4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

erm.com

# TECHNICAL MEMO

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|---|---|
| TO | Seán Gallagher - South Tyneside Council (Planning Group) |
| FROM | ERM |
| DATE | 30th March 2026 |
| REFERENCE | 0793820 |
| SUBJECT | Dow Jarrow – Draft Method Statement for Backfilling of Pits |

Dear Seán:

**Planning application for engineering works to backfill existing below ground pits at Dow Chemical Company Limited, Ellison Street, Jarrow, Tyne and Wear, NE32 3DJ**

## 1. BACKGROUND

The site is the former production facility of Dow Chemical Company Ltd, which ceased production on 31st May 2016. The Site has since been decommissioned and demolished with the exception on the former office block and gate house adjacent to the Site's Ellison Street entrance.

Three former below ground pits (K-Pit, S-Pit and the former Oroglas® basement) are present at the site which were deliberately not backfilled during the demolition program in case access was needed to support remediation activities at the site. The location of these three pits is shown in Figure 1 (Appendix A). Photographs of the pits are shown in Appendix B.

Although the pits are surrounded by Heras fencing and the Site perimeter is fenced and there is a full-time security presence on-site, there are concerns that the pits may present a health and safety risk if trespassers were able to gain access. These concerns have recently been heightened following a number of break-ins at the Site and the death of child at a disused industrial facility in Gateshead during early May 2025. This latter incident is understood to have increased the focus of the Local Authority on other redundant sites in their region.

Furthermore, under the Occupiers Liability Act (1984) and the Health & Safety at Work Act (2015), the site occupier (i.e. owner or operator) has a duty of care towards visitors to their Site including trespassers and those who exceed their permission. In practical terms this means that if there is a known hazard on-Site (i.e. a fall hazard, live cables, confined space, asbestos materials) and there is a realistic potential risk of harm occurring to trespassers then the risk needs to be managed in a way that offers some protection to the trespasser.

In this context Dow have investigated options to reinforce the current security around the pits and reduce the likelihood that the pits can be accessed by trespassers at the Site.

On behalf of Dow, ERM has completed an outline options assessment for securing the three pits. The assessment looked at three options:

- Option 1 – Building a steel structure over the pits using steel beams and plates;
- Option 2 – As Option 1 but using scaffolding; and

- Option 3 – Backfilling using imported and/or site-won materials.

Dow's preferred option is Option 3 (Backfilling) as it is the most robust option in that it completely removes the fall hazard. Although not the cheapest option, it can still be cost effective if using materials already stockpiled on-site.

The following sections presents an outline method statement for backfilling the pits including preparatory works, source materials and material validation.

# 2. METHOD STATEMENT

The following section presents the proposed method statement for the backfilling of the three pits.

## 2.1 BACKFILL MATERIAL – ORIGIN

In March 2018, planning permission (ref: ST/0061/18/FUL) was granted to undertake earthworks to relocate an existing soil berm located in the south-eastern corner of the Jarrow site in order to access a buried basement and two former gasholders. The work involved the excavation of approximately 29,000 $m^3$ of soil from the soil berm footprint and placement into five stockpiles located to the immediate north and west of the soil berm footprint (see Plate A below).

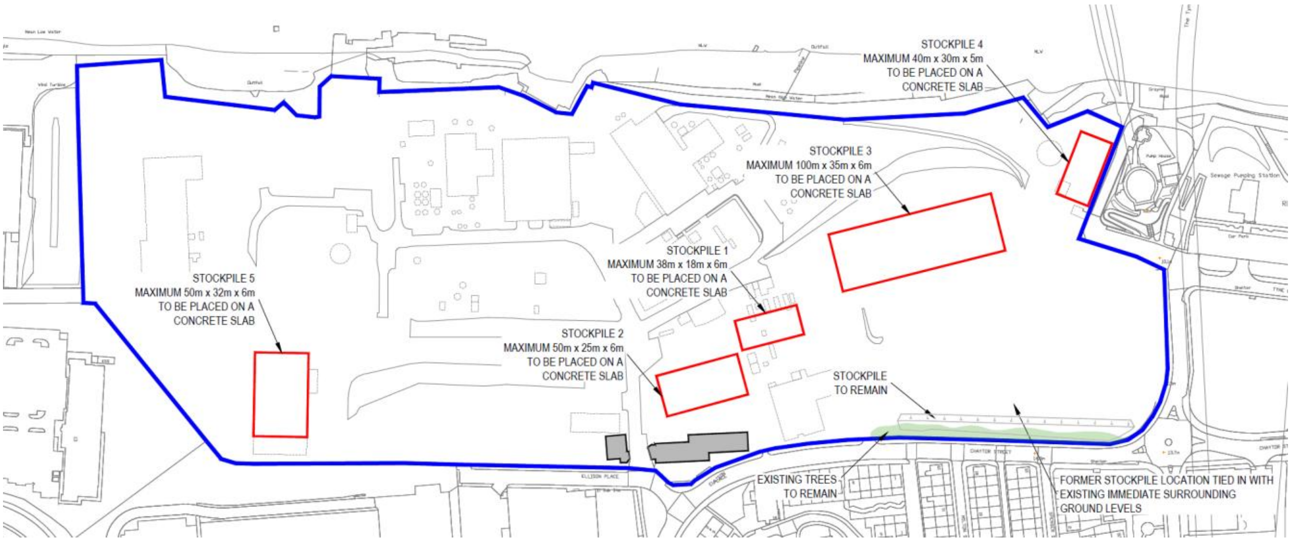


Plate A – Site Plan from 2018 planning application documents showing location of soi berm and planned position of stockpiles.

Material within the former berm and current stockpiles comprises predominantly clay with minor components of silt, sand, bricks, burnt shale, clinker and slag.

## 2.2 BACKFILL MATERIAL – CHEMICAL VALIDATION

Laboratory analytical data from thirty-two soil samples collected from various locations and depths within the soil berm were shared South Tyneside Council as part of the 2018 planning application (see Appendix C). The samples were tested for a broad range of analytes including Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), metals and asbestos and were screened against human health and controlled waters Site Specific Assessment Criteria (SSAC) specific to the Dow Jarrow site.

The majority of compounds were reported at concentrations below the method reporting limit (MRL). Where concentrations were detected above the MRL, these did not exceed their respective SSACs. Therefore, the material was considered unlikely to pose a potential risk to controlled waters or human health.

Asbestos was reported in six of the eighteen soil samples analysed. Subsequent quantification indicated that three samples contained asbestos below the MRL of <0.001% w/w. The remaining samples contained asbestos lagging (0.0081% w/w), Asbestos Containing Materials (ACM) debris (0.0193% w/w) and loose fibres (0.0041% w/w). The potential risk from asbestos to on-site workers and off-site residents was considered to be low due to the presence of moisture within the material which would inhibit the release of fibres during material movements.

During 2023, Dow commissioned additional sampling and analysis of the stockpiles originating from the Former soil berm. Eighteen samples were collected and scheduled for laboratory analysis which replicated the testing included in the 2018 planning application (see above). The results (see Appendix D – Table A) aligned with the 2018 testing i.e. most analytes <MRL, no exceedances of the human health SSAC, minor exceedances of controlled waters SSAC for selected metals, PAHs and TPH fractions and trace detections of asbestos fibres in minority (three) of samples.

In January 2026, ERM collected an additional twenty-two samples from the stockpiles originating from the former soil berm (SP1 – SP5, SP8 and SP14) and scheduled them for leachate testing to further assess the likelihood that material will present a risk to Controlled Waters (River Tyne) if used to backfill the pits, particularly the K-Pit and S-Pit located with approximately 30 m of the river. Sampling locations are shown in Plate B below.


Plate B – ERM January 2026 Stockpile Sampling Locations (Stockpiles SP1 – SP5, SP8, SP10 and SP14 all originate from the former soil berm).

Analytical summary tables corresponding to the ERM January 2026 leachate samples are presented in Appendix D – Table B. The majority of metals, TPH and BTEX were reported below the MRL. For the analytes reported above the MRL, a Stage 2 Generic Quantitative Risk Assessment (GQRA) was undertaken whereby the recorded concentrations were compared against their respective Environmental Quality Standards (EQS), protective of surface water (marine)[1]. Copper, zinc plus selected PAHs and TPH fractions were found to exceed the EQS at some locations.

An exceedance of the EQS does not mean that the concentrations are likely to impact the River Tyne as the GQRA is inherently conservative as it does not take into account processes such as retardation, biodegradation, dilution (in groundwater) and dispersion between the source and the receptor.

Therefore, a Stage 3 Detailed Quantitative Risk Assessment (DQRA) has been undertaken for those analytes that exceed their respective EQS and initial re-use targets have been calculated below which the CoC concentration in the River Tyne is not predicted to exceed the EQS.

Re-use targets have been calculated using the Environment Agency (EA) Remedial Targets Worksheet (RTW). The RTW comprises a series of spreadsheets which allow deterministic analytical contaminant fate and transport modelling. Only one source term and one contaminant can be modelled at a time and only single values can be inputted for the model parameters such as concentration, organic carbon-water partition coefficient (Koc), degradation half-lives, fraction of organic carbon (foc), hydraulic gradient, hydraulic conductivity (K), aquifer thickness, porosity and dispersivity. Therefore, the potential for cumulative impact from the multiple sources cannot be quantified, nor the likely variation and potential range in values for the aforementioned parameters be taken into consideration. In line with UK guidance[2] the RTW has been set to determine the concentration at a compliance point down gradient from the source after 1,000 years.

Appendix F presents the input parameters used for the models. Table 1 presents the calculated initial remedial targets and the number of the leachate test samples that exceed the re-use target.

## TABLE 1: CALCULATED RE-USE TARGETS

| **CoC** | **EQS** | **Re-Use target (µg/l)** | **Maximum leachate concentration (µg/l)** | **Number of exceedances of the remedial target.** |
|---|---|---|---|---|
| Copper | 3.76 | 7.67 | 40 | 1 out of 22 samples |
| Zinc | 6.8 | 8.96 | 8 | 0 out of 22 samples |
| Phenanthrene | 1.5 | 0.377 | 2.459 | 2 out of 22 samples |
| Anthracene | 0.1 | 0.175 | 1.17 | 2 out of 22 samples |
| Fluoranthene | 0.0063 | 0.0108 | 7.18 | 17 out of 22 samples |
| Pyrene | 0.24 | 0.342 | 8.922 | 5 out of 22 samples |
| Benzo(a)pyrene | 0.00017 | 0.0517 | 6.966 | 17 out of 22 samples |
| Indeno(1,2,3-cd)pyrene | 0.00017 | 4.25E-3 | 4.381 | 22 out of 22 samples |

[1] There are no EQS for TPH. Therefore, the now discarded surface water drinking standard of 10 µg/l, which is also the MRL for the majority of TPH fractions, has conservatively been used for the individual fractions.
[2] Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination, Environment Agency 2006

| CoC | EQS | Re-Use target (µg/l) | Maximum leachate concentration (µg/l) | Number of exceedances of the remedial target. |
|---|---|---|---|---|
| Benzo(g,h,i)perylene | 0.00017 | No breakthrough | 3.727 | None |
| Benzo(b)fluoranthene | 0.00017 | 0.019 | 8.033 | 19 out of 22 samples |
| Benzo(k)fluoranthene | 0.00017 | 0.156 | 3.124 | 7 out of 22 samples |
| TPH Aliphatic $C_{21}$-$C_{35}$ | 0.01 | 237 | 790 | 1 out of 22 samples |
| TPH Aromatic $C_{16}$-$C_{21}$ | 0.01 | 13.3 | 30 | 1out of 22 samples |
| TPH Aromatic $C_{21}$-$C_{35}$ | 0.01 | 237 | 370 | 1 out of 22 samples |

Table 1 shows that some analyte concentrations exceed their re-use targets, however the DQRA does not take into account dilution in the River Tyne.

To allow for dilution within the River Tyne a Level 4 DQRA has been undertaken to determine the dilution factor using the equation:

$$DF = \frac{Qc + Qu}{Qc}$$

Where: $Qc \ = KiwMz$

$Qu \ = Q95\ (low\ flow) in\ the\ receiving\ water$[3]

$K = Hydraulic\ conductivity\ (1m/day)$

$i = Hydraulic\ gradient\ (0.042)$

$w = Plume\ width\ (10m)$

$Mz = Mixing\ zone\ thickness\ (6m)$

The initial DF has been calculated as 209,830.

However, to allow for background concentration from other contaminant sources in the River, UK guidance states that 10% of the EQS should be used as a screening tool. To allow for this a highly conservative DF of 20,983 has been used. Table 2 presents the re-use targets calculated allowing for dilution.

## TABLE 2 RE-USE TARGETS WITH DIULTION AT THE RIVER TYNE

| CoC | Re-Use target (without dilution) (µg/l) | Re-Use target (with dilution) (µg/l) | Maximum concentration (µg/l) |
|---|---|---|---|
| Copper | 7.67 | 160,940 | 40 |
| Zinc | 8.96 | 188,008 | 8 |
| Phenanthrene | 0.377 | 7,910 | 2.459 |

[3] The Q95 has been taken from the gauging station Tyne at Bywell with a Q95 of 6.12m3/s based on records from 1956 – 2024. NRFA station mean flow data for 23001 - Tyne at Bywell, approximately 20km upstream from the site.

| CoC | Re-Use target (without dilution) (µg/l) | Re-Use target (with dilution) (µg/l) | Maximum concentration (µg/l) |
|---|---|---|---|
| Anthracene | 0.175 | 3,672 | 1.17 |
| Fluoranthene | 0.0108 | 227 | 7.18 |
| Pyrene | 0.342 | 7,176 | 8.922 |
| Benzo(a)pyrene | 0.0517 | 1,084 | 6.966 |
| Indeno(1,2,3-cd)pyrene | 4.25E-3 | 89 | 4.381 |
| Benzo(g,h,i)perylene | No breakthrough | | |
| Benzo(b)fluoranthene | 0.019 | 399 | 8.033 |
| Benzo(k)fluoranthene | 0.156 | 3,273 | 3.124 |
| TPH Aliphatic $C_{21}$-$C_{35}$ | 237 | 497,2971 | 790 |
| TPH Aromatic $C_{16}$-$C_{21}$ | 13.3 | 279,073 | 30 |
| TPH Aromatic $C_{21}$-$C_{35}$ | 237 | 4,972,971 | 370 |

With a conservative estimate of dilution in the River Tyne taken into account, none of the stockpile samples present concentrations that are likely to significantly impact the River Tyne if used to backfill the pits (K-Pit and S-Pit) approximately 30m from the river.

For the majority of CoC the remedial target, taking dilution into account, is at least two orders of magnitude greater than the maximum concentration recorded meaning that it is highly unlikely that the proposed backfill material will present a significant risk to the River Tyne.

## 2.3 PROPOSED WORKS METHODOLOGY

### 2.3.1 PREPATORY WORKS TO SUPPORT BACKFILLING

Vegetation clearance work (mostly Buddleia) was undertaken during February 2026. In addition, any standing water present within the pits will be pumped out prior to backfilling.

Some standing water is present within each of the pits. To assess disposal options, the standing water in each of the three pits was tested in January 2026 for metals, VOCs, SVOCs, TPH (including PAHs), chemical oxygen demand (COD), total suspended solids and pH. See Appendix D – Table C.

All 200+ analytes were reported below the MRL with the exception of chlorobenzene (S-Pit), chlorotoluene (K-Pit) and zinc (K-Pit). However, reported concentrations of these analytes were very low (≤16 µg/l). Prior to backfilling it therefore proposed to discharge standing water within the pits is transferred directly to ground adjacent to the pits.

### 2.3.2 MATERIAL SELECTION

The estimated volume of material required to backfill the three pits is 500 – 700 $m^3$. The majority of this material will result from stockpile SP1 (see Plate B), which comprises crushed concrete from the site demolition and is located in the center of the site (estimated volume 600 $m^3$). If additional material is needed this will be taken from stockpile SP3 (estimated volume 3,000 $m^3$).

A total of 73 samples have been collected and analysed from the original soil berm stockpile and the smaller stockpiles which originated from the soil berm in three phases of testing undertaken in 2018, 2023 and 2026. The bulk sampling frequency for the proposed backfill material is one sample per 600 tonnes and for SP1 which will provide the majority/all of the backfill material one sample per 400 tonnes. Given that the proposed backfill material is from a single source (i.e. the former soil berm) and the analytical testing results are generally consistent, it is not proposed to take additional validation samples unless unexpected materials are identified.

### 2.3.3 SOIL MOVEMENT

The scope of work will include the following:

- Movement up to 800 $m^3$ of soil using an excavator and dumper truck;
- All machine movements will be undertaken within the Dow Tyneside Works site boundary and not on public roads. The site boundary is fenced and secure which will prohibit public access;
- All works will be undertaken during working hours of 08:00 to 17:30;
- Work will be undertaken in accordance with the Construction (Design and Management) Regulations 2015 (if applicable) with appropriate risk assessments and method statements undertaken and reviewed by the client prior to commencement;
- As the soil is currently exposed to the elements it is likely to contain moisture which will mitigate the amount of dust produced during soil movements. Further wetting down will be undertaken if required;
- Oversized and or unsuitable material e.g. large concrete blocks, brickwork, wood and plastic will not be used for backfilling the pits;
- The soil does not contain volatile contaminants so odours are not anticipated. If odours are produced then work will be stopped and the methodology reviewed.

### 2.3.4 COMPACTION

A visual review of the soils indicates that the soils would be classed as Type 2C stoney cohesive, although occasional oversized fragments were observed in the material.

Given that the primary aim of this exercise is to backfill the voids to reduce the potential for a health and safety incident, the materials do not need to behave as an engineered fill. The soils are therefore considered suitable to be used a backfill material. If the materials do change during backfilling and materials are observed that are clearly classified as unsuitable for re-use, those materials will be segregated and disposed of off site in an appropriate manner. By way of example, materials that would obviously characterised as waste such as buried black liners, large proportions of plastic or wood, would be segregated.

The selected fill will be placed into each pit in controlled layers, typically between 200–400 mm in thickness and compacted using an excavator bucket. This process will allow the pits to be infilled gradually and safely, building up to finished levels that match the surrounding ground profile and restore a stable, uniform surface.

Yours sincerely,

[redacted]

**Neil Walshaw**

Planning Consultant

4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

**erm.com**

# APPENDIX A – FIGURES

4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

**erm.com**

# APPENDIX B – SITE PHOTOGRAPHS

4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

**erm.com**

<table>
<tr><td>Photograph 1</td><td rowspan="3"></td></tr>
<tr><td>Direction picture was taken:<br>North</td></tr>
<tr><td>Description:<br>K-Pit<br>(07 Plant)</td></tr>
</table>

<table>
<tr><td>Photograph 2</td><td rowspan="3"></td></tr>
<tr><td>Direction picture was taken:<br>North-West</td></tr>
<tr><td>Description:<br>S-Pit<br>(09 Plant)</td></tr>
</table>

| | |
|---|---|
| **Photograph 3** |  |
| **Direction picture was taken:**<br>South-East | |
| **Description:**<br>Oroglas® Pit | |
| **Photograph 4** |  |
| **Direction picture was taken:**<br>South | |
| **Description:**<br>Stockpile (SP1) | |

# APPENDIX C – AECOM PLANNING APPLICATION (REF: ST/0061/18/FUL) COVERING LETTER

4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

**erm.com**

# APPENDIX D – ANALYTICAL SUMMARY TABLES & ANALYTICAL CERTIFICATES

4th Floor
One New York Street
Manchester
M1 4HD

T +44 161 958 8800

**erm.com**

# APPENDIX E - TRIAL PIT LOGS

# APPENDIX F – REMEDIAL TARGET WORKSHEET INPUTS

# TABLE F1: HYDROGEOLOGICAL INPUTS

| Parameter | Unit | Value | Source |
|---|---|---|---|
| Width of plume | m | 10 | Approximate width of pit |
| Plume thickness at source | m | 4 | Approximate depth of pit |
| Saturated aquifer thickness | m | 6 | Average from AECOM |
| Bulk density of aquifer material | $g/cm^3$ | 1.62 | Average from AECOM |
| Effective porosity of aquifer | | 0.15 | Average from AECOM |
| Hydraulic gradient | | 0.042 | Average from AECOM |
| Hydraulic conductivity | m/day | 1 | Average from AECOM |
| Distance to compliance point | m | 30 | Distance between nearest pit and the River Tyne |
| Fraction of organic carbon (Foc) | | 0.00784 | Average from AECOM |
| Longitudinal dispersivity | m | 3 | 10% of pathway |
| Transverse dispersivity | m | 0.3 | 1% of pathway |
| Vertical dispersivity | m | 0.003 | 0.1% of pathway |

# TABLE F2: ANALYTE INPUTS

| CoC | EQS ug/l | Koc | Source | Kd | Source | Half Life (days) | Source |
|---|---|---|---|---|---|---|---|
| Copper | 3.76 | - | - | 295 | - | 1E99* | |
| Zinc | 6.8 | - | - | 26 | - | 1E99* | |
| Phenanthrene | 1.5 | 6,334 | Mackay | - | - | 200 | Mean value from Howard et al assuming aerobic degradation |
| Anthracene | 0.1 | 5,942 | Mackay | - | - | 460 | |
| Fluoranthene | 0.0063 | 18,197 | SR7 | - | - | 440 | |
| Pyrene | 0.24 | 16,218 | SR7 | - | - | 1,898 | |
| Benzo(a)pyrene | 0.00017 | 128,825 | SR7 | - | - | 529 | |
| Indeno(1,2,3-cd)pyrene | 0.00017 | 87,096 | SR7 | - | - | 730 | |
| Benzo(g,h,i)perylene | 0.00017 | 416,869 | SR7 | - | - | 650 | |
| Benzo(b)fluoranthene | 0.00017 | 104,713 | SR7 | - | - | 610 | |
| Benzo(k)fluoranthene | 0.00017 | 147,911 | SR7 | - | - | 2139 | |
| TPH Aliphatic $C_{21}$-$C_{35}$ | 0.01 | 125,893 | TPHCWG | - | - | 1E99* | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TPH Aromatic $C_{16}$-$C_{21}$ | 0.01 | 15,849 | TPHCWG | - | - | 1E99* | |
| TPH Aromatic $C_{21}$-$C_{35}$ | 0.01 | 125,893 | TPHCWG | - | - | 1E99* | |

Mackay: Mackay et al, 2006. Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals. Second Edition.
SR7: Environment Agency, 2008. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values. Science Report SC050021/SR7
TPHCWG: Total Petroleum hydrocarbon Criteria Working Group Series; Volumes 1 to 5, 1997.
Howard et al: Environmental Degradation Rates, PH Howard, RS Boethling, WF Jarvis, WM Meylan, ED Michalenko, Lewis Publishers, 1991
*It has been assumed that no degradation of copper, zinc or TPH is occurring and therefore a half life of 1E99 days has been used.