CRoW Appendix 4 (140_10_SD02)

CRoW Act 2000: Natural Resources Wales application for permission - Formal Notice

Cyfoeth Naturiol Cymru Natural Resources Wales

Natural Resources Wales Formal Notice.

Requirements of Section 28I of the Wildlife & Countryside Act 1981 as amended by the Countryside and Rights of Way Act (CRoW) 2000.

Duty in relation to granting any consent, licence or permit for activities likely to damage Sites of Special Scientific Interest (SSSI).

Guide to filling in this form for Natural Resources Wales staff:
To be completed by Permitting Officers for any applications for a permission which the Natural Resources Wales has considered under S28G duties to protect and enhance SSSIs. This applies to all proposed permissions within a SSSI, and to operations outside the SSSI boundary which are likely to damage its special features.
Refer to OI 140_10 'Applying the Countryside and Rights of Way (CRoW) Act 2000 to applications for permits with potential for impact on Sites of Special Scientific Interest (SSSI)', including the flowchart in Appendix 2.

Pink italic text – drafting notes, to be deleted before completion/consultation.
Blue text – examples, to be replaced with permission-specific information.
Ensure you have completed all sections.

1. Natural Resources Wales area/region/NPS hub:	Wales/Mid/Powys
2. Name of SSSI:	River Teme SSSI
3. Type of permission:	New Bespoke Permit for a mineral water bottling plant with associated effluent treatment plant, discharging treated trade effluent to surface water.
4. Date for Natural Resources Wales permit determination:	--
5. Predicted 28 day date for response from NRW conservation/ecology (under S28 I(4)):	06/09/17
6. Natural Resources Wales reference no:	PAN 000849
7. National grid reference:	SO 34383 72493
8. Description of proposal:	The applicant has applied for a New Bespoke Permit. The first activity is *Section 6.8 A (1) (d) (ii).* This is because the installation produces bottled water. The second activity applied for is *Section 5.4 A (1) (a) (i)* for an effluent treatment plant on site. The effluent discharge is wholly to surface water (River Teme). A discharge location has been chosen by the applicant where there is a continuous flow (confirmed by P.Giles Environment Agency, experience by Radnor Hills and also being down gradient of where springs rise to the North). The effluent will be piped the 1.2km from the installation to the discharge point. The pipe will run across mainly agricultural land, underneath a road and finally discharged to the river.
9. Is the proposed activity within (wholly or partially) the SSSI boundary?	No, the activity (installation) is not but the process effluent discharge is directly into the River Teme SSSI
10. Has there been any pre-application discussion or correspondence with NRW conservation/ecology	NO

11. What aspect(s) of the proposed permission may damage the features which are of special interest for the SSSI?

The following SSSI features and mechanisms of impact have been considered to assess the likelihood of damage:

1. *Water discharge into the River Teme SSSI, with potentially polluting contaminants.*

12. Decision

The proposed permission is **not likely to damage** any of the special interest features of the River Teme SSSI.

The Teme rises on Cilfaesty Hill, Powys and falls steeply to Knighton. The upland section is short, with fast-flowing, nutrient-poor and relatively acidic waters. The lower portions of the river are much slower-flowing and situated on soft, flat deposits. The banks of the Teme are well tree-lined with alder and willow species. There are established communities of otter, as well as several nationally/globally threatened freshwater invertebrates. The River Teme has long been recognised as a quality salmonid and coarse fishery. The bird community is typical of that found along medium to fast flowing rivers.

The site has 4 small natural gas boilers and 1 small oil gas heater. These are all less than 5MW and are therefore not considered to pose a significant risk to the environment. The applicant has carried out an H1 Risk Assessment for the 5 sources and assessed NOx, SOx, Particulates and Carbon Monoxide. Environment Agency Guidance Document H1 Annex F suggests that; *As stand-alone units, they are not considered to be major sources of pollution but are subject to the requirements of the Clean Air Act. Whilst it is important that the environmental impact of these sources is estimated, it is considered that the risk from these sources will not often warrant detailed dispersion modelling to be undertaken as part of this assessment.'*

The site plans to discharge treated effluent into the River Teme. It is proposed to discharge the total volume of effluent to the river, the applicant has based their assessment on a worst-case scenario of 290m^3 per day, however in reality this value will be significantly smaller as the applicant has stated that a large proportion of the water will be re-used within the plant. A volume of approximately 110m^3 would usually be discharged per day. A H1 assessment has been carried out for the discharge based on Ammonia at a maximum rate of 5 mg/l (1.45 kg/year). Water impact in terms of ammonia is not more than 4% of the EQS, therefore further modelling of this substances is not required as it can be screened out at this stage. However, more detailed modelling of impact on surface water and has been conducted by the applicant that includes Ammonia and substances not specified in the H1 tool.

2 discharge locations have been selected by the applicant where there is a continuous flow; around Lingden Bridge. The continuous flow for the original location was confirmed by P.Giles of the Environment Agency, experience by Radnor Hills and also being down gradient of where springs rise to the North. The second discharge location was proposed in the latest Schedule 5 responses (dated 02/08/17 and 08/18/17). The response stated that this second location was the preferred option of Natural England and the Environment Agency. At this location, there is still a continuous flow but has lower volumes than the original location. At both locations, the modelling results were similar, only BOD and Total Ammonia were slightly higher in the second location, but still within the assessment limits as noted by the CSMG.

The consultants acting on behalf of the operator provided river flow data with the application for the original discharge location. There is no nearby continuous flow data for the Teme (the nearest gauge is at Tenbury), so the consultants derived these flow statistics using available spot flows for the Teme near Heartsease, correlated to gauged flows on other nearby rivers or river stage measurements at Knighton. The derivation of the data has been detailed in the application.

- 95 percentile (stage at Knighton = 0.535 m): 0.09 m^3/s (7,776 m^3/day)
- 50 percentile (stage at Knighton = 0.660 m): 1.32 m^3/s (114,048 m^3/day)
- Mean flow (stage at Knighton = ~0.739 m): 2.29 m^3/s (197,856 m^3/day)

Based on the above statements, the NRW Hydrology team were consulted to check the river flow data that was supplied with the application. The Environment Agency Hydrology team was also consulted due to much of the River being managed by them. Both NRW and EA hydrology have confirmed they are satisfied with the flow data provided with the application.

The second discharge location proposed in August, has a lower flow. Based on a very limited spot flow dataset for 200m upstream of Lingen Bridge, and in the absence of more specific flow data, it has been assumed by the applicant that both annual mean and summer flows are 70% of those at the original location noted above. However, it should be noted that this is conservative as the mean flows are likely to be very similar to those at the original location.

Following submission of information requested by Schedule 5 notice (dated 02/08/17), the applicant also modelled the lower summer flow rates for the months March – September at both discharge locations. These flows were derived by applying correlation factors (between the spot flows on at the Teme at Lingen Bridge and flows at other gauged catchments and the river stage at Knighton).

The methodology for the modelling assessment has been carried out in-line with Environment Agency Horizontal Guidance document H1 Annex E – Surface Water Discharges (complex).

Two tests are used to decide if discharges to surface waters are acceptable. A discharge is usually acceptable if:

1. it does not cause deterioration in quality of the water body receiving the discharge, and
2. the receiving water body meets its target quality standards

For the calculation, the Monte Carlo Method has been used, as set out in Appendix A 'Calculation of River Needs Permits'. This was conducted using the RQP software as requested from the Environment Agency by the applicant.

Upstream water quality data was obtained from the Environment Agency, as there were no nearby flow data for the river Teme, the applicant's consultant derived the flow statistics using available spot flows for the Teme correlated to gauged flows on other nearby rivers. In response to the Schedule 5 (dated 02/08/17), the applicant requested further background data from the Environment Agency which was received by the applicant on the 25th July 2017. This data provided the most up-to-date background levels for Unionised Ammonia (as NH_3) and Soluble Reactive Phosphorus (orthophosphate as PO_4). The updated data for Biological Oxygen Demand and Total Ammonia was not available so the original data provided with the application was used.

The design average concentrations of the effluent treatment plant as quoted by the provider of the treatment technology were used as the discharge quality parameters, these will also be the concentrations that will be in the permit to assess compliance. The parameters that were assessed based on the process were BOD, Ammonia, Soluble Reactive Phosphorus (as PO_4) and Total Suspended Solids.

As the River Teme is a sensitive river, the Common Standards Monitoring Guidance 2016 (CSMG) was used to base the assessment against rather than the standard WFD targets. The targets required by the CSMG were applied to the assessment, the results are shown below. The assessment was based on a direct discharge to river.

Original Discharge Location

Parameter	Current River Quality (mg/l)	Design average effluent quality (mg/l)	Resultant river quality – full year flows (mg/l)	Resultant river quality – summer flows (mg/l)	River quality target (mg/l)
BOD (mean)	1.13	5.00	1.18	1.20	1.50
Total Ammonia as N (90%ile)	0.018	0.50	0.04	0.05	0.25
Unionised Ammonia as NH_3 (95%ile)	<LOD	n/a	0.0001	0.0002	0.025
Soluble Reactive Phosphorus as PO_4 (mean)	0.10	0.20	0.10	0.10	0.025
Total Suspended Solids (mean)	8.1	5.00	8.07	8.05	n/a

New proposed discharge location (Natural England and Environment Agency preferred location).

Parameter	Current River Quality (mg/l)	Design average effluent quality (mg/l)	Resultant river quality – full year flows (mg/l)	Resultant river quality – summer flows (mg/l)	River quality target (mg/l)
BOD (mean)	1.13	5.00	1.20	1.23	1.50
Total Ammonia as N (90%ile)	0.018	0.50	0.04	0.05	0.25
Unionised Ammonia as NH_3 (95%ile)	<LOD	n/a	0.0002	0.0002	0.025
Soluble Reactive Phosphorus as PO_4 (mean)	0.10	0.20	0.10	0.10	0.025
Total Suspended Solids (mean)	8.1	5.00	8.06	8.03	n/a

The applicants amended modelling shows that at both discharge locations the BOD and Ammonia would not result in the river exceeding the quality target as stated by the CSMG. There are no quality targets for Total Suspended Solids (TSS), the modelling shows that this will be reduced slightly by the proposed effluent discharge, as TSS is lower in the discharge than in the river. For Soluble Reactive Phosphorus (SRP) however the river currently exceeds the water quality target without the proposed discharge, the modelling shows that the proposed discharge would not cause the levels of SRP to increase and therefore no deterioration of the current levels within the river. However, we requested the raw data that the applicant used for the modelling assessment. We then ran the numbers through Monte Carlo to assess the deterioration. We multiplied either side of the model to account for the 3rd decimal place in the modelling software. This was based on a worst-case flow in the river, whereby the applicant has assumed that the new discharge location suggested by NE/EA has 70% of the flow as the original proposed/modelled location, this is conservative as realistically the flows are the same. We also used the summer flow rates (Mar-Sept), as these are a lot lower than the annual and provide a worst-case scenario for river flow. Based on the realistic annual average effluent flow rate of 2.25l/s (194.4m^3/day) with the plant's design average concentration of 0.2mg/l of P, the deterioration is 2.6% against the current river background, this is below the 3% allowed by the Wesser Rule. The maximum effluent flow rate proposed of 290m^3/day was above the 3% and consequently the applicant has agreed to limit the effluent flow rate to 194.4m^3/day. This will be controlled with a flow limit in the permit. An improvement condition will be included in the permit that requires the operator to carry out monthly monitoring of SRP at 3 locations throughout the process; 1. As the water leaves the MBR, 2. Before the effluent enters the swale and 3. When the effluent leaves the swale and enters the river. If the monitoring shows that the impact of SRP on the river causes any deterioration the operator will add a chemical treatment to the end of the process that removes any residual phosphorus from the effluent. We agree that this method is the best way forward.

There were also concerns surrounding the temperature of the proposed effluent. Data provided by the Environment Agency showed that water temperatures fluctuate annually between 3.9ºC and 18.9ºC. The applicant has stated that the effluent treatment system will increase the effluent temperature by up to 3ºC, the final effluent temperature is therefore dependant on the input temperature. Based on the current treatment system the applicant has suggested that the effluent would be at a maximum of 25ºC as it leaves the plant. The effluent would travel approximately 1.2km via pipeline to the river and would lose around 1-2ºC during this time. The applicant has also proposed to discharge the effluent to a drainage swale/wetland prior to input to the river. This wetland environment would also serve to reduce the temperature prior to entering the river. There are too many unknown variables in the process to accurately model the temperature of the effluent, so the applicant has proposed to spend up to a year actively monitoring the temperatures of the effluent at different parts of the treatment process and the final discharge point. If it is found that the river temperature is increased beyond 1ºC then measures such as the installation of a heat exchanger will be added, this will be dealt with by way of Improvement Condition in the environmental permit that will ensure that the applicant actively monitors and reports on the effluent temperature and potential impact to the discharge location. We agree that this method is the best way forward.

The inclusion of a wetland/swale type discharge structure will also serve to lessen the impact of the discharge on any fish that may be present within the discharge location, as the flow of effluent will be reduced when using a swale as opposed to a pumped outfall type system. The concern about the original discharge location affecting fish as they were often relocated to where the effluent would be discharging.

A new discharge location has been selected by the applicant, this would further reduce the impact of the effluent on fish.

We asked the applicant about relevant hazardous substances from the installation as there is historical evidence that various substances may be present. The first substance being Toluene; this was identified in relation to Groundwater, however Toluene is not a relevant hazardous or priority hazardous substance for Surface Water. Toluene is volatile and will not persist in surface waters. Even though this is the case the applicant has committed to minimise at all costs. The applicant has carried out their own investigations and found that the Toluene is only currently present in the effluent after treatment in the reed bed system. Toluene is being created in the anaerobic conditions of the reed beds and not produced in the process. The effluent will now be piped from the process straight to the effluent treatment plant and then to the discharge location, as there will be no anaerobic conditions then Toluene will not be formed and the risk is insignificant.

Another substance is nonylphenol. There is concern as this substance can be seen at levels above the EQS, however there is currently limited effluent treatment on site – the applicant has confirmed that at present all that is there is a balancing tank with limited aeration, this means that there are anaerobic conditions present with very low oxygen content which explains the presence of nonylphenol within the tank. The applicant is installing a new effluent treatment plant that will treat process effluent prior to discharge. The plant designers cannot confirm if all the nonylphenol will be removed due to lack of experimental evidence, however they can show that other hazardous substances are reduced significantly by the plant. The applicant has conducted their own investigation into nonylphenol and has stated that research shows that nonylphenol can be formed during anaerobic sludge formation and is not generally present during aerobic processes. As the substance is also volatile it would be removed by aeration, as there is a large amount of aeration in the proposed effluent treatment plant process, nonylphenol is not expected to be present in the final effluent, finally nonylphenol is highly hydrophobic it tends to enter soils/sludge during wastewater treatment, therefore the substance would be expected to be present in the sludge from the balancing tanks within the effluent treatment plant and not in the final effluent discharged to the river. As the applicant, has not been able to fully rule out the possibility of nonylphenol being present in the effluent, a permit condition would be added to ensure that the applicant took regular samples once the effluent treatment plant was running to ensure the limit of detection for nonylphenol is not breached. The applicant has also committed to carrying out additional investigations to identify the root of this substance.

As the effluent treatment system is a biological process, concerns were raised regarding the nutrients and chemicals used in the treatment, the applicant and technology provider listed the nutrients and chemicals used in the treatment and confirmed that the any added nutrients and chemicals will be removed by the MBR and will not be present in the discharge to the environment.

Based on the results of the modelling the discharge to the River Teme is **not likely to damage** any of the special interest features in the SSSI.

Natural Resources Wales is minded to:
Issue the permission

13. Name and job title of Natural Resources Wales officer:	**Saul White** **Senior Permitting Officer**
14. Date form sent to NRW conservation/ecology	08/08/17
For Natural Resources Wales use only, once NRW conservation/ecology response received	
15. NRW conservation/ecology comment on assessment:	
16. Name and job title of NRW conservation/ecology officer:	
17. Date of receipt of NRW conservation/ecology response:	