Teesport Waste Storage Facility Environmental Permit Application

Surface Water Pollution Risk Assessment

PD Teesport Limited

17-27 Queens Square, Middlesborough, England, TS2 1AH
Prepared by:

SLR Consulting Limited

3rd Floor, Brew House, Jacob Street, Tower Hill,
Bristol, BS2 0EQ

SLR Project No.: 416.067287.00002

30 July 2026

Revision: 01

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	30 July 2026	RC	MD	MD

Basis of Report

This document has been prepared by SLR Consulting Limited (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with PD Teesport Limited (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid. SLR may have used artificial intelligence (AI) in the preparation of this document. Should SLR use AI, any information and analysis resulting therefrom will be reviewed for accuracy.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

Table of Contents

Tables in Text

Figures in Text

1.0 Introduction

1.1 Background and context

SLR Consulting Ltd (SLR) have been instructed by PD Teesport Limited (PD Teesport) to undertake a surface water pollution risk assessment (SWPRA) in support of their permit application for their Teesport site.

A SWPRA was requested by the Environment Agency (EA) in order to validate the application and was requested to be provided within 20 working days.

As this is a new facility, no characterisation data for rainfall run-off is available and surrogate information has had to be used. Therefore, SLR would suggest that this report is viewed as an indicative assessment of the potential impact of the discharge activity; once suitable data is available from the site post commencement of operations, a follow up study should be completed to verify the assumptions made in this assessment. A significant amount of professional judgement has been used in the assumptions made in preparation of this report, which should be viewed in this context.

1.2 Site Information

Refuse derived fuel (RDF) and scrap metals will be stored at the site prior to export via ships at the dockside. Incident rainfall that falls on the site is proposed to be discharged into the River Tees via the dock. The rainfall will come into contact with wastes at the site producing a surface water run-off that may contain elevated concentrations of hazardous substances.

The River Tees at the point of discharge is an estuarine receiving watercourse and is designated a Special Protection Area (SPA) as part of the Teesmouth and Cleveland Coast SPA, and Nutrient Neutrality Catchment as part of the Teesmouth and Cleveland Coast SPA/Ramsar.

2.0 Methodology

A Risk Assessment is sometimes required when applying for an environmental 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 an H1 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

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

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.

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 might apply:

- 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.

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[3] 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. Since the River Tees is an estuary at the point of discharge from the site, the estuarine/coastal methodology screening tests were initially applied.

Table 2-1 summarises the coastal/estuarine screening tests.

Table 2-1: Estuary/Coastal Screening Test Descriptions

Estuary/Coastal Screening Test	Test Detail
Test 1	This test is devised to quickly screen out hazardous pollutants.

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

Estuary/Coastal Screening Test	Test Detail
	If the concentration of the hazardous pollutant in the effluent exceeds its EQS (both AA and MAC limits if available), it is potentially significant and should be carried forward to Test 2.
Test 2	This test applies for discharges to low water channels in the upper parts of an estuary where the water is mainly fresh. If this is the case, the screening tests for freshwaters needs to be carried out (starting at Test 2). If the discharge point isn't to a low water channel, Test 2 for estuaries and coastal waters can be skipped.
Test 3	This test asks if the point of discharge has restricted dispersion or dilution (for example, coves, docks and ports). If this is the case, extra modelling is required. If it is not, then Test 4 can be carried out.
Test 4	This test requires a chart datum point to be identified (i.e. this is the point where the water depths are shown on nautical charts as zero). The discharge point must be at least 1m below and at least 50m away from the chart datum point. If this is not the case, then further modelling is required. If it is, then Test 5 can be undertaken.
Test 5	This test only applies if the discharge is buoyant. If the discharge is not buoyant, then further modelling is required. The effective volume flux of the discharge is calculated and compared to the allowable effective volume flux (which is proportional to the water depth). If the effective volume flux is outside the allowable limits, further modelling is required.

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

EA guidance on modelling[4,5] suggests that substances which are not screened out by an initial screening assessment are further assessed via an iterative approach, starting with simple calculations and modelling techniques.

Modelling of estuarine discharges may start with simple initial dilution calculations, progress to two-dimensional plume modelling if required and for complex situations where mixing

[4] 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

[5] Environment Agency (2019) LIT 13134 Permitting of hazardous chemicals and elements in discharges to surface waters

zones are not clearly acceptable, more detailed three-dimensional hydrodynamic studies may be carried out.

In this case, initial dilution calculations were not deemed appropriate since the discharge is not via a submerged pipe where a buoyant discharge rises to the surface of saline water but rather is a discharge to the surface of the water in the port via the dockside. Therefore, simple approximation of mixing zones was carried out using a spreading disc plume model.

The *BasicPlumeModel.xls* spreadsheet tool (previously acquired from the EA) was used to determine dilution values at various longitudinal and transverse distances from the point of discharge. These were then compared to the dilution required for substances which exceed their EQS to be diluted to below the concentration of their EQS.

The aim of this modelling was to determine whether nor not the extent of the mixing zones is "clearly acceptable" or not, as defined in the European Technical Guidelines for the Identification of Mixing Zones[6].

In order to maintain a conservative approach, velocities for dry (0 cumecs fluvial flow) and neap tide conditions were used to determine mixing zones in conditions with the most conservative environment.

Mixing zones were estimated at hourly intervals over the course of a tide cycle with varying flow velocity values, in order to assess mixing zones at all states of the tide and identify worst case scenarios.

3.0 Data Inputs

Since the site is not yet operational, no discharge effluent quality or flow data was available for assessment. However, efforts have been made to use data from similar sites along with rainfall data to determine estimated discharge effluent quality and flows in order to make a simplistic estimate of the impact of the discharge and the acceptability of mixing zones.

3.1 Discharge Quality

Since the operations at the site have not commenced, no data for the actual quality of the effluent to be discharged exists. Therefore, this assessment has been based on data which could be sourced from sites with similar activities, with adjustments made to account for variation in the nature of PD Teesport's proposed site in order to make a best professional estimate of potential future effluent quality.

Whilst this is approach is highly open to differing interpretation of data and site risk, it does provide a reasonable baseline on which to assess the likely scale of impact in terms of the scale of mixing zones within the receiving watercourse and whether the activity is likely to be acceptable. Should the discharge be deemed acceptable, it is recommended that a sampling and analysis programme is implemented upon commencement of operations in order to build a dataset on which a revised assessment can be carried out and this approach has been proposed as part of the application.

Both RDF and scrap metal are proposed to be stored and transferred at the site. The RDF will be present as wrapped bales and daily checks are made and contingency measures are in place to address any sign of loss of integrity or presence of leachate. Therefore, leaching

[6] European Commission (2010), *TECHNICAL GUIDELINES FOR THE IDENTIFICATION OF MIXING ZONES*

of contaminants from the waste into pluvial run-off is expected to be minimal to non-existent and minimal in comparison to that of the scrap metal open stockpiles.

SLR has not been able to obtain any information on rainfall run-off characterisation for wrapped RDF stored at dockside. It is not known whether any data exists in the public domain as existing sites have not been required historically to characterise the run off.

In order to understand whether there are any substances of concern that could be released from the baled RDF in the unlikely event that leaching did occur, SLR has reviewed the Waste Treatment Bref Table 6.1: BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body which sets BAT-AELs for a range of substances. The table identifies substances that would be applicable to different types of waste treatment, including ‘physico-chemical treatment of waste with calorific value’ which we would assume to include sites that produce RDF. The only substances identified in the Table that applies to physico-chemical treatment of waste with calorific value, and which are relevant to the H1 assessment, and which are not already substances within the dataset obtained for metal storage are Cadmium and Mercury. In the absence of any site-derived data, we have included the compliance limit for mercury in Table 6.1 as a surrogate value. We believe this will be very much an overestimate of the likely contamination, as the value in Table 6.1 applies to sites that produce RDF which will clearly present a bigger risk of contamination than those simply storing the wrapped product.

Therefore, in an attempt to make a conservative judgement, it has been assumed that the quality of effluent from the RDF storage areas will be the same as that of the scrap metal storage areas, to which an assumed worst case emission of Cadmium and Mercury have been added. Whilst it is acknowledged that this is a simplification and that run-off from RDF may potentially contain different contaminants to that of scrap metal, it is suggested that the scale of the impact can be assessed using this approach and follow up sampling with reassessment could validate the outcomes of this assessment or otherwise highlight contaminants of concern for further investigation.

SLR has obtained effluent quality data from a site which processes scrap metals (S Norton Canada Dock West) which is in the public domain. Table 3-1 presents this data (covering the period May 2023 – April 2024) along with estimated discharge quality from the PD Teesport site after adjustment for uncontaminated run-off from non-waste storage areas.

Waste is proposed to be stored within a concrete bunded area as wells as in five temporary storage piles to facilitate transfer via shipping. For the purposes of estimating a discharge effluent quality, it has been assumed that all effluent generated from rainfall within the concrete bunded storage area and the five temporary storage piles, will be equal to the quality of the effluent from the Canada Dock West site, whilst surface water run-off from other areas of the site will be uncontaminated. The total area of contaminated run-off was calculated to be 13,085 m^2. The total site area is 37,392 m^2, therefore the effluent quality from the Canada Dock West site was adjusted by a factor of 0.35 to determine an estimated discharge quality from the site.

Table 3-1: Estimated Discharge Effluent Quality

Substance	Average Concentration in Canada Dock West Effluent (µg/l)	Estimated Average Discharge Concentration (µg/l)	AA-EQS (µg/l)	MAC-EQS (µg/l)
Arsenic	2.34	0.82	25	N/A

Substance	Average Concentration in Canada Dock West Effluent (µg/l)	Estimated Average Discharge Concentration (µg/l)	AA-EQS (µg/l)	MAC-EQS (µg/l)
Cadmium	N/A [1]	17.5 [2]	0.2	N/A
Chromium	10.99	3.85	0.6	32
Copper	71.9	25.17	3.76	N/A
Lead	209	73.15	1.3	14
Mercury	N/A [1]	1.75 [2]	N/A	0.07
Nickel	40.2	14.07	8.6	34
Zinc	930	326	10.9	N/A
Phenol	3,743	1,310	7.7	46
Silver	0.7	0.5	0.5	1
Tin	2.2	0.77	10	N/A
Vanadium	3.12	1.09	100	N/A

Notes

[1] Not contained within Canada Dock West dataset.

[2] Discharge concentration based on waste BREF BAT-AEL upper limit adjusted by a factor of 0.35 as described in section 3.1.

[3] Metal concentrations are quoted as dissolved

3.2 Discharge Flow Rate

As the discharge is from surface water runoff, an estimated effluent flow rate has been calculated using the site surface area (37,392 m^2) and flood estimation handbook (FEH) rainfall data.

To calculate a mean effluent flow rate, the site area was multiplied by the standard annual average rainfall value (SAAR) for the site of 595mm. This was then averaged over 365 days, giving an average volume of 61 m^3/day, which is equivalent to 0.00071 m^3/s when averaged over 24 hours.

The maximum effluent flow rate was calculated by multiplying the site area by the rainfall rate for a 1-day event duration 1 in 1-year storm. FEH rainfall implied a rainfall depth of 31.47 mm. A maximum effluent discharge flow rate of 1,177 m^3/day was therefore determined. Assuming a continuous discharge averaged over 24 hours, this is effluent to a flow rate of 0.0136 m^3/s.

3.3 River Tees Background Quality

The EA's water quality archive was searched to obtain background quality data for the Tees Estuary[7]. Background data has been taken upstream from the sampling point *Tees at*

[7] Background quality data for the River Tees. [Available at]: Open WIMS data

Smiths Dock" for the period August 2025 – July 2026. Where sampling data is not available for a contaminant, it has been assumed that the upstream quality was 50% of the relevant EQS, as supported by the Risk Assessment guidance[8]. The background water quality data and the data sources are presented in Table 3-2.

Table 3-2: Background Water Quality

Substance	Average Background Concentration (µg/l)	Source
Arsenic	1.22	EA Water Quality Database
Cadmium	0.03	EA Water Quality Database
Chromium	0.3	50% of EQS
Copper	0.921	EA Water Quality Database
Lead	0.43	EA Water Quality Database
Mercury	0.005 [1]	EA Water Quality Database
Nickel	0.691	EA Water Quality Database
Zinc	3.59	EA Water Quality Database
Phenol	3.85	50% of EQS
Silver	0.25	50% of EQS
Tin	5	50% of EQS
Vanadium	50	50% of EQS
Notes [1] All analytical results quoted as <0.01, therefore half face value taken as background concentration.		

3.4 Modelling Parameters

The *BasicPlumeModel.xls* spreadsheet tool (previously acquired form the EA) requires the following inputs:

- Discharge rate (m^3/s);
- Dispersion coefficient (ky);
- Depth of mixing (m); and

[8] 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

- Flow Velocity (m/s).

An average discharge rate of 0.00071 m^3/s and maximum rate of 0.0136 m^3/s was used.

A dispersion coefficient of 0.1ky was used as a typical value in the absence of site-specific data.

Depth of mixing was set at 0.25 m to reflect minimal depth of mixing at the surface of the water body. The model is very sensitive to changes in depth of mixing and a zero depth of mixing results in calculation of infinite mixing zones. Therefore, SLR have used what they consider to be a conservatively small depth of mixing (25cm) to represent mixing at or near the surface of the water body. Whilst this approach has not been justified empirically, in SLR's opinion the iterative nature of the modelling process starting with a simple approximation to determine whether or not mixing zones are "clearly acceptable" or not justifies a simple approximation of the depth of mixing.

Flow velocity values were obtained from a publicly available report[9] conducted by HR Wallingford on hydrodynamic and sedimentation studies for a proposed Northern Gateway Container Terminal.

4.0 Screening

4.1.1 Screening Tests

4.1.1.1 Test 1

Given the location of the discharge into the port, the only applicable screening test was deemed to be test 1 which is a direct comparison of the effluent quality versus EQS values.

Test 1 is devised to quickly screen out hazardous chemicals and elements. If the concentration of the hazardous chemical or element in the discharge is less than its corresponding AA and/or MAC EQS value, then it is deemed by the Environment Agency to be unlikely to cause a significant impact on the receiving water body.

This screening test highlighted that the following contaminants did not require further assessment:

- Arsenic;
- Silver;
- Tin; and
- Vanadium

All other substances were further assessed via the modelling stage.

4.1.1.2 Tests 2 – 5

The point of discharge is not direct to the low water channel (though given the industrial nature of the area the discharge will enter directly into the main water body at all states of the tide via the dock), is less than 50m from the shoreline and is not discharge via a submerged pipe, meaning that tests 2 – 5 could not be used to carry out further screening.

[9] HR Wallingford (2006), *Northern Gateway Container Terminal Hydrodynamic and Sedimentation Studies*

4.1.2 pH

The average pH (7.75) of the effluent is within the MAC-EQS range of 6-8.5. Therefore, the pH of the effluent is not considered likely to cause a significant impact to the receiving watercourse.

4.1.3 Significant Load Assessment

The annual load of Cadmium estimated to be discharged was calculated to be 0.00186 kg, which is lower than the significant load limit of 5 kg.

The annual load of Mercury estimated to be discharged was calculated to be 0.000019 kg, which is lower than the significant load limit of 1 kg.

Therefore, the discharge of these substances is deemed to be acceptable.

5.0 Modelling

5.1 Modelling of Dock Area

5.1.1 Flow Velocities

Flow velocities were extracted at hourly intervals from the appendices of the HR Wallingford report. Figure 1 shows an extract from the report which details flow velocities over the course of a 12-hour tide cycle at a location close to point of discharge. Due to the assumed shallow depth of mixing, the near surface velocities were used. It is understood that the scheme referred to in the report is not yet implemented and therefore the "existing" flow velocities were used.

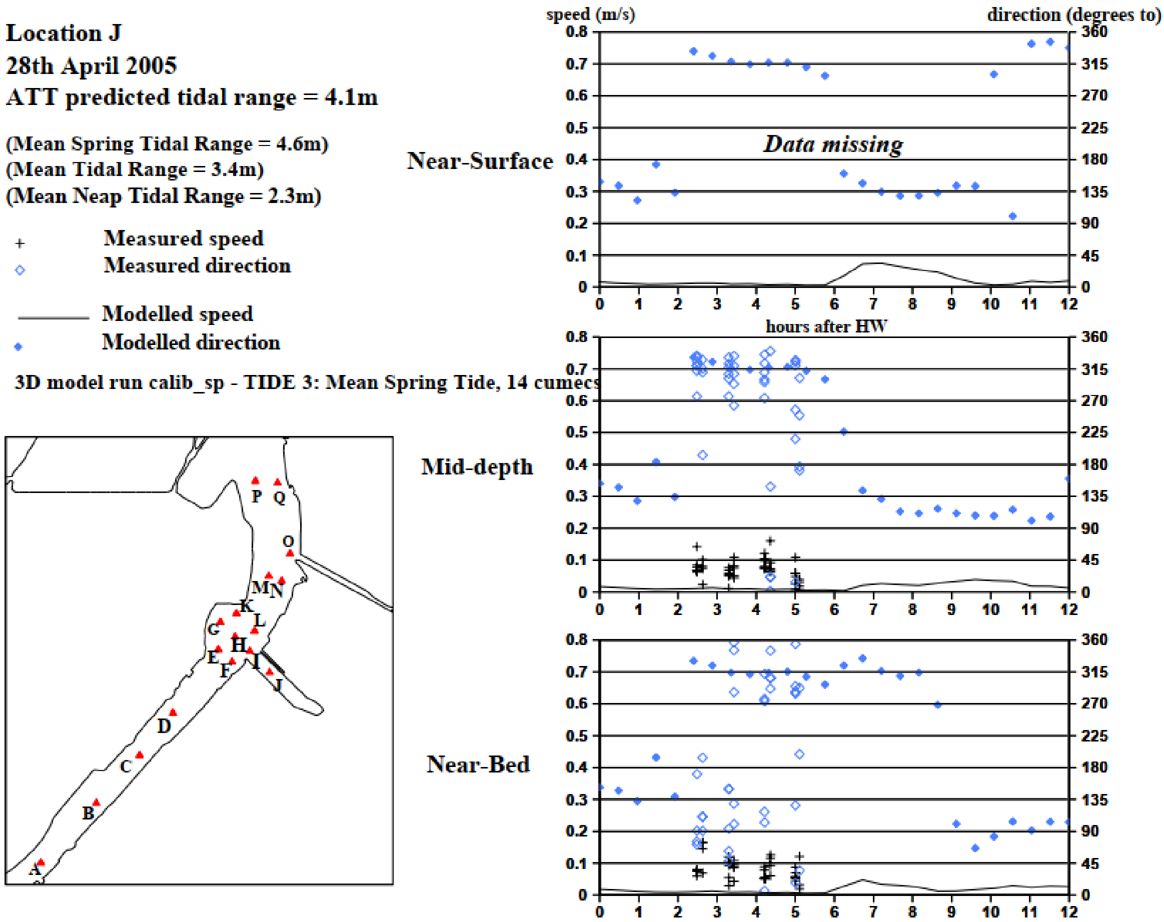

Figure 1: Flow Velocities Within the Dock

5.1.2 Dilution requirements

The dilution required in order to reduce the concentration of contaminants to their respective EQS concentration was calculated according to the following equation:

$$D = \frac{Cr - C_b}{EQS - C_b}$$

Where:

D = Dilution

Cr = Effluent release concentration

Cb = Background river concentration

EQS = Environmental Quality Standard

The calculated dilution factors are presented in Table 5-1. The dilution values in Table 5-1 highlight that Lead, Zinc and Phenol require the most dilution in order to meet their respective AA-EQS and MAC-EQS values.

Table 5-1: Dilution Factors Required

Substance	Average Estimated Release Concentration (µg/l)	Receiving Water Background Concentration (µg/l)	AA-EQS (µg/l)	MAC-EQS	Dilution Factor Required to Meet AA-EQS	Dilution Factor Required to Meet MAC-EQS
Cadmium	17.5	1.22	0.2	N/A	- [1]	N/A
Chromium	3.85	0.3	0.6	32	11.8	-
Copper	25.17	0.921	3.76	N/A	8.5	N/A
Lead	73.15	0.43	1.3	14	85.6	5.4
Mercury	1.75	0.005	N/A	0.07	N/A	26.9
Nickel	14.07	0.691	8.6	34	1.69	-
Zinc	326	3.59	10.9	N/A	44.0	N/A
Phenol	1,310	3.85	7.7	46	339	31
Notes [1] EQS is already exceeded in the receiving watercourse.						

5.1.3 Approximation of Mixing Zones

The dilution values in Table 5-1 suggest that the largest mixing zone is likely to be that of Phenol, due to the highest dilution factor required. Table 5-2 presents the longitudinal distance required, at a 0 m transverse distance, to reach the required dilution factor for Phenol of 339 to reach the AA-EQS at average discharge flow rate and 31 to reach the MAC-EQS at maximum discharge flow rate.

Table 5-2: Dilution Distances

Hourly Interval from Low Neap Tide	Flow Velocity (m/s)	Longitudinal Distance to Reach Required Dilution for AA-EQS (m, at 0 m Transverse Distance)	Longitudinal Distance to Reach Required Dilution for MAC-EQS (m, at 0 m Transverse Distance)
1hr - Flood	0.009	85	255
2hr - Flood	0.01	75	225
3hr – Peak Flood	0.012	65	190
4hr – Flood	0.008	95	285
5hr – Flood	0.007	110	325
6hr – High Water	0.02	40	115
7hr - Ebb	0.073	15	35
8hr - Ebb	0.057	15	40
9hr – Peak Ebb	0.035	25	65
10hr - Ebb	0.007	110	325

Hourly Interval from Low Neap Tide	Flow Velocity (m/s)	Longitudinal Distance to Reach Required Dilution for AA-EQS (m, at 0 m Transverse Distance)	Longitudinal Distance to Reach Required Dilution for MAC-EQS (m, at 0 m Transverse Distance)
11hr - Ebb	0.018	45	130
12hr – Low Water	0.02	40	115

The mixing zones for Phenol represent the largest mixing zones due to the highest dilution requirements of 339 to meet its AA-EQS at average flow rates and 31 to meet its MAC-EQS at maximum flow rates.

At a transverse distance of 0 m from the point of discharge (the most conservative distance), the longitudinal extent of the mixing zone to meet the AA-EQS concentration at average flow rates ranges from 15 m to 110 m. To meet the MAC-EQS concentration at maximum flow rate the range extends from 35 m to 325 m. For comparison the dimensions of the dock are approximately 160 m wide (transverse direction) and 1 km long (longitudinal direction).

The European Technical Guidelines for the Identification of Mixing Zones[10] states that, *"In order to ensure that EQS exceedance does not impair the quality of the overall water body and to ensure that the extent of the mixing zone is restricted to the proximity of the discharge point, it is therefore recommended that a precautionary approach is taken at Tier 2 so that the extent of EQS exceedance in rivers that can be considered acceptable without further assessment should be the lesser of 10*W (river width) or 1 kilometre provided that the extent of mixing zone does not exceed 10% of water body length overall.".*

The point of discharge is directly into the dock and therefore comparison of the mixing zone to the width of the river may not be the most appropriate way of defining the acceptability of the mixing zone. However, given at average flow rates the largest mixing zone during the tide cycle assessed would not extend to the opposite side of the dock (and the smallest mixing zone extends no further than 15 m), therefore it is suggested that the extent of the mixing zone is limited to such an extent that it could be considered acceptable.

At maximum flow rates the largest mixing zone does not extend beyond the dock in a longitudinal direction. Therefore, given that all containments are expected to have been diluted to below their respective EQS concentrations prior to meeting the main channel of the River Tees, it is suggested that the extend of mixing zones is acceptable.

6.0 Conclusion

A surface water pollution risk assessment has been carried out for the discharge of contaminated surface water from the proposed RDF and scrap metal storage facility at Teeside on behalf of PD Teesport in support of their permit application.

In the absence of actual effluent quality or flow data from the site, substitute data has been used to estimate effluent quality and flow rates have been based on FEH rainfall data to determine effluent generation at the site.

The discharge would be direct to the dock which is part of the Teesmouth and Cleveland Coast SPA / RAMSAR. A screening assessment was carried out to identify substances which are likely to be present at concentrations lower than their corresponding EQSs. This

[10] European Commission (2010), *TECHNICAL GUIDELINES FOR THE IDENTIFICATION OF MIXING ZONES*

resulted in Arsenic, Silver, Tin and Vanadium being screened out of the assessment. All other contaminants were modelled further using a spreading disc plume model previously obtained from the EA.

The dilutions required to reduced each contaminant substance to its EQS concentration were calculated and the longitudinal distance of the largest mixing zones determined via the EA model.

The mixing zones for Phenol represent the largest mixing zones due to the highest dilution requirements of 339 to meet its AA-EQS at average flow rates and 31 to meet its MAC-EQS at maximum flow rates.

Mixing zones ranged from 15 – 110 m to reach AA-EQS concentration at average flow rates and from 35 – 325 m to reach MAC-EQS concentration at maximum flow rates.

At maximum flow rates the largest mixing zone does not extend beyond the dock in a longitudinal direction. Therefore, given that all containments are expected to have been diluted to below their respective EQS concentrations prior to meeting the main channel of the River Tees, it is suggested that the extent of mixing zones is acceptable.

This assessment has been carried out with a significant element of professional judgement and included a number of assumptions and estimations. Therefore, the conclusions of this report should be viewed in this context and are intended to provide an estimation of the scale of impact of the proposed discharge. It is recommended that if the permit is approved, then a sampling regime is implemented to obtain actual site data and a further assessment of impacts undertaken.

Making Sustainability Happen