

Environmental Management Plan and Case Study of Batang Sadong Bridge Project in Sarawak

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Abstract

This paper highlights the implementation of Environmental Management Plan (EMP) for development projects under Jabatan Kerja Raya (JKR) Sarawak and case study of Batang Sadong Bridge Project in Sarawak, Malaysia. It has now become standard practice for EMP to be included in tender documents issued by JKR, the implementation agency for government development projects. Project proponent or contractor will be guided by the Environmental Impact Assessment (EIA)'s Terms and Conditions of Approval. The contractor shall prepare an EMP and engage an independent party to carry out the monitoring works. In this paper, findings from the Environmental Management Reports (EMRs) on the Batang Sadong Bridge Project are presented. The environmental parameters are lower than or comparable with the baseline data but some do not meet the required standards. It is hope that the efforts to protect and enhance our environment would be taken more seriously by all parties involved in development projects in Malaysia.

Keywords: Environmental Management Report, impacts, construction; bridge, JKR Sarawak.

1.0 Introduction

Overall, there is an increase in awareness on importance of environment in construction industry around the world especially in the developing countries. According to a survey (Z. Abidin, 2009), developers in Malaysia do understand the importance of environment but they have not done much to implement sustainability practices. One of the main reasons for low sustainability practices in our construction industry is due to lack of enforcement through law and legislation. Among the barriers to implementing environment management by developers are increase in labor use and material handling costs (Shen and Tam, 2002). The environmental impacts are expected to be most damaging during the construction stage (Ithnin, 2006). Issues to be addressed during this stage include erosion and sedimentation, drainage and flood, waste generation and management, air, water and noise pollution, safety and health, ecological impacts as well as socio-economic impacts. These impacts must be studied in detail and mitigation measures to avoid and reduce the impacts are to be recommended in the early stage of a proposed development. This paper highlights the implementation of (Environmental Management Plan (EMP) for development projects under Jabatan Kerja Raya (JKR) Sarawak and case

study of Batang Sadong Bridge Project in Sarawak, Malaysia. The 1.48 kilometer bridge, when completed, will be the longest in the state. It will shorten the travel time from Kuching to towns such as Simunjan and Pusa and is expected to boost socio-economic activities in the surrounding areas. Findings from the Environmental Management Reports (EMRs) on the Batang Sadong Bridge Project are presented herein.

2.0 Environmental Legislation in Malaysia

In the Environmental Quality Act 1974, environment is defined as:

“the physical factors of the surroundings of the human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics”

Among the relevant legislations that govern construction industry in Malaysia including the Environmental Quality Act 1974, Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, Environmental Quality (Clean Air) Regulations 1978 and Environmental Quality (Scheduled Waste)(Amendment) Regulation 2007). The Environmental Impact Assessment (EIA), made into force in 1988 through the EIA Order 1987, has become an integral requirement for obtaining approval for development projects in Malaysia. EIA is carried out to evaluate damages to the environment that are likely to arise during project implementation. Only prescribed activities under the legislation are required to conduct EIA and submit to the approving authority. In the case of Sarawak State, the Natural Resources and Environment Board (NREB) was established as the approving authority through the National Resources and Environment Ordinance 1993 - Laws of Sarawak. Sarawak and Sabah are different from the rest of states in Malaysia because of their exclusive jurisdiction on matters related to land use, forestry, agriculture, inland water resources, rivers, electricity and local government (Memon, 2003). EIA reports submitted to the NREB are evaluated by a panel of experts and their recommendations are taken into consideration in the approval process by the Controller of Environmental Quality (NREB, 2016).

3.0 Environmental Management Plan (Emp)

Environmental Management Plan (EMP) was introduced in Malaysia in 1999 (Briffett et al, 2004). The objective of EMP is to protect and enhance the environment. The EMP requirement has been incorporated into tender documents issued by JKR, the implementation agency on behalf of the federal or state agencies in Malaysia. The EIA report is normally made available to the project proponent or contractor in preparing the EMP, and the EMP shall include the mitigation measures to be implemented based on the EIA's Terms and Conditions of Approval. The EMP is to be submitted for the Superintending Officer (S.O.)'s approval, which includes the contractor's proposed arrangements of organization, work program chart related to

environment, abatement and mitigation measures for environmental protection, environmental monitoring programme and reporting. The cost of preparing the EMP including the cost involved obtaining the services of Environmental Consultant shall be borne by the contractor. The Consultant must be registered with NREB and is also expected to prepare quarterly Environmental Management Reports (EMRs) to monitor impacts of the development project.

4.0 Batang Sadong Bridge: Approval Conditions

Batang Sadong Bridge project site is located about 12 km upstream of Sadong Jaya near to Kpg. Sungai Buloh, Samarahan. It is constructed 466 m and 606 m away from the existing ferry points at Kpg. Sungai Buloh and Sebangan side, respectively. The bridge and approach roads will link the existing Jalan Sungai Buloh with Jalan Seruyuk-Sebangan, which forms part of the State Coastal Road. The bridge project is subjected to approval conditions with regards to impacts during construction, operational stage and handover and abandonment, and recommendations for compliance. Only important requirements related to impacts during construction are briefly explained below:

1. Ecological impacts

Land clearing shall be carried out within the Right of Way (ROW) and landscaping should be carried out immediately at areas which have no further activities.

2. Waste generation

Construction waste should be placed a distance away from river and shall be collected at specified collection area to be disposed later in a designated landfill. Any scheduled wastes should be handled as per the requirements of Environmental Quality (Scheduled Waste)(Amendment) Regulation 2007.

3. Soil erosion and riverbank instability

Riparian reserve is to be left untouched to reduce soil erosion and protection is to be implemented to ensure riverbank stability.

4. Deterioration of water quality

Silt trap shall be constructed and the Total Suspended Solids (TSS) in water discharged from the silt trap is to be regularly monitored. No waste of any kind shall be disposed into the river. Skid tanks and fuel depot should be bunded to contain any spills.

5. Deterioration of air quality

The contractor is required to adhere to all applicable requirements of the Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996. Regular monitoring for Total Suspended Particulates

(TSP) is to be carried out near settlement areas and school. There shall be no opening burning of biomass, construction wastes, etc. and if necessary, written permission must be obtained from NREB.

6. Noise pollution

Construction activities are to be carried out during day time, ideally from 7 a.m. to 7 p.m. Noise monitoring shall be undertaken during construction to evaluate the noise level. The management shall provide workers who are exposed to high noise level with earplugs or earmuffs. Hoarding or temporary wooden fence is recommended to be set-up nearby schools to reduce excessive noise during earthwork and construction.

7. Traffic Impact

The contractor is recommended to conduct marine traffic and risk analysis (MTRA) study to assess the possible impact of the engineering works. Construction activity must not cause any obstruction or danger to traffic on the river and adequate lights, signs or warnings shall be displayed. No construction works shall be carried out between hours of sunset and sunrise. The contractor shall prepare a temporary traffic control plan (TCP) to ensure the safety of the motoring public traveling through the work done. Temporary traffic signs shall be erected and maintained on site and at prescribed points on the approaches to the site.

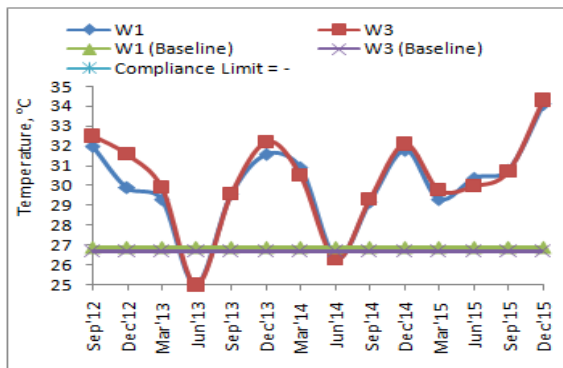
8. Social Economic Impacts

Chain link fencing is to be constructed to prevent unauthorized persons to enter the project site. Advance notice of construction activity schedules, access restrictions and anticipated disturbances shall be notified to the public. The accommodation of workers and facilities such as potable water supply, septic tanks and solid waste disposal must conform to standard set by the Minister of Housing and Local Government, Medical Department and the local authorities responsible for such matter. Locals should be given priority for employment with attractive and competitive employment scheme. Recruitment of foreign workers should be through the legal channel and proper repatriation should be instituted at the end of contract to ensure smooth and legal departure. Rules and regulations under Act 139 and Act 514 in Factories and Machinery (Building, Operations and Works of Engineering Construction) (Safety) Regulation 1986 and Occupational Safety and Health Act 1994 are to be followed by the contractor while carrying out construction works.

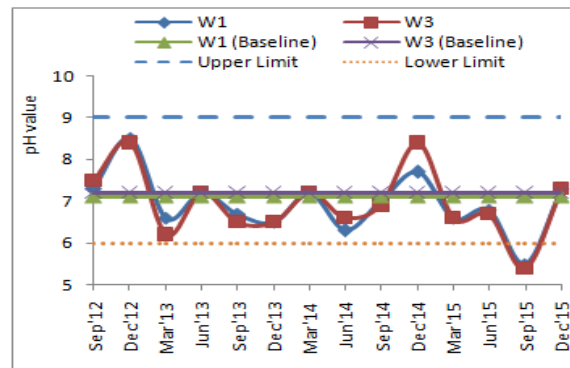
5.0 Findings and Discussion

Construction works for the Batang Sadong Bridge Project in Sarawak began in July 2012 after permission for early commencement of work was given by NREB. The EIA and EMP for the project were only approved by NREB in January 2013 and November 2012, respectively. Preparation of EMRs is based on the project quarterly reporting system. During each monitoring period (3 months), a total of two (2) surface water samples, one (1) ambient air sample and one (1) boundary noise level measurements were taken by the Environmental Consultant staff.

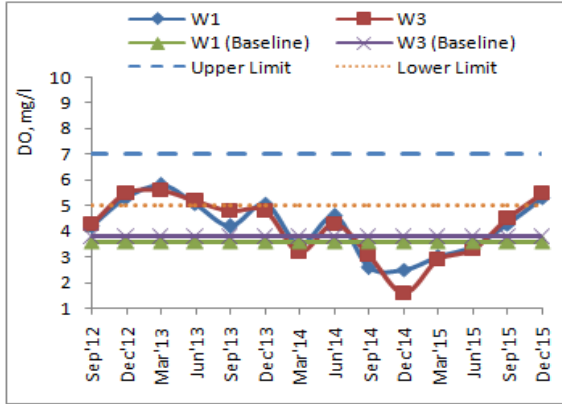
The water samples were taken at downstream and upstream of the bridge site. Water temperature, pH value and DO were measured in-situ using portable equipment. For other water quality parameters, the samples were sent to the laboratory and analysed. Air quality and noise level monitoring were carried out at Kpg. Sungai Buloh where. During the site visit, the water was observed to be turbid, tea-colour and flowing smoothly. The results for water quality, air quality and noise level monitoring are shown in Figs.1, 2 and 3, respectively, and are compared against the compliance limit. Overall, it can be seen in Figure 1 that the water quality parameters are comparable with the baseline data, which was taken prior to start of construction works. Analysis of the water pH value shows it is within 6 to 9, except in September 2015 the river water was slightly acidic. Figure 1(c) and (f), respectively, shows low DO and high COD levels at both upstream and downstream of the bridge site, which indicate inherently the river water contains high organic matter. Turbidity and TSS values in Figure 1(d) and (g) were higher than the compliance limit throughout the monitoring, which might be due to river transportation activities and water movements at upstream of the bridge site. Although proper sanitation facilities are provided at the project site, high level of A-N, HPC, TCC and FCC of the river water as shown in Figure 1(h), (j), (k) and (l) indicates presence of sewage discharge, sanitary waste and faecal contamination. Most probable reason for the high content of faeces is because of direct discharge from nearby settlements and farm areas.



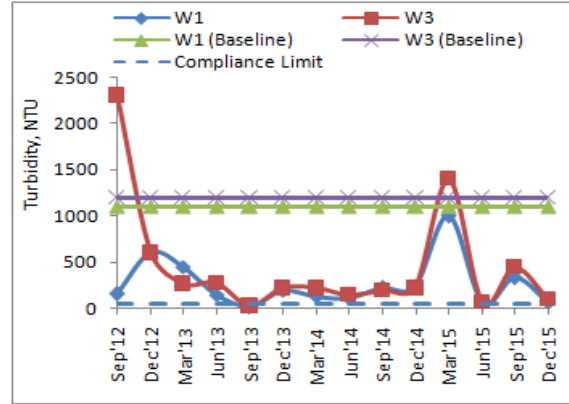
(a)



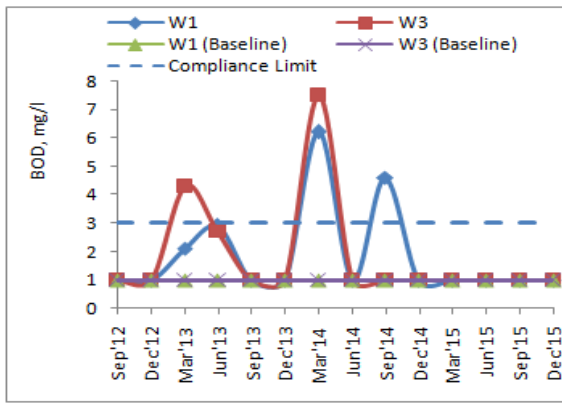
(b)



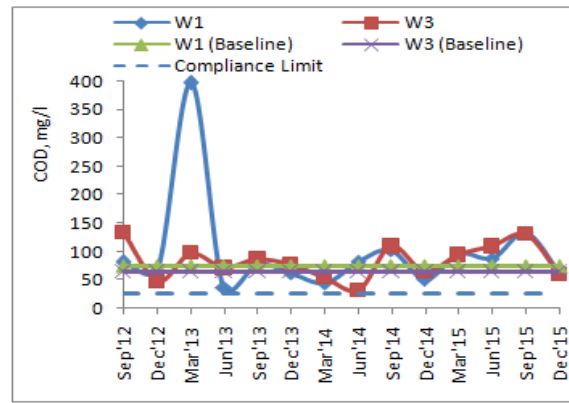
(c)



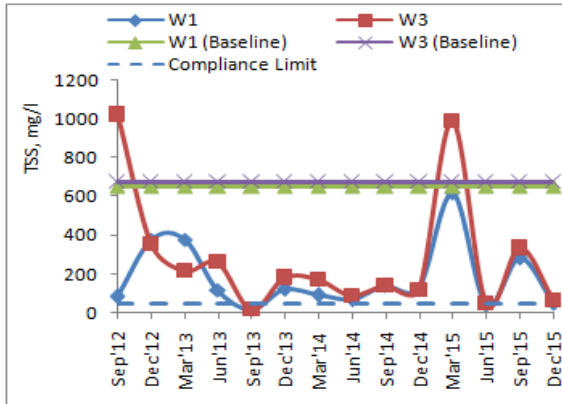
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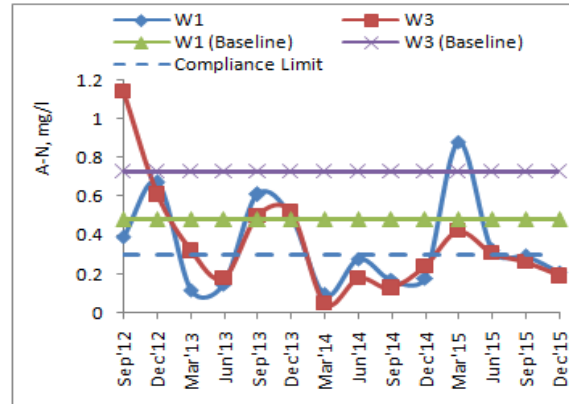
(e)



(f)



(g)



(h)

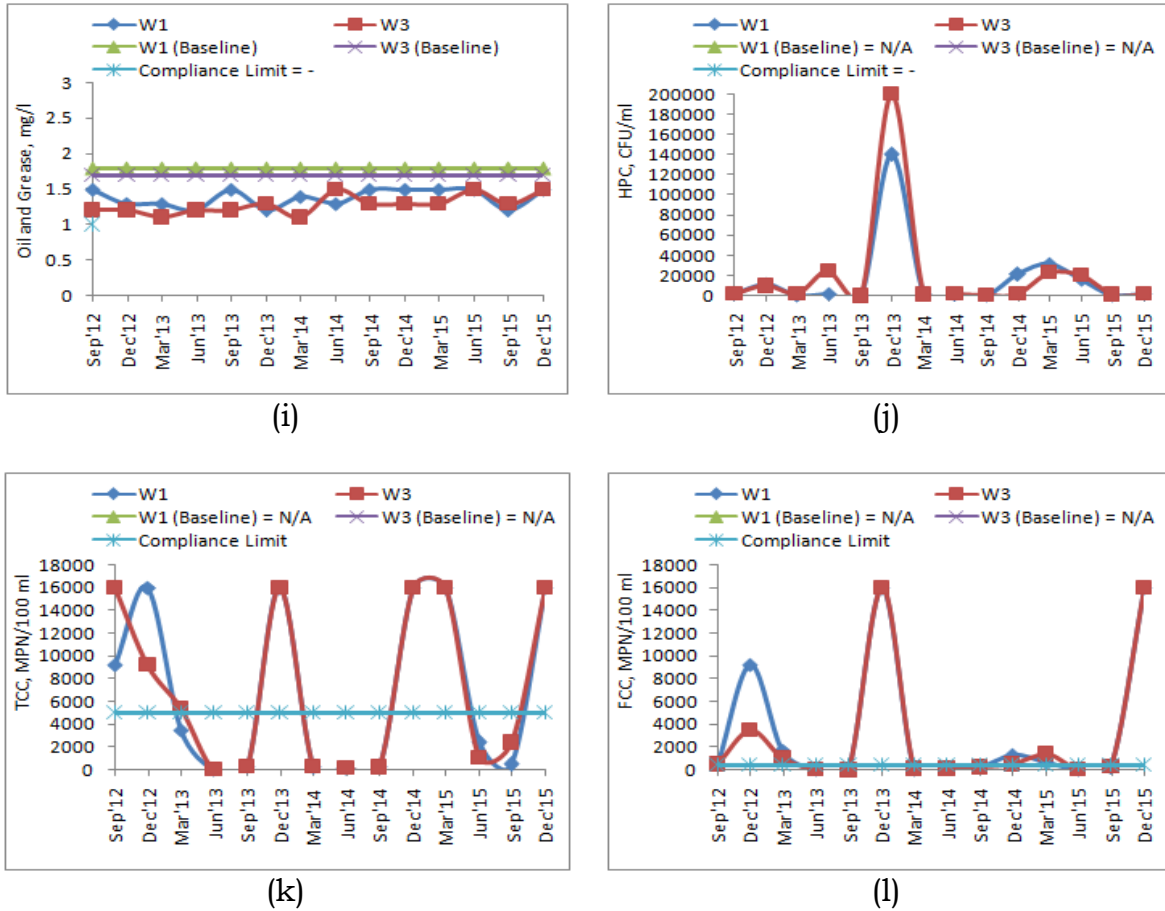


Figure 1: Water quality monitoring results.

Air quality monitoring results show the TSP level near the settlement areas and school is below the stipulated Malaysian standard. However, dust dispersion was observed at site when vehicles passed through the access road. The contractor has been informed to make sure water dampening is carried out to minimize dust dispersion. The noise level during day time and night was higher than the compliance limit, especially in September 2013. Main sources of noise at site were vehicular movements and construction activities. Noise at night was not generated by the project activities since no activity was carried out at night.

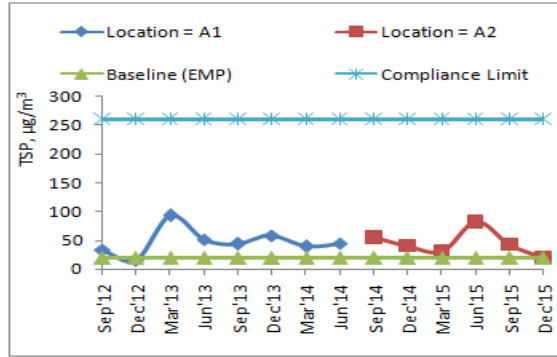


Figure 2: Air quality monitoring results

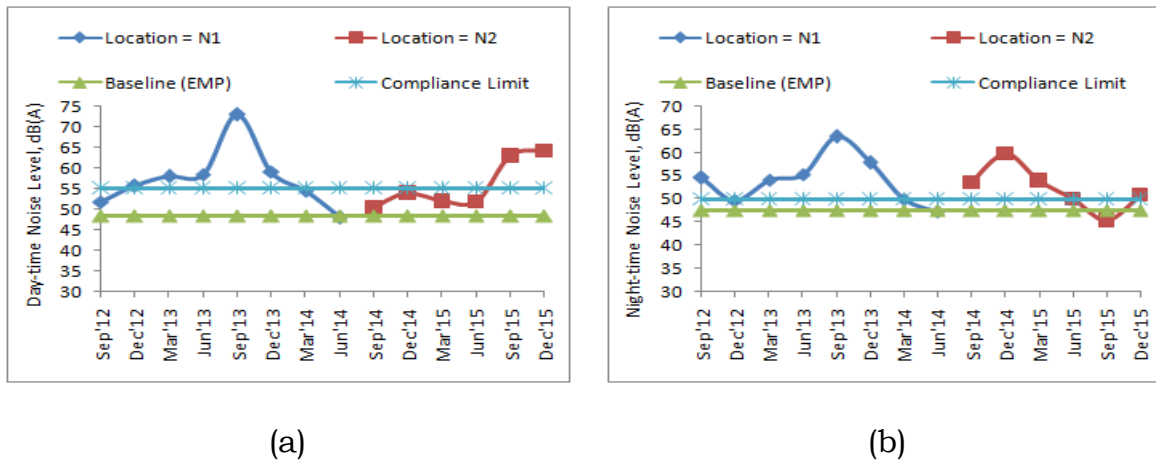


Figure 3: Noise level monitoring results.

6.0 Conclusion

JKR Sarawak has included the EMP to form part of the tender specifications to ensure contractor take into account environment protection and enhancement during construction works. In this paper, findings from the EMRs on the Batang Sadong Bridge Project are presented. No major non-conforming environmental components were observed. In line with the notion of transparency and accessibility of information, it is hope that the efforts to protect and enhance our environment would be taken more seriously by all parties involved in development projects in Malaysia.

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