Low)
Water Quality Index (WQI)	3:Polluted(0-60), 2:Slightly Polluted(61-80), 1:Good (81-100)
Air Pollutant Index (API)	3:Unhealthy (101-200), 2:Moderate (51-100), 1:Good (0-50)
Public Perception Concern (PPC)	3 : High (Rank 1), 2 : Moderate (Rank 2), 1 : Low (Rank 3&4)
Cumulative Environmental Impact (CEI)	3 : High Impact , 2 : Moderate Impact, 1 : Low Impact
S (State Abbreviations in Malaysia)	

		DEFINITE INPUT										
S	**NSP SWM Sites**	**ESA**	**EPL**	**ESR**	**WQI**	**API**	**PPC**	**WQI**	**API**	**Nearest PA/ Forest**	**Nearest Receptor**	**River System**
J	TFS Desaru	3	1	2	2	2	2	70	69	Lebam Dam	Bandar Penawar	Sg Lebam
J	TFS Pontian	1	2	2	2	2	2	70	68	Gunung Pulai	Pekan Nenas	Sg Pontian Kechil
J	TFS Batu Pahat	2	2	1	2	2	2	80	72	Air Hitam Utara	Kg Parit Sulong	Sg Muar
J	TFS Segamat Selatan	2	2	1	1	2	2	81	72	Labis Utara	Taman Pelangi	Sg Labis
J	TFS Kluang Utara	1	2	1	1	2	2	81	72	Labis Tengah	Kg Muhibbah	Sg Paloh
J	TFS Muar Selatan	1	2	2	2	2	2	80	72	Air Hitam Utara	Taman Teratai	Sg Muar
J	TFS Muar Utara	2	2	3	2	2	2	80	72	Gunung Ledang	Kg Paya Mas	Sg Kesang
J	TFS Mersing	1	1	2	2	2	2	78	69	Jemaluang	Kg Seri Pantai	Sg Jemaluang
J	MRF Johor Baharu	1	3	3	2	2	2	68	68	Sg Bahan	Taman Tasek	Sg Sekudai
J	SLF Johor Baharu	2	3	2	3	2	2	56	68	Sedenak	Taman Impian Jaya	Sg Tebrau
J	SLF Batu Pahat	2	3	1	2	2	2	80	72	Maokil	Taman Selatan	Sg Bekok

5.3.1 Environmental Sensitive Areas (ESA)

1. <u>Baseline Environment</u>

Environmentally Sensitive Areas (ESA) are important areas for biodiversity, life support services and hazard risk areas. The three ranks of ESA in Malaysia consist of Protected Areas (Rank 1), forest reserves (Rank 2) and water catchment areas (Rank 3). Peninsular Malaysia has a total of 12.1 million hectares of ESA out of which 4.7 million hectares are ESA Rank 1, 3.6 million hectares of ESA Rank 2 and 3.8 million hectares of ESA Rank 3. The highest ESA area is in Pahang followed by Perak and Johor (Table 5.6) (Government of Malaysia, 2010). ESA Rank 1 and 2 are critical areas for biodiversity where Malaysia is one of the 12-mega biodiversity countries in the world consisting of a variety of ecosystems in the form of forest, freshwater and marine habitats. Peninsular Malaysia is estimated to contain about 8300 vascular plants, 2,830 tree species, 229 mammals, 742 birds, 242 amphibians, 567 reptiles and 290 freshwater fish. There are about 1,141 threatened species, 631 totally protected and 122 protected species in Malaysia (Government of Malaysia, 2009b).

Table 5.6 : Overall ESA Size in Malaysia in Hectares

State	ESA Rank 1	ESA Rank 2	ESA Rank 3	Total
Perlis	32.6	9.2	27.6	69.4
Kedah	222.0	251.0	373.6	846.6
P. Pinang	3.8	19.1	39.6	62.5
Perak	1,087.0	320.2	471.9	1879.1
Selangor/KL	268.9	150.4	317.6	736.9
N. Sembilan	115.6	184.6	352.9	653.1
Melaka	8.1	13.5	88.4	110
Johor	617.5	322.1	652.3	1,591.9
Pahang	1,192.2	1,468.9	814.1	3,475.2
Terengganu	403.1	533.8	316.6	1,253.5
Kelantan	784.3	351.2	313.0	1,448.5
Total	4,735.1	3,624	3767.6	12,126.7

Source : National Physical Plan-2, 2010

ESA Rank 1 consists of PA and dam catchment areas where Peninsular Malaysia has 56 PA with total area of 990,987 ha. The largest PA is the Taman Negara Pahang followed by the Taman Diraja Belum and the Taman Negara Terengganu (Table 5.7) (Government of Malaysia, 2012c).

Table 5.7 : Protected Areas (PA) in Peninsular Malaysia

No	State	Protected Area	(Hectares)
1.	Johor	Taman Negara Endau Rompin	19,562
2.	Johor	Taman Negara Endau Rompin (Selai)	29,343
3.	Johor	Taman Negara Johor Gunung Ledang	8,612
4.	Johor	Taman Negara Johor Kepulauan Mersing	4.040
5.	Johor	Rezab Hidupan Liar Endau Kluang	52,493
6.	Johor	Rezab Hidupan Liar Endau Kota Tinggi (Timur)	8,660
7.	Johor	Rezab Hidupan Liar Endau Kota Tinggi (Barat)	45,581
8.	Johor	Rezab Hidupan Liar Four Islands	1
9.	Johor	Rezab Hidupan Liar Segamat	12,216
10.	Johor	Hidupan Liar Jemaluang	20
11.	Johor	Tapak-Tapak Ramsar Negeri Johor	16,404
12.	Johor	Santuari Burung Gunung Panti	1,800
13.	Kedah	Hidupan Liar Tuntung Bukit Pinang	1
14.	Kedah	Hidupan Liar Tuntung Sidam	1
15.	Kedah	Taman Pulau Singa Besar Langkawi	636
16.	Kelantan	Taman Negara Kelantan	80,250
17.	Kelantan	Pusat Pemulihan Hidupan Liar Gua Musang	127
18.	Kelantan	Taman Negeri Gunung Stong	21,950
19.	Melaka	Rezab Hidupan Liar Tanjung Tuan	61
20.	Melaka	Rezab Zoo Melaka	21
21.	Melaka	Rezab Hidupan Liar Pulau Sembilan	1
22.	N.Sembilan	Rezab Hidupan Liar Port Dickson Islands	0.5
23.	Pahang	Taman Negara Pahang	248,121
24.	Pahang	Rezab Hidupan Liar Bukit Fraser Pahang	2,000
25.	Pahang	Tapak Ramsar Tasek Bera	31,255
26.	Pahang	Tasik Chini	5,085
27.	Pahang	Rezab Hidupan Liar Pulau Tioman	9,455
28.	Pahang	Rezab Hidupan Liar Krau	62,395
29.	Pahang	Rezab Hidupan Liar Pahang Tua	1,335
30.	Perak	Taman Diraja Royal Belum	117,500
31.	Perak	Rezab Hidupan Liar Chior	689
32.	Perak	Rezab Hidupan Liar Sungkai	2,468
33.	Perak	Hidupan Liar Tuntung Bota Kanan	6
34.	Perak	Santuari Burung Batu Gajah	5
35.	Perak	Santuari Burung Kuala Gula	0.4
36.	Perlis	Hutan Taman Negeri Perlis	4,380
37.	Perlis	Rezab Hidupan Liar Wang	68
38.	Perlis	Hidupan Liar Napoh Sg. Batu Pahat	27
39.	Penang	Taman Negara Pulau Pinang	2,563
40.	Penang	Taman Botani	242

Table 5.7 : Protected Areas (PA) in Peninsular Malaysia (Continued)

No	State	Protected Area	(Hectares)
41.	Selangor	Rezab Hidupan Liar Bukit Kutu	1,943
42.	Selangor	Rezab Hidupan Liar Bukit Fraser	2,979
43.	Selangor	Rezab Hidupan Liar Klang Gate	130
44.	Selangor	Rezab Hidupan Liar Kuala Selangor Hill	44
45.	Selangor	Rezab Hidupan Liar Bukit Sungai Puteh	36
46.	Selangor	Rezab Hidupan Liar Sungai Dusun	4,330
47.	Selangor	Rezab Hidupan Liar Templer Park	966
48.	Selangor	Paya Indah Wetlands	450
49.	Selangor	Taman Negeri Selangor	91,145
50.	Selangor/	Rezab Hidupan Liar Golf Diraja Selangor	403
51.	Selangor/	Rezab Hidupan Liar Bukit Nanas	16
52.	Selangor/	Rezab Hidupan Liar Bukit Sungai Puteh	4
53.	Terengganu	Taman Negara Terengganu	103,062
54.	Terengganu	Rezab Tuntung Bukit Paloh	1
55.	Terengganu	Pusat Santuari Penyu Rantau Abang	70
56.	Terengganu	Pusat Santuari Penyu Ma'daerah	70
	Total		990,987.94

Source : Government of Malaysia, 2012.

ESA Rank 2 areas consist of forest reserves and forested areas where Peninsular Malaysia has about 5,807,005 ha of forested area, which is about 44.0% of the land area. The largest forested area is in Pahang followed by Perak and Kelantan while the highest percentage of forest coverage is in Pahang followed by Kelantan and Terengganu (Table 5.8)(Government of Malaysia, 2012c).

Table 5.8 : Forested Area by States in Peninsular Malaysia

State	Forested Area Area (Ha)	Forested Area (%)
Johor	466,792	24.5
Kedah	344,871	36.6
Kelantan	812,196	53.8
Melaka	5,066	3.1
Negeri Sembilan	157,298	23.6
Pahang	2,068,605	57.5
Perak	1,030,530	49.0
Perlis	11,470	14.4
Penang	7,809	7.6
Selangor	250,860	31.6
Kuala Lumpur	1,767	6.1
Terengganu	649,741	50.1
Peninsular Malaysia	5,807,005	44.0

Source : Forestry Department Peninsular Malaysia, 2012

ESA Rank 3 areas consist of water intake catchment areas, which provide the drinking water supply in Malaysia. Water intake catchment are hydrological areas upstream of water intake points identified under the Third Schedule of the Environmental Quality (Sewage) Regulations 2009 where the discharge of effluent into any inland waters within these catchment areas must comply with the Standard A of the Regulations. Peninsular Malaysia has about 405 water intake points that constitute 252 water supply schemes and has a total water treatment plant (WTP) design capacity of 14,758 MLD. Pahang has the most number of water intake points followed by Selangor and Perak while Selangor has the largest water treatment plant design capacity followed by Johor and Perak (Table 5.9) (Government of Malaysia, 2011, 2012b).

Table 5.9 : Total Water Intake Points in Peninsular Malaysia

State	Water Intake Points	Water Supply Schemes	WTP Capacity (MLD)
Perlis	6	6	289
Kedah	32	26	1,251
Penang	34	11	1,387
Perak	56	45	1,740
Selangor/KL	64	11	4,477
Negeri Sembilan	26	26	790
Melaka	9	5	506
Johor	45	7	1,787
Pahang	76	76	1,203
Terengganu	16	6	923
Kelantan	41	33	405
Peninsular Malaysia	405	252	14,758

Source : Government of Malaysia, 2012.

2. ASEA Evaluation

The ASEA findings indicate that about 15% of the NSP SWM facilities has a high potential to impact ESA Rank 1&2 areas including forest reserves while about 36% of the NSP SWM facilities has a high potential to impact ESA Rank 3 areas including water intake catchment areas.

This implies that about 51% of the NSP SWM sites are planned within highly sensitive ESA Rank 1, 2 & 3 areas including PA, dam catchment areas, forest reserves and water catchment areas (Figure 5.2). Meanwhile, the findings also indicate there are seven NSP SWM facilities impacting ESA Rank 1 & 2 in the central-eastern region (Selangor, Kuala Lumpur, Kelantan, Terengganu and Pahang), three facilities in the northern region (Perlis, Kedah, Pulau Pinang and Perak) and two facilities in the southern region (Negeri Sembilan, Melaka and Johor) (Figure 5.3, Figure 5.4 & Figure 5.5). Three of the NSP SWM sites may potentially impact dam catchment areas (Gemencheh, Lebam and Pergau dams) while another three sites may affect wildlife reserves of Tioman including the Taman Negara or National Park of Malaysia. Meanwhile, the states with the most number of NSP SWM within water catchment areas are Pahang (6) and Johor (6) followed by Kelantan (4), Negeri Sembilan (4) and Selangor (4). This also is consistent with states with the highest number of water intakes. The significance of these finding is that about 51% of the NSP SWM sites are within ESA areas and have the potential to cause significant environmental impacts (Figure 5.6). This suggests that environmental policy integration is minimal even at the national policy planning level for SWM in Malaysia. This may explain the pollution problems and public protest at the project levels when these SWM facilities are operational (Tan, 2012; The Star, 2008). This is because even with maximum compliance with environmental standards, these NSP SWM project will have minimum effect in reducing their impact on the environment due to poor siting. Optimal siting of solid waste facilities is one of the most significant approaches to prevent potential environmental pollution and issues (Rafiee et al., 2011; Sumiani et al., 2009). Furthermore, there are concerns that Malaysia is quickly losing its biodiversity heritage due to excessive development in ESA areas (Sario, 2006; Yip, 2013).

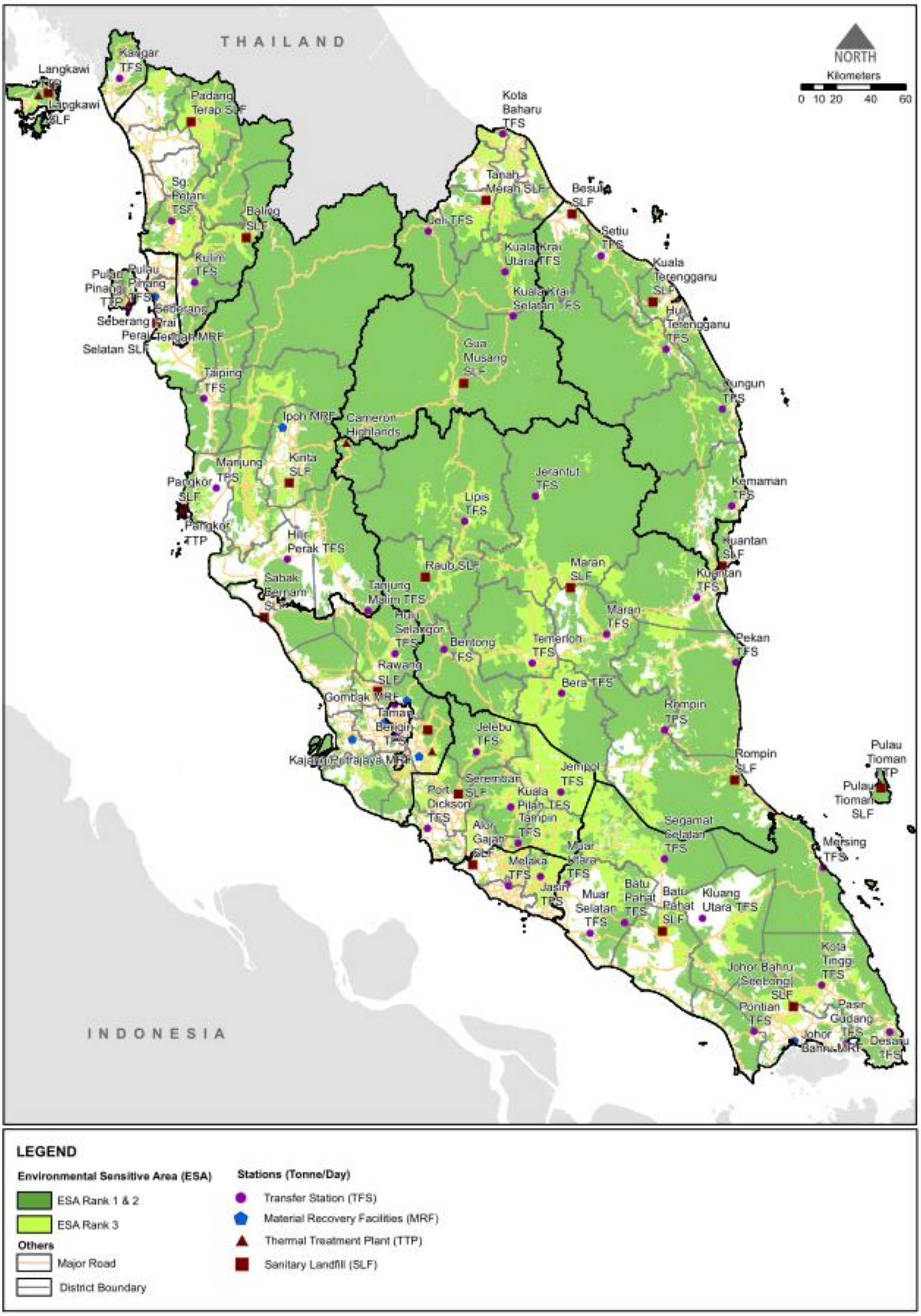


Figure 5.2 : NSP SWM ESA Peninsular Malaysia

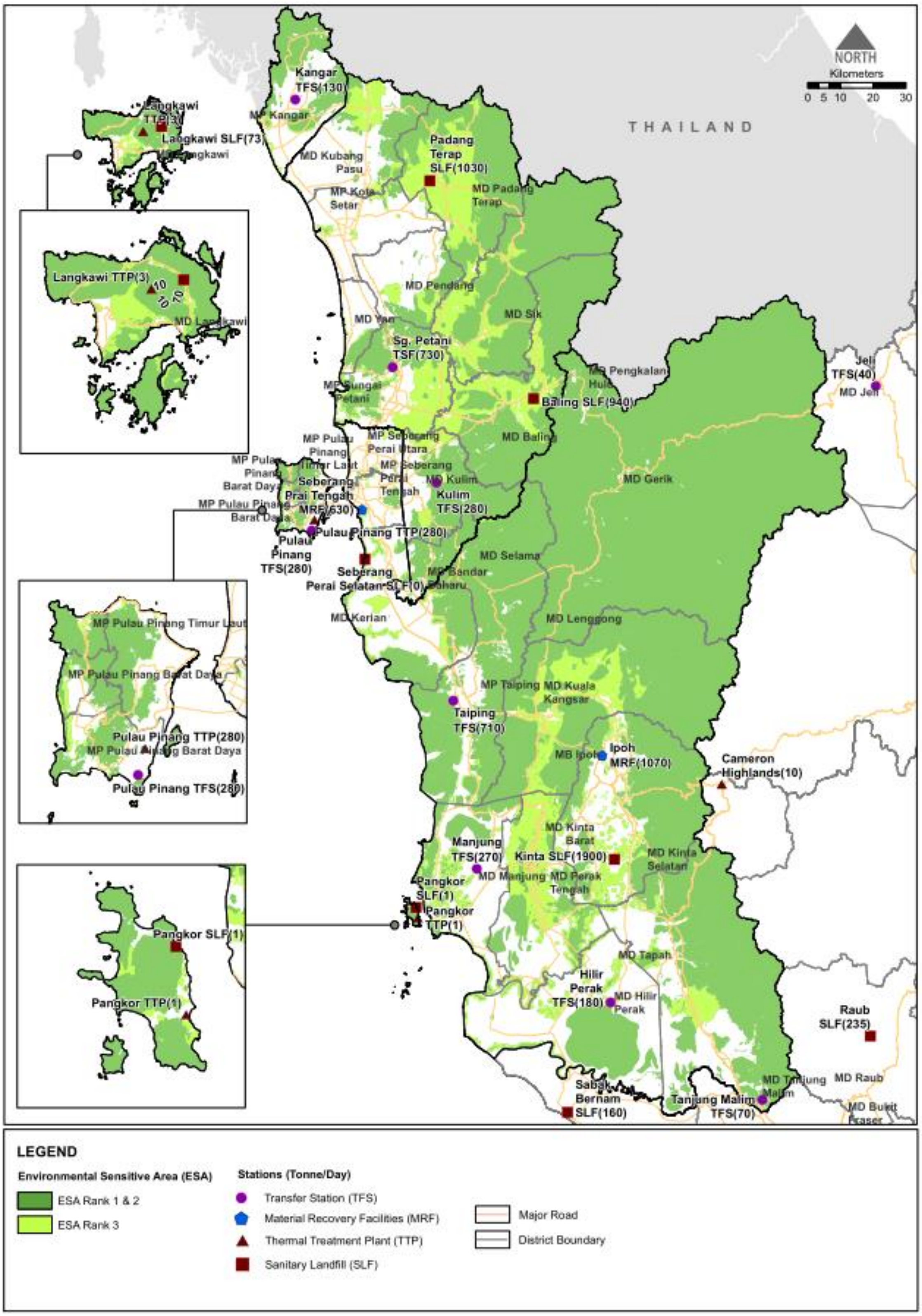


Figure 5.3 : NSP SWM ESA Northern Region

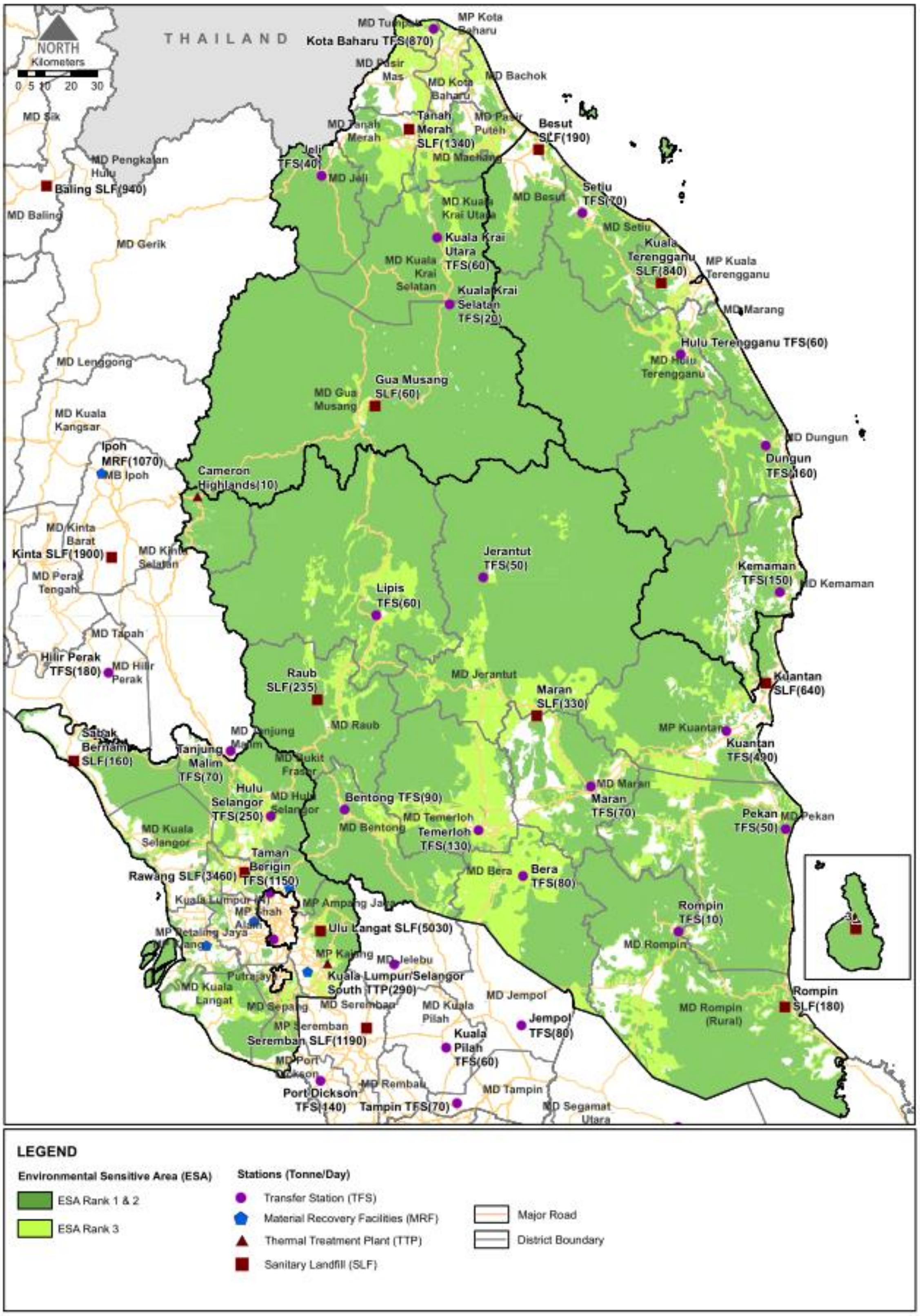


Figure 5.4 : NSP SWM ESA Central-Eastern Region

Figure 5.5 : NSP SWM ESA Southern Region

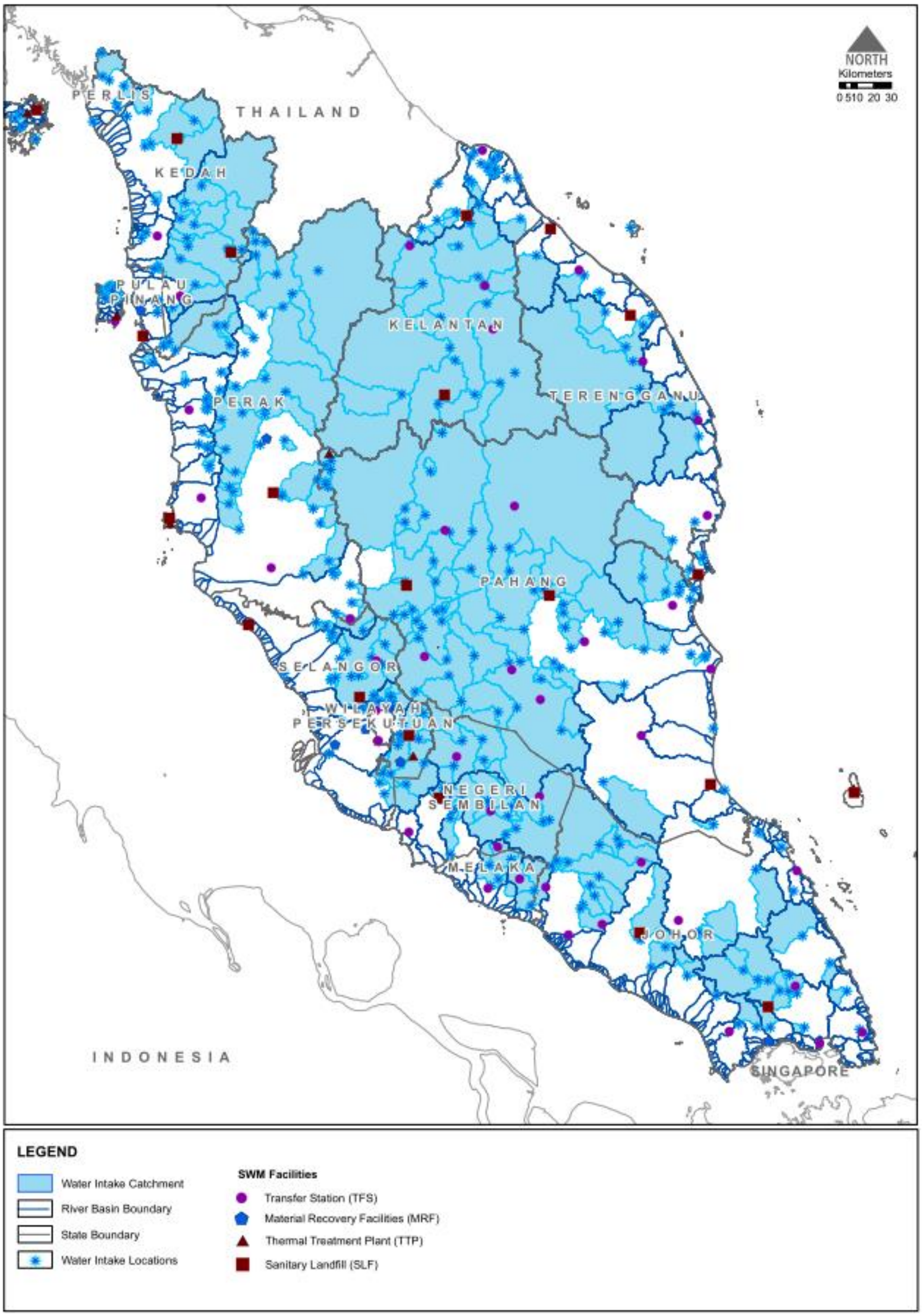


Figure 5.6 : NSP SWM in ESA Rank 3 Water Catchments

Consequently, one critical question that needs to be highlighted is why have national policy strategies such as the NSP failed to integrate environmental considerations such as the ESA, which have been designated at the national level. There are three possible causes for this lack of ESA integration in the NSP SWM. The first and the simplest cause may be a lack of awareness on the existence of the ESA and SEA in Malaysia even among policy makers and government agencies. This is consistent with the finding that SEA awareness level was only a low 24% among stakeholders though EIA awareness levels was a high 84%. This may also suggest that policy makers may merely be shifting the burden of environmental consideration to the EIA at the project level, which seems to be the common mind-set (Lau, 2010). The second possible cause is a lack of inter-agency coordination among ministries and departments at the national and regional levels. This could indicate that government agencies may still be operating on an organizational silo mentality with minimal collaboration and traditional agency rivalry (Abu Bakar, 2011). Thus, the policy prepared by one ministry or agency fails to be integrated or cross-fertilized in other sectoral policy planning. Finally, the third possible cause may be due to a gap between policies and practice, which may be a symptom of a deeper problem in the policy planning process in Malaysia (Aliman, 2012). Thus, in theory, the policies look good but in practice fail to be implemented due to limited resources and planning. This is consistent with authors who perceive the policy planning process in Malaysia as a haphazard top-down approach and formulated with minimal consultation. Furthermore, there are also strong sentiments that some of these policy planning documents have been outsourced to consultants with ties to government linked companies but with limited practical experience to formulate and integrate pragmatic policies and strategies (Hunter, 2013). Ultimately, the level of ESA integration within public policies may be an indicator of how well environmental governance is practiced in Malaysia.

5.3.2 Environmental Pollution Load (EPL)

1. Baseline Environment

The existing water and air pollution sources in Malaysia consists of industrial wastewater treatment plants (WWTP), sewage treatment plants (STP), landfill leachate sources (LLS) and industrial air pollution sources (APS). The proposed NSP SWM are expected to contribute to the existing pollution load in terms of environmental pollution load (EPL) of air and water discharges. The total number of pollution sources in Malaysia consists of 8,692 industrial WWTP sources, 11,206 sewage STP sources, 98 sources landfill LLS and 32,497 APS sources (Department of Environment, 2011b, 2012). Currently, the highest number of industrial WWTP is in the state of Johor at 4,629 sources while the lowest number of industrial WWTP is in Perlis at 15 sources. The highest number of sewage STP is in the state of Selangor at 3,183 sources while the lowest number of sewage STP is in Perlis at 51 sources. The highest number of landfill LLS is in the state of Perak at 17 sources while the lowest number of landfill LLS is in Perlis at one source. The highest number of APS is in the state of Johor at 9,276 sources while the lowest number of APS is in Perlis at 240 sources. Generally, the trends indicate that Selangor, Johor and Perak have the highest existing pollution load on the environment while Perlis has the least existing pollution load (Table 5.10). This is consistent with states with the highest population, which are also Selangor, Johor and Perak (Government of Malaysia, 2012c). There is some concern in the international community that uncontrolled population and economic growth will lead to irreversible environmental problems due to unsustainable patterns of consumption and production (United Nations, 2006). Meanwhile, in Malaysia there are increasingly concerns that the current trend is reaching critical levels and that the government and decision makers need to make a stand in terms of sustainable environmental growth (Chan, 2013).

Table 5.10 : Existing Pollution Sources in Malaysia

State	Number People '000	TPD NSP EPL	Number NSP SWM	Number Industrial WWTP	Number Sewage STP	Number Landfills LLS	Number Air APS
Perlis	237.5	130	1	15	51	1	240
Kedah	1,973.1	3,089	6	123	871	9	3,415
P.Pinang	1,593.6	4,390	4	250	686	3	3,215
Perak	2,397.6	4,429	8	125	1,580	17	2,205
Selangor/KL	7,348.3	19,860	11	2,887	3,183	8	6,451
Kelantan	1,615.2	2,400	6	54	965	13	1,006
Terengganu	1,074.0	1,490	6	219	239	8	2,250
Pahang	1,524.8	2,462	16	163	551	16	1,694
N. Sembilan	1,042.9	1,580	6	156	974	7	1,513
Melaka	833.0	1,390	3	80	803	2	1,232
Johor	4,401.8	7,410	13	4,620	1,123	14	9,276
Total	24,041.8	48,630	80	8,692	11,026	98	32,497

Source : Department of Environment (2012) & Government of Malaysia (2012)

2. ASEA Evaluation

The ASEA findings indicate that the total projected capacity of all these NSP SWM facilities are 48,630 TPD. The highest number of NSP SWM facilities will be in Pahang though the highest pollution loading will be in Selangor/KL at 19,860 TPD. Meanwhile, the lowest number and pollution loading will be in Perlis at 130 TPD. Furthermore, about 24% of the NSP SWM facilities will have a capacity of more than 1,000 TPD while about 35% will have a capacity below 100 TPD. The NSP SWM facility with the highest capacity is the SLF Ulu Langat at 5,030 TPD followed by SLF Rawang and MRF Petaling Jaya. The findings also indicate that Selangor will have about 13% of the NSP SWM facilities with a high capacity more than 1,000 TPD while Pahang, which has the highest number of sites, will have no facility with a capacity more than 1000 TPD. This implies that Selangor, which currently has one of the highest pollution loading, will also have a high pollution loading from the NSP SWM facilities. Furthermore, Selangor will also have high capacity facilities concentrated in the state compared to other states, which may have more sites, but with smaller capacities.

The significance of these findings is that the NSP approach of siting high capacity facilities within existing high pollution loading areas will eventually cause irreversible damage to the carrying capacity of the environment in Selangor. This is consistent with findings that indicate the rivers in Selangor are currently polluted (The Star, 2012c). This suggest that the sizing and siting of the NSP SWM facilities is mainly focused on the basic collection and treatment of solid waste as opposed to adopting a strategic approach of waste management which takes into consideration the existing pollution loading and carrying capacity of the area. The most essential limitation of this approach is the lack of waste prevention strategies integrated within the NSP and the existing SWM policy planning framework. Findings indicate that waste generation for Malaysia will increase from the existing 17,000 TPD to 48,630 TPD, which is almost a 300% increase in waste generation. This limitation in a national strategic document for SWM is perplexing given the public emphasis on recycling by the government. Recent reports suggest that the government is set on this reactive approach and is embarking on the construction of high capacity SWM facilities such as incinerators (Looi, 2012). Nevertheless, studies on public perception in Malaysia indicates that the public perceive waste reduction and recycling as preferred options compared to solid waste facilities such as landfilling and incinerators (Abba et al., 2013). This is consistent with NGOs such as the Consumers Association of Penang (CAP) frustration that the government is more inclined to building SWM facilities such as incinerators than adopting waste prevention and recycling policies (Idris, 2012). The ASEA findings suggest that an integrated macro approach is required which takes into account the cumulative pollution loading from SWM facilities as opposed to mitigating waste problems at the local level. This is also in line with the philosophy of SEA, which seeks to prevent problems rather than mitigate them and to consider cumulative impacts as opposed to individual impacts (Wallington et al., 2007).

5.3.3 Environmental Sensitive Receptor (ESR)

1. <u>Baseline Environment</u>

Environmentally Sensitive Receptors (ESR) are residential areas that may be potentially affected by development or pollution sources such as SWM facilities. ESR are typically located within built-up areas where the total built-up area for Malaysia is only 6.3%. Perak has the largest built-up area at 358,740 ha while Kelantan has the smallest built-up area at 7,207 ha. Nevertheless, in terms of percentage of the state, Penang has the largest built-up area at 31.5% while Kelantan has the smallest built-up area at 0.5%. The main landuse are forest and agriculture even in developed states such as Selangor/KL and Pulau Pinang (Government of Malaysia, 2011, 2012c) (Table 5.11).

Table 5.11 : Existing Built-Up Areas in Malaysia

State	State Size (ha)	Built-Up Areas (ha)	Built-Up %	Main Landuse	Main Towns
Perlis	1,898,609	69,338	3.6	Agriculture	Kangar, Padang Besar, & Arau
Kedah	946,752	58,993	6.2	Agriculture	Alor Setar, Sg Petani, & Kulim
P.Pinang	104,684	32,965	31.5	Agriculture	Georgetown, Mertajam & Butterworth
Perak	2,100,485	358,740	17.1	Forest	Ipoh, Kuala Kangsar & Sitiawan
Selangor/ KL	823,427	162,360	19.7	Forest	Kuala Lumpur, Shah Alam & Petaling Jaya
Kelantan	1,509,900	7,207.8	0.5	Forest	Kota Bahru, Kuala Krai & Tanah Merah
Terengganu	1,295,512	40,420	3.1	Forest	Kuala Terengganu, Kemaman and Paka
Pahang	3,596,586	42,097	1.2	Forest	Kuantan, Temerloh and Jerantut
N. Sembilan	665,364	84,283	12.7	Agriculture	Seremban, Port Dickson & Nilai
Melaka	164,842	18,550	11.2	Agriculture	Melaka, Alor Gajah & Jasin
Johor	1,898,609	69,338	3.6	Agriculture	Johor Bharu, Muar & Kota Tinggi
Total	15,004,770	944,291.8	6.3		

Source : Government of Malaysia (2012)

2. <u>ASEA Evaluation</u>

The ASEA findings indicate that about 43% of the NSP SWM facilities may be located within 1km of ESR areas while about 46% may be located within 1-3km of ESR areas. This implies about 89% of the NSP SWM may be located within 3km of ESR areas. Furthermore, about 16% of the NSP SWM, which are located within 1km of ESR areas, are also high capacity facilities of more than 1,000 TPD. These NSP SWM sites are TFS Kuala Lumpur (S), TFS Tmn Beringin, TTP P Pinang, SLF Seremban, SLF Pdg Terap, MRF Johor Baharu, SLF Tanah Merah, SLF Rawang, MRF Kajang, MRF Gombak, MRF Klang, MRF Petaling Jaya and MRF Ipoh. Meanwhile, the states with the most number of NSP SWM within 1km of ESR areas are Selangor (6), Pahang (5) and Kelantan (4). This is not consistent with states with the largest built-up areas as Pahang and Kelantan have relatively low built-up areas. The significance of this finding is that about 89% of the NSP SWM may be within 3km of residential areas and may cause significant environmental impacts of water, air and noise pollution due to its proximity (Fauziah & Agamuthu, 2012). Interestingly, the proximity of the NSP SWM facilities is not consistent with the size of the built-up areas in the state as demonstrated by low built-up states such as Pahang and Kelantan. Theoretically, these states should provide more flexibility in siting SWM facilities due to their relatively lower built-up areas. This suggests that the siting of the NSP SWM in close proximity may be more due to inadequate strategic planning rather than the constraints of the development level of the state. This may shed some light on the public perception that the authorities and the EIA consultants are not fulfilling their responsibility as evidenced from the protest of residents in proximity of proposed and newly constructed landfills in Malaysia (Karupiah, 2013; Tan, 2012).

Furthermore, the trend of siting high capacity SWM facilities in close proximity of ESR is also perturbing especially in Selangor, which has the highest built-up area in the country. The findings indicate that at least three residential areas (Taman Tun Perak, Taman Tenaga and Bandar Utama) and two schools Gombak School and Klang Methodist Girls School) will be within 1km of the NSP SWM facilities. One possible argument against the proximity concern of ESR is that the locations of the NSP SWM are tentative and at the national level will require some adjustments before finalization. Nevertheless, this argument relies too heavily on relinquishing the planning responsibility to the project EIA level rather than the strategic policy level. The main counter-argument is that these issues should be addressed as practically as possible within the SWM strategies and the fact that 89% of the NSP facilities are in proximity of ESR does not bode well for the strategic planning of the NSP (Partidário, 1996). Another possible argument in terms of ESR is that residents will protest against the siting of SWM facilities not matters where or how it is designed due to the Not In My Backyard (NIMBY) syndrome in Malaysia (Agamuthu & Fauziah, 2010a). This reasoning may have merits based on similar experience in Asia especially for SWM incinerators (Asakura et al., 2010; Hsu, 2006). Nevertheless, this logic is also flawed since the main premise of SEA and ESR places the ‘due diligence’ burden on the policy makers and the SWM policy planning system rather than conveniently bypassing this strategic planning. This is also the essence of public participation, which requires dialogue and engagement where policy issues are decided on national interest based on rational cumulative impacts rather than emotional individual interest. Ultimately, the consideration of ESR within the SWM policy planning may not result in an ideal scenario where there are no ESR proximity within SWM facilities but it will reduce the number of ESR in close proximity as well as rationalize the trade-off in a more transparent manner (Gauthier et al., 2011).

5.3.4 Water Quality Index (WQI)

1. Baseline Environment

Malaysia utilizes the Water Quality Index (WQI) as the basis for the assessment of rivers and the designation of river classes as stipulated in the National Water Quality Standards for Malaysia. The WQI was derived using Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Ammoniacal Nitrogen (NH 3 -N), Suspended Solids (SS) and pH. Consequently, Peninsular Malaysia has about 200 clean rivers, 111 slightly polluted rivers and 37 polluted rivers. Pahang had the highest number of clean rivers followed by Johor and Perak while Johor had the highest number of polluted rivers followed by Penang and Selangor. The WQI also indicate that Johor followed by Melaka had the biggest different between the highest and lowest WQI of the river basins within the State (Figure 5.7) & (Department of Environment, 2012). The worst polluted river basins in Peninsular Malaysia are the Air Baloi and Pasir Gudang river basin in Johor with a WQI of 41 and 43 respectively. Meanwhile the cleanest river basin is the Kisap river basin in Kedah with a WQI of 92. Generally, the trends indicate that river basins in Johor, Penang and Selangor are polluted which is also consistent with states with the highest pollution loads in terms of WWTP and STP (Table 5.12). River water quality pollution has been a source of concern in Malaysia to the extent that the government has initiated numerous river basin pollution prevention programmes as well as is conducting a comprehensive pollution mapping of rivers to determine the major sources of river pollution in Malaysia (The Star, 2012d). Furthermore, the government has also launched the River of Life (ROL) project under the National Economic Transformation Programme (ETP) to improve the water quality of the Klang river basin in Malaysia (Puspadevi, 2013).

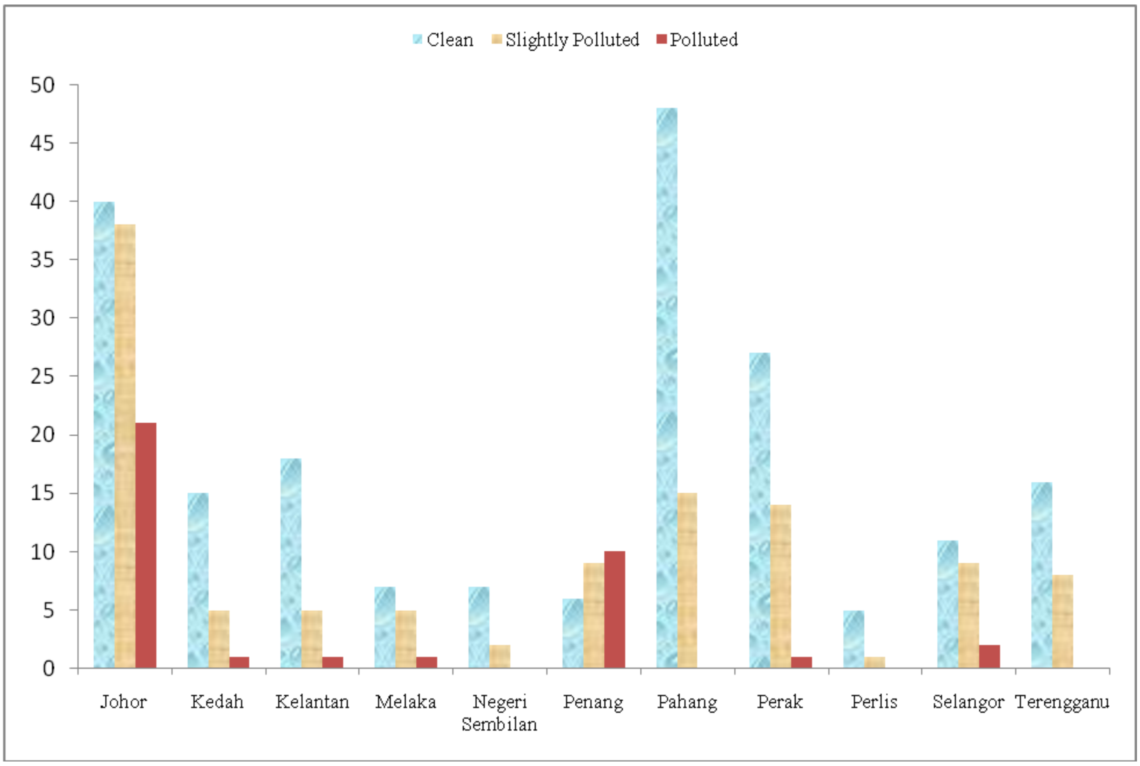


Figure 5.7 : River Water Quality Status in 2011

Table 5.12 : Average WQI of River Basins in Peninsular Malaysia

No	State	River Basin	Average WQI	Status[a]
1.	Johor	Air Baloi	41	3
2.	Johor	Batu Pahat	75	2
3.	Johor	Benut	70	2
4.	Johor	Danga	49	3
5.	Johor	Endau	81	1
6.	Johor	Jemaluang	78	2
7.	Johor	Johor	84	1
8.	Johor	Kempas	51	3
9.	Johor	Kim-Kim	64	2
10.	Johor	Mersing	81	1
11.	Johor	Muar	81	1
12.	Johor	Paloi	87	1
13.	Johor	Pasir Gudang	43	3
14.	Johor	Pontian Besar	58	3
15.	Johor	Pontian Kecil	70	2
16.	Johor	Pulai	64	2
17.	Johor	Rambah	59	3
18.	Johor	Sanglang	47	3
19.	Johor	Sedili Besar	78	2
20.	Johor	Sedili Kecil	77	2
21.	Johor	Segget	53	3

Table 5.12 : Average WQI of River Basins in Peninsular Malaysia (Continued)

No	State	River Basin	Average WQI	Status[a]
22.	Johor	Skudai	67	2
23.	Johor	Tebrau	56	3
24.	Kedah	Kedah	81	1
25.	Kedah	Kisap	92	1
26.	Kedah	Merbok	79	2
27.	Kedah	Muda	89	1
28.	Kedah	Ulu Melaka	89	1
29.	Kelantan	Golok	86	1
30.	Kelantan	Kelantan	88	1
31.	Kelantan	Kemasin	79	2
32.	Kelantan	Pengkalan Chepa	67	2
33.	Kelantan	Pengkalan Datu	79	2
34.	Melaka	Duyong	80	2
35.	Melaka	Kesang	85	1
36.	Melaka	Melaka	84	1
37.	Melaka	Merlimau	53	3
38.	Melaka	Seri Melaka	62	2
39.	N.Sembilan	Linggi	84	1
40.	P. Pinang	Bayan Lepas	69	2
41.	P. Pinang	Kluang	79	2
42.	P.Pinang	Jawi	70	2
43.	P.Pinang	Juru	60	2
44.	P.Pinang	Kerian	81	1
45.	P.Pinang	Perai	62	2
46.	P.Pinang	Pinang	55	3
47.	Pahang	Anak Endau	84	1
48.	Pahang	Balok	71	2
49.	Pahang	Bebar	73	2
50.	Pahang	Cherating	76	2
51.	Pahang	Kuantan	86	1
52.	Pahang	Merchong	90	1
53.	Pahang	Pahang	86	1
54.	Pahang	Rompin	86	1
55.	Pahang	Tonggok	69	2
56.	Perak	Bernam	91	1
57.	Perak	Bruas	87	1
58.	Perak	Kurau	85	1
59.	Perak	Perak	80	2
60.	Perak	Raja Hitam	71	2
61.	Perak	Sepetang	87	1
62.	Perak	Wangi	66	2
63.	Perlis	Perlis	84	1
64.	Selangor	Buloh	58	3
65.	Selangor	Klang	73	2
66.	Selangor	Langat	80	2
67.	Selangor	Selangor	87	1

Table 5.12 : Average WQI of River Basins in Peninsular Malaysia (Continued)

No	State	River Basin	Average WQI	Status[a]
68.	Selangor	Sepang	73	2
69.	Selangor	Tengi	77	1
70.	Terengganu	Besut	91	1
71.	Terengganu	Chukai	81	1
72.	Terengganu	Dungun	90	1
73.	Terengganu	Ibai	77	2
74.	Terengganu	Kemaman	78	2
75.	Terengganu	Kertih	92	1
76.	Terengganu	Marang	81	1
77.	Terengganu	Merang	69	2
78.	Terengganu	Merchang	69	2
79.	Terengganu	Paka	88	1
80.	Terengganu	Setiu	84	1
81.	Terengganu	Terengganu	85	1

Source : Department of Environment, 2012. Note a : 1 (Clean), 2 (Slightly Polluted) and 3 (Polluted)

2. <u>ASEA Evaluation</u>

The ASEA findings indicate that about 5% of the NSP SWM facilities may be located in river basins that are polluted with a WQI of below 60. Meanwhile about 40% of the facilities may be located in river basins that are slightly polluted with a WQI between 60 to 80. Finally, about 55% of the facilities will be located within river basins that is clean with a WQI above 80. This implies that about 45% of the NSP SWM facilities will be located within river basin that is currently under environmental stress. The NSP SWM facilities that are within river basins that are polluted are SLF Sbg Perai, SLF Johor Baharu, MRF Sbg Perai and TFS Manjung. On the other hand, about 16% of the high capacity NSP EPL facilities will be located in river basins, which are either polluted or slightly polluted. Interestingly, only the SLF Seberang Perai in Penang, which is also a high EPL facility, is located in a polluted river basin that is also a water catchment area.

The significance of these findings is that these 16 % high capacity NSP EPL will be contributing significant pollution loading to river basins that are currently polluted or slightly polluted and may result in further deterioration of river water quality. This highlights the important link between pollution loading and river water quality, which is framed by two schools of thought on river water quality management. The first approach emphasizes on mitigation and addresses river pollution through technological means of enforcing the DOE environmental standards for industrial WWTP, domestic STP and landfill leachate discharge into river system. This approach believes that the river pollution can be mitigated by merely meeting standards and installing pollution control equipment such as gross pollutant traps (GPT) to trap rubbish in river systems (Sadiq, 2012). This means that the river system functions as a natural wastewater treatment system that dilutes the discharges based on its assimilative capacity. The problem arises when the river system is already polluted and is unable to cope with the additional pollution loading resulting in significant negative impact to its ecosystem function including providing drinking water supply for human consumption (Meng, 2013). Meanwhile, the second approach emphasizes prevention through an integrated river basin management and seeks to address river pollution through both complying with environmental discharge standards as well as limiting and managing the pollution loading into river system. This means not only meeting environmental standards is important but also reducing the discharge quantity or raising the discharge quality before releasing it into rivers under stress. The challenge with this approach is that it requires a holistic approach where pollution sources such as the NSP SWM facilities prevent and reduce pollution loading into river systems that are polluted or slightly polluted so that it maintain its ecosystem service functions (Elfithri et al., 2011). This will require a paradigm shift in the existing mind-set of river water quality management in Malaysia.

Generally, the first approach is more popular especially with government agencies since it is relatively simpler to implement and does not require a drastic change in discharge practices. Nevertheless, the main disadvantage of this approach is that it fails to account for the carrying capacity of the river system and presumes that wastewater sources can discharge as much as they want as long as they meet environmental standards. Nevertheless, the second approach is more in line with the SEA philosophy of preventing environmental problems where practical. Consequently, this disputes the NSP SWM approach of siting high pollution loading SWM facilities in polluted river basins, which also provide drinking water supply as this poses a high risk of river water pollution. The other aspect that the NSP may have failed to consider is that in the event of spills or emergency discharge of leachate this could result in the shutdown of water intake plants that supply drinking water to millions of residents as experienced in Selangor (Shazwan, 2010). SWM facility leachate poses a serious contamination problem not only for surface water but also to soil and groundwater resources due to the presence of high levels organic pollutants and heavy metals (Agamuthu & Fauziah, 2010b; Suratman et al., 2011). The recent initiative by the government on pollution mapping of river pollution sources suggest that the authorities are beginning to realize that while in the short-term the mitigative first approach may be simpler but in the long-term, the preventive second approach may be more strategic and cost effective. Projects such as the River of Life in the Klang river basin, Selangor are estimated to cost the government about 500 million USD (Khoo, 2011). This raises the question of whether the government is willing to spend another 500 million USD on mitigating potential pollution loading problems of the NSP SWM facilities in river basins. Alternatively, the government can invest in a preventive approach of the SEA in minimizing the potential problems of the NSP SWM facilities and spend the fund allocated for river clean-ups on source reduction of pollution loading.

5.3.5 Air Pollutant Index (API)

1. Baseline Environment

Malaysia utilizes the Air Pollution Index (API) as a basis for the assessment of air pollution and its impact on human health. The API is calculated based on the average concentration of the air pollutants of SO_2, NO_2, CO, O_3 and PM_{10}. The highest air pollutant concentration will determine the value of the API. Peninsular Malaysia had about an average of 173 days of good API, 189 days of moderate API and 2 days of unhealthy API in 2011. Perlis had the highest days of good API followed by Kedah and Pahang while Melaka had the lowest days of good API (Figure 5.8) (Department of Environment, 2012). The API trends indicate that the highest monthly maximum API was in Tanjung Malim at 165 while the lowest monthly maximum API was in Langkawi at 40 (Figure 5.8) (Table 5.13) (Government of Malaysia, 2012c).

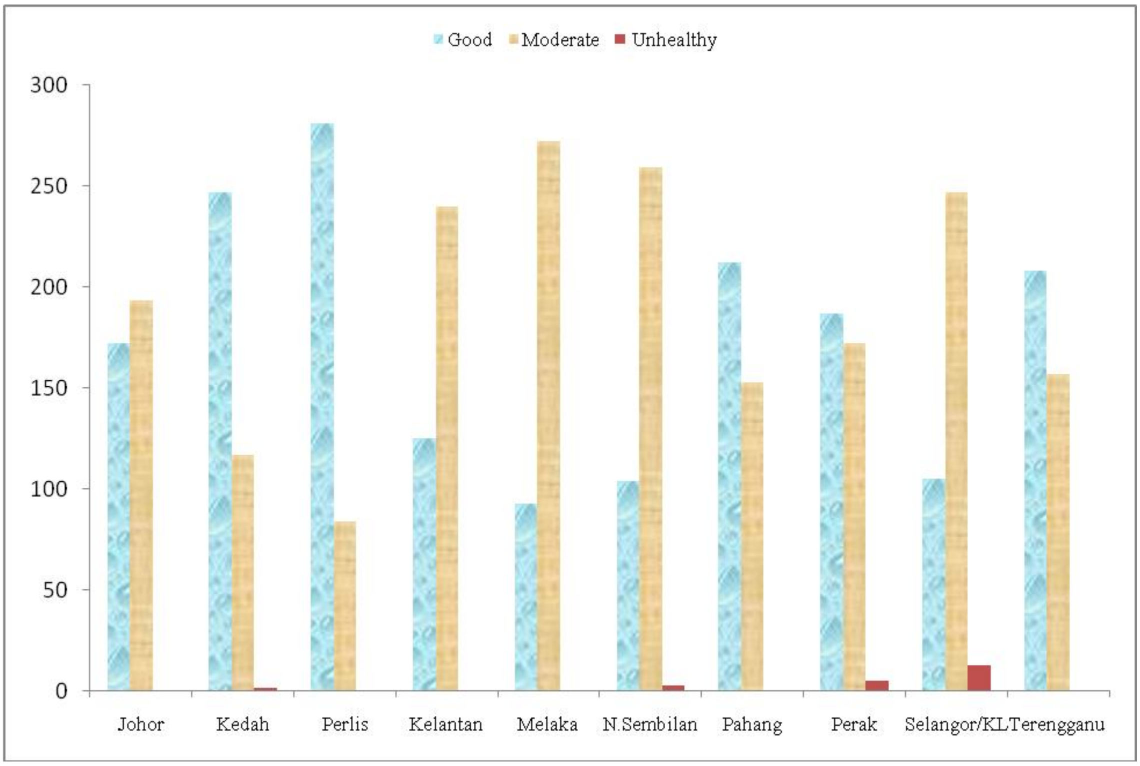


Figure 5.8 : API Days of Good, Moderate & Unhealthy in 2011

Table 5.13 : Monthly Maximum API in 2011

No	State	Station	API Min	API Max	API[a] Average
1.	Johor	Pasir Gudang	51	111	74
2.	Johor	Muar	60	91	72
3.	Johor	Kota Tinggi	58	102	69
4.	Johor	Larkin	50	84	68
5.	Kedah	Sungai Petani	62	107	77
6.	Kedah	Alor Setar	54	118	75
7.	Kedah	Langkawi	40	78	56
8.	Kelantan	Tanah Merah	62	80	72
9.	Kelantan	Kota Bharu	52	72	62
10.	Melaka	Bukit Rambai	68	99	84
11.	Melaka	Bandaraya Melaka	67	97	81
12.	Negeri Sembilan	Port Dickson	82	132	95
13.	Negeri Sembilan	Seremban	78	112	94
14.	Negeri Sembilan	Nilai	77	107	90
15.	Pahang	Balok Baru	60	82	69
16.	Pahang	Kuantan	54	76	63
17.	Pahang	Jerantut	41	71	55
18.	Perak	Tanjung Malim	52	165	95
19.	Perak	Tasek, Ipoh	66	95	78
20.	Perak	Pegoh, Ipoh	67	99	77
21.	Perak	Taiping	47	81	65
22.	Perak	Seri Manjung	40	104	64
23.	Perlis	Kangar	47	80	59
24.	Pulau Pinang	Seberang Jaya	58	98	77
25.	Pulau Pinang	USM	59	89	75
26.	Pulau Pinang	Perai	58	98	74
27.	Selangor	Cheras	86	150	121
28.	Selangor	Shah Alam	81	158	104
29.	Selangor	Batu Muda	77	120	103
30.	Selangor	Banting	83	115	93
31.	Selangor	Klang	79	112	93
32.	Selangor	Putrajaya	81	103	91
33.	Selangor	Petaling Jaya	72	116	88
34.	Selangor	Kuala Selangor	51	95	71
35.	Terengganu	Kemaman	44	95	69
36.	Terengganu	Kuala Terengganu	53	77	66
37.	Terengganu	Paka	42	71	57

Source : Department of Statistics (2013), Note[a] : 0-50 (Good), 51-100 (Moderate) and >100 (Unhealthy)

2. <u>ASEA Evaluation</u>

The ASEA evaluation indicates that all the NSP SWM facilities will be located within areas that have a moderate air quality which have an average API between 51-100. This in the context of average API, implies that none of the NSP SWM facilities pollution loading would be significant. Nevertheless, the findings also indicate that about 10% of the NSP SWM facilities are in areas that are very close to becoming unhealthy levels, which are average API beween 90-100. These NSP SWM facilities are TFS Port Dickson, TFS Tg Malim, SLF Seremban, TFS Kuala Pilah, TFS Tampin, TFS Jempol, MRF Klang and TFS Jelebu. Interestingly the majority of these facilities are in the state of Negeri Sembilan. Furthermore, the states of Selangor, Negeri Sembilan, Perak, Kedah and Johor during peak periods recorded unhealthy air quality, which have a maximum API above 100. The significance of these findings is that the existing air quality may only be critical during abnormal peak periods rather than normal average periods. This means that the NSP SWM facilities especially TTPs and SLF may need to be especially conservative in their air emission during unhealthy air quality levels. This is especially relevant for Selangor, which has recorded the highest number of stations with a peak API at unhealthy levels. One possible reason may be due to the higher number of industrial air pollution and landfill sources in Selangor. This coupled with the highest population figure in the country may have resulted in the unhealthy air quality during peak periods. This is consistent with the fact that air quality in Malaysia reached hazardous levels during peak periods of the Haze incident where schools was closed and major outdoor events were cancelled. The Haze refers to air quality deterioration to dangerous levels in Malaysia due to forest fires in Indonesia and is an annual occurrence during the dry months (Lai, 2013c).

One main criticism of the current approach to air quality management in Malaysia is its reactive approach. Some NGOs have insisted that the government take a more proactive stance in managing air quality rather than waiting for an air quality crisis like the Haze (The Star, 2013c). This suggests that Malaysia may have to manage both its domestic air emissions and its international regional cooperation to combat air quality deterioration during peak periods. This may imply that NSP SWM air pollutant discharges either from plume emissions from thermal treatment plants or landfill gas flaring may have to be constrained during peaks periods such as the during Haze or poor climatic conditions when wind dispersion patterns are minimal. This may also entail NSP SWM facilities in Negeri Sembilan adopting a higher standard of air emission due to the dangerously close air quality to unhealthy levels. Consequently, national policy and legislation development on air quality management indicate that the government is already taking the initiate towards a more sustainable approach to air quality management. This includes policy commitments in the ninth and tenth Malaysian Plans as well as the development of a draft Clean Air Regulations which includes SWM facilities such as waste incinerators. These latest developments are expected to revamp the current approach and limits of emission for air pollution management from domestic sources (Abdullah et al., 2012). In terms of its non-domestic air pollution causes, the government has been pressured to take a more firm stand towards Indonesia to manage its forest fires and ratify the Asean Agreement on Transboundary Haze Pollution (Pillay, 2013). Finally, while the individual NSP SWM facility impacts may not be significant in terms of the baseline API, the cumulative air quality impacts will be significant for all the 80 NSP SWM sites in Malaysia especially for states like Selangor Johor and Pahang, which have the highest number of NSP SWM facilities.

5.3.6 Public Perception Concern (PPC)

1. Baseline Environment

Public perception concern (PPC) refers to the level of public concern on individual interest as opposed to social benefits, economic development or environmental protection. PPC is a form of NIMBY syndrome where a PPC, which prioritizes individual concerns over environmental protection or social benefit, may indicate a higher level of resistance towards NSP SWM facilities. The PPC was based on the SEA survey where 1,200 respondents across 12 cities in Peninsular Malaysia ranked their highest priority on environmental protection, social benefits, economic development and individual interest. High PPC (score=3) were respondents who ranked individual interest as their highest priority while low PPC were respondents who ranked individual interest as their third or fourth highest priority (score=1). The PPC for Peninsular Malaysia indicated environmental protection ranked the highest priority at 63% followed by interest of affected individuals at 16%, followed by social benefits at 11% and finally economic development at 10%. Generally, most of the states ranked environmental protection first followed by individual interest except for Penang, which ranked environmental protection first followed by social benefit. Interestingly, this may indicate that Penang places higher priority on social benefits compared to the interest of individuals affected by SWM facility planning. The public perception trends indicate that Johor had the highest rating for environmental protection while Kedah had the lowest rating for environmental protection. Consequently, the public perception trends indicate that environmental protection and individual interest are the dominant priority while the economic development and social benefit priority seem to vary with the states (Figure 5.9). This is consistent with international surveys that record Malaysian’s public high level of concern on the environment (Nielsen, 2011).

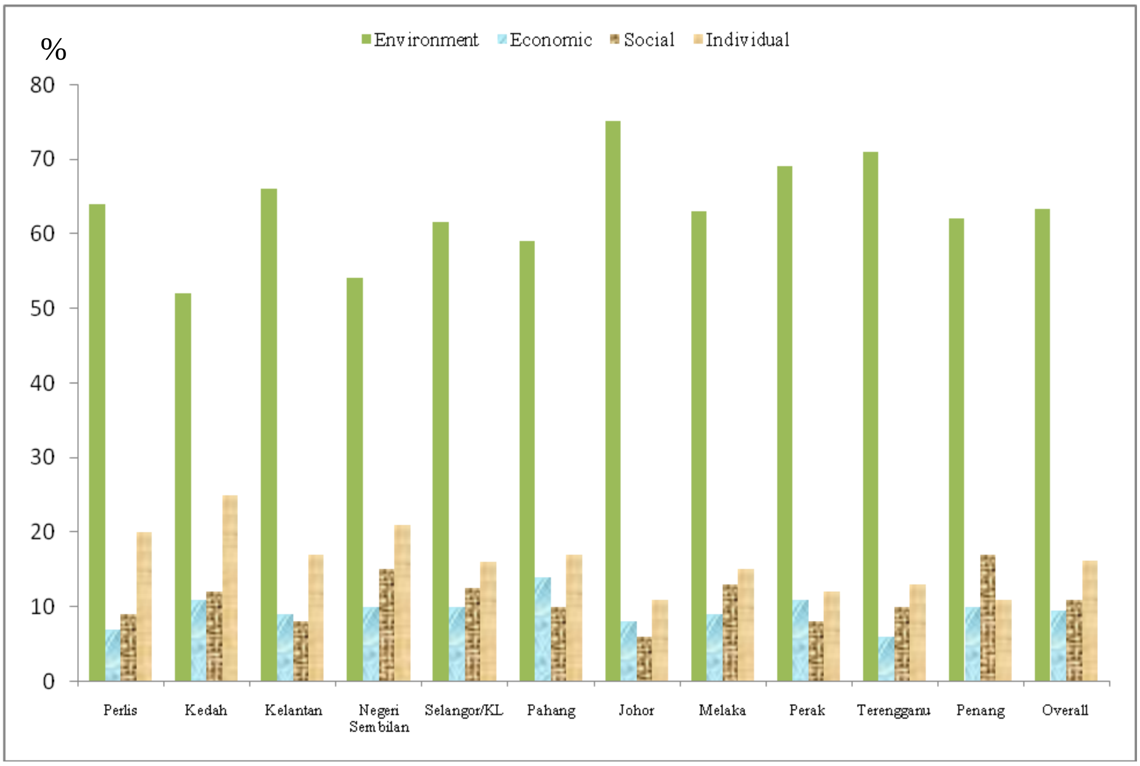


Figure 5.9 : Public Perception Priority in Peninsular Malaysia

2. ASEA Evaluation

The ASEA findings indicate that none of the NSP SWM had high PPC levels where individual interest was prioritized over environmental concerns. About, 95% of the NSP SWM had moderate PPC levels where individual interest was ranked second to environmental protection. Interestingly, about 5% of the NSP SWM had low PPC levels where environmental protection and societal benefits were prioritized over individual interest. These NSP SWM facilities were TTP Pulau Pinang, TFS Pulau Pinang, MRF Seberang Perai and SLF Seberang Perai. This implies that generally the Malaysian public prioritizes environmental protection over individual interest though not above societal benefits except in the state of Pulau Pinang.

The significance of these findings indicate the Malaysian public dichotomy on environmental management. This means that the public may generally be supportive of SWM facilities except in cases where it may affect them personally such as the siting of SWM facilities adjacent their residential areas. This supports the findings of the Malaysian public's high concern for the environment but reluctance to pay the higher cost for environmental protection (The Star, 2011). This disparity in the public attitude on the environment and cost would especially be relevant to the 43% of the NSP SWM facilities located within 1km of residential areas. The proximity of these facilities to the residential areas has a high probability in resulting in public resistance towards them. This is consistent with previous incidents of protest and lawsuits against SWM facilities due to proximity concerns and environmental pollution (Loong & Cheah, 2007; Tan, 2012). Nevertheless, research also suggest that the public dissent with the SWM facilities in Malaysia may actually be due to a lack of public participation and quality of stakeholder engagement. These critics contend that the existing environmental public participation process are only conducted to legitimize the siting of SWM facilities or to utilize the public as information providers for the EIA reports while ignoring their concerns and feedback. These types of public participation are not likely to gain support but may in fact create resentment towards SWM facilities (Marzuki, 2009; Ramli et al., 2012). This implies that public participation if conducted only to legitimize projects or that ignores public concern maybe counterproductive and cause more resistance than support. There are concerns that the top-down policy planning approach does not support a democratic public participation process in Malaysia. This is due to the perception that the SWM projects have been determined in terms of location and design and that the public participation process is merely an administrative requirements to be fulfilled.

Consequently, the public may also perceive that any feedback provided will have no impact or input into the decision making process. In the long-term, this superficial public participation will only result in the public's disillusionment of the process. This has been further compounded by the limited recognition of the judiciary for public participation on environmental matters due to limited *locus standi* where individuals or organizations have to show proof of being directly affected by the environmental decision making process (Sharom, 2013). Meanwhile, one other concern on the public participation process is the capacity of the public to provide technical input rather than mere protest within the public participation process. Previous experience of highly controversial projects such as the Selangor Dam detailed EIA has revealed that the majority of the feedback were general protest of the project as opposed to scientific and technical comments on the detailed EIA. This raises the question of whether a meaningful dialogue can be established in the public participation process in Malaysia without raising the capacity of the public and stakeholders (Jaria, 2011). One possible measure would be to provide non-technical summaries to facilitate the public participation process as is practiced in many developed countries. Other measures would be to extend the period of the process to allow for better public participation. Nevertheless, the recent emphasis by the government on public participation especially in the formulation of new legislation indicates a positive development in this crucial area of SWM planning (Singh & Yuen, 2012). Admittedly, there are still some weaknesses in the limited period provided for public feedback and the objectivity of who evaluates these feedbacks, as it will still be in the domain of the civil service as opposed to an independent body. Ultimately, an effective public participation would require a transparent process such as SEA to ensure that the views and feedback of the public are taken into consideration in the decision making process.

5.3.7 ASEA Cumulative Environmental Impact (CEI)

The ASEA cumulative environmental impact (CEI) was conducted on the proposed NSP SWM sites for Peninsular Malaysia using the DEFINITE model with the weighted summation and the expected value method which is based on the transformation of all criteria into a scale of 0 - 1 (Figure 5.10) (Janssen, 2003). The detail ASEA input source and results are provided in Appendix 4. The DEFINITE models calculates the individual scoring of the six ASEA criteria (ESA, EPL, ESR, WQI, API and PPC) to obtain the CEI factor with a maximum score of 1.00. CEI factors of below 0.5 are considered low impact, 0.51-0.75 are considered moderate impact and 0.76 to 1.00 are considered as high impact. The CEI impact factors were charted for Peninsular Malaysia based on a relative impact magnitude (Figure 5.11). The findings indicate that about 21% of the NSP SWM facilities are categorized as high impact, about 66% moderate impact and only about 13% as low impact. This implies that about 89% of the NSP SWM facilities may require some form of review and revision to minimize the impacts on the environment at the policy level. The highest impact NSP SWM facilities are MRF Kajang, TFS Kemaman and SLF Rawang with a CEI factor of 0.85 while the lowest NSP SWM facilities are TFS Rompin, SLF Langkawi and TFS Maran with a CEI factor of 0.47. Meanwhile, the findings also indicate that the central-eastern region (Selangor, Kuala Lumpur, Kelantan, Terengganu and Pahang) have the highest number (9) of high impact NSP SWM facilities. Meanwhile the northern region (Perlis, Kedah, Pulau Pinang and Perak) and the southern region (Negeri Sembilan, Melaka and Johor) have about four high impact facilities each. This corroborates with policy concerns on the emerging environmental impacts due to urbanization where the central region is one of the most urbanized areas in Malaysia (LESTARI, 1997).

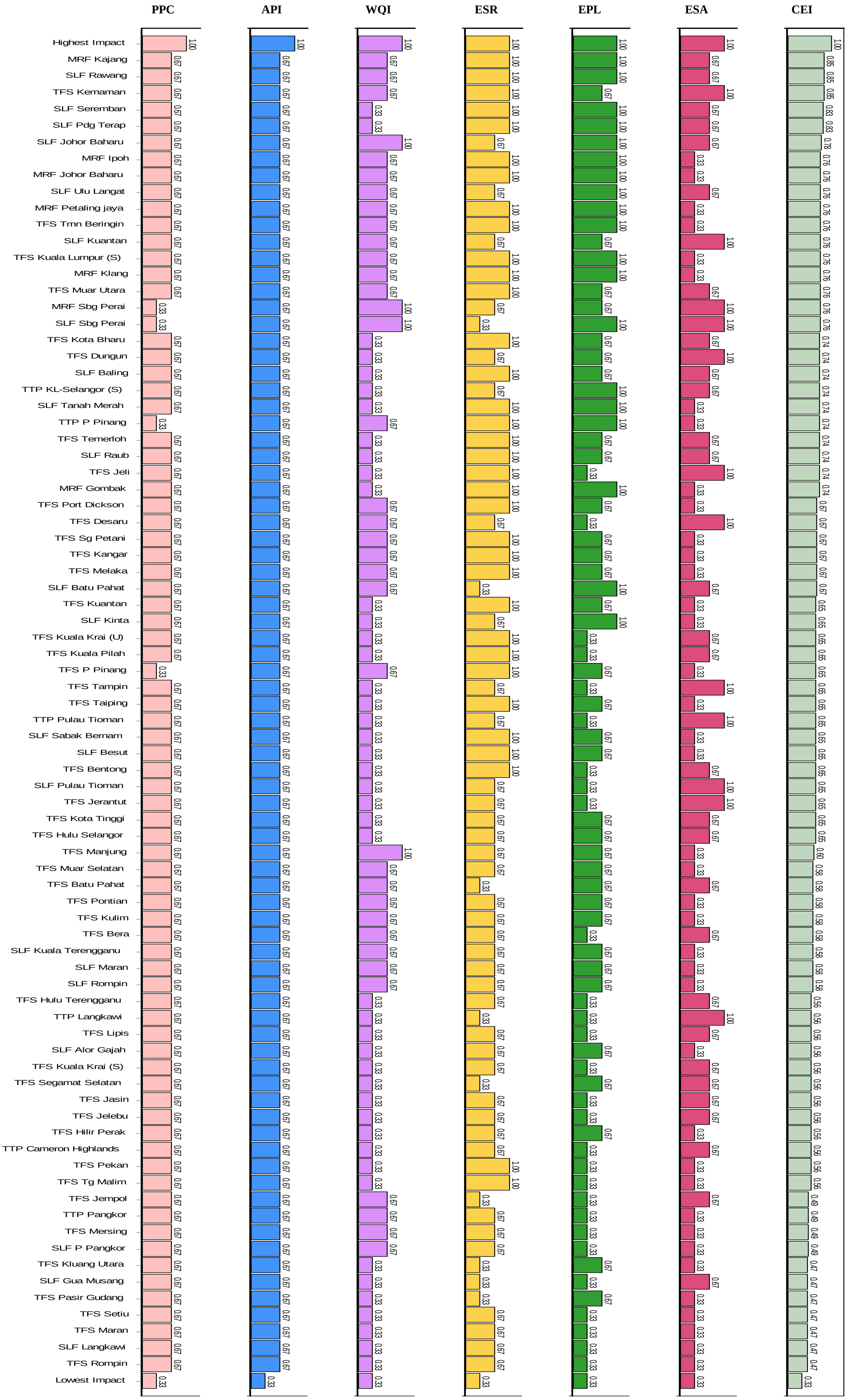


Figure 5.10 : NSP DEFINITE Cumulative Environmental Impact

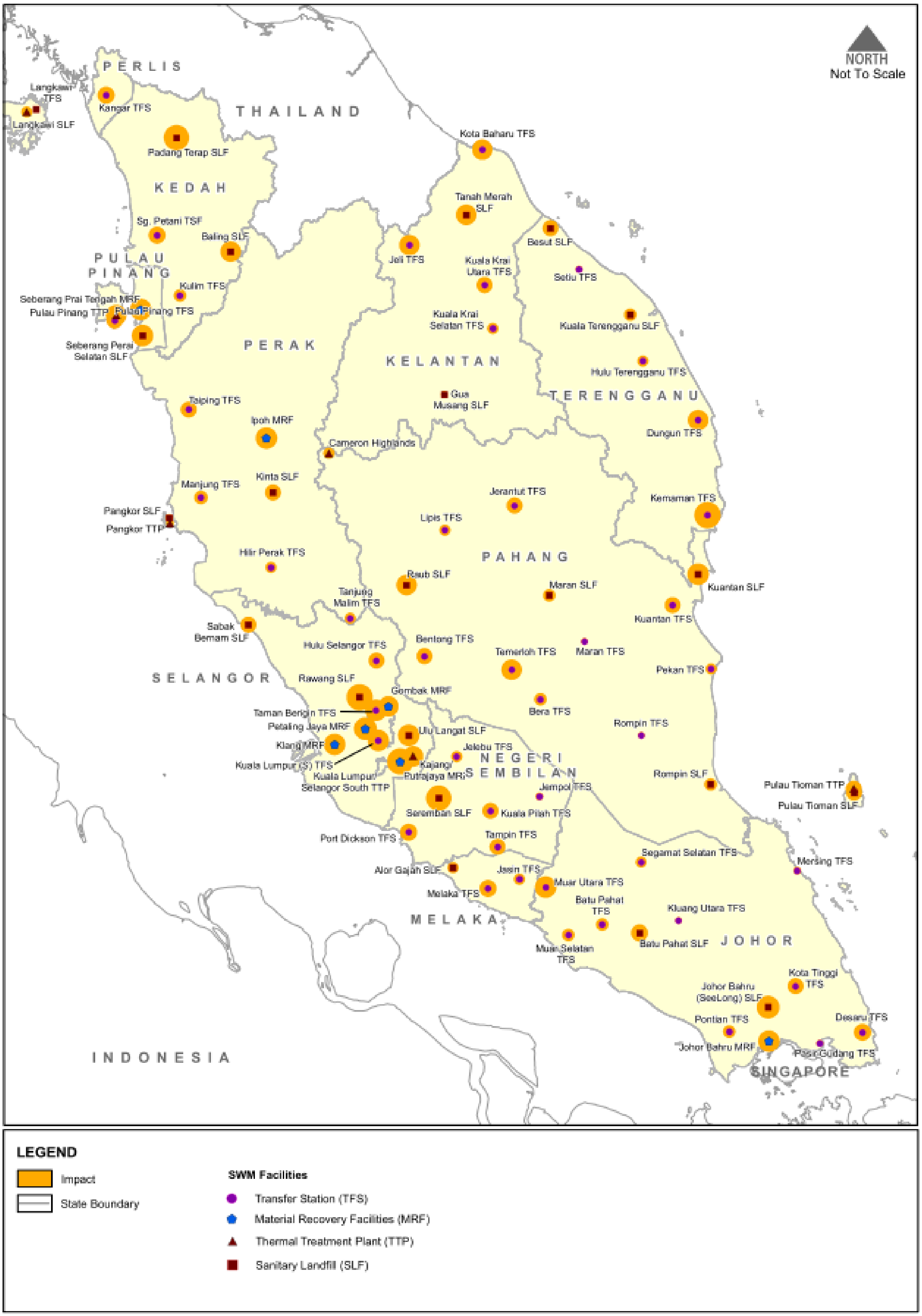


Figure 5.11 : ASEA CEI Factors

The implications of the ASEA is that it provides a demonstrated analytical framework to evaluate potential impacts in an integrated manner. This is important especially in the context of sustainable development where development objectives consisting of environmental, economic and social aspects have to be rationalized and integrated in strategic policy planning. One of the main challenges in SWM facilities planning has been to satisfy multiple sectoral and stakeholders requirements. This is because the NSP SWM facilities may have different impacts on various components of the environment such as ESA, ESR and PPC. The ASEA addresses this multiple perspectives by evaluating the impact in a cumulative manner resulting in a CEI factor that enables decision makers to rationalize and prioritize SWM facilities that may be high in one aspect but low in another. SEA in this context provides an objective basis for SWM policy planning to facilitate environmental integration in the broader national aspiration towards sustainability (White & Noble, 2013). Consequently, the significance of these findings further reinforce the limitations of the existing SWM planning at the strategic level especially in achieving sustainable development. Generally, there is a consensus that sustainable development in Malaysia has been severely limited despite its many policy and public commitments (Hezri, 2004). Sceptics have often lamented that sustainable development has become a buzzword with many proclaiming it but with few comprehending it and even fewer operationalizing it (Chiew, 2005). Interestingly, this supports the existing perception by the NGOs that Malaysia's environmental planning is currently unsustainable (Chan, 2013). More importantly, is the question on why sustainable development has failed to materialize in Malaysia in practice. Consequently, the two possible causes for the sustainable development dilemma in Malaysia relates to the willingness to embrace the concept and on the capability to implement it.

The first cause have been attributed to the ideological stance of Malaysia in the 1980s that resisted the concept of sustainable development based on the premise that it was initiated by developed countries for nefarious 'eco-imperialistic' purposes. This resulted in a latent opposition to western environmental ideologies while at the same time defending the right of less wealthy countries in the South for development against the wealthy countries in the North. Scholars have argued that this mind-set was prevalent well into the early 2000s and has resulted in a deeply rooted resistance to sustainable development that often prioritizes economic development over environmental protection or social considerations. This was further intensified by the indifference of the state governments in tackling issues of patronage and economic development at the expense of environmental protection (Hezri & Nordin Hasan, 2006). Consequently, this may have resulted in a kind of environmental inertia apathy at the policy level after more than two decades of limited action on environmental sustainability in strategic decision making. An example of this was the comprehensive National Conservation Strategy prepared in 1993 for the Prime Minister's Department but never officially endorsed or published until today. Another consequence of this earlier mind-set is also the increased emphasis on the project level EIA that may have provided greater opportunities for implementation since they were less constrained by political posturing on environmental issues at the international level. Nevertheless, this trend has seen a reversal with the Prime Minister of Malaysia Najib Razak recently pledging a commitment to the environment including maintaining a 50% permanent forest cover and a 40% reduction in carbon emission intensity by 2020 (Bernama, 2013). Some may perceive this as a sign that Malaysia is on the right track on balancing the needs of the environment and development while others may contend that this is another environmental public rhetoric of having the right words without the right implementation (Bernama, 2012).

The second cause on the lack of sustainable development may be due to lack of capacity in operationalizing sustainable development and other environmental mechanisms such as SEA. Undoubtedly, concepts such as sustainable development and SEA have often been discussed abstractly with a philosophical perspective that eludes specific how to measures that can be operationalized in a national policy planning context. The literature on SEA even in the international arena is biased towards qualitative discourses rather than quantitative empirical studies. This is aggravated by the fact that most of the SEA research is heavily focused on developed countries as well as still limited in sectors such as waste and tourism (Fischer & Onyango, 2012). Nevertheless, trends in Malaysia since 2008 indicate that the EPU under the Prime Minister's Department has embarked on exploratory work on SEA with the support from the Danish International Development Assistance (DANIDA) programme. Key areas investigated are water resources management and biodiversity mainstreaming where a workshop on SEA for Natural Water Resources was conducted in June 2008 (Dusik & Xie, 2009). Subsequently, the EPU in 2009 published a circular on 'Guidelines for Planning and Preparation of Development Programmes and Projects in Malaysia', which includes a section on SEA. Nevertheless, the focus of the circular was on EIA at the project level while the description on SEA was limited to its benefits as opposed to practical application frameworks (Economic Planning Unit, 2009). The recent developments in the EPU are a positive sign for sustainable development and SEA especially in terms of capacity building. The key problem with these trends is that there has been no publication or notification on SEA since the DANIDA projects. Some may conjecture that this implies, the SEA capacity building was mainly driven by the DANIDA programme as opposed to internal need for change in addressing environmental issues. This suggest that Malaysia is still constrained by its past mind-set established by the previous government administration.

Consequently, SEA development suggest that both a constrained mind-set and a limited capacity building in SEA application framework are the main causes of sustainable development roadblocks in Malaysia. The main problem seems to be the top-down policy signal from the current administration on SEA as well as the translation of the conceptual notion of SEA into practical application frameworks that can be used by the respective planning agencies. However, recent progress in the public pledge by the Prime Minister Najib Razak on environmental integration in development planning is an important signal to government agencies. This coupled with the recent circular on public participation on new legislation and the 600 million USD funding to incentivise the production and utilization of green technology products are clear indicators that Malaysia is embarking on a pathway towards sustainable development (Bernama, 2013). One important caution to be kept in mind is that this new environmental mind-set may require some time to trickle down to the various planning agencies. Consequently, the only other limitation that requires to be addressed is the availability of practical SEA application framework. This is where the ASEA framework mitigates the gap by providing a SEA framework that has been operationalized on the NSP SWM. The advantage of the ASEA framework is that is based on an international SEA protocol but utilizes local Malaysian environmental criteria and baseline information such as the ESA network, WQI and API. Furthermore, it integrates social concerns by including ESR and PPC, which addresses public proximity concerns on SWM siting. Conversely, one limitation of the ASEA is that it has not been operationalized for other sectoral policy planning beyond SWM and its applicability in these areas is unverified. Nevertheless, the ASEA does provide a starting point to initiate the translation of SEA into practical application. Finally, one of the more significant insights to emerge from this study is that policy makers behavioural mind-set plays an important role in transforming SEA policy into practice.

5.4 Policy Implications

The ASEA framework's potential policy implications are that it provides a validated framework customized based on Malaysia's ESA system and existing environmental indices to assess and to rank SWM facilities that have a high potential to impact the environment in Malaysia. This provides a strategic and preventive measure at the policy planning level to screen, rank and implement intervention initiatives to minimize potential cumulative and irreversible environmental impacts as well as to optimize SWM facility design planning at an early stage. Currently, the environmental evaluation of SWM facilities in Malaysia is left to the EIA stage when the site selection and planning design has generally been determined. This poses significant constraints to the EIA as facility siting and design play a critical role in preventing and mitigating potential impacts to environmental systems such as biodiversity, life support systems and sensitive receptors such as residential areas. The lack of strategic environmental planning for SWM facilities at the policy planning level may potentially result in irreversible loss of biodiversity, significant pollution loading on environmental systems that are already above their carrying capacity and critically impact sensitive receptors such as residential areas that in turn may result in protest and resistance to the SWM facilities. Examples of pollution and public protest to SWM facilities are already evident in the states of Selangor, Perak and Johor (Agamuthu & Fauziah, 2010b; Tan, 2012; The Star, 2013a). The effect to the country due to these significant environmental issues is beyond environmental impacts but may also result in economic and social impacts in terms unnecessary loss of time, resources and potential litigation in micro mitigating these issues at the project level. The ASEA potentially enables strategic options for decision makers at the policy planning level to strategically plan these SWM facilities in an efficient and objective based decision making process.

The ASEA framework can be conceptual illustrated in the ASEA Impact Matrix where the ESA ranking area is compared with the potential SWM pollution loading or the potential sensitive receptor. Sectors with combinations of ESA Rank 1 typically results in potentially negative environmental impacts even with the low potential pollution loading or sensitive receptors while combinations with ESA Rank 2 and high pollution loading or sensitive receptors typically results in negative environmental impacts (Figure 5.12).

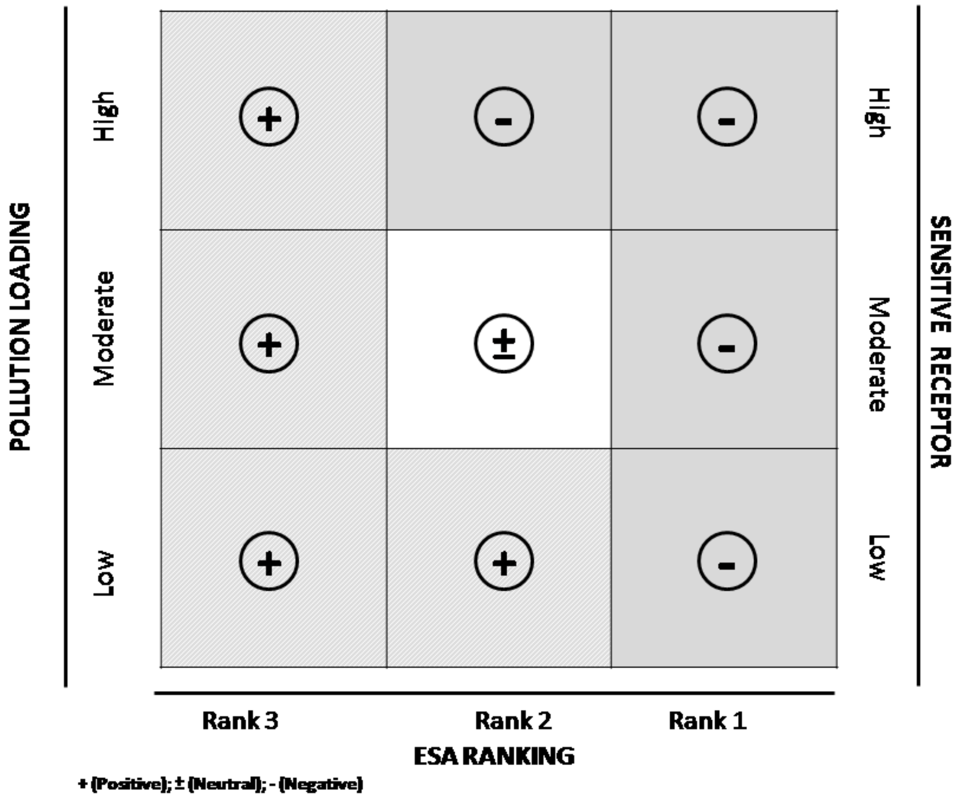


Figure 5.12 : ASEA Impact Matrix

The specific policy implications of the ASEA framework findings for policy makers and decision makers indicate the following strategic policy implication areas.

1. Adoption of ASEA Framework

The first policy implication is the potential ASEA framework adoption by the DSWM as a prototype policy optimization tool. The advantages of the ASEA framework is its customization based on the ESA, ESR, WQI and API. Furthermore, the ASEA also includes site-specific public feedback mechanism in the form of PPC. This is especially significant for the DSWM, as experience with poorly sited SWM facilities has resulted in litigation and public protest. Furthermore, SWM siting in critical ecosystem areas such as water catchment areas has also resulted in disruption of water supply to millions of people. This has economic significance, as the degradation of forest ecosystem services is an economic loss since water intakes expend resources to treat polluted water. The cost of raw water treatment is inversely proportionate to the quality of the water. This means polluted rivers have higher cost per unit of treated water, which is typically borne by the public. It has been estimated that the economic valuation of a forest is about 600 million USD per hectare in Selangor (Awang Noor et al., 2007) while the economic loss of water supply disruption is about 35,000 USD per day for every million consumers (Bernama, 2011). Currently, the DSWM relies on the EIA to mitigate environmental problems of SWM facilities. However, this means the EIA is only conducted once the site, design and capacity have been determined. At this stage if the site is unsuitable, the EIA may be rejected. However, even rejected EIAs have a cost associated with it including the cost for the engineering feasibility studies, which can range from the millions depending on the size and scale of the SWM facility. Consequently, the adoption of the ASEA in the interim period may provide a cost effective means of screening potential problematic and unsuitable sites even before the EIA stage, thus saving the government and the public taxpayer millions of ringgit in time and money.

2. Review of the NSP SWM

The second policy implication is the potential review of the NSP SWM by the Government of Malaysia. The findings of the ASEA indicate that the NSP SWM has minimal integration of environmental considerations including for ESA, ESR and PPC. Potentially, about 51% of the NSP SWM sites will be in ESA areas including in high biodiversity and critical ecosystem areas such as water intake catchments. Furthermore, about 43% of the sites may be located within 1km of residential areas though this figure may vary slightly as the ESR has been estimated at a national scale where the exact location may differ. These findings support the notion that it is timely for the NSP to be revised and updated with an ASEA framework optimizing its findings. Experiences in Europe indicate that SEA frameworks can optimize waste management plans by providing a macro and strategic technical input into the planning. Nevertheless, SEA advocates also highlight that SEA goes beyond technical input where it also provides a legitimate platform for stakeholder engagement and public participation as well as indirectly addresses socio-political issues. The simple but startling realization among policy makers and researchers in the field is that policy planning including SWM is highly political and publicly sensitive. This means that technical solutions to SWM problems and challenges may be only addressing one side of the problem while ignoring the softer socio-political side of SWM. Some scholars argue that SWM is a complex dynamic interaction between the federal and state governments as well as between stakeholders and the public. In the Malaysian context, this socio-political gap is becoming apparent as different political parties wrest control of the states from the traditional ruling party. Already in terms of SWM, this has resulted in the states of Selangor, Pulau Pinang and Perak from the alternative parties rejecting the adoption of the SWMA.

Furthermore, the NSP SWM may also require a paradigm shift of SWM policy planning from facilities planning to waste prevention via SEA. The focus of waste preventive is to ensure that waste is prevented from being generated by strategically tackling the root cause of waste generation, which is unsustainable production and consumption. This is also similar with international experience where little focus is given to waste prevention and minimization as opposed to waste treatment and disposal. Most studies indicate that this failure to adopt an integrated approach limits SWM policy planning's usefulness to decision makers (Pires et al., 2011). Typically, waste plans do mention waste prevention conceptually but lack pragmatic and specific measures in their implementation (Desmond, 2009). This is also consistent with the ASEA findings, which indicates that the focus of the NSP has mainly been in SWM facilities planning as opposed to waste prevention where by 2020 the waste generation for Malaysia is projected to increase from 17,000 TPD to 48,630 TPD. This is an almost 300% increase in solid waste generation for Malaysia where SWM facilities planning without measures to reduce waste generation at source is generally unsustainable and is expected to continually require additional facilities which places a pollution burden on the environment. Consequently, the adoption of waste prevention measures is in line with the SEA principle of 'pollution prevention', which seeks to prioritize prevention of pollution rather than mitigation of pollution. Admittedly, this is easier said than done as even in the waste hierarchy, SWM policy actors perceive their limited influence over waste consumption and production decision making at the national level. Nevertheless, the recent drive on climate change priorities has demonstrated the success of realigning SWM towards waste prevention initiatives (Marshall & Farahbakhsh, 2013). Ultimately, the NSP formulated in 2005 is drastically in need of a revision into a more sustainable SWM strategy for Malaysia.

3. Establishment of a SEA Management Unit (SMU)

The third policy implication is the establishment of a SMU initially within the DSWM with the responsibility to administer SEA implementation on SWM PPPs in Malaysia including the screening of SWM EIA. The complex nature of SWM and environmental issues requires a dedicated unit within the DSWM to engage and establish linkages with decision makers, cross-sectoral agencies, stakeholders and the public both at the federal and state levels in Malaysia. This is significant since SWM PPP often intersect with a number of different agencies involved in landuse and development planning as well as extend across various state and regional boundaries. This means the SMU has to build partnerships on SEA with politicians, sectoral government agencies, NGOs and potentially affected public with differing agendas. This is because insight from Europe indicate that politicians, sectoral agencies and the public may find it difficult to appreciate the relevance of SEA to their individual concerns and as such resist SEA implementation (Cherp et al., 2011). Meanwhile, NGOs who are often the strongest supporters of SEA may also have difficulty in balancing between environmental concerns and development needs, which sometimes require trade-off at a macro-context. One potential criticism of the SMU may arise from the perceived lack of 'political will' as well as personnel resources to support SEA implementation. Granted that resources and personnel for a dedicated unit on SEA will be a challenge but this is also possible since the DSWM is a new agency established under a newly enacted legislation namely the SWMA. As a result, this provides the opportunity for the DSWM to experiment with novel approaches that can optimize the existing SWM process. This also is in line with one of the key mandate of the DSWM which is to "establish a sustainable solid waste management system so as to safeguard public health, protect and conserve the environment and preserve natural resources" (Department of Solid Waste Management, 2013b).

4. Establishment of an Environmental Information System (EIS)

The fourth policy implication is the potential development of a SEA EIS by the DSWM, which integrates a database of key environmental criteria of ESA, ESR, WQI, API and PPC. The SEA EIS main purpose would be for the early screening and detection of potentially high impact SWM facilities prior to proceeding with the EIA. This is because the ASEA framework provides a working prototype for the development of a SEA EIS. SEA EIS including Geographical Information Systems (GIS) has been identified as key tools to support SEA decision support in Europe though experience here also suggest that it needs to be customized to local conditions and environmental systems (Culshaw et al., 2006; Partidário & Wilson, 2011). An EIS for the DSWM makes sense in the long-term as it also reduces dependence on external consultants to conduct internal screening of SWM facilities as well as monitoring of the SEA system. This is also significant in terms of utilizing existing environmental databases in Malaysia, as the key criteria of the ESA, WQI and API used in the ASEA are available from DTCP and the DOE Malaysia. This means the DSWM would not need to waste time and resources acquiring these data but only need to develop strategic linkages with existing government agencies such as the DTCP and DOE. Nevertheless, one main weaknesses in the existing system is the data sharing and inter-agency coordination, which is often hindered by bureaucracy and departmental tunnel vision. The other criticism is that environmental data is often treated as confidential information where even the API at one time was considered a state secret under the Official Secrets Act (OSA) (New Straits Times, 2004). This situation is now changing with the API being publically available which is why an EIS is timely as part of an ASEA framework.

5. Formulation of a SEA Steering Committee (SSC)

The fifth policy implication is the potential formulation of a SSC consisting of representatives from key agencies that may have an impact on SWM policy planning. This includes but is not limited to representatives of the Ministry of Urban Wellbeing, Housing and Local Government (MHLG), DSWM, Ministry of Natural Resources and the Environment (MNRE), DOE and DTCP. The main purpose of the SSC would be to coordinate, facilitate and integrate environmental considerations at the SWM policy planning level to ensure SWM facilities do not pose irreversible significant environmental impacts but without limiting or replicating the jurisdiction of existing ministries/departments. Lack of inter-sectoral coordination can cause tremendous problems for integrated environmental management and planning (Ng & Obbard, 2005). This is because the ASEA framework evaluation indicates any implementation of SEA for SWM policy planning would be not be possible without the integration of inter-sectoral agencies that is involved in environmental and urban planning. SEA will have limited influence in national policy planning as long as strategic environmental integration is perceived as the responsibility of one agency only. Key areas that requires inter-sectoral coordination would be the integration of the Malaysian ESA system, WQI and API within a SEA framework as these would be the basis of a strategic environmental planning of SWM facilities in Malaysia. SEA experiences in Europe indicate that potential systemic problems in SEA implementation are due to lack of coordination between departments and the duplication of efforts. Interestingly, some studies highlight that this form of coordination and cooperation between departments cannot be enforced through legislation or compulsory participation but rather requires the fostering of a culture of cooperation between departments within the government (Nooteboom et al., 2008). Consequently, this supports the premise of the SSC, which will be an administrative group to provide the platform for inter-sectoral coordination.

6. <u>Formulation of a SEA Governance Centre (SGC)</u>

The sixth policy implication is the potential establishment of a SGC at the federal level. The ASEA findings indicate that essential elements of the environment, economic and social have inadequate linkages and integration at the national level as demonstrated in the NSP. Generally, successful SEA implementation for SWM requires it to be mainstreamed in national policy planning including the Five Year National Development Plans. This mainstreaming of SEA at the national level will then cascade down to the various departmental planning including the DSWM. Otherwise, SEA initiatives for SWM policy planning will most likely fizzle out after the initial excitement and impetus. Nevertheless, the function and responsibility of the SGC is not to implement SEA but rather to facilitate SEA policy, strategy and plans. This means the SGC provides the resources, technical assistance and standards for SEA implementation in Malaysia. Furthermore, the SGC is also envisaged as a SEA hub and knowledge centre for agencies, organizations, researchers, NGOs and the public. The SGC is expected to establish linkages with international organizations for the purpose of SEA development in Malaysia. One of the main weaknesses identified for SEA in Asia is the lack of cooperation and inadequate information and experience sharing within the region (Hayashi et al., 2011). Consequently, the SGC can also function as a regional SEA knowledge hub to enhance capacity building for SEA and national policy planning. This also has significance for SEA innovation in Malaysia as SWM issues become more complex and require innovative solutions for common problems including poverty reduction (Ghanime et al., 2011). This means SEA implementation has to evolve beyond mimicking developed countries and adopting general SEA solutions to customized SEA applications in Malaysia’s socio-political climate. Ultimately, a national SEA mainstreaming will have a positive development effects to sectoral SEA such as SWM.

5.5 Conclusion

In conclusion, the ASEA study findings highlight a critically minimal level of environmental policy integration at the strategic level for SWM in Malaysia. The operationalization of the ASEA framework on the National Strategic Plan (NSP) for SWM indicate that 51% of its SWM facility siting is either within environmental sensitive areas, which are protected areas, or in water catchment areas. The ASEA policy implications are the adoption of the ASEA framework and a review of the NSP SWM as well as the establishment of an SEA Management Unit, Environmental Information System, SEA Steering Committee and a SEA Governance Centre. Ultimately, the ASEA framework provides a Malaysian customized SEA framework at the policy planning level to minimize potential cumulative and irreversible environmental impacts for SWM. Consequently, sustainable SEA policy implementation may require complementing the ASEA framework with strategic behaviour frameworks as part of a dynamic system rather implementing them individually as static plans (Dennis & Agamuthu, 2012b). This will require a paradigm shift from the traditional view of SEA as an individual environmental evaluation plan to a revolutionary perspective of SEA as part of a multi-dimensional approach. This suggest the linking of the SBM and ASEA framework as part of a SEA policy systems model.

6.0 SEA POLICY RECOMMENDATIONS

6.1 Introduction

The SEA policy recommendations were formulated based on the findings of the SEA policy analysis, SEA Behavioural Models (SBM) and Analytical SEA Framework (ASEA) evaluation of the Malaysian National Strategic Plan (NSP) for SWM. The SEA policy recommendations were framed using the four main elements of an Environmental Management System (EMS), which were planning, implementation, monitoring and review. This is considered as a dynamic system since the policy recommendations will be monitored and subsequently improved as part of a Plan, Do, Check and Act cycle (PDCA). This is in contrast to typical policy recommendations, which focuses on only planning and implementation and are considered static plans. This also is envisaged to address the limitations of the NSP, which is a static plan and has yet to be reviewed and updated since its formulation in 2005. This is consistent with research findings that the even though numerous approaches have been developed for SEA, a common theme is the need for continual improvement as part of a management system (Bao et al., 2004b; Brown & Thérivel, 2000; Dalkmann et al., 2004). Furthermore, international experience indicates that policy recommendations based on the EMS elements have a high potential for continuous improvement and pollution prevention than static environmental plans. These insights from emerging SEA trends suggest that SEA policy recommendations framed using the EMS PDCA cycle is more likely to achieve sustainable environmental integration rather than focusing on any one element individually. Nevertheless, experience with SEA policy recommendations using the EMS PDCA have been limited with the exception of Sweden, which has applied it at the local government level (Sheate, 2011).

Interestingly, these SEA application using EMS PDCA have proposed modified approaches, which link SEA policy recommendations and EMS PDCA by adapting it for government agencies. The key advantage of formulating SEA policy recommendations using the EMS PDCA framework is that it commits the government agency to monitoring and continual improvement in policy formulation but does not impose restrictive compliance limits and certification requirements. Other benefits include a systematic and transparent mechanism of policy planning as well as enhanced credibility and support with inter-sectoral agencies and the public (Alshuwaikhat & Abubakar, 2007). Finally, the SEA policy recommendations aims to achieve environmental sustainability by reframing environmental policy integration within a vertical and horizontal paradigm of the Malaysian policy planning system. This means the SEA policy recommendations for SWM addresses both up-streaming of SEA to policy makers, down-streaming of SEA to the public and cross-streaming of SEA to inter-sectoral agencies. This is consistent with the application of a dynamic system to implement the SEA policy recommendations derived from the policy implications of the SBM and ASEA. Consequently, this would enable the consideration of both the behavioural and technical aspects of SEA and result in a cascading systemic environmental integration effect for SWM policy planning in Malaysia (Dennis & Agamuthu, 2012a). In conclusion, the SEA policy recommendations has been parsimoniously framed within the context of an EMS PDCA framework and thematic areas of planning, implementation, monitoring and environmental governance to achieve continual improvement of SEA in SWM (ISO, 2004). This means that the SEA policy recommendations can be flexibility implemented using elements of the EMS that are relevant while still conforming to the PDCA cycle since EMS by its very nature is a flexible and adaptive instrument that can be adapted to dynamic situations.

6.2 Background of EMS

An EMS is a set of processes and procedures, which function as part of a system that enables an organization to achieve its environmental policies and objectives (Alshuwaikhat & Abubakar, 2007). An EMS has four main elements consisting of policy and planning, implementation and operations, checking and finally management review, which follows a continual improvement process of Plan, Do, Check and Act. The first element of Plan refers to the establishment of processes required to achieve the objectives of the policy while the second element of Do refers to implementing the processes. Meanwhile the third element of Check refers to monitoring and auditing the processes against the policy, objectives and other requirements. The final element of Act refers to establishing resources and implementing measures to continually improve the EMS (ISO, 2004). The ISO 14001 EMS standard is one of the most well known in the world with more than one million organization certified. Traditionally, private corporations adopted EMS as an independent certification of their environmental conformance to an international recognized standard though recently government organizations have also been adopting it to enhance the sustainability of their policy planning. Internationally, the USA has implemented EMS for all its federal agencies through an executive order from the President entitled "Greening the Government through Leadership in Environmental Management" (Government of the United States of America, 2000). In Malaysia, the Public Works Department (PWD) is certified to ISO 14001 EMS for its projects in environmentally sensitive areas. This is a commendable environment initiative for a federal government agency in Malaysia. Consequently, international trends including in SEA applications indicate that the key elements of the EMS is increasingly being used and adapted as a flexible policy integration framework (Alshuwaikhat & Abubakar, 2007).

6.3 SEA Objective

The main objective of the SEA policy recommendations is to facilitate the systemic and strategic integration of environmental consideration in SWM PPPs with the ultimate aim of ensuring environmental protection in Malaysia. The sub-objectives of the SEA policy recommendations are:-

- Establishing a SEA policy declaration to publicly committing and uniting stakeholders and the public for the common good of a sustainable environmental policy planning system in Malaysia.
- Establishing a transparent policy planning system inclusive of legislative measures and strategic plans to benchmark policy visions and implementation.
- Establishing a pragmatic and proven operational systems consisting of guidelines, procedures and analytical frameworks for SEA implementation.
- Establishing an all-inclusive communication and access to information for stakeholder consultation and public participation.
- Establishing a robust SEA environmental information system to support strategic environmental decision making.
- Establishing an independent and objective monitoring and auditing system to ensure the efficiency and effectiveness of the SEA system.
- Establishing a good governance systems consisting of a collaborative and consultation mechanism both on a vertical and horizontal cross-sectoral integration of agencies and organizations.

6.4 SEA Guiding Principles

The SEA policy recommendations are directed by the following three (3) guiding principles for its five thematic areas based on the EMS PDCA. Each strategic thematic areas will encompass a broad range of policy instruments required to address complex and multi-dimensional environmental issues in SWM including environmental objectives and targets. The SEA policy recommendations guiding principles has been derived from key acknowledgements within the existing environmental management framework coupled with international and national trends in SEA and other environmental initiatives. Firstly, the SEA policy recommendations are based on an acknowledgement that internationally environmental priorities have evolved from simple end of pipe pollution control measures to sectoral pollution prevention initiatives and finally to integrated systems based cross-sectoral environmental thematic areas addressing issues of environmental sustainability (Hezri & Hasan, 2004).

Secondly, the SEA policy recommendations are based on an acknowledgement that strategic environmental integration including SEA intervention may require an innovation in environmental thinking and planning and one that may be based on dynamic environmental systems rather static environmental assessments. This means strategic environmental policy planning may have to adopt an iterative approach that takes into consideration potential adaptation of its objectives, targets and initiatives to cater for developing situations and environmental conditions as opposed to static assessments and plans that have to be implemented irrespective of the situation (Jordan & Lenschow, 2008).

Thirdly, the SEA policy recommendations acknowledges that there is an abundance of policies, which has resulted in some progress in environmental management. However, this does not always translate into environmental practice or better environmental quality. Therefore, a SEA policy systems model has not only to formulate objectives, targets and initiatives but also to anticipate potential obstacles to strategic environmental management (Aliman, 2012). This is because, environmental obstacles may vary from region to region and sometimes take different forms with the same function but generally consists of primarily short-term thinking where many environmental initiatives are abandoned because of excessive vested interest in short-term outcomes rather than in long-term investment in the environment. Furthermore, a secondary obstacle is the fragmentation of environmental initiatives where many environmental initiatives with similar objectives are commenced individually without coordination and result in undermining each other. Finally, a tertiary obstacle is the reactive approach to environmental problems where action to address environmental problems are procrastinated until environmental problems reach critical levels or becomes a public issue (Hezri & Nordin Hasan, 2006; Maidin, 2005). Finally, the SEA policy recommendations are based on an acknowledgement that certain environmental issues can be complex and obscure and will require time for stakeholders and public to come to terms with due to traditional worldviews and complex socio-political dynamics. Nonetheless, strategic environmental integration requires that we envisage potential issues and proactively address them today so that we can have a better tomorrow even though society as whole may not embrace these issues at present. This is because certain environmental issues may result in irreversible consequences if it is addressed too late beyond a certain tipping point and as such would require some measure of precautionary planning built-in the current environmental planning framework (Fuller, 2013).

Consequently, the SEA policy recommendations in recognizing the inter-dependence and connectivity of the environment adopts the following guiding principles :-

SEA Principle 1 : Strategic Environmental Integration

- Environmental protection shall constitute an integral part of the planning and development process in all sectors with a view towards environmental sustainability.

SEA Principle 2 : Public Participation

- Stakeholders shall cooperate and contribute as environmental partners to conserve, protect and rehabilitate the environment where different stakeholders have a common but differentiates responsibility in contributing to environmental sustainability.

SEA Principle 3 : Pollution Prevention

- The pollution prevention approach shall be promoted to ensure that pollution and waste is prevented or minimized at source as opposed to end of pipe pollution treatment, which seeks to treat pollution after it is generated.

6.5 SEA Thematic Areas

The SEA policy recommendations were based on the SEA policy analysis, SBM and ASEA findings and structured based on the five thematic areas of the EMS PDCA to construct the SEA policy systems model (Figure 6.1). A key caveat is that the SEA policy recommendations were framed flexibly on the EMS PDCA elements with the purpose of organizing the policy recommendations. This was to address the limitation of EMS as it was primarily designed for corporations and industries and not for policy recommendations. Nevertheless, this approach was consistent with the practice in modifying SEA implementation within an EMS framework while recognizing its limitation (Alshuwaikhat & Abubakar, 2007; Hjelm et al., 2010). Consequently, SEA policy recommendations were formulated in coherence with the EMS PDCA elements with modifications to customize for the SWM policy planning in Malaysia (Table 6.1).

Figure 6.1 : SEA Policy Systems Model

Table 6.1 : EMS PDCA and SEA Policy Recommendations

EMS Element	**SEA Thematic Areas**	**SEA Policy Recommendations**	**Key Basis**
• Scope	• SEA Scope	• SEA Scope	SWM
• Environmental Policy • Planning	• SEA Policy Planning	• SEA Declaration • SEA Legislation • SEA Blueprint	SBM SBM SBM
• Implementation	• SEA Operational Implementation	• Analytical SEA Framework • SEA Public Engagement • SEA Training	ASEA SBM SBM
• Monitoring	• SEA Monitoring Audit	• SEA EIS • SEA Management Unit • SEA Commission	ASEA ASEA SBM
• Management Review	• SEA Governance	• SEA Steering Committee • SEA Governance Centre • SEA SWM PPP Review	ASEA ASEA ASEA

Each SEA policy recommendations were assigned a subjective and relative potential impact and implementation probability of moderate or high. Potential impact refers to the potential contribution impact of the policy recommendation on the development and implementation of SEA in Malaysia. Moderate impact are contribution impacts that are mainly confined within the SWM sector with limited cascading and multiplier effects on SEA development in Malaysia while high impact are contribution impacts that are typically cross-sectoral and has a cascading and multiplier effect on SEA development in Malaysia. Implementation probability refers to the relative ease and simplicity in implementing the policy recommendations. High implementation potential are SEA policy recommendations that can be implemented within the purview of the SWM sector while moderate implementation probability are policy recommendations that require intervention at the national and federal government level.

6.6 SEA Scope

The SEA scope defines the coverage of SEA application for SWM in Malaysia where SWM PPPs including the NSP currently is not subject to environmental integration requirements during the policy planning stage. All SWM facilities including landfills and incinerators are subject to a detailed EIA under the EIA prescribed activity list of the Environmental Quality Act 1974. Thus, environmental policy integration is only during the EIA stage where most of the project planning have been finalized. This has resulted in environmental pollution, public protest and litigation of SWM facilities (Tan, 2012). Furthermore, the study findings indicate that NSP SWM has limited provisions of environmental integration where about 51% of its facilities are located within ESA sites, which has a high potential to affect biodiversity and critical ecosystem areas such as water catchment areas. The implementation of a SEA for all SWM PPP's with a potential project EIA is in line with the SEA requirements internationally especially in Europe where PPP's of projects which require an EIA are subject to a SEA. Moreover, the SEA requirements in Europe also extends to SWM PPP, which do not require an EIA if it is deemed warranted. Nevertheless, this may be ambitious for a top-down country like Malaysia with a poor track record on implementing even existing environmental policies. Ultimately, even the implementation of the SEA PPP subject to EIA will be considered a tremendous achievement for Malaysia. Consequently, the study recommends that an SEA shall be carried out for all SWM PPPs, which have the potential to result in an EIA due to SWM facilities such as landfills as well as recycling and thermal treatment facilities. The scope of the SEA was adapted from the SEA Protocol and Resource Manual developed by the United Nations (United Nations, 2003a, 2012). The application of a SEA for SWM PPPs is expected to minimize significant environmental impacts due to poorly planned SWM facilities in Malaysia as well as obtain stakeholder and public support for SWM policy planning.

6.7 SEA Policy Planning

The SEA policy planning is the public commitment, declaration and strategic planning of the EMS element to achieve strategic environmental policy integration. This is the driver for implementing and improving the SEA policy recommendations so that it can achieve its ultimate objective of intra-sector and inter-sector strategic environmental policy integration. The main aspects of the SEA policy recommendations within the policy planning element are :-

- The SEA Declaration on the Environment shall be defined and documented within the context of the environmental policy at the national, regional and local levels.
- The SEA Declaration on the Environment shall reflect the commitment of the DSWM to comply with applicable environmental legal requirements and other requirements, to prevent pollution and to achieve continual improvement.
- The SEA Declaration on the Environment shall be sufficiently understood by internal and external interested parties.
- The SEA Declaration on the Environment shall be communicated to all internal and external personnel.
- The SEA Declaration on the Environment shall be periodically reviewed and revised to adapt to robust conditions and situations.
- The SEA planning shall include identifying strategic environmental intervention positions, legal frameworks as well as objectives and initiatives for SEA implementation.

6.7.1 Adoption of the SEA Declaration on the Environment

The DSWM has formulated its vision and mission, which includes the establishment of a sustainable SWM system to safeguard public health, protect and conserve the environment. Nevertheless, the study findings indicate that public awareness of SWM policies and plans are below 40% while SEA awareness is below 25%. Public awareness of SWM and environmental policies can ultimately determine the success or failure of SWM systems (Marshall & Farahbakhsh, 2013). An SEA environmental declaration can serve the dual purpose of raising awareness on the environment as well as obtain buy-in from stakeholders and the public. Trends indicate SEA policy elements has the potential to function as a public relations and communication tool (Gachechiladze-Bozhesku & Fischer, 2012b). Consequently, the study recommends the adoption of an SEA Declaration on the Environment, which articulates the guiding principles and commitment to the environment. This also provides the opportunity for the public and stakeholders to pledge and sign in principle without any binding obligations. The adoption of the SEA Declaration on the Environment is expected to be a powerful tool to bring together all SWM stakeholders and the public for environmental sustainability of SWM in Malaysia. This SEA policy recommendation is considered moderate impact and high implementation probability. The SEA Declaration on the Environment shall conform but is not limited to the following requirements:-

<u>SEA Declaration Requirements</u>

1. The DSWM shall define and endorse a SEA policy consisting but not limited to the following :-

i. Commitment to ensure the integration of environmental considerations in PPPs.

ii. Commitment to conform to the requirements of international and national environmental policies.

iii. Commitment to comply with applicable environmental legal requirements.

iv. Commitment to adopt the SEA Guiding Principles of Strategic Environmental Integration, Public Participation and Pollution Prevention.

v. Commitment to the EMS framework, SEA objectives and SEA policy recommendations via a documented, maintained and implemented system.

vi. Commitment to communicate or make available its SEA policy to internal and external stakeholders and the public.

<u>SEA Declaration Template</u>

"We the People of Malaysia in recognizing Malaysia's commitment towards international and national environmental agendas and conventions such as Agenda 21 and the Malaysian National Policy on the Environment acknowledge Malaysia requires a clean and healthy environment to ensure the sustainable development of its cities and people as well as our current environmental issues stem from existing mindsets in managing the environmental and natural resources and require a paradigm shift in addressing environmental challenges. Therefore, Malaysia in recognizing the inter-dependence and connectivity of the environment adopts the environmental guiding principles of Strategic Environmental Integration, Public Participation and Pollution Prevention. Finally, Malaysia in recognizing that our shared environment binds us to a common future which requires a firm dedication from all parties to act individually and collectively, commits to endorsing and supporting measures to incorporate protection, conservation and enhancement of environmental management by adopting a Strategic Environmental Assessment approach to development planning which includes measures to enhance environmental governance by facilitating partnerships and sharing of information between public, stakeholders and decision makers for strategic environmental management"

6.7.2 Formulation of a SEA Legislation

Malaysia does not have a SEA legislation though SEA has been promoted in national development and environmental policies and plans (Dennis & Agamuthu, 2013). The study findings indicate that SEA application in Malaysia is low in SWM with an emphasis of addressing environmental issues only during the EIA stage. This has resulted in a reactive approach in mitigating environmental issues as opposed to a proactive approach in preventing issues in the SWM policy planning stage. Furthermore, the study findings also indicate that 84% of policy makers and 78% of the public perceive SEA implementation for SWM in Malaysia requires a SEA legislation. This is supported by SEA trends in both Europe and Asia that suggest that SEA legislation is the key driver for SEA implementation (Tetlow & Hanusch, 2012). The study SEA models also indicate that SEA legislation is a critical enabler for SEA implementation for SWM in Malaysia. Consequently, the study recommends the formulation of a SEA legislation at the federal level for PPP that may result in a project subject to the EIA prescribed activity list of the Environmental Quality Act, 1974. This would also include the SWM facilities such as landfills and incinerators. The proposed SEA legislation would also empower the establishment of an SEA Council, SEA Centre and SEA Protection Areas. The formulation of a SEA legislation for Malaysia should result in the strategic integration of environmental consideration at the national level and streamline EIA implementation. Furthermore, this would also increase stakeholder engagement and public participation in environmental policy planning in the country since it is mandated by legislation (Elling, 2011). This SEA policy recommendation is considered high impact and moderate implementation probability. The SEA legislation shall conform but is not limited to the following requirements:-

SEA Legislation Requirements

1. The Government of Malaysia shall review, amend or formulate where applicable its existing legislation and regulation in PPP planning to include provisions for SEA consisting but not limited to the following :-

i. Legislative provisions to implement SEA in new or significantly revised PPPs.

ii. Legislative provisions to adopt the SEA recommendations in new or significantly revised PPPs.

iii. Legislative provisions to obtain stakeholder and public feedback of the SEA findings in the new or significantly revised PPPs.

2. The Government of Malaysia shall enact a SEA legislation with subsidiary regulation in PPP planning without limiting the jurisdiction, powers and functions of the existing Environmental Quality Act consisting but not limited to the following :-

i. Empower the mandatory requirement for a SEA for PPPs which have the potential to have significant environmental impacts including and exclusive to PPP's prepared for the projects under the EIA prescribed activity list of the Environmental Quality Act 1974, and which set the framework for future development projects that requires an environmental impact assessment under national legislation.

ii. Empowers the establishment of a SEA Commission with the function to review and mediate SEA implementation between the government and the public as well as monitor and audit SEA implementation to minimize gaps and enhance existing SEA integration without limiting or replicating the jurisdiction of existing environmental or solid waste legislation.

iii. Empower the establishment of a SEA Governance Centre with the function to collate, maintain, update and disseminate data and studies on SEA as well as to provide a physical knowledge hub for agencies, organizations, researchers from institutions of higher learning, research institutes, libraries and documentation centres for the purpose of coming together and building and enhancing knowledge on SEA.
iv. Empower the establishment of SEA Protection Areas (SPA), which will be coordinated by the SEA Commission. SPA are environmentally sensitive areas which have been identified as having a high conservation value and ecosystem support function similar to the ESA Rank areas identified in the NPP.

6.7.3 Formulation of a SEA Blueprint

Malaysian environmental strategic direction is guided by the National Policy on the Environment (NPE), 2002. Nevertheless, the NPE at the policy level is still generic in nature and has not been translated into a National Environmental Blueprint or Strategy with measureable objectives, targets and programmes. Furthermore, the NPE is also still conceptual on the application of SEA and the integration of environmental considerations in policy planning. The study findings also indicate that stakeholder and public awareness of the NPE was relatively low at 52% and 37% respectively. This lack of strategic direction with implementable environmental targets and programmes has resulted in an ad-hoc implementation of environmental initiatives driven by public outcry of pollution problems. This has also resulted in NGOs calling for the declaration of an environmental emergency in the country due to declining quality of natural resources and environmental quality (Lai, 2013b).

Interestingly, a worldwide SEA Blueprint or Strategy is lacking even in the international community due to variations in country experiences and local application context (Sadler et al., 2011). Nevertheless, scholar have highlighted the importance of a national or regional environmental strategy in coordinating environmental activities and programmes towards a common goal. Accordingly, this is being implemented in Europe with sectoral and thematic environmental strategies and blueprints (Jordan & Lenschow, 2008). Consequently, the study recommends the formulation of a National SEA Blueprint to translate and implement the NPE environmental vision and commitment to implement SEA in Malaysia. This would also entail integration of environmental considerations in sectoral PPPs with respective targets and programmes including the solid waste sector. The formulation of a SEA Blueprint should integrate the various sectoral environmental initiatives into an integrated and macro SEA programme for Malaysia. This should result in the proactive prevention of environmental degradation in the country as potential environmental problems are addressed at the policy level in an integrated manner. This SEA policy recommendation is considered high impact and moderate implementation probability. The SEA Blueprint shall conform but is not limited to the following requirements:-

<u>SEA Blueprint</u>

1. The Government of Malaysia shall formulate, review and update as necessary a SEA Blueprint in PPP planning to outline the macro objectives, targets and mechanism for SEA implementation consisting but not limited to the following :-

i. The SEA Blueprint shall elaborate on the roles, functions and implementation mechanism for the SEA Commission and SEA Governance Centre.

ii. The SEA Blueprint shall identify specific SEA targets to be achieved by the year 2020, 2030 and 2050 in line with the pursuit of a fully developed nation status including strategic environmental integration, public participation and pollution prevention in SPA.
iii. The SEA Blueprint shall elaborate on the roles and responsibilities of the various stakeholders in the environmental and solid waste management framework.
iv. The SEA Blueprint shall elaborate on the use of the various SEA policy instruments that will be used to achieve the targets set in the SEA Blueprint. These instruments may include regulatory requirements, economic instruments or other best management practices that may be available.
v. The SEA Blueprint shall be reviewed and updated every 5 years in conjunction with the 5 Year Malaysia Plans.

6.8 SEA Operational Implementation

SEA operational implementation is the operational framework, guidelines and interventions related to the pragmatic implementation of SEA within the DSWM. SEA operational implementation relates to the who, why, what, where, when and how of implementing SEA is a systematic and prescribed manner. The main aspects of the SEA policy recommendations within operational implementation elements are :-

- To define, establish and document the ASEA framework for implementation including the methodology, evaluation criteria and reporting format.
- To determine and meet the capacity requirements of training necessary to ensure the capability of personnel involved in implementing SEA functions.

- To establish the lines of communication for internal and external stakeholders and the public.
- To establish documented frameworks and guidelines for the effective and efficient implementation of SEA where its deficiency has the potential to digress the DSWM from achieving its SEA policy and objectives.

6.8.1 Adoption of the Analytical SEA Framework

SEA is not formally conducted for PPPs in Malaysia though a few SEA have been applied for landuse plans and water resources study. Nevertheless, the findings indicate that there is no consistent methodology adopted in these SEA studies, which range from application of EIA approaches to descriptive and qualitative evaluation of environmental impacts. This results in ineffective application of SEA as well as frustration and abandonment of the SEA process due to limited operational analytical SEA frameworks (Dennis & Agamuthu, 2012a). Meanwhile, the study findings indicate that the ASEA framework developed for the NSP SWM performed adequately and was successful in integrating Malaysian environmental baseline information such as the ESA system, ESR, WQI and API indices within a United Nations SEA Protocol. International application of SEA also supports the finding on the lack consistent methodologies even within similar sectoral or country SEA while some argue that there is no single best methodology where SEA application needs to be customized according to local context (Brown & Thérivel, 2000). Consequently, the study recommends the adoption of the ASEA framework and reporting format developed for the NSP SWM in Malaysia, which has been validated through its application on the siting potential of the 80 NSP SWM facilities in Malaysia. The ASEA framework general methodology was adapted from the UN SEA Protocol (United Nations, 2003b).

This consists of formulating, reviewing and updating as necessary the ASEA framework in PPP planning to provide the scope, data requirements and methodological framework for SEA analysis (World Bank, 2011). The adoption and utilization of the ASEA framework should provide a concise, consistent and functional SEA methodology that can screen, analyze and synthesize SWM facilities environmental impact in Malaysia. Finally, the ASEA simplistic and robust design enables easy utilization of its analytical capabilities while providing a measure of customization of weights and scenarios for the more advanced users. This SEA policy recommendation is considered high impact and high implementation probability. The ASEA framework and reporting format shall conform but is not limited to the following requirements:-

<u>ASEA Framework</u>

1. The ASEA shall provide a description of the PPP, which is screened to determine key areas that has a potential significant environmental impact based on whether it would result in projects that would require an EIA within the Malaysian EQA prescribed activity list.
2. The ASEA shall determine the scope of assessment by setting the SEA objectives and components of the PPP to be evaluated based on established international and national environmental policy framework.
3. The PPP evaluation scope shall be described by identifying its environmental aspects and impacts.
4. Baseline environmental analysis shall be conducted on the existing state of the environment in terms of environmentally sensitive areas (ESA), environmental pollution loading (EPL), environmental sensitive receptors (ESR), water quality index (WQI), air quality index (API) as well as public perception concern (PPC) on potential areas affected by the PPP.

5. The ASEA evaluation shall identify environmental impacts of PPP aspects in terms ESA, EPL, ESR, WQI, API and PPC.
6. The ASEA shall conduct a multi-criteria analysis to weight and rank the cumulative impacts of the SWM facilities.
7. Finally, the ASEA shall develop potential preventive and mitigate initiatives for the PPP aspects and impacts.

<u>ASEA Reporting Requirements</u>

i. The SEA Reporting shall consist of an outline of the contents, main objectives of the PPP and the existing state of the environment and the potential environmental sensitive areas that may be affected by the PPP.
ii. The SEA Reporting shall consist of the environmental protection objectives, established at international, national and regional levels, which may be relevant to the PPP.
iii. The SEA Reporting shall consist of the potential environmental impacts including environmental aspects such as biodiversity and ecosystem functions as well as public concerns as reflected by the ESA, EPL, ESR, WQI, API and PPC in the ASEA.
iv. The SEA Reporting shall consist of measures proposed to prevent, reduce and mitigate any significant adverse effects on the environment due to the PPP.
v. The SEA Reporting shall consist of the rationale for alternative selection and a description of the evaluation framework including limiting conditions.
vi. The SEA Reporting shall consist measures proposed to monitor environmental conditions and potential impacts from the PPP.
vii. The SEA Reporting shall consist of a non-technical summary for policy decision makers highlighting key findings, alternatives and policy implications.

6.8.2 Implementation of Strategic Public Participation

Public participation in Malaysia for environmental planning is mainly conducted during spatial plans and detailed EIA studies. Nevertheless, findings indicate that the current coverage and approach is limited where the Malaysian public is evolving in its need for additional public engagement opportunities. The study findings support this premise with indications that 95% of the policymaker and the 96% of the public perceive public participation as a pre-requisite for SEA in Malaysia. The current limitation in public participation has resulted in dissatisfaction and protest of SWM projects due to limited and often monologue public participation events. International research on SEA consider public participation as a key ingredient for SEA and waste management policy planning to the extent that SEA scholars consider policy planning that ignore public participation have a high probability of failure (Marshall & Farahbakhsh, 2013; Tetlow & Hanusch, 2012). Interestingly, waste behaviour models indicate that public participation in SWM policy require a different approach from the current awareness campaigns. This involves latent and strategic targeting of stakeholders and the public based on SBM drivers of benefits, barriers and enablers (Bortoleto et al., 2012; Dennis & Agamuthu, 2013; Ramayah et al., 2012). Consequently, the study recommends the implementation of public participation initiatives based on SBM developed in this study for stakeholders and the public. The implementation of SEA public participation initiatives are expected to result in a transparent, empowering and consultative feedback from stakeholders and the public for SWM policy planning. The utilization of the SEA SBM drivers should also increase the probability of obtaining buy-in from stakeholders and the public by targeting dominant drivers that influence behaviour. This SEA policy recommendation is considered high impact and moderate implementation probability. The SEA public participation requirements shall conform but is not limited to the following requirements:-

Public Participation Requirements

1. The Solid Waste Management and Public Cleansing Corporation (PPSP) shall ensure the early, timely and effective public participation opportunities of the SEA findings by adopting a SBM and behaviour drivers consisting but not limited to the following :-

i. The PPSP shall ensure that SEA Public Participation is conducted at a stage when the decision making alternatives are still open for deliberation and alteration.

ii. The PPSP shall ensure that SEA Public Participation utilizes the appropriate media channels to ensure the timely availability of the draft SEA report of the PPP to the public and stakeholders.

iii. The PPSP shall ensure that SEA Public Participation has identified stakeholders including relevant non-governmental organizations and interest groups as part of the SEA engagement process.

iv. The PPSP shall ensure that SEA Public Participation allows for non-biased opportunity for stakeholders and the public to provide their feedback within a reasonable time-frame.

v. The PPSP shall ensure that SEA Public Participation details and arrangements such as the proposed PPP, responsible authority, time and venue as well as procedures to submit feedback, comments or questions are made available in an adequate manner.

6.8.3 Implementation of SEA Capacity Building (Awareness and Training)

SEA awareness in Malaysia is currently consistently low at 24% for policymakers and 23% for the public in contrast to the EIA awareness, which was at 84% for policymakers and 44% for the public. Interestingly recycling awareness was high at 99% for policymakers and 86% for the public. This low awareness on SEA and high awareness on EIA has resulted in environmental policy integration dominantly occurring in the EIA stage with the resulting limitations for environmental integration during policy planning. Nevertheless, the study findings also indication that 97% of the policymakers and 92% of the public perceive training as a pre-requisite for SEA in Malaysia. SEA applications around the world have also focused on awareness and training as the primary means of capacity building. Furthermore, experience in SEA projects suggest that SEA awareness and training is a two-way capacity building exercise of providing knowledge and obtaining buy-in for the SEA process. Consequently, the study recommends the implementation of SEA awareness and training programmes for the public, policymakers and decision maker as part of a continual engagement process in SWM PPP policy planning. This capacity building initiative is expected to build ownership of the SEA process within the sectoral departments and the public instead of delegating environmental matters to the environmental agencies and NGOs. Furthermore, this will also assist decision makers in engaging with the alternatives in SWM PPP in an objective manner. This SEA policy recommendation is considered high impact and high implementation probability. The SEA capacity building requirements shall conform but is not limited to the following requirements:-

SEA Capacity Building (Awareness and Training) Requirements

1. The PPSP shall formulate, review and update as necessary a SEA Programme in PPP planning for the provision of SEA awareness and capacity building for the public and other stakeholders consisting but not limited to the following :-

i. The SEA Awareness Programme shall elaborate strategic mechanism, time-frame and spatial coverage of public awareness campaigns and initiatives including the production of SEA educational publications in the forms reading materials and video documentaries.
ii. The SEA Training Programme shall elaborate strategic mechanism, time-frame and sectoral coverage to meet the capacity requirements of experience, competence and training necessary to ensure the capability of personnel involved in implementing SEA functions.
iii. The SEA awareness and training programmes shall utilize the learning-by-doing approach, which entails involving policymakers and the public in the SEA evaluation process.
iv. The SEA Awareness and Training Programmes shall utilize the SEA Behavioural Model with the Benefit-Barrier-Enabler Matrix or an equivalent validated model. This would enable the optimization of key drivers of environmental policy integration consisting of perceived benefits, barriers and enablers to influence stakeholders and the public to support SEA policy integration in SWM.

6.9 SEA Monitoring Audit

SEA monitoring audit is the SEA performance monitoring and audit mechanism to evaluate the level of achievement of the SEA policy and objectives as well as the overall purpose of environmental policy integration. The SEA monitoring audit is also a mechanism to provide feedback for the SEA system to ensure non-conformance or non-compliance can be detected early and mitigated prior to a cascading systemic failure of the SEA system. The main aspects of the SEA monitoring audit are :-

- To establish a monitoring system to collect data on key aspects of the SEA implementation in managing strategic environmental aspects, achievement of policy and objectives as well as continual improvement goals.
- To provide a platform to demonstrate that the DSWM has conformed and complied with the requirements of the SEA evaluation including a documented and transparent system for implementing SEA for PPP in Malaysia.
- To establish a system of maintaining and updating SEA reporting and records.
- To establishing a system of internal and external auditing of the SEA evaluation by personnel within the DSWM or external parties and stakeholders selected by the DSWM for the purpose of demonstrating an objective, transparent and impartial SEA system.

6.9.1 Establishment of an Environmental Information System

Environmental information sharing using a common platform or systematic manner is limited to ad-hoc cases in Malaysia. Environmental information collected by the government agencies are not publicly available except in annual reports published by the respective agencies. Government agencies can request inter-sectoral environmental information on a case by case basis but this is limited in terms of time delays and current information. This system of environmental information sharing has resulted in limited inter-agency information sharing including public access to information. This is in contrast to the international practice in developed countries where information sharing is based on a common platform and is publicly accessible especially for SEA purposes (Culshaw et al., 2006; Pires et al., 2011). The prompt exchange of environmental information between the DSWM and environmental and planning agencies is critical in ensuring environmental issues are quickly integrated in SWM policy planning to avoid leakages in integrating environmental considerations. Consequently, the study recommends the establishment of a baseline EIS for the purpose of supporting decision making and implementation of SEA for SWM in Malaysia. The EIS should provide the DSWM with accurate data and up to date information on the status, distribution, and activities of ESA and environmental information in Malaysia. The potential benefits of this policy initiative is the easy access of environmental related information such as the locations of ESAs and environmental data (WQI & API) which will facilitate the protection and conservation of these areas. This should result in the screening and rejection of SWM facilities within ESA Rank 1 and 2 areas as well as the rationalization of these facilities in Rank 3 areas. This SEA policy recommendation is considered moderate impact but high implementation probability. The SEA EIS requirements shall conform but is not limited to the following requirements:-

EIS Requirements

1. The DSWM shall establish or have access to an environmental data and information system as part of a SEA EIS consisting but not limited to the following :-
   i. A database of existing environmental sensitive areas as recognized by the National Physical Plan and other national policy planning documents.
   ii. A database of existing solid waste management facilities as recognized by the Department of Solid Waste Management Malaysia and other national policy planning documents.
   iii. A database of existing environmental quality consisting but not limited to the WQI and the API as recognized by the Department of Environment Malaysia and other national policy planning documents.
2. The DSWM shall establish or have access to existing environmental and solid waste legislative and policy documents as part of a SEA EIS consisting but not limited to the following :-
   i. A database of existing international policies and convention consisting but not limited to Agenda 21 and the Rio Declaration on Environment and Development.
   ii. A database of existing environmental and solid waste legislation consisting but not limited to Federal Constitution, Environmental Quality Act, 1974 and the Solid Waste and Public Cleansing and Management Act, 2007.
   iii. A database of existing environmental and solid waste policies consisting but not limited to the National Policy on the Environment, National Physical Plan and the National Strategic Plan for Solid Waste Management in Malaysia.

6.9.2 Establishment of a SEA Management Unit (SMU)

Currently, there is no dedicated personnel within the DSWM to administer and monitor the implementation SEA for SWM policy planning though there are personnel who administer EIA requirements. Nevertheless, the complex nature of SEA and policy planning requires a dedicated unit within the DSWM to develop capacity in both technical and behavioural aspects of SEA implementation. Furthermore, this would also require communicating and engaging with decision makers, inter-sector agencies, NGOs and the public at the policy planning level. International experience with SEA institutional development indicate that SEA institutions need to evolve within the agencies existing cultural context and avoid mimicking from other country models (OECD, 2012). This supports the concept of a SEA dedicated unit, which will serve as prototype SEA institution prior to formalizing it within the context of legislation or strategy documents. Consequently, the study recommends the establishment of a SEA Management Unit (SMU) within the DSWM to administer, monitor and conduct internal audits of SEA implementation for SWM in Malaysia. The SMU would also be the priority personnel for SEA training and capacity building. The establishment of the SMU is expected to empower, build ownership of the SEA process within the DSWM, and avoid relegating SEA implementation to external consultants. Furthermore, it should provide for the training and development of technically competent SEA personnel who in turn would be able to engage and communicate with stakeholders and the public. This SEA policy recommendation is considered moderate impact and high implementation probability. The SEA SMU requirements shall conform but is not limited to the following requirements:-

SMU Requirements

1. The DSWM shall select and appoint key personnel to be part of the SMU consisting but not limited to the following functions :-

i. Implement, monitor and facilitate SEA evaluation of SWM PPPs.

ii. Review and integrate SWM PPP for environmental protection.

iii. To coordinate all activities and initiatives related to SEA implementation within the DSWM.

iv. To establish linkages with stakeholders and the public for SEA implementation.

v. To consolidate and integrate existing SWM facility planning with SEA principles.

vi. To promote awareness, education and knowledge of SEA for the DSWM.

2. The SMU shall formulate, review and update as necessary SEA Procedures in PPP planning to provide the procedural framework for SEA implementation consisting but not limited to the following :-

i. The SEA Procedures shall elaborate on the roles, responsibility and authority of the SEA Delegate appointed to implement the SEA integration.

ii. The SEA Procedures shall elaborate on the educational, competency and training requirements for personnel recognized to conduct SEA evaluations.

iii. The SEA Procedures shall elaborate on the procedural requirements to communicate with external and internal stakeholders including the public especially on matters related to public complaints, protests or litigation.

iv. The SEA Procedures shall elaborate on the procedural requirements for document control and the document structure hierarchy.

v. The SEA Procedures shall elaborate on the contingency measures to deal with unexpected situations in an adaptable and robust manner including non-compliance and non-conformance to the SEA procedural requirements and contravention to the ASEA framework.

6.9.3 SEA Commission

Current stakeholder and public participation in environmental planning in Malaysia is limited to spatial planning and detailed EIAs. Increasingly, there are concerns that the existing public participation system does not obtain significant technical input beyond mere protest from affected residents nor is there an avenue to establish a two-way communication with the public, technical expects and the authority. Furthermore, the existing participative system also lack an auditing mechanism of environmental performance that is represented by a multi-stakeholder group beyond the scope of the initial consultative process. This raises the need to bridge the gap between stakeholders, technical experts and the authorities through the mediation of a SEA Commission. The purpose of a SEA Commission is to enable independent monitoring and auditing as well as provide technical and public representation in an inter-disciplinary and multi-stakeholder group that can engage both the authorities and the members of the community in an objective manner. This means the role of the SEA Commission would evolve beyond the traditional public monologues to dialogues between the authorities and other member of the public as well as auditing the SEA implementation. This is consistent with international SEA experience in Europe on the use of inter-disciplinary and multi-stakeholder group which has produced public monitoring, increased transparency and independent audit of the SEA process (Sadler & Jurkeviciute, 2011; World Bank, 2011). Consequently, the study recommends the establishment of a SEA Commission to represent and engage both the authorities and other members of the public in a meaningful objective dialogue to enable evaluation, monitoring and audit of the SEA implementation in Malaysia.

The potential benefit of a SEA Commission is the increased transparency and the independent objective feedback into the SEA process and the perception that the SEA Commission is a representative of the people and for the people in environmental integration. This SEA policy recommendation is considered moderate impact and moderate implementation probability. The SEA Commission shall conform but is not limited to the following requirements:-

<u>SEA Commission Requirements</u>

1. The Government of Malaysia shall provide for the appointment and establishment of an independent, objective and transparent SEA Commission.

i. The SEA Commission members shall consist of representative from the public, policy makers, stakeholders, decision makers and led by a SEA Commissioner to monitor and audit the performance of the SEA implementation in Malaysia.

ii. The SEA Commission shall mediate on SEA issues with both the government the public in SEA evaluations conducted on sectoral and national PPP to provide objective and inter-disciplinary feedback to both parties.

iii. The SEA Commission shall report on its findings on an annual basis or as required to the Parliament of Malaysia.

iv. The GOM shall provide for the publishing of the SEA Commissions findings and make it available to the public and stakeholders.

2. The SEA Commission shall establish a SEA Audit Programme consisting of internal and external auditing of the SEA evaluations for the purpose of demonstrating an objective, transparent and impartial SEA system.

6.10 SEA Governance

SEA governance is the sum of organizations, policies instruments, mechanisms and processes to achieve environmental protection and conservation at regional, national and international levels. SEA governance forms the framework for environmental management involving inter-agencies, multi-stakeholders and cross-sectoral environmental issues. Globally environmental governance is critical in achieving common international objectives on the environment through inter-sectoral cooperation and agreements. The main aspects of SEA governance are :-

- To provide a framework for SEA involving inter-agencies, multi-stakeholders and cross-sectoral environmental issues.
- To coordinate SEA integration efforts and initiatives in achieving mutually agreed environmental objectives.
- To facilitate the cooperation and sharing of environmental information to achieve common but differentiated responsibility in environmental management.
- To provide a platform for stakeholder participation and dialogue in environmental management and SEA implementation.
- To address gaps in SEA initiatives involving inter-agencies, multi-stakeholders and cross-sectoral environmental issues.

6.10.1 SEA Steering Committee (SSC)

The existing environmental management framework in Malaysia has been deemed fragmented and lacking sustainability. This is because protection of biodiversity areas come under multiple agencies including the DTCP, Forestry Department and the Wildlife Department, pollution control issues are under the DOE while SWM is under the DSWM. Furthermore, inter-agency rivalry and lack of cooperation has resulted in limited coordination and data sharing among government agencies especially in environmental matters (Hezri, 2004). Nevertheless, the study findings indicate that 96% of policy makers perceived inter-sectoral cooperation and coordination is critical for SEA implementation in SWM while 99% of policy makers perceived that SEA should be implemented for the Five Year Malaysian Development Plans. International SEA experience indicates that ad-hoc inter-agency coordination should be improved to a more permanent basis for a shared vision of issues, priorities and actions (Dusik & Xie, 2009). This is also strongly reflected in Malaysian environmental planning documents namely 'A Common Vision on Biodiversity" (Ministry of Natural Resources and Environment, 2008). Consequently, this study recommends the establishment of a permanent SEA Steering Committee to coordinate facilitate and integrate environmental considerations and data sharing in SWM policy planning. Consequently, this is expected to transform the perception that SWM and environmental integration is the responsibility of only one agency. This SEA policy recommendation is considered moderate impact and moderate implementation probability. The SSC shall conform but is not limited to the following requirements:-

SSC Requirements

1. The Government of Malaysia shall establish and provide resources for a SEA Steering Committee (SSC) to facilitate inter-agency coordination and data sharing for SWM policy planning consisting but not limited to the following :-

i. The SSC shall be chaired by a representative of the DSWM and consisting of representatives from the EPU, MHLG, MNRE, SEA Management Unit (SMU), Solid Waste Management & Public Cleansing Corporation (PPSP), DOE, representative of solid waste concessionaires and local authorities.

ii. The SSC shall support and facilitate the SEA Management Unit and the SEA Commission for SEA implementation in Malaysia.

iii. The SSC shall provide a framework for SEA involving inter-agencies and cross-sectoral SEA integration initiatives in SWM policy planning.

iv. The SSC shall enable inter-agencies data sharing for SEA integration initiatives in SWM policy planning including on the ESA, WQI and API

6.10.2 SEA Governance Centre (SGC)

SEA has been experimented and pilot tested by the EPU in the Prime Minister's Department especially in the water resources sector. Furthermore, SEA has also been recommended as a key tool for mainstreaming biodiversity by the MNRE. Nevertheless, SEA implementation in the country has still been limited especially in the area of public participation of PPP. This has resulted in a gap between theory and practice where in theory there is policy support for SEA but in practice, there is limited and incomplete implementation of SEA. The study findings indicate that both policymakers and the public perceive SEA cannot be implemented without public participation. However, in reality SEA implementation has limited public participation that conforms to the 'spirit' of SEA beyond stakeholder workshops. International SEA experience indicate a need for a national institution to oversee SEA implementation as well as function as the national centre for SEA capacity building initiatives (OECD, 2006). Consequently, the study recommends the establishment of a SEA Governance Centre (SGC) for the purpose of mainstreaming SEA into national policy planning as well as SEA capacity building. The function of the SGC would be to provide resources, technical assistance and standards for SEA implementation in Malaysia. The potential benefits of the SGC is its role as the SEA knowledge hub in Malaysia and the Asia region to establish linkages with government agencies, private organizations, academic researchers, NGOs and the public. Ultimately, the SGC may also function as a training and licensing centre for SEA professionals in the region. This SEA policy recommendation is considered high impact and moderate implementation probability. The SGC shall conform but is not limited to the following requirements:-

SGC Requirements

2. The Government of Malaysia shall establish and provide resources for a SEA Governance Centre (SGC) functioning as an independent body reporting to Parliament consisting but not limited to the following :-

v. The SGC shall facilitate environmental governance, stakeholder participation, cooperation and information exchange as well as promote environmental awareness on SEA to achieve common but differentiated responsibility in environmental management.

vi. The SGC shall support and facilitate the SEA Commission and SEA implementation in Malaysia.

vii. The SGC shall provide a framework for SEA involving inter-agencies, multi-stakeholders and cross-sectoral environmental issues as well as to coordinate SEA integration efforts and initiatives in achieving mutually agreed environmental objectives.

viii. The SGC shall provide technical advisory services and facilitate the implementation of SEA at the national, regional and locals levels.

ix. The SGC shall address gaps in SEA initiatives involving inter-agencies, multi-stakeholders and cross-sectoral environmental issues.

x. The SGC shall adopt the SEA Declaration on the Environmental or formulate an equivalent environmental declaration, which articulates the vision, guiding principles and commitment to the environment, as well as provide the opportunity for the public and stakeholders to publicly pledge and commit in principle without any binding obligations.

6.10.3 SEA SWM PPP Review

Environmental integration of SWM PPP currently is minimal where the NSP SWM has yet to be reviewed and updated since its formulation in 2005. The study findings indicate about 51% of the NSP SWM sites will be in ESA areas including in high biodiversity and critical ecosystem areas such as water intake catchments. This has the potential to result in significant environmental degradation, pollution and public protest to these NSP SWM facilities. This is supported by international trends that indicate SEA has been used successfully for biodiversity screening and protection (Gontier et al., 2006). Consequently, the study recommends an SEA review and updating of SWM PPP including the NSP SWM at five year intervals to enable continual improvement of these SWM PPP. The potential benefits of this policy initiative are twofold. Firstly, this is in line with the recommendations of the EPU guidance document on biodiversity 'A Common Vision', which has recommended that SEA be used extensively to mainstream biodiversity in Malaysia since the existing biodiversity heritage is already under intense pressure from unsustainable development (Ministry of Natural Resources and Environment, 2008). Nevertheless, there is inadequate practical application frameworks provided to enable SEA implementation. Hence, the ASEA facility rationalization is one of the few practical applications for biodiversity mainstreaming in Malaysia. Secondly, this is timely with the recommendations of the international CBD guidance on the use of SEA for the conservation of biodiversity. This is gaining prominence as experience in India and South Africa indicate that biodiversity conservation has to go beyond spatial planning into strategic stakeholder engagement as part of a SEA process (Treweek et al., 2005). This SEA policy recommendation is considered moderate impact and high implementation probability. The SEA SWM PPP review shall conform but is not limited to the following requirements:-

SWM PPP Review

1. The DSWM shall review SWM PPP at planned intervals to ensure its continuing suitability, adequacy and effectiveness to the principles and practice of SEA consisting but not limited to the following :-

i. The SWM PPP review shall consist of opportunities for improvement and revision of the SWM PPP including the elements of SEA policy planning, implementation monitoring audit and governance.

ii. The SWM PPP review shall document decisions of the review in terms of the effectiveness of the SEA implementation and include potential measures related to updating and revising the SWM PPP elements in line with the commitment to strategic environmental integration, public participation and pollution prevention.

iii. The DSWM shall review and update the NSP SWM at five year intervals in conjunction with the Five Year Malaysian Plans to ensure its continual improvement of environmental integration, waste prevention and minimization as well as public participation initiatives.

iv. NSP SWM facilities that are identified as significantly impacting ESA areas of biodiversity and ecosystem support should be reviewed in terms of the facility rationalization, site relocation, design review and/or suspension. In addition, these high impact NSP SWM facilities should be subject to the following detailed environmental studies of biodiversity assessment, water quality, air quality modelling and social impact assessment. These NSP SWM facilities should not be allowed to proceed to the EIA stage until these environmental studies have been conducted.

6.11 Summary of SEA Policy Recommendations

A summary of the policy priority areas in terms of SEA policy recommendations indicate that highest priority based on a high impact and high implementation probability is the adoption of the ASEA framework and the implementation of SEA Awareness and Training (Table 6.2). Both these SEA policy recommendation can be implemented within the purview of the DSWM and PPSP and require minimal time and resources. In contrast, the lowest priority are the establishment of the SEA Commission and the establishment of the SEA Steering Committee. Both these recommendations require external intervention at the federal level for implementation as well as require significant amount of time and resources. In conclusion, the SEA policy recommendations provides a validated and operationalized SEA implementation system for SWM policy planning in Malaysia.

Table 6.2 : Summary of SEA Policy Recommendations

No	SEA Policy Recommendations	Impact	Probability	Agency
1.	• Adoption of the ASEA Framework	High	High	DSWM
2.	• Implementation of SEA Capacity Building (Awareness & Training)	High	High	PPSP
3.	• Formulation of a SEA Legislation	High	Moderate	GOM
4.	• Formulation of a SEA Blueprint	High	Moderate	GOM
5.	• Implementation of SEA Public Participation	High	Moderate	PPSP
6.	• Establishment SGC	High	Moderate	GOM
7.	• Adoption of the SEA Declaration	Moderate	High	DSWM
8.	• Establishment of an EIS	Moderate	High	DSWM
9.	• Establishment of a SMU	Moderate	High	PPSP
10.	• SEA SWM PPP Review	Moderate	High	DSWM
11.	• Establishment of a SEA Commission	Moderate	Moderate	GOM
12.	• Establishment SSC	Moderate	Moderate	GOM

7.0 CONCLUSIONS

7.1 SEA Evolution

SEA has evolved from an alternative to shortcomings perceived in the project based EIAs in the 1970s to an environmental policy planning tool in the 1990s and finally to a potential strategic environmental governance instrument in national policy planning and development. The current proliferation of SEA legislation around the world emphasizes the role of SEA as an essential policy planning tool to integrate environmental considerations and complement EIA in environmental protection. Nevertheless, international trends in SEA is increasingly re-examining and questioning the role and effectiveness of SEA in environmental policy planning due to potential barriers and areas of neglect in SEA towards fulfilling its full potential as a strategic environmental governance instrument. The primary area of neglect is the current disconnected emphasis on technical aspects of SEA with limited development of the strategic nature of SEA, which is the SEA behavioural models of stakeholder and public integration of SEA in policy planning. The common prevailing mind-set is that SEA implementation would take care of itself once a SEA plan is conducted. Nevertheless, SEA experiences indicate otherwise where SEA implementation can be severely hindered due to the socio-economic complexity and the political nature of policy planning. Policy makers and stakeholders have a complex decision making and integration drivers, which may significantly affect their choices and potential to either facilitate or hinder SEA implementation, which transcend simplistic SEA awareness programmes.

The secondary area of neglect is the current biased reliance on the legislative aspects of SEA with limited progress in developing locally customized validated analytical SEA frameworks. This is may again be perpetuated by the common prevailing mind-set that SEA implementation would take care of itself once a SEA legislation is formulated. Nevertheless, SEA experiences indicate otherwise where SEA implementation can be highly multi-dimensional due to differing environmental and local context across countries with varying levels of environmental development. This may simply indicate that SEA legislation is a not a 'silver bullet' that can be mimicked from other countries but has to be complemented with a locally customized and validated analytical SEA framework taking into consideration national environmental data availability and systems. Finally, the tertiary area of neglect is the current unbalanced emphasis on SEA as static policy evaluation plans with limited development of dynamic SEA system based on the elements of an EMS. This may be the crux of the debate on SEA effectiveness and relevance since static SEA plans would always become irrelevant and superseded due to the rapid changing nature of policy planning thus requiring a more robust framework of SEA as a dynamic policy planning system. This would require a significant shift from the traditional mind-set of SEA as one off static policy evaluation plan to a dynamic SEA policy integration framework. Finally, SEA policy trends indicate that SEA evolution has come a long way since its early days but has yet to fulfil its full potential of strategic environmental integration. This will require a paradigm shift from the traditional view of SEA as an individual environmental evaluation plan to revolutionary perspective of SEA as part of a multi-dimensional approach linking SEA behavioural modelling and customized analytical SEA frameworks as part of a SEA policy systems model.

7.2 Key Study Findings

This study has examined the SEA policy framework for integrating environmental requirements in SWM PPPs in Malaysia. The key problem the study frames is the lack of environmental integration in Malaysia for SWM during the policy planning process. Currently, environmental issues are mainly addressed during the environmental impact assessments (EIA) of SWM facilities, which have indirectly resulted in significant environmental pollution, public protest and public litigation. The primary objective was to determine the potential for SEA integration in SWM while the secondary objective was to determine the mechanism for SEA implementation for SWM based on the SEA Behaviour Models (SBM) and the analytical SEA (ASEA) framework. The study conducted a SEA policy analysis of environmental and solid waste management policies in Malaysia to identify potential gaps in SEA theory and practice. Consequently, the study utilized the SBM and ASEA framework to determine the potential for SEA integration in SWM as well as to identify SEA policy recommendations for policy interventions. The SEA policy recommendations were structured as part of a SEA policy systems model for SWM in Malaysia using the EMS framework.

A review of the national environmental and solid waste policy planning framework indicates that Malaysia is currently lacking in SEA pragmatic provisions with limited specifications for SEA concepts such as early environmental planning, addressing cumulative environmental impacts and integrating public participation. Nevertheless, the SEA policy analysis indicates significant SEA policy integration potential though the existing environmental management emphasis is still on EIA.

Primarily, the findings of the SBM highlight an overwhelming support for SEA implementation with 100% of stakeholders and 99% of the public in favour of SEA implementation for SWM in Malaysia. The SBM findings also indicate that the key drivers of SEA are perceived benefits, barriers and enabler, which are interrelated, in a tripartite pathway influencing the stakeholders/public decision to support or reject SEA policy integration in SWM. Furthermore, this tripartite driver interaction has a hierarchy of effect on behaviour, which is different in the SEA stakeholder model and the SEA public model. In the SEA stakeholder model, SEA integration behaviour is influenced directly by the three drivers of perception of benefits, perception of barriers and perception of enablers as well as influenced indirectly by the drivers of Environmental Attitude and Environmental Awareness. Meanwhile in the SEA public model, SEA integration behaviour is influenced directly by three drivers of perception of benefits, perception of enablers and existing environmental attitude.

The general policy implications of these findings are that there is currently significant support for SEA implementation in SWM policy planning from stakeholders and the public. Furthermore, the SBM provides an empirical based framework for SEA policy integration initiatives among policy actors consisting of SEA stakeholders and the public. This suggest that the optimal SEA policy integration pathway may require strategic and selective intervention of key drivers based on target stakeholders and public as part of a long-term SEA policy integration strategy for SWM. Meanwhile, the specific policy implications are the need for SEA policy interventions such as strategic public participation, SEA capacity building and a strategic transformation of the environmental planning framework. Ultimately, this enables an alternate policy intervention strategy for SWM in Malaysia.

Secondarily, this study has examined the potential application of a Malaysian customized ASEA framework conducted on the SWM facilities planning of the National Strategic Plan for Solid Waste Management, Malaysia, 2005 (NSP) and its related infrastructure spatial planning. The findings indicate the current NSP for SWM planning in Malaysia has minimal integration of environmental considerations at the strategic level. The NSP has potentially designated 51% of its SWM facility siting in ESA Rank 1 and 2 areas, which are either protected areas or water intake catchment areas. Furthermore, it has designated 10% of its high pollution loading SWM facilities in water intake catchment areas as well as designated 43% of its SWM facilities in high impact sensitive receptors areas.

The general policy implications of these findings are that the current minimal level of environmental integration indicates a significant need for SEA integration in SWM policy planning. Furthermore, the ASEA provides a customized and validated SEA framework for SWM based on Malaysia’s ESA system and existing environmental indices to assess and to rank SWM facilities that have a high potential to impact the environment. This suggest that the ASEA framework provides a strategic and preventive measure at the policy planning level to screen and implement intervention initiatives to minimize potential cumulative and irreversible environmental impacts as well as to optimize SWM facility planning at an early stage. Meanwhile, the specific ASEA policy implications is the need for the adoption of the ASEA framework and a review of the NSP SWM as well as the establishment of a SEA Management Unit, Environmental Information System, SEA Steering Committee and a SEA Governance Centre.

Finally, this study has developed SEA policy recommendations based on the SEA policy analysis, SBM and the ASEA framework on the NSP. The SEA policy recommendations were parsimoniously formulated based on the EMS framework of planning, implementation, monitoring and review as well as directed by the three guiding principles of Strategic Environmental Integration, Public Participation and Pollution Prevention. The SEA policy recommendations five thematic areas are SEA Scope, SEA Policy Planning, SEA Operational Implementation, SEA Monitoring Audit and SEA Governance (Figure 7.1). Consequently, the highest SEA policy recommendations priority quadrant is the adoption of the ASEA framework and the implementation of SEA Capacity Building in terms of Awareness and Training. Both these policy recommendations potentially have the highest impact on SEA implementation as well as the highest potential for implementation. In conclusion, the study indicates significant potential of SEA integration for SWM in Malaysia, which ultimately will require a synergism of the SBM and ASEA framework as part of a dynamic SEA policy systems model.

IMPACT ON SEA		
High	**2** • SEA Legislation • SEA Blueprint • SEA Public Participation • SEA Governance Centre	**1** • ASEA Framework • SEA Capacity Building
Moderate	**4** • SEA Commission • SEA Steering Committee	**3** • SEA Declaration • Environmental Information System • SEA Management Unit • SEA SWM PPP Review
	Moderate	High
	IMPLEMENTATION PROBABILITY	

Figure 7.1 : SEA Policy Recommendations Priority Quadrant

7.3 Unanticipated Findings

Generally, the study has two main unanticipated findings based on the SBM and the ASEA framework findings on the NSP. In terms of the SBM, traditionally existing environmental attitude and environmental awareness have been assumed to be directly related to environmental behaviour (Ramayah et al., 2012). Nevertheless, the SBM indicates that existing environmental attitude and environmental awareness may follow different pathways for stakeholders and the public. Consequently, for SEA stakeholders it does not influence environmental behaviour directly but rather indirectly through the external enabler driver while for the public only existing environmental attitude influences behaviour both directly and indirectly through the enabler driver. This suggest that environmental awareness initiatives may not be as successful if it is conducted without taking into consideration the specific policy actor integration pathways. Hence, there is a need in designing environmental policy integration to explore and be cognizant of policy actors key drivers and their potential limiting predictors on external constraints manifested through their perception on external enablers. In terms of the ASEA framework, the basic assumption was that environmental considerations such as environmental sensitive areas would have been integrated in the NSP planning. Nevertheless, the ASEA framework indicates environmental integration in the NSP is minimal.

7.4 International Implications

The SBM and ASEA framework provides an empirically validated SEA policy systems model for both policy stakeholders and the public in countries considering the prospect of integrating SEA as part of their policy planning framework. Countries which may especially benefit from the SEA policy systems model will be those that share similar characteristics with Malaysia where existing national policy planning is a mainly a top-down approach with minimal public participation and consultation with stakeholders as well as countries that lack cross-sectoral environmental policy integration. At the macro level, the findings from the study may provide both a theoretical and practical SEA framework, which links SBM and the ASEA frameworks as part of a SEA policy systems model for developing countries. Meanwhile, at the micro level the SBM may provide a theoretical behavioural framework of perceived benefits and barriers with enabling factors while theorizing that perception of external enabling factors may provide the elusive nexus between environmental behaviour and existing environmental attitudes, awareness, benefits and barriers for policy stakeholders as opposed to the public. Indisputably, this will require additional research and model optimization, which will be interesting to explore in an international and environmentally diverse setting.

7.5 Limitations & Future Research

This purpose of this study was to identify the SEA integration potential for solid waste management policy planning in Malaysia, which involved validating the SBM and operationalizing the ASEA framework to formulate SEA policy recommendation as part of SEA policy systems model. Nevertheless, the generalization of the SEA policy systems model in supporting other environmental behaviour may be subject to context-based customization as drivers of constructs may need to be customized for the relevant environmental aspect. Finally, although the structural path of the SBM supports the study hypothesis, it does not preclude alternate or additional directions of the relationship in the structural relationship.

Consequently, recommendations for future research areas in the field of SEA are in its application and customization in other sectors such as landuse, transport and biodiversity including its overall integration within the environmental planning framework in Malaysia. This includes research into SEA behavioural models and analytical SEA frameworks within inter-sectoral and intra-sectoral settings as well as comparative studies on SEA policy systems model applications between countries in the Asian region.

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APPENDICES

APPENDIX 1 : SEA STAKEHOLDER SURVEY QUESTIONNAIRE

Declaration: *This questionnaire is aimed at collecting information on the concept of Strategic Environmental Assessment (SEA) in Malaysia. Information provided will be used for research purposes only. Your cooperation and feedback is highly appreciated.*

Pengistiharan*: Soal selidik ini bertujuan untuk mendapatkan maklumat berkenaan konsep Penilaian Alam Sekitar Strategik (SEA) di Malaysia. Maklumat yang diberikan hanya akan digunakan untuk tujuan penyelidikan sahaja. Kerjasama dan maklumbalas anda amat dihargai.*

General Information/Maklumat Am

Please mark √ for your selection / Sila tandakan √ untuk pilihan anda

Name / Organization

Nama /Organisasi ______________________________________

Age/*Umur*	☐	<40 Years *<40 Tahun*	☐	40 years and above *40 Tahun and keatas*
Gender/*Jantina*	☐	Male *Lelaki*	☐	Female *Wanita*
Education/Pendidikan	☐	Diploma/Degree *Diploma/Sarjana*	☐	Primary/Secondary *Rendah/Menengah*
Role/Peranan	☐	Policy Maker/Implementer *Pembuat Dasar/Pelaksana*	☐	Public *Orang Awam*
Environmental Experience ***Pengalaman Alam Sekitar***	☐	Yes *Ada*	☐	None *Tiada*
Recycling Practice ***Amalan Kitar Semula***	☐	Yes *Ada*	☐	None *Tiada*

***Part A* / Bahagian A**

Please mark √ at the appropriate space your level of awareness using the indicators below:
Sila tanda √ di ruang yang berkenaan tahap keseadaran anda menggunakan penunjuk di bawah:

No Awareness *Tiada Kesedaran*	Not Aware of Existence *Tidak Sedar Kewujudan*
Low Awareness *Kesedaran Rendah*	Aware of Existence but Not Aware of Concept *Sedar Kewujudan Tetapi Tidak Sedar akan Konsep*
Moderate Awareness *Kesedaran Sederhana*	Aware of Existence and Concept but no understanding on its Application *Sedar Kewujudan dan Konsep tetapi tiada pemahaman akan Penggunaan*
High Awareness *Kesedaran Tinggi*	Aware of Existence, Concept and Application *Sedar Kewujudan, Konsep dan Penggunaan*

No	**Policy, Concepts & Principles** ***Dasar, Konsep & Prinsip***	**No Awareness** ***Tiada Kesedaran***	**Low Awareness** ***Kesedaran Rendah***	**Average Awareness** ***Kesedaran Sederhana***	**High Awareness** ***Kesedaran Tinggi***
1.	National Policy on the Environment (2002) *Dasar Alam Sekitar Negara (2002)*				
2.	National Strategic Plan for Solid Waste Management (2005) *Pelan Pengurusan Strategik Sisa Pepejal Negara (2005)*				
3.	Environmental Quality Act (1974) *Akta Kualiti Alam Sekeliling (1974)*				
4.	Solid Waste and Public Cleansing Management Act 2007 *Akta Pengurusan Sisa Pepejal & Pembersihan Awam 2007*				
5.	Environmental Impact Assessment (EIA) *Penilaian Kesan Alam Sekitar*				
6.	Strategic Environmental Assessment (SEA) *Penilaian Alam Sekitar Strategik (SEA)*				
7.	Pollution Prevention Principle *Prinsip Pencegahan Pencemaran*				
8.	Public Participation Principle *Prinsip Penyertaan Awam*				
9.	Precautionary Principle *Prinsip Tindakan Pecegahan*				
10.	Reduce, Reuse & Recycle Concept (3R) *Konsep Kurang, Guna Semula & Kitar Semula (3R)*				

Bahagian B/ *Part B*

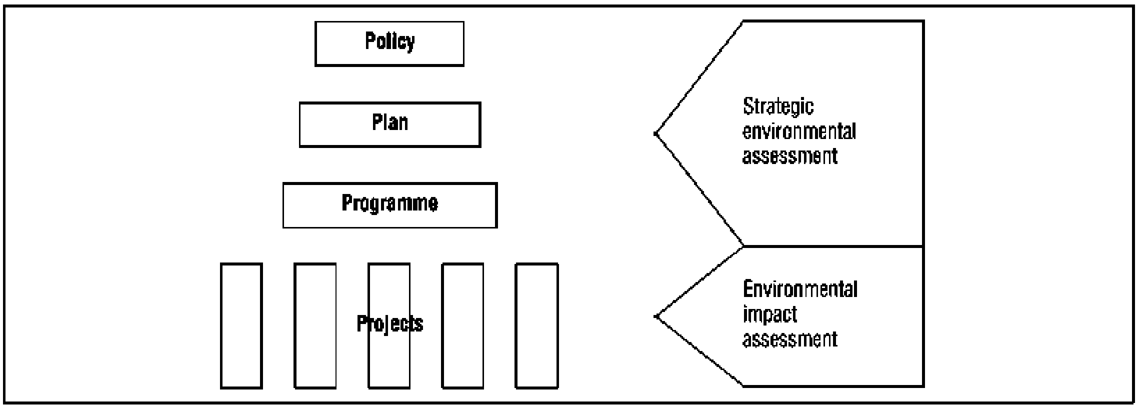
Please read the following definitions before proceeding to the next section.
Sila baca definsi berikut sebelum beralih ke bahagian seterusnya:

Definition of Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is a system of integrating at a strategic level environmental consideration into Policies, Plans and Programmes (PPP). Generally, Policy is a general direction that a government is or will be pursuing and that guide ongoing decision making while Plan is a strategy with priorities, options and measures that implement Policy. Programme is a schedule of proposals and/or activities that elaborate and implement Policy and Plans. SEA is usually conducted at an early stage during the Policy, Plan and Programme level and involved public participation while Environmental Impact Assessment (EIA) is usually conducted at a later stage during the Project level.

Definisi Penilaian Alam Sekitar Strategik (SEA)

Penilaian Alam Sekitar Strategik (SEA) adalah suatu sistem yang mengintegrasikan pada peringkat strategik keperluan alam sekitar ke dalam Dasar, Pelan dan Program (PPP). Umumnya, Dasar adalah suatu arah tuju umum yang kerajaan akan atau sedang mengikuti yang mempengaruhi keputusan manakala Pelan adalah suatu strategi dengan system keutamaan, pilihan dan tindakan untuk melaksanakan Dasar. Program merupakan jadual cadangan dan/atau aktiviti yang meneliti dan melaksanakan Dasar dan Pelan. SEA umumnya dilaksanakan pada peringkat awal iaitu semasa fasa Dasar, Pelan dan Program dan melibatkan penyertaan awam manakala Penilian Kesan Alam Sekitar (EIA) biasanya dilaksanakan pada peringkat akhir iaitu semasa fasa Projek.



SEA Understanding Check / Penyemakan Pemahaman SEA

Statements/Kenyataan	**Correct** ***Betul***	**Wrong** ***Salah***
Strategic Environmental Assessment (SEA) is the same as Environmental Impact Assessment (EIA) / *Penilaian alam sekitar strategik (SEA) ada sama dengan Penilian Kesan Alam Sekitar (EIA)*		√
Strategic Environmental Assessment (SEA) is conducted late in the project planning stage / *Penilaian Alam Sekitar Strategik (SEA) dilaksanakan lewat semasa fasa perancangan projek,*		√
Strategic Environmental Assessment (SEA) usually does not involve public participation / *Penilaian Alam Sekitar Strategik (SEA) biasanya tidak melibatkan penyertaan awam*		√

Please mark √ at the space that best represents your opinions:
Sila tanda √ di ruang yang paling mewakili pendapat anda:

	Statement/*Kenyataan*	**Strongly Disagree/ *Sangat Tidak Setuju***	**Disagree/ *Tidak Setuju***	**Agree/ *Setuju***	**Strongly Agree/ *Sangat Setuju***
1.	The existing state of environmental quality in Malaysia is good. / *Kualiti alam sekitar sediada di Malaysia adalah baik.*				
2.	The existing system for solid waste planning and siting of landfills, transfer stations and incinerators in Malaysia is effective in addressing environmental issues. / *Sistem sisa pepejal sediada untuk perancangan dan penapakan tapak pelupusan sampah, stesen pemindahan dan insinerator di Malaysia adalah berkesan dalam menangani isu-isu alam sekitar.*				
3.	The existing Environmental Impact Assessment (EIA) system in Malaysia is effective in addresing environmental issues in solid waste management planning and siting. / *Sistem Penilaian Kesan Alam Sekitar (EIA) sediada di Malaysia adalah berkesan dalam menangani isu-isu alam sekitar dalam perancangan pengurusan sisa pepejal.*				
4.	The existing solid waste management planning system in Malaysia practices Strategic Environmental Assessment (SEA). / *Sistem perancangan sisa pepejal sediada di Malaysia mengamalkan Penilaian Alam Sekitar Strategik (SEA).*				
5.	Strategic Environmental Assessment (SEA) can improve solid waste management planning in Malaysia by integrating environmental considerations at a strategic and early stage. / *Penilaian Alam Sekitar Strategik (SEA) dapat memperbaiki perancangan pengurusan sisa pepejal di Malaysia dengan mengintegrasikan pertimbangan alam sekitar pada tahap yang strategik dan awal.*				
6.	Strategic Environmental Assessment (SEA) can improve solid waste management planning in Malaysia by addressing cumulative and multi-project environmental impacts. / *Penilaian Alam Sekitar Strategik (SEA) dapat memperbaiki perancangan pengurusan sisa pepejal di Malaysia dengan mengatasi kesan persekitaran kumulatif dan multi-projek.*				
7.	Strategic Environmental Assessment (SEA) can improve solid waste management planning in Malaysia by increasing the transparency of solid waste planning decisions. / *Penilaian Alam Sekitar Strategik (SEA) dapat memperbaiki perancangan pengurusan sisa pepejal di Malaysia dengan meningkatkan ketelusan keputusan perancangan sisa pepejal.*				

	Statement/*Kenyataan*	**Strongly Disagree/ *Sangat Tidak Setuju***	**Disagree/ *Tidak Setuju***	**Agree/ *Setuju***	**Strongly Agree/ *Sangat Setuju***
8.	Strategic Environmental Assessment (SEA) can improve solid waste management planning in Malaysia by improving the understanding of decision makers on the potential environmental impacts of proposed solid waste policies, plans and programmes. / *Penilaian Alam Sekitar Strategik (SEA) dapat memperbaiki perancangan pengurusan sisa pepejal di Malaysia dengan meningkatkan pemahaman pembuat keputusan tentang kesan alam sekitar dasar, pelan dan program sisa pepejal yang dicadangkan.*				
9.	Strategic Environmental Assessment (SEA) implementation in solid waste management planning in Malaysia would burden the agencies involved in solid waste planning. / *Pelaksanaan Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia akan membebankan agensi yang terlibat dalam perancangan sisa pepejal.*				
10.	Strategic Environmental Assessment (SEA) implementation in solid waste management planning in Malaysia would delay project execution. / *Pelaksanaan Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia akan melambatkan pelaksanaan projek..*				
11.	Strategic Environmental Assessment (SEA) implementation in solid waste management planning in Malaysia would increase the cost of projects. / *Pelaksanaan Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia akan meningkatkan kos projek.*				
12.	Strategic Environmental Assessment (SEA) implementation in solid waste management planning in Malaysia would limit project options for decision makers. / *Pelaksanaan Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia akan menghadkan pilihan projek untuk pembuat keputusan.*				
13.	Strategic Environmental Assessment (SEA) in solid waste management planning in Malaysia can be implemented without a legislation on SEA. / *Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia dapat dilaksanakan tanpa mengubal undang-undang untuk SEA.*				
14.	Strategic Environmental Assessment (SEA) in solid waste management planning in Malaysia can be implemented without political will for SEA. / *Penilaian Alam Sekitar Strategik (SEA) dalam perancangan*				

	Statement/*Kenyataan*	**Strongly Disagree/ *Sangat Tidak Setuju***	**Disagree/ *Tidak Setuju***	**Agree/ *Setuju***	**Strongly Agree/ *Sangat Setuju***
	pengurusan sisa pepejal di Malaysia dapat dilaksanakan <u>tanpa</u> kehendak politik untuk SEA.				
15.	Strategic Environmental Assessment (SEA) in solid waste management planning in Malaysia can be implemented <u>without</u> public participation on SEA findings. / *Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia dapat dilaksanakan <u>tanpa</u> penyertaan awam keatas penemuan SEA.*				
16.	Strategic Environmental Assessment (SEA) in solid waste management planning in Malaysia can be implemented <u>without</u> SEA capacity building for solid waste planning agencies. / *Penilaian Alam Sekitar Strategik (SEA) dalam perancangan pengurusan sisa pepejal di Malaysia dapat dilaksanakan <u>tanpa</u> peningkatan kapasiti SEA untuk agensi perancangan sisa pepejal.*				
17.	Strategic Environmental Assessment (SEA) should be <u>implemented</u> for solid waste policy, plan and programmes in Malaysia. / *Penilaian Alam Sekitar Strategik (SEA) harus <u>dilaksanakan</u> untuk dasar, pelan dan rancangan sisa pepejal di Malaysia.*				
18.	Strategic Environmental Assessment (SEA) should be <u>implemented</u> for proposed solid waste legislation in Malaysia. / *Penilaian Alam Sekitar Strategik (SEA) harus <u>dilaksanakan</u> untuk perundangan sisa pepejal di Malaysia.*				
19.	Strategic Environmental Assessment (SEA) should be <u>implemented</u> for other sectoral policy, plan and programmes relevant to solid waste management planning in Malaysia. / *Penilaian Alam Sekitar Strategik (SEA) harus <u>dilaksanakan</u> untuk dasar, pelan dan program sektor lain yang berkaitan dengan perancangan pengurusan sisa pepejal di Malaysia.*				
20.	Strategic Environmental Assessment (SEA) should be <u>implemented</u> for national level development and economic plans (5 Year Malaysian Plans) for aspects which may be relevant to solid waste management planning in Malaysia. / *Penilaian Alam Sekitar Strategik (SEA) harus <u>dilaksanakan</u> untuk rancangan pembangunan dan ekonomi peringkat kebangsaaan (Rancangan Malaysia 5 Tahun) untuk aspek yang mungkin berkaitan dengan perancangan pengurusan sisa pepejal di Malaysia.*				

***Part C* / Bahagian C**

Please mark √ at only <u>ONE</u> space, the option which best represents your opinion:
Sila tanda √ di hanya <u>SATU</u> ruang, pilihan yang paling mewakili pendapat anda:

1. In your opinion what is the main benefit from implementing SEA in solid waste management planning in Malaysia?
Pada pendapat anda apakah manafaat utama melaksanakan SEA dalam perancangan pengurusan sisa pepejal di Malaysia?

☐	Integrating environmental considerations at an early stage *Mengintegrasikan pertimbangan alam sekitar pada peringkat awal*
☐	Addressing cumulative environmental impacts *Mengatasi kesan alam sekitar kumulatif*
☐	Increasing the transparency of solid waste management planning decisions *Meningkatkan ketelusan keputusan perancangan pengurusan sisa pepejal*
☐	Improving the understanding of decision makers on solid waste planning decisions *Meningkatkan pemahaman pembuat keputusan terhadap keputusan perancangan sisa pepejal*
☐	Others *Lain-lain*: ____________________

2. In your opinion what is the main factor/requirement for the succesful implementation of SEA in Malaysia?
Pada pendapat anda keperluan/faktor utama untuk menjayakan pelaksanaan SEA di Malaysia?

☐	SEA Legislation *Perundangan SEA*
☐	SEA Political Will *Sokongan politik untuk SEA*
☐	SEA Public Participation *Penyertaan Awam untuk SEA*
☐	SEA Capacity Building *Pembinaan kapasiti untuk SEA*
☐	Others *Lain-lain*: ____________________

Part D **/ Bahagian D**

Please write down any comments or suggestions you may have on SEA or on environmental management in Malaysia
Sila tulis sebarang komen atau cadangan berkenaan SEA atau pengurusan alam sekitar di Malaysia

THANK YOU / TERIMA KASIH

APPENDIX 2 : SEA PUBLIC SURVEY QUESTIONNAIRE

Declaration: *This questionnaire is aimed at collecting information on the concept of environmental planning & solid waste management in Malaysia. Information provided will be used for research purposes only. Your cooperation and feedback is highly appreciated.*

Pengistiharan*: Soal selidik ini bertujuan untuk mendapatkan maklumat berkenaan konsep perancangan alam sekitar & pengurusan sisa pepejal di Malaysia. Maklumat yang diberikan hanya akan digunakan untuk tujuan penyelidikan sahaja. Kerjasama dan maklumbalas anda amat dihargai.*

General Information/Maklumat Am

Please mark √ for your selection.
Sila tandakan √ untuk pilihan anda.

Name/Nama ____________________________________

Town/Bandar ____________________________________

State/Negeri ____________________________________

Age/*Umur*	☐	<40 Years *<40 Tahun*	☐	40 years and above *40 Tahun and keatas*
Gender/*Jantina*	☐	Male *Lelaki*	☐	Female *Wanita*
Education/Pendidikan	☐	Diploma/Degree *Diploma/Sarjana*	☐	Primary/Secondary *Rendah/Menengah*
Job/ Pekerjaan	☐	Government Sector *Sektor Kerajaan*	☐	Private Sector *Sektor Swasta*
Environmental Awareness ***Kesedaran Alam Sekitar***	☐	Yes *Ada*	☐	None *Tiada*
Recycling Practice ***Amalan Kitar Semula***	☐	Yes *Ada*	☐	None *Tiada*

***Part A* / Bahagian A**

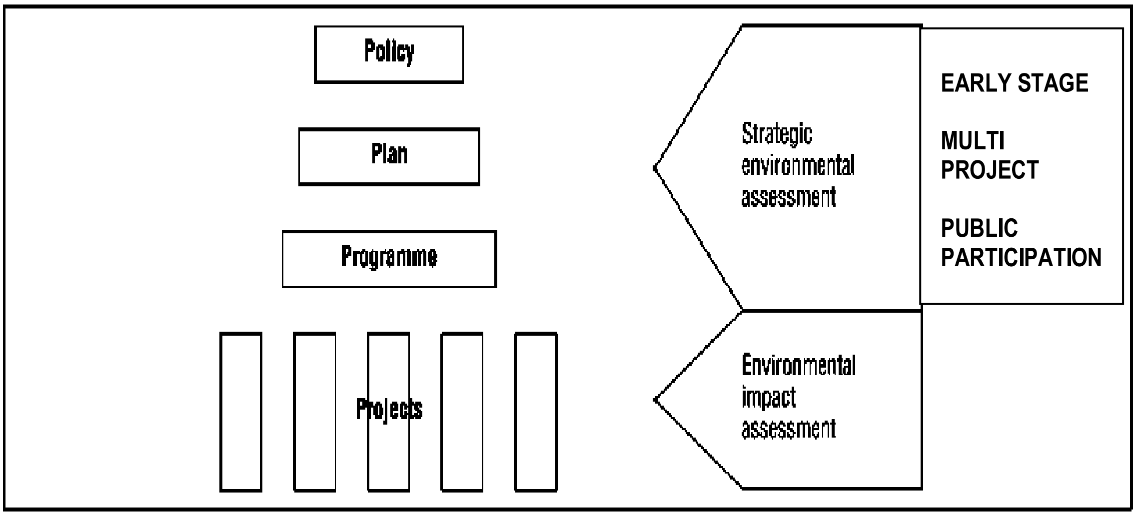
Please mark √ at the appropriate space your level of **Awareness** using the indicators below.
*Sila tanda √ di ruang yang berkenaan tahap **Kesedaran** anda menggunakan penunjuk di bawah.*

No Awareness *Tiada Kesedaran*	Not Aware of Existence *Tidak Sedar Kewujudan*
Low Awareness *Kesedaran Rendah*	Aware of Existence but Not Aware of Concept *Sedar Kewujudan Tetapi Tidak Sedar akan Konsep*
Moderate Awareness *Kesedaran Sederhana*	Aware of Existence and Concept but no Understanding on its Application *Sedar Kewujudan dan Konsep tetapi tiada Pemahaman akan Penggunaan*
High Awareness *Kesedaran Tinggi*	Aware of Existence, Concept and Application *Sedar Kewujudan, Konsep dan Penggunaan*

No	**Policy, Concepts & Principles** ***Dasar, Konsep & Prinsip***	**No Awareness** ***Tiada Kesedaran***	**Low Awareness** ***Kesedaran Rendah***	**Average Awareness** ***Kesedaran Sederhana***	**High Awareness** ***Kesedaran Tinggi***
1.	National Policy on the Environment (2002) *Dasar Alam Sekitar Negara (2002)*				
2.	National Strategic Plan for Solid Waste Management (2005) *Pelan Pengurusan Strategik Sisa Pepejal Negara (2005)*				
3.	Environmental Quality Act (1974) *Akta Kualiti Alam Sekeliling (1974)*				
4.	Solid Waste and Public Cleansing Management Act 2007 *Akta Pengurusan Sisa Pepejal & Pembersihan Awam 2007*				
5.	Environmental Impact Assessment (EIA) *Penilaian Kesan Alam Sekitar*				
6.	Strategic Environmental Assessment (SEA) *Penilaian Alam Sekitar Strategik (SEA)*				
7.	Pollution Prevention Principle *Prinsip Pencegahan Pencemaran*				
8.	Public Participation Principle *Prinsip Penyertaan Awam*				
9.	Precautionary Principle *Prinsip Tindakan Pecegahan*				
10.	Reduce, Reuse & Recycle Concept (3R) *Konsep Kurang, Guna Semula & Kitar Semula (3R)*				

Bahagian B/ *Part B*

Please read the following **definitions** before proceeding to the next section.
*Sila baca **definsi** berikut sebelum beralih ke bahagian seterusnya.*



1. Environmental Impact Assessment (EIA) / Penilaian Kesan Alam Sekitar (EIA)

Environmental Impact Assessment (EIA) is a system of integrating environmental considerations at a project level and is usually conducted at a later stage of planning and may not involve public participation.

Penilaian Kesan Alam Sekitar (EIA) adalah suatu sistem yang mengintegrasikan keperluan alam sekitar pada peringkat projek dan biasanya dilaksanakan pada peringkat akhir perancangan serta mungkin tidak melibatkan penyertaan awam.

2. Strategic Environmental Assessment (SEA) / Penilaian Alam Sekitar Strategik (SEA)

Strategic Environmental Assessment (SEA) is a system of integrating environmental consideration at the strategic level of Policies, Plans and Programmes (PPP) and is usually conducted at an early stage of planning for multi projects and involves public participation.

Penilaian Alam Sekitar Strategik (SEA) adalah suatu sistem yang mengintegrasikan keperluan alam sekitar pada peringkat strategik Dasar, Pelan dan Program (PPP) dan biasanya dilaksanakan pada peringkat awal perancangan untuk multi projek serta melibatkan penyertaan awam.

3. Public Participation / Penyertaan Awam

Public participation is the involvement of the public and stakeholders in a formal consultation process to consider their feedback and opinions in the decision making of environmental/solid waste management policies, plans, programmes or projects.

Penyertaan awam adalah penglibatan orang awam dan pihak berkepentingan untuk mempertimbangkan maklumbalas dan pendapat mereka melalui proses rundingan rasmi di dalam membuat keputusan untuk dasar, pelan, program atau projek alam sekitar/pengurusan sisa pepejal.

Please mark √ at the space that best represents your opinions:
Sila tanda √ di ruang yang paling mewakili pendapat anda:

	Statement/*Kenyataan*	**Strongly Disagree/ *Sangat Tidak Setuju***	**Disagree/ *Tidak Setuju***	**Agree/ *Setuju***	**Strongly Agree/ *Sangat Setuju***
1.	The existing environmental quality is good. *Kualiti alam sekitar sediada adalah baik.*				
2.	The existing system for environmental protection is good. *Sistem sediada untuk memelihara alam sekitar adalah baik.*				
3.	The existing solid waste recycling rate is high. *Kadar kitar semula sisa pepejal adalah tinggi.*				
4.	The existing system for environmental protection in solid waste management planning is good. *Sistem perancangan pengurusan sisa pepejal sediada untuk memelihara alam sekitar adalah baik.*				
5.	SEA can improve the solid waste management system in Malaysia. *SEA boleh meningkatkan system pengurusan sisa pepejal di Malaysia.*				
6.	SEA for solid waste management can be implemented without formulating a SEA legislation. *SEA untuk pengurusan sisa pepejal dapat dilaksanakan tanpa mengubal undang-undang SEA.*				
7.	SEA for solid waste management can be implemented without political will. *SEA untuk pengurusan sisa pepejal dapat dilaksanakan tanpa kehendak politik*				
8.	SEA for solid waste management can be implemented without public participation. *SEA untuk pengurusan sisa pepejal dapat dilaksanakan tanpa penyertaan awam.*				
9.	SEA for solid waste management can be implemented without SEA training. *SEA untuk pengurusan sisa pepejal dapat dilaksanakan tanpa latihan SEA.*				
10.	SEA should be implemented for solid waste policy planning in Malaysia. *SEA harus dilaksanakan untuk perancangan dasar sisa pepejal di Malaysia.*				

***Part C* / Bahagian C**

Please mark √ at only **<u>ONE</u>** space, the option which best represents your opinion.
*Sila tanda √ di hanya **<u>SATU</u>** ruang, pilihan yang paling mewakili pendapat anda.*

1. In your opinion what is the main **BENEFIT** of implementing SEA in solid waste management in Malaysia?
*Pada pendapat anda apakah **MANAFAAT** utama untuk melaksanakan SEA di dalam pengurusan sisa pepejal di Malaysia?*

☐	Early Stage of Environmental Planning *Perancangan Alam Sekitar Peringkat Awal*
☐	Addressing Multi Project & Cumulative Environmental Impacts *Mengatasi Kesan Alam Sekitar Multi Projek & Kumulatif*
☐	Public Participation & Transparency of Solid Waste Management Planning Decisions *Penyertaan Awam & Ketelusan Keputusan Perancangan Pengurusan Sisa Pepejal*
☐	Improving the Understanding of Decision Makers on Solid Waste Planning Decisions *Meningkatkan Pemahaman Pembuat Keputusan dalam Perancangan Sisa Pepejal*
☐	Others *Lain-lain*: ____________________

2. In your opinion what is the main factor for the **SUCCESSFUL** implementation of SEA in Malaysia?
*Pada pendapat anda apakah faktor utama untuk **MENJAYAKAN** pelaksanaan SEA di Malaysia?*

☐	SEA Legislation *Perundangan SEA*
☐	SEA Political Will *Kehendak Politik untuk SEA*
☐	SEA Public Participation *Penyertaan Awam untuk SEA*
☐	SEA Capacity Building/Training *Pembinaan Kapasiti & Latihan untuk SEA*
☐	Others *Lain-lain*: ____________________

3. Please **PRIORITIZE** the following areas according to importance during solid waste management planning in Malaysia? (1 FOR THE MOST IMPORTANT WHILE 4 FOR THE LEAST IMPORTANT)
*Sila susun bidang berikut mengikut **KEUTAMAAN** semasa perancangan pengurusan sisa pepejal di Malaysia? (1 UNTUK PALING PENTING MANAKALA 4 UNTUK PALING KURANG PENTING)*

☐	Environmental Protection *Pemeliharaan Alam Sekitar*
☐	Economic Development *Pembangunan Ekonomi*
☐	Social Benefit *Manafaat Sosial*
☐	Interest of Affected Individuals/Residents Kepentingan Individu/Penduduk Terjejas

4. Would you consider involving in an SEA public participation for solid waste management in Malaysia in the future?
Sudikah anda mempertimbangkan melibatkan diri di dalam penyertaan awam SEA untuk pengurusan sisa pepejal di Malaysia pada masa akan datang?

☐ YES / YA

☐ NO / TIDAK

Reason/Sebab : ____

***Part D* / Bahagian D**

Please provide any comments or suggestions you may have on Strategic Environmental Assessment (SEA) or solid waste management in Malaysia.
Sila beri sebarang komen atau cadangan anda berkenaan Penilaian Alam Sekitar Strategik (SEA) atau pengurusan sisa pepejal di Malaysia.

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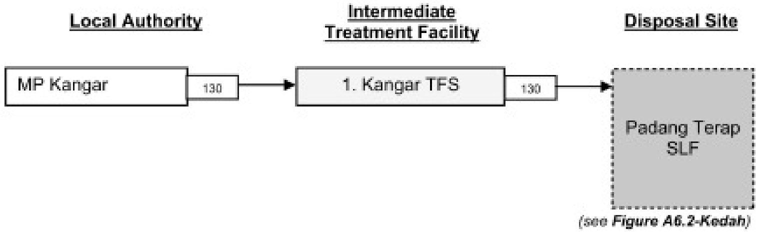
THANK YOU / TERIMA KASIH

APPENDIX 3 : NATIONAL STRATEGIC PLAN WASTE FLOW MAPS



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Kangar TFS	130	3	III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

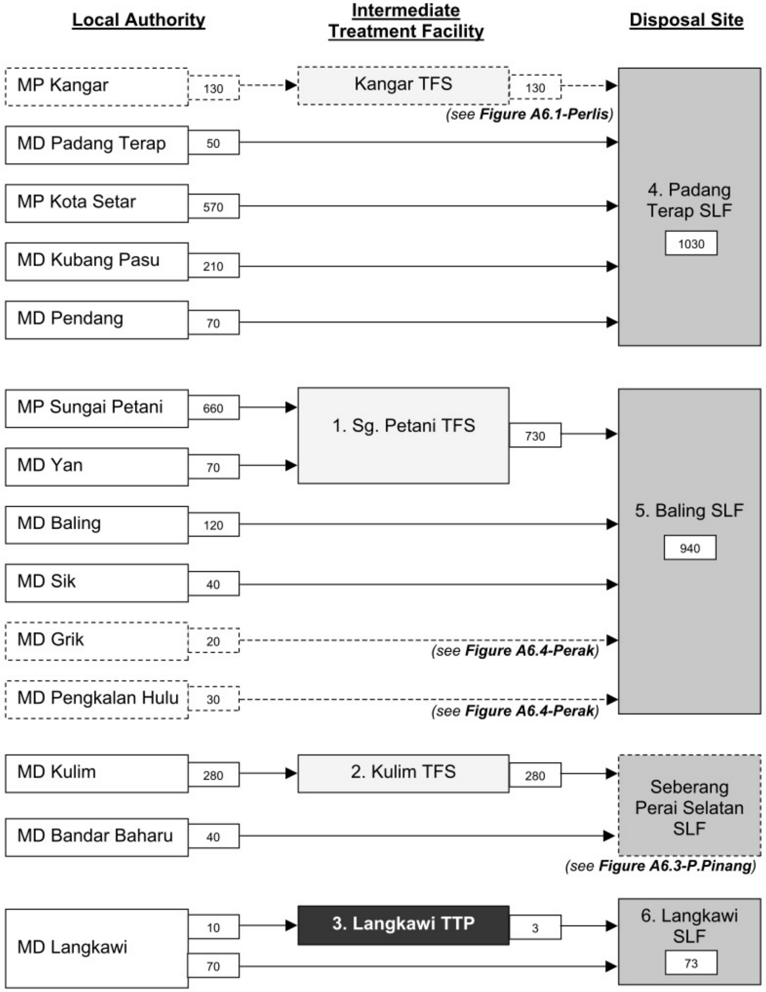
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.1

Waste Flow and SWM Facilities in Perlis in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Sg. Petani TFS	740	4	II
2.	Kulim TFS	290	3	II
3.	Langkawi TTP	16	-	Existing
4.	Padang Terap SLF	1,030	30	I,II,III
5.	Baling SLF	940	30	I,II,III
6.	Langkawi SLF	73	3	I,II,III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

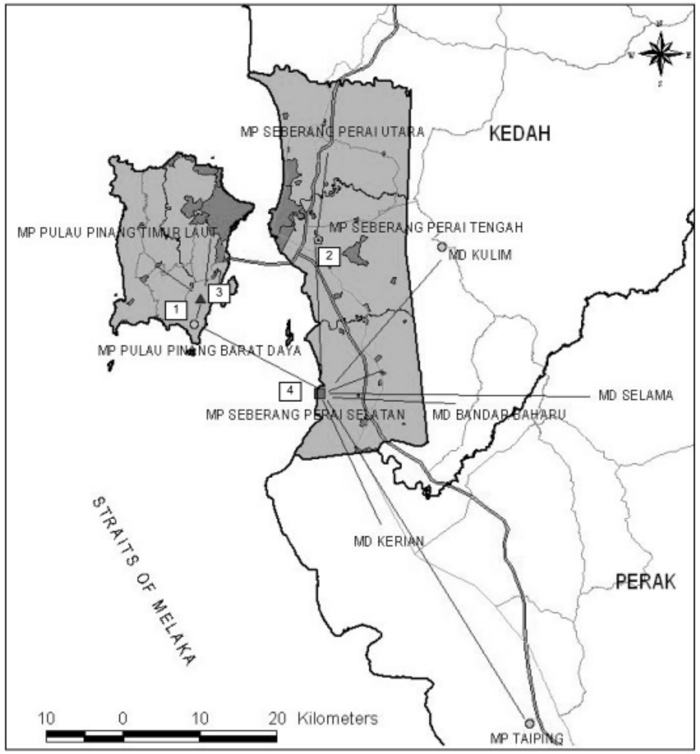
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

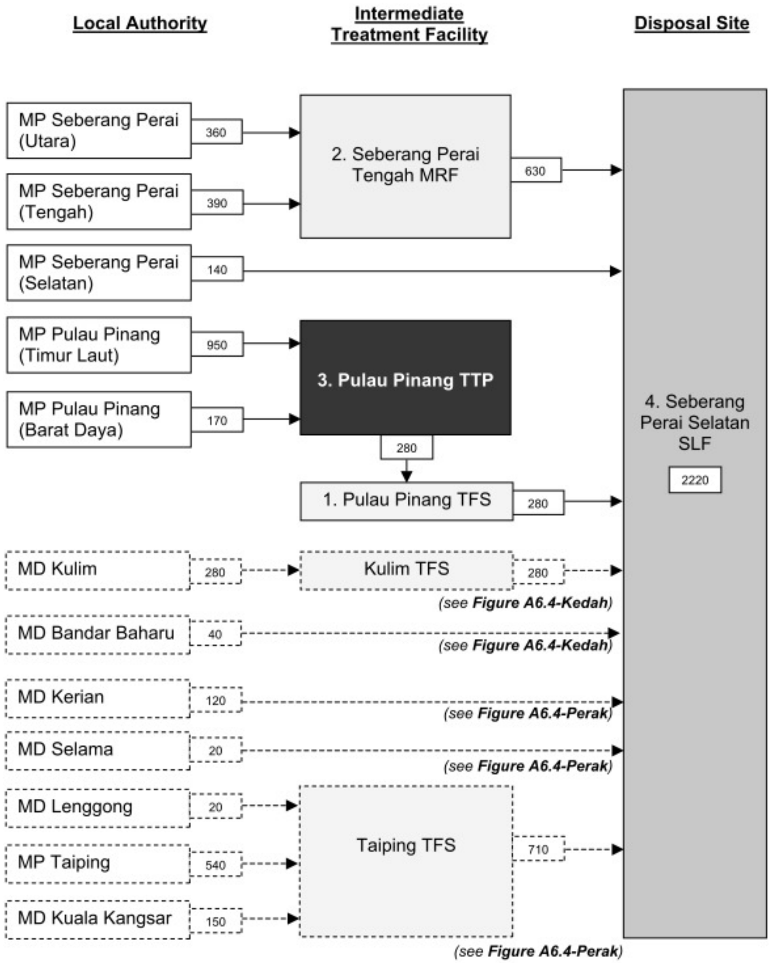
Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
Phase I: 2003-2009
Phase II: 2010-2014
Phase III: 2015-2020

Figure 4.2

Waste Flow and SWM Facilities in Kedah in 2020





No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Pulau Pinang TFS	300	3	II
2.	Seberang Perai Tengah MRF	750	7	I
3.	Pulau Pinang TTP	1,120	20	I
4.	Seberang Perai Selatan SLF	2,220	90	I, II, III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

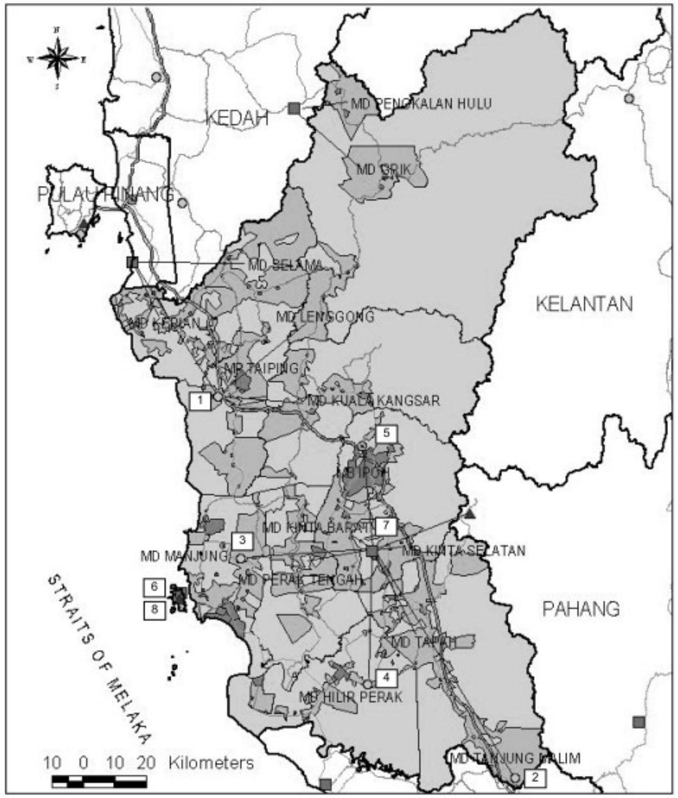
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

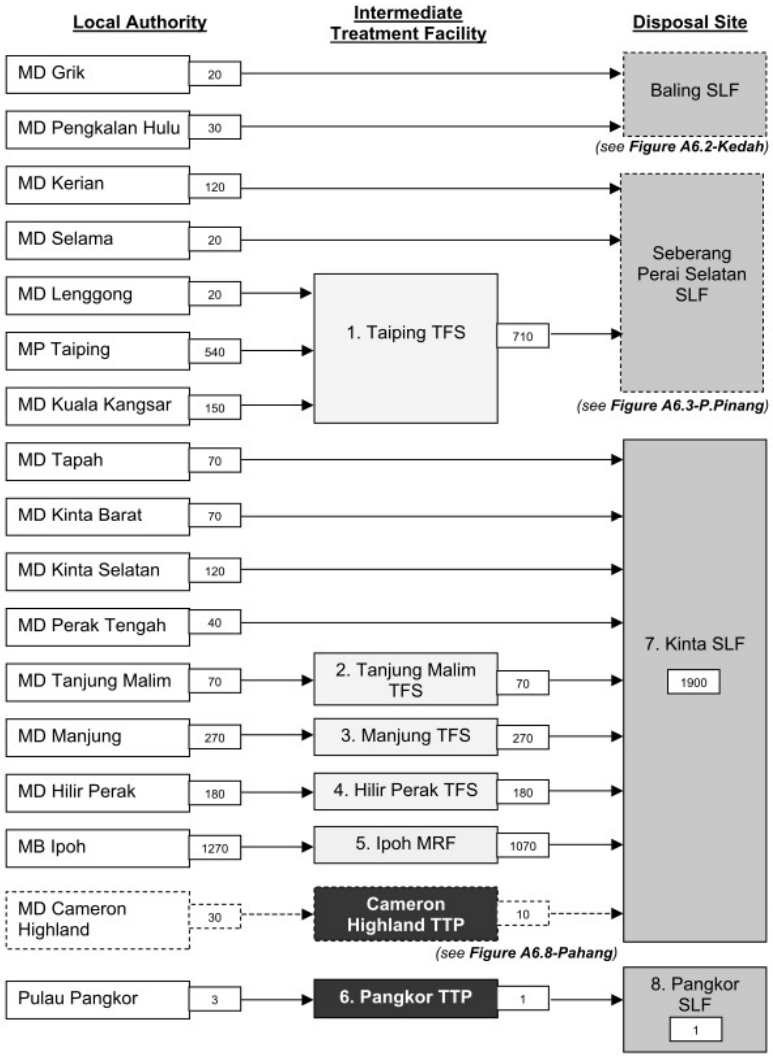
1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.3

Waste Flow and SWM Facilities in Pulau Pinang in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Taiping TFS	710	4	II
2.	Tanjung Malim TFS	80	2	I
3.	Manjung TFS	270	3	I
4.	Hilir Perak TFS	180	3	II
5.	Ipoh MRF	1,280	8	I
6.	Pangkor TTP	8	-	Existing
7.	Kinta SLF	1,900	60	I,II,III
8.	Pulau Pangkor SLF	1	3	I



Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

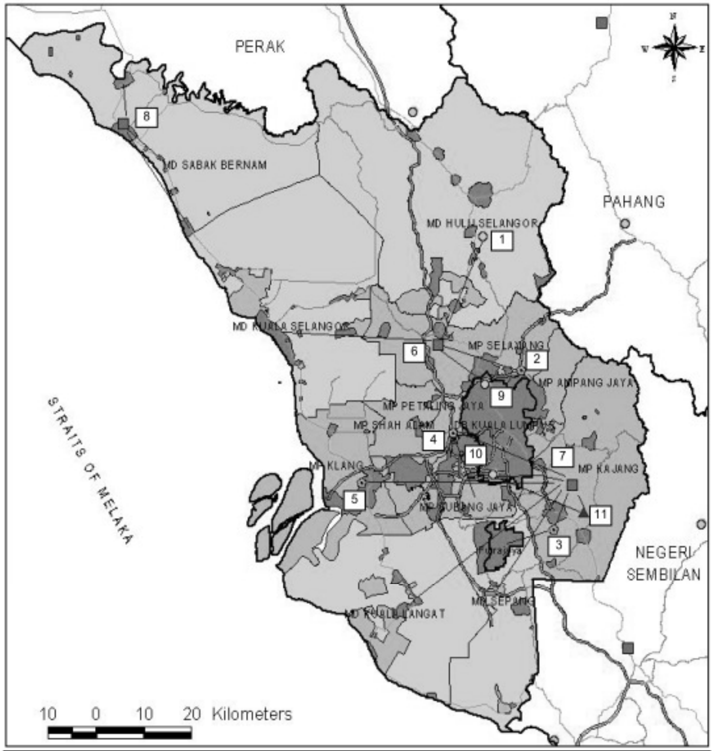
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

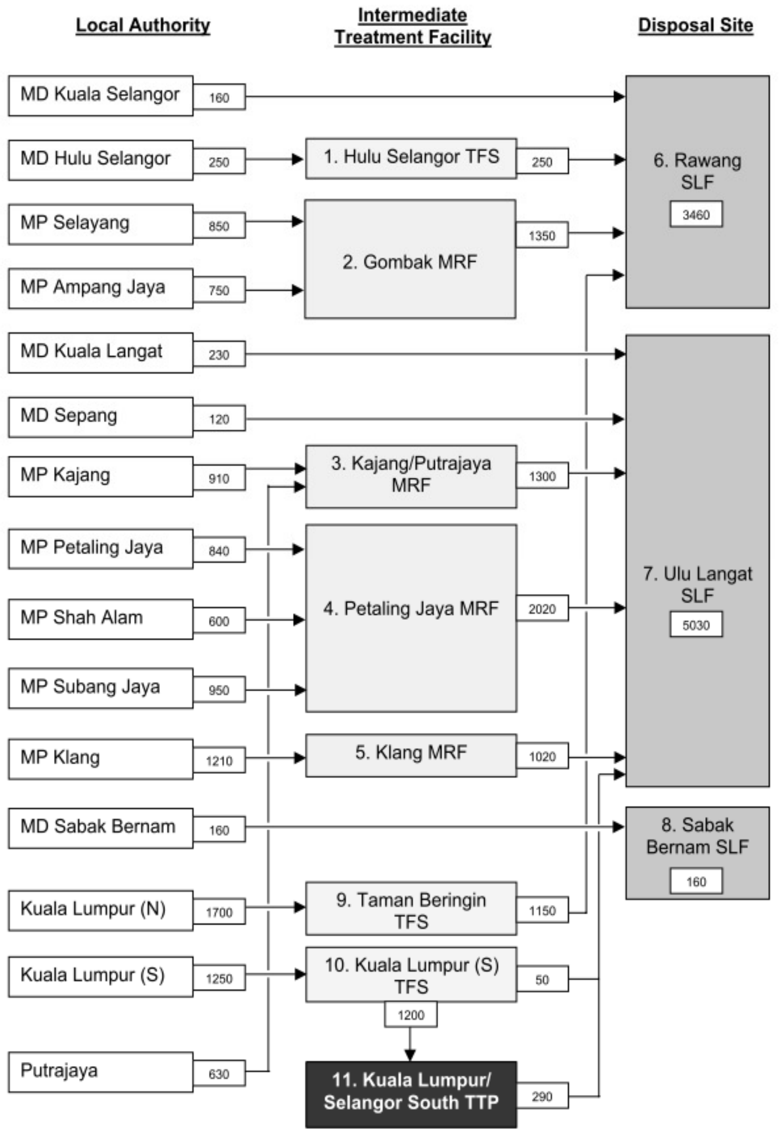
1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.4

Waste Flow and SWM Facilities in Perak in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Hulu Selangor TFS	260	3	III
2.	Gombak MRF	1,600	8	I
3.	Kajang/Putrajaya MRF	1,540	8	I
4.	Petaling Jaya MRF	2,390	8	I
5.	Klang MRF	1,220	8	I
6.	Rawang SLF	3,460	150	I, II, III
7.	Ulu Langat SLF	5,030	160	I, II, III
8.	Sabak Bernam SLF	160	7	I, II, III
9.	Taman Beringin TFS	1,700	6	Existing
10.	Kuala Lumpur (South) TFS	1,300	6	I
11.	Kuala Lumpur-Selangor South TTP	1,200	20	I



Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

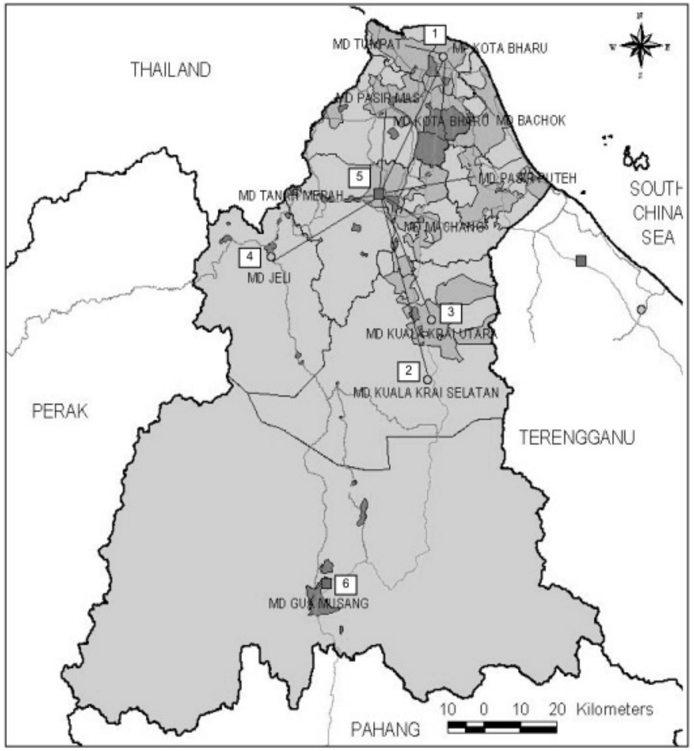
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

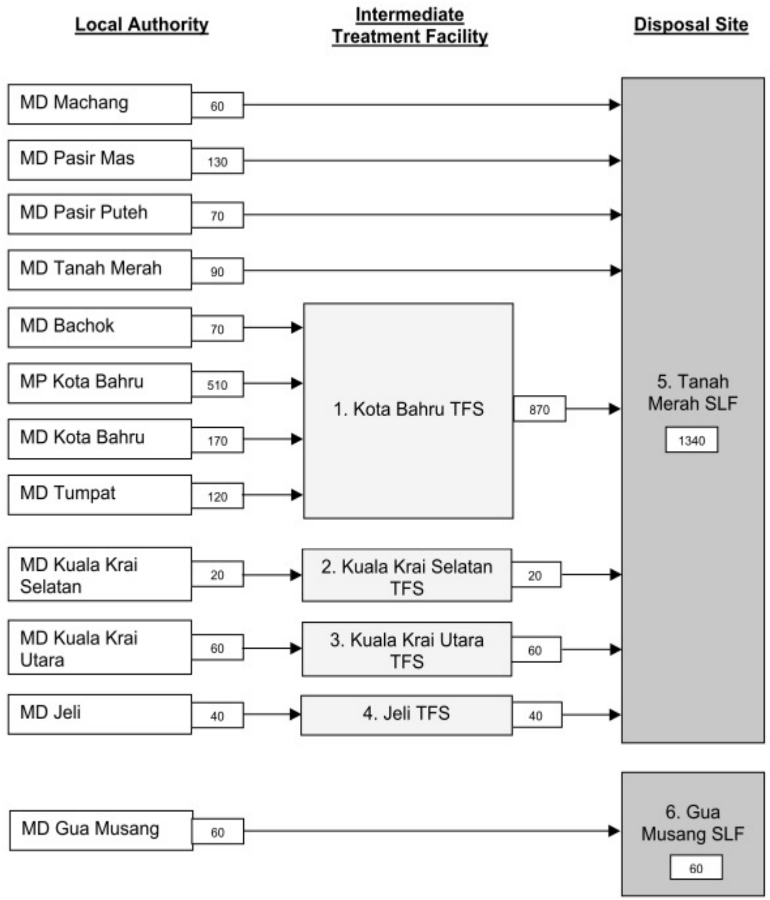
1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.5

Waste Flow and SWM Facilities in Selangor, Kuala Lumpur and Putrajaya in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Kota Bahru TFS	880	4	I
2.	Kuala Krai Selatan TFS	20	2	I
3.	Kuala Krai Utara TFS	60	2	I
4.	Jeli TFS	40	2	II
5.	Tanah Merah SLF	1,340	40	I, II, III
6.	Gua Musang SLF	60	3	I, II, III



Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

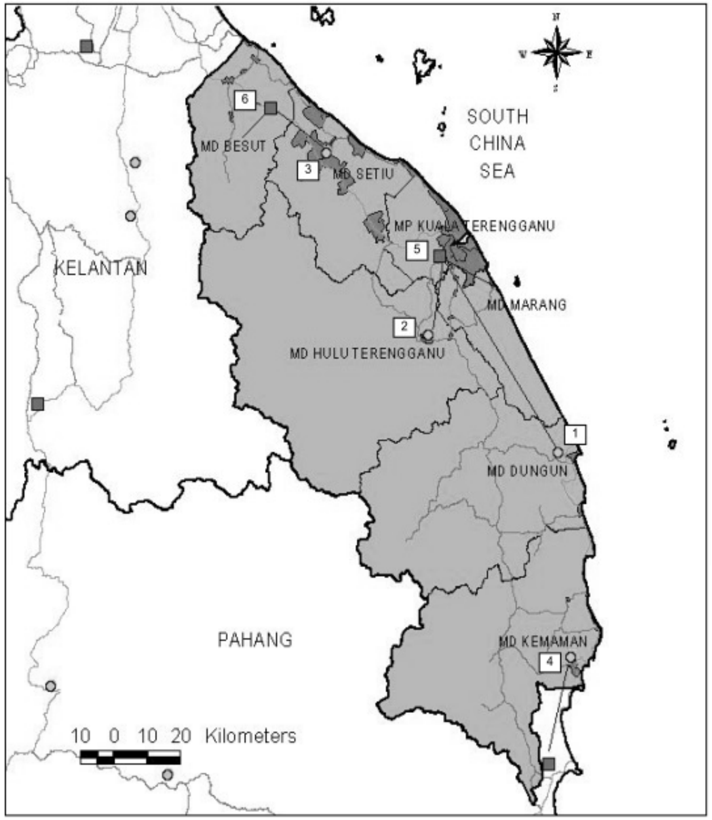
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

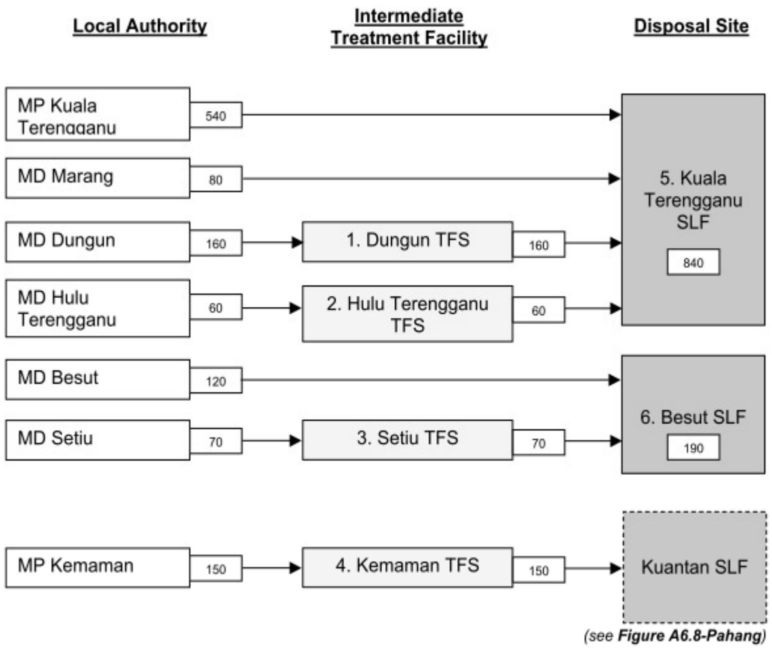
Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.6

Waste Flow and SWM Facilities in Kelantan in 2020





No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Dungun TFS	170	3	III
2.	Hulu Terengganu TFS	70	2	II
3.	Setiu TFS	70	2	II
4.	Kemaman TFS	150	3	I
5.	Kuala Terengganu SLF	840	30	I, II, III
6.	Besut SLF	190	5	I, II, III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

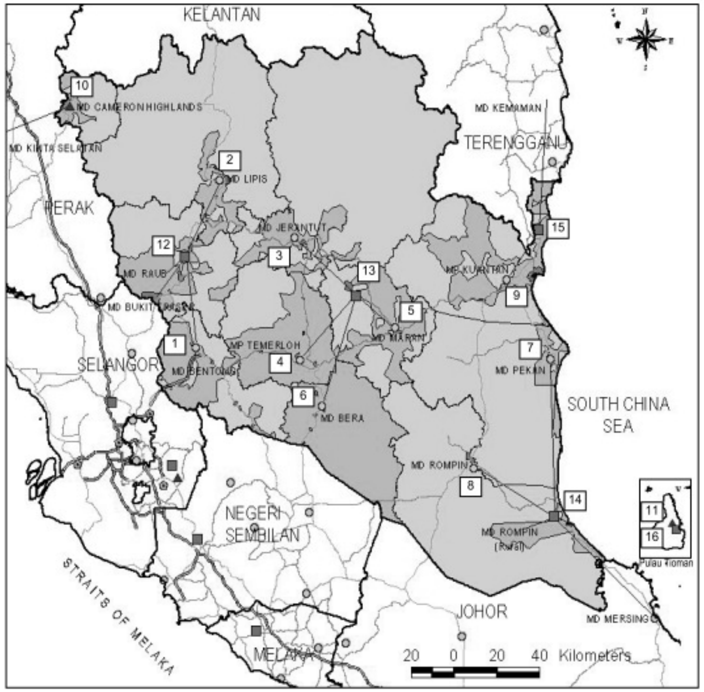
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

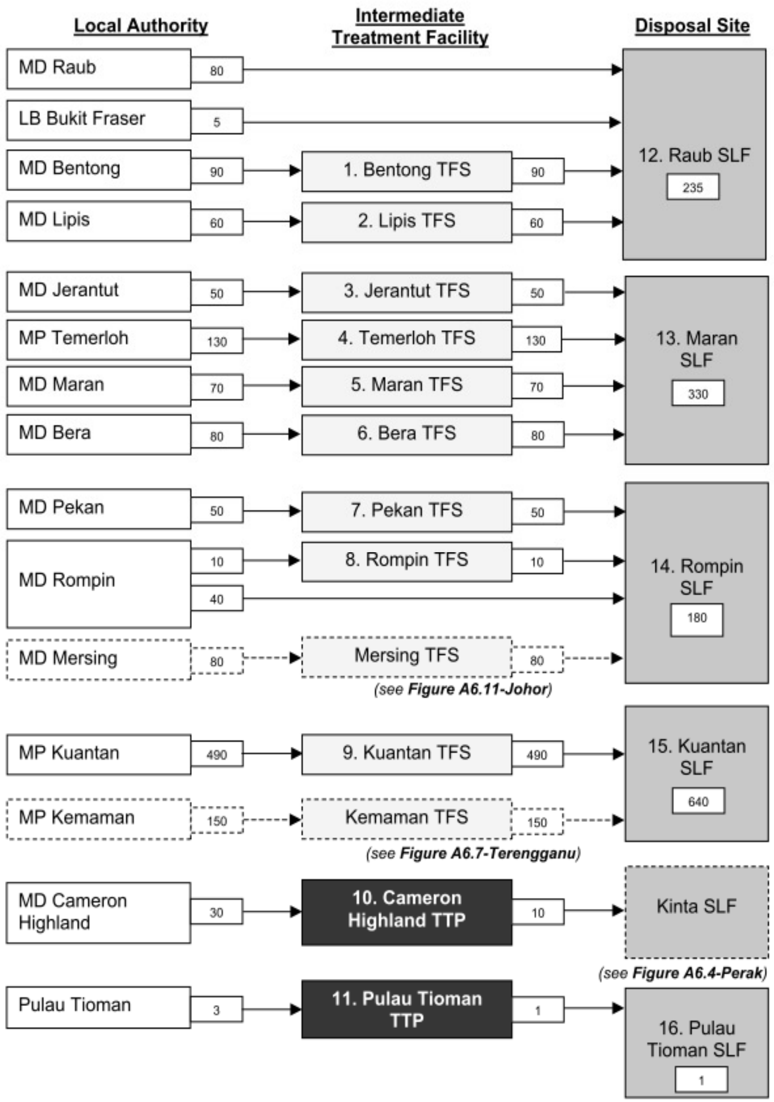
1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.7

Waste Flow and SWM Facilities in Terengganu in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Bentong TFS	90	2	I
2.	Lipis TFS	60	2	II
3.	Jerantut TFS	50	2	I
4.	Temerloh TFS	130	3	I
5.	Maran TFS	70	2	I
6.	Bera TFS	80	2	III
7.	Pekan TFS	60	2	III
8.	Rompin TFS	10	2	III
9.	Kuantan TFS	490	3	I
10.	Cameron Highland TTP	30	3	I
11.	Pulau Tioman TTP	6	-	Existing
12.	Raub SLF	235	10	I, II, III
13.	Maran SLF	330	10	I, II, III
14.	Rompin SLF	180	5	I, II, III
15.	Kuantan SLF	640	20	I, II, III
16.	Pulau Tioman SLF	1	3	I, II, III



Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

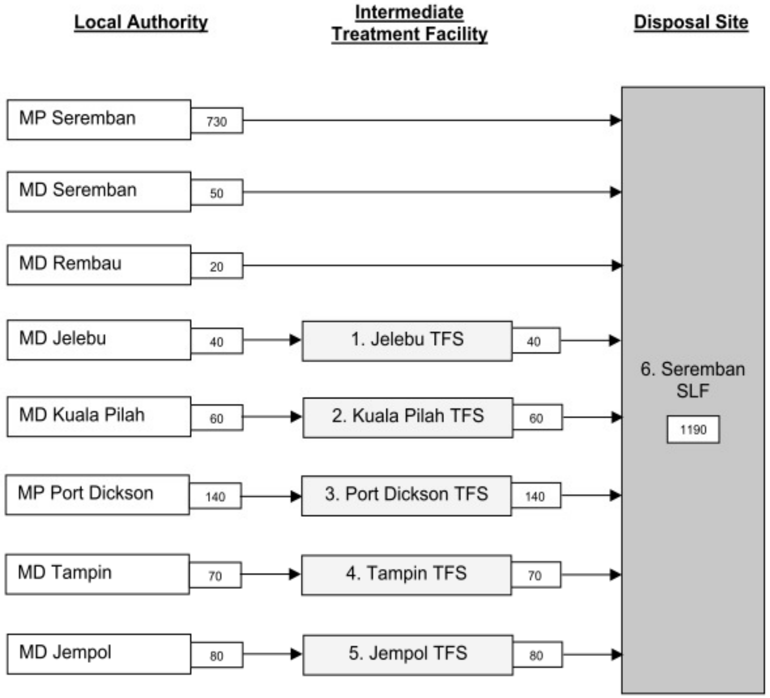
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.8

Waste Flow and SWM Facilities in Pahang in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Jelebu TFS	40	2	III
2.	Kuala Pilah TFS	60	2	III
3.	Port Dickson TFS	140	3	I
4.	Tampin TFS	70	2	III
5.	Jempol TFS	80	2	II
6.	Seremban SLF	1,190	40	I, II, III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

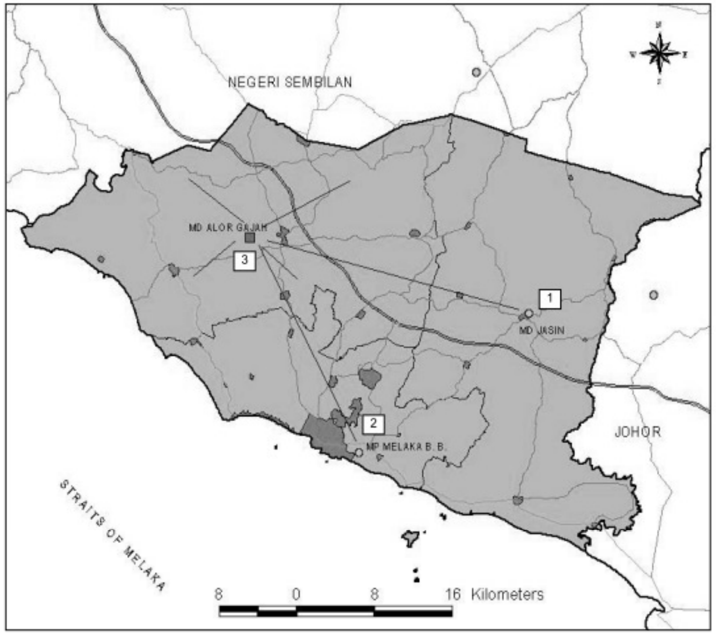
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

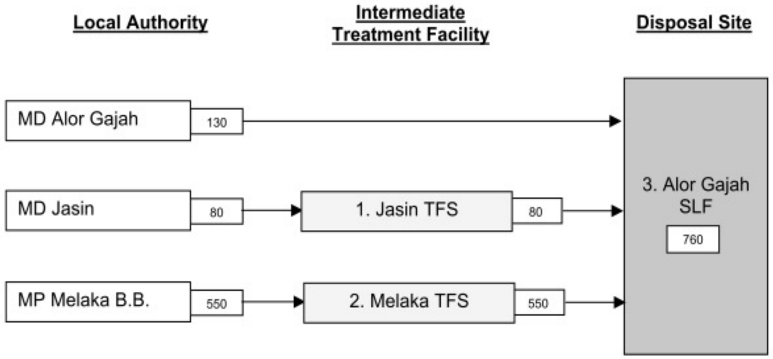
Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.9

Waste Flow and SWM Facilities in Negeri Sembilan in 2020





No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Jasin TFS	80	2	II
2.	Melaka TFS	550	4	I
3.	Alor Gajah SLF	760	25	I, II, III

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

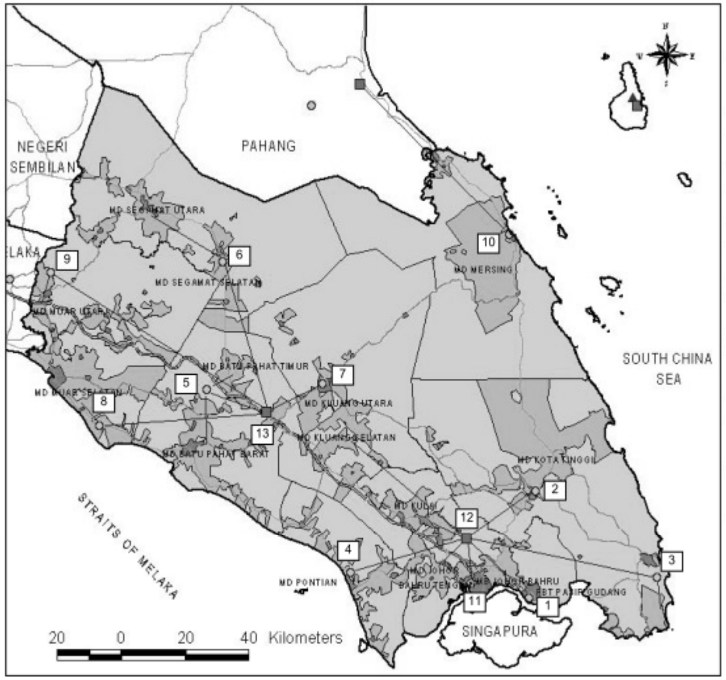
TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

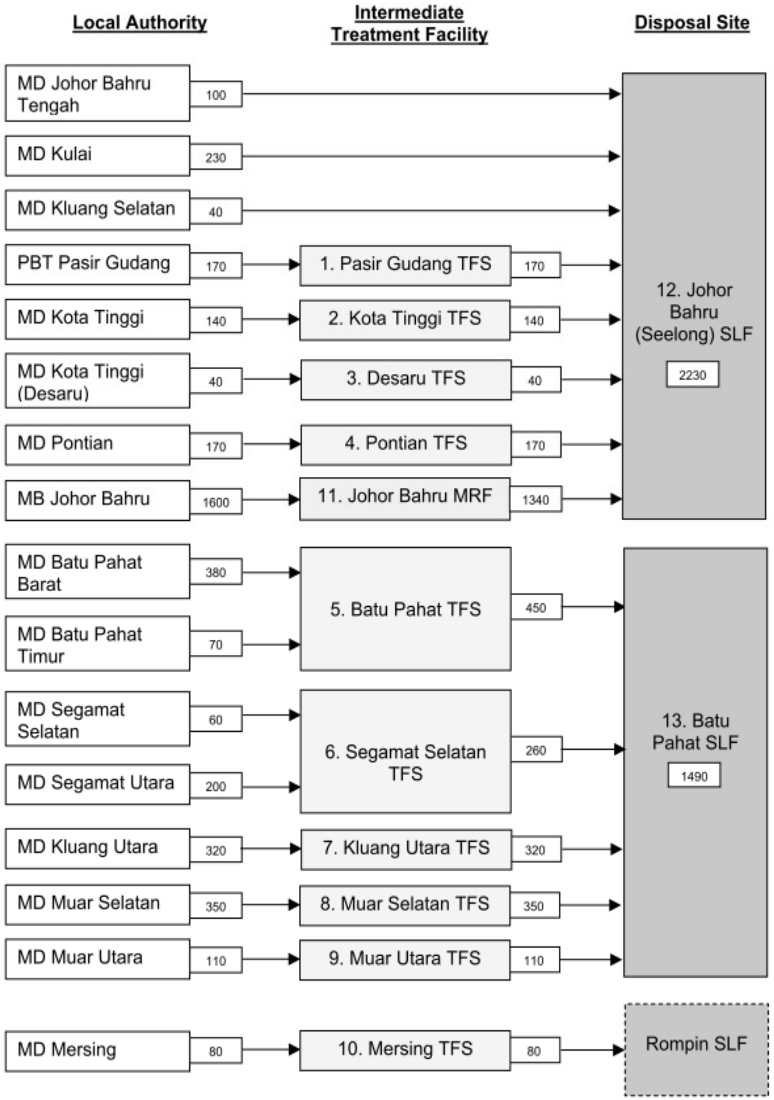
1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.10

Waste Flow and SWM Facilities in Melaka in 2020



No.	SWM Facilities	Capacity in 2020 (TPD)	Estimated Land Area (Ha)	Phase
1.	Pasir Gudang TFS	170	3	II
2.	Kota Tinggi TFS	140	3	I
3.	Desaru TFS	40	2	I
4.	Pontian TFS	170	3	I
5.	Batu Pahat TFS	450	3	I
6.	Segamat Selatan TFS	260	3	I
7.	Kluang Utara TFS	320	3	II
8.	Muar Selatan TFS	350	3	I
9.	Muar Utara TFS	110	3	I
10.	Mersing TFS	80	2	III
11.	Johor Bahru MRF	1,600	8	I
12.	Johor Bahru (Seelong) SLF	2,230	70	I, II, III
13.	Batu Pahat SLF	1,490	45	I, II, III



(see **Figure A6.8-Pahang**)

Legends:

- Transfer Station
- Material Recovery Facility
- Thermal Treatment Plant
- Sanitary Landfill
- Waste Flow
- Highway
- Federal Road
- State Road
- District Area
- Local Authority Area
- Township Area

Abbreviations:

TFS: Transfer Station
MRF: Material Recovery Facility
TTP: Thermal Treatment Plant
SLF: Sanitary Landfill
TPD: Tonne per Day
Ha: Hectare

Explanatory Note:

1. Figures in flow diagram are projected tonnes per day (TPD) of waste collected in Year 2020.
2. The locations of planned SWM facilities are generic.
3. Land areas requirement are estimates.
4. Construction of facilities in 3 phases:
   Phase I: 2003-2009
   Phase II: 2010-2014
   Phase III: 2015-2020

Figure 4.11

Waste Flow and SWM Facilities in Johor in 2020

APPENDIX 4 : DEFINITE ASEA INPUT AND RESULTS

Input	Rank	Weight	Input Source
ESA	1	0.269	National Physical Plan (2010), Department of Town & Country Planning
EPL	1	0.269	National Strategic Plan (2005), Department of Solid Waste Management
ESR	1	0.269	Landuse Maps (2002-2010), Department of Survey & Mapping
WQI	2	0.064	Environmental Quality Report (2011), Department of Environment
API	2	0.064	Environmental Quality Report (2011), Department of Environment
PPC	2	0.064	SEA Study Survey (2012)

NSP Sites	PPC	API	WQI	ESR	EPL	ESA	CEI
Highest Impact	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MRF Kajang	0.67	0.67	0.67	1.00	1.00	0.67	0.85
SLF Rawang	0.67	0.67	0.67	1.00	1.00	0.67	0.85
TFS Kemaman	0.67	0.67	0.67	1.00	0.67	1.00	0.85
SLF Seremban	0.67	0.67	0.33	1.00	1.00	0.67	0.83
SLF Pdg Terap	0.67	0.67	0.33	1.00	1.00	0.67	0.83
SLF Johor Baharu	0.67	0.67	1.00	0.67	1.00	0.67	0.78
MRF Ipoh	0.67	0.67	0.67	1.00	1.00	0.33	0.76
MRF Johor Baharu	0.67	0.67	0.67	1.00	1.00	0.33	0.76
SLF Ulu Langat	0.67	0.67	0.67	0.67	1.00	0.67	0.76
MRF Petaling jaya	0.67	0.67	0.67	1.00	1.00	0.33	0.76
TFS Tmn Beringin	0.67	0.67	0.67	1.00	1.00	0.33	0.76
SLF Kuantan	0.67	0.67	0.67	0.67	0.67	1.00	0.76
TFS Kuala Lumpur (S)	0.67	0.67	0.67	1.00	1.00	0.33	0.76
MRF Klang	0.67	0.67	0.67	1.00	1.00	0.33	0.76
TFS Muar Utara	0.67	0.67	0.67	1.00	0.67	0.67	0.76
MRF Sbg Perai	0.33	0.67	1.00	0.67	0.67	1.00	0.76
SLF Sbg Perai	0.33	0.67	1.00	0.33	1.00	1.00	0.76
SLF Baling	0.67	0.67	0.33	1.00	0.67	0.67	0.74
TTP P Pinang	0.33	0.67	0.67	1.00	1.00	0.33	0.74
MRF Gombak	0.67	0.67	0.33	1.00	1.00	0.33	0.74
TTP KL-Selangor (S)	0.67	0.67	0.33	0.67	1.00	0.67	0.74
TFS Kota Bharu	0.67	0.67	0.33	1.00	0.67	0.67	0.74
TFS Jeli	0.67	0.67	0.33	1.00	0.33	1.00	0.74
SLF Tanah Merah	0.67	0.67	0.33	1.00	1.00	0.33	0.74
TFS Dungun	0.67	0.67	0.33	0.67	0.67	1.00	0.74
TFS Temerloh	0.67	0.67	0.33	1.00	0.67	0.67	0.74
SLF Raub	0.67	0.67	0.33	1.00	0.67	0.67	0.74
TFS Kangar	0.67	0.67	0.67	1.00	0.67	0.33	0.67
TFS Sg Petani	0.67	0.67	0.67	1.00	0.67	0.33	0.67
TFS Port Dickson	0.67	0.67	0.67	1.00	0.67	0.33	0.67
TFS Melaka	0.67	0.67	0.67	1.00	0.67	0.33	0.67
TFS Desaru	0.67	0.67	0.67	0.67	0.33	1.00	0.67
SLF Batu Pahat	0.67	0.67	0.67	0.33	1.00	0.67	0.67
TFS P Pinang	0.33	0.67	0.67	1.00	0.67	0.33	0.65

NSP Sites	PPC	API	WQI	ESR	EPL	ESA	CEI
TFS Taiping	0.67	0.67	0.33	1.00	0.67	0.33	0.65
SLF Kinta	0.67	0.67	0.33	0.67	1.00	0.33	0.65
TFS Hulu Selangor	0.67	0.67	0.33	0.67	0.67	0.67	0.65
SLF Sabak Bernam	0.67	0.67	0.33	1.00	0.67	0.33	0.65
TFS Kuala Krai (U)	0.67	0.67	0.33	1.00	0.33	0.67	0.65
SLF Besut	0.67	0.67	0.33	1.00	0.67	0.33	0.65
TFS Bentong	0.67	0.67	0.33	1.00	0.33	0.67	0.65
TFS Jerantut	0.67	0.67	0.33	0.67	0.33	1.00	0.65
TFS Kuantan	0.67	0.67	0.33	1.00	0.67	0.33	0.65
TTP Pulau Tioman	0.67	0.67	0.33	0.67	0.33	1.00	0.65
SLF Pulau Tioman	0.67	0.67	0.33	0.67	0.33	1.00	0.65
TFS Kuala Pilah	0.67	0.67	0.33	1.00	0.33	0.67	0.65
TFS Tampin	0.67	0.67	0.33	0.67	0.33	1.00	0.65
TFS Kota Tinggi	0.67	0.67	0.33	0.67	0.67	0.67	0.65
TFS Manjung	0.67	0.67	1.00	0.67	0.67	0.33	0.60
TFS Kulim	0.67	0.67	0.67	0.67	0.67	0.33	0.58
SLF Kuala Terengganu	0.67	0.67	0.67	0.67	0.67	0.33	0.58
TFS Bera	0.67	0.67	0.67	0.67	0.33	0.67	0.58
SLF Maran	0.67	0.67	0.67	0.67	0.67	0.33	0.58
SLF Rompin	0.67	0.67	0.67	0.67	0.67	0.33	0.58
TFS Pontian	0.67	0.67	0.67	0.67	0.67	0.33	0.58
TFS Batu Pahat	0.67	0.67	0.67	0.33	0.67	0.67	0.58
TFS Muar Selatan	0.67	0.67	0.67	0.67	0.67	0.33	0.58
TTP Langkawi	0.67	0.67	0.33	0.33	0.33	1.00	0.56
TFS Tg Malim	0.67	0.67	0.33	1.00	0.33	0.33	0.56
TFS Hilir Perak	0.67	0.67	0.33	0.67	0.67	0.33	0.56
TFS Kuala Krai (S)	0.67	0.67	0.33	0.67	0.33	0.67	0.56
TFS Hulu Terengganu	0.67	0.67	0.33	0.67	0.33	0.67	0.56
TFS Lipis	0.67	0.67	0.33	0.67	0.33	0.67	0.56
TFS Pekan	0.67	0.67	0.33	1.00	0.33	0.33	0.56
TTP Cameron Highlands	0.67	0.67	0.33	0.67	0.33	0.67	0.56
TFS Jelebu	0.67	0.67	0.33	0.67	0.33	0.67	0.56
TFS Jasin	0.67	0.67	0.33	0.67	0.33	0.67	0.56
SLF Alor Gajah	0.67	0.67	0.33	0.67	0.67	0.33	0.56
TFS Segamat Selatan	0.67	0.67	0.33	0.33	0.67	0.67	0.56
TFS Jempol	0.67	0.67	0.67	0.33	0.33	0.67	0.49
TTP Pangkor	0.67	0.67	0.67	0.67	0.33	0.33	0.49
TFS Mersing	0.67	0.67	0.67	0.67	0.33	0.33	0.49
SLF P Pangkor	0.67	0.67	0.67	0.67	0.33	0.33	0.49
TFS Kluang Utara	0.67	0.67	0.33	0.33	0.67	0.33	0.47
SLF Gua Musang	0.67	0.67	0.33	0.33	0.33	0.67	0.47
TFS Pasir Gudang	0.67	0.67	0.33	0.33	0.67	0.33	0.47
TFS Setiu	0.67	0.67	0.33	0.67	0.33	0.33	0.47
TFS Maran	0.67	0.67	0.33	0.67	0.33	0.33	0.47
SLF Langkawi	0.67	0.67	0.33	0.67	0.33	0.33	0.47
TFS Rompin	0.67	0.67	0.33	0.67	0.33	0.33	0.47
Lowest Impact	0.33	0.33	0.33	0.33	0.33	0.33	0.33

APPENDIX 5 : PUBLICATIONS & CONFERENCES

ISI Publications Accepted

Dennis, V., & Agamuthu, P. (2013). Strategic Environmental Assessment Policy Integration Model for Solid Waste Management in Malaysia. *Environmental Science & Policy*, 33, 233–245 *(ISI-Cited Publication)*.

Agamuthu, P., & Dennis, V. (2013). Policy trends of e-waste management in Asia. *Journal of Material Cycles and Waste Management*, 15(4), 411–419 *(ISI-Cited Publication)*.

Agamuthu, P., & Dennis, V. (2011a). Policy trends of extended producer responsibility in Malaysia. *Waste Management & Research*, 29(9), 945–953 *(ISI-Cited Publication)*.

ISI Publications Under Review

Dennis, V., & Agamuthu, P. (2014). Policy Trends of Strategic Environmental Assessment in Asia. *Environmental Science & Policy*. (*Under Review)*.

Dennis, V., & Agamuthu, P. (2014). Strategic Environmental Assessment Public Behavioural Model for Solid Waste Management. *Waste Management & Research*. *(Under Review)*.

Paper Presented in Conferences

Dennis, V., & Agamuthu, P. (2012a). Strategic Environmental Assessment Policy Optimization Prospects for Solid Waste Management in Malaysia. Presented at the International Solid Waste Association World Congress Italy 2012, Florence, Italy.

Dennis, V., & Agamuthu, P. (2012b). Strategic Environmental Assessment Policy Intervention Scenario for Solid Waste Management in Malaysia. Presented at the 7th Asian-Pacific Landfill Symposium 2012, Bali, Indonesia.