

[REDACTED]

From: [REDACTED]
Sent: 30 November 2016 13:52
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: Curraghinalt sewage treatment permitting

[REDACTED] the objectives for BOD and ammonia for this particular catchment are as follows:

BOD 3 mg/l
Ammonia 0.2 mg/l

However these signify the class boundaries between Good and Moderate status under WFD, so cannot be exceeded. For this reason, when undertaking modelling we assume that the concentration in the river is 50% that of the maximum permitted (mid class concentration (in this case 1.5 mg/l for BOD and 0.1 mg/l for ammonia)), and allow a certain amount of deterioration as a result of the proposed discharge. In the case of sewage effluent, we normally permit a deterioration from the mid class of 13% for BOD and 28% for ammonia.

I hope this is useful, however again any queries please come back to me.

Regards

[REDACTED]

From: [REDACTED]@kayaconsulting.co.uk]
Sent: 29 November 2016 17:00
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: Curraghinalt sewage treatment permitting

[REDACTED]

We are using a Monte Carlo method for our water balance modelling, which appears consistent with the EA method. I will contact them so our input distributions are similar to those used in the EA method and hopefully our model will be able to be set up consistent with their approach.

Can you clarify the receiving water targets for typical sewage effluent in NI?

Regards,

[REDACTED]

From: [REDACTED]@daera-ni.gov.uk]
Sent: 29 November 2016 16:54
To: [REDACTED]@kayaconsulting.co.uk>
Cc: [REDACTED]
Subject: RE: Curraghinalt sewage treatment permitting

[REDACTED], we normally calculate required consent conditions for specific discharges by using mass balance calculations- using "Monte Carlo" modelling software- this software is owned by the Environment Agency for England and as such we are unable to share it- you could try approaching the Agency directly to ascertain if it would be possible to obtain a copy (enquiries@environment-agency.gov.uk).

The mass balance software uses various permutations of the following equation to calculate downstream contaminant concentrations following discharge input:

$$T = (FC + fc) / (F + f)$$

Where:

T = concentration of pollutant in river after mixing

F = upstream river flow

f = discharge flow

C = concentration of pollutant in upstream river

c = concentration of pollutant in discharge

In the Monte Carlo simulation, a value for each of the variables F, C, f and c is plucked randomly from the full range of possible values. Values will be determined by the input parameters in the model, using data which describes the distributions of each of the variables, which are:

Mean and Q95 upstream river flows.

Mean and standard deviation of discharge flow.

Mean and standard deviation of pollutant concentration in river.

Mean and standard deviation of pollutant concentration in discharge.

A value for T is created for each set of values of F, C, f and c using the equation above. The sequence of random selection and mass balance is repeated until enough values of T have been created to define its distribution (Typically about 500 such calculations will be carried out).

To calculate the discharge standard needed to achieve a 90 percentile river quality objective downstream, the Monte Carlo model compares the river quality target with the 90 percentile value of the calculated distribution of T. Using this model, the discharge standard required is expressed as a 95 percentile. Consent conditions are therefore set on a 95 percentile basis, and compliance assessed as such.

I hope that this provides some explanation of the calculations used to formulate consent conditions- please let me know if you want to discuss further.

Best Regards

[REDACTED]

[REDACTED]
Industrial and Domestic Consents
Regulation Unit
Northern Ireland Environment Agency
17 Antrim Road
Tonagh
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BT28 3AL

Direct Line: 0 [REDACTED]
email: [REDACTED]@daera-ni.gov.uk

From: [REDACTED]@kayaconsulting.co.uk]
Sent: 29 November 2016 14:10
To: Coey, Richard

Cc: [REDACTED]
Subject: Curraghinalt sewage treatment permitting

[REDACTED]

In the meeting of the 9th November, we briefly discussed requirements related to sewage discharges from the Curraghinalt mine site. You noted that if the discharge rate from the proposed treatment plant was <10 m³/day then this would be considered within guideline limits for small (<2km²) catchments.

At the time of the meeting we presented discharge rates that were significantly higher than 10 m³/day, but they were based on conservative flow rates used for costing purposes. The engineers have gone back to the proposals and refined the treatment rates based on the staffing numbers on site and the British Water guidance. They have managed to decrease the flow rates very close to 10m³/day, but at still a little (1 to 3 m³/day) above this rate.

During the meeting you noted that if the rates were higher than 10 m³/day it would be possible to calculate dilution rates based on observed low flow conditions and/or standard values used by NIEA.

Would you be able to forward us details of the calculations that you will be undertaking at the site so we can undertake some work to review the discharge rates and discharge quality required at the treatment plant. We have flow data for small streams in the site area that can be used to calculate median and 95%ile low flows. In addition, there is some flexibility within the mine water management to provide a compensation flow to the receiving waters. We would want to undertake some iterations to assess what would be required to meet your requirements.

Please get back to me if you have any questions, but we look forward to hearing from you.

Regards,

[REDACTED]
Dr [REDACTED]
Hydrologist / Director
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