

1 Executive Summary

- 1.1.1 Monitoring was undertaken across C1 throughout January 2023 in response to site construction activities. Graphs showing the monitoring data for the month are attached in Appendix A.
- 1.1.2 Monitoring at Chalfont St Peter (CSP) ventilation shaft remained at a quarterly monitoring frequency, whilst monitoring at Chalfont St Giles (CSG), Amersham (AMS), Little Missenden (LMI), Chesham Road (CHR) ventilation shafts, along with the North Portal (NPTL) continued monthly in line with the SSMP's.
- 1.1.3 Monitoring at Colne Valley Viaduct (CVV) module 1 continued at a weekly frequency in response to rotary bored piling (RBP) at pier 11. Monitoring at Modules 4, and 2 remained at a monthly monitoring frequency. Monitoring at Module 3 was not undertaken following the completion of the RBP works in November.
- 1.1.4 Remedial works in the piles at Pier 19 were undertaken in January. In response, the nearby sentinel borehole ML026-RC070 was monitored on a weekly basis. No impacts were observed
- 1.1.5 CFA piling was undertaken at the North Embankment (NE). 169 out of 209 piles were drilled, with water monitoring conducted at a weekly basis at ML029-CR021, and ML029-RO431. No impacts were observed.
- 1.1.6 Monitoring across the South Portal and Western Valley Slopes areas continued at a monthly monitoring frequency, with continued surface water monitoring of the drainage systems. Pynesfield monitoring remains at a fortnightly monitoring schedule.
- 1.1.7 The priority monitoring round was completed, with all locations visited where possible.
- 1.1.8 BH2 continues to trend towards higher pH than the other Pynesfield boreholes. In January, a peak of 9.4 pH was recorded on the fifth. This was short lived with subsequent visits returning to below 9 pH. The reason for this is currently uncertain. However, the Pynesfield ditch has been drained, and an inspection is scheduled.
- 1.1.9 The CSP attenuation pond was reported to be leaking in January. An estimated 400 m³ was lost between January 26th and 30th. Water quality results from the 26th, 27th, and 30th indicate that pH and chromium VI were

within acceptable discharge limits. Nitrites are elevated above drinking water standards. On-going monitoring of the levels in the CSP pond are being undertaken. Monitoring of nearby boreholes detected no changes from background levels following this incident.

- 1.1.10 Tunnel construction monitoring borehole ML032-RC006, later used to monitor downgradient of ML032-RC009, became blocked in October 2022. In January 2023 after many repeated attempts to unblock and save this borehole, it was deemed unusable. No arrangements have yet been made to decommission this borehole.
- 1.1.11 Rain was observed throughout the month at Chenies rain gauge, with 15 days of rainfall recorded across the South Portal site primarily in the first half of the month.

1. Site Specific Monitoring

Overview

1.2 A high-level overview of the water monitoring activities and occurrences at each site is provided below for the month. The graphs showing the in-field monitoring data are attached in the appendix.

Colne Valley Viaduct (CVV)

1.2.1 Rotary bored piling activities continued with the Pier 11 worked on during the month. Rotary bored piling is now complete on the CVV route. Works were concluded on 26th January.

1.2.2 Works began on 9th January for the Continuous Flight Auger (CFA) piling at North Embankment. 169 piles were drilled in January out of a total of 209.

1.2.3 Remedial pile works were conducted at Pier 19 between the 26th and 31st of January. During these works, the nearby sentinel monitoring borehole, ML026-RC070 was monitored weekly, with no impacts from works observed.

1.2.4 No support fluid loss was reported during January.

CVV Module 1 (Pier 12 to South Embankment)

Groundwater

1.2.5 There were no trigger limit breaches in Module 1 during the month.

1.2.6 Table 1 compares typical borehole ranges for the area with trigger levels and any trigger level exceedances.

Table 1 CVV Module 1 borehole in-field parameter data

	pH	SPC ($\mu\text{S}/\text{cm}$)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	6.7 – 7.7	620 - 1300	1 – 25	-50 - 300	1 – 11
Trigger limit	5 – 9	1500 ¹	500	-	-

¹ Due to pre-existing contamination in the Module 1 area, EC values are generally higher than anywhere else in Section C1.

	pH	SPC ($\mu\text{S}/\text{cm}$)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Trigger Level Exceedances	-	-	-	-	-
Exceeding borehole	-	-	-	-	-

1.2.7 Groundwater levels displayed a varied response in January. ML026-RO430 and ML026-RO428 both show an initial decline (0.2 m and 0.6 m respectively), before recovering and displaying an increase by the end of the month (0.6 m and 0.8 m). ML026-RO431 displayed a decrease <0.1 m across the month. Monitoring at ML026-RO426 reduced to monthly monitoring in line with works reducing in the area so no late January result was obtained, in December this borehole displayed a decline before stabilising across the month. ML026-CR032 displayed an increase of approximately 0.3 m in January.

1.2.8 A lab sample collected from ML026-RO426 on 4th January detected low levels (0.3 $\mu\text{g}/\text{L}$) TPH C7-C10 (Aromatic). This has not been observed in this borehole before. Considering the site was shut down, over Christmas, for more than one week prior with no intrusive works undertaken, it is very unlikely this is related to Align activities. Conversations with SCS (the S2 main works contractor) have advised Align that TPH is sporadically identified in their datasets and likely owes to the historic contamination from the New Years Green Bourne (NYGB) Landfill. A sampling event for February has been organised for ML026-RO426 to validate any on-going presence of TPH.

Surface water

1.2.9 Surface water bodies within Module 1 include Harefield lake No. 2 (ML026-SW002 and ML026-SW003) and New Years Green Bourne (ML026-SW005 and ML026-SW006).

1.2.10 During January, pH values for ML026-SW002, which recorded a spike of 8.9 in December, have shown typical values, with no spikes, ranging from 7.8 and 8.0, confirming that the high value recorded in December was a short-lived event.

1.2.11 The two monitoring locations (ML026-SW005 & ML026-SW006) on the NYGB have both displayed high (2600 and 3170 $\mu\text{S}/\text{cm}$ respectively) EC in January. Elevated versus typical values for ammoniacal nitrogen, potassium, sodium and calcium were also observed, these are displayed in Table 2. The NYGB is

known to be affected by contamination from the NYGB landfill, and the stream is also likely affected by the council road gritting undertaken in response to cold weather.

Table 2 New Years Green Bourne determinand exceedance table

	Ammoniacal Nitrogen (µg/l)	Calcium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Chloride (mg/l)
Typical Range	0-500	100-500	30-200	10-50	20-100
Trigger Level Exceedances	21400, 18780	845, 819	1600, 1200	84, 84	640, 470
Exceeding borehole	ML026-W005, ML026-SW006	ML026-SW005, ML026-SW006	ML026-SW005, ML026-SW006	ML026-SW005, ML026-SW006	ML026-SW005, ML026-SW006

- 1.2.12 On 6th January hexavalent chromium was identified in both the upstream and downstream monitoring locations (relative to our discharge location). The highest value identified by the Align onsite laboratory was 34 µg/L recorded at ML026-SW005. In response, the EA were notified and discharge was stopped and the attenuation pond located close to Pier 5 which feeds the discharge outlet was drained.
- 1.2.13 Off-site lab analysis from the 26th January confirm no presence of hexavalent chromium in upstream or downstream NYGB samples.
- 1.2.14 Access to a new monitoring location at the outlet of the NYGB and Harefield Number 2 has been arranged, with access available from the week commencing 13th February.
- 1.2.15 Table 3 compares typical surface water ranges for the area with any exceedances.

Table 3 CVW Module 1 surface water in-field parameter data

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	7.7 – 8.5	600 - 1200	1 – 20	0 - 300	7.5 – 13
Exceedances	-	2600, 3170	-	-	-

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Exceeding location	-	ML026-SW005, ML026-SW006	-	-	-

CVV Module 2 (Pier 28 - Pier 13)

Groundwater

- 1.2.16 Table 4 compares typical priority borehole ranges for the area with trigger levels and any trigger level exceedances.
- 1.2.17 In response to the remediation works carried out at P19, ad-hoc infield monitoring was carried out pre- and post-works at ML02-RC070. No significant change has been observed in relation to the works.
- 1.2.18 There were no trigger limit breaches in Module 2 during the month.

Table 4 CVV Module 2 borehole in-field parameter data

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	7 - 8	600 - 850	1 - 25	50 - 300	7 - 11
Trigger limit	5 - 9	1000	250	-	-
Trigger Level Exceedances	-	-	-	-	-
Exceeding borehole	-	-	-	-	-

- 1.2.19 Groundwater levels displayed an increase of approximately 0.6m across the month. The exception to this is the lake borehole ML027-RO400 which declined between December and January by <0.1m.

Surface water

- 1.2.20 Surface water bodies within Module 2 include Savay Lake (ML027-SW006), and Small Pond (ML027-SW004 and SW005), as well as the Grand Union Canal (ML026-SW001).

1.2.21 Table 5 compares typical surface water ranges for the area with any exceedances.

Table 5 CVV Module 2 surface water in-field parameter data

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	7 – 7.7	700-850	1 – 25	0 - 250	6 – 13
Exceedances	-	-	-	-	-
Exceeding location	-	-	-	-	-

CVV Module 3 (Pier 42 – P29)

Groundwater

1.2.22 Monitoring for groundwater impacts ceased in December at module 3 in line with the SSMP following completion of intrusive piling activities.

Surface water

1.2.23 Surface water bodies within Module 3 include the River Colne, Long Pond (ML028-SW001 and ML027-SW003), and Korda Lake (ML027-SW002 and ML027-SW001).

1.2.24 Table 6 compares typical surface water ranges for the area with any exceedances.

Table 6 CVV Module 3 surface water in-field parameter data

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	7 –8.5	550 - 900	1 – 25	50 - 250	7- 13
Exceedances	-	-	-	-	-
Exceeding location	-	-	-	-	-

CVV Module 4 (North Embankment to Pier 43)

Groundwater

- 1.2.25 There were no trigger limit breaches during the month in Module 4.
- 1.2.26 CFA piling works began at the NE on 9th January. 169 piles were drilled out of a total of 209. The monitoring frequency at ML029-CR021 and ML029-RO431 was increased to weekly for the duration of these works, and to date, no impacts have been observed.
- 1.2.27 Table 7 compares typical priority borehole ranges for the area with trigger levels and any trigger level exceedances.

Table 7 CVV Module 4 borehole in-field parameter data

	pH	SPC ($\mu\text{S/cm}$)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	6.5 – 8	700 - 875	1 – 10	50 - 300	8 – 11
Trigger limit	5 – 9	1000	100 ² /250 ³ /500 ⁴	-	-
Trigger Level Exceedances	-		-	-	-
Exceeding borehole	-		-	-	-

- 1.2.28 Groundwater levels displayed an increase of approximately 0.2m across the month.

Surface water

- 1.2.29 Surface water monitoring was completed during the month with chemical sampling and gauge board readings collected where possible. Monitoring continued both weekly and monthly. Surface water bodies within Module 4 include ML029-SW001, Denham Water-Ski Lake (ML028-SW004 and SW003) and the River Colne (ML028-SW002).
- 1.2.30 Table 8 compares typical surface water ranges for the area with any exceedances.

² ML029-CR010, ML029-RO431

³ ML028-CR018, ML028-CR009

⁴ ML028-CR006

Table 8 CVV Module 4 surface water in-field parameter data

	pH	SPC (µS/cm)	Turb (NTU)	REDOX (mV)	DO (mg/L)
Typical Range	7.8 – 8.5	500 – 650	1 – 25	100 – 225	9 – 13
Exceedances	-	-	-	-	-
Exceeding location	-	-	-	-	-

1.2.31 Sampling of the River Colne on 26th January identified elevated calcium levels (840 – 870 mg/L). Align do not currently discharge water into the Colne within the Module 4, and as both locations observed this elevated calcium, it is unlikely anything to do with Align works.