**Site:** Land adjacent to Border Yard, Coach Road, Whitehaven
**Planning application:** 4/22/2466/0F1
**Condition:** 5

This Remediation Strategy has been prepared to address the Environment Agency's comments concerning hydrocarbon contamination associated with the former underground storage tanks and the identified risks to controlled waters.

The Phase 2 Ground Investigation identified hydrocarbon impacts within made ground and natural soils in the vicinity of Trial Pits TP12 and TP13, together with impacts to shallow groundwater at Boreholes BH03 and BH05. No free-phase hydrocarbon product was encountered, but the findings confirmed that the former fuel-storage infrastructure represents a source of contamination requiring remediation before redevelopment.

The remediation strategy is based on removal of the source, excavation of affected soils, controlled management of groundwater and validation of the completed works.

# Remediation objectives

The objectives are to remove the former underground storage tanks, associated pipework, chambers and redundant fuel infrastructure; remove hydrocarbon-impacted soils within the tank area; prevent further migration of contaminants through shallow groundwater; and confirm that the completed works have reduced the risks to controlled waters to an acceptable level.

# Underground storage tank removal

The former underground storage tanks will be exposed by controlled removal of the overlying hardstanding and surrounding soils. Before lifting, the tanks will be cleaned, degassed and confirmed as safe by a competent contractor.

The tanks will then be removed using suitable lifting equipment. Associated fuel lines, chambers, pumps and other redundant infrastructure will also be removed where encountered.

The tanks and associated materials will be transported to appropriately authorised facilities. Tank-cleaning records, gas-free certification and waste documentation will be retained as evidence of completion. This follows the removal methodology established in the Underground Storage Tank Remediation Plan.

# Removal and management of contaminated soils

Hydrocarbon-impacted soils within and surrounding the former tank area will be excavated under appropriate geo-environmental supervision.

Visual evidence, odour and suitable field-screening observations will be used to guide the excavation. These observations will be supported by laboratory validation and will not be relied upon as the sole evidence that remediation is complete.

Excavation will continue until the tanks and associated infrastructure have been removed and the remaining base and sidewall soils are suitable for validation. Where hydrocarbon impacts extend beyond the initial excavation, the excavation will be extended where it is safe and practicable to do so.

Excavated material will be segregated and held within a suitably contained area pending classification. Material requiring off-site disposal will be assessed in accordance with WM3 and transported by a registered waste carrier to a facility authorised to accept the relevant waste.

Soils removed from the hydrocarbon-impacted area will not be reused within the development unless testing has demonstrated their suitability and the reuse is undertaken through an appropriate regulatory route.

# Groundwater management

Where groundwater requires treatment prior to disposal or authorised discharge, the selected treatment methodology will be based on the nature and concentration of contaminants, anticipated flow rates and the agreed discharge route. In accordance with recognised groundwater remediation practice, treatment may comprise a pump-and-treat approach using temporary extraction sumps or boreholes to recover impacted groundwater, followed by treatment through granular activated carbon filtration or other suitable treatment technologies where supported by analytical testing. More advanced in-situ techniques, such as air sparging, soil vapour extraction or in-situ chemical oxidation, would only be considered if post-source removal monitoring demonstrates that residual dissolved-phase hydrocarbon contamination cannot be satisfactorily addressed through source removal and conventional pump-and-treat measures. Any treatment system will be validated through groundwater monitoring and operated only in accordance with the relevant regulatory approvals and discharge consents.

Shallow groundwater is expected to be encountered during removal of the tanks and affected soils. Water entering the excavation will be collected through temporary sumps or equivalent controlled containment.

Contaminated or potentially contaminated groundwater will not be discharged directly to the ground, groundwater, surface-water drainage, foul drainage or a watercourse.

Pumped water will be temporarily stored and assessed to determine the appropriate management route. The primary disposal route will be removal by a licensed waste contractor to an authorised facility. Where analytical testing demonstrates that on-site treatment is suitable, granular activated carbon filtration or an equivalent treatment process may be used.

Any discharge of treated water will only take place where a lawful discharge route has been confirmed and any necessary consent or agreement has been obtained. The volume of water removed, analytical results, treatment undertaken and disposal or discharge route will be recorded.

This directly addresses the groundwater-management measures identified in the Underground Storage Tank Remediation Plan while ensuring that no uncontrolled discharge takes place.

# Soil-validation methodology

Following removal of the tanks, associated infrastructure and impacted soils, validation samples will be collected from the bases and sidewalls of the completed excavations.

Sampling will cover each former tank location, the former pipework and pump areas, and any locations where staining, odour or other evidence of hydrocarbon contamination was encountered. Additional samples will be obtained where the dimensions of the excavation or field observations indicate that wider coverage is required.

Samples will be analysed by an appropriately accredited laboratory for the contaminants identified as relevant by the Phase 2 Ground Investigation. The analytical suite will include petroleum hydrocarbon fractions and relevant polycyclic aromatic hydrocarbons, together with any additional determinands identified by the supervising geo-environmental professional.

The results will be compared against criteria appropriate to the proposed residential use and the protection of controlled waters.

Where the validation results demonstrate that the applicable criteria have not been achieved, further excavation or treatment will be undertaken and the affected area re-sampled before acceptance.

# Groundwater validation

Following removal of the former tanks and affected soils, groundwater monitoring will be undertaken using the existing monitoring installations where they remain serviceable and suitably located.

Monitoring will include locations within or close to the former tank area and locations capable of assessing whether residual contamination is migrating away from the source area.

Groundwater samples will be analysed for the petroleum hydrocarbon fractions and PAHs identified as relevant within the Phase 2 Ground Investigation. Zinc will also be included because elevated concentrations were recorded within groundwater across the site.

The results will be assessed against controlled-waters criteria appropriate to the site's conceptual model and identified groundwater receptor. Where the results show that residual contamination remains capable of presenting an unacceptable risk, further monitoring or targeted treatment will be undertaken.

# Oxygen-release compounds

Oxygen-release compounds are retained only as a contingency measure should groundwater validation demonstrate that residual dissolved-phase hydrocarbons remain following source removal.

No oxygen-release compound will be introduced without a product-specific environmental risk assessment confirming the material, proposed quantity, treatment area, application method and monitoring requirements.

Any applicable permit, exemption or regulatory agreement will be established before use. Where groundwater validation confirms that source removal has adequately addressed the risk, oxygen-release compounds will not be required.

# Unexpected contamination

If previously unidentified tanks, pipework, free-phase hydrocarbons or other unexpected contamination are encountered, works will stop locally and the affected material will be assessed.

The excavation and remediation measures will be extended as necessary to address the additional source. Any material change to the understood contamination conditions will be recorded and incorporated into the validation of the completed works.

# Verification of the works

The remediation works will be verified through the following records:

- plans showing the final excavation extents and former infrastructure;
- photographic evidence of tank, pipework and contaminated-soil removal;
- tank-cleaning and gas-free certification;
- soil-validation sampling locations and analytical results;
- groundwater analytical results;
- groundwater treatment, disposal or authorised discharge records;
- waste-classification information;
- waste transfer and consignment documentation; and
- confirmation of any additional excavation or treatment undertaken following validation.


These records will demonstrate that the identified hydrocarbon source has been removed, that groundwater has been appropriately managed and that the remediation objectives have been achieved.