

## BAB VI PROFIL HIDROLIS

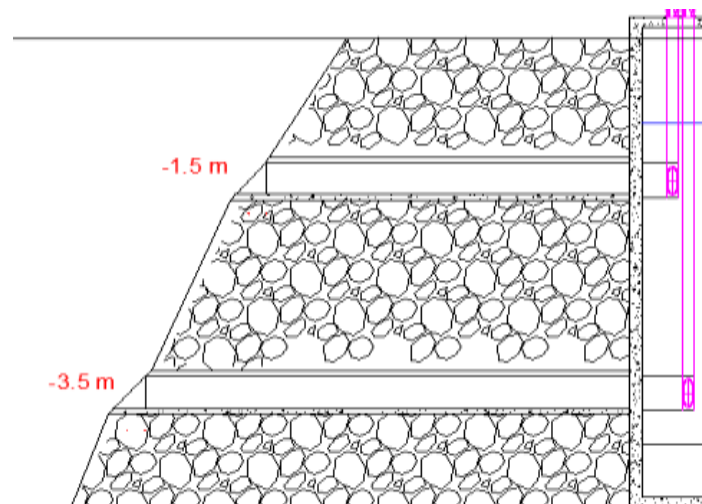
### 6.1 Perhitungan profil hidrolis

Profil hidrolis dapat menunjukkan ketinggian muka air di masing-masing unit. Penggambaran profil hidrolis ini menggunakan elevasi muka tanah unit pengolahan dan *headloss* pada masing-masing bangunan. Berikut ini perhitungan profil hidrolis di masing-masing unit pengolahan. Tinggi permukaan tanah adalah datar/landai, yaitu 0,00 m.

#### 6.1.1 Intake dan Bar Screen

Direncanakan bangunan diletakkan di bawah permukaan tanah.

- H pipa HWL = 3 meter
  - H pipa LWL = 1 meter
  - Elevasi awal = 0 meter
- PH pipa HWL = elevasi awal – (tinggi sungai – H HWL)  
= 0 m – (4,5 m – 3 m)  
= - 1.5 m (di bawah permukaan tanah)
- PH pipa LWL = elevasi awal – (tinggi sungai – H LWL)  
= 0 m – (4,5 m – 1 m)  
= - 3,5 m (di bawah permukaan tanah)
- Headloss = 0,021 m



#### 6.1.2 Sumur Pengumpul

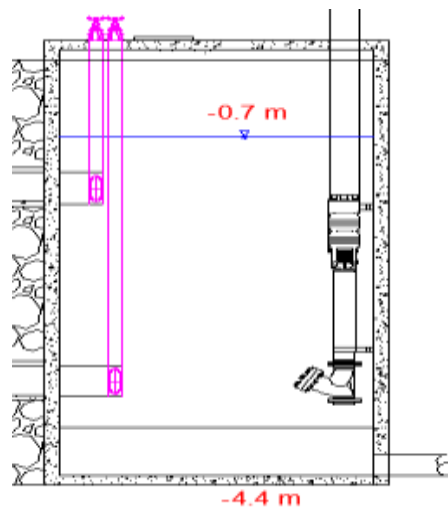
Direncanakan bangunan diletakkan di bawah permukaan tanah.

- H total = 4,2 m
- H air = 3,5 m
- Freeboard = 0,7 m
- Tebal dinding = 0,2 m
- Elevasi awal = 0 m

$$\begin{aligned} \text{Tinggi bangunan awal} &= \text{elevasi awal} - (\text{H total} + \text{tebal dinding}) \\ &= 0 \text{ m} (4,2 \text{ m} + 0,2 \text{ m}) \\ &= -4,4 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Level muka air} &= \text{elevasi awal} - (\text{H total} - \text{H muka air} - \text{tebal dinding}) \\ &= 0 \text{ m} (4,4 \text{ m} - 3,5 \text{ m} - 0,2 \text{ m}) \\ &= -0,7 \text{ m} \end{aligned}$$

$$\text{Headloss} = 3,373 \text{ m}$$



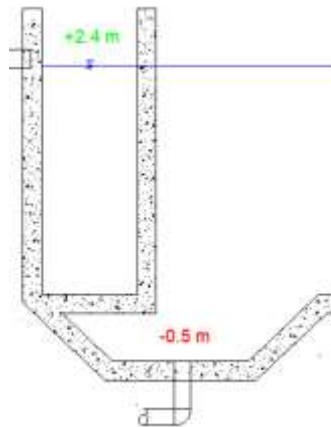
### 6.1.3 Prasedimentasi

#### A. Zona Inlet

Direncanakan bangunan diletakkan di atas permukaan tanah.

- Elevasi awal = 0 m
- Freeboard = 0,6 m

$$\begin{aligned} \text{Level muka air} &= \text{elevasi awal} + (\text{H total} - \text{freeboard}) \\ &= 0 \text{ m} + (3 \text{ m} - 0,6 \text{ m}) \\ &= +2,4 \text{ m} \end{aligned}$$



## B. Zona Settling

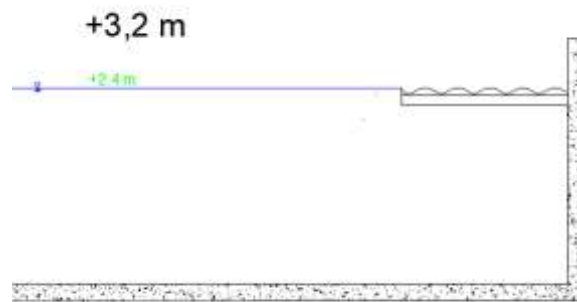
Direncanakan bangunan diletakkan di atas permukaan tanah.

- H total = 3 m
- H air = 2,4 m
- Freeboard = 0,6 m
- Tebal dinding = 0,2 m
- *Slope* (S) = 0,456
- Elevasi awal = 0 m

$$\begin{aligned} \text{Tinggi bangunan awal} &= \text{elevasi awal} + (\text{H total} + \text{tebal dinding}) \\ &= 0 \text{ m} + (3 \text{ m} + 0,2 \text{ m}) \\ &= + 3,2 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Tinggi bangunan akhir} &= \text{elevasi awal} + (\text{H total} + \text{tebal dinding} - S) \\ &= 0 \text{ m} + (3 \text{ m} + 0,2 \text{ m} - 0,456) \\ &= + 2,744 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Level muka air} &= \text{H total} - \text{Fb} \\ &= 3 \text{ m} - 0,6 \text{ m} \\ &= + 2,4 \text{ m} \end{aligned}$$



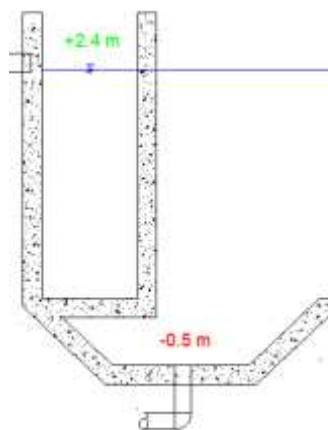
### C. Zona Lumpur

Direncanakan bangunan diletakkan di bawah permukaan tanah

- H total = 0,7 m
- Tebal dinding = 0,2 m
- Elevasi awal = 0 m

$$\begin{aligned} \text{Tinggi bangunan} &= \text{elevasi awal} - (\text{H total} - \text{tebal dinding}) \\ &= 0 \text{ m} - (0,7 \text{ m} - 0,2 \text{ m}) \\ &= -0,5 \text{ m} \end{aligned}$$

$$\text{Headloss} = 2,5 \times 10^{-6} \text{ m}$$

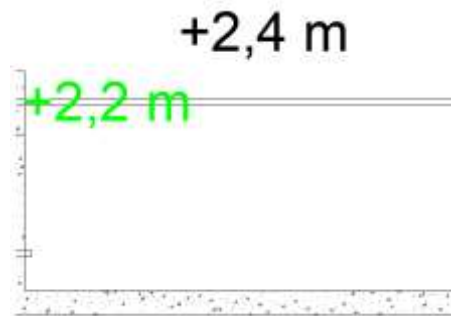


### 6.1.4 Aerasi

Direncanakan bangunan diletakkan di atas permukaan tanah

- Kedalaman = 2 m
- Freeboard = 0,2 m

- Elevasi awal = 0 m
  - Tebal dinding = 0,2 m
- Level muka air = elevasi awal + kedalaman + tebal dinding  
= 0 m + 2 m + 0,2 m  
= + 2,2 m
- Level muka bangunan = elevasi awal + kedalaman + tebal dinding + freeboard  
= 0 m + 2 m + 0,2 m + 0,2  
= + 2,4 m
- Headloss = 3,17 m

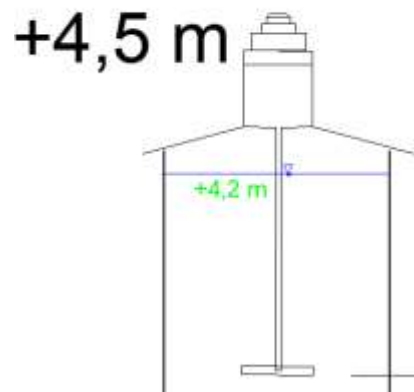


### 6.1.5 Koagulasi

Direncanakan bangunan diletakkan di atas permukaan tanah

#### A. Bak Pembunuh Koagulan

- H total = 1,54 m
  - H air = 1,28 m
  - Freeboard = 0,25 m
  - Tebal tangki = 0,0004 m
  - Elevasi awal = 3 m
- Tinggi bangunan = elevasi awal + (H total + tebal tangki)  
= 3 + 1,54 m + 0,0004 m  
= + 4,5 m
- Level muka air = elevasi awal + (H air + tebal tangki)  
= 3 m + 1,28 + 0,0003 m  
= + 4,2 m



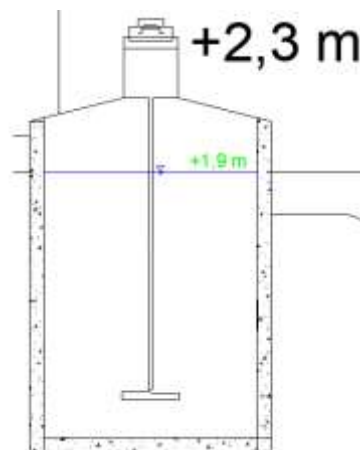
### B. Bak Koagulasi

- H total = 2,2 m
- H air = 1,8 m
- Freeboard = 0,34 m
- Tebal tangki = 0,1 m
- Elevasi awal = 0 m

Tinggi bangunan = elevasi awal + (H total + tebal tangki)  
 $= 0 + 2,2 \text{ m} + 0,1 \text{ m}$   
 $= + 2,3 \text{ m}$

Level muka air = elevasi awal + (H air + tebal tangki)  
 $= 0 \text{ m} + 1,8 \text{ m} + 0,1 \text{ m}$   
 $= + 1,9 \text{ m}$

Headloss = 0,0068 m



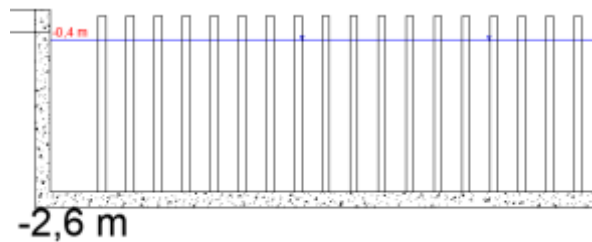
### 6.1.6 Flokulasi

Direncanakan bangunan diletakkan di bawah permukaan tanah.

- H total = 2,4 m
- Freeboard = 0,4 m
- Tebal dinding = 0,2 m
- Elevasi awal = 0 m

$$\begin{aligned}\text{Kedalaman bangunan} &= \text{elevasi awal} - (\text{H total} + \text{tebal dinding}) \\ &= 0 \text{ m} + 2,4 \text{ m} + 0,2 \text{ m} \\ &= - 2,6 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Level muka air} &= \text{elevasi awal} - \text{freeboard} \\ &= 0 \text{ m} - 0,4 \text{ m} \\ &= - 0,4 \text{ m}\end{aligned}$$



$$\begin{aligned}\text{Headloss kompartemen 1} &= 0,128 \text{ m} \\ \text{Headloss kompartemen 2} &= 0,082 \text{ m} \\ \text{Headloss kompartemen 3} &= 0,046 \text{ m}\end{aligned}$$

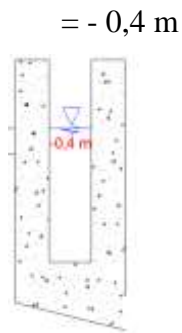
### 6.1.7 Sedimentasi

#### A. Zona Inlet

Direncanakan bangunan diletakkan di bawah permukaan tanah.

- Elevasi awal = 0 m
- Freeboard = 0,4 m

$$\begin{aligned}\text{Level muka air} &= \text{elevasi awal} - (\text{H total} - \text{freeboard}) \\ &= 0 \text{ m} - 0,4 \text{ m}\end{aligned}$$



### B. Zona Settling

Direncanakan bangunan diletakkan di bawah permukaan tanah.

- H total = 3 m
- H air = 2,4 m
- Freeboard = 0,6 m
- Tebal dinding = 0,2 m
- *Slope (S)* = 0,432 m
- Elevasi awal = 0 m

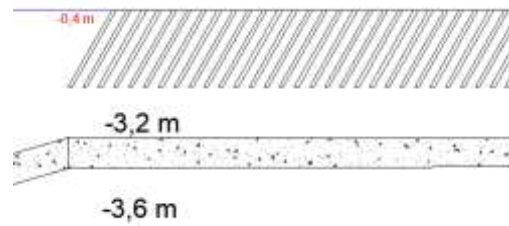
$$\begin{aligned}
 \text{kedalaman bangunan awal} &= \text{elevasi awal} + (\text{H total} + \text{tebal} \\
 &\quad \text{dinding}) \\
 &= 0 \text{ m} - 3 \text{ m} + 0,2 \text{ m} \\
 &= - 3,2 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Kedalaman bangunan akhir} &= \text{elevasi awal} + (\text{H total} - \text{tebal} \\
 &\quad \text{dinding} - S) \\
 &= 0 \text{ m} + (3 \text{ m} - 0,2 \text{ m} - 0,432 \text{ m}) \\
 &= - 3,6 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Level muka air} &= \text{H total} - \text{Fb} \\
 &= 3 \text{ m} - 0,6 \text{ m} \\
 &= - 0,4 \text{ m}
 \end{aligned}$$

$$\text{Headloss bak} = 4,3 \times 10^{-6} \text{ m}$$

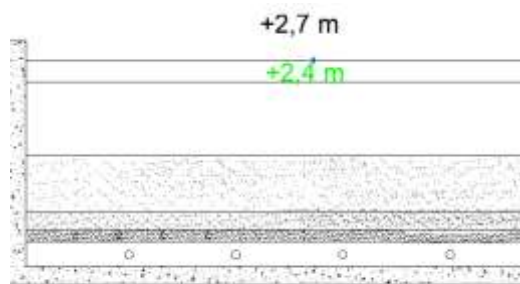




### 6.1.8 Filtrasi

Direncanakan bangunan diletakkan di atas permukaan tanah.

- H total = 2,7 m
  - Elevasi awal = 0 m
  - Freeboard = 0,26 m
- Tinggi bangunan = elevasi awal + H total  
= 0 m + 2,7 m  
= + 2,7 m
- Level muka air = elevasi awal + (H total – freeboard)  
= 0 m + (2,7 m – 0,26 m)  
= + 2,4 m
- Headloss = 0,0549 m

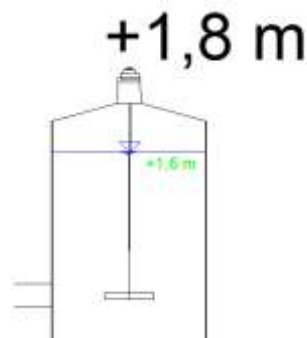


### 6.1.9 Desinfeksi

Direncanakan bangunan diletakkan di atas permukaan tanah tepatnya berada di atas bangunan reservoir.

- H total = 1 m
- H air = 0,86 m
- Elevasi awal = 0,8 m

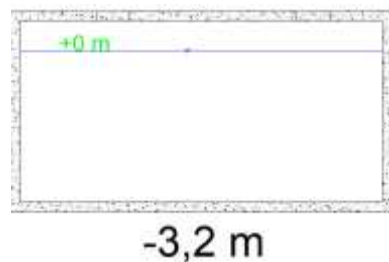
- Ketebalan bak = 0,003 m
- Tinggi bangunan = elevasi awal + ketebalan bak + H total  
= 0,8 m + 0,0003 m + 1 m  
= + 1,8 m
- Level muka air = elevasi awal + (H air + ketebalan bak)  
= 0,8 m + (0,86 m + 0,003 m)  
= + 1,66 m



#### 6.1.10 Reservoir

Direncanakan bangunan diletakkan di atas permukaan tanah.

- H total = 3,6 m
  - Freeboard = 0,6 m
  - Tebal dinding = 0,2 m
  - Elevasi awal = 0,8 m
- Kedalaman bangunan = elevasi awal – (H total + tebal dinding)  
= 0,8 m – (3,6 m + 0,2 m x 2 )  
= - 3,2 m
- Level muka air = elevasi awal – freeboard + tebal dinding  
= + 0,8 m – 0,6 m + 0,2 m  
= 0 m



### 6.1.11 Sludge Drying Bed

Direncanakan bangunan diletakkan di bawah permukaan tanah.

- H total = 1,5 m
- Freeboard = 0,3 m
- Tebal dinding = 0,2 m
- Tebal cake = 0,3 m
- Elevasi awal = 0 m

$$\begin{aligned}\text{Kedalaman bangunan} &= \text{elevasi awal} - (\text{H total} + \text{tebal dinding}) \\ &= 0 \text{ m} - (1,5 \text{ m} + 0,2 \text{ m}) \\ &= - 1,7 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Level muka air} &= \text{elevasi awal} - (\text{freeboard} + \text{tebal} \\ &\text{dinding}) \\ &= 0 \text{ m} - (0,3 \text{ m} + 0,2 \text{ m}) \\ &= - 0,5 \text{ m}\end{aligned}$$

