

The mixing of a discharge with a river is described by the Mass Balance Equation [1]:

$$T = \frac{FC + fc}{F + f}$$

where:

- F is the river flow upstream of the discharge
- C is the concentration of pollutant in the river upstream of the discharge
- f is the flow of the discharge
- c is the concentration of pollutant in the discharge
- T is the concentration of pollutant downstream of the discharge.

The most commonly used quality standards for rivers are the annual 90-percentiles for the Biochemical Oxygen Demand (BOD) and Total Ammonia and the annual mean standard for Phosphate.

Volume discharged per day 200cm<sup>3</sup>

Hours per day of discharge	Flow rate (l/s)	BOD (mg/l)	Concentration of pollutant downstream	Within 10% deterioration?
24	2.314814815	22	2.833004343	Yes

The standards that should be used for the ~~Skellingthorpe~~ Main drain to model the discharge from Dovecote Park Ltd are:

- Water Framework Directive (WFD) standard for ammonia = High status that equates to 0.3mg/l as a 90%ile.
- WFD standard for BOD = High status (5mg/l as a 90%ile)
- WFD standard for soluble reactive phosphorus (similar to orthophosphate) = High status (0.051mg/l as an annual average based on the downstream monitoring point LKS19)

**River flow upstream of the discharge location at SK9357972807:**

Influenced mean flow = 0.175 m<sup>3</sup>/s

Influenced Q95 = 0.0255m<sup>3</sup>/s

**Rive quality upstream of the discharge at LKS18:**

Ammonia mean = 0.039mg/l

Ammonia standard deviation = 0.0364

Ammonia number of samples = 7

BOD mean = 2.58mg/l (no data – mid class estimate for high status)

BOD standard deviation = 1.55mg/l (no data – mid class estimate for high status)

BOD number of samples = 12

Orthophosphate mean = 0.02843mg/l

Orthophosphate standard deviation = 0.0234mg/l

Orthophosphate number of samples = 7

**Downstream river quality at LKS19:**

pH mean = 7.54

pH standard deviation = 0.346

pH number of samples = 20

Temperature mean = 11.3832

Temperature standard deviation = 5.0238

Alkalinity mean = 219.74mg/l

Alkalinity standard deviation = 49.116mg/l

Alkalinity number of samples = 19

Total Dissolved Solids (TDS) mean = 260mg/l (default value)

TDS standard deviation = 30mg/l (default value)

TDS number of samples = 12

Dissolved oxygen mean = 8.29mg/l

Dissolved oxygen standard deviation = 4.442mg/l

Dissolved oxygen number of samples = 19