SKANSKA COSTAIN STRABAG Working in partnership with HS2

1MC04 Main Works – Contract Lot S2

Copthall South Water Management Plan

Document no: 1MC04-SCJ-EV-PLN-SS05_SL07-000039

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C01	Richard Green	Sam Gold	Andrea Fitzmaurice	05/06/2023	1st Issue
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	Richard Green		A. Fitzmaurice		

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C01	05/06/2023	All	1st Issue	R Green	S Gold	A Fitzmaurice	Internal review	~
C02	03/10/2023	All	Additional of STA, Chr VI, Sulphate & Conditioner Management	R Green	S Gold	A Fitzmaurice	Update	~

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1 Purpose

1.1.1 This Water Management Plan (WMP) details how the Skanska Costain Strabag Joint Venture (SCSJV) and its supply chain will deliver the environmental and sustainability requirements of the High Speed Two (HS2) Main Works Contract (MWCC) for S1 and S2 during construction. The purpose of this document is to identify risks and management of site/offsite surface water and groundwater at Copthall South (Gate 1, Harvil Road, UB6 9JL), henceforth written as "the site" during construction. A well-designed water management plan is necessary to control, manage and protect water resources while ensuring compliance with applicable consents. These waters, if not managed correctly will have the potential to adversely affect project delivery and/or causing environmental harm

This document is supplementary to the Site Specific Environmental Control Plan (SSECP) and should be read in conjunction with the HS2 Code of Construction Practice (CoCP) and Environmental Minimum Requirements (EMR's).

2 Scope

2.1.1 This plan covers the management and protection of water resources at Gate 1, inclusive of groundwater, surface water and 3rd party assets (i.e. Thames Foul). Additionally included are details of site controls for the management site generated waters and leachate, including a summary of consents and requirements associated with the Copthall South construction activities

3 Site Information

3.1.1 The Copthall South asset area is located in Ickenham, around 3 km to the west of Ruislip in the London Borough of Hillingdon (LBH), in the River Pinn catchment. The site sits immediately south of the National Rail (NR) Chiltern Main Line (CML). The Copthall South area is split into the Southern Treatment Area (STA) facility in the northern part of the area, and the Southern Sustainable Placement Area (SSPA) which will hold the compacted TBM arisings in permanent placement. The SSPA mounds are bound by Harvil Road to the west and Breakspear Road South to the east, as shown in Figure 1. The SSPA land is part of Copthall Farm.

3.1.2 Historically, aerial surveys show the site appeared to be used predominantly comprised of agricultural fields of varying sizes with a small area of commercial operation to the east. A small area of woodland (approx. 1.5 Ha), referred to as the Copthall Covert bounds to the north of the site.

3.1.3 Within the SSPA boundary a series of land drains and/or ditches transfer surface water of the SSPA towards a ditch that runs parallel to Breakspear Road, and ultimately discharges to the River Pinn. The STA area south of the Copthall Covert typically followed a similar regime, with

surface water to the north of the covert managed by drainage installed by enable works contractors in advance of SCS's presence, however this area is also still within the catchment of the River Pinn.

3.1.4 SCS have modified the sites drainage to manage surface waters during the construction phase. The site consists of five attenuation ponds as per below:

- Pond 1: Attenuates watershed of STA offices, car park, muck bays and PUG Mill (lime treatment infrastructure)
- Pond 2: Attenuates watershed of STA liming mound (treatment pad 1) and top/sub soil storage
- Pond 3: Additional attenuation for Pond 4
- Pond 4: Attenuates watershed of SSPA Mound 1 for treated arisings stockpiling
- Pond 5: Attenuates watershed of SSPA Mounds 2 & 3

3.1.5 Ponds 1 – 4 discharge via a treatment system (pH & sediment) to an ordinary watercourse to the south of the STA, this enters storm drainage at Breakspear Road before discharging to the River Pinn.

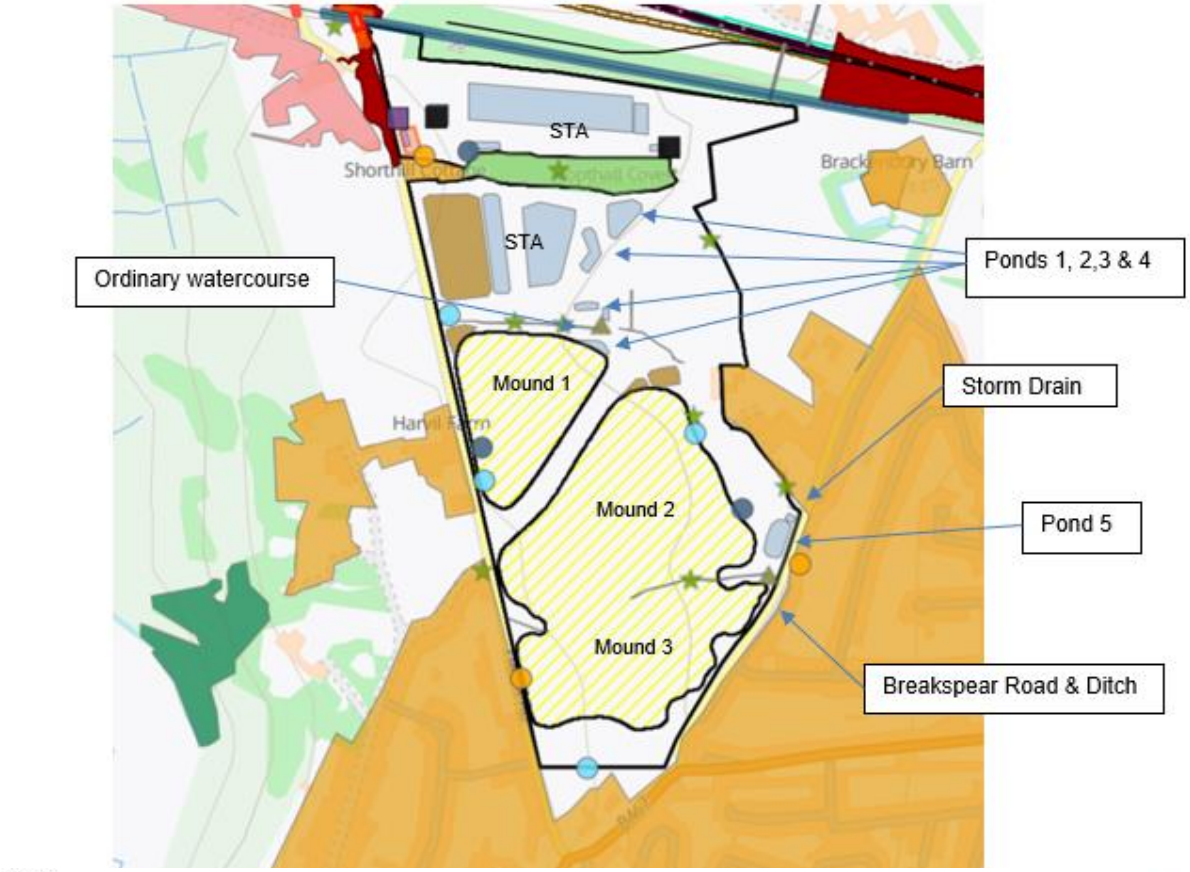
3.1.6 Pond 5 discharges via a treatment system to a ditch that runs parallel to Breakspear Road, before entering the storm drain and discharging to the River Pinn. It should be noted that the Breakspear Road ditch has been prone to historic flood events prior to SCS's construction activities.

Table 1 – Drainage Flow Routes

Site Drainage Flow Routes	
Muck bin drainage	Muck bin drainage - siltbuster 1 - oil interceptor 1 - to pond 1 - siltbuster 2 - ordinary watercourse - Breakspear road drainage/culvert - River Pinn
STA (including carpark, skip lane and haul roads) (Fig 1 & 2)	Site drainage - oil interceptor 1 - pond 1 - siltbuster 2 - ordinary water course - Breakspear road drainage - River Pinn
Treatment Pad 1 (Fig 3)	V-ditches - pond 2 - oil interceptor 2 - siltbuster 2 - ordinary water course - Breakspear road drainage/culvert - River Pinn
Mound 1 (Fig 3)	V-ditches - pond 4 - pond 3 over pump - siltbuster 2 ordinary water course - Breakspear road drainage/culvert - River Pinn
Mound 2 & 3 (Fig 4)	V-ditches - pond 5 - siltbuster 3 - Breakspear road drainage/culvert - River Pinn

3.2 Site Plans

1. Site Environmental Constraints



KEY

Receptors (polygons)
- Residential
- Commecial

Sensitivities (polygons)
- Ecology
- Nature Conservation Area (Ancient woodland/LWS/SBI etc)
- Historic Environnement (Built Heritage areas/conservation areas)
- Topsoil
- Landscape management areas

Site Equipment (polygons)
- Welfare
- Significant construction assets

Monitor Locations (points)
- Air Quality
- Vibration
- Noise
- Water

Discharge Points (points)
- Thames water
- Surface water
- Groundwater (Recharge)

Meter Locations (points)
- Water
- Electricity

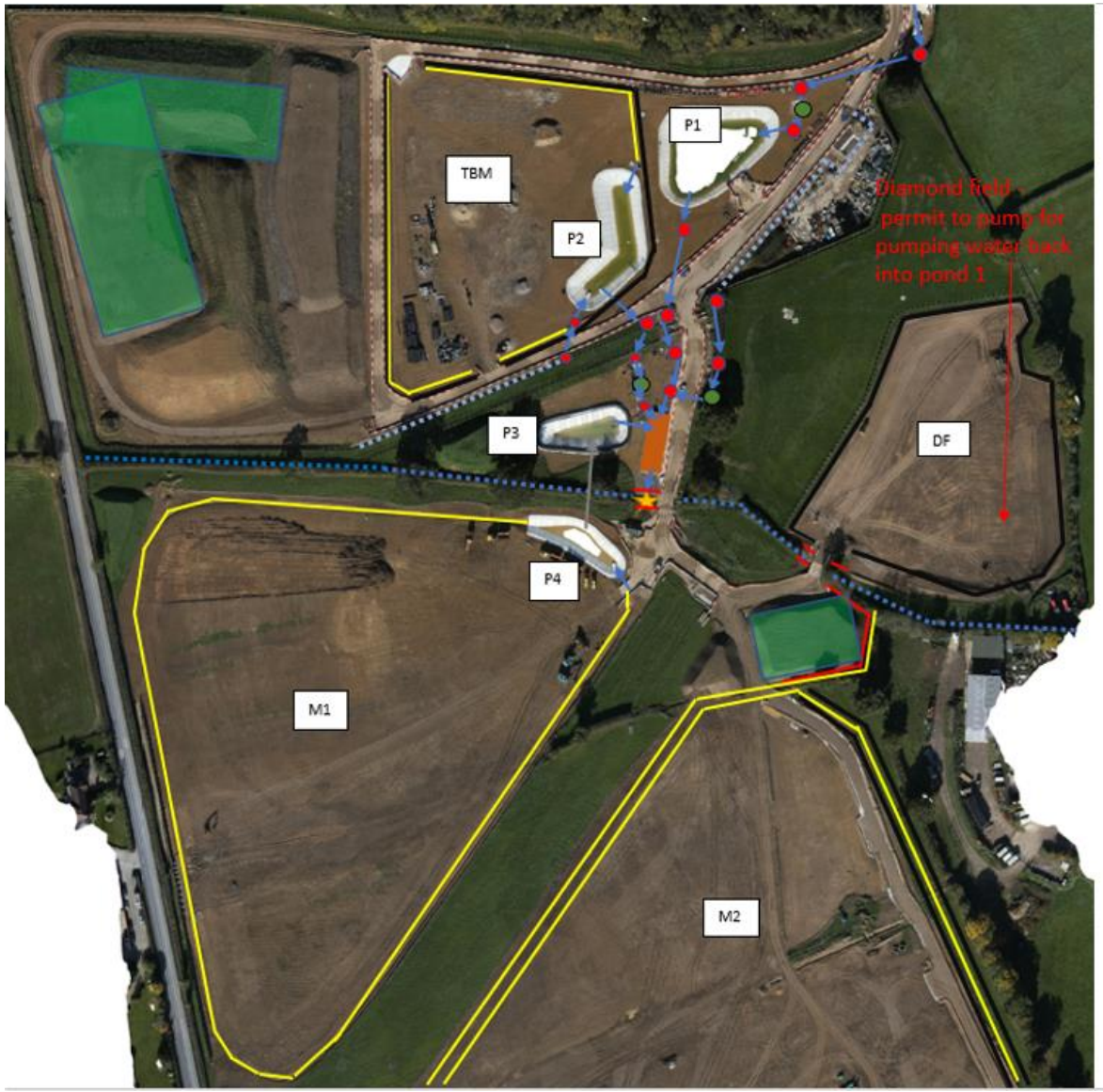
Sensitivities (points)
- Ecology
- Heritage

Site Equipment (points)
- Generators
- COSHH Stores
- Skips / Haz waste

2. STA & Skip Lane Drainage

Site Labels			
HROC	Harvil Road Over Chiltern Line	**SL**	Skip Lane
MB1-3	Muck bin 1-3	**WML**	West Materials Lab
CL	Chiltern Line	**CP**	Cesspit
CGL	Cadent gas line	**CC**	Copthall Covert
CON	Conveyor	**PUG**	Pugmill

3. STA Temporary TBM Stockpiles, Diamond Field & Mound 1 Drainage



★ Sch 33 HS2/P10415 - covers STA

EA Agreement – Covers mound 1/2/3 - not yet consented but application in progress

Discharge point for p1-4

Legend	
	Attenuation Tank
	Siltbuster
	Muck bin drainage
	Drainage including flow
	V-ditch
	Manhole
	Runoff direction
	Wheelwash
	Oil interceptor
	Discharge point
	Overpump
	Watercourse
	Silt fencing
	Bunding
	Topsoil stockpile
	Filter drain

Site Labels			
HROC	Harvil Road Over Chiltern Line	**SL**	Skip Lane
MB1-3	Muck bin 1-3	**P1-5**	Attenuation ponds 1-5
CL	Chiltern Line	**TBM**	Tunnel boring machine arisings spoil
CGL	Cadent gas line	**DF**	Diamond Field
CON	conveyor	**M1-3**	Mounds 1-3
OF	Office		

4. SSPA Mounds 2 and 3 Drainage

Legend	
	Attenuation Tank
	Siltbuster
	Muck bin drainage
	Drainage including flow
	V-ditch
	Manhole
	Runoff direction
	Wheelwash
	Oil interceptor
	Discharge point
	Overpump
	Watercourse
	Silt fencing
	Bunding
	Topsoil stockpile
	Filter drain

Mounds 2/3 application in progress – currently operating under an EA agreement.


Stormwater culvert

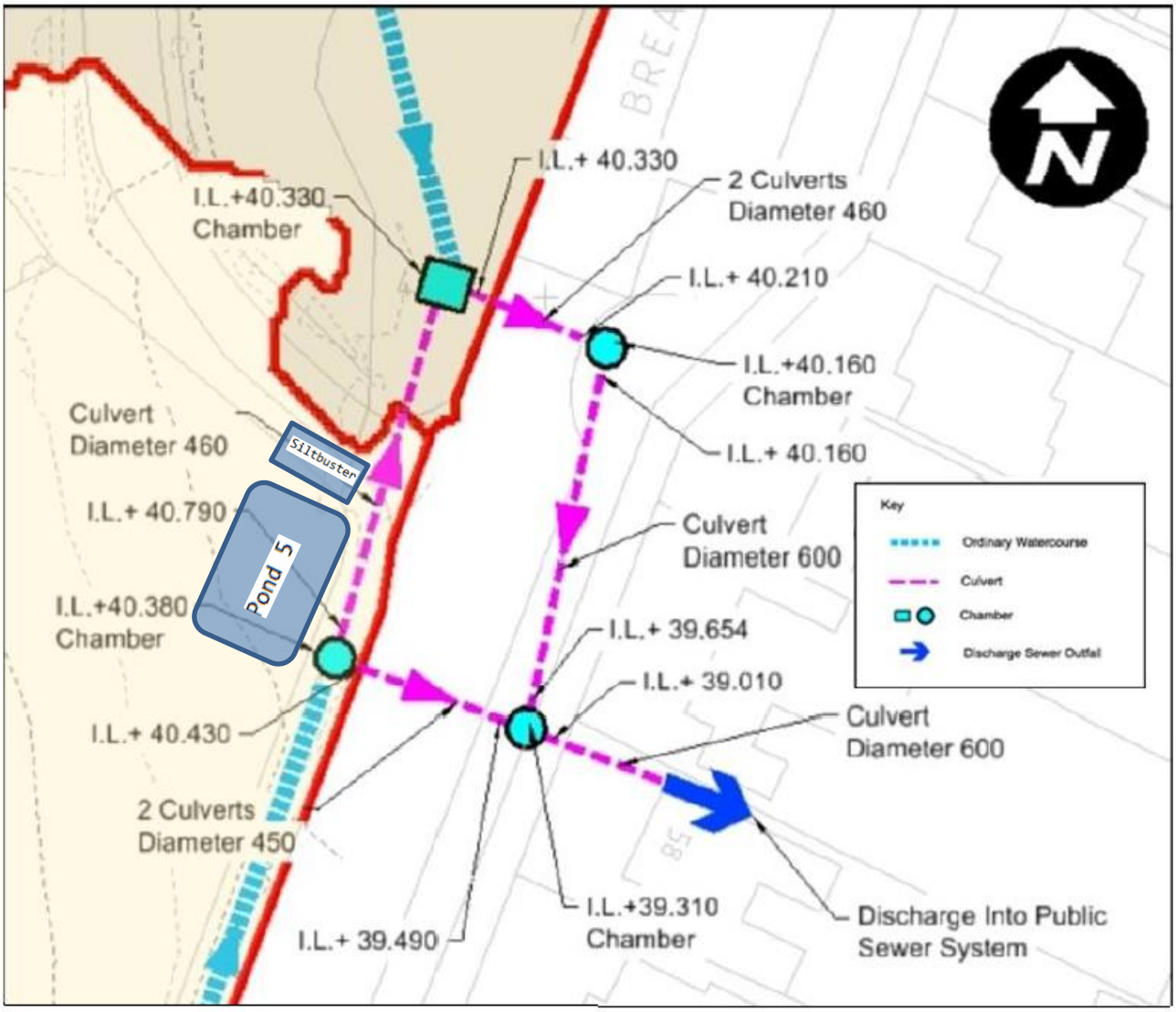

Drainage ditch along Breakspear road

Pond 5 discharge point


Pond 5

Site Labels			
HROC	Harvil Road Over Chiltern Line	SL	Skip Lane
MB1-3	Muck bin 1-3	P1-5	Attenuation ponds 1-5
CL	Chiltern Line	TBM	Tunnel boring machine arisings spoil
CGL	Cadent gas line	DF	Diamond Field
CON	conveyor	M1-3	Mounds 1-3
OF	Office		

5. Drainage around the Drainage ditch and stormwater chamber



6. Drainage to River Pinn (Siltbuster 2 & Siltbuster 3)

3.3 Underlying geology

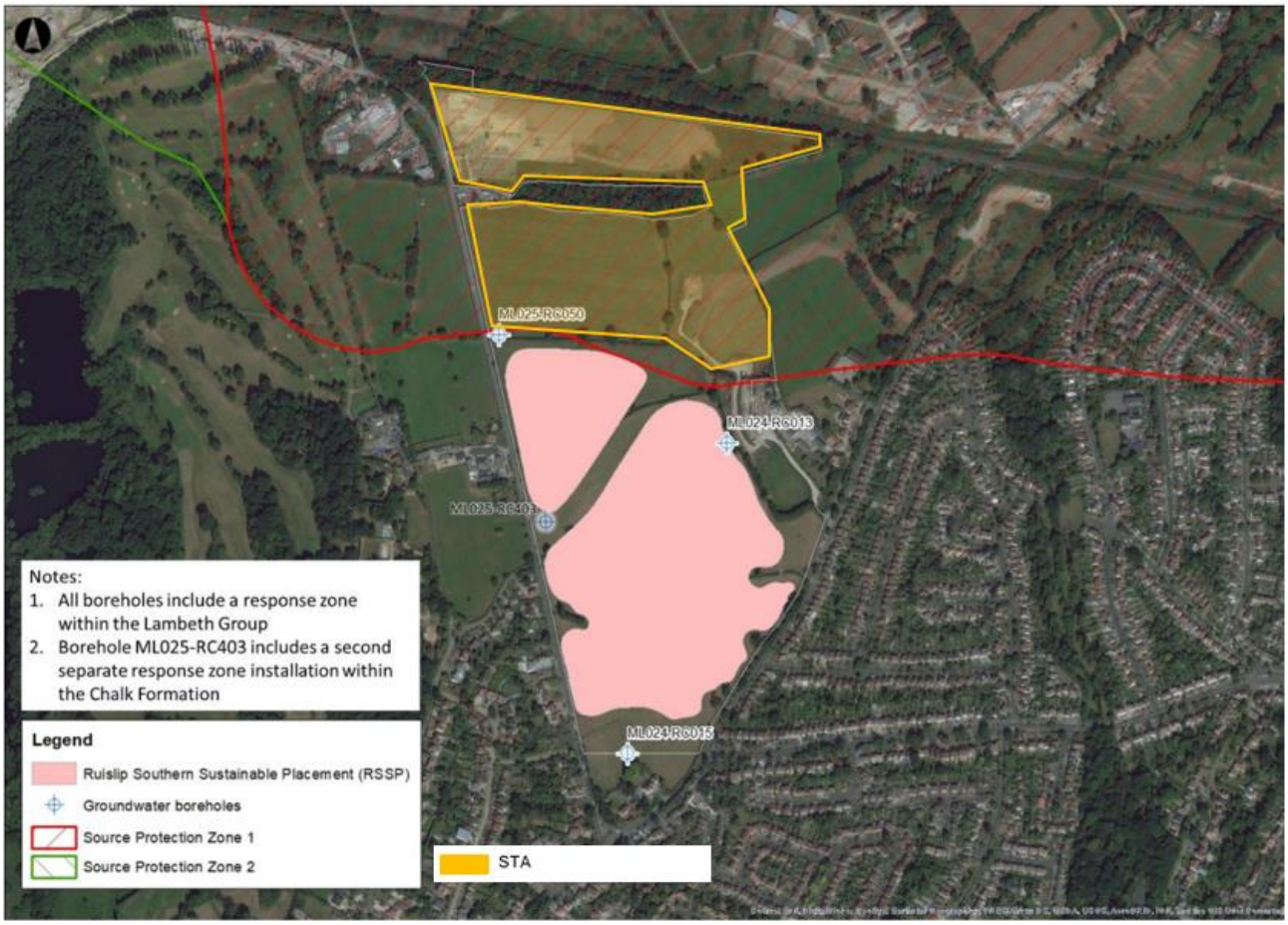
3.3.1 A Ground Investigation Report (GIR) and Hydrogeological Risk Assessment (HRA) was prepared for the SSPA assets. The stratigraphy of Gate 1 shows the London Clay Formation, a geological unit with a low permeability, overlying lower formations with greater and more variable permeability, the Harwich Formation, Lambeth Group, and Seaford Chalk Formation. A thin layer of topsoil was also found at the surface level overlying superficial (clay) deposits.

3.3.2 The STA overlies an inner Source Protection Zone (SPZ) as shown in Fig 6, whilst the SSPA lies south of the SPZ1 limit.

3.3.3 There are no known public or private licensed groundwater abstraction wells in proximity to the Gate 1 site boundary except for the Ickenham Well, which is owned by Affinity Water. This permitted abstraction well lies in the SPZ-1, however it is not currently in operation and the closest edge of the SSPA is more than 500m away from the nearest adit.

3.3.4 Within the limits of site there is no interaction between surface water and the deep aquifer. Given the low permeability nature of the materials above the Chalk Formation and basal sands in the Lambeth Group and since the natural watercourses are assumed to not be in hydraulic continuity with the Chalk.

7. STA & SSPA in relation to SPZ1



3.4 Flood Zones

3.4.1 Flood Risk is mostly surrounding Attenuation Pond 5 which takes the water from mounds 2 and 3, and has been designed to a 1:2 year flood event. This location has historically flooded prior to SCS activities, the last being 2021. Located at the low point of the SSPA and with drainage that is susceptible to blockages, SCS is working to increase attenuation capacity at this location (this plan will be updated to reflect upon completion). To alleviate the risk of flooding contingency measures have been put in place. These include:

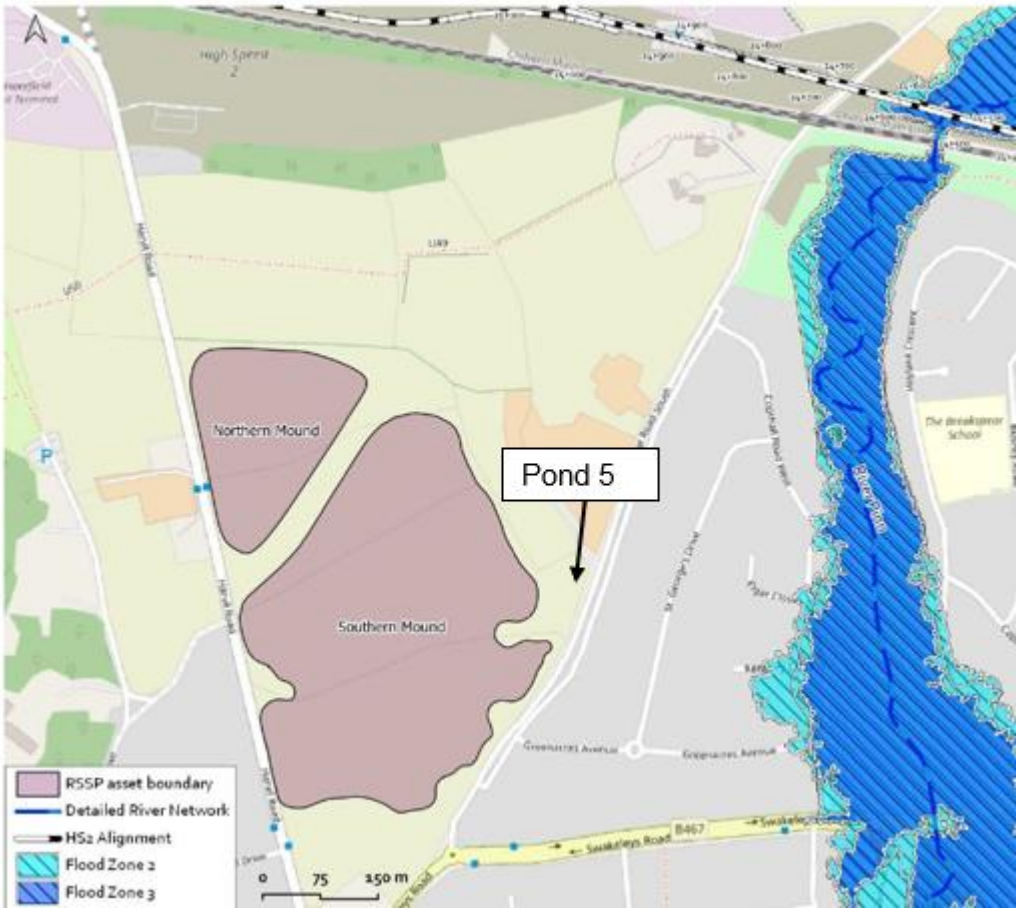
- Sandbag attenuation for overflow events
- Emergency Access off farmer's access
- Check dams within the v-ditches
- Additional attenuation area on mound 3
- Overnight pumping (if required)

- Emergency dewatering (T&M)
- Daily Breakspear Road stormwater grate checks
- Camera installation for checking drainage

3.4.2 In addition to the extra mitigation measures the team check the weather daily to see what actions are required to deal with incoming rain events, and sign up to the EA's local flood alerts.

3.4.3 The River Pinn also has a flood zone as shown in Figure 9. The site is located 300m away from the Flood Zone 2 flood extent (1 in 1,000-year) of the River Pinn. Therefore, there will be no risk of flooding of the site from fluvial flood sources.

8. Fluvial flood extent map (EA Flood zones)



3.5 STA and SSPA Catchment Management

3.5.1 The STA and SSPA is split into different catchments. These catchments are captured within the v-ditches and attenuation ponds on-site.

3.5.2 Small volumes of rainfall runoff within the catchments which are not connected to any drainage is pumped to the closes available v-ditch or adjacent ground under specific permits to pump.

HS2/P10415 (STA)

- Drainage System 1: Collecting/Treating Water for the Muck Bins/STA. Pumps 1-4 (Siltbuster Units 1 &2)
- Drainage System 2: Collecting/Treating Water from the temporary TBM arisings. Pump 5-6 (Siltbuster Unit 2)

HS2/P10692 (SSPA)

- Drainage system 3: Collecting/Treating Water from Mound 1. Pump 7-8 (Siltbuster Unit 2)
- Drainage System 4: Collecting/Treating Water from Mounds 2/3. Pump 9 with flow rate 65.2l/s (Siltbuster Unit 3)

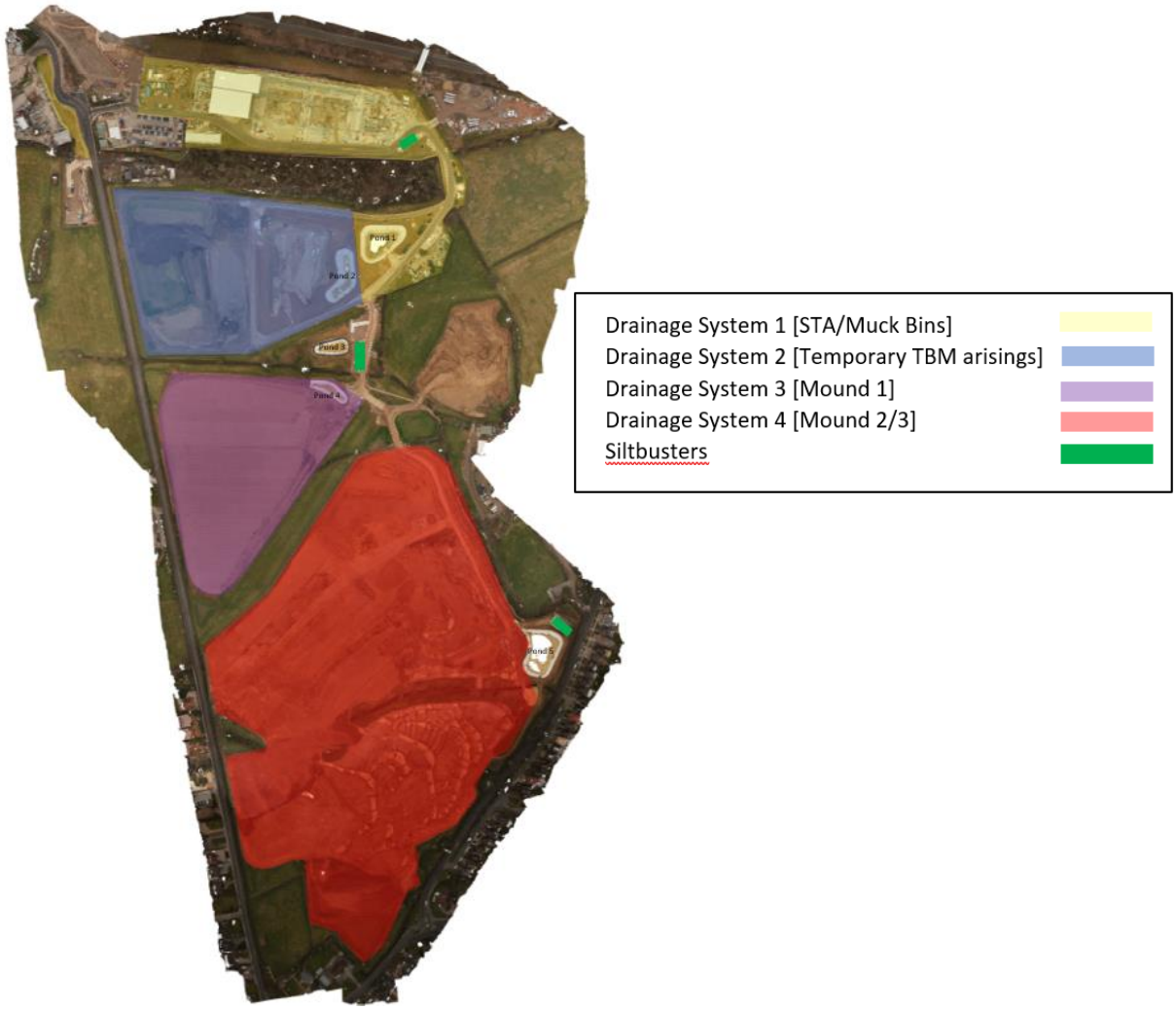
Table 10. Summary of Pond and Details

Catchment Reference	Catchment Area	Ponds	Attenuation pond capacity	Discharge Point Grid reference	Return period used for measurements (subject to change based on final programme)	Proposed Max discharge rate from catchment per hour	Location of Treatment system	Outfall point
Drainage system 1 [STA/Muck bins/Skip Lane]	*60,910.6 m2*	*Attenuation pond 1*	*3942m³*	*TQ06609 86904*	*1 in 30 year*	*58.3 m3 (16.2l/s)*	*Near Lime Treatment silo*	*Unnamed ordinary watercourse*
Drainage system 2 [Temporary TBM treatment]	*46,080.4 m2*	*Attenuation pond 2*	*1642m ³*	*TQ06609 86904*	*1 in 2 years*	*58.3m3 (14l/s)*	*Near Pond 3*	*Unnamed ordinary watercourse*

Drainage system 2 [Mound 1]	*43,940 m2*	*Attenuation pond 3 & 4*	*Pond 3: 107om³ Pond 4: 405m³*	*TQ06609 86904*	*1 in 30 years*	*58.3 m3 (16.2l/s)*	*Near Pond 3*	*Unnamed ordinary watercourse*
Drainage System 4 [Mounds 2 & 3]	*149,030 m2*	*Attenuation pond 5*	*4058m³*	*TQ 06900 86624*	**1 in 2 years*	*234.7m3/h (65.2l/s)*	*Near the farmers entranceway and Breakspear Road South*	*Breakspear Road South drainage ditch*

**Construction of pond 5 capacity was slightly above the designed plans. This was achieved through a small increase in the pond's perimeter height, and by installing the pond base (and pump) to an additional 500mm depth.*

9. Catchment Areas for the Drainage Systems On-site



3.6 Rainfall Calculations for Ponds

3.6.1 When topsoil is stripped, the exposed surface may be compacted, resulting in reduced infiltration capacity and increased surface runoff. Additionally, London clay is a relatively impermeable soil type that can limit the infiltration of water into the ground, leading to increased surface runoff.

3.6.2 Calculations for runoff and flooding have been undertaken for all the attenuation ponds. These calculations were done by the Engineers that designed the ponds. Ponds 1 and 2 were designed by Costain engineer and ponds 3, 4, and 5 were designed by Skanska engineers.

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Skanska Engineer: stuart.goodall@skanska.co.uk

Pond 1:

3.6.3 The drainage network of Pond 1 is complex and not straightforward. It is important to consider the entire drainage network, including inflows from the upstream catchment and backflows from the downstream network catchment when flow control is activated at CP37. Please refer to design drawing 1MC04-SCJ-EN-SKE-SS05_SL07-650028_C01 & -650029_C01 and associated drawings for Pond details, drainage philosophy, and flow control information. It is assumed that the designed details are similar to the as-built on-site conditions.

1:2 Year event (from empty)

3.6.4 It takes 480 minutes to fill up to the maximum level of 46.429 mAOD (meters above ordnance datum) with a discharge rate restricted to 16 l/s at CP37. Pond 1 does not flood, and it has a freeboard of 1.771 m.

1:10 Year Event (from empty)

3.6.5 It takes 600 minutes to fill up to the maximum level of 46.987 mAOD with a discharge rate restricted to 16 l/s at CP37. Pond 1 does not flood, and it has a freeboard of 1.213 m.

1:30 Year Event (from empty)

3.6.6 It takes 720 minutes to fill up to the maximum level of 47.419 mAOD with a discharge rate restricted to 16 l/s at CP37. Pond 1 does not flood, and it has a freeboard of 0.781 m.

3.6.7 Without any discharge, Pond 1 does not flood for storm events of 1:2, 1:10, and 1:30 years. However, the chambers downstream of the pond (CP 30, 34, 36 & 37) do experience flooding.

Pond 2:

3.6.8 SCS Design Brief TWDB 4415 – Pond 2 (referred to as Pond CP 17 on drawings. The following responses consider the entire drainage network rather than just the empty or fill scenarios of Pond 2. Downstream of Pond 2, there are two pump flow controls: one at FC 19 with a restricted flow rate of 13 l/s, and the other at FC 25 with a restricted flow rate of 16.5 l/s. The cover level of Pond 2 is at 48.400 mAOD.

3.6.9 For detailed information regarding Pond specifications, drainage philosophy, and flow control, please refer to design drawing 1MC04-SCJ _CST-EN-SKE-SS05_SL07-000175 - GA C01 and the associated drawings. It is assumed that the designed details and as-built on-site are similar.

1:2 Year event (from empty)

3.6.10 it takes approximately 480 minutes for the pond to fill up to a maximum level of 48.154 mAOD. Pond 2 does not flood under these conditions, and the available freeboard in the pond is 0.246 m.

1:10 Year Event (from empty)

3.6.11 It takes 60 minutes for the pond to fill up to a maximum level of 48.190 mAOD. Pond 2 does not flood during this storm duration but may flood during the next storm. The available freeboard in the pond is 0.21 m.

After 180 minutes, the pond floods, resulting in a flooded volume of 53.2 m3.

After 600 minutes, the pond reaches its maximum flooded volume of 109.4 m3.

1:30 Year Event (from empty)

3.6.12 It takes 30 minutes for the pond to fill up to a maximum level of 47.948 mAOD. Pond 2 does not flood during this storm duration but may flood during the next storm. The available freeboard in the pond is 0.452 m.

After 60 minutes, the pond floods, resulting in a flooded volume of 13.1 m3.

After 720 minutes, the pond reaches its maximum flooded volume of 246.9 m3.

3.6.13 Without any discharge, pond 2 floods in 240 minutes for a 2-year winter storm, with a flooding volume of 9.7m³ (9700 litres).

Pond 4:

3.6.14 These calculations are based on a discharge rate of 19.2 l/s, which is the consented discharge for pond 4.

1:2 Year event (from empty)

3.6.15 The main pond reaches capacity in 240 minutes for a winter storm, without flooding.

1:10 Year Event (from empty)

3.6.16 The main pond reaches capacity in 360 minutes for a winter storm, without flooding. However, there is 74m³ of flooding at the culvert inlet to the swale near the pump.

1:30 Year Event (from empty)

3.6.17 The main pond floods in 360 minutes for a winter storm. Flooding is experienced throughout the swale system upstream, with an approximate volume of 480m³ (480,000 litres).

3.6.18 4. Without any discharge, the main pond floods in 1440 minutes for a 2-year winter storm, with a flooding volume of 228m³ (228,000 litres).

Pond 5:

3.6.19 Pond 5 has a discharge limit of 65.2 l/s, but the calculations are based on a discharge rate of 20 l/s.

3.6.20 The updated pond with increased capacity can accommodate a 2-year storm plus 10% climate change with a discharge rate as low as 20 l/s. The model has been adjusted to allow the pump to sit at the invert level of the pond (41.500m) and not 500mm higher as in the previous design. The additional depth of the pond, as instructed by the site team, is 500mm, resulting in an additional 1000mm of storage depth. The new pond volume is calculated as 4058m³.

- Top of pond: 44.500m
- Base of pond: 41.500m
- Pond depth: 3.000m

1:2 Year event (from empty)

3.6.21 it takes 240 minutes to fill without flooding at a discharge rate of 65.2 l/s, and 960 minutes at a discharge rate of 20 l/s.

1:10 Year Event (from empty)

3.6.22 it takes 1440 minutes to flood with a discharge rate of 20 l/s. However, with the reduced discharge rate, there is 392m³ of flooding on the swales and pond. At a discharge rate of 65.2 l/s, the pond does not reach full capacity within 360 minutes, and the maximum water level reached is 43.972m. The flooding total is 105m³ on the swales, not the pond.

1:30 Year Event (from empty)

3.6.23 it takes 1440 minutes to flood with a discharge rate of 20 l/s. However, with the reduced discharge rate, there is 1,918m³ of flooding on the swales and pond. At a discharge rate of 65.2 l/s, the pond fills up to 44.250m in 240 minutes, and then floods in the next 360-minute storm. The flooding total is 217m³ on the swales and pond.

3.6.24 Without any discharge, the pond starts to flood in 1440 minutes for a 1:2 year storm.

Table 12. Summary of Pond Behaviour During Storm Events

	Pond Flood Times for a 1:2 Storm Event	Pond Flood Times for a 1:10 Storm Event	Pond Flood Times for a 1:30 Storm Event	Estimate Flood Volumes at pond (m^3) for 1:30 Event
Pond 1	X	X	X	X
Pond 2	X	180 Minutes	60 Minutes	240
Pond 4	X	X	*350 Minutes	480
Pond 5	X	X	*240 Minutes	217

**Ponds adjacent to watercourse or at risk if uncontrolled discharge to surface waters during flood event*

3.7 Response in the Event of Pond Flood Risk

Pond 1:

3.7.1 Pond 1 is estimated to be the least likely to flood in a storm event upto a 1:30 flood event, inclusive of on-site and off-site. However should flood risk be suspected, and all additional control measures be implemented (i.e. tankering, alternative disposal, pond transfer etc) this should be permitted to flood the local area and monitored to ensure no discharge to watercourses.

Pond 2:

3.7.2 Pond 2 is estimated to be the only pond to flood in a 1:10 event, and the quickest to flood in a 1:30 flood event or higher. Should flood risk be suspected, it should initially be considered as to whether alternative ponds can accommodate excess water attenuation. Should all additional control measures be implemented (i.e. tankering, alternative disposal, pond transfer etc) this should be permitted to flood the local area and monitored to ensure no discharge to watercourses.

Pond 4:

3.7.3 Pond 4 is estimated to be the last pond to flood in a 1:30 year event and above, however flooding is modelled to be on site, specifically within the upstream swales for a 1:10 event. Despite this the pond is located adjacent to the ordinary watercourse and therefore poses a risk of a pollution event. In the event of flooding additional controls (i.e. sandbags) should be deployed to prevent flood risk to the watercourse and swales closely monitored. Should it be suspected that flood water may enter the ordinary watercourse excess waters should removed offsite and/or to Pond 1 if practicable.

Pond 5:

3.7.4 Pond 5 is estimated to flood in a 1:30 year event and above, with swales flooding for a 1:10 year event. The pond is located adjacent to the ordinary watercourse and residential receptors and therefore poses a risk of a pollution and stakeholder event respectively. In the event of pond flooding additional controls (i.e. sandbags & pumps) should be deployed to prevent pollution risk to the watercourse. Use of the emergency flood store should be provided to residents of Breakspear Road and the new access of Copthall Farm utilised for tanker removals, while excess capacity in alternative ponds should be utilised by on site tanker transfers.

4 Consent Summary

4.1.1 The schedule 33 discharge consent sets out the terms and conditions under which HS2 Ltd is permitted to discharge to surface water, including water quality and discharge volumes. Live consents associated with the site are summarised below, with more detail provided:

4.2 Key Consents

- Schedule 33 (HS2/P10415) which consents surface water discharges from Skip Lane and the STA (Fig 1)
- Schedule 33 (HS2/P10692) which consents surface water discharges from the Southern Sustainable Placement Area (SSPA), Mounds 1, 2 & 3 (Fig 1).
- EA Landfill (non-hazardous) environmental permit (EPR/WP3029SW) which consents the permanent placement of Tunnel Boring Machine (TBM) arisings at the SSPA
- EA Mobile plant deployment for treatment pad 1 which consents in situ liming of TBM arisings and temporary stockpiling (KB3301HSD0005)
- Trade Effluent Consent for the discharge of SSPA collected leachate (Consent pending)

Sch33 Consents can be found here.

Waste Consents can be found here here.

4.3 Exemptions

- Schedule 33 Exemption (1MC04-SCJ-EV-APP-SS05_SL07-000162) for temporary pipeline crossing over SSPA ordinary watercourse
- Schedule 33 (1MC04-SCJ-EV-APP-SS05_SL08-000013) for temporary culvert within ordinary watercourse to accommodate access to site compound off Harvil Road (Skip Lane Junction)
- Schedule 33 Exemption (1MC04-SCJ-EV-APP-SS05_SL07-000150) for temporary haul road crossing over ordinary watercourse at SSPA
- Schedule 33 Exemption (1MC04-SCJ-EV-APP-SS05_SL07-000157) for temporary works at the SSPA including new 'soft' connection to watercourse; vegetation clearance; and installation of pedestrian crossing over watercourse
- Schedule 33 Exemption (1MC04-SCJ-EV-APP-SS05_SL08-000012) for pumping of rainwater from site compound to IBC containers at skip lane junction

Exemptions can be found here.

5 Key Consents Detail & Requirements

5.1.1 The Environment Agency shall be notified without delay following the detection of any breach of a limit specified in the consent or any significant environmental effects resulting from the activities or of any breach of the consent. Written confirmation of actual or potential incidents or effects and breaches shall be submitted within 24 hours.

5.2 Schedule 33: HS2/P10415

1MC04-SCJ-EV-PER-SS05_SL07-000041

5.2.1 This consent covers The Southern Treatment Area, Skip Lane and Harvil Road over Chiltern Line Bridge (HROC).

5.2.2 Activities consented under P10415 include:

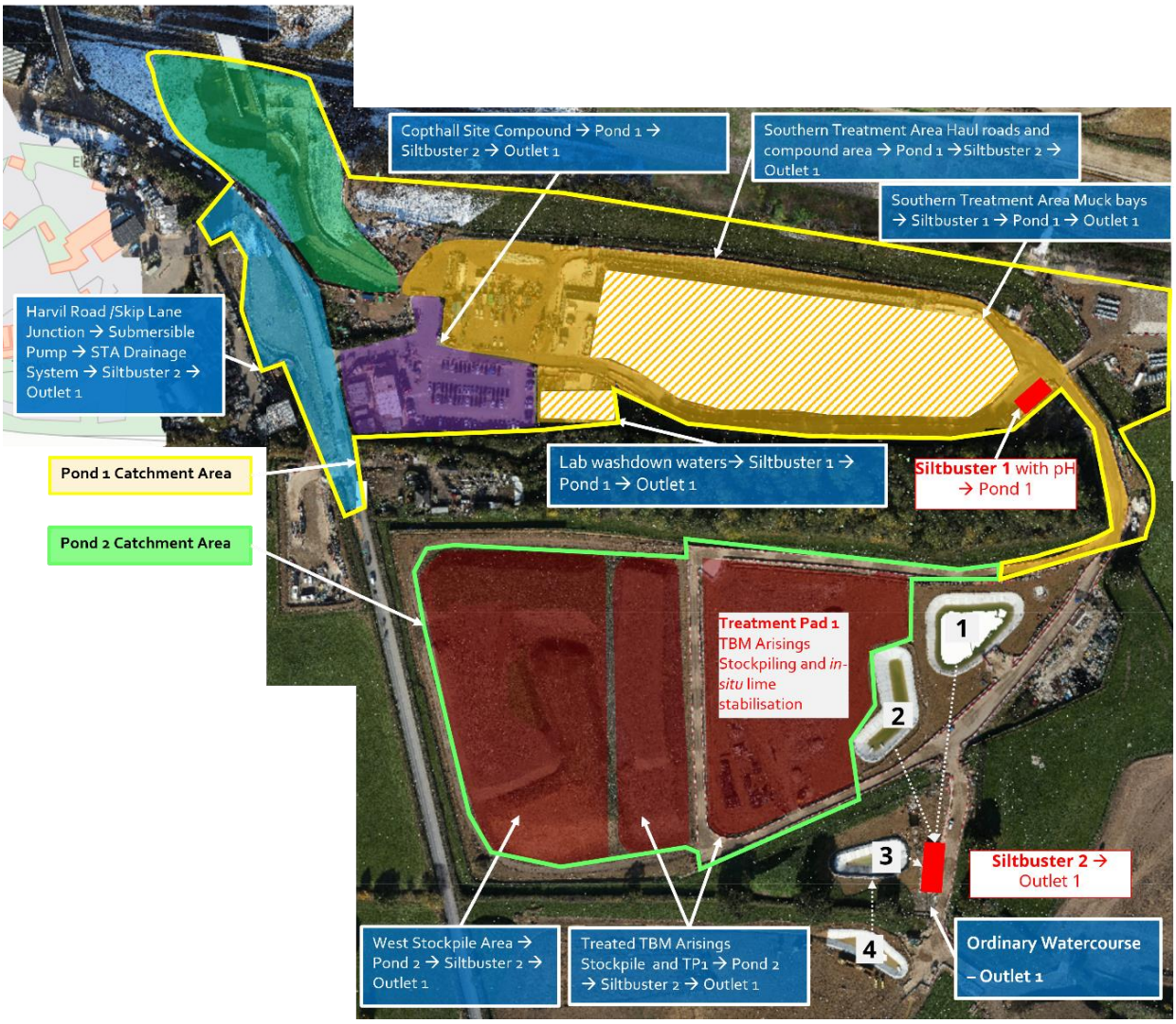
- **Activity T1:** Discharge of trade effluent consisting of treated site surface water drainage in admixture with a small quantity of lab washdown waters via Outlet 1
- **Activity T2:** Discharge of trade effluent consisting of excavation dewatering, piling pad run-off water, displaced piling water, haul road drainage and site compound drainage via Outlet 1
- **Activity T3:** Discharge of trade effluent consisting of treated settled construction site and stockpile run-off via Outlet 1

5.2.3 These activities to be consolidated into a single effluent source in the varied consent (HS2/P10415-V003), and includes a temporary drainage connection from a section of Harvil Road (at the Skip Lane junction). The variation was submitted April 2023 and is awaiting issue by the EA.

5.2.4 Covered within the consent is the operation of 3 attenuation Ponds (Ponds 1, 2, 3), siltbuster treatment and a single discharge point to an ordinary watercourse which outfalls to the River Pinn. As shown in Fig's 1 & 2.

5.2.5 Pond 4 which collects water from Mound 1 will be discharged through the same Siltbuster and discharge point under the SSPA Sch33 (HS2/P10692)

10. Sch33 Consent Monitoring Map for STA (HS2/P10415)



5.2.6 The consent requires the following to be undertaken:

- *Written Management System is required (Covered in the Environment Management Plan and this document)*
- *All liquids which could be hazardous to land or water requires secondary containment (silt buster chemicals)*
- *Do not cause the spread of invasive species or plant/animal disease*
- *minimise so far as reasonably practicable the polluting effects of the emissions of substances in the discharge not controlled by emission limits*
- *Maintain access, in either electronic or hard copy, electronic or hard copy, to the records, plan and management system*
- *Monthly Reporting of discharge quality data*

More in-depth details are found on the consent document here.

5.3 Schedule 33: HS2/P10692

1MC04-SCJ-EV-NTE-SS05_SL07-000011

5.3.1 This consent covers the discharge of surface runoff from SSPA mounds 1, 2 & 3, including the in-situ treatment and temporary placement of TBM arisings, as well as permanent placement.

5.3.2 Activities consented under P10692 include:

- Activity T1:Discharge of runoff from lime stabilised TBM arisings at SSPA mound 1 via Outlet 1
- Activity T2: Discharge of runoff from lime stabilised TBM arisings at SSPA mounds 2 & 3 via Outlet 2

5.3.3 Covered within the consent is the operation of 2 ponds (ponds 4 & 5). Pond 4 attenuates surface waters from Mound 1 before overpumping to Pond 3 (covered under 1MC04-SCJ-EV-APP-SS05_SL07-000162) and being discharged to ordinary watercourse via the same siltbuster system as the STA. Pond 5 attenuates surface water from Mounds 2 & 3 before discharging an ordinary watercourse that runs parrel to Breakspear Road via siltbuster. This discharges to the River Pinn via culvert as shown in Fig 2.

11. Sch33 Consent Monitoring Map for SSPA (HS2/P10692)

5.3.4 **The consent requires the following to be undertaken:**

- *Written Management System is required (Covered in the Environment Management Plan and this document)*
- *All liquids which could be hazardous to land or water requires secondary containment (silt buster chemicals)*
- *Do not cause the spread of invasive species or plant/animal disease*

- *minimise so far as reasonably practicable the polluting effects of the emissions of substances in the discharge not controlled by emission limits*
- *Maintain access, in either electronic or hard copy, electronic or hard copy, to the records, plan and management system*
- *Monthly Reporting of discharge quality data*

More in-depth details are found on the consent document here.

5.4 Landfill (non-hazardous) Environmental Permit: EPR/WP3029SW

1MC04-SCJ-EV-PER-SS05_SL07-000042

5.4.1 Surface water run-off will be collected via a system of V-ditches and perimeter drains during the operational phase of the landfill (construction of the mounds and restoration). Surface water will be discharged via siltbuster and in accordance with Sch33 consent (SCS-000-0221 / HS2/P10692). Leachate from the waste mounds will be collected in a series of manholes (sumps) and disposed off-site or discharged to Thames foul (Trade Effluent Consent pending).

5.4.2 **The consent requires the following to be undertaken in relation to water management:**

- *The limits for the level of leachate listed in schedule 3, table S3.1 (of the permit) shall not be exceeded.*
- *The operator shall prevent the input of any hazardous substances from the activities into groundwater.*
- *The operator shall submit to the Environment Agency a review of the Hydrogeological Risk Assessment:*
  - *between nine and six months prior to the sixth anniversary of the granting of the permit; and*
  - *between nine and six months prior to every subsequent six years after the sixth anniversary of*
  - *the granting of the permit*
- *The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring and any other actions specified in the following tables in schedule 3 (of the permit):*
  - *Leachate specified in tables S3.1 and S3.4 (of the permit);*
  - *Groundwater specified in tables S3.2 and S3.3 (of the permit);*
  - *Surface water specified in table S3.6 (of the permit);*
- *The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data*
- *All records required to be made by this permit shall be legible, made as soon as reasonably practicable, amended in such a way previous records are legible. Furthermore they will be retained, unless otherwise agreed in writing by the*

Environment Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:

- *the results of groundwater monitoring;*
- *leachate levels, quality and quantities*

- *In the event: that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately—*
  - *inform the Environment Agency;*
  - *take the measures necessary to limit the environmental consequences of such an incident*
  - *or accident; and*
  - *take the measures necessary to prevent further possible incidents or accidents.*
- *In the event of a breach of any permit condition the operator must immediately—*
  - *inform the Environment Agency; and take the measures necessary to ensure that compliance is restored within the shortest possible time.*
- *In the event of a breach of permit condition which poses immediate significant adverse effect on the environment, the operator must immediately suspend the operation of the activities or the relevant part of it until compliance with the permit conditions has been restored*

More in-depth details are found on the consent document here.

5.5 Mobile Plant Deployment Treatment Pad 1:KB3301HSD0005

1MC04-SCJ-EV-CRI-SS05_SL07-000014

5.5.1 In-situ lime treatment and temporary storage operations at Treatment Pad 1 (STA) operate under a Mobile Plant Deployment which covers the treatment of lime in-situ and the temporary stockpiling of TBM Arisings.

More in-depth details are found on the consent document here

6 Monitoring Requirements

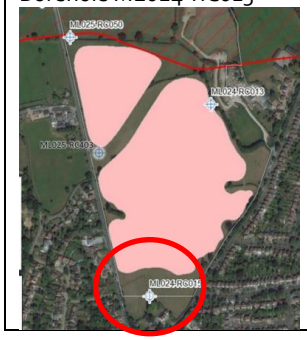
6.1.1 Subject to additional requirements issued under a Permit from the Environment Agency the following monitoring is recorded:

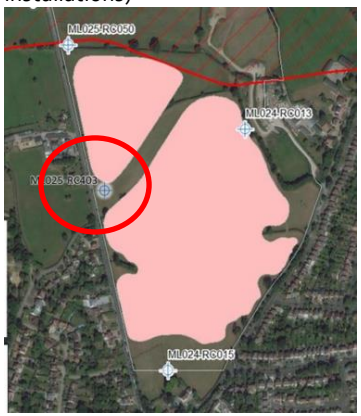
Table 2: Sch33 Consent Monitoring Requirements for STA (HS2/P10415)

Point Source emissions to water – emission limits and monitoring requirements for Copthall South				
Effluent and discharge point(s)	**Parameter**	**Limit (including unit)**	***Monitoring frequency**	**Person(s) Responsible**
HS2/P10692 (T1) Discharge of runoff from lime stabilised TBM arisings at SSPA mound 1 via Outlet 1	Maximum daily discharge	19.2 litres per second	Daily check	Alin Mihalache & Ravinder Singh
	Suspended solids (measured after drying at 1050C)	50 mg/l	Daily Check / Weekly Sample	Check - Alin Mihalache & Ravinder Singh Sample – Richard Green & Helena Dale
	pH	6 to 9	Daily Check / Weekly Sample	Check - Alin Mihalache & Ravinder Singh Sample – Richard Green & Helena Dale
	Total Iron as Fe	N/A (1000 ug/l)	Weekly Sample – 1st 8 weeks of operation	Richard Green & Helena Dale
	Dissolved Iron as Fe	N/A (1000 ug/l)	Weekly Sample -– 1st 8 weeks of operation	Richard Green & Helena Dale
	Acrylamide	N/A	Weekly Sample – 1st 8 weeks of operation	Richard Green & Helena Dale
	Visual appearance	no significant adverse visible effect on the receiving water, including plants/animals	Daily Check - visual examination	Alin Mihalache & Ravinder Singh
	Visible oil or grease	No significant trace present so far as is reasonably practicable	Daily Check - visual examination	Alin Mihalache & Ravinder Singh
HS2/P10692 (T2) T2.Discharge of runoff from lime stabilised TBM arisings at SSPA mounds 2 & 3 via Outlet 2	Maximum daily discharge	65.2 litres per second	Daily check	Alin Mihalache & Ravinder Singh
	Suspended solids (measured after drying at 1050C)	50 mg/l	Daily Check / Weekly Sample	Check - Alin Mihalache & Ravinder Singh Sample – Richard Green & Helena Dale
	pH	6 to 9	Daily Check / Weekly Sample	Check - Alin Mihalache & Ravinder Singh Sample – Richard Green & Helena Dale

	Total Iron as Fe	N/A (1000 ug/l)	Weekly Sample – 1st 8 weeks of operation	Richard Green & Helena Dale
	Dissolved Iron as Fe	N/A (1000 ug/l)	WeeklSample -– 1st 8 weeks of operation	Richard Green & Helena Dale
	Acrylamide	N/A	Weekly Sample – 1st 8 weeks of operation	Richard Green & Helena Dale
	Visual appearance	no significant adverse visible effect on the receiving water, including plants/animals	Daily Check - visual examination	Alin Mihalache & Ravinder Singh
	Visible oil or grease	No significant trace present so far as is reasonably practicable	Daily Check - visual examination	Alin Mihalache & Ravinder Singh
All reports and notifications required by the consent shall be sent to the Environment Agency at hs2@environment-agency.gov.uk or using other contact details supplied in writing by the Environment Agency. *SCS is required to submit data on a monthly basis to the Environment Agency				

Table 3. EPR Monitoring Requirements for Landfill Permit (Groundwater)

Landfill Permit – Groundwater Monitoring Southern Sustainable Placement Area				
Effluent and discharge point(s)	**Parameter**	**Limit (including unit)**	**Monitoring frequency**	**Person(s) Responsible**
EPR/WP3029SW Borehole ML024-RC015 	Ammoniacal Nitrogen	2.4 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Arsenic	0.0033 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Benzene	0.001 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Chloride	328 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Selenium	0.0028 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Sulphate	960 mg/l	Quarterly	Peter Johnston/Miles German/Concept

EPR/WP3029SW ML025-RC403 (Lambeth and Chalk installations)  	Ammoniacal Nitrogen	2.4 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Arsenic	0.0095 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Benzene	0.001 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Chloride	700 mg/l)	Quarterly	Peter Johnston/Miles German/Concept
	Selenium	0.0042 mg/l	Quarterly	Peter Johnston/Miles German/Concept
	Sulphate	2,750 mg/l	Quarterly	Peter Johnston/Miles German/Concept
EPR/WP3029SW Up gradient MEPP (ML025-RC050 and ML024-RC013)  	Water level, electrical conductivity, chloride, ammoniacal nitrogen, sulphate, pH, arsenic, benzene and selenium	N/A	Quarterly	Peter Johnston/Miles German/Concept
	Alkalinity, Total Organic Carbon, Dissolved Organic Carbon, nitrate, nitrite arsenic, aluminium, antimony, beryllium, barium, boron cadmium, chromium (III and VI), copper, lead, nickel, iron, arsenic, magnesium ,mercury, potassium, selenium, vanadium, calcium, sodium, zinc, manganese, cyanide (total and free)	N/A	Annually	Peter Johnston/Miles German/Concept
	Hazardous substancesincluding: alcohols and acetates screen, acrylamide, VOC screen (including BTEX), SVOC screen.	N/A	Annually for first six years of operation	Peter Johnston/Miles German/Concept

EPR/WP3029SW Up gradient MEPP (ML025-RC050 and ML024-RC013) 	Water level, electrical conductivity, chloride, ammoniacal nitrogen, sulphate, pH, arsenic, benzene and selenium	N/A	Quarterly	Peter Johnston/Miles German/Concept
	Alkalinity, Total Organic Carbon, Dissolved Organic Carbon, nitrate, nitrite arsenic, aluminium, antimony, beryllium, barium, boron cadmium, chromium (III and VI), copper, lead, nickel, iron, arsenic, magnesium ,mercury, potassium, selenium, vanadium, calcium, sodium, zinc, manganese, cyanide (total and free)	N/A	Annually	Peter Johnston/Miles German/Concept
	Hazardous substancesincluding: alcohols and acetates screen, acrylamide, VOC screen (including BTEX), SVOC screen	N/A	Annually for first six years of operation then every two years	Peter Johnston/Miles German/Concept
EPR/WP3029SW MEPP (all groundwater wells)	Base of monitoring point (mAoD)	Annually		Peter Johnston/Miles German/Concept

Table 4. EPR Monitoring Requirements for Operational Landfill Permit (Leachate)

Landfill Permit – Leachate Monitoring Southern Sustainable Placement Area (operational phase)				
Effluent and discharge point(s)	**Parameter**	**Limit (including unit)**	**Monitoring frequency**	**Person(s) Responsible**
EPR/WP3029SW (MH01 – MH05 and LST_01 and LST02)ML024-RC013)	Level, volume discharged, pH, EC, ammoniacal nitrogen, chloride, sulphate, alkalinity, total organic carbon, dissolved organic carbon, sodium, potassium,	N/A	Monthly	Peter Johnston/Miles German/Concept

	calcium, magnesium, arsenic, lead, selenium, manganese, alcohols and acetates in waters, BTEX suite			
	As above plus: barium, beryllium, cadmium, chromium (total, III and VI), copper, iron, mercury, nickel, tin, zinc.	N/A	Quarterly	Peter Johnston/Miles German/Concept
	VOC suite, acrylamide and SVOC suite	N/A	Quarterly for 12 months then annually	Peter Johnston/Miles German/Concept
EPR/WP3029SW (MH01 – MH05)	Depth to base (mAoD)	N/A	Annually	Peter Johnston/Miles German/Concept

Table 5. EPR Monitoring Requirements for Non-Operational Landfill Permit (Leachate)

Landfill Permit – Leachate Monitoring Southern Sustainable Placement Area (non-operational phase)				
Effluent and discharge point(s)	**Parameter**	**Limit (including unit)**	**Monitoring frequency**	**Person(s) Responsible**
EPR/WP3029SW (MH01 – MH05 and LST_01 and LST02)	Level, volume discharged, pH, EC, ammoniacal nitrogen, chloride, sulphate, alkalinity, total organic carbon, dissolved organic carbon, sodium, potassium, calcium, magnesium, arsenic, lead, selenium, manganese, acrylamide, alcohols and acetates in waters, BTEX suite, barium, beryllium, cadmium, chromium (total, III and VI), copper, iron, mercury, nickel, tin, zinc	N/A	Six monthly	Peter Johnston/Miles German/Concept

EPR/WP3029SW (MH01 – MH05)	Depth to base (mAoD)	N/A	Annually	Peter Johnston/Miles German/Concept

Table 6. EPR Monitoring Requirements for Landfill Permit (Surface Water)

Landfill Permit – Surface Water Monitoring Southern Sustainable Placement Area				
Effluent and discharge point(s)	**Parameter**	**Limit (including unit)**	**Monitoring frequency**	**Person(s) Responsible**
EPR/WP3029SW (SW_Outlet 1 and Outlet 2; SWN-I, SWN-H, SWN-G)	Ammoniacal nitrogen, chloride, sulphate, suspended solids, visual oil and grease, pH, electrical conductivity, alkalinity, total organic carbon,dissolved organic carbon, arsenic, aluminium, barium, beryllium, boron cadmium, chromium (III and VI), copper,lead, nickel, iron, arsenic, magnesium,mercury, potassium, selenium, vanadium,calcium, sodium, zinc, manganese, cyanide (total), acrylamide, alcohols and acetates in waters, BTEX suite and phenols	N/A	Monthly	Surface Monitoring: Peter Johnston/Miles German/Concept Outlet Monitoring: Helena Dale/Richard Green/ Alin Mihalache/Ravinder Singh

6.1.2 **Agency Notification Process:**

- The Environment Agency shall be notified no less than 14 days before the commencement of the activities.
- The Environment Agency shall be notified no less than 7 days after the activities are completed.
- The Environment Agency shall be notified without delay following the detection of any breach of a limit specified in the consent or any significant environmental effects resulting from the activities or of any breach of the consent.
- Written confirmation of actual or potential incidents or effects and breaches referred to in above shall be submitted within 24 hours.

6.1.3 Send all reports and notifications to hs2@environment-agency.gov.uk & matt.emery@environment-agency.gov.uk

Links:

Monitoring - Chain of Custody

EA Monthly Reporting

7 Water Management

7.1 Potential Sources of Surface & Groundwater Water Management Issues

7.1.1 The prime sources of surface water issues on site are:

- Rainwater / sediment laden surface run off
- Groundwater from existing land drainage and pumping out of excavations
- On site and off-site flooding – especially around mounds 2 & 3
- Concrete pours and washout
- Watercourses and other water bodies
- Storm events
- Watercourses/ditches crossing the project footprint, including unofficial 3rd party drainage entering site
- Chemical and oil spills on-site, impacting surface water, boreholes or Groundwater Source Protection Zone
- Oil interceptor overflow
- Improper maintenance – silt controls, oil interceptor, ponds, silt busters, generators
- Natural & additive contaminants associated with TBM arisings (i.e. naturally elevated sulphate & metals, soil conditioner and lime)
- Leachate production and management from permanent placement
- Surface activities impacting and contaminating boreholes
- Hexavalent Chromium (Chr VI) from concrete works, offsite sources and lime
- Elevated Sulphates from disturbed London Clay
- Soil conditioner from untreated arisings

7.2 Water Management Techniques

7.2.1 Facilities available to manage surface water are details in Table 8 below:

Table 7. Summary of Potential Sources of Surface and Management Techniques

Source	Risk	Management Technique
Rainwater / sediment laden surface run off	Contamination of surface waters on/off site, breach of Sch33 conditions	Road sweepers, attenuation and settlement (ponds, v-ditch, check dams), silt fencing, coir logs and siltbuster treatment, total suspended solid probes, alerts and alarms for exceedances
Groundwater from existing land drainage and pumping out of excavations	Contamination of surface waters, exasperate flood risk	Pumping out excavations, permit to pump, routine inspections, sediment controls (i.e. silt sock)
Onsite and off-site flooding – specifically around mounds 2 & 3	Flooding onto site, contaminants potentially moving onto soils, risk to Breakspear road, risk to house of Breakspear road south	attenuation and settlement (ponds, v-ditch, check dams), routine excavation of built-up silt within the ponds, surface water pond skimming, sandbags, secondary overflow attenuation, emergency dewatering contractor (T&M/Adler & Allan), overnight pumping process
Concrete pours and washout	High pH inside the ponds and discharge, chromium issues inside attenuation ponds, contamination of surface waters on/off site, breach of Sch33 conditions	Concrete washout IBCs, IBCs delivered off-site, toolbox talks, Carbon Dioxide (CO_2) gas on siltbusters (regulate pH), pH probes on siltbuster, telemetry data, sampling, alerts and alarms for exceedances
Storm events	Flooding on/off site, contamination of water on/off site, breach of Sch33 consent	Checking weather activities and flood alert sign up, emergency provisions for dealing with high flow, sandbags, emergency dewatering contractor, overnight pumping if required, routine checks of catchpit for debris, check-dams, overflow attenuation
Watercourses/ditches crossing the project footprint, including unofficial 3rd party drainage entering site	Contamination of water on/off-site, flooding on/off-site	Siltfencing watercourses/ditches, coirlogging if siltfencing not possible, sedimatting, sedimatting with vegetation
Chemical and oil spills on-site	Contamination of surface waters on/off site, contamination of soils on/off site, breach of Sch33 conditions	Chemical and oil spill kits on-site, routine audits for spill kits, toolbox talks on spill kits and environmental reporting, oil interceptors, spill kit training, COSHH bunding
Oil interceptor overflow	Contamination of surface waters on/off site, large cost to site	Chemical and oil spill kits, oil interceptor alarms, routine maintenance, monitoring check sheets
Improper maintenance - silt controls, oil interceptor, ponds, silt busters, generators	contamination of water on-site/off-site, breach of sch33 consent, flooding on/off site.	Routine inspections, daily checks, Aggreko telematics (generators), routine visits from Aggreko, contractor maintenance for oil interceptor
Natural & additive contaminants associated with TBM arisings (i.e. naturally elevated sulphate & metals, soil conditioner and lime)	contamination of water on-site/off-site, breach of sch33 consent	Weekly sampling from attenuation ponds and discharge

Leachate production and management from permanent placement	contamination of water on-site/off-site	Spine drainage within the permanent placement, sampling, leachate collection tanks, inspections
Surface activities impacting and contaminating boreholes	Contamination of groundwater	All boreholes are demarcated, no fuel/chemical storage or washout operations within 10m, routine sampling is undertaken by concept labs
Hexavalent Chromium from road drainage , concrete activities and lime	Contamination of groundwater and/or surface water, breach of sch33 consent	Weekly pond testing, H1 assessments, interim field tests, reducing at source through controls on concrete and lime activities
Elevated sulphates from disturbed London Clays	Contamination of groundwater and/or surface water, breach of sch33 consent	Weekly pond testing, H1 assessments, reducing at source through controls on sediment run off
Soil conditioner from untreated arisings	Contamination of groundwater and/or surface water, breach of sch33 consent	Weekly pond testing, H1 assessments, reducing at source through controls on untreated arisings

8 Construction Phase Surface Water Management Methods

8.1 Hexavalent Chromium

8.1.1 Hexavalent Chromium (Chr VI) is classified as a hazardous substance which should not be discharged into the Environment. Site run off with Chromium VI concentrations less than EQS (Environmental Quality Standard) are acceptable for discharge to surface water; the EQS limit for surface water discharge is 3.4 ug/L.

8.1.2 Chr VI has been identified in attenuated surface waters across Copthall, with SCS led investigations conducted to identify potential sources. The presence of Chr VI was traced back to the Harvil Road realignment due to drainage system being diverted onto our site, concrete washout activites, and lime usage. At present all Gate 1 ponds are exposed to Chr VI risk as a result of the wide spread lime treatment and placement. Weekly sampling is now in place for Chr VI to provide assurance of management of all Gate 1 ponds, this is carried out by concept and analysed using ALS labs.

8.1.3 **Harvil Road Drainage**

The ongoing construction of Harvil Road over the Chiltern line required realigning the road. During this realignment, the road drainage was diverted into a manhole on the construction site. A variation to Schedule 33 was made to pump the road drainage into the site drainage system. However, SCS investigation indicates that the road drainage was a major contributor to Chr VI contamination within the site drainage and Pond 1.

Once the road drainage was identified as a source of CrVI, the manhole was no longer pumped into the site drainage system. T&M periodically dewaters this manhole and disposes of the wastewater at a registered waste facility, removing it from the site.

8.1.4 **Materials Management Lab – Concrete Washout Activities**

Samples taken from the material washout basin and the filter drain manhole downstream of the materials management lab showed high levels of Chr VI. The basin was used to wash the tools associated with concrete washout and the outdoor concrete washout system was unbunded to prevent any runoff.

New procedures were instated disallowing washing of tools within the basin and the concrete washout area was sandbag bunded with polythene have been placed around the concrete washout.

8.1.5 **Lime**

Lime treatment is used to dry out the TBM arisings so it can be placed in the sustainable placement mounds. In-situ lime treatment is undertaken within the treatment pads using a lime tractor. The dosing varies depending on moisture content averages out to around 2% lime usage per 100 kg of TBM material. Lime treatment is also undertaken at the pugmill, which doses the TBM material based on moisture content. Rudimentary tests of the lime mixed with water indicate that Chr VI levels of upto 36ug/l can be found.

Elevated Chr VI levels have been identified infrequently within ponds 3, 4 and 5 which attenuate surface waters from the placement of lime treated arisings. Its anticipated that when compacted and avoided in loose form, Chr VI within surface run off is typically below the EQS value. However when disturbed and loose, these concentrations can increase.

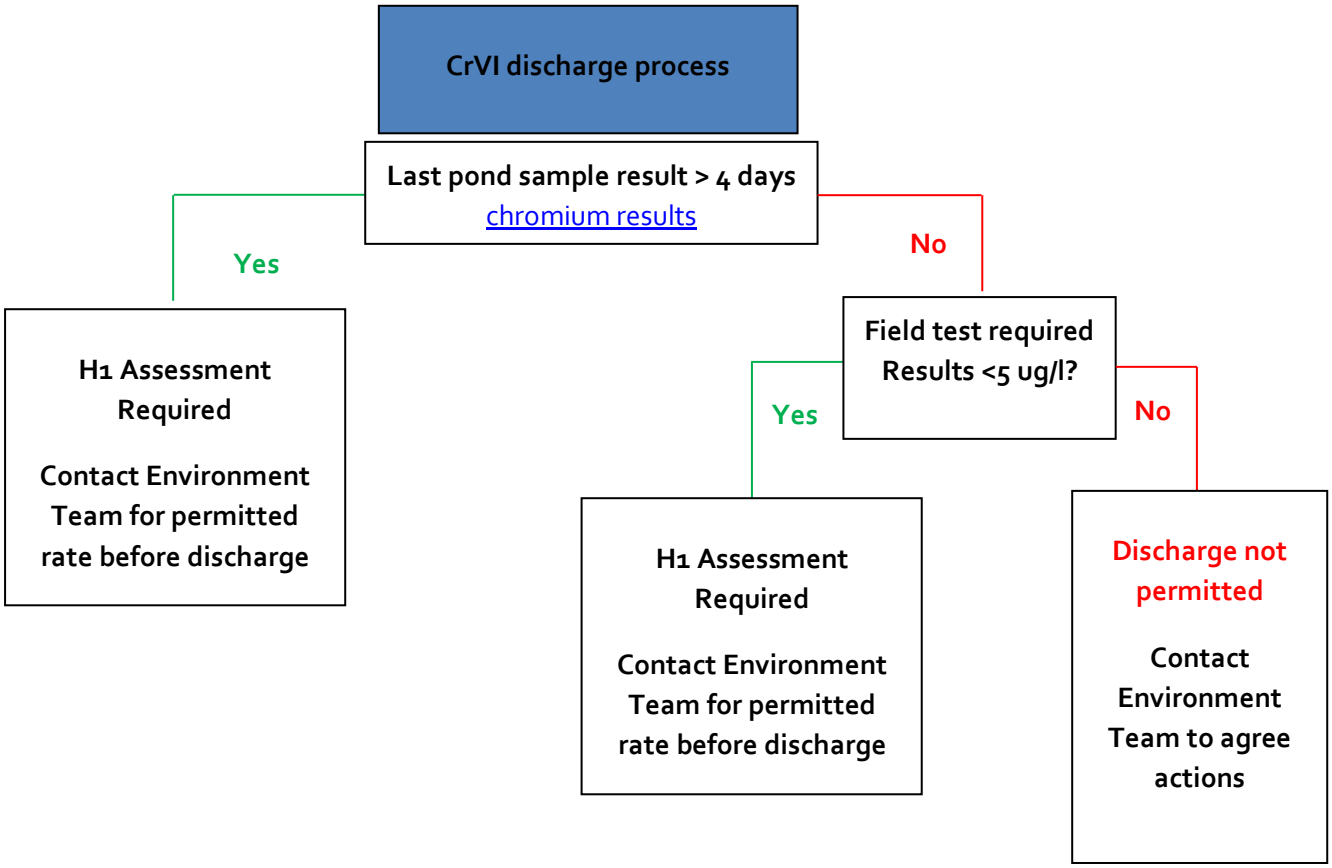
8.1.6 **Assurance**

SCS has initiated the collection of pond samples to self assure it's quality of surface water discharges, additionally SCS has acquired Chr VI field test kits. Where ponds are found to be above the EQS a H1 Assessment must be agreed with the Environment Agency, which may alter permitted discharge rates.

Utilising both laboratory and field tests kits, the process flow chart must be followed to ensure environmental harm is minimised as far as reasonably practicable when discharging all ponds. Field tests kits will be used on a regular basis acting as an assurance check, accounting for the lag period between laboratory sample collection and results.

8.1.7 Check the chromium results prior to assist with compliance:

12. Process Flow Chart for discharge Chr VI to the Environment



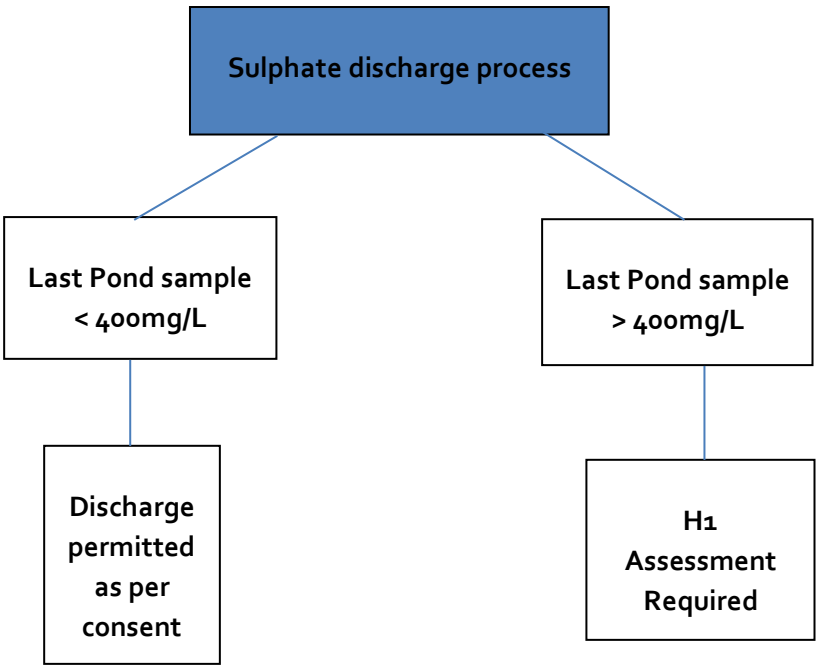
8.2 Sulphate

8.2.1 Sulphate is not classified as a direct toxic hazard like heavy metals or organic pollutants, its effects on water quality at elevated levels can indirectly pose risks to human health and ecosystems. Sulphate has been found to occur naturally at high levels within the London clays. Whilst this is naturally occurring, the process of excavating and potential sediment laden run-off mobilises the sulphate which can cause it to enter site drainage and subsequently the surrounding surface waters. The annual average sulphate concentrations is 400mg/l for the receiving water bodies, above which SCS cannot discharge without a H1 assessment in place from the Environment Agency.

Concept takes weekly samples for all the attenuation ponds. At this current time, sulphate has not exceeded the sulphate limit within any of the attenuation ponds. The environment team are responsible for reviewing weekly data ro ensure compliance. Table 13. Shows the process for testing before discharging water off-site.

8.2.2 Check the sulphate results prior to discharge

13. Process Flow Chart for discharge Suphate to the Environment



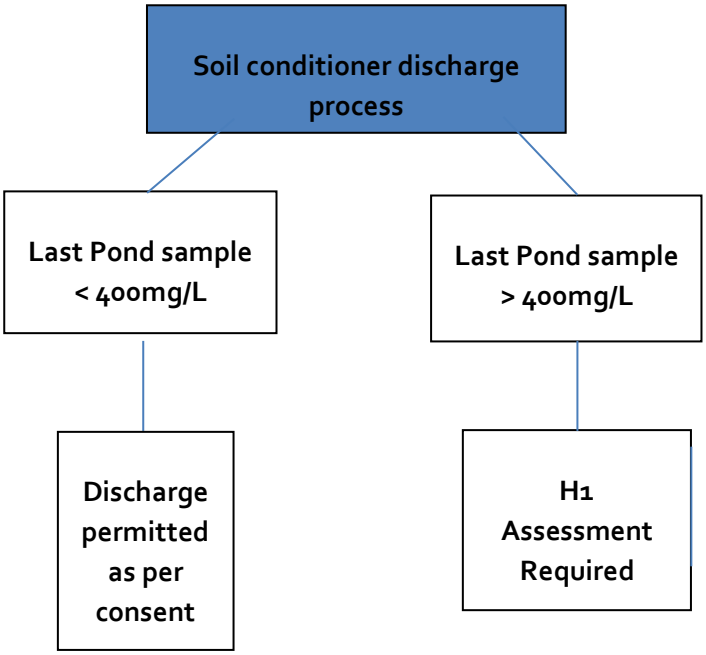
8.3 Soil Conditioner

8.3.1 Soils within the tunnel are treated with soil conditioners at the cutter head before excavation to facilitate progression. The conditioners loosen the soil for easier excavation. The excavated material is transported via a conveyor belt from the TBMs to the STA. The visual appearance of foam is a potenitial indicator of soil conditioner contamination within a waterbod, drainage or haul roads. At the current time, soil conditioner has not been an issue at Copthall South, however the introduction of untreated arisings at does introduce a source and subsequent risk.

8.3.2 The soil conditioner determinants are tested by SCS within the landfill leachate WAC testing and by concept within the attenuation ponds. Soil conditioner has three parameters which are tested depending no the conditioner used with the TBM. The determinants are as follows: C12-C14 fatty alcohols, Tridecanol Ethoxylates, and Alcohols, C12-C14 ethoxylated (1-2.5 EO), sulphated, sodium salts (CAS 68891-38-3).

8.3.3 Check the soil conditioner results prior to discharge

14. Process Flow Chart for discharge Conditioner to the Environment



8.4 The control of substances hazardous to health

8.4.1 The Control of Substances Hazardous to Health (COSHH) regulations are important to control because they help to protect the health and safety of workers who may be exposed to hazardous substances in the workplace, they can also have important benefits for the environment. Many hazardous substances used in the workplace, such as chemicals and solvents, can have negative impacts on the environment if they are not properly managed and disposed of. For example, they may contaminate soil, waterways, and air, and harm wildlife and ecosystems.

8.4.2 SCS has a COSHH store within the STA where all site COSHH for use by SCS is stored. This is the same area where disposal of empty or used COSHH is disposed of.

8.4.3 **Diesel and petrol:** are in labelled diesel containers in a bunded container at the stores. A large bunded bowser within the site compound on hard standing is also located in the southern treatment area near the stores. The COSHH stored more than 10 m away from the water course and 50 m away from all boreholes

8.4.4 **Storage of Liquid in Drums:** All drums or containers of liquid i.e. mixed diesel, are stored within a drip tray bunding that can hold 110% of the contents, these are also covered with a tarp to prevent rainwater infiltration. These are kept at the stores and managed by Patrick Kenny.

8.4.5 **Storage and Use of Fuel Cans:** Ensure the appropriate vessel is used for each fuel and that caps are securely fitted when not in use and containers are restrained during transportation. These are stored in a contained storage unit which acts as a bund. This is locked to prevent access.

8.4.6 Paint and solvents are stored in a locked container and are disposed once used in appropriate bins.

8.4.7 **Use of drip trays:** Is mandatory across the site, for items of plant and fuels / COSHH substances. Drip Trays are not expected to follow excavators, dumpers etc. around unless the item of plant shows signs of leakage, in which case this should be fixed. Environment team ensures that drip trays are under appropriate plant during their inspections.

8.4.8 The use of 'baking sheet' style of drip tray will require careful monitoring for, damage, water ingress and spillages. The use of spill kit absorbents within the drip tray is promoted to enable easy clean-up of spills collection of spills. The contents of these drip trays will require decanting into a suitable container for disposal. If oils or chemicals are present, they should never be emptied to; ground, drains or water courses.

8.5 Water and silt management techniques

Siltbuster Pond Management

8.5.1 Copthall South has five attenuation ponds. Attenuation ponds are designed to manage and treat surface water runoff from urban and industrial areas. The purpose of the pond is to attenuate or slow down the flow of water, allowing suspended solids and pollutants to settle out before the water is discharged into the environment. To ensure the pond is functioning correctly and effectively managing the water quality, several checks are needed on a regular basis, including:

- Ensure the attenuation ponds are clear of debris and any floating scums which accumulate
- Ensure Sediment levels should be checked regularly and removed as necessary to ensure the pond continues to function correctly.

- Ensure the floatation devices are attached to the inlet valve sitting in the attenuation pond so that the water is extracted from the top of the water column (settled water)
- Ensure attenuation ponds have hydrocarbon booms in place which cover the inlet headwalls, this is to prevent the potential of hydrocarbons entering the siltbuster
- Ensure the inlet hoses to the siltbuster are protected by hydrocarbon booms.
- Ensure visual inspections are conducted regularly to check for any water discolouration, oil sheens, unusual odours, or damage to the pond's banks.
- Concept will be testing the ponds on a weekly basis. SCS has procured chromium VI probes to get spot samples.
- Ideally SCS wish to discharge water on non-rain days and after a period of settling out. If when checking the weather, we anticipate some bad weather we can reduce the water in the attenuation areas. This is important as this will reduce the need to use chemicals and allow capacity in the ponds for heavy rain.
- Catchment sizes and runoff rates are known for each of the catchments, a close eye will be kept on the weather to see what actions site needs to take for pumping the ponds eg. Overnight pumping, maximum discharge rate, bowsers, emergency actions.

Siltbuster Management

- Check that there is gas in the CO_2 tanks (releasing the CO_2 valve is a quick easy way of checking)
- Ensure the permit to pump is in place
- Ensure you have hydrocarbon strips to test the inlet water. Test the water and take photo and store this with your water monitoring and lab analysis data sheet/ record
- Use the handheld calibrated monitor to test the water before entering siltbuster to ensure PH is between 6-9 – if higher CO_2 will be required.
- Ensure the siltbuster chemicals are stored in an appropriate bund which can contain 110% of the chemicals within and are also protected from plant strike
- Keep an eye on chemical levels and let the team know in advance when they are getting low so SCS can procure more.
- Ensure all generators and fuel cubes are housed on drip tray units.
- Ensure there are back-up generators and pumps in-case these fail
- Pumps and generators are checked regularly by the Siltbuster operators
- Aggreko checks the generators, telematics installed on these systems to alert of issues.
- pH should be kept above 7.5 to prevent zinc from dissolving into the aqueous solution.

Siltbuster daily check sheets

8.5.2 Checksheets are important because they help to ensure that the equipment is being used correctly and that the water treatment process is working effectively. The checksheets are designed to be used by operators of the Siltbuster equipment to record data and monitor the performance of the equipment.

8.5.3 By using checksheets, operators can identify and address any problems early before they become serious issues. This can help to ensure that the water treatment process is working effectively and that the treated water is safe for discharge or reuse.

8.5.4 Siltbuster check sheets are filled in by siltbuster operators and are saved onto the sharepoint by the environment team.

Datalogger and Telemetry

8.5.5 Dataloggers and telemetry are two important tools that are used to monitor and collect data remotely from our siltbusters. The site has installed dataloggers and telemetry on their siltbuster units. The data is collected from the probes installed on the siltbuster units and show pH, TSS, and flow rate. The TSS and pH probes are cleaned weekly to ensure calibration is correct. The water meter is a magnetic flow meter which requires recalibration every five years according to manufacturer's guidelines. The recorded data is for internal monitoring and does not need to be submitted to the Environment Agency but is especially useful in situations where immediate action needs to be taken, such as in emergency response situations.

8.5.6 Telemetry systems can be configured to send alerts when certain parameters exceed predetermined thresholds, allowing for quick response to potential issues. The siltbusters are set with the compliance limits outlined in the section 33s for the site. These alarms send text and email notifications whenever an exceedance occurs to the environment, landfill, and site team.

Table 14. Gate 1 staff login and contact phone numbers for siltbuster telemetry

Gate 1 telemetry for siltbuster 2 & 3		
Samuel Gold	Environment Manager	07423 003 504 - Samuel.gold@scsrailways.co.uk
Richard Green	Environment Advisor	07890 985 801 - Richard.green@scsrailways.co.uk
Helena Dale	Graduate Environment Advisor	07823 356 512 - Helena.dale@scsrailways.co.uk
Miles German	Landfill Manager	07831 788 965 - miles.german@scsrailways.co.uk
Reinis Purvins	Assistant Landfill Manager	07823 356 532 - Reinis.Purvins@scsrailways.co.uk
John Kenny	Senior General Foreman	07717 344 424 - john.kenny@scsrailways.co.uk
Portal website: https://monitoring.siltbuster.com/login.php		

Table 15. Siltbuster contacts

Name	**Job Description**	**Contact**	**Details**
Chris Radagonde	Technical Sales Engineer	Tel: +44 (0)1600 772256 Mobile: +44 (0)7912 392508 Email:chris.radegonde@siltbuster.com	Telemetry set-up + adding people to monitoring portal Technical expertise

Ashley Copley	Field Service Engineer	Tel: +44 (0)1600 772256 Mobile: +44 (0)7976933263 Email: Ashley.copley@siltbuster.com	Site technician Technical expertise Siltbuster calibration advice
Luke Edwards	Field Engineering Coordinator	Tel: +44 (0)1600 528461 Mobile: +44 (0)7747828980 luke.edwards@siltbuster.com	Siltbuster coordinator Organising site visits/staff

8.5.7 **Useful links:**

Siltbuster 2 – Results and Telemetry

Siltbuster 3 – Results and Telemetry

Task Briefing Sheet for Siltbuster

8.6 V-ditch Drainage and Check Dams

8.6.1 Filter and V-ditch drainage has been installed around the STA and SSPA, this captures and diverts water into the attenuation ponds which then get transported to the siltbusters for treatment. Within the v-ditch drainage sediment matting has been installed to slow water and prevent scouring of the v-ditch. The ditches themselves have varying depths depending on the catchment size. The v-ditches help slow the flow of water, help reduce silt from getting into the pond and provides extra attenuation of water.

8.6.2 At mound 2 and 3 check dams have been installed within the v-ditches at intervals of 14 m to slow the passage of water and settle out suspended solids. Due to the v-ditch sizing check dams have not been instated in the mound 1 v-ditch. However, sandbags have been placed periodically to slow water.

Table 16. Checkdam spacing based off site slope

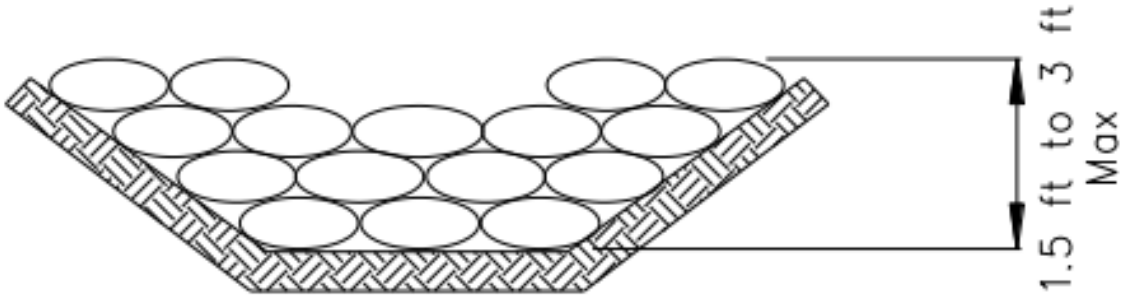
Slope of site (%)	Spacing (m) between dams with a 450 mm centre height	Spacing (m) between dams with a 600 mm centre height
Less than 2%	24	30
2 – 4%	12	15
4 – 7%	8	11
7 – 10%	5	6
>10%	Unsuitable – use stabilised channel or specific engineered design	Unsuitable - use stabilised channel or specific engineered design

Maintenance:

- Repair or reinstate the check dams if destroyed or displaced
- Inspect the check dams after rainfall or storms and repair as necessary
- Check if water is outflanking the structures and look for scouring around the edges of the check dams. If there is scouring, increase the centre height (spillway height) and/or turn up the edges of the structures.

- Check dams should be inspected for sediment accumulation after each significant rain event. This will be undertaken by the environment team.

15. Check dam construction for v-ditch placement



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE

8.7 Silt Fencing

8.7.1 Silt fencing has been instated along the haul road prior to discharge into the v-ditch. Silt fencing can promote the capture of sediment from running off into the v-ditches and overburdening our siltbuster units. In some areas, silt fencing cannot be installed due to interference with the geo-membrane for the landfill (Mound 1). In these cases, coir logs will be used to try and capture silt before discharging into the v-ditch.

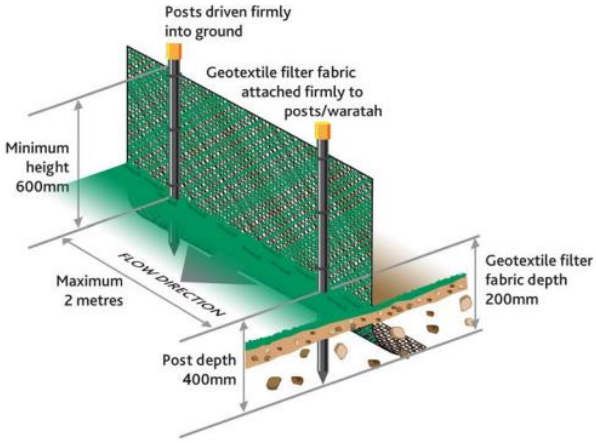
Proper silt fence installation is critical to its performance:

- be installed in a trench 200mm deep by 100mm wide
- have waratahs or posts hammer-staked at least 400mmm deep on the downhill
- side of the fabric, no more than 2m apart
- be 600mm high above ground, with an additional 200mm of cloth below ground in the trench
- be anchored by backfilling the trench and placing soil on top of the fabric.

Maintenance:

- Inspect silt fences at least once a week and after each rainfall
- Check for damage including rips, tears, bulges in the fabric, broken support wires, loose waratahs, overtopping, outflanking, undercutting, and leaking joins in fabric
- Make any necessary repairs as soon as identified

- As the geotextile material becomes clogged with sediments, this will result in increased duration of ponding. Therefore, careful cleaning of the silt fence geotextile with a light broom or brush may be appropriate
- Remove sediment when bulges occur or when sediment accumulation reaches 20% of the fabric height
- Remove sediment deposits as necessary (prior to 20% of fabric height) to continue to allow for adequate sediment storage and reduce pressure on the silt fence
- Dispose of sediment to a secure area to ensure environment.



Silt Control Procurement:

Hy-Tex: https://www.hy-tex.co.uk/

Keyline Civils Specialist Ltd: https://www.keyline.co.uk/

8.8 Southern Treatment and Transfer Station

8.8.1 The Southern Treatment Area has been constructed for the treatment and temporary storage of arising waste generated by the tunnel boring machines (TBM), prior to placement within the placement area. Within the confines of the Southern Treatment Area, three pug mills, three lime silos, three 10,000m³ TBM muck bins , and a 4,000m³ quarantine bin have been constructed. The anticipated volume of TBM materials to be managed is approximately 1.23 million cubic meters, all of which will be transported to the STA from the tunnel coming out at West Ruislip Portal.

8.8.2 Conditioning agents will be introduced at the TBM face to support the cutter head progression, the agents will incorporated in the arisings and transferred through a conveyor system to the treatment area. The conditioner will inadvertently elevate the moisture content of the materials, rendering them unsuitable for placement and compaction. To rectify this issue and ensure the suitability of TBM arisings for placement, lime is added to reduce the moisture content. Upon initial entry into the STA, the weight and moisture content of the TBM materials will be continuously gauged using the conveyor system. Should the materials necessitate treatment, they will be diverted from the conveyor using a tripper unit and directed into one of the three pug mills. Further assessments of moisture content and weight will be conducted to determine the precise dosage of lime to be incorporated. From the muck bins the material is transported to their designated landfill mound via ADTs where it is placed and compacted.

8.8.3 The muck bins have two shovelers which move the TBM material around the bins and transfer it into the ADTs. The muck bins have concrete blocks to prevent ADTs from entering to prevent tracking the muck out onto site. The concrete blocks also help to retain the TBM material inside the bin itself. If any of the material becomes contaminated there is a quarantine area which can store approximately 4,000m^3

8.8.4 The Muck Bins are covered so any rainfall experienced will be captured by the roof drainage system and disposed into the on-site drainage. This prevents any direct runoff from the TBM material.

8.8.5 An precautionary Siltbuster has been installed with the sole purpose of treating the drainage from the Muck bins. The thought process behind this was that the runoff from the muck bins would have heavier silt loads. However, due to the muck bin cover the silt loads have been lower than anticipated.

Lime Replenishment Process

Lime needs to be replenished on a routine basis

- Prior to transfer, a visual inspection is conducted to identify potential obstructions within the discharge line.
- Secure connections are ensured by properly attaching hoses and confirming the tightness of clasp connections.
- Before unloading the lime, the supervisor confirms the storage tank's capacity and structural integrity to ensure safe product discharge.
- The supervisor to assesses the flow of lime through the pipes and inspects all connections for air or lime leaks.
- The pressure gauge is continuously monitored during the discharge process. When the pressure starts dropping rapidly, the discharge valve is closed.
- Each hopper is systematically purged by gradually opening and closing the discharge valves, progressing from the front to the rear of the trailer. This prevents any residuals from spilling out.
- Leaks and spills are promptly attended to, and they are cleaned as soon as they occur or as soon as feasible.

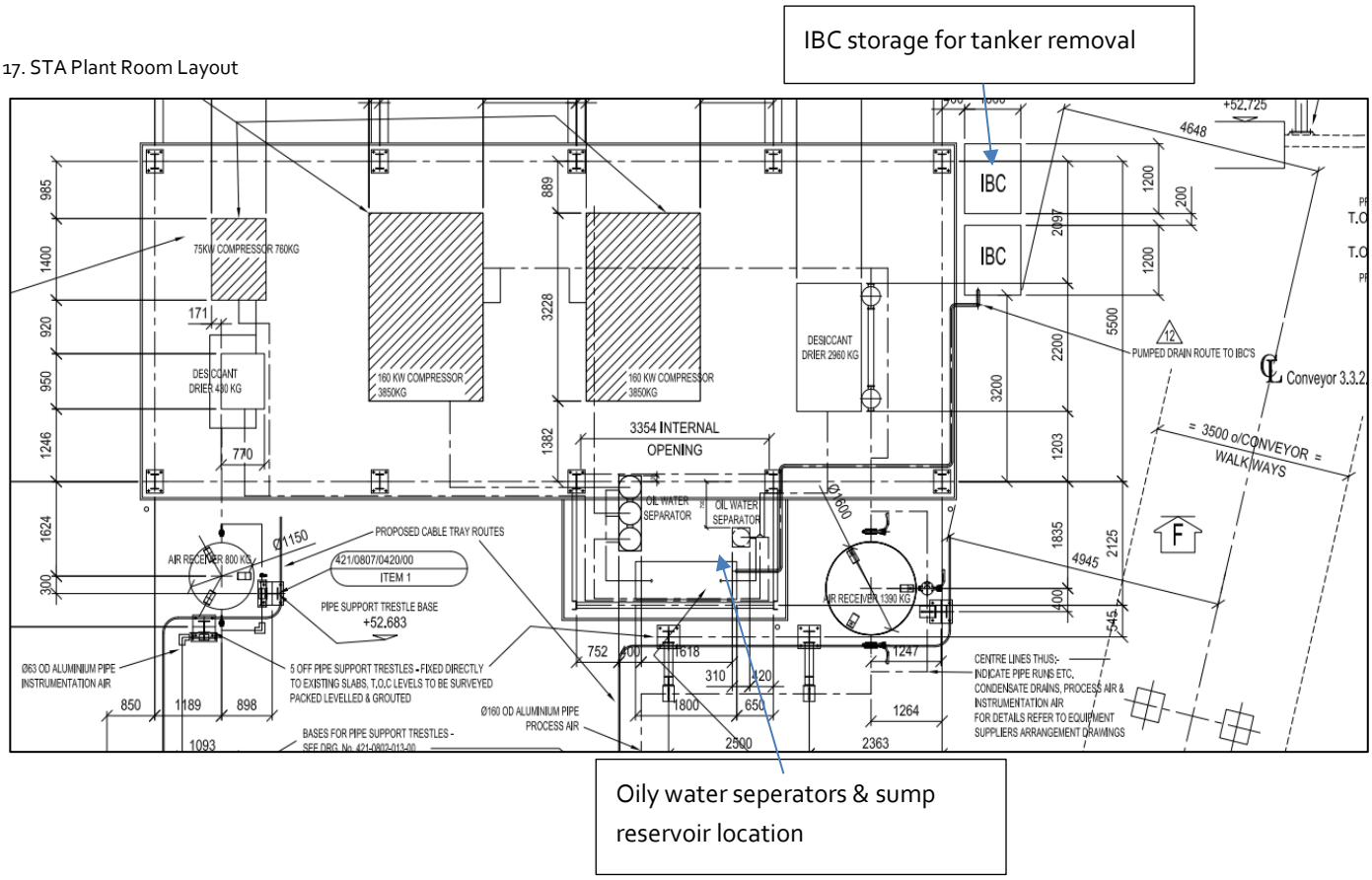
16. STA Photo's

	
Surfacing and drainage	**Quarantine Bay**
	
3 No. Soil storage bays – 10,000 m3 each	**Conveyor system with return**
	
3 No. pugmills – 1,800 m3 capacity / day	**4 No. lime silos**

Management of Dryer Water Condensate

8.8.6 The STA incorporates driers for the conditioning of lime within the silo's. Water condensate is produced from the operation of the blowers and associated plant, which has the potential to include oil. This water is passed through an internal oily water separator (Sterling Separation CSR Range) before being discharged to a contained outfall sump reservoir within the plant room, from which it is drainged to two metal clad IBC's for storage and removal from site via tanker. This water is under no circumstances permitted to discharge to the site drainage.

17. STA Plant Room Layout



Arisings Damping Management

8.8.7 To ensure blockages are not encountered at the conveyor/STA, damping of the TBM arisings pre treatment is necessary. This can lead to potential run off of water laden with untreated arisings within the boundary of the STA. To prevent this water entering the general site drainage, belly bans and ground containment (i.e. bunds, walls and/or sundbags) are to be installed to collect water run off should it occur. This will be removed and incorporated back within the TBM arisings for treatment, and eventually placement.

8.9 Storage of Excavated Material Stockpiles

8.9.1 Excavated material that is stockpiled on site for further use should be managed to prevent silty run-off or losses due to wind. When stockpiling material, the following control measures should be considered (make contract specific):

- Where feasible locate all stockpiles at least 10 meters from watercourses.
- Seeding with suitable grass species may help prevent slippage and erosion from wind or rain.
- Ensure adequate weed control.

- A silt fence should be constructed around any top-soil stockpile
- Direct surface water away from the stockpiles to prevent erosion at the base
- Comply with the Soil Management Control Plan
- Located away from drains and watercourses. A vegetation strip will be left between the toe of a heap and any adjacent watercourse.
- Seeded or provided with other stabilisation measures appropriate to the length of time stored.

8.10 Firewater runoff

8.10.1 Fire water runoff refers to the water used by firefighters to extinguish fires. This water can contain harmful substances such as chemicals, fuels, and other pollutants that can harm the environment if not properly handled.

8.10.2 Firewater runoff should be contained to prevent it from spreading further. Sandbags or other absorbent materials can be used to create a barrier around the runoff and keep it from entering nearby bodies of water or storm drains.

8.10.3 All drainage leads into the attenuation ponds, if firewater runoff is suspected to discharge into a drain this can be plugged in advance and sucked out using our emergency tankers. This will be disposed of at a hazardous waste station and consignment notes will be retained.

8.11 Permit to pump

8.11.1 The environment team should be consulted on the best way working methods and a permit to pump should be completed before dewatering or discharges commence.

Never Pump Directly to a Water Course or Allow Waters to Enter a Water Course

8.11.2 A Permit to Pump (PTP) is a permit granted to the High-Speed Two (HS2) project to allow the pumping of groundwater during construction activities. Groundwater pumping is required during the construction of tunnels, shafts, and other underground structures to lower the water table and prevent water ingress into the construction site. In the context of gate 1 the permits to pump are generally due to rainwater ingress. This water may contain silt and/or other contaminants that, if disposed of incorrectly, could result in pollution of controlled waters. Permit to pump is to be completed prior to any discharge activity and should be reviewed monthly or following any changes to the Site-Specific Environmental Control Plan. Where multiple discharge activities are being undertaken a separate permit to pump is to be completed for each activity.

Gate 1 permits to pump

- Permit to Pump (Mound 2 & 3 via Pond 5) - WES-RSSP-PTP-00063

- HRHW Permit to pump

To be done:

- Diamond Field – With Engineer Team

8.11.3 Such discharges are from excavations consisting of pumping out rainfall. These will consist of water that can be managed by a two-inch pump and would be short duration to empty excavations.

8.11.4 The following should be undertaken prior to pumping the water

- Check if there is evidence of a sheen or contamination of other contaminants do not pump the water and contact the environment team for advice.

8.11.5 The following are minimum requirements when dealing with ingress of water:

- All discharge waters should be passed through a siltbuster before being discharged off-site.
- The discharge outputs must be regularly monitored for elevated suspended solids, smell, evidence of oil. If there is evidence of contaminants which are not suspended soilds please advise the environment team.
- If the pump is to be operating for a long period, then it must be inspected by a competent person.

8.11.6 Where oily water is noted to be entering discharge then appropriate action must be taken:

- Stop pumping
- Consult the Environment Team
- Investigate source of pollution
- Take action to reduce pollution

8.11.7 Where none of the above is applicable then the water can be disposed of by tanker to one of our attenuation ponds – seek advice from the foreman on which pond is appropriate.

Live Permits to Pump are found here

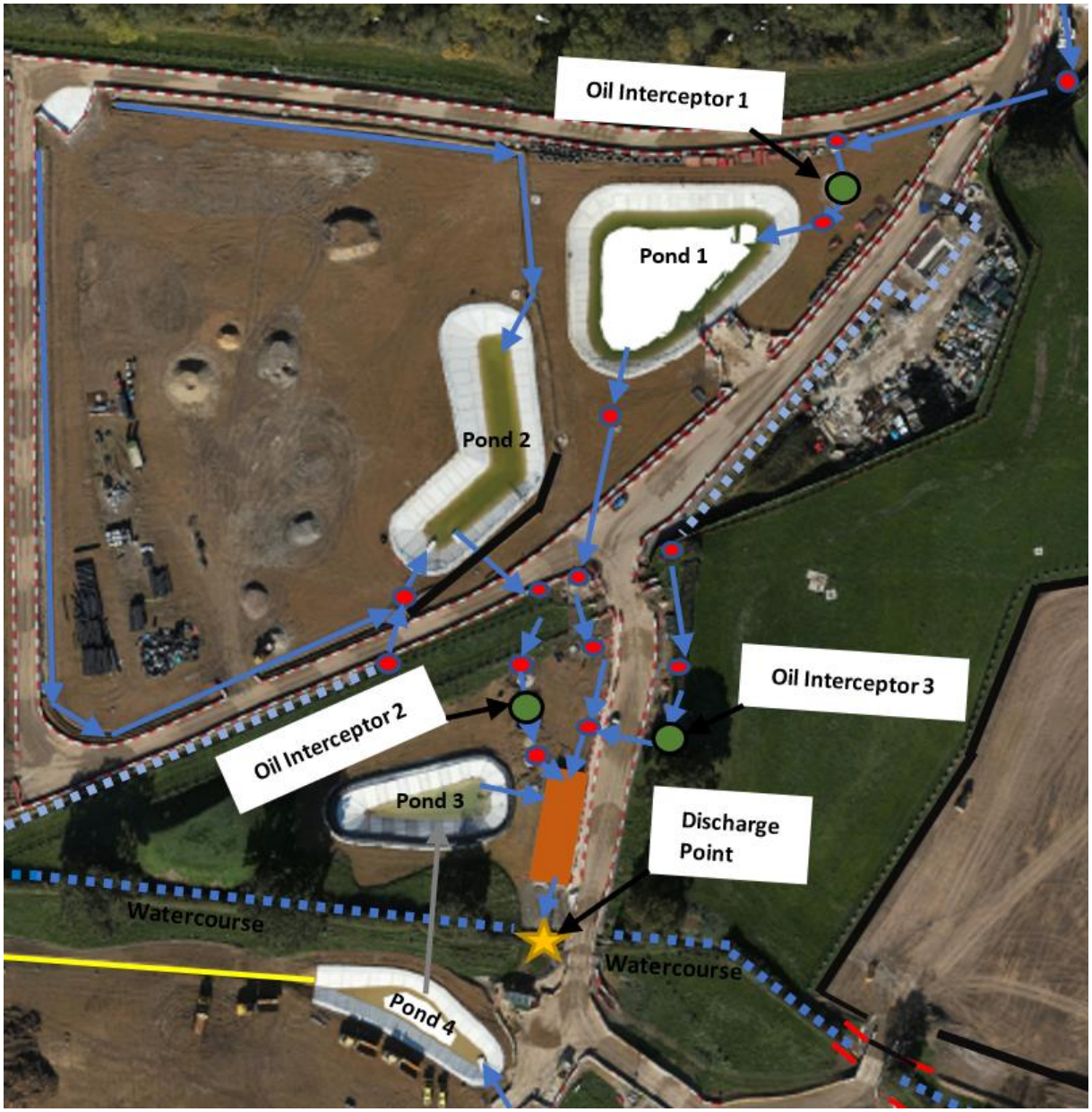
8.12 Oil interceptors

8.12.1 Oil interceptors are systems designed to capture and separate oil, grease, and other pollutants from stormwater/wastewater before it is released into the environment. Regular maintenance of these systems is important to ensure they continue to function effectively and to minimize the risk of oil or other pollutants escaping into the environment. By performing regular maintenance, it also helps to extend the lifespan of the oil interceptor, ensuring it operates efficiently and avoids costly replacements or repairs.

8.12.2 There are three oil interceptors on-site:

1. Oil Interceptor no1: SPEL Stormceptor Class 1 By-pass Seperator with silt capacity - 470C1/SC/NSB/NS: 70-470C1/SC NSB/NS: 70
2. Oil Interceptor no 2: SPEL Stormceptor Class 1 By-pass Seperator with silt capacity - 206C1/SC/300 NSB/NS: 6
3. Oil Interceptor no 3: SPEL Automatic Oil Alarm/Monitoring System

18. STA Interceptor Locations



Maintenance:

8.12.3 Regular maintenance has been set-up with SPEL contractors to undertake inspections every 4 months to ensure that the system is running properly. We are currently in the process of

getting the contract in place. The plan is to get the SPEL contractors out to look at the system and have a black hat take over the maintenance once they are competent to do so. SPEL has checklists which they work off when they undertake inspections. The main purpose of oil interceptor maintenance is to:

- Prevent oil and pollutants from escaping into the environment
- Ensure the system continues to function effectively
- Extend the lifespan of the system
- Meet regulatory compliance requirements and avoid penalties

Why it is necessary:

8.12.4 Regular oil interceptor maintenance is necessary to:

- Keep the system functioning at optimal levels
- Ensure compliance with environmental regulations
- Avoid costly replacements or repairs
- Protect the environment and public health

In the event of a spill

- If there are any minor or major spills, the environment team needs to be kept in the loop
- Oil interceptor should be checked after any major spills and emptied if required.
- Incident should be raised on HORACE after consultation with site team and environment manager.
- Information to be gathered is date, time, location, cause, environmental effect, and cleanup actions to be taken.
- Toolbox talk regarding Environmental Reporting to be given on a quarterly basis

Solar oil separator alarm

8.12.5 Alarm systems were not installed during interceptor placement, and are expected to be retrofitted to include by July 2023

8.12.6 The idOil Solar is a solar powered oil separator alarm for off-grid areas. It is equipped with a beacon light and/or 3G modem. In an alert situation, the beacon light will flash and/or an alarm message will be sent to the user's mobile phone. This has been installed at siltbuster 1

SPEL website: https://www.spelproducts.co.uk/

SPEL Fuel/Oil Separators Guidance: Section 3 Fuel & Oil Separators.pdf

Table 14. Interceptor Responsibilities

Name	Job Title	Contact	Details
Konstantinos Kalomalos	Section Engineer	konstantinos.kalomalos@scsrailways.co.uk 078 7097 8334	Oil Interceptor information Procurement Plans for installation
Richard Green	Environmental Advisor	Richard.green@scsrailways.co.uk 078 9098 5801	Oil interceptor record keeping Maintenance Plans Oil interceptor coordination
Alin Mihalache	Black Hat	075 5154 4331	Site supervisor for the oil interceptor area Maintenance of interceptor Siltbuster 2 operator

8.13 CESSPIT

8.13.1 Near the carpark, there is a cesspit which is responsible for collecting all the wastewater and greywater generated by the site offices and welfare facilities around the gate. With a capacity of 25,000 liters, the cesspit undergoes regular pumping by the GAP Group tanker services on Mondays, Wednesdays, and Fridays. Additionally, T&M provides their services every other day to pump out the septic system, ensuring the absence of any potential problems. The site welfare facilities are also pumped out as needed to maintain proper functionality. To prevent overflow this cesspit needs be pumped regularly, a level sensor alarm may be put onto the cesspit in the future to notify the team when this is near capacity.

Cesspit company: Kingspan Group

Cesspit Make: Klargester

Service & Maintenance

GAP Services

Agreement Number: 8001228

Email: Alan.Loudon@gap-group.co.uk

Phone: 07811 590771

Website: www.gap-group.co.uk

T&M Bowser Solutions

Email: info@tmplant.co.uk

Phone: 01293 774 500

Website: https://www.bowser-hire.com/contact-us/

8.14 Near Waterways

8.14.1 Most work will be undertaken away from the water course, however, in some cases works shall take place adjacent to watercourses. There is one watercourse that runs through the site and extra care and attenuation should be given to this watercourse. The watercourse takes inputs from siltbuster 2 discharge, Harvil road drainage realignment and any other rainfall it picks up upstream course. This waterway is naturally ephemeral, so it only runs when influenced by rainfall. The other main river that is our final discharge point is the River Pinn. Works shouldn't be undertaken near here as it is located 200 m away from the site boundary.

8.14.2 Where works are likely to interfere with controlled waters then Environment Agency should be consulted over working methods, general control measures in the vicinity of a controlled waters are:

- Monitor consent requirements for compliance – routinely undertake inspections on-site and check the discharges are being well managed.
- All containers of oils should be contained within drip trays and returned to stores after use. All chemicals are kept within compliant levels to ensure no aquatic and avian fauna
- Refuel plant carefully and at least 10m away from water edge whilst using drip trays and funnels.
- Do not wash equipment out in watercourses
- Spill kits should be available for emergency incidents – any kit that is used will need to be replenished, information on what was used should be tracked so this can be replenished. This is the responsibility of the user of equipment.
- No water should be pumped into watercourses without prior permission from Environment Agency.
- Site spoil heaps and temporary stockpiles at least 10m from watercourse and drainage systems – stockpiles need to be stabilized as soon as practicable.
- Stockpiles close to watercourses must have silt fencing to prevent silty water from running off into the river.
- All water that runs off from site should be treated through the siltbusters before discharging.

8.15 Ecological protection

8.15.1 Watercourses around the contract could support aquatic life of various kinds. As such, additional protection measures may be necessary.

Other Fauna

- All settlement ponds will be carefully managed to ensure no algae, floating debris or suspended oils/solids enter water courses.
- Water quality will be checked for any changes in pH to ensure no impact on the existing water quality and water sampling will be carried out regularly, telemetry downloads and checks will be done on a weekly basis and saved here: Siltbuster 2 Telemetry & Siltbuster 3 Telemetry
- All chemicals are kept within compliant levels to ensure no aquatic and avian fauna
- If an exceedance or spill occurs the river Pinn discharge should be checked and sampled. In addition, a walkover the river should be undertaken to check there are no wildlife that have been impacted.
- If any biota is found inside the siltbuster or ponds the ecologist will be consulted on how to proceed.

8.16 Refuelling

Fuel Tankers / Refuelling

8.16.1 The fuelling of mobile and static plant on site provides a potential for contamination of the environment. This may prove to be either localised, or possibly more widespread owing to waterborne or airborne dispersal. SCS recognises the potential risk involved in fuel-filling plant and equipment and has decided that certain precautions must be carried out whilst employees or sub-contractors are engaged in work of this nature.

8.16.2 This procedure must be complied with:

- All re-fuelling activities will undertaken by T&M
- Spill kits will be fitted to all re-fuelling vehicles, ensuring spills do not penetrate into the ground. Sand/granules will also be present on site to soak up any spills should they occur on impermeable surfaces.
- Plant and generators will be supplied with hydrotreated vegetable oil. This will be stored in a bunded bowser within the site compound on hard standing.
- Refuelling will take place in a designated area over 10 metres from any watercourse, boreholes or drains and on hard standing in the Site Compound

- Plant nappies and drip trays will be used for refuelling.

8.16.3 All existing site drainage is connected to the existing compound area and is connected to the STA drainage system that will clean drips and minor spillages through the silt busters, oil interceptors and PH treatment prior to discharging. However, all spillages should be isolated and cleaned to avoid entry into drainage, if possible, with larger spills potentially requiring discharge shut down and clean-up support by emergency spill contractor. The emergency spill contractor is below

8.16.4 Plant and generators will be supplied with predominantly hydrotreated vegetable oil (HVO). HVO is stored within the large 60,000 L bunded static container located in the STA T&M container near the stores. The site has dedicated refuelling areas; the STA refuelling is undertaken behind the COSHH stores, and the mounds are refuelled in the concrete turn around area. Hargreaves and Alltask also have mobile bowsers which refuel all their plant. Adblue is also stored on-site within the same area, this is stored within a double skinned 30,000L container and distributed in 220 L containers attached to the T&M truck bowser.

Fuel Storage and Tankers:

8.16.5 **Mobile Bowsers:** T&M are used for carting HVO throughout the West sites. All bowsers are fitted with automatic shut-off refuelling pumps. Where movements occur of mobile fuel browsers, the refuelling valves and flaps should be shut down to prevent lapping liquids escaping. Copthall South has three T&M bowsers, two of which undertake the refuelling daily and one which is used as a back-up for contingencies. Mobile bowsers distribute HVO through-out the site to all SCS plant in the designated hardstanding areas

8.16.6 **Cranes:** All cranes are refuelled by the company that owns the crane. This is undertaken on the hardstanding areas using their own bowsers. Cranes are fuelled using diesel. Spill kits are stocked close by and if a spill occurs will be captured by an oil interceptor.

8.16.7 **Fuel Log:** T&M keep all fuel logs on a spreadsheet which SCS can request.

8.17 Environmental Spills / Spill Kit Provision

8.17.1 Spill provision will be provided in fuel storage areas capable of controlling the maximum container spill which could occur.

8.17.2 A fully stocked spill kit will be located at multiple locations within the site compound, contractor storage areas and high-risk work areas, i.e. COSHH Storage area, all site storage areas, muck bins 1, 2, and 3, all attenuation ponds, near all the siltbuster units, near the unnamed tributary and anywhere the plant is operating. Smaller emergency spill kits shall be carried by all items of large plant, i.e. mechanical excavators, wagons etc. The large spill kits shall, as a minimum, contain:

- 1 x Wheeled Bin
- 6 x Oil Only Socks (3m x 8cm)
- 140 x Oil Only Pads (Double Weight)
- 5 x Oil Only Cushions
- 1 x 5Kg A Granules
- 5 x Disposal Bag & Tie
- 1 Instruction Sheet

8.17.3 **Note:** Chemical spill kits must be available at chemical stores (i.e. siltbusters, COSHH stores etc), these are identified as yellow pads and booms, as opposed to grey or white oil kits.

Spill Kit ordering:

Onsite Support Ltd - https://www.onsite-support.co.uk/

Email - sales.support@onsite-support.co.uk

EHM - https://www.ehmltd.co.uk/

Email: sales@ehmltd.co.uk

8.17.4 Spill Kit training should be organised by the environment team and will be undertaken on a 6-month basis. Training can be given by on-site support or by the environment team.

Plant Nappies

8.17.5 The use of Plant Nappies is required across sites, in preference to the 'baking sheet' style of drip tray. Controlled targeted risk monitoring (CTRM) is undertaken monthly, plant nappies

are one of the checks, if it is found that the plant doesn't have a nappy this is remediated in the actions.

8.17.6 In addition, the environment and site teams check to ensure that drip trays are under appropriate plant. This is also mentioned within the Risk Assessment Method Statement (RAMS) for all activities which is briefed to all staff undertaking the activity, so all staff are aware of the requirements. Plant nappy liners will need replacement once it becomes degraded, the site team will be responsible for procuring these.

Internal Spill Kit Audit

8.17.7 An internal audit of all spill kits on-site is undertaken on a quarterly basis. The spill kits are sealed with breakable zip ties which shows if the kit has been used and requires restock. Additional checks are undertaken by the environment and site team during inspections to see if spill kits require replenishment. This is also audited within CTRM.

Link to Spill Kit Audits: Spill Kit Audit

19. Copthall South Spill Kits Locations

8.18 Tunnel boring arisings

Lime Modification

8.18.1 In-situ lime treatment and temporary storage operations at Treatment Pad 1 operate under a Mobile Plant Deployment (Document no. 1MC04-SCJ-EV-APP-SS05_SL07-000165) which covers the treatment of lime in-situ and the temporary stockpiling of TBM Arisings. Treatment Pad 1 will be operational throughout 2023, particularly until the STA is complete. The lime treated stockpile is contained by bunding and any water that runs off will fall into attenuation pond 2.

8.18.2 Lime treatment is used to dry out the TBM arisings so it can be placed in the sustainable placement mounds. However, the addition of lime can cause runoff from the soil to be high in pH. To lower the pH of water, carbon dioxide is added to the water via the siltbuster unit. The siltbusters have pH probes to check pH of the water and CO_2 is added automatically once the pH rises to 8.5, typically by bubbling the CO_2 gas into the water stream. This process can help to lower the pH by increasing the concentration of carbonic acid in the water, which can then react with the alkalinity present in the water to lower the pH.

8.18.3 Once operational under the waste transfer and treatment permit, TBM Arisings treated with lime has the potential to go to the STA drainage system. To prevent lime getting into the drainage system, the STA muck bays will be covered over by a purpose-built roof designed to reduce rainwater and contain noise/light with a dust suppression screen towards the back of the muck bays near the conveyor. The pugmill is a contained system so rainwater exposure during this aspect of the STA area will be minimal. It Is expected that the TBM Arisings treatment and storage operations within this area may cause high amounts of silt to be contained in water captured in this area. Any water runoff from the TBM arisings will be captured in a separate drainage system which will be treated through two siltbuster units, an oil interceptor, and attenuation pond before it discharges into the watercourse running through site.

Soil Conditioner

8.18.4 The tunnel boring machine employs a soil conditioner to facilitate its progress through the soil by altering its properties and creating a more viscous state. The excavated material resulting from this process is then conveyed to the West Ruislip Portal and subsequently transported to the site via trucks. After the completion of the conveyor system, the tunnel boring machine arisings are transferred to the STA muck bins for lime treatment. By drying them with lime, the risk of soil conditioner leaching and runoff into waterways is minimized, ensuring compliance with discharge regulations when released into the river.

8.18.5 To ensure compliance with soil conditioner regulations, weekly samples are taken from the attenuation ponds to assess the presence of aliphatic and aromatic carbon chains as well as sulphates. Concept, an organization responsible for sampling, sends these samples for analysis to ALS laboratories. Once the results are obtained, the environment team compiles and shares the data with the water specialist, who in turn reports to the environment agency.

8.19 Vehicle Washing

8.19.1 All vehicle washing shall be permitted on site but shall be undertaken in the designated location which is at the STA near the quarantine for the muck bins. When tracking plant in and out of compounds, particularly in bad weather conditions, wheels shall be checked on exit and jet washed down if required.

8.19.2 The drainage system from the muck bins runs into the site drainage and gets treated by oil interceptor, attenuation at pond 1 and treatment by 2 siltbusters before discharging into the watercourse.

8.20 Dust and Mud Prevention

8.20.1 The main entrance / exit utilised by operational vehicles should be regularly monitored to ensure that excessive mud does not affect the adjoining highway.

8.20.2 A sweeper will be deployed when ground conditions are unsatisfactory and may lead to mud on the road or dust emissions

8.20.3 Wheel cleaning facilities should be undertaken for all vehicles leaving site. Tracking mud onto the road is a breach of HS2 undertakings and assurances.

8.20.4 Sweeper will be required to remove mud off the haul road to prevent tracking off-site.

8.20.5 Disposal of sweeper arisings are disposed of at a designated treatment facility.

8.21 Concrete Washout Management

8.21.1 Concrete washout is conducted in two distinct locations. The first location is outside the Materials Management Lab and employs a. The second location is a skip near siltbuster 1 that uses an impermeable membrane to prevent leakage. Both systems allow the settlement of sediment and solids from the liquid portion. Gravity helps the particles settle to the bottom of the container while the materials lab uses a three-part container which flows from one compartment to the next when one compartment becomes full.

8.21.2 While concrete pours are infrequent on the site as most of them have been completed, the Materials Management Lab regularly conducts concrete testing, necessitating proper management of the washout process in this area.

Potential Sources of Concrete Washout Management Issues

8.21.3 The prime sources of concrete wash water are:

- Concrete Pours for compound
- Concrete pours for foundations
- Materials Laboratory – crushing cubes, slump tests, washing the tools
- Concrete washout system outside the Materials Laboratory
- Concrete washout skip near siltbuster 1

Method of Works

8.21.4 The following general philosophy applies to the proposed Concrete washout management procedures, to ensure that the risk posed from concrete wash water is minimised;

- Collection of concrete wash-water in a secure and watertight container/skip;
- Lining the skip bin as a precautionary measure
- Settlement of suspended concrete sediment from the wash-water;
- Regular inspection of concrete washout equipment to ensure that there are no leaks/spills.
- Bunding the concrete washout area to prevent any leaks from leaching into drainage

Treatment of Concrete washout

8.21.5 There shall be a lined and water-tight washout facility such as a lined waste skip or pit or a dedicated concrete washout facility.

8.21.6 Where a lined skip is used the process shall be:

- Any suspended concrete sediment within the wash-water will be allowed to settle to the bottom of the skip.
- Washout water gets collected via tanker and disposed off-site. Waste transfer notes are sent to the environment team.
- The hardened concrete at the bottom of the skip will be either sent to a licensed waste facility off-site. This gets collected by Cappagh or Ace as crushed concrete.

8.21.7 The site is currently looking into alternative methods of managing the concrete washout such as getting a blue rinse system which uses non-hazardous pH/BLUE to reduce alkalinity safely. It is also a closed loop system which can be protected from the elements.

9 Davis Weather Monitor – Vantage Pro 2 Plus Wireless

The environment team has a weather monitor which is managed by someone within the environment team. This device collects information from a weather station that is set-up on the roof of the office building. The data is saved onto a website and can be downloaded into an excel spreadsheet. Whoever has the weather monitor will be the access owner for the monitor. Each time a new user is set-up the datalogger will need to be set-up for the new user. This will include downloading the datalogger software and inputting parameters. For more information contact Davis support for assistance.

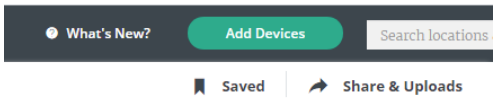
Instructions for new users

The weather monitor is USB version, the USB does NOT have a Device ID that is assigned. A new Device ID and Key can be collected from the website WeatherLink.com When you add a DEVICE

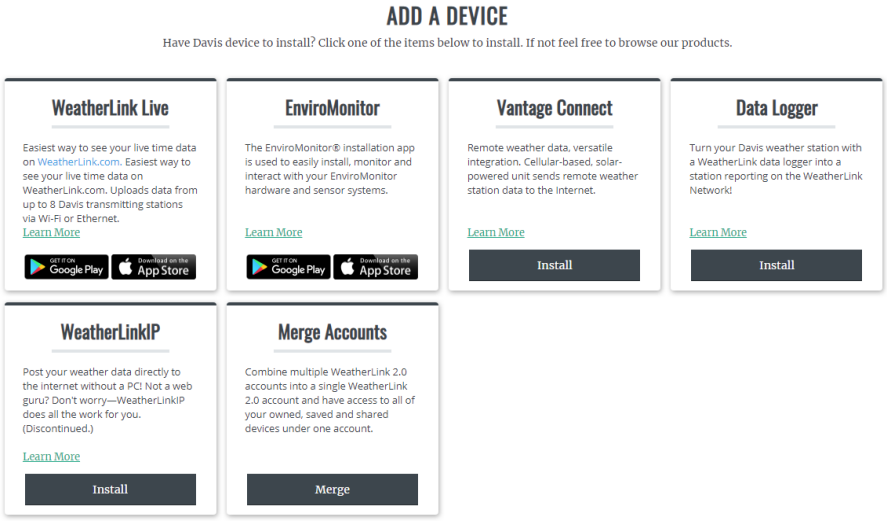
The USB Data Logger does not have a built in Device ID or Key.
You would register the device on the WEBSITE, and then the WEB would create a Device ID and KEY.

To register the device and to get a Device ID, you would register a new account and log into your account.

Then, at the top of the page, find "ADD DEVICES"

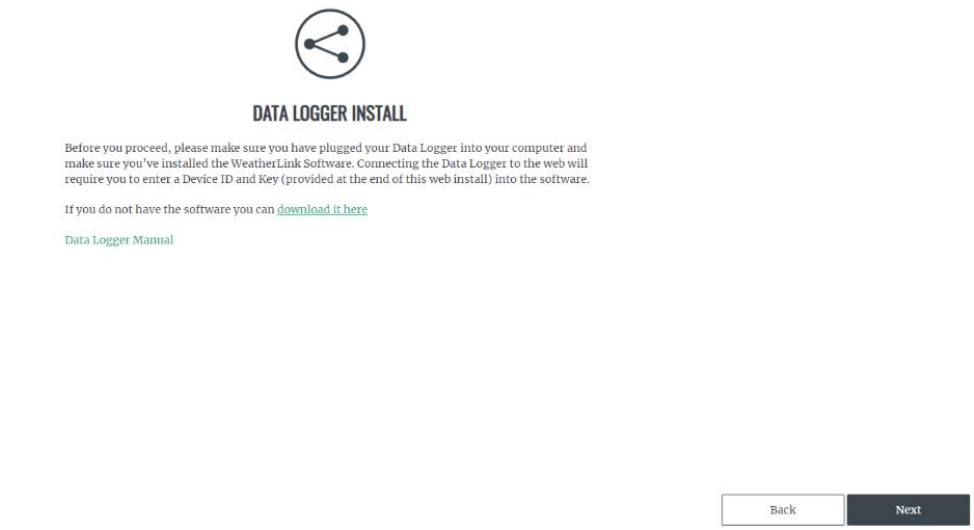


You would then select:
"DATA LOGGER"

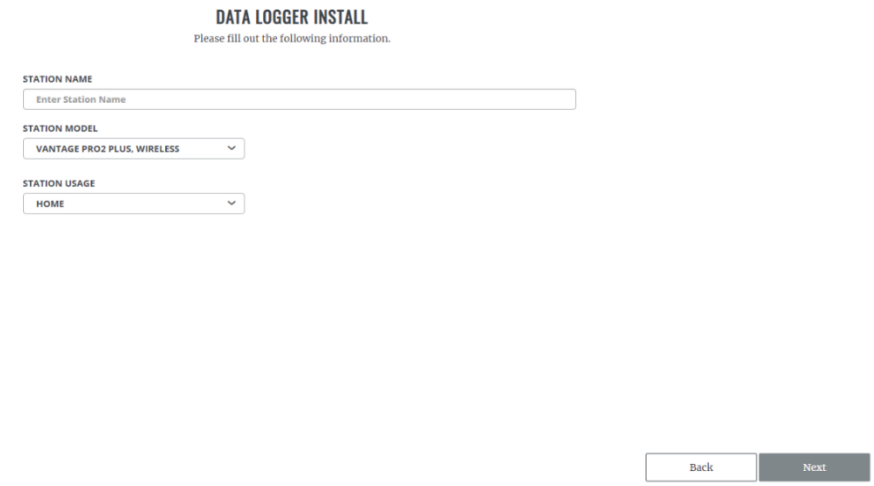


Download the WeatherLink Software (you will need someone from SCS IT Team to assist in downloading

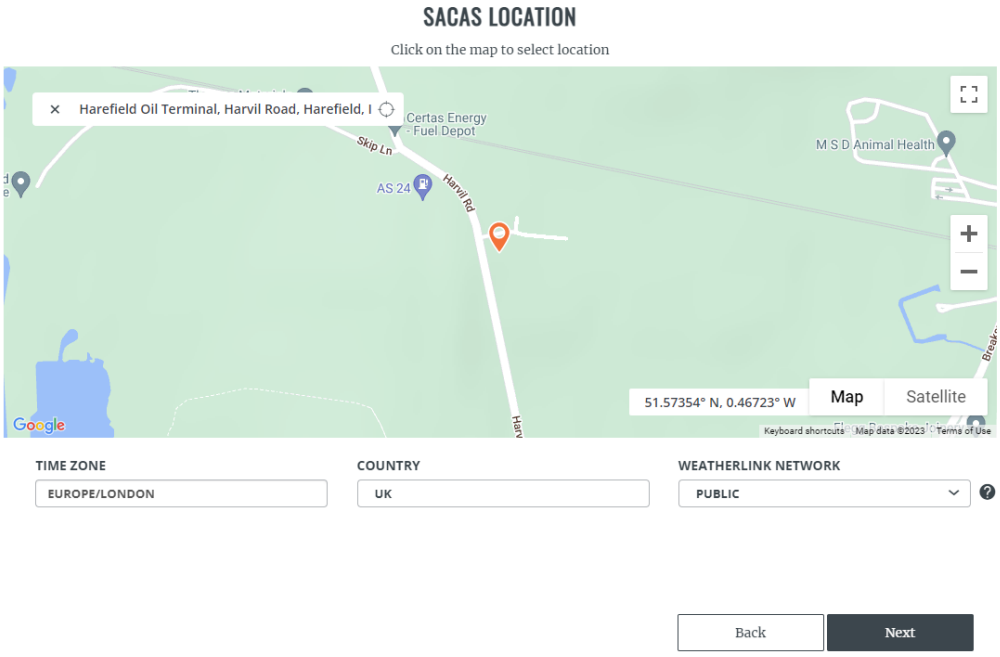
the device) and click next:



Then give your station a name (eg. Copthall South Weather Station), then select the type of station and if desired, the Station Usage.



The next screen will ask for the LOCATION. Clear out our address and enter your address, or drag the orange icon to your location, then hit NEXT



You will then be given the **SERVICE AGREEMENT** agreement, Read and then press Agree. It will then give you your Device ID and KEY. **Make note of these.**

Once you have downloaded the Weatherlink software you can find the application in the C:Drive under the Weatherlink folder. Follow the tutorial for completion of set-up and input your device ID and key to sync the device with Weatherlink website.

To check and download data go onto the Data tab on the weatherlink website and click the export icon

The pro version is required to download the data from the Weatherlink Website

WeatherLink Website: https://www.weatherlink.com/

Support: support@davisinstruments.com

10 Pollution incidents

10.1.1 It is important to take immediate action to minimize the impact on the environment and to comply with applicable laws and regulations. The following should be undertaken when dealing with an incident on-site.

10.1.2 **Assess the situation:** Determine the severity of the incident and identify the potential environmental impacts. This will help you determine the appropriate response and the resources needed to address the situation. Let the environment team know of the situation so they can plan accordingly.

10.1.3 **Implement emergency response measures:** If necessary, take immediate steps to control the spill or release, such as containing the spill or stopping the release. Use appropriate PPE and follow established safety protocols. If the spill is a hazardous substance, read the COSHH assessment and the MSDS sheet. Prevent access to the area if it is believed to be dangerous.

10.1.4 **Document the incident**: Keep detailed records of the incident, including the type of material released, the location and time of the incident, and any actions taken to respond to the incident. Also take as many photos as possible to help tell the story. of the discharge, actions taken and general environmental impact which is being caused

10.1.5 **Develop and implement a remediation plan:** The environment team will develop a plan to address the environmental impacts of the incident, such as clean-up and restoration activities. Follow the plan to ensure that the environmental damage is minimized and that you comply with all applicable regulations.

10.1.6 **Communicate with stakeholders:** The Environment Manager is to keep the appropriate stakeholders informed about the incident, including regulatory agencies, nearby communities, and HS2. Provide updates on the situation and the progress of the remediation efforts.

10.1.7 **Review and learn from the incident:** Once the incident has been resolved, review what happened and identify any lessons learnt – the Environment Agency will need an incident report detailing what occurred, actions taken and lessons learned. Use this information to improve your environmental management practices and prevent similar incidents from occurring in the future.

HORACE

10.1.8 Is our incident reporting platform whenever an incident occurs on-site. The platform categorizes severity based on environmental impact:

- Level 4 – Near Miss
- Level 3 – Minor Incident
- Level 2 – Major Incident
- Level 1 – Catastrophic

Please refer to the Horace incident severity and levels matrix found on HORACE attachments.

Useful documentation:

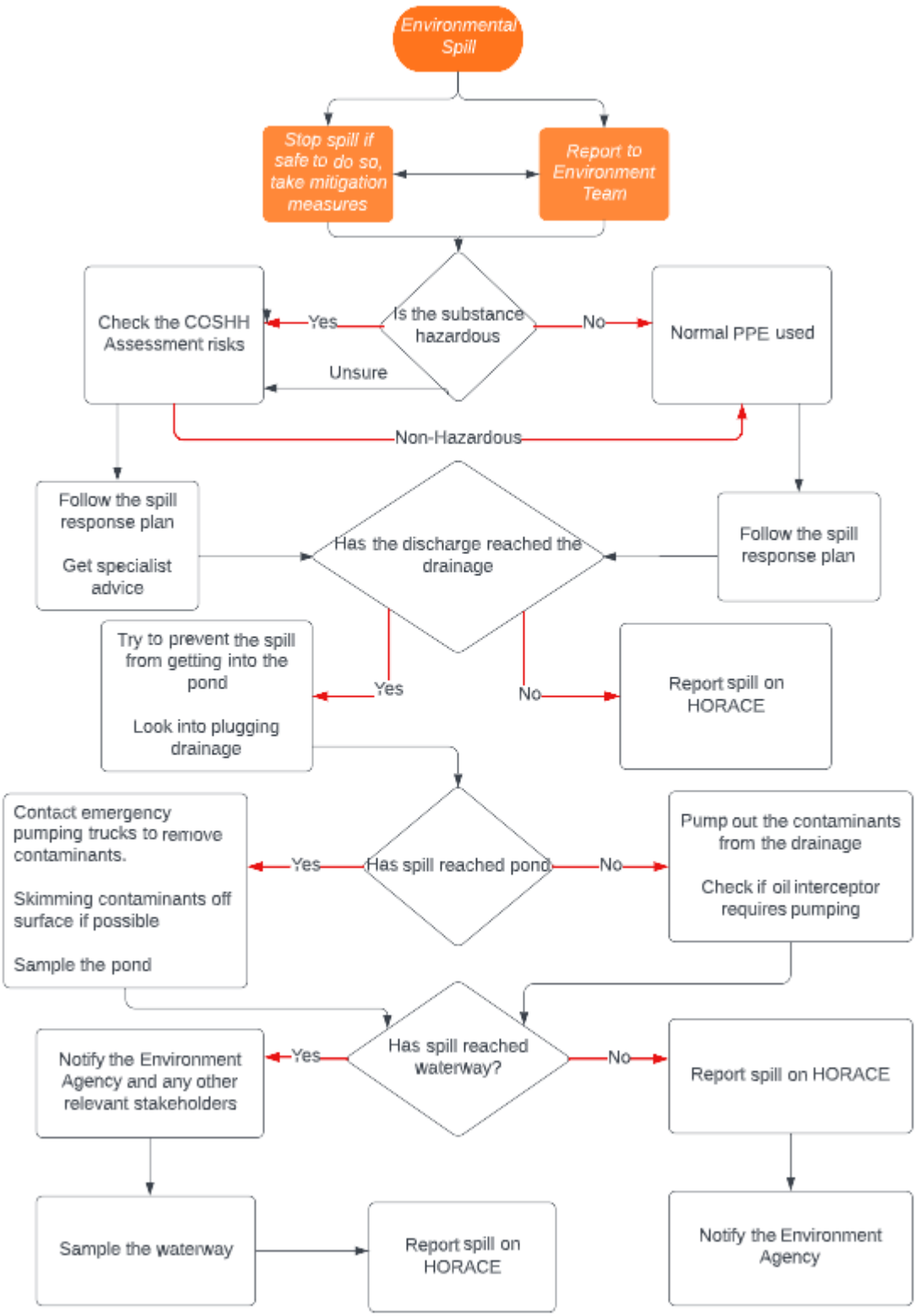
Horace -> How to report an incident

HORACE

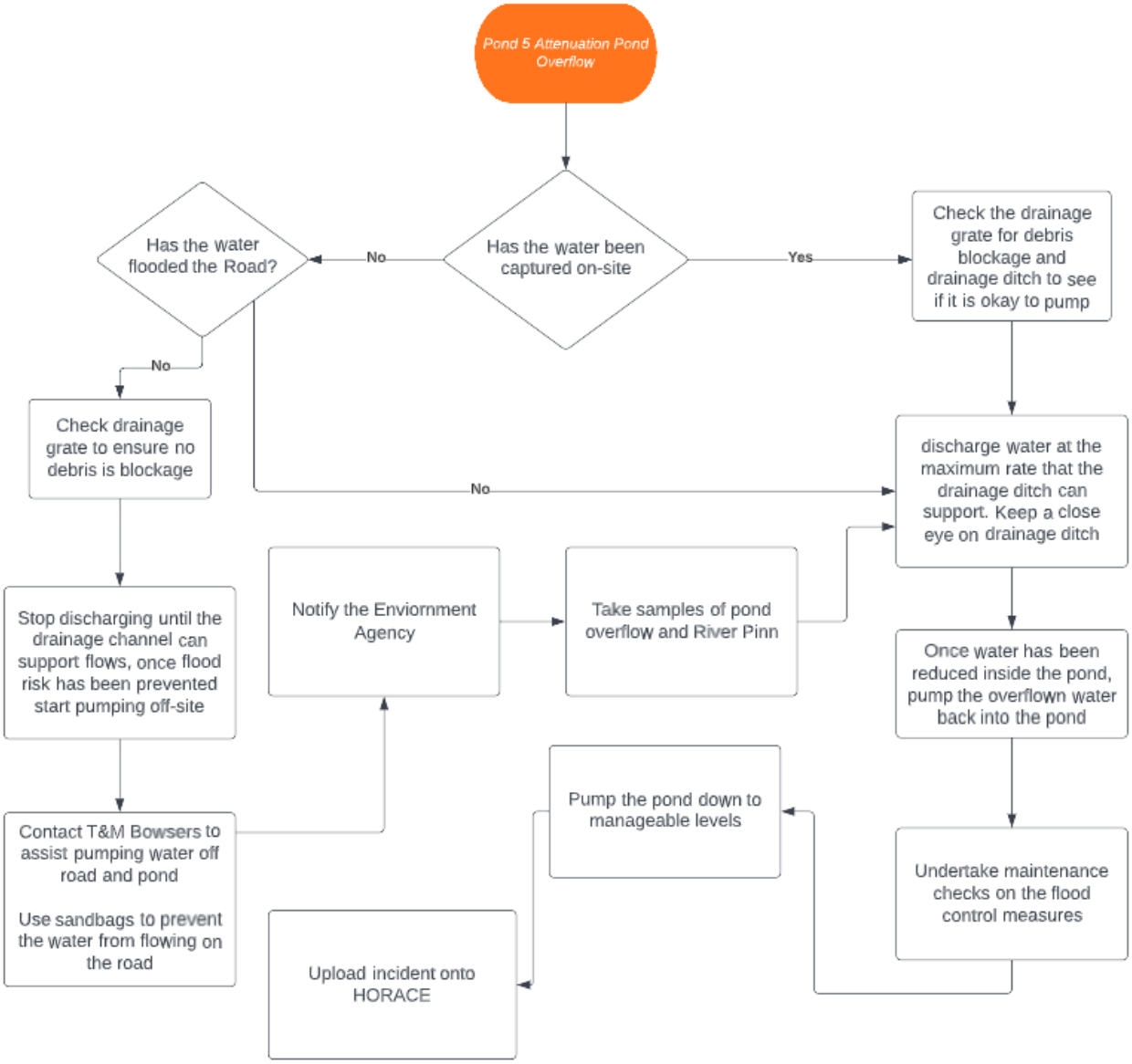
Incident Folder

11 Incident Action Flow Charts

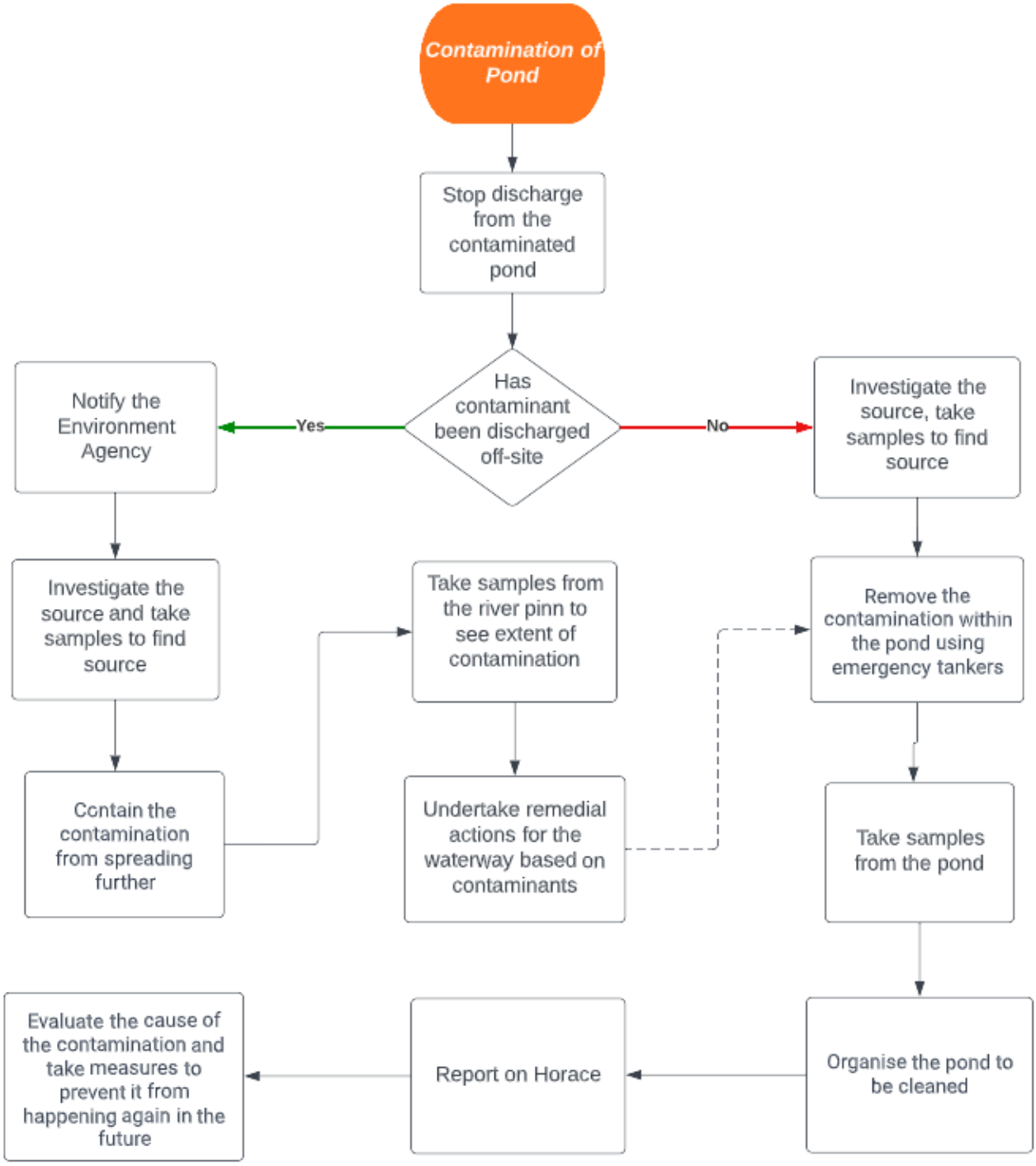
20. Environment Spill Action Flow Chart



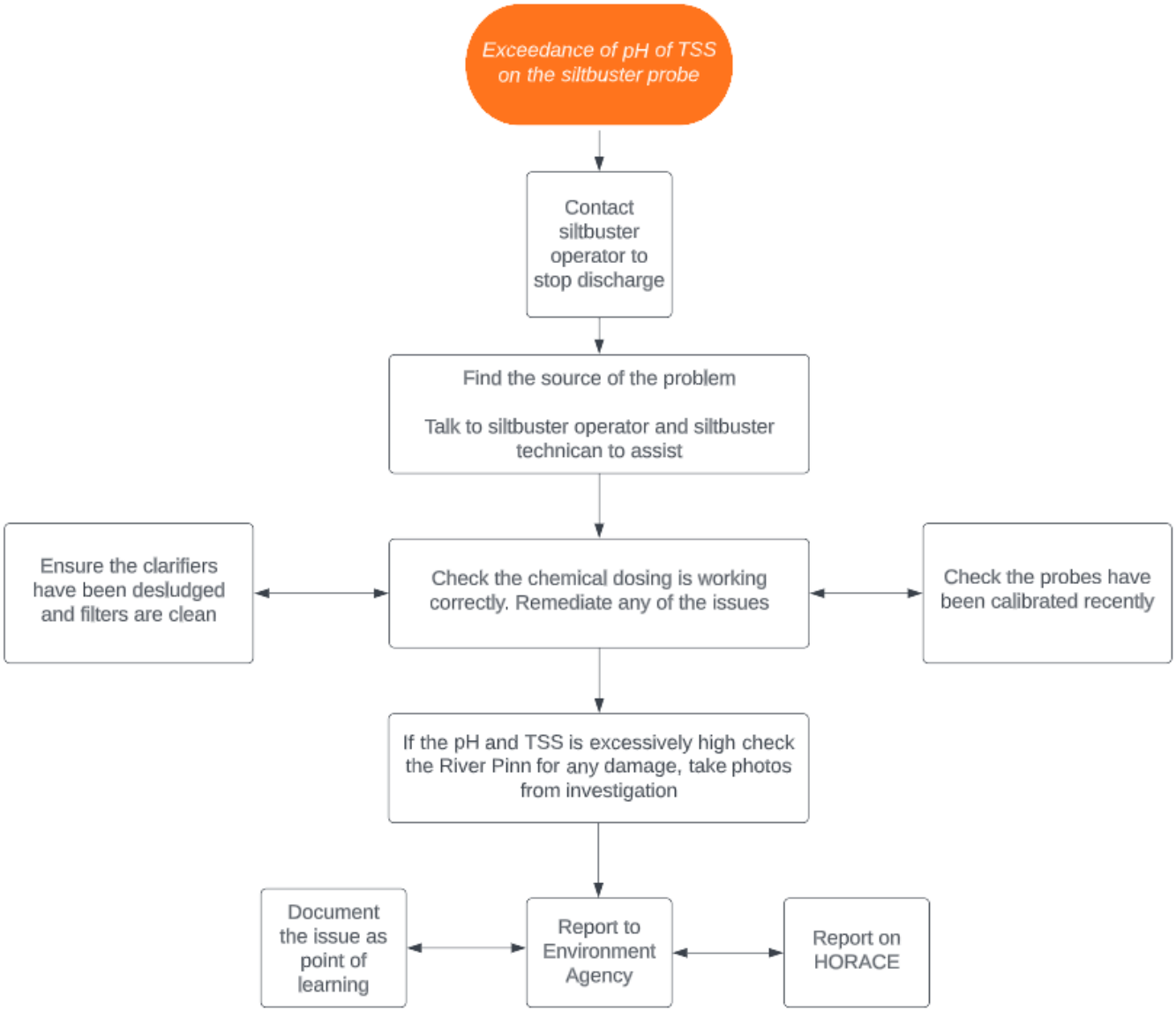
21. Pond 5 Overflow Action Flowchart



22. Pond Contamination Action Flow Chart



23. TSS or pH Exceedance Action Flow Chart



Appendix A – Gate 1 Siltbuster Operational Checklist

This checklist must be completed:

1. **On the start up of the siltbuster/dewatering system, and**
2. **Every morning if the operation of the siltbuster has been continuous**

Week commencing:	**Mon**	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**
Time turned on:							
Time turned off:							
Persons Initials:							
Pre-Commencement & Daily Check Checks							
Has the Site Engineer / Section Engineer approved this operation?							
Pond visual inspection complete prior to discharge (sheen, foam, other etc)?							
Has the discharge point been checked for damage to controls (silt fencing, matting, coir rolls etc)?							
Is the siltbuster in good working order?							
Check all: pipework/connections/outflows for signs of blockage/ wear/leaks							
Check CO2 and chemical levels are sufficient and IBC mixer is connected and turned on							
Check the operation of heater							
Check discharge is compliant: - Maximum flow 65.2L/s - Suspended solids (less than 50mg/l) - pH is between 6-9							

Is there any evidence of freezing that could affect: pumps, paddles, motors, pipework, and discharge?							
Which attenuation pond is being discharged? (Note: update Whatsapp group with images during each discharge)							
Pictures to Whatsapp Group – to be sent for every discharge							
Picture of both incoming and discharge pH							
Picture of totaliser quantity							
Picture of TSS							
Comments and observations:							

Appendix B – Gate 1 Siltbuster Operational Checklist

OVERNIGHT PUMPING INFORMATION

If the pond level is at/over 50% capacity (half full) at 17:00, pumping overnight will be required. When discharging via the siltbuster overnight (18:00 to 08:00), the steps below must be completed:

1. **Notify relevant personnel:**
   Notify relevant personnel, such as the Senior General Foreman and the Environment team of the need to discharge overnight. No unattended overnight pumping should be undertaken.
2. **Monitor the water level in the road drainage ditch (Breakspear Road):**
   The ditch/watercourse along Breakspear Road is prone to flooding and should be visually checked prior to operating the siltbuster overnight. If flooding, or suspected to flood, overnight pumping should not commence. Regular checks should be undertaken as per the 'flow rates' table below.
3. **Operational Checklist:**
   If starting up the pumps and Siltbusters between 18:00 – 08:00 the operational checklist should be completed (Appendix A).

Flow Rates for Overnight Pumping:

Pond Level	Forecast Rainfall	Maximum Discharge	Regular checks required of Breakspear Road	Someone stationed at the siltbuster
>50%	Rain	10 litres per second	Yes – check every 2 hours	No*
>50%	None	50 litres per second	Yes – check every 4 hours	No*

*Until such a time as suitable access and lighting is established at the siltbuster works area.

If you have any issues with the siltbuster please contact the following people during working hours

SCS Staff Contact

Name	Job title	Phone number	Email
John Kenny	Senior General Foreman	077 1734 4424	John.kenny@scsrailways.co.uk
Shiv M. Hans	General Foreman	074 6454 4636	shivmandeep.hans@scsrailways.co.uk
Samuel Gold	Environmental Manager	074 2300 3504	samuel.gold@scsrailways.co.uk
Richard Green	Environmental Advisor	078 9098 5801	Richard.green@scsrailways.co.uk
Helena Dale	Graduate Environmental Advisor	078 2335 6512	Helena.dale@scsrailways.co.uk

Siltbuster Contact Details

Name	Job title	Phone
Main Office		01600 772256
Ashley Copley	Field Service Engineer	01600 772256

Environment Agency & Emergency Services

It's important to remember that if you suspect an immediate threat to human health, or a serious incident is occurring, it is best to contact emergency services immediately as well. The environment agency pollution hotline is a way to report environmental incidents and potential pollutants, and it is important to report any such incidents as soon as possible:

The Environment Agency's pollution hotline should be called if:

- the pond is overflowing and is discharging out of site

- The drainage ditch has overflowed onto the road
- The discharge water has overflowed onto the road

Phone Number: 03708 506 506

T&M

If the road is flooding, we can call T&M to pump the discharge from the road. Contactable 24/7.

T&M		
Name	**Title**	**Phone**
Jono	T&M Project Manager	07473 327 860

Appendix C Copthall South Siltbuster Organogram