SCREENING PROCEDURES FOR PRESCRIBED ACTIVITIES – WATER QUALITY

1.1 Introduction

This document serves as a guide for investors to screen, and to a certain degree, assess potential environmental impacts of a proposed development towards surrounding water courses. It presented steps and measures that the proponent should give attention to with regards to undertaking assessment for water pollutions impacts from their projects and considerations needed during site selection.

1.2 Basin and River Identification

The river basin where the project site is located must first be accurately identified. The basin designation/name can be sourced from official/recognized agencies such as the Department of Irrigation and Drainage (DID) or Department of Survey and Mapping. The basin and sub-basin boundaries, area, as well as riverine flowpath(s) and gradient should also be determined.

This is so that potential sensitive receptors can be identified; particularly in view of pollution transport which follows the path of the river. To facilitate this process, stream and rivers adjacent to the project site should be demarcated.

It would also be prudent for the project proponent to take note whether a particular river stretch is tidally affected or not, and if it is, to what extent. Impact assessment for uni-directional and bi-directional rivers vary, which is why this procedure is important.

As a rule of thumb, smaller, slower flowing streams are more susceptible to pollution, compared to large flowing rivers (Zainudin, 2015).

1.3 Riparian Reserve

The project proponent also needs to ensure the project boundary does not encroach into river reserves (also known as riparian reserves). There should be sufficient buffer between the boundaries of the proposed development to the river bank. The Department of Irrigation and Drainage have guidelines on this, as depicted in Table 1.1. Riparian vegetation should also be preserved as it can to a certain degree, remediate non-point source pollution (runoff) (Klapproth and Johnson, 2009).

Table 1.1 : River Reserves for Development based on River Width (DID, 2008)

River Width (m)	River Reserve (m)
> 40	50
20 – 40	40
10 – 20	20
5 – 10	10
< 5	5

1.4 Beneficial use, sensitive receptors and standards

Beneficial uses of streams and rivers must also be identified. Beneficial use here refers to inherent usage of the stream/river water such as for tourism purposes, water supply/intake, recreational activities, body contact, aquaculture, domestic use (*kampung* areas), fish propagation and others (UN-Water, 2015). Identification of the beneficial use usually entails a preliminary field survey.

However, in the case of water intakes for potable supply, the gazetted locations (basin, river and coordinates) are available in the Environmental Quality Act, 1974 under the respective effluent regulations (DOE, 2010). It should be noted, industrial and sewage development, that intend to release effluent upstream of public water intakes, are required to comply to the Standard A limits of the prevailing regulations. This is the minimum requirement.

The proponent should also ensure other intakes, not gazetted or in the above act (eg. for agricultural irrigation, domestic use etc.) are identified as well.

This step is important as the information should be taken into consideration when deciding the final discharge point. The prescribed activity is expected not to alter any of the beneficial use and adversely impact sensitive receptors. Preferably, the baseline water quality should be preserved even after the project is initiated.

Water quality standards typically correspond to beneficial use and should be referred to, during the screening process (UN-Water, 2015). Some of these standards are listed in Table 1.2 below. These are only some examples and depending on situation, other standards can be referred to as well.

Table 1.2 : Applicable Standards Which Can Serve As A Guide To Preserve Beneficial Use

Water body	Standard	Organization
Freshwater (eg. rivers/lakes)	National Water Quality Standards	Department of Environment
Freshwater (potable supply)	Raw Drinking Water Quality Standards	Ministry of Health Malaysia
Lakes	National Lake Water Quality Standards	NAHRIM
Estuarine/brackish	Marine Water Quality Criteria and Standards	Department of Environment

1.5 Prevailing Regulations

For effluent generating premises, the proponent also needs to be aware of the prevailing regulations and limits that governs effluent discharge in the Environmental Quality Act, 1974 or any other statutory legislation. Some of these regulations include;

- Environmental Quality (Sewage) Regulations 2009
- Environmental Quality (Industrial Effluent) Regulations 2009
- Environmental Quality (Control of Pollution From Solid Waste Transfer Station And Landfill) Regulations 2009

These are examples of regulations which apply and can vary according to type of prescribed activity. The proponent needs to identify the appropriate regulations and maximum limits to enable them to better prepare and design the treatment system.

1.6 Identification of Final Discharge Location (for effluent generating premises)

As previously discussed, the prescribed activity should not alter/deteriorate the beneficial use and baseline water quality of surrounding streams and rivers.

In relation to this, it is noteworthy to mention, even compliance to existing standards (eg. Standard A or B of prevailing regulations) **does not necessarily mean** a water body will not be impacted.

Because of this, the proponent needs to consider ALL available preservation options; even achieving effluent quality **lower than limits** stated in prevailing regulations and reducing the amount of discharge through effluent recovery/reuse. This is done by imploring more effective treatment technologies and methods; beyond the conventional.

Discharge near sensitive receptors, is also highly discouraged. Besides potential impacts during normal operations, potential impacts during treatment failures must also be considered when choosing the final discharge location.

Treatment failures and discharge of raw effluent (unintentional or not) upstream of sensitive receptors, present a very real danger to public health and safety. Because of this, under certain circumstances, it may be desirable to avoid the situation entirely and release the effluent downstream of these sensitive receptors.

This can be done via channelization of the effluent, such as piping, drains, outfalls etc. to lower river segments; or to adjacent, less sensitive basins or even directly to the sea. Example situations when this may be desirable is when a water intake (or any other sensitive receptor) is located too near the discharge location, or if the downstream segments of the river hosts a variety of recreational activities (e.g. swimming, kayaking, etc.).

Hence, when identifying the final discharge location (even designing the treatment system for that matter), the proponent is advised to factor all these into consideration, as there are cost implications. Nonetheless, they are necessary measures to ensure public health and safety is not compromised in view of the new development.

1.7 Constituents of Concern

Laboratory analysis can comprise of a wide multitude of parameters as the previously discussed standards or even beyond that.

The proponent (particularly effluent generating premises) should clearly identify constituents of concern which will be generated from the prescribed activity, even if they are not part of existing standards or regulations. This is to ensure appropriate impact assessment and control can be executed.

The project proponent need not limit themselves to only parameters as per the DOE-Water Quality Index (WQI) or even the Environmental Quality Act, 1974; but can go beyond this as per necessary.

For example, even though faecal coliform and *E. coli* are not regulated constituents as per the Environmental Quality (Sewage) Regulations, 2009 and is not considered in the DOE-WQI calculation; the release of such bacterial species may still incur harm if they come into contact with humans, through skin contact (eg. swimming) or consumption. This aspect therefore, requires further scrutiny on the part of the proponent (especially when identifying the discharge location).

Emerging pollutants, carcinogens, antibiotics, endocrine disruptors and other potentially hazardous substances in the effluent stream should also be accounted for.

1.8 Establishing a Baseline

Sampling and monitoring is typically done during the assessment stage, nonetheless it would be beneficial for the proponent to have some level of understanding of the sampling plan during screening.

In planning the sampling regime, data collection should entail both *in-situ* as well as analysis of parameters relevant to the proposed development. *In-situ* parameters typically comprise of DO, $\%DO_{sat}$, temperature, salinity, conductivity, pH and TDS. Laboratory analysis should comprise of all constituents of concerned as previously discussed under section 1.6.

Riverine sampling location will vary from project to project, but typically there should be stations upstream of the proposed development, adjacent to the proposed development, downstream, as well as near sensitive receptors (Mills et al., 1986).

Frequency of sampling may also vary depending on the water body, but generally temporal monitoring is encouraged for tidally affected rivers (river mouth), whereas grab sampling for uni-directional streams should be sufficient. However, the sampling regime can always be modified depending on need. Lake and coastline monitoring on the other hand, should entail measurement at several depths to characterize stratified layers.

1.9 Impact Screening

As previously discussed, compliance to existing standards does not necessarily guarantee the preservation of a water body. In the event a water body is compromised due to a prescribed activity; alternative methods of discharge have to be considered.

Hence, it may be desirable for the proponent to screen the suitability of the discharge location even before the EIA is conducted. Screening procedures pertaining to potential discharge locations can be done through mass balance approaches, the simple mixing model and even the Streeter-Phelps formula. An example calculation using the mass-balance approach is shown in Figure 1.1.

In this example, the potential impact of NH_3-N discharge from a sewage treatment plant, STP (at 0.10 m^3/s and Standard B compliance) is assessed using a mass balance approach. For the assessment process to be done, some preliminary data such as the river discharge and quality needs to be approximated.

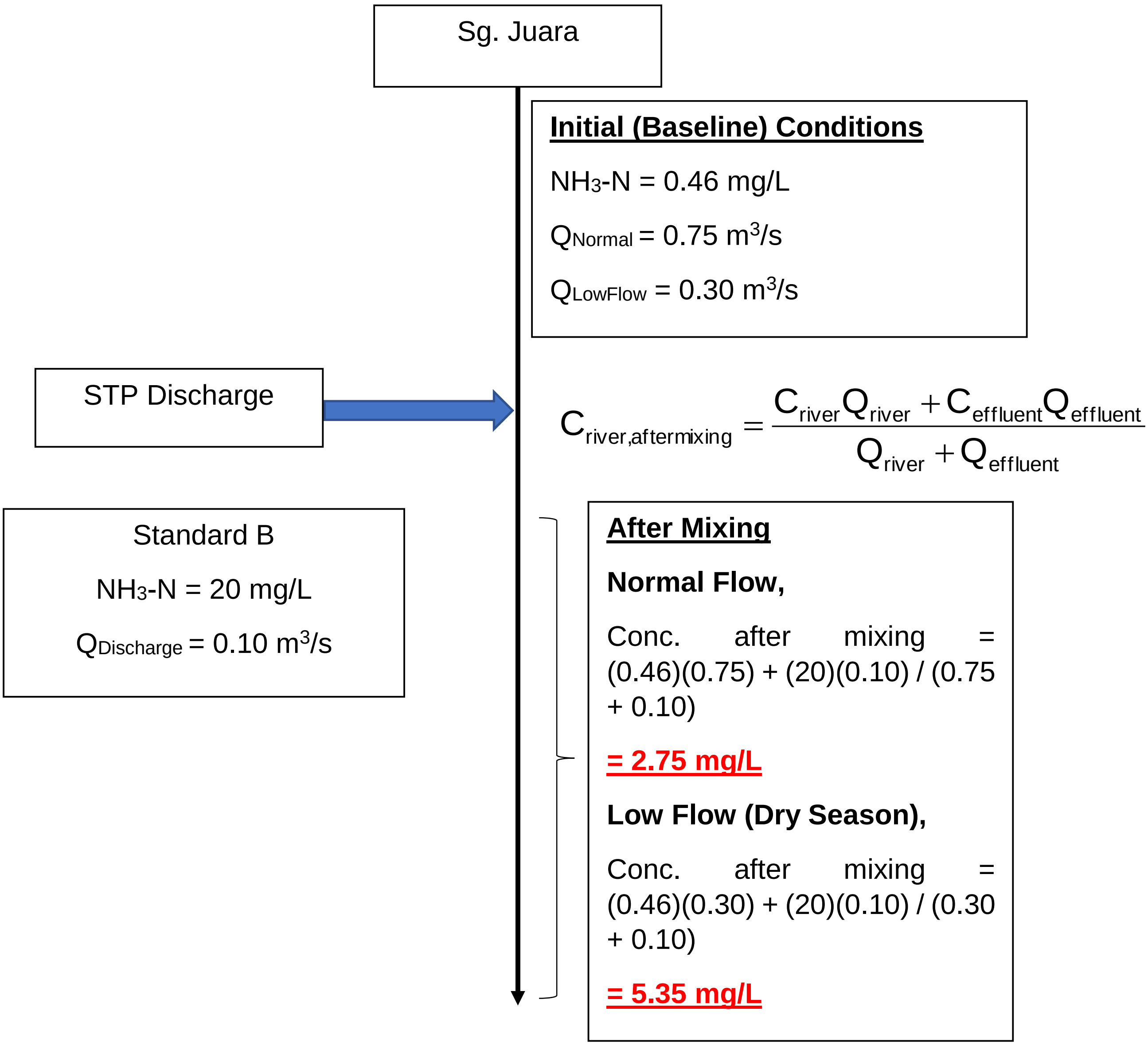

Figure 1.1 : Example of Impact Screening using Mass Balance/Simple Mixing Approach

In the example above, NH_3-N would rise from 0.46 mg/L to between 2.75 – 5.35 mg/L, after the point of discharge, even if the effluent were to comply to the Standard B limit of 20 mg/L. Referring to the NWQS, this constituted a class change from Class III to Class V; which of course would alter the beneficial use as well. To put this into context, such a rise would result in fish-kill, as elevated levels of NH_3 are toxic to more sensitive aquatic species.

Under such circumstances, the project proponent need to consider reducing the effluent load, either by imploring more efficient treatment methods or reducing the volume of discharge. Volume reduction can be achieved through effluent recovery/reuse. If such methods are not feasible, then the final discharge location may have to be revised to a point/stretch where the river is less susceptible to contamination (higher waste assimilative capacity).

The above screening procedure is only intended to provide a preliminary indication of the suitability of the discharge location. A full water quality assessment exercise should still be conducted during the EIA stage.

References

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