# Run off Surface Water in Compostingplants

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## A Example: Surface waters of the maturation area and storage areas

The rainwater collected from the secondary rotting and storage areas of compost is lead to a collecting basin made of site concrete through a separate pipe system. The surface water collected here is then pumped back through a pressure line e.g. to the intensive rotting for humidification of the rotting material. The collecting basin is equipped with an emergency overflow leading to the clarification basin in case of huge amounts of water caused by torrential rain.

**Dimensioning of collecting basin**

**Catchment areas:**

| | | |
|---|---|---|
| 1. Storage area of compost | A1 = | 902 $m^2$ |
| 2. Area of secondary rotting | A2 = | 1,650 $m^2$ |
| 3. Collection site of green waste | A3 = | 1,485 $m^2$ |
| 4. Drive of secondary rotting area | A4 = | 157 $m^2$ |
| **Total catchment area** | **A =** | **4,194 $m^2$** |

**Amount of rainwater:**

Parameter

runoff coefficient Ψ = 0.9

rainfall $r_{15,1}$ = 140 l/s,ha

$Q_{in}$ = 0.4194 ha x 0.9 x 140 l/s,ha = 52.84 l/s

During rainfall the total amount of accruing water should be able to be stored in the collecting basin without removing water from the basin.

$Q_{off}$ = 0

=> BR = 1,400

$$\text{neededV} = \frac{1.400 x 52,84}{1.000}$$

neededV = 73.98 existingV = 76.8 $m^3$

In case of extreme rainfall the water can be lead from the collecting basin into the rainwater

retention basin through an emergency overflow.

## B Example: Surface water from Street and roof runoff

The accruing urban and roof runoff is collected and lead into a combined retention and clarification basin before being discharged into the receiving water. In doing so huge fluctuations in the amount of water that is to be discharged into the receiving water are levelled out. The amount of water resulting from torrential rain is stored in the retention basin. By throttling the discharge of the basin a constant outflow into the receiving water is ensured. The integrated clarification basin retains floating and settling solids through mechanical separation. The dimensioning of the basin is based on ATV worksheet 117 and the administrative regulation on street surface runoff (*VwV Straßenoberflächen-wasser*). The basin intended for the treatment of street surface and roof runoff is to be built as a basin in the ground equipped with mineral sealing. The layout of the basin is chosen in such a way that a semi-natural design and planting is possible. The discharge of the clarification and retention basin for rainwater with $Q_{max}$ = 32 l/s is lead into an existing central shaft. The water is then lead through a drainage channel and discharged into the receiving water. Dimensioning of retention basin for rainwater with integrated clarification tank according to *VwV Straßenoberflächenwasser*

**Amounts of urban and roof runoff – catchment area**:

| | |
|---|---|
| 1. Street surface | $A_1$ = 1,962 $m^2$ |
| 2. Roof surface | $A_2$ = 2,737 $m^2$ |
| 3. Civic amenity site and entry area | $A_3$ = 378 $m^2$ |
| Total | $A_{total}$ = 5,077 $m^2$ |

**Clarification basin for rainwater**

| | |
|---|---|
| Catchment area | A = 5,077 $m^2$ |
| Runoff coefficient | $\Psi$ = 0.9 |
| Rain yield factor | $r_{15.1}$ = 140 l/s,ha |
| Selected | $r_{krit}$ = 70 l/s,ha |

$Q_{r,krit} = r_{krit} \times A \times \Psi$ = 70 l/s,ha x 0.577 ha x 0.9 = 32.00 l/s

By adhering to a maximal surface loading of 9 m/h the floating and settling solids settle at the bottom as sludge when flowing slowly and steadily through the basin.

**Surface feeding**

$q_A$ < 9 m/h

needed $A_{RKB}$ $\frac{3{,}6x32l/s}{9m/h}$

= 12,8 $m^2$

choosen A = 15 $m^2$

Following the recommendations of guidelines an oblong basin with a depth of H = 2 m is selected.

$V_{min} = A_{RKB}$ x 2 = 30 $m^3$

**Calculation of retention time:**

$t_A$ = V/Q = 30 $m^3$/32 l/s = 938 s  15 min

**Retention basin for rainwater**

Catchment area A = 5,077 $m^2$

Runoff coefficient Ψ = 0.9

Rain yield factor $r_{15,02}$ = 228.1 l/s,ha

$Q_{in}$ = 0.5077 ha x 0.9 x 228.1 l/s,ha = 104.23 l/s  selected 110 l/s

$Q_{off}$ = $Q_{r,krit}$ = 32 l/s

The dimensioning of the basin is done with the help of the dimensioning diagrams according to Pecher.

Retention factor = $Q_{ab}/Q_z$ = 32 l/s / 110 l/s = 0.3

Flow time $t_f$< 10 min

This leads to a rated value BR of 550 s.

basin volume

$$V_{erf} \quad \frac{BRxQ_{15,02}}{1000} = \frac{550sx110l/s}{1000}$$

By throttling the basin discharge the critical rainwater discharge is maximal $Q_{r,krit}$ = 32 l/s. The basin is sealed by implementing a clay layer. Honeycomb-type paving stones are set into the bottom of the clarification basin enabling vehicles to drive into the basin for cleaning purposes. Additionally, the basin is equipped with a bottom outlet and an emergency overflow.