anjan ku	
From: Sent: To: Cc: Subject:	30 November 2016 13:52 References RE: Curraghinalt sewage treatment permitting
BOD Ammonia	jectives for BOD and ammonia for this particular catchment are as follows: 3 mg/l 0.2 mg/l
However these For this reason, maximum perm certain amount permit a deterio I hope this is us Regards	signify the class boundaries between Good and Moderate status under WFD, so cannot be exceeded. when undertaking modelling we assume that the concentration in the river is 50% that of the hitted (mid class concentration (in this case 1.5 mg/l for BOD and 0.1 mg/l for ammonia)), and allow a of deterioration as a result of the proposed discharge. In the case of sewage effluent, we normally poration from the mid class of 13% for BOD and 28% for ammonia. eful, however again any queries please come back to me.
<u>Einimmi</u>	

From:	kayaconsulting.co.uk]
Sent: 29 November 2016 17:00	
To:	
Cc:	
Subject: RE: Curraghinalt sewage treatment per	rmitting

_		_
9		В.
1		_

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,

From: Geo;; Fichard [.....inonFichard Coo;@daera-ni.gov.uk]

Sent: 29 November 2016 16:54

To: <u>@kayaconsulting.co.uk</u>>

Cc: 📑

Subject: RE: Curraghinalt sewage treatment permitting

Enclose, 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

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

Direct Line: 0

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

Cc: **Subject:** Curraghinalt sewage treatment permitting

I 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 propose 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 $10 \text{ m}^3/\text{day}$, 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 $10\text{m}^3/\text{day}$, 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% le 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,

Dr Human Hydrologist / Director

Kaya Consulting Limited Phoenix House, Strathclyde Business Park, Bellshill, ML4 3NJ Conference House, 152 Morrison Street, The Exchange, Edinburgh, EH3 8EB

T. +44 M. +44 www.kayaconsulting.co.uk

This message may contain privileged or confidential information which is intended for the addressee only. If you have received this message in error, please destroy all copies in your possession or control and notify the originator immediately. Recipients may not forward, disclose or copy this message to any third party without the proper consent of Kaya Consulting Limited. Kaya Consulting Limited does not accept liability for direct, indirect or consequential damages arising from alteration of the contents of this message by others.

In the interest of resource conservation, please only print this e-mail if absolutely necessary.

3