2nd May 2024

Leah Mathias-Collins
Group Environment Manager
Vitacress Salads Limited

By Email

Our Ref: RMA/LC2638_4 – SMB H1 Risk Assessment

Dear Leah,

RE: H1 SURFACE WATER RISK ASSESSMENT FOR DISCHARGES FROM WATERCRESS BEDS AND FACTORY WASHWATER AT LOWER LINK FARM, ST MARY BOURNE, HAMPSHIRE

Further to our instruction to carry out a surface water pollution risk assessment for the existing discharges from the watercress beds and salad washwaters at Lower Link Farm, we have set out the results of the H1 screening assessment in the following subsections.

This covering letter and associated H1 modelling spreadsheets supersedes all previous versions.

The H1 screening assessment includes the following scenarios:

- watercress bed discharges to the Eastern Channel of the Bourne Rivulet (without dilution);
- watercress bed discharges to the Eastern Channel of the Bourne Rivulet (with dilution);
- factory discharges to the Eastern Channel of the Bourne Rivulet (without dilution);
- factory discharges to the Eastern Channel of the Bourne Rivulet (with dilution);
- factory discharges to the Eastern Channel of the Bourne Rivulet (ozonation, no dilution);
- factory discharges to the Eastern Channel of the Bourne Rivulet (ozonation, dilution); and
- watercress bed discharges to the Western Channel of the Bourne Rivulet.

The discharge from the watercress beds and factory into the Eastern Channel occur at the top of the Eastern Channel of the Bourne Rivulet. There is therefore no upstream flow and no dilution of the discharge prior to it reaching the Eastern Channel. This has been modelled in the H1 screening model for the watercress bed discharge and factory discharge as having no dilution from upstream flows; however, for comparative purposes, it has also been modelled using the dilution which would arise from the main Bourne Rivulet (i.e. at the confluence with the Western Channel).

The Bourne Rivulet flows south through the western part of the site and ultimately joins the River Test approximately 4 km south of the site. The Bourne Rivulet is a groundwater fed stream which is generally dry in its upper reaches (north of the site) from late summer to January when groundwater levels in the Chalk aquifer are seasonally low. The Bourne Rivulet flows at all times of the year from a point about half-way down the site where flows are augmented from discharge of water from the watercress beds. The section of the Bourne Rivulet from this point to the northern boundary of the site is typically dry for two months of the year (typically December to late January/early February). At the point of discharge into the main Bourne Rivulet (Western Channel), there is usually flow all year round although, on rare occasions, the winterbourne section of the river has extended that far downstream.

For more information on the hydrology and hydrogeology of the site refer to Section 2.4 of the HRA.

Vitacress carry out routine monitoring of watercress bed and factory discharges and this data set has been used to define the list of substances included in the H1 screening assessment as follows:

- **watercress bed discharges**: ammoniacal nitrogen (NH4-N), chloride (Cl), iron (Fe), sulphate (SO_4), potassium (K) and zinc (Zn); and

- **factory discharges**: Acetamiprid, Azadirachtin, Azoxystrobin, Boscalid, Chlorantraniliprole, Difenoconazole, Dimethomorph, Fludioxonil, Fluopicolide, Fluopyram, Fosetyl aluminium, Fosetyl aluminium (sum), Mandipropamid, Metalaxyl, Propamocarb-HCl, Pyraclostrobin, Spinosad and Trifloxystrobin. Fosetyl-aluminium product; phosphonic acid and Spirotetramat product: spirotetramat enol were not modelled as no PNEC values are available for these substances.

Previous consultation with the Environment Agency (EA) concluded that it was not appropriate to carry out H1 screening for phosphate and nitrate, so these substances are not covered by this assessment.

Data Sources

The following data sources have been used to inform the H1 screening assessment:

- mean and maximum concentration data for the relevant watercress bed discharges into the Eastern and Western Channels have been taken from routine monitoring from 2018 to date, comprising more than 75 sampling events for NH4-N, iron, potassium and zinc and 11 sampling events for chloride and sulphate;

- mean and maximum concentration data for the factory discharge have been taken from the routine monitoring data as above, supplemented by more recent analyses for a suite of pesticides;

- mean and maximum flow rates for each waste stream have been taken from data used in the Hydrogeological Risk Assessment undertaken by Firth Consultants (refer to Table A of the HRA). It should be noted that the flows for the watercress beds are based on 24 hour operation per day and flows in the factory washwater are based on 18 hour operation per day; The flows used in the H1 modelling relate to the following:

    - Cress bed discharge into the Eastern Channel – flows from Blocks B, C and E
    - Cress bed discharge into the Western Channel – flows from Blocks D and R
    - Factory discharges into the Eastern Channel – flows from the Factory

- the upstream 95% exceedance flow (Q_{95}) for the main Bourne Rivulet has been estimated using the methodology described in the Institute of Hydrology (IH) Report 126 Hydrology of Soil Types (the Q95 calculations are enclosed for information). The method involves the following steps:

    - Derivation of the catchment area (AREA) of the receiving watercourse from FEH mapping
    - Estimation of the Average Annual Rainfall Depth (AARD) from rainfall and evaporation data
    - Estimation of the Mean Flow (MF) in the watercourse (MF = AARD x AREA x 0.0000317)
    - Estimation of the Q95 flow as a % of MF using the low flow HOST group for the catchment

- Environmental Quality Standards (EQSs) or other relevant thresholds have been used for non-pesticide substances. At the request of the EA, Predicted No Effect Concentrations (PNECs) have been used for the assessment of pesticides rather than their EQSs. As ammoniacal nitrogen and potassium do not have EQSs, the equivalent thresholds in the Drinking Water Standards (DWS) have been used as a proxy for the EQS.

Risk Assessment Methodology

This H1 screening assessment has been undertaken using the methodology set out in Government guidance on 'Surface water pollution risk assessment for your environmental permit'[1]. A spreadsheet model has been developed which includes the four screening tests required for each substance present in the discharges.

The individual H1 screening spreadsheets have been submitted with this covering letter for the scenarios listed above.

Results

The results of the preliminary H1 screening assessment are summarised as follows:

Watercress Bed Discharges to Eastern Channel

Based on the substance list described above (i.e. NH4-N, chloride, iron, potassium, sulphate and zinc), all substances screen out after Test 2 (with or without dilution), so detailed modelling should not be required. The background water quality value has been set to 50% of the EQS which is what the guidance suggests is used if no upstream water quality data is available.

It should be noted here that the dilution scenario is only included for comparative purposes. The most appropriate scenario is the no dilution scenario as this is a more accurate representation of the actual discharge arrangement (the same applies to the factory discharges discussed below).

Factory Discharges to the Eastern Channel

These results show that a number of pesticides fail Tests 3 and 4 for the no dilution and dilution scenarios and therefore detailed modelling is required for these substances.

Vitacress propose to adopt an ozonation process which would significantly reduce the concentrations of pesticides in the discharge. The treatment efficiency of ozonation (based on a series of trials) has been estimated for each substance covered by this H1 assessment and this information has been included in the H1 modelling using a treatment reduction factor (the filenames for these model runs end in "_ozone").

The updated H1 screening results show that, with ozonation, all pesticides are screened out at Test 3 meaning that detailed modelling should not be required. Notwithstanding this, detailed modelling will need to carried out by the EA for the no ozonation and ozonation scenarios to assess the potential impacts of the discharge in more detail.

Watercress Bed Discharges to the Western Channel

Based on the substance list described above (i.e. NH4-N, chloride, iron, potassium, sulphate and zinc), all substances screen out after Test 2 (with or without dilution), so detailed modelling should not be required. The background water quality value has been set to 50% of the EQS which is what the guidance suggests is used if no upstream water quality data is available.

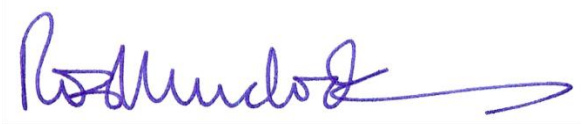
Conclusion

Based on these H1 screening assessment results, it is concluded that detailed modelling of the factory discharge will be required. The H1 screening assessments for the watercress bed discharges conclude that all modelled substances are screened out after Test 2 and therefore detailed modelling should not be required.

[1] Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk)

I trust that this summary of the H1 screening assessment is useful, but please let me know if you have any questions or need any additional information.

Yours sincerely



Dr Rob Murdock
Director

Encs: H1 Screening Spreadsheets (Excel)
Q95 Flow Estimation Spreadsheet