MULLER TELFORD

Surface Water Pollution Risk Assessment

Prepared for: Muller UK & Ireland Group LLP

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BASIS OF REPORT

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DOCUMENT REFERENCES

TABLES

APPENDICES

1.0 Introduction

Muller UK & Ireland Group LLP (Muller) has instructed SLR Consulting (SLR) to undertake a Surface Water Pollution Risk Assessment (often referred to as an H1 assessment) on the trade effluent produced at their site in Telford (permit reference EPR/SP3200SY), for inclusion as part of a permit variation being progressed.

Trade effluent is treated on site in a dissolved air flotation (DAF) plant, prior to discharge to sewer under a trade effluent discharge consent (TEDC) with Severn Trent, where it undergoes further treatment at Telford Sewage Treatment Works (STW) prior to discharge into the River Tern.

The Environment Agency (EA) requires a Surface Water Pollution Risk Assessment (hereinafter referred to as a SW Risk Assessment) to quantify the environmental impact of discharging hazardous pollutants to the receiving watercourse (i.e. River Tern). If a hazardous pollutant is screened from the Risk Assessment, it is deemed by the EA as not being liable to cause pollution to the River Tern.

This report details the methodology, data inputs and findings from the Risk Assessment.

2.0 Surface Water Pollution Risk Assessment Methodology

A Risk Assessment is required when applying for a bespoke permit that includes discharging hazardous pollutants to surface water or if a variation of an existing permit is required to cover an increase in quantity and/or concentration of hazardous pollutants to surface water under the Environmental Permitting Regulations[1].

The purpose of a SW risk assessment is to quantify the environmental impact of discharging hazardous chemicals and elements to a receiving watercourse to assess whether they are a risk to the environment.

This includes discharging to:

- Freshwaters;
- Estuaries and coastal waters; and
- Sewers

The EA methodology contained in the "*Surface water pollution risk assessment for your environmental permit*" guidance[2] provides guidance on assessing effluent discharges containing hazardous pollutants to surface water. Hazardous pollutants are the pollutants listed in the tables of the guidance.

The EA's "*H1 Annex D2 – Assessment of sanitary and other pollutants within surface water*" guidance[3] was also used, which provides guidance on assessing effluent discharges containing sanitary and other pollutants within surface water.

Assessing whether a hazardous chemical or element is a risk to the environment is a two-phase process i.e., screening (phase 1) and modelling (phase 2).

If phase 1 screening show that a hazardous chemical or element is a potential risk to the receiving watercourse, then further tests called "phase 2 modelling" need to be undertaken.

2.1 Environmental Quality Standards

The surface water risk assessment guidance contains a list of environmental quality standards (EQS) for hazardous chemicals and elements.

There are two types of EQS values that a hazardous chemical or element must comply with:

- Maximum Allowable Concentration EQS (MAC-EQS) - to evaluate the short-term environmental impact of emissions to a receiving watercourse; and
- Annual Average (AA-EQS) - to evaluate the long-term environmental impact of emissions to a receiving watercourse.

A hazardous chemical or element may only have a corresponding AA-EQS value, a MAC-EQS value or both an AA-EQS and MAC-EQS value.

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[1] Environmental Permitting (England and Wales) Regulations 2016

[2] Environment Agency and DEFRA, (2020). *Surface water pollution risk assessment for your environmental permit*. [Available at]: https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit

[3] Environment Agency, (2014). *H1 Annex D2: Assessment of Sanitary and Other Pollutants within Surface Water Discharges (v1.0).* [Available at]: https://www.gov.uk/government/publications/h1-annex-d2-assessment-of-sanitary-and-other-pollutants-insurface-water-discharges

2.2 Screening Phase

Phase 1 screening eliminates all hazardous chemicals and elements which are considered to not be a risk to the environment. This phase uses precautionary raw data which has not been "cleaned-up" (e.g., the minimum reporting values (MRVs) are taken at "face-value").

Phase 1 screening is composed of two parts – part A for all hazardous chemicals and elements and part B for priority hazardous substances.

The EA has developed a Risk Assessment software tool[4] to perform many of the calculations involved in the Risk Assessment to aid in the quantification of the impact of releases from the regulated activities.

2.2.1 Screening Tests

Phase 1-part A screening comprises of a series of tests. These tests vary depending on whether the receiving water is freshwater or coastal/Estuarine. The tests for freshwater are described in Table 1 as the River Tern is a fresh water watercourse at the point of discharge.

Table 1
Freshwater Screening Test Descriptions

Freshwater Screening Test	Test Detail
Test 1	This test is devised to quickly screen out hazardous pollutants. If the concentration of the hazardous pollutant in the effluent exceeds 10% of the EQS, it is potentially significant and should be carried forward to Test 2.
Test 2	This test introduces the dilution available in the receiving watercourse by calculating the Process Contribution (PC). PC is the concentration of the discharged hazardous pollutant in the receiving water after dilution. If the PC exceeds 4% of the EQS, it is potentially significant and should be carried on to Tests 3 and 4.
Test 3	This test introduces the existing concentration of the hazardous pollutants in the receiving watercourse. The Predicted Environmental Concentration (PEC) is the predicted concentration in the receiving water downstream of the discharge. If the difference between the upstream quality and the PEC is >10% of the EQS, the hazardous pollutant is potentially significant and will fail the Risk Assessment screening process and require further modelling. If it is not, then Test 4 must be carried out.
Test 4	This test assesses whether the discharge, when combined with the existing upstream water quality, will contribute to an EQS failure in the receiving watercourse. It therefore takes into account the combination effects with existing discharges. If the PEC exceeds the EQS, the hazardous pollutant is potentially significant and will fail the Risk Assessment screening process and require further modelling.

[4] Environment Agency (2016). Environment Agency H1 Software Tool, Version 2.7.6, February 2016 (64-bit). Available upon request from the Environment Agency.

Tests 1 and 2 in Part A of screening are progressive i.e. a hazardous pollutant can be screened out at any stage having failed to be screened out at the previous stage(s). However, a hazardous pollutant must pass both Test 3 & 4 to be considered as not liable to cause pollution and requires no additional control.

2.2.2 Significant Load Assessment

Phase 1-part B screening assesses whether the discharge exceeds pre-determined significant load limits and is only carried out on Priority Hazardous Pollutants. Priority Hazardous Pollutants must be screened out in the Part A assessment and the Part B assessment (where applicable) to be deemed to require no further detailed assessment.

2.3 Modelling Phase

Modelling[5] is required if the Phase 1 screening tests did not screen out all hazardous pollutants. Modelling consists of additional tests which assess whether the discharge is a risk to the environment. If the modelling tests show the discharge is an unacceptable risk to the environment, then the EA may include conditions on the permit to control certain pollutants.

The following subsections detail the Phase 2 modelling methodology outlined in the EA's modelling guidance.

2.3.1 Modelling Test 1: Risk to EQS

Modelling Test 1 assesses whether the proposed load could cause failure of the receiving water EQS using the RQP Monte Carlo simulation tool.

For MAC (or 95 percentile) EQSs, if the 95th percentile downstream quality is less than the EQS, the discharge is not predicted to cause an EQS failure, and this modelling test has been passed. If instead the 95th percentile downstream quality exceeds the EQS, the substance is considered significant and a numeric emission limit for this substance will be required on the permit.

2.3.2 Modelling Test 2 – Significant deterioration of receiving water quality

Test 2 determines whether the discharge causes upstream/background quality to deteriorate by more than 10 percent of the EQS.

If the calculated downstream concentration is higher than the upstream concentration plus 10 percent of the EQS, the substance is considered significant, and a numeric emission limit is required for this substance on the permit.

2.3.3 Modelling Test 3 – Risk of effluent quality deteriorating significantly

Test 3 is only appropriate for some effluents. For example, if a number of trade effluents are discharged into a sewerage catchment, and these effluents are being discharged consistently below the consented limit, an assessment must be carried out to determine the impact of the full consented load on the watercourse.

This test is not applicable to the Muller Telford site as the preceding assessment is modelled on a worst-case singular effluent stream discharged from site.

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[5] Environment Agency (2014). LIT 10419 Modelling: surface water pollution risk assessment. [Available at: https://www.gov.uk/government/publications/modelling-surface-water-pollution-risk-assessment

3.0 Effluent Management and Treatment

The DAF plant at Muller Telford will treat raw effluent prior to discharging to sewer under a Trade Effluent Discharge Consent (TEDC) regulated by Severn Trent. The treated effluent will then undergo further treatment at the Telford (Rushmoor) STW before eventually being discharged to the freshwater River Tern at grid reference SJ 61346 13874.

According to the European Commission Urban Wastewater website[6], Telford STW has a generated load of 131,895 population equivalent (PE).

The River Tern from its conference with the River Meese is a heavily modified river with a length of 12.4 km and catchment area of 40.8 km^2. From the latest publicly available data on the EA's Catchment Data Explorer[7], the river had the following sanitary pollutant classifications in 2019 in accordance with the Water Framework Directive:

- Ammonia: High, and
- Phosphate: Poor.

[6] European Commission urban waste water website - https://uwwtd.eu/United-Kingdom/uwwtps/treatment
[7] Environment Agency Catchment Data Explorer - https://environment.data.gov.uk/catchment-planning/

4.0 Data Inputs to Surface Water Pollution Risk Assessment

4.1 Assumptions

The following assumptions have been made by SLR in preparing this Risk Assessment:

- Data relating to hazardous chemicals and elements referenced in the EA guidance[8] only has been reviewed; and
- Hazardous chemicals which are referenced in the EA guidance and for which no data has been provided, have not been considered in this report.

4.2 Effluent Quality

To maintain a conservative approach, the limits from the site's TEDC have been used in the Risk Assessment and are presented in Table 2 along with averages from actual site sampling data, sewage treatment reduction factors (STRFs) and resultant release concentrations after the STRFs have been applied to the initial contaminant concentrations in the discharge. Averages from actual discharge data are also included for comparison.

Table 2
STRF and Release Concentrations of Contaminants

Contaminant	TEDC Limit	Effluent Data Yearly Average	STRF	TEDC Release Concentration	Effluent Data Release Concentration
Ammoniacal Nitrogen	50,000 µg/l	10,277 µg/l	0.03	1,500 µg/l	308.3 µg/l
Phosphorus	25,000 µg/l	12,840 µg/l	0.23	5,750 µg/l	2,954 µg/l
Sulphate	1,000,000 µg/l	N/A	N/A	1,000,000 µg/l	N/A
Total Suspended Solids (TSS)	700,000 µg/l	437,348 µg/l	0.04	28,000 µg/l	17,494 µg/l
pH	6-11	7.6 (95th percentile 9.99)	N/A	6-11	7.6 (95th percentile 9.99)

[8] Environment Agency and DEFRA, (2020). *Surface water pollution risk assessment for your environmental permit*. [Available at]: https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit

Appendix A contains the emissions inventory taken from the EA's screening tool which highlights the contaminant concentrations used in the screening of hazardous substances.

4.2.1. Review of Chemical Usage

Materials safety data sheets (MSDS) for chemicals used at the site have been reviewed and any relevant hazardous components of the chemicals identified have been compared to the specific and priority hazardous substances lists in the EA surface water pollution risk assessment guidance.

Table 3: Review of MSDS

Substance	Hazardous component(s) [1]	Listed Hazardous substance [2] present?
ADI S10	Cobalt Sulphate (<1%)	Cobalt
ADI S20	Sodium Hydroxide	No
Ultralox 40	Calcium Hypochlorite	No
Poly Aluminium Chloride (18%)	Aluminium Chloride	Chloride
Oxysan 5	Acetic Acid Hydrogen Peroxide Peracetic Acid	No
Nitric Acid 60%	Nitric Acid	No
Nitric Acid 10%	Nitric Acid	No
Mida San 311 KZ	Propan-1-ol Propan-2-ol	No
Mida Foam 176 WD	Propan-1-ol Propan-2-ol	No
Mida Flow Klenz 3	Sodium Hydorxide	No
Mida Chriox F2	Acetic Acid Hydrogen Peroxide Isotridecanol, ethoxylated Dodecylbenzenesulfonic Acid Peracetic Acid	No
Caustic Liquor 32%	Sodium Hydroxide	No
Bacticlense	2-Aminoethanol	No

Substance	Hazardous component(s) [1]	Listed Hazardous substance [2] present?
Solcide 140	Methanamine, N-methyl-, polymer with (chloromethyl)oxirane	No
C2-T	1-HYDROXYETHYLIDENEDIPHOSPHONIC ACID TETRASODIUM SALT; HYDROXYPHOSPHONOACETIC ACID; Tetrasodium Phosphonoethane-1,2-Dicarboxylate and Hexasodium Phosphonobutane-1,2,3,4-Tetracarboxylate; PHOSPHONOBUTANETRICARBOXYLIC ACID (PBTC); PHOSPHORIC ACID; SODIUM MOLYBDATE; SODIUM TOLYLTRIAZOLE.	Phosphates
ADI SBG2SC	BROMOCHLORO-5,5-DIMETHYLIMIDAZOLIDINE-2,4-DIONE	Bromine Chlorine

[1] Components highlighted in the MSDS which present health and safety hazards.

[2] Substances which are listed as specific or priority hazardous substances in EA surface water risk assessment guidance

The review of MSDS documentation highlighted the potential presence of Chloride from PAC as well as Cobalt from ADI S10. Usage figures for ADI S10 were not available, suggesting that they are either not being used routinely at the site, or their usage is low. The concentration of Cobalt Sulphate in ADI S10 is less than 1%, indicating negligible concentrations will be present in the discharge from this source.

The potential mass of chloride present from usage of PAC was calculated from usage figures supplied. A maximum of 1,229 µg/l concentration determined, based on annual usage of 3 IBC containers (1,000 litres) and an annual discharge volume at the limit of the TEDC. This compares to an EQS of 250,000 µg/l for chloride, again implying a negligible concentration in the discharge from this source.

Phosphates were noted to be present in the chemical C2-T, however phosphate has been assessed with actual effluent concentration data, therefore contribution from this product has been accounted for in the assessment.

ADI SBG2SC was noted to contain a substance which includes a compound with covalently bonded bromine and chlorine atoms. However this substance is insoluble in water and therefore the bromine and chlorine is not expected to be present as bromide or chloride ions.

4.2.2. Sewage Treatment Reduction Factors

The current Risk Assessment guidance document references generic sewage treatment reduction factors (STRF) for various hazardous pollutants, providing an expected removal rate of a hazardous pollutant passing through a STW. However, the current guidance does not include STRF's for all of the pollutants assessed in the Risk Assessment. Therefore, the STRF values shown in Table 2 are site specific, having been derived from Telford STW sampling data on the EA's Water Quality Archive[9]. This calculation involves dividing the average effluent concentration (i.e. discharge to River Tern) by the average influent concentration (storm tank at Telford STW) of each pollutant.

4.3 Effluent Flow Rate

The site has a TEDC limit of 1,296 m^3/day and 15 l/s of trade effluent which will discharge to sewer. This equates to 0.015 m^3/s. This flow rate has been used as both average and maximum to maintain a conservative approach.

4.4 Receiving Water Quality

The Environment Agency's water quality archive was searched to obtain background quality data for the River Tern. Sampling locations MD-26949540 (River Tern downstream of Water Upton ground water outfall) was deemed as appropriate in relation to the discharge from Telford STW. However, data for most of the relevant substances was either non-existent or several years out of date. For this reason, it was assumed that the upstream quality was 50% of the relevant EQS, as supported by the Risk Assessment guidance[10].

Table 4
EQS values and Estimated Background Concentrations in the Receiving Water

Contaminant	AA-EQS	MAC-EQS	Receiving Water Upstream Concentration
Ammoniacal Nitrogen [1]	No AA-EQS	300 (90th percentile)	150 µg/l
Phosphorus [2]	1,000 µg/l	No MAC-EQS	500 µg/l
Sulphate	400,000 µg/l	No MAC-EQS	200,000 µg/l
Total Suspended Solids (TSS) [3]	25,000 µg/l	No MAC-EQS	12,500 µg/l
pH	N/A	6-9 (95th percentile)	7.85 [4]
[1] Ammonia standard for rivers is determined by site altitude, alkalinity (as mg/l Ca CO3) of receiving watercourse and the status of the river (i.e. High, Good, Moderate, Poor). The site altitude is less than 80 m and the alkalinity of the receiving watercourse is between 150-210 mg/l $CaCO_3$ according the EA's Water Quality Archive. The receiving watercourse has a High status for Ammonia. Therefore, as per EA guidance document 'H1 Annex D2 - Assessment of sanitary and other pollutants within surface water', the 90th percentile Ammonia standard equates to 300 µg/l.			

[9]Environment Agency Water Quality Archive - https://environment.data.gov.uk/water-quality/view/landing
[10]Environment Agency (2014). *LIT 10419 Modelling: surface water pollution risk assessment*. [Available at]: https://www.gov.uk/government/publications/modelling-surface-water-pollution-risk-assessment

Contaminant	AA-EQS	MAC-EQS	Receiving Water Upstream Concentration
[2] Phosphorus standard for rivers is determined by site altitude, alkalinity (as mg/l Ca CO3) of receiving watercourse and the status of the river (i.e. High, Good, Moderate, Poor). The site altitude is less than 80 m and the alkalinity of the receiving watercourse is between 150-210 mg/l $CaCO_3$ according the EA's Water Quality Archive. The receiving watercourse has a Poor status for Phosphorus. Therefore, as per EA guidance document 'H1 Annex D2 - Assessment of sanitary and other pollutants within surface water', the annual-means Phosphorus standard equates to 1,000 µg/l. [3] TSS guideline standard of 25 mg/l (25,000 µg/l) as given in the Freshwater Fish Directive. [4] pH background figure based on actual data from EA Water Quality Archive data			

4.5 Receiving Water Flow Rate

A theoretical Q95 flow value (95th percentile low flow) of the River Tern has been estimated upstream of where Telford STW discharges to. The Q95 value was calculated using the Centre for Ecology and Hydrology's (CEH) LowFlow 2 software at location X: 52.717757, Y: -2.574391.

In lieu of site-specific observed data, LowFlow 2 provides a means for predicting flows within ungauged catchments based on regionalised models represented by flow duration statistics. In addition, LowFlow 2 contains / has access to the UK Hydrometric Register and thus actual recorded flow data from gauges within the respective catchments are integrated into the flow derivation simulation to improve the accuracy of the results.

The theoretical Q95 flow rate value has been calculated to be **1.777 m^3/s.**

The theoretical average flow rate value is **4.58 m^3/s.**

5.0 Results From Screening

5.1 H1 Tool Screening Tests

5.1.1 Test 1

The Test 1 assessment was carried out in the EA software model but did not screen out Sulphate (see Appendix B). Therefore, the hazardous pollutant not screened out in Test 1 was carried over to Test 2.

5.1.2 Test 2

The Test 2 assessment was carried out in the EA software model and screened out Sulphate (see Appendix B). Therefore, no further screening tests or modelling was required.

5.1.3 Test 3 & 4

Tests 3 & 4 were not required since all hazardous pollutants had previously been screened out.

5.2 Significant Load Assessment

No priority hazardous substances were assessed.

5.3 pH

The TEDC states that the pH of the discharge must be between 6 – 11. Actual site discharge data was assessed and the 95th percentile was found to be 9.99. This is higher than the MAC-EQS of 6-9. However, on the basis that the discharge from site will be mixed with the general effluent from the STW and that pH adjustment will likely be carried out as part of the treatment process, it can be assumed that the MAC-EQS will not be exceeded at the point of final discharge to the receiving water.

5.4 RQP Screening of Sanitary Pollutants

The sanitary pollutants Ammoniacal Nitrogen and TSS, as well as Phosphorus, were assessed in the EA's River Quality Planning (RQP) version 6.0 software as per the EA guidance *'H1 Annex D2 – Assessment of sanitary and other pollutants within surface water'*.

The software uses Monte-Carlo modelling to predict the expected concentration in the receiving surface water downstream of the discharge point. A screening assessment was carried out for each pollutant and predicted the expected downstream concentration.

5.4.1 Ammoniacal Nitrogen

Modelling Screening Test 1 – Risk to EQS

Modelling Test 1 assesses whether the proposed load could cause failure of the receiving water EQS for Ammoniacal Nitrogen, i.e. 300 µg/l. Here, the mean discharge sewer concentration has taken into consideration the STRF, shown in Table 2 above.

Ammoniacal Nitrogen was assessed in the RQP software using the following parameters in Table 5:

Table 5
Ammoniacal Nitrogen parameters used in the RQP software

Parameter	Value
River Tern mean flow rate	4.58 m^3/s
River Tern Q95 flow rate	1.78 m^3/s
Mean discharge flow rate to sewer	0.015 m^3/s
River Tern 90th percentile upstream Ammoniacal Nitrogen concentration (i.e. 50% of EQS)	150 µg/l
Mean Ammoniacal Nitrogen concentration in sewer discharge	1,500 µg/l
90th percentile downstream river quality target	165 µg/l (i.e. upstream concentration plus 10% deterioration)

The RQP software calculated the discharge from the Site will result in a 90th percentile downstream quality of 160 µg/l for Ammoniacal Nitrogen (See Appendix C). This value is below the EQS for Ammoniacal Nitrogen and has therefore passed screening test 1. This value was assessed using the RQP compliance with mean standards software to determine the percentage confidence of the MAC-EQS being exceeded, which gave a value of 0.00%. Therefore, the discharge of Ammoniacal Nitrogen is unlikely to risk failure of the receiving water EQS.

Modelling Screening Test 2 - Significant deterioration of receiving water quality

Test 2 determines whether the discharge causes upstream/background quality to deteriorate by more than 10 per cent of the EQS.

To achieve the downstream 90th percentile river quality of 165 µg/l, the results from the RQP software indicate that the discharge mean Emission Limit Value (ELV) for Ammoniacal Nitrogen is 2,211 µg/l, i.e. a discharge mean below this value is not likely to cause pollution to the River Tern (See Appendix C).

As Ammoniacal Nitrogen has a TEDC release concentration of 1,500 µg/l, it has passed screening test 2.

Modelling Screening Test 3 - Significant deterioration of receiving water quality

As discussed in section 2.3.3 this test is not applicable to Muller Telford.

5.4.2 Phosphorus

Modelling Screening Test 1 – Risk to EQS

Modelling Test 1 assesses whether the proposed load could cause failure of the receiving water EQS for Phosphorus, i.e. 1,000 µg/l.

Phosphorus was assessed in the RQP software using the following parameters in Table 6:

Table 6
Phosphorus parameters used in the RQP software

Parameter	Value
River Tern mean flow rate	4.58 m^3/s
River Tern Q95 flow rate	1.78 m^3/s
Mean discharge flow rate to sewer	0.015 m^3/s
River Tern 90th percentile upstream Phosphorus concentration (i.e. 50% of EQS)	500 µg/l
Mean Phosphorus concentration in sewer discharge	5,750 µg/l
90th percentile downstream river quality target	550 µg/l (i.e. upstream P concentration plus 10% deterioration)

The RQP software calculated the discharge from the Site will result in a 90th percentile downstream quality of 539 µg/l for Phosphorus (See Appendix C). This value is below the EQS for Phosphorus and has therefore passed screening test 1. This value was assessed using the RQP compliance with mean standards software to determine the percentage confidence of the AA-EQS being exceeded, which gave a value of 0.00%. Therefore, the discharge of Phosphorus is unlikely to risk failure of the receiving water EQS.

Modelling Screening Test 2 - Significant deterioration of receiving water quality

Test 2 determines whether the discharge causes upstream/background quality to deteriorate by more than 10 per cent of the EQS.

To achieve the downstream 90th percentile river quality of 550 µg/l, the results from the RQP software indicate that the discharge mean Emission Limit Value (ELV) for Phosphorus is 7,369 µg/l, i.e. a discharge mean below this value is not likely to cause pollution to the River Tern (See Appendix C).

As Phosphorus has a TEDC release concentration of 5,750 µg/l, it has passed screening test 2.

Modelling Screening Test 3 - Significant deterioration of receiving water quality

As discussed in section 2.3.3 this test is not applicable to Muller Telford.

5.4.3 TSS

Modelling Screening Test 1 – Risk to EQS

Modelling Test 1 assesses whether the proposed load could cause failure of the receiving water EQS for TSS, i.e. 25,000 µg/l.

TSS was assessed in the RQP software using the following parameters in Table 7:

Table 7
TSS parameters used in the RQP software

Parameter	Value
River Tern mean flow rate	4.58 m^3/s
River Tern Q95 flow rate	1.78 m^3/s
Mean discharge flow rate to sewer	0.015 m^3/s
River Tern 90th percentile upstream TSS concentration (i.e. 50% of EQS)	12,500 µg/l
Mean TSS concentration in sewer discharge	28,000 µg/l
90th percentile downstream river quality target	13,750 µg/l (i.e. upstream TSS concentration plus 10% deterioration)

The RQP software calculated that the discharge from the Site will result in a 90th percentile downstream quality of 12,609 µg/l for TSS (See Appendix C). This value is below the EQS for TSS and has therefore passed screening test 1. This value was assessed using the RQP compliance with mean standards software to determine the percentage confidence of the AA-EQS being exceeded, which gave a value of 0.00%. Therefore, the discharge of TSS is unlikely to risk failure of the receiving water EQS.

Modelling Screening Test 2 - Significant deterioration of receiving water quality

Test 2 determines whether the discharge causes upstream/background quality to deteriorate by more than 10 per cent of the EQS.

To achieve the downstream 90th percentile river quality target of 13,750 µg/l, the results from the RQP software indicate that the discharge mean Emission Limit Value (ELV) for TSS is 192,195 µg/l, i.e. a discharge mean below this value is not likely to cause pollution to the River Tern (See Appendix C).

As TSS has a TEDC release concentration of 28,000 µg/l, it has passed screening test 2.

Modelling Screening Test 3 - Significant deterioration of receiving water quality

As discussed in section 2.3.3 this test is not applicable to Muller Telford.

6.0 Conclusion

Muller UK & Ireland Group LLP currently operates a DAF plant which discharges to River Tern via Telford STW at a maximum TEDC rate of 0.015 l/s.

A surface water risk assessment is required when applying for a permit variation that includes discharging hazardous chemicals and elements to surface water, including discharges to sewer. All pollutants assessed were screened out, therefore no further modelling was required.

Sulphate was assessed using the H1 screening tool software and passed at test 2.

pH was found to have a 95th percentile higher than the MAC-EQS, however was not deemed to pose a risk to the receiving water on the basis of dilution and adjustment within the sewage treatment works

Sanitary pollutants passed screening via basic modelling without considering dilution from the effluent of the receiving STW.

Following the screening process, all contaminants assessed were deemed not to be significant in terms of risk to the deterioration of the downstream receiving water quality.

APPENDIX A

EA's Screening Tool - Emissions Inventory

Water Emissions Inventory Base Option

Release Concentrations of Substances Present in Discharges to Water

Please list all Substances released to Water for each Release Point identified in the previous page.

Which type of assessment method are you using?
(See help box & H1 Annex D for information)

Method:

Reference:

Number	Substance	Meas'ment Method	Operating Mode (% of	Average Concentration in the Effluent (AA)		Maximum Concentration in the Effluent (Max)		Annual Rate	Sewage Treatment Factor	Significant Load (PHS Only)
				Conc.	Meas'ment Basis	Conc.	Meas'ment Basis			
				µg/l		µg/l		kg/yr		kg/year
1	Sulphate	Estimated	100.0%	1000000	Annual Avg	1000000		473040	1	

Comments:

Environment Agency H1 Database

APPENDIX B

EA's Screening Tool Results – Test 1 to 4

Water Impacts Test 1 - Freshwater Base Option

Water Impacts - Fresh Water Releases

Apply Test 1 (See Guidance) and Calculate Process Contributions of Emissions to Water

This table applies Test 1 and also estimates the Process Contribution for Freshwater releases, this is calculated after dilution into the relevant surface water type for each emission to water listed in the inventory, according to the release point parameters input earlier. If you have more accurate data obtained through dilution modelling, this may be entered as indicated and will be used instead of the estimated PC. Any releases which 'Pass' Test 1 are screened out at this point.

	Annual Avg EQS			MAC EQS		
Substance	Release µg/l	EQS µg/l	Release conc < 10% EQS Test 1	Release µg/l	MAC µg/l	Release conc < 10% EQS Test 1
[ETP] Sulphate (River Tern)	##########	##########	Fail	##########		N/A

Note that the Process Contribution shown for each substance is the sum of the individual process contributions of each point from which the substance is emitted. Process Contributions obtained from modelling data should incorporate all relevant release points and flow conditions.

* If you have valid dispersion modelling data available - please enter it here

Comments:

Environment Agency H1 Database

Water Impacts Test 2 - Freshwater Base Option

Water Impact Screening - Fresh Water Releases

Apply Test 2

This page applies Test 2 and displays the Process Contribution as a proportion of the EQS. Emissions with PCs that are less than 4% of the EQS can be screened from further assessment as they are likely to have an insignificant impact.

	Annual Avg EQS					MAC EQS				
Substance	Annual Avg EQS µg/l	PC µg/l	Modelled PC	% PC of EQS %	PC < 4% of EQS? Test 2	MAC EQS µg/l	PC µg/l	Modelled PC	% PC of MAC %	PC < 4% of MAC? Test 2
Sulphate (River Tern)	400000	8,370.5357		2.09	Pass		8,370.5357		-	Pass

Comments:

Environment Agency H1 Database

APPENDIX C

EA's RQP Screening Software Results

Ammoniacal Nitrogen Screening Test 1

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 09:56

Discharge:	Muller Telford				
River:	River Tern				
Pollutant:	Ammoniacal Nitrogen	Target:	165	90-percentile	

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	150	(148 - 152)	Mean d/s river quality	156	(1482 - 1518)
Standard deviation	1.5	(0.51 - 2.52)	Standard deviation	3.68	(5.00 - 25.4)
Number of samples	4		Number of samples	4	
90-percentile	152	(151 - 156)	90-percentile	160	(157 - 172)
CURRENT DISCHARGE		(confidence)			
Mean discharge quality	1500	(1482 - 1518)			
Standard deviation	15	(4.93 - 25.1)			
Number of samples	4				
95-percentile	1525	(1511 - 1579)			
99-percentile	1535	(1519 - 1609)			
99.5-percentile	1539	(1521 - 1621)			

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000
Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

Ammoniacal Nitrogen Screening Test 2

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 10:05

Discharge:	Muller Telford				
River:	River Tern				
Pollutant:	Ammoniacal Nitrogen	Target:	165	90-percentile	

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	150	(148 - 152)	Mean d/s river quality	159	(2185 - 2237)
Standard deviation	1.5	(0.51 - 2.52)	Standard deviation	5.18	(7.25 - 36.9)
Number of samples	4		Number of samples	4	
90-percentile	152	(151 - 156)	90-percentile	165	(161 - 181)
CURRENT DISCHARGE		(confidence)	**REQUIRED DISCHARGE**		(confidence)
Mean discharge quality	1500	(1482 - 1518)	Mean discharge quality	2211	(2185 - 2237)
Standard deviation	15	(4.93 - 25.1)	Standard deviation	22.1	(7.25 - 36.9)
Number of samples	4		Number of samples	4	
95-percentile	1525	(1511 - 1579)	95-percentile	1525	(2228 - 2328)
99-percentile	1535	(1519 - 1609)	99-percentile	1535	(2239 - 2372)
99.5-percentile	1539	(1521 - 1621)	99.5-percentile	1539	(2242 - 2388)

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000
Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

Phosphorus Screening Test 1

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 10:24

Discharge:	Muller Telford				
River:	River Tern				
Pollutant:	Phosphorus	Target:	550	90-percentile	

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	500	(494 - 506)	Mean d/s river quality	522	(5682 - 5818)
Standard deviation	5	(1.76 - 8.48)	Standard deviation	13.9	(18.9 - 96.4)
Number of samples	4		Number of samples	4	
90-percentile	506	(502 - 521)	90-percentile	539	(527 - 582)
CURRENT DISCHARGE		(confidence)			
Mean discharge quality	5750	(5682 - 5818)			
Standard deviation	57.5	(18.9 - 96.1)			
Number of samples	4				
95-percentile	5845	(5793 - 6053)			
99-percentile	5885	(5822 - 6169)			
99.5-percentile	5900	(5832 - 6213)			

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000
Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

Phosphorus Screening Test 2

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 10:29

Discharge:	Muller Telford				
River:	River Tern				
Pollutant:	Phosphorus	Target:	550	90-percentile	

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	500	(494 - 506)	Mean d/s river quality	529	(7283 - 7455)
Standard deviation	5	(1.76 - 8.48)	Standard deviation	17.3	(24.0 - 122)
Number of samples	4		Number of samples	4	
90-percentile	506	(502 - 521)	90-percentile	550	(535 - 604)
CURRENT DISCHARGE		(confidence)	**REQUIRED DISCHARGE**		(confidence)
Mean discharge quality	5750	(5682 - 5818)	Mean discharge quality	7369	(7283 - 7455)
Standard deviation	57.5	(18.9 - 96.1)	Standard deviation	73.0	(24.0 - 122)
Number of samples	4		Number of samples	4	
95-percentile	5845	(5793 - 6053)	95-percentile	5845	(7428 - 7759)
99-percentile	5885	(5822 - 6169)	99-percentile	5885	(7463 - 7903)
99.5-percentile	5900	(5832 - 6213)	99.5-percentile	5900	(7474 - 7958)

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000
Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

TSS Screening Test 1

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 10:39

Discharge:	Muller Telford				
River:	River Tern				
Pollutant:	TSS	Target:	13750	90-percentile	

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	12500	(12494 - 12506)	Mean d/s river quality	12565	(27666 - 28334)
Standard deviation	5	(-4.8073 - 1.91)	Standard deviation	40.6	(93.2 - 474)
Number of samples	4		Number of samples	4	
90-percentile	12505	(12502 - 12518)	90-percentile	12609	(12575 - 12727)
CURRENT DISCHARGE		(confidence)			
Mean discharge quality	28000	(27671 - 28329)			
Standard deviation	280	(92.0 - 468)			
Number of samples	4				
95-percentile	28463	(28207 - 29477)			
99-percentile	28658	(28350 - 30042)			
99.5-percentile	28729	(28399 - 30255)			

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000
Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

TSS Screening Test 2

MASS BALANCE (MONTE CARLO): Version 6.0

Calculations: 18 November 2022 at 10:37

Discharge: Muller Telford
River: River Tern
Pollutant: TSS Target: 13750 90-percentile

Mean u/s river flow	4.58		Mean discharge flow	0.015	
95-percentile low flow	1.78		Standard deviation	0.0002	
		(confidence)			(confidence)
Mean u/s river quality	12500	(12494 - 12506)	Mean d/s river quality	13252	(189942 - 194448)
Standard deviation	5	(-4.8073 - 1.91)	Standard deviation	400	(629 - 3200)
Number of samples	4		Number of samples	4	
90-percentile	12505	(12502 - 12518)	90-percentile	13750	(13407 - 14999)
CURRENT DISCHARGE		(confidence)	**REQUIRED DISCHARGE**		(confidence)
Mean discharge quality	28000	(27671 - 28329)	Mean discharge quality	192195	(189942 - 194448)
Standard deviation	280	(92.0 - 468)	Standard deviation	1914	(629 - 3200)
Number of samples	4		Number of samples	4	
95-percentile	28463	(28207 - 29477)	95-percentile	28463	(193723 - 202397)
99-percentile	28658	(28350 - 30042)	99-percentile	28658	(194624 - 206188)
99.5-percentile	28729	(28399 - 30255)	99.5-percentile	28729	(194924 - 207608)

CORRELATION COEFFICIENTS	
River and discharge flow	0.6000
River flow and quality	-0.3000
Discharge flow and quality	-0.2000

	FILES WITH NON-PARAMETRIC DATA
River flow	none
River quality	none
Discharge flow	none
Discharge quality	none
Intermittent discharge flow	

	INTERMTTENT DISCHARGE ADDED
% time in operation	0.0000
Mean flow (when operating)	0.0000
Standard deviation	0.0000

Correlation coefficient	0.0000
Mean quality	0.0000
Standard deviation	(0.0000 - 0.0000)
Correlation with flow	0

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