

Chetwode Embankment Landscape Earthworks Deposit for Recovery Permit Conceptual Site Model Technical Note



A High-Speed Design Partnership
ARCADIS COWI



Working in
partnership with



Environment
Agency

HEALTH & SAFETY MOMENT

Visibility

- Darker Mornings, Darker Nights
 - Evenings are getting darker sooner (following daylight savings).
 - Plan this into journeys and be prepared for sunsets/sunrises with low sun as this can be dazzling.
 - Visibility in general is likely to get worse with the changing weather.
 - More fog, mist rain etc. limiting vision.
 - Still remain prepared for the occasional sunny days.
 - Check the state and condition of Hi-vis clothing before travelling to Sites as being seen on Site will be more difficult given the low light conditions.

23/01/2025



AGENDA



1. Chetwode Embankment DfR Overview
2. Site Setting
3. Earthworks Design
4. Post-remediation Screening
5. Conceptual Site Model
6. Summary

1. Chetwode Embankment DfR Overview



A High-Speed Design Partnership
ARCADIS  COWI



HS2 Section C23

Outline



- Re-use of Landfill Waste within the HS2 scheme:
 - Excavation from Barton to Mixbury Cutting (Finmere Railway Cutting Landfill, LQ 14-02)
 - Deposition within Chetwode Embankment Landscape Earthworks
- An application for a Deposit for Recovery Permit for these works was submitted (EPR/LB3404KN/A001):
 - The Environment Agency raised 6 queries relating to the submission
 - ASC Conceptual Site Model Technical Note addresses the queries raised
 - This presentation summarises the CSM Technical Note

Summary of the queries raised by the Environment Agency:

- I. Conceptual model (shallow groundwater) – additional evidence
- II. Conceptual model (cross-sections) – present full CSM
- III. Conceptual model (Schedule 22- EPR 2016) – Evidence that the waste will meet requirements
- IV. Assessment required of the waste as a source term
- V. Details of any mitigation measures are required
- VI. Assessment of the risk to surface water from contaminated runoff

2. Site Setting

Query I, II, VI



A High-Speed Design Partnership
ARCADIS COWI



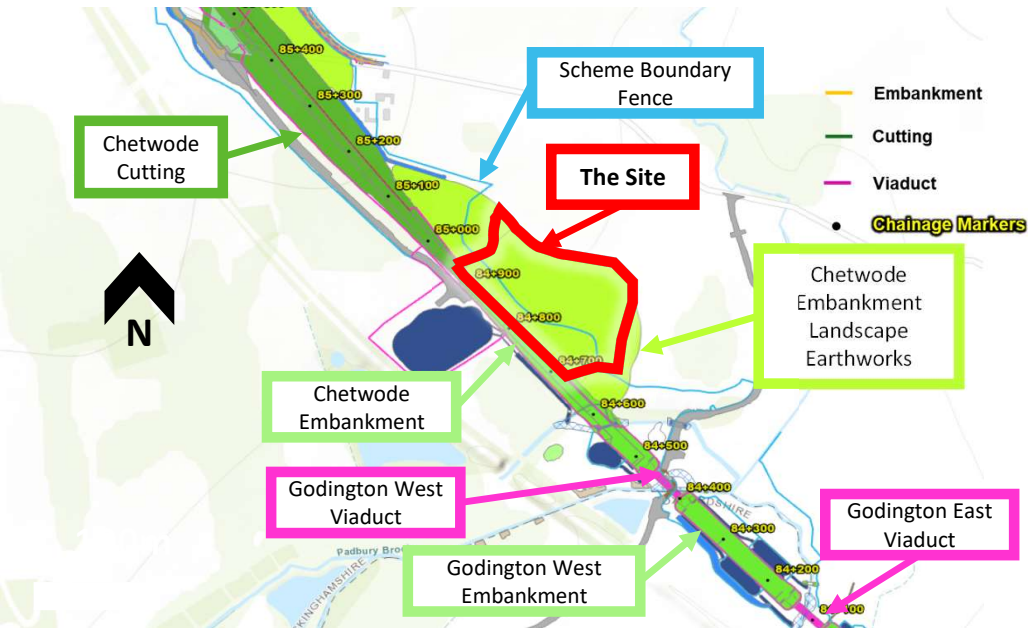
HS2 Section C23

Site Setting

- Situated within Twyford to Greatworth (T2G) ,C23, Phase 1
- Located at Chetwode Embankment, Preston Bissett Road, Chetwode, Buckinghamshire, MK18 4LF

Key

Ground Investigation



On-site Geology

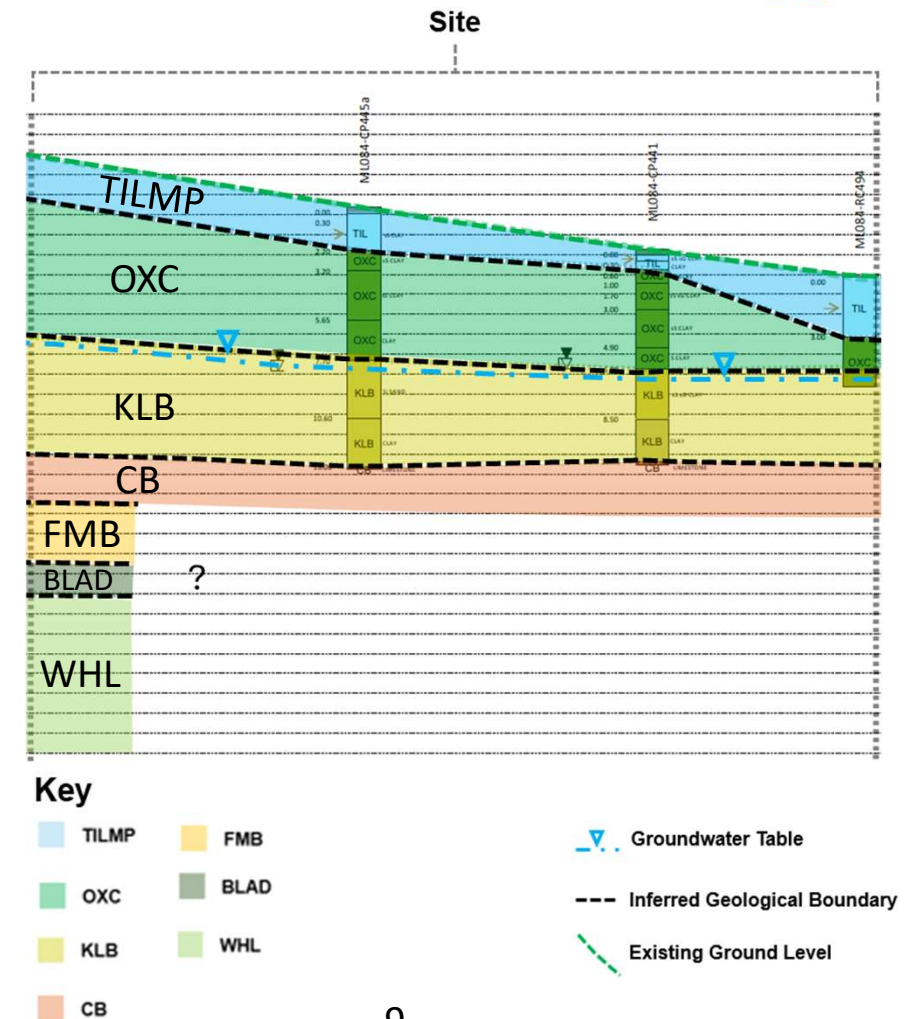
- Published and site-specific GI:
- TILMP, OXC, and KLB on-Site
- Geotechnical and hydrogeological testing of the TILMP and OXC (on-Site and off-Site) shows that both units have similar physical properties (composition, plasticity, permeability)
 - Occasional sand pockets within the TILMP – however, limited + discontinuous
- TILMP + OXC considered as a single cohesive (silty CLAY) unit for the purpose of the assessment
- Combined TILMP/OXC thickness ranges between >5-9m (south to north)



Hydrogeology/Groundwater



- Chetwode Embankment falls within re-use Zone 3 (unproductive strata) due to TILMP and OXC (very low to low permeability)
- Groundwater underlying the Site was encountered at the top of KLB (confined by TILMP/OXC)
- Therefore, migration of contaminants to groundwater is not considered to be a viable pathway given the thick underlying low permeability strata



Hydrology

Watercourses

- Padbury Brook
- Tributary of Padbury Brook

Ponds

- 2 attenuation ponds
 - C2.T.79 Pond – 150 SE
 - C2.T.80 Pond – 50m W

Springs

- 2 present within the surrounding area
 - 1 inactive within the footprint of the proposed C2.T.80 Pond (not recorded since 1930s)
 - 1 active (Off-Site) situated 340m W/NW
 - Feeding the tributary of Padbury Brook.
 - Situated Upgradient from the Site



3. Earthworks Design

Query V



A High-Speed Design Partnership
ARCADIS COWI

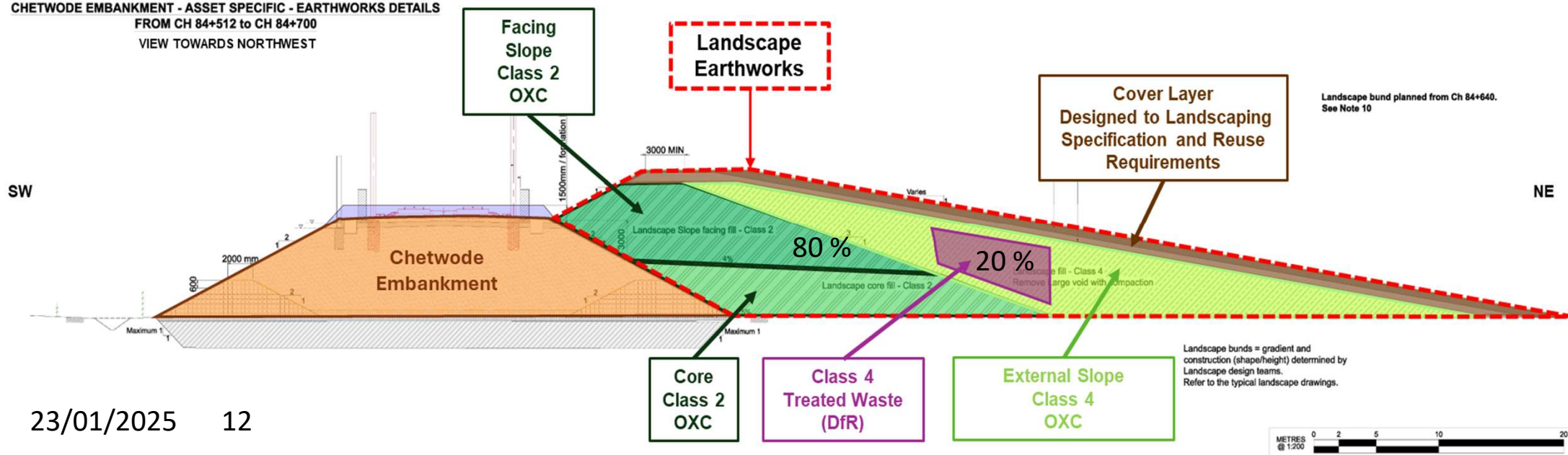


HS2 Section C23

Chetwode Embankment Landscape Earthworks Design

- High plasticity clays (OXC) – Class 2 and Class 4
- Treated waste to be placed within engineered OXC & use of an orange demarcation layer between treated waste and clean cover
- Restoration clean cover material (as per landscaping design/re-use requirements)
- Treated waste 20% : OXC 80% of the required materials for construction

CHETWODE EMBANKMENT - ASSET SPECIFIC - EARTHWORKS DETAILS
FROM CH 84+512 TO CH 84+700
VIEW TOWARDS NORTHWEST



4. Post-remediation Screening

Query III, IV



A High-Speed Design Partnership
ARCADIS COWI



HS2 Section C23

Post Remediation Validation



- Initial validation results (25 available) confirm a significant reduction in the number of exceedances recorded on-Site.
- Post-remediation results confirm the suitability of the treated wastes to be re-used on-Site (when placed at depth, below a demarcation and restoration layer)

Post- Remediation (25 samples) - DUO/Jackson Remediation Data						
Criteria	Human Health/Zone 3					
	Allotment		POS park		Commercial/Industrial	
Chemical Name	# of Exceedances	% of total samples	# of Exceedances	% of total samples	# of Exceedances	% of total samples
Arsenic						
Cadmium						
Zinc						
Naphthalene						
Fluoranthene						
Phenanthrene						
Chrysene						
Benzo(a)anthracene						
Benzo(b)fluoranthene	1	6%	0	0%	0	0%
Benzo(a)pyrene	1	6%	0	0%	0	0%
Dibenz(a,h)anthracene						
Indeno(1,2,3-c,d)pyrene						
>EC8-EC10 Aromatics						
>EC10-EC12 Aromatics						
>EC12-EC16 Aromatics						
>EC16-EC21 Aromatics						
>EC21-EC35 Aromatics						
Benzene						
Asbestos	# Detect	% Detect	Min (% v/v)	Max (% v/v)	Types	Form
	3	12%	<0.001	<0.001	Chrysotile	Fibres

5. Conceptual Site Model

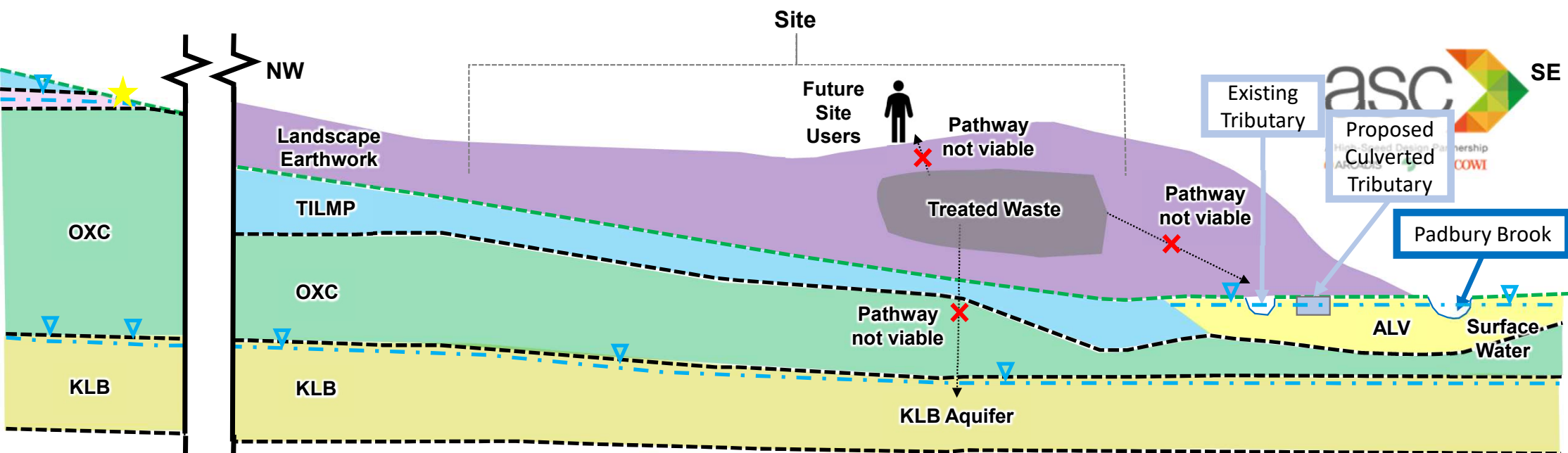
Query II, VI



A High-Speed Design Partnership
ARCADIS COWI



HS2 Section C23



Key

- | | |
|--------------------------------|-----------------------|
| Glaciofluvial Deposits (GFDMP) | Geological Boundary |
| Alluvium (ALV) | Groundwater Table |
| Till (TILMP) | Potential Pathway |
| Oxford Clay Formation (OXC) | Existing Ground Level |
| Kellaways Formation (KLB) | Groundwater Spring |
| Treated Waste | |
| Landscape Earthwork | |

The CSM has assessed that there are not viable Contaminant pathways present on site, these are presented in the next slide

Conceptual Site Model (CSM)



The CSM shows the treated waste is suitable for re-use on-Site due to the absences of pathways to the following:

- **Human Health**

- Chemical suitability (Passes Zone 3 Material Re-use Criteria)
- Placement at sufficient depth within the scheme
- Utilising a demarcation layer to indicate the presence of the treated waste/asbestos impacted soils

- **Controlled Waters** (Inclusive of the above)

- Groundwater
 - Placement within high plasticity, low permeability clay strata of sufficient thickness.
- Surface Water
 - Surface water receptors are to be culverted and lined where appropriate
 - Depth of placement of the waste and use of low permeability OXC limits interaction with surface water run-off

8. Summary



A High-Speed Design Partnership
ARCADIS  COWI



HS2 Section C23

EA Queries- I, II,III

I. Conceptual model (shallow groundwater) – additional evidence

- CSM prepared based on published (desk-based) environmental setting information and site-specific ground investigation
- Groundwater encountered on site at depth (>6m bgl) at the top of the KLB, and potential for it to be present within limited, discontinuous, small sand pockets within the TILMP
- The geological model shows >5m of low permeability TILMP/OXC underlies the Site that acts as an aquitard confining groundwater within the KLB

II. Conceptual model (cross-sections) – present full CSM

- An asset specific CSM has been prepared based on published (desk-based) environmental setting information (geology, hydrogeology, hydrology) and site-specific ground investigation, incorporating the proposed engineering design and mitigation measures and is presented as a tabulated CSM and cross-section in response to this query.

III. Conceptual model (Schedule 22- EPR 2016) – Evidence that the waste will meet requirements

- RPS undertook a HazWasteOnlineTM (WM3) assessment on the pre-remediated waste which classified the majority of the samples as non-hazardous waste. 2/109 samples were classified as hazardous (ecotoxicity and corrosiveness/pH)
- Treated waste results (available to date) assessed and considered suitable for re-use within the Site (re-use Zone 3); in accordance with the Routewide Materials Re-Use Strategy which has been agreed with the Environment Agency.
- The potential impacts to groundwater from the treated waste are considered very low given the proposals ensuring there is the absence of a viable pathway to controlled waters and therefore meets the requirements of Schedule 22 of EPR 2016.

EA Queries- IV, V, VI

IV. Assessment required of the waste as a source term

- The Made Ground re-use screening criteria utilised within C23 were derived on the assumption that the placed Made Ground (e.g. treated waste) is the source (conservatively modelled as continuous).
- The treated waste has been assessed against the Zone 3 reuse criteria and is considered suitable for re-use within the Site
- In addition, the design of the landscape earthworks reduces the likelihood of potential pollution
- The contaminant linkage to groundwater, runoff to surface water and human health direct contact receptors are not considered viable (Section 5).

V. Details of any mitigation measures are required

- Mitigation measures incorporated into the landscape earthworks comprise the engineering design and re-use strategy/criteria are protective of groundwater receptors. Furthermore, the treated waste has been remediated and the Site is underlain by >5m of unproductive strata.

VI. Assessment of the risk to surface water from contaminated runoff

- The CSM has demonstrated the absence of a viable pathway between the treated waste and surface runoff due to the engineering design of the landscape earthworks (the chemically suitable, compacted, treated waste will be within low permeability OXC) .
- The agreed reuse criteria is based on conservative Consim modelling, which models the leaching of a continuous source (in this instance the source being the treated waste) and migration to surface water receptors.
- Adopting the agreed reuse criteria demonstrates that there is not a need for further remedial measures when considering surface water receptors due to the absence of a potential pollution linkage.
- Following construction of the HS2 scheme the nearest surface watercourse will be the diverted tributary of the Padbury Brook ~90m south of the Site, which will be lined or culverted where diverted.

Summary

- Treated waste is chemically suitable for the Site (Zone 3)
 - Due to presence of asbestos free fibres, material will be suitable for placement at differing depths below the restoration layer based on where in the scheme they are to be re-used:
 - Within the Limit Of Deviation (LOD) >600mm
 - Within ecological planting >300mm below landscaping cover
 - Within agricultural land cover >1.2m
 - To be separated by a demarcation layer
- Given the engineered design (placement within cohesive high plasticity clays below a restoration layer) of the earthworks viable contaminant pathways are not considered present on Site.
- Further information provided within the Chetwode Embankment Landscape Earthworks Conceptual Site Model Technical Note (1MC06-CEK-EV-NOT-CS06_CL10-000004)