

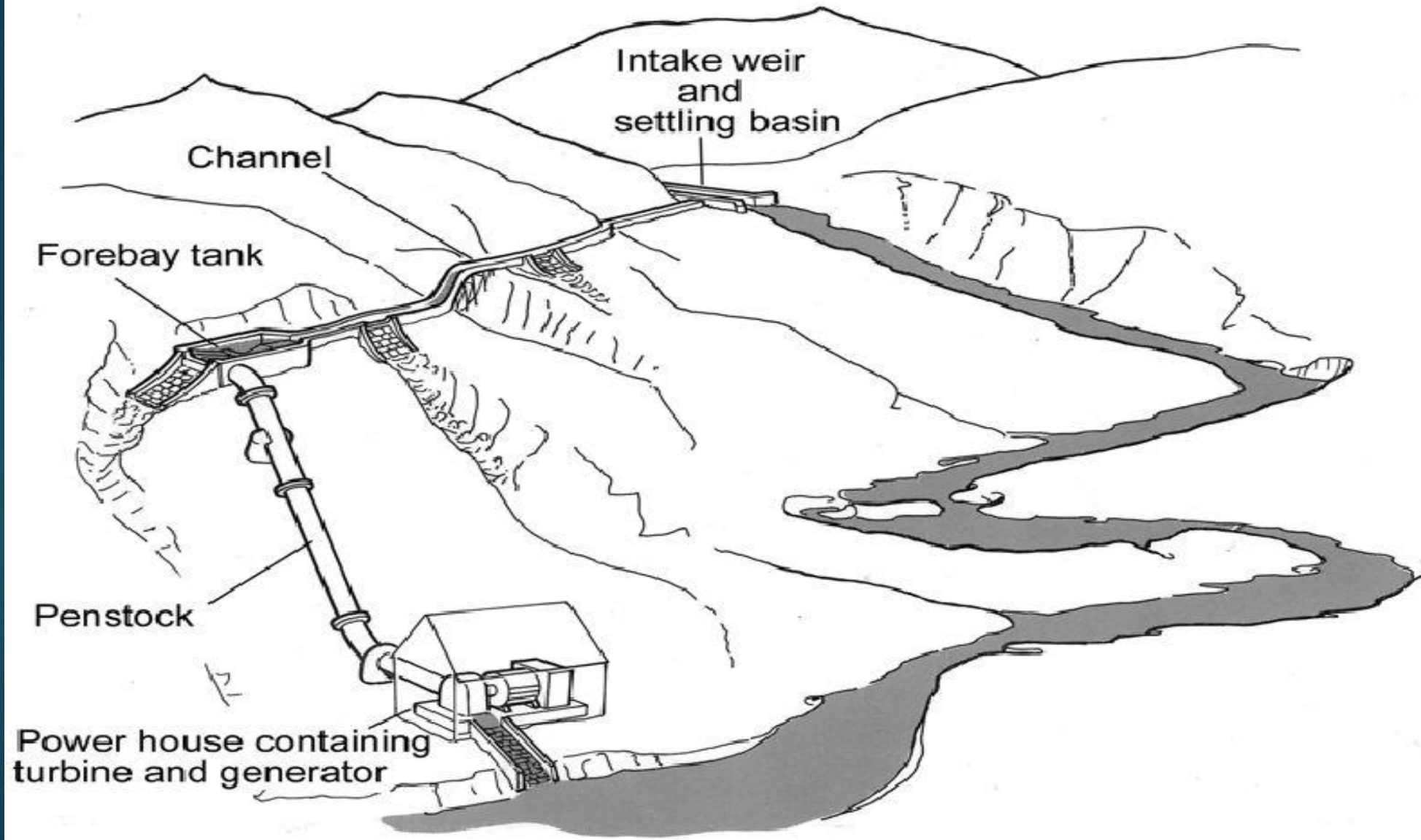
Micro Hydro Power

LECTURE 3:

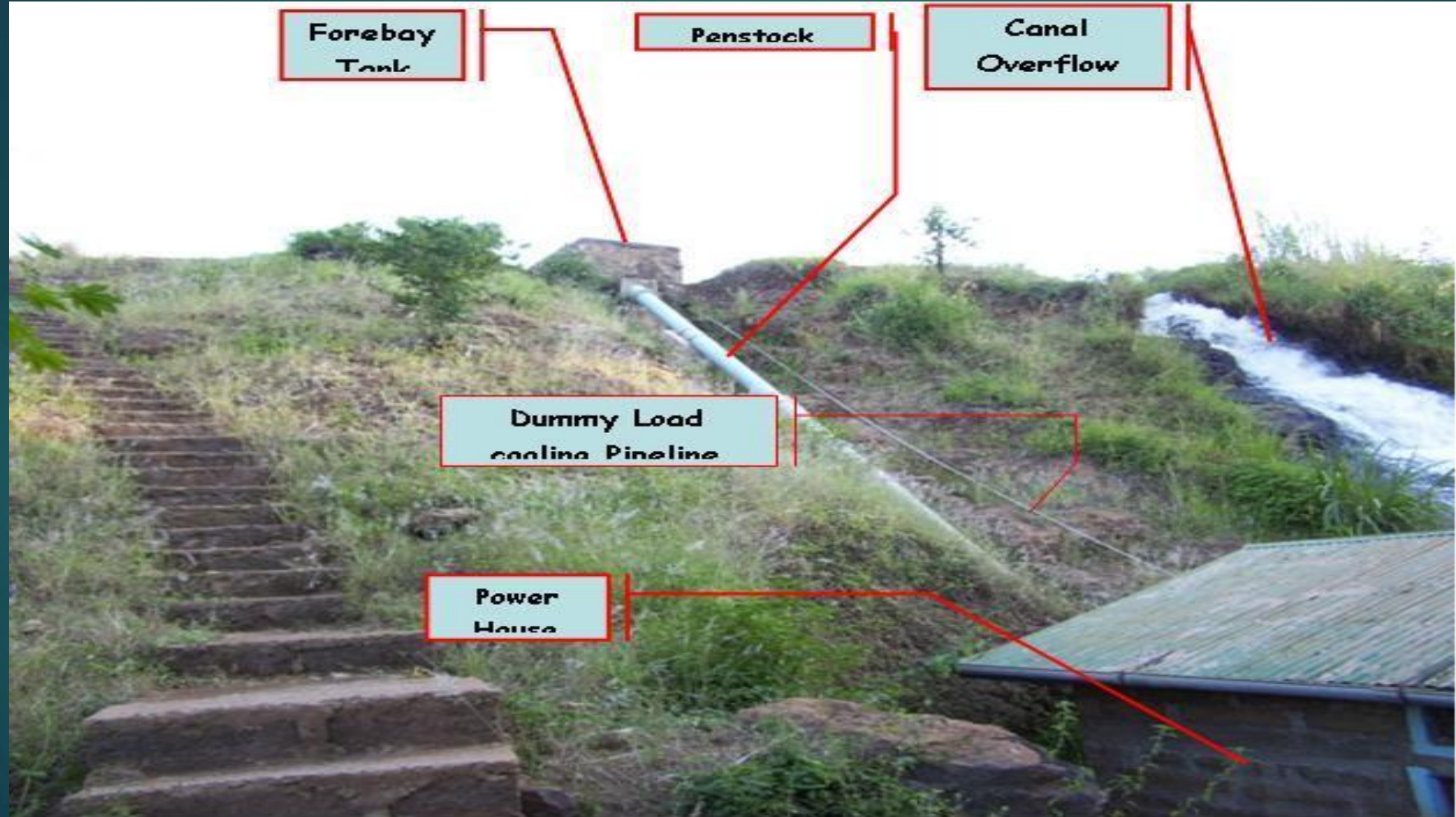
BASIC CONCEPT AND CIVIL CONSTRUCTION WORKS OF MHP PLANT

Basic layout of MHP Plant

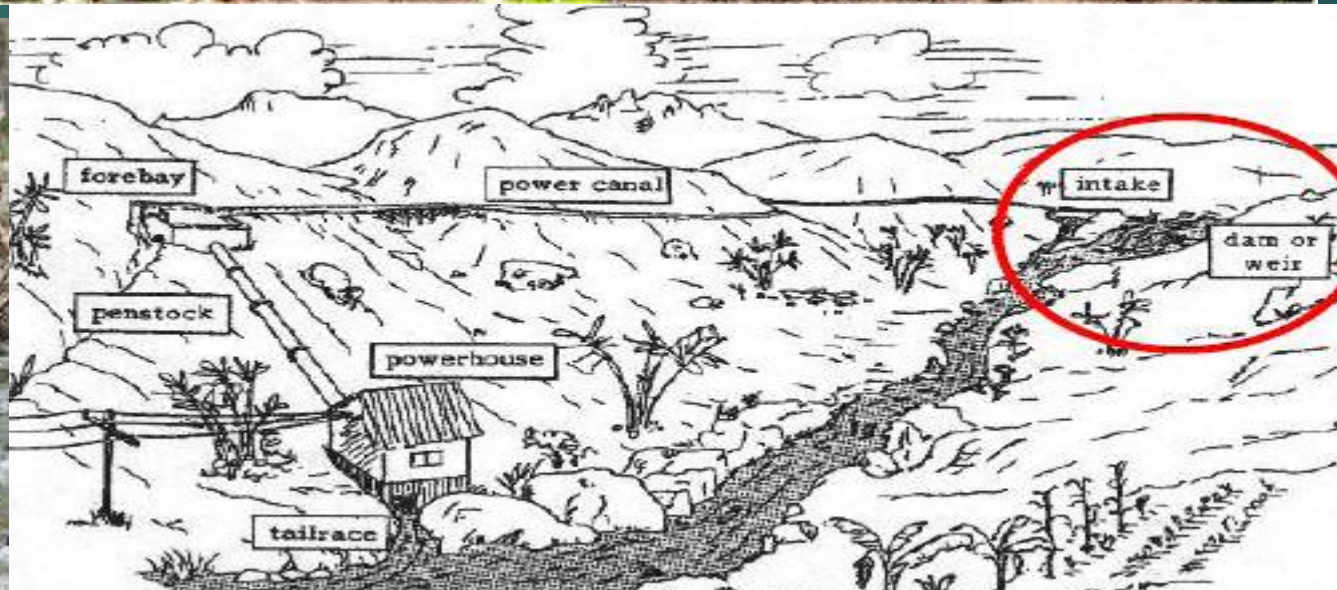
2



Basic layout of MHP Plant



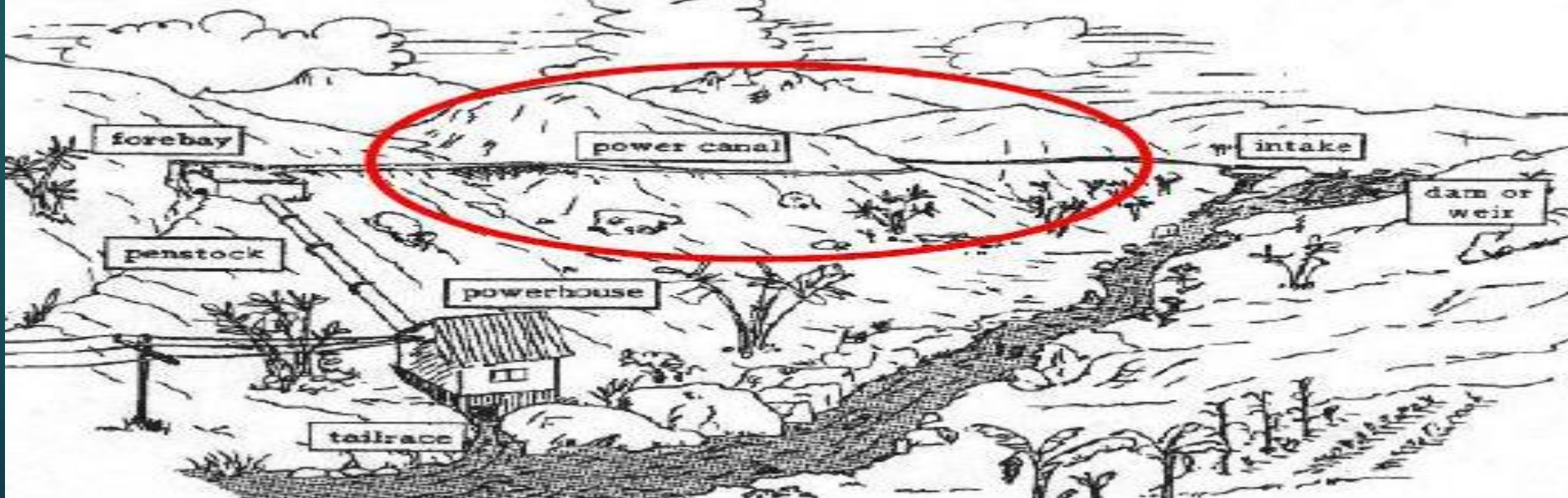
1. Weir and Intake



1. Weir and Intake

- ▶ A hydro system must extract water from river in a reliable and controllable way
- ▶ The water flowing in the channel must be regulated during high river flow and low flow condition
- ▶ A weir can be used to raise the water level and ensure a constant supply to the intake
- ▶ Sometimes it is possible to avoid building a weir by using natural features of the river
- ▶ A permanent pool in the river may provide the same function as a weir
- ▶ The intake of a hydro scheme is designed to divert a certain part of the river flow.
- ▶ The intake should be well located to prevent debris and high flows from being funneled into intake.

2. Canal



2. Canal

- ▶ Canal conveys water from the intake to fore bay
- ▶ Usually canals are open channel
- ▶ It may be of concrete or soil but may be constructed in the form of pipes too
- ▶ The canal should generally be designed to carry 110% to 120% of the design discharge
- ▶ The water velocity in canal for should be self cleaning but not erosive ($\geq 0.3\text{m/s}$)
- ▶ Pipe used could be of PVC/HDPE/GRP buried at least 1m into ground
- ▶ Provision of air valves and wash outs where necessary

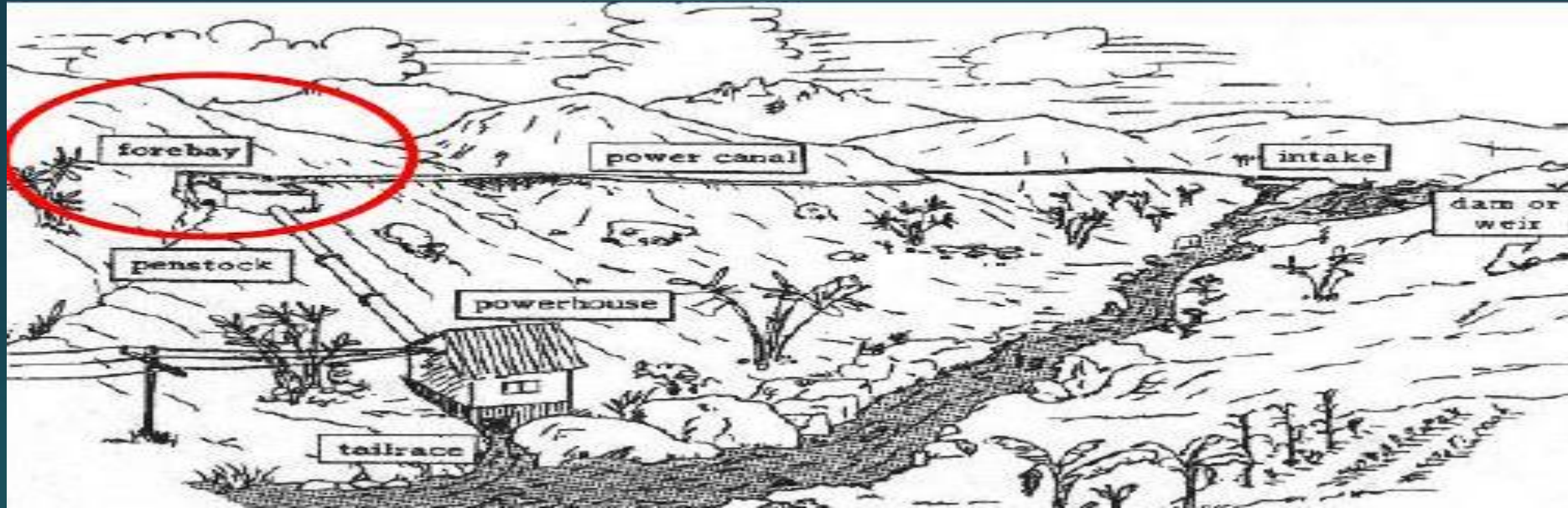
3. Settling Basin



3. Settling Basin

- ▶ It is a pond to collect and flush out sediments like sand and soil
- ▶ It is essential to prevent suspended materials from entering the water way
- ▶ Sometimes it is not constructed in cases that inflowing sand and soil is minimal
- ▶ The function of settling basin is very important to protect the following components from the impact of sand and soil

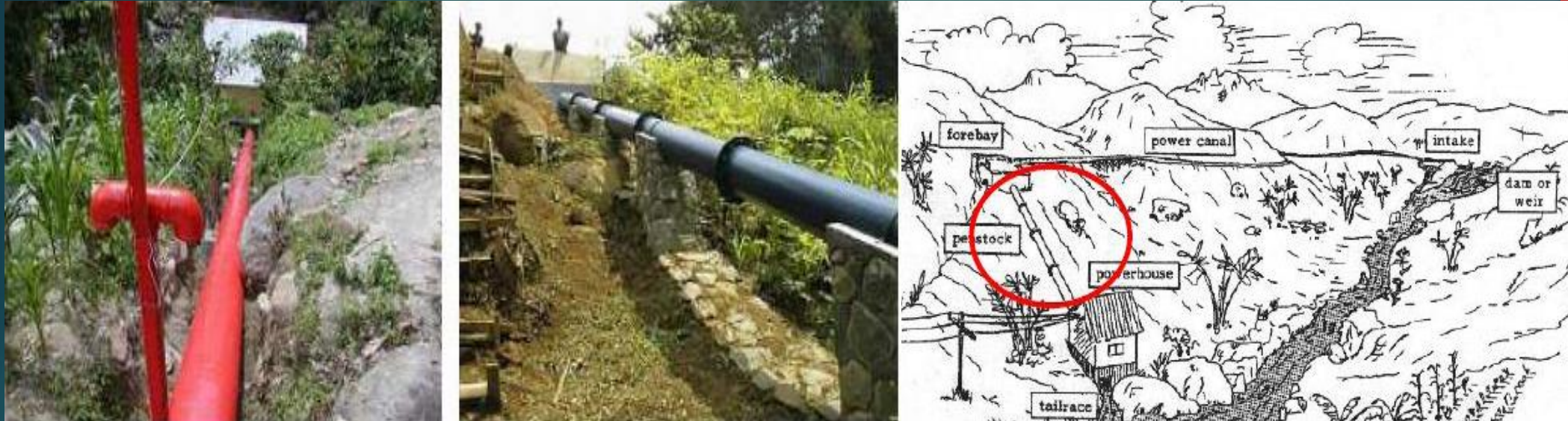
4. Fore bay



4. Fore bay

- ▶ It is a pond like structure at the top of the penstock to take and let water enter the penstock from waterway
- ▶ A spillway is connected to fore bay to flush out excess water
- ▶ It also functions as the final settling basin for suspended materials in water
- ▶ Spilling capacity should be minimum of spilling Q_d during load rejection

5. Penstock



5. Penstock

- ▶ It is a pipe to convey water from fore bay to turbine
- ▶ It conveys water from free flow state (at a settling basin or a fore bay) to pressure flow state to the power house and converts the potential energy of the flow at the settling basin or fore bay to kinetic energy at the turbine
- ▶ In case of high pressure, mild steel pipes (exposed and buried) are generally used
- ▶ HDPE/GRP (buried) can also be used as penstock pipe
- ▶ Combination of mild steel and HDPE/GRP can also be used
- ▶ Hard vinyl chloride plastic pipes or FRP (fiber Reinforce Plastic) pipes

6. Power House



6. Power House

- ▶ The power house is a solid structure for storing the electromechanical equipment like turbines, generators, controllers and panels
- ▶ It must be easily accessible and have sufficient space for dismantling equipment during repair and maintenance activities
- ▶ Turbines in the power house convert water energy to rotational power
- ▶ Generators generate electricity from the rotational power of the turbine

7. Tail Race



This is a short, open canal that leads water from power house back to the stream

THANK YOU