

**ASRAMA RAYA SDN BHD**

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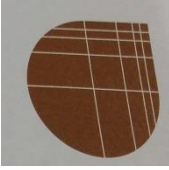
**STANDARD OPERATING PROCEDURE**  
**PROTECTING**  
**NATURAL WATERCOURSES**  
**AND BUFFER ZONES**

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| <b>AR/SOP 10/Protecting Watercourse/V5</b>                                                                                                                                                                      |                                                                                                                   |
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| <b>Prepared by</b><br><br><b>Name:</b> Pong Kuan Kin<br><b>Position:</b> Assistant Forest Manager<br><b>Date:</b> 19-01-2025 | <b>Approved by</b><br><br><b>Name:</b> Chan Kim Men<br><b>Position:</b> Forest Manager<br><b>Date:</b> 22-01-2025 |
| <b>Version No.</b>                                                                                                                                                                                              | 5                                                                                                                 |
| <b>Relevant FSC Indicator</b>                                                                                                                                                                                   | 6.7.1, 6.7.2, 6.7.3                                                                                               |
| <b>Approval Date</b>                                                                                                                                                                                            | 22-01-2025                                                                                                        |

**CONFIRMED**

22 JAN 2025

|                                                                                   |                                |                                                         |                      |                                        |
|-----------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------|----------------------|----------------------------------------|
|  | <b>ASRAMA RAYA SDN BHD</b>     |                                                         | <b>Ref.</b>          | <b>AR/SOP 1/Resource Protection/V4</b> |
|                                                                                   | <b>Policy/Procedure/ Title</b> | <b>Standard Operating Procedure Resource Protection</b> |                      |                                        |
|                                                                                   | <b>Relevant Indicator</b>      | 6.7.1, 6.7.2, 6.7.3                                     |                      |                                        |
|                                                                                   | <b>Prepared by</b>             | Assistant Forest Manager                                | <b>Approved by</b>   | Forest Manager                         |
|                                                                                   | <b>Version No.</b>             | 5                                                       | <b>Approval Date</b> | 22-01-2025                             |

### 1. PURPOSE

To protect or restore natural watercourses, water bodies, buffer zones and their connectivity as well as to avoid negative impacts on water quality and quantity and mitigate and remedy those that occur.

### 2. SCOPE

This SOP applies to forest management team who responsible to protect or restore natural watercourses, water bodies, buffer zones and their connectivity as well as developing mitigation measure to minimize the negative impacts on water quality of watercourses.

### 3. RESPONSIBILITIES

The forest management team and forest workers are responsible for:

- Protecting natural watercourses, water bodies and buffer zones.
- Developing mitigation measure to minimize the negative impacts on watercourses.

The Forest Manager are responsible for:

- Training of staff and forest workers.
- Ensuring the implementation of this procedure.
- Monitoring effectiveness of the implemented measures.

## 4. PROCEDURE

### 4.1. Protecting natural water courses, water bodies, riparian zones and their connectivity

1. Establish buffer zones along the watercourses.
2. Establish the buffer zones based on the width of watercourse (Table 1) specified by Forestry Department Peninsular Malaysia (FDPM, 2024).

Table 1. Recommended buffer zones based on width of watercourse.

| Width (m) | Buffer zone (m) |
|-----------|-----------------|
| ≤10       | 10              |
| 10-20     | 20              |
| 20-40     | 40              |
| >40       | 45              |

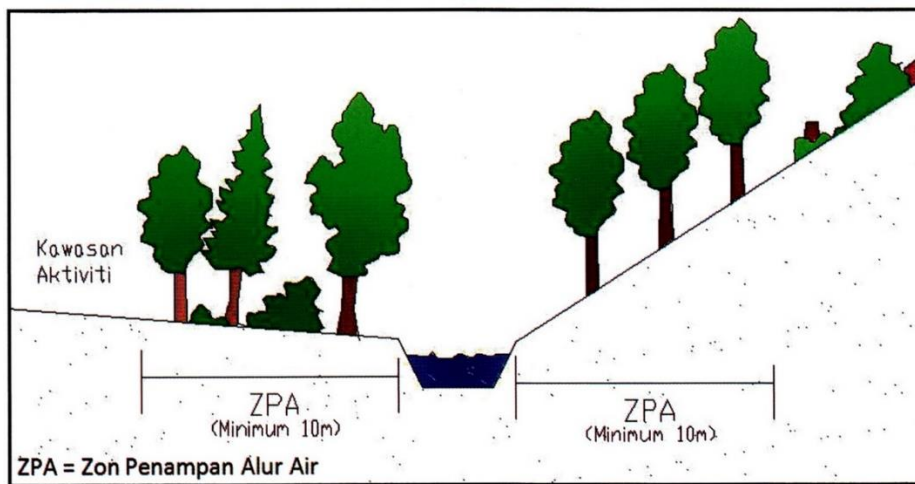


Figure 1. Cross section of buffer zone.

3. Trees located along the border of buffer zones are painted with one (1) yellow ring at not more than 10 meters intervals.
4. Do not harvest all trees located along the border of buffer zones and watercourses.
5. Do not conduct any activities at watercourses and buffer zones.
6. Conduct water quality analysis once per year to determine the quality and health status of the watercourse
  - The water quality parameters are pH, temperature, conductivity, turbidity, total suspended solids (TSS), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and ammoniacal nitrogen (AN).

#### 4.1.1 Water Quality Analysis

1. Collect water samples at two sections, which are upstream and downstream.
2. Conduct in situ measurement for temperature, pH and dissolved oxygen (DO) and turbidity.
3. Measure temperature and pH using Horiba LAQUA pH210 pH/ temperature meter.
4. Measure dissolved oxygen (DO) using YSI 550A dissolved oxygen instrument.
5. Measure turbidity using Eutech Tn100 turbidity meter.
6. Use plastic bottles to collect water samples for total suspended solid (TSS), chemical oxygen demand (COD) and ammoniacal-nitrogen (NH<sub>3</sub>-N) analysis.
7. Place water samples in ice box before taken the samples to the laboratory for analysis.
8. Formula used for WQI calculation is shown at below:  
$$WQI = 0.22(\text{siDO}) + 0.19(\text{siBOD}) + 0.16(\text{siCOD}) + 0.15(\text{siAN}) + 0.16(\text{siTSS}) + 0.12(\text{siPH})$$

siDO-subindex is for dissolved oxygen, siBOD-subindex is for biochemical oxygen demand, siCOD-subindex is for chemical oxygen demand, siAN-subindex is for ammoniacal-nitrogen, siTSS-subindex is for total suspended solid, siPH-subindex is for pH.

#### 4.2. Modifying measures (if procedure protecting natural watercourses and buffer zones is ineffective)

1. Prepare a new plan for protecting watercourse water bodies, riparian zones and their connectivity.
2. Conduct field survey / research.
3. Consult Terengganu State Forest Department for the suggestion of new measures.
4. Have to more frequent monitor the watercourse and buffer zones.
5. Have to increase frequency of conducting water sampling.
6. Inform all forest workers must protect the natural watercourses and buffer zones.

#### **4.3. Monitoring effectiveness of implemented measures**

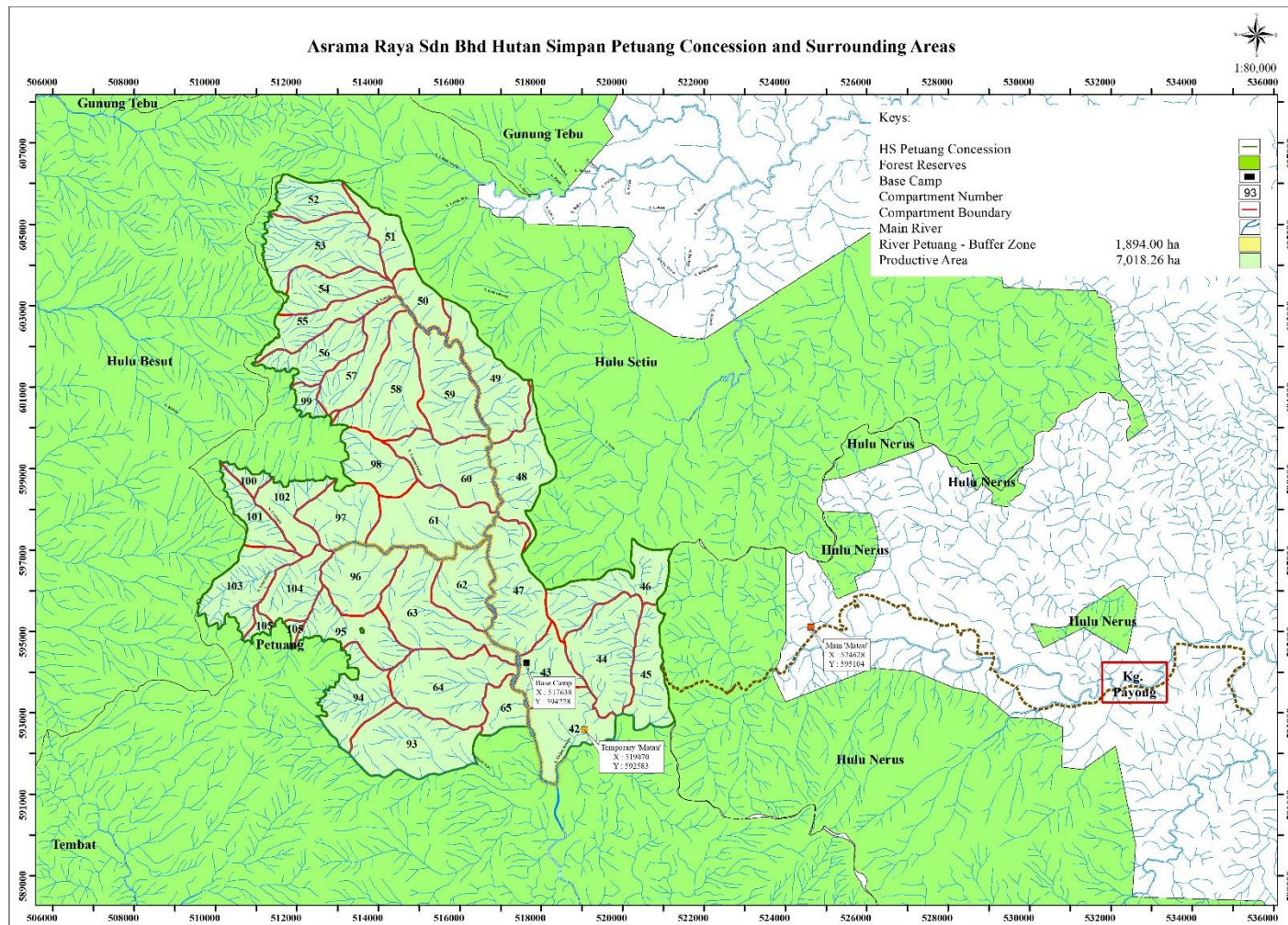
1. Forest Supervisor monitor the buffer zones and watercourses which needed for protection.
2. Forest Supervisor or Assistant Forest Manager monitor and ensure the trees located along the border of buffer zones are not harvested.
3. Forest Supervisor and Assistant Forest Manager monitor and ensure all the buffer zones of watercourse are established in accordance with the standard FDPM. (2024).
4. Forest Supervisor and Assistant Forest Manager monitor water quality of the watercourses in ARSB HS Petuang-Tembat Concession.
5. ARSB collaborate with Forestry Department Peninsular Malaysia and Forest Research Institute Malaysia in conducting water quality analysis to monitor the quality and health status of the watercourse.
6. ARSB also monitor water quality of river in ARSB HS Petuang-Tembat Concession by conducting water quality analysis once per year.

#### **References**

FDPM. (2024). Garis Panduan Jalan Hutan 2024. Kuala Lumpur: Forestry Department Peninsular Malaysia.

**Appendix 1.**

Map of ARSB HS Petuang concession showing natural watercourses, water bodies and buffer zones within the management unit and surrounding areas.



## Appendix 2.

Map of ARSB HS Tembat-Petuang Replacement Area showing natural watercourses, water bodies and buffer zones within the management unit and surrounding areas.

