

CHERRYFIELD DRIVE, KIRKBY

TECHNICAL STATEMENT OF DESIGN – GAS CUT-OFF BARRIER

Site: Cherryfield Drive, Kirkby

Client: Barratts and David Wilson Homes

Reference: 15-280-L7-1

Date: June 2026

1. INTRODUCTION

E3P has been instructed by Barratts and David Wilson Homes (the client) to provide a technical statement of design in relation to the proposed gas cut-off barrier that is to be installed along the western boundary of the proposed residential development at land to the south of Cherryfield Drive, Kirkby.

This technical statement will discuss the potential impact the gas cut-off barrier may have on the groundwater tables identified within Made Ground and superficial deposits beneath the site, and the relevant mitigation measures that would be required to address any potential surface water flooding risks resulting from the barrier's installation.

2. BACKGROUND AND SITE CONDITIONS

Ground gas has been assessed by E3P as part of the E3P Geoenvironmental Site Assessment, with the final assessment detailed within the E3P Ground Gas Addendum Report (Ref: 15-280-R3-2, dated November 2025). The assessment was completed in accordance with the methodology outlined in BS8485, utilising the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV).

The calculated GSVs indicated that, based on the peak flow rates, the majority of the monitoring locations were classified as Characteristic Situation 1 (CS1) – Very Low Gas Risk, with areas of the site characterised as CS2. In addition, a localised area of the site (WS201) associated with the adjacent landfill and historically deposited materials has been characterised as CS4 due to significant concentrations of methane and carbon dioxide. Data obtained from flooded monitoring wells or during flooded visits were excluded from the initial assessment.

E3P has assessed the previous variables and has made the following conclusions based on the ground gas monitoring programme:

- Ground gas monitoring has been split into sections based on observed or theorised ground gas sources, with the key sources identified as the adjacent landfill, the historically deposited landfill materials across the site, and the former petrol filling station.





- The key source of ground gas identified within the Conceptual Site Model is the adjacent landfill at Bewley Road (Ref: EAHLD06985), which is noted to include household waste and was active from the 1950s to circa 1974.
- In addition, deep Made Ground has been encountered across the site, with the deepest deposits noted in the central region, associated with historical upfilling with landfill materials, as delineated in the Buro Happold report (Ref: 021706, dated November 2007).
- To the north of the site, in the area of the former petrol filling station and in the supplementary investigation to the northwest, volatile hydrocarbon contamination has been encountered. The area will be fully remediated, with the tanks removed and validated to ensure there is no unacceptable risk to future end users or the wider environment. None of the wells in the location of the former filling station indicated elevated concentrations of carbon dioxide or methane.
- The highest concentrations of ground gas observed were in monitoring wells WS201 and WS108, both located adjacent to the Bewley Road Landfill site.
- In monitoring well WS201, methane was recorded at a maximum concentration of 72.8 % v/v and GSV reading of 4.56 l/hr, with consistently high concentrations recorded throughout all visits. WS201 also indicated high levels of CO₂ with a maximum concentration recorded as 26.5 % v/v and GSV of 1.54 l/hr.
- Concentrations above the limit of detection of hydrogen sulphide (H₂S) were also identified within WS201. Hydrogen sulphide can be a corrosive gas, and it is therefore essential that if plots are to be built in this area, the manufacturer of the gas-resistant membrane on any plot must be consulted to ensure that it is suitable for the levels of sulphide observed.
- The GSV for methane is currently within a CS4 classification in WS201. This borehole is located adjacent to the north of the off-site landfill. In addition, Made Ground with a hydrocarbon odour and decaying timber was noted.
- Monitoring well WS108 is situated in the southern central region of the site, directly adjacent to the Bewley Road Landfill site. It has recorded a maximum methane concentration of 46.1 % v/v and a carbon dioxide concentration of 10.8 % v/v. Despite high concentrations recorded, minimal flow has been recorded in this location, and it is therefore considered to fall within the CS2 category, alongside all other plots adjacent to the landfill.
- The increased flow rate observed in WS113 during visit 1 (6.4 l/hr) is likely associated with the known landfill located directly adjacent to the western boundary, however, across a total of 30 visits completed, only one visit noted any indication of gas flow, with the majority of visits encountering carbon dioxide and methane at the limit of detection.
- Several monitoring wells across the site have identified elevated concentrations of methane and/or carbon dioxide, however with GSV thresholds noted to be below the CS2 criteria. These wells include: WS101, WS102, WS105, WS106, WS108, WS111 and WS124. In general, all of the above noted locations can be associated with the infilling of ground in the central parts of the site and adjacent to the known landfill. It is considered by E3P that precautionary CS2 membranes should be placed in these areas.
- Regarding potential ground gas pathways across the site, it has been noted that the majority of wells are predominantly underlain by both granular SANDS and cohesive CLAY at depths of 0.10 m bgl to 6.10 m bgl, and it is, therefore, unlikely to fully restrict the migration of ground gases.
- Ground gas migration pathways are likely to alter during the development, with newly installed drainage potentially introducing preferential pathways for gas migration into buildings.
- High groundwater levels have been observed across the site, therefore the soils are largely saturated. The proposed development will result in a change in the hydrogeology, and this has the potential to change the anaerobic and aerobic environment, which may result in the increased generation of CH₄ and CO₂.

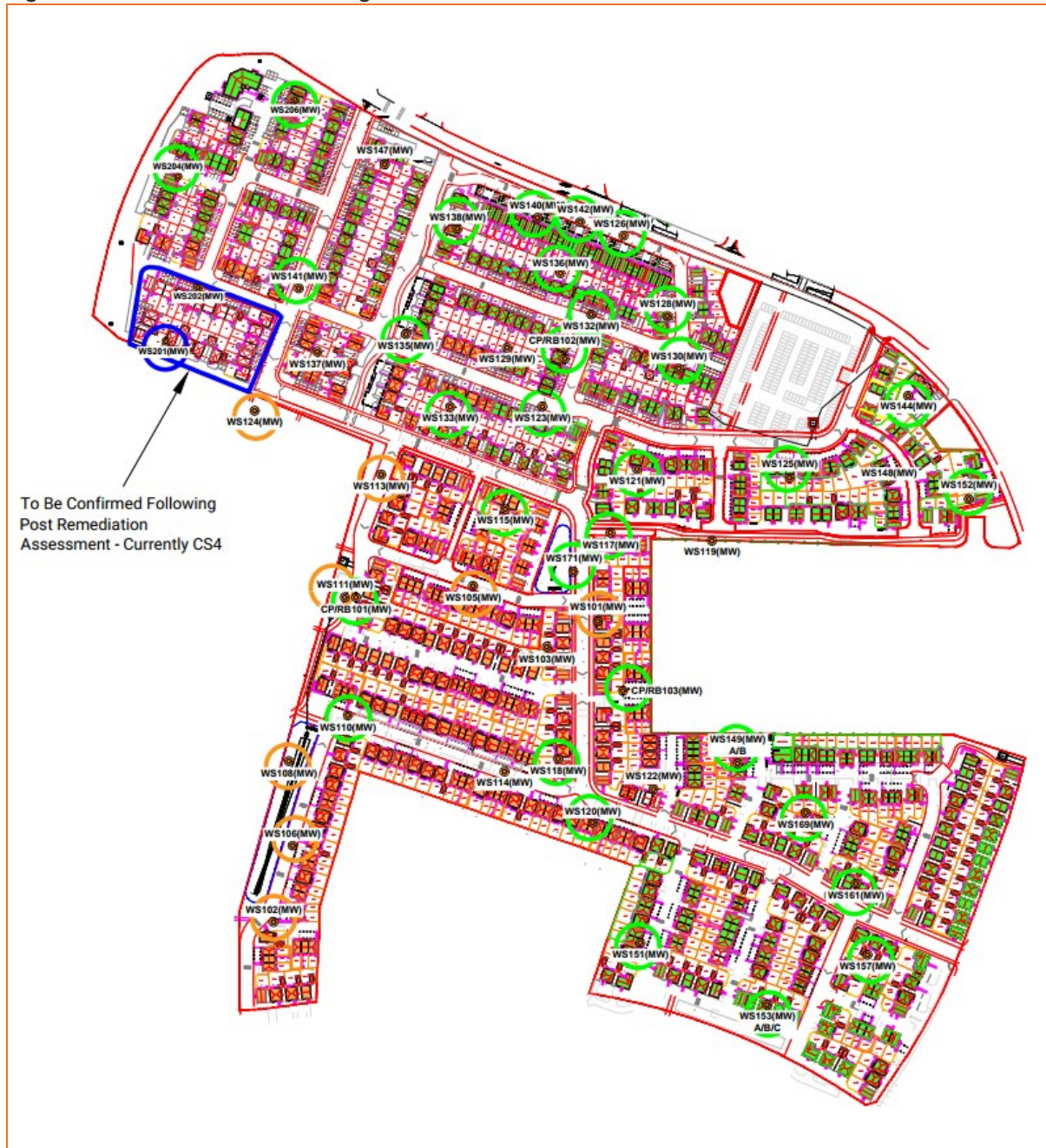


- Migration of ground gas from the adjacent landfill has been identified and this has the potential to act as a significant on-going source of ground gas. The ternary plot indicates that the concentrations of methane and carbon dioxide in WS101, WS111 and WS124 are indicative of landfill gas migration.
- In addition, elevated flow rates and GSVs were recorded in WS201 and WS113 located to the north of the adjacent landfill. Ground gas is considered to be actively migrating along the infilled channel through the central sector of the site.
- The flux box tests and surface emissions survey identified elevated concentrations of methane and carbon dioxide in the vicinity of WS201. Given the observed gas concentrations within the adjacent landfill, a gas cut-off barrier is considered to be required along the boundary with the landfill to interrupt potential gas migration pathways laterally within the ground, and reduce the ground gas concentrations in this area of the site.
- The gas cut-off barrier will need to be designed and installed by a suitably qualified specialist and validated through a programme of post remediation monitoring.
- Made Ground deposits within the vicinity of WS201 will require excavation to their full depth and all deleterious and putrescible materials removed for off-site disposal.
- Further post remediation assessment will be required in the location of WS201 to confirm the ground gas classification, given this location is currently classified as CS4 due to significantly elevated concentrations of methane and carbon dioxide. Post remediation monitoring will be required following the installation of the gas ventilation trench and remedial excavation works in order to confirm the reduction of recorded ground gas concentrations.
- With due consideration of the Conceptual Site Model, it is considered that following the installation of the gas ventilation trench, CS2 gas protection measures will likely be required for all plots where monitoring has identified a CS2 classification within the vicinity of the adjacent landfill and in the area of the on-site infilled channel in the central sector. It is considered that plots located in the north, east and southeast of the site can be classified as CS1 and gas protection measures are not considered to be required in these locations.

Based on the above conclusions, a detailed ground gas zoning plan has been created and is presented as Drawing 15-280-020 (appended to this letter) to indicate the plots that will require ground gas mitigation to ensure no risk to future end users. A snapshot of the ground gas zoning plan is presented as Figure 2.1.



Figure 2.1 Ground Gas Zoning Plan





3. POTENTIAL IMPACT ON GROUNDWATER

3.1. GROUNDWATER LEVELS

During the E3P site investigations, groundwater strikes were encountered as seepages and strikes along with perched water. The depth of the strikes is summarised in Table 3.1 to Table 3.3.

Table 3.1 Summary of Groundwater Strikes – E3P 2022 Site Investigation

LOCATION	DEPTH (M BGL)	DESCRIPTION OF STRIKE	STRATA	EVIDENCE OF CONTAMINATION
TP101	2.60	Seepage - Slow ingress	SAND	N/A
TP103	2.60	Seepage - Slow ingress	SAND	
TP104	0.40	Seepage	CLAY	
TP106	1.40	Seepage - Slow ingress	SAND	
TP107	2.00	Strike	SAND	
TP109	2.30	Strike	MADE GROUND	
TP110 / SA101	1.80	Seepage – Slow ingress	SAND	N/A
TP111	2.40	Strike – Fast water ingress	MADE GROUND	
TP113	1.80	Strike – Fast water ingress	MADE GROUND	
TP114	2.80	Seepage - Slow ingress	SAND	
TP116	0.40	Strike – Fast water ingress	CLAY	
TP117	2.40	Strike – Fast water ingress	MADE GROUND	
TP118	2.00	Strike	CLAY	
TP119	2.40	Strike	MADE GROUND	
TP120	2.00	Strike – Fast water ingress	SAND	
TP123	2.40	Strike – Fast water ingress	MADE GROUND	
TP124	0.65	Seepage - Slow ingress	CLAY	
TP128	1.40	Strike – Fast water ingress	CLAY	
TP129	1.50	Seepage - Slow ingress	CLAY	
TP130 / SA103	0.80	Seepage – Very slow ingress	SAND	
TP134	2.00	Seepage - Slow ingress	SAND	
TP135	1.40	Seepage - Slow ingress	CLAY	
TP136	0.80	Seepage - Slow ingress	CLAY	
TP137	2.30	Seepage - Slow ingress	CLAY	
TP139	1.30	Land drain	MADE GROUND	Slight hydrocarbon odour
TP140	1.20	Seepage - Slow ingress	MADE GROUND	N/A
TP141	1.00	Perched water	MADE GROUND	
TP142	0.40	Perched water	MADE GROUND	
TP143	2.00	Seepage - Slow ingress	CLAY	
TP144	1.20	Seepage - Slow ingress	SAND	
TP145	0.60	Seepage - Slow ingress	MADE GROUND	
TP146	1.40	Seepage - Slow ingress	SAND	
TP148	0.50	Strike – Fast water ingress	CLAY	
TP149	1.20	Strike – Fast water ingress	MADE GROUND	
TP152	2.40	Seepage - Slow ingress	CLAY	
TP153	0.50	Strike – Fast water ingress	MADE GROUND	
TP154	2.90	Seepage - Slow ingress	SAND	
TP155	0.80	Strike – Fast water ingress	MADE GROUND	
TP156	2.70	Seepage - Slow ingress	CLAY	
TP160	0.50	Perched water – rapid ingress	MADE GROUND	
TP161	1.50	Seepage - Slow ingress	CLAY	
TP167	1.50	Perched water – slow ingress	MADE GROUND	
TP169	1.80	Strike – Fast water ingress	MADE GROUND	



LOCATION	DEPTH (M BGL)	DESCRIPTION OF STRIKE	STRATA	EVIDENCE OF CONTAMINATION
TP170	0.90	Seepage - Slow ingress	CLAY	N/A
TP174	0.90	Seepage - Slow ingress	MADE GROUND	
TP177	2.00	Seepage - Slow ingress	MADE GROUND	
TP178	1.20	Seepage - Slow ingress	CLAY	
TP179	1.60	Seepage - Slow ingress	CLAY	
TP180	1.70	Seepage	CLAY	
TP181	1.80	Seepage - Slow ingress	CLAY	
TP182	1.00	Seepage - Slow ingress	CLAY	
TP183	1.40	Seepage - Slow ingress	CLAY	
TP184	0.80	Seepage - Slow ingress	CLAY	
TP185	0.70	Strike – Fast water ingress	CLAY	
TP186	1.80	Land drain	CLAY	
TP187	1.40	Seepage - Slow ingress	CLAY	
TP188	3.00	Seepage - Slow ingress	SAND	
TP191	0.80	Seepage - Slow ingress	CLAY	
TP193	1.00	Perched water – fast ingress	MADE GROUND	
TP196	1.10	Seepage - Slow ingress	CLAY	
TP198	3.00	Seepage - Slow ingress	SAND	
TP199	1.00	Land drain – fast ingress	MADE GROUND	
TP1100	2.00	Seepage - Slow ingress	SAND	
TP1101	0.90	Perched Water	MADE GROUND	Very strong hydrogen sulphide odour
TP1106	2.00	Seepage - Slow ingress	SAND	N/A
TP1114	2.60	Seepage - Slow ingress	CLAY	
TP1115	0.60	Strike	MADE GROUND	
TP1116	0.60	Perched water	CLAY	
TP1116	1.70	Running sands	SAND	
TP1119	1.80	Strike	SAND	
TP1122	2.80	Seepage - Slow ingress	CLAY	
TP1123	2.00	Land drain	CLAY	
TP1124	0.70	Perched water	CLAY	
TP1124	1.70	Seepage - Slow ingress	SAND	
WS105	2.20	Strike	CLAY	
WS108	2.20	Strike – slow ingress	MADE GROUND	
WS109	4.00	Perched water	MADE GROUND	
WS116	1.00	Seepage – slow ingress	SAND	
WS117	2.00	Strike	CLAY	
WS119	2.80	Strike	SAND	
WS129	2.50	Strike	CLAY	
WS133	3.00	Strike	CLAY	
WS136	3.50	Seepage - Slow ingress	CLAY	
WS144	3.00	Seepage - Slow ingress	GRAVEL	
WS145	1.00	Perched water - Slow ingress	MADE GROUND	
WS148	3.00	Seepage - Slow ingress	SAND	
WS150	2.00	Seepage - Slow ingress	SAND	
WS152	2.00	Seepage - Slow ingress	MADE GROUND	
WS155	1.20	Strike	SAND	
WS163	1.30	Strike	SAND	Organic odour
CP/RB102	2.00	Strike	MADE GROUND	N/A
CP/RB103	3.40	Strike	MADE GROUND	
TP202	1.80	Perched water - Slow ingress	MADE GROUND	Strong hydrocarbon odour
TP203	0.30	Seepage - Moderate ingress	MADE GROUND	
TP204	0.30	Seepage - Slow ingress	MADE GROUND	Slight hydrocarbon odour
WS204	1.00	Strike	CLAY	



Table 3.2 Summary of Groundwater Strikes – E3P 2022 Site Investigation Monitoring

LOCATION	DEPTH RANGE (M BGL)	AVERAGE DEPTH (M BGL)	STRATUM ENCOUNTERED	WEATHER CONDITIONS DURING MONITORING
WS101	Dry – 1.65	1.65	MADE GROUND	Clear to Overcast to Rain
WS105	1.15 – 2.20	1.76	CLAY	
WS106	2.30 – 2.82	2.58	CLAY	
WS108	1.50 – 2.40	2.17	MADE GROUND	
WS110	0.57 – 0.80	0.69	CLAY	
WS111	2.03 – 3.17	2.70	MADE GROUND	
WS113	1.02 – 1.75	1.30	CLAY	
WS115	1.13 – 1.75	1.47	CLAY	
WS117	1.10 – 2.35	1.87	CLAY	
WS118	1.20 – 1.75	1.57	CLAY	
WS119	0.60 – 2.55	1.85	CLAY	
WS120	1.12 – 1.50	1.25	SAND	
WS121	0.60 – 1.20	1.00	MADE GROUND	
WS123	1.15 – 2.45	2.03	CLAY	
WS124	1.76 – 3.70	2.92	MADE GROUND	
WS125	0.55 – 0.90	0.89	MADE GROUND	
WS126	1.15 – 1.43	1.28	SAND	
WS128	1.20 – 2.20	1.75	CLAY	
WS130	1.63 – 2.13	1.96	CLAY	
WS132	1.92 – 3.80	2.69	CLAY	
WS133	0.86 – 1.55	1.27	SAND	
WS135	0.55 – 1.20	0.91	SAND	
WS136	0.87 – 2.98	2.11	CLAY	
WS137	0.95 – 2.25	1.97	CLAY	
WS138	1.05 – 2.10	1.60	CLAY	
WS140	2.05 – 2.92	2.66	CLAY	
WS141	1.58 – 2.80	2.32	CLAY	
WS142	1.30 – 2.30	1.91	SAND	
WS144	1.90 – 2.70	2.35	CLAY	
WS147	0.60 – 1.45	1.23	CLAY	
WS151	1.10 – 1.85	1.56	CLAY	
WS152	1.41 – 2.60	2.04	MADE GROUND	
WS153A	0.50 – 0.85	0.71	MADE GROUND	
WS157	1.02 – 1.80	1.43	CLAY	
WS161	0.58 – 1.28	0.93	CLAY	
WS169	1.04 – 1.80	1.52	CLAY	
WS171	1.12 – 2.20	1.56	CLAY	
CP/RB101	2.75 – 4.23	3.57	MADE GROUND	
CP/RB102	2.76 – 3.60	3.27	MADE GROUND	
CP/RB103	3.10 – 3.30	3.17	MADE GROUND	
WS201	3.16 – 3.57	3.34	MADE GROUND	
WS202	1.49 – 2.09	1.86	SAND	
WS204	1.01 – 1.69	1.28	SAND	
WS206	0.62 – 1.47	1.31	CLAY	



Table 3.3 Summary of Groundwater Strikes – E3P 2026 Supplementary Site Investigation

LOCATION	DEPTH TO STRIKE (M BGL)	STRATUM	NOTES
Barratt Phase 1			
TP Plot B133	0.50	Made Ground	Fast Seepage
TP Plot B134	1.20	Made Ground	Fast Seepage
TP Plot B150	0.80	Made Ground	Slow Seepage
TP Plot B153	1.50	Made Ground	Fast Seepage
TT Plot B65 East	1.00	Made Ground	Slow Seepage
TT Plot B65 Centre	2.40	Made Ground	Fast Seepage
TP Plot B65 Centre-North	1.00	Made Ground	Moderate Seepage
Private Rented Sector (PRS)			
TT Plot T019-T023	1.80	Made Ground	Moderate seepage in the north of the trench
	2.30	Made Ground	Moderate seepage in the south of the trench
TT Plot T019-T026	1.80	Made Ground	Moderate seepage in the west of the trench
TT Plot T020-T025	2.50	Made Ground	Moderate seepage in both the east and west of the trench
TT Plot T023-T024	2.80	Made Ground	Fast seepage in both the east and west of the trench
David Wilson Phase 1			
TP Plot D123-D124	1.60	Made Ground	Moderate Seepage
David Wilson Phase 2			
TT Plot D280 East	3.90	Made Ground	Moderate Seepage
TT Plot D281 East	4.10	Made Ground	Moderate Seepage
TT Plot D281 Centre	4.30	Made Ground / Gravelly CLAY	Slow Seepage
TT Plot D282	4.10	Gravelly CLAY	Moderate Seepage
TT Plot D283 Centre	3.40	Gravelly CLAY	Slow Seepage
TT Plot D276-D277 North	4.10	Made Ground	Moderate Seepage
TT Plot D276-D277 South	3.80	Made Ground / Silty SAND	Slow Seepage
TT Plot D277-D278 North	3.80	Made Ground	Slow Seepage
TT Plot D278-D279 Centre	3.80	Made Ground	Fast Seepage
TP Plot T105-T106	2.00	Made Ground	Slow Seepage
TP Plot T106 North	2.50	Silty Sandy CLAY	Fast Seepage
TP Plot T107	2.00	Made Ground	Moderate Seepage
TP Plot D324	1.80	Clayey Gravelly SAND	Slow Seepage
TP Plot D08	1.90	Made Ground	Moderate Seepage

True groundwater is considered to be within the natural CLAY and SAND deposits between circa 1.40 m and 4.00 m bgl and was generally encountered as seepages with occasional water strikes. Perched water was encountered within the Made Ground deposits, overlying the underlying superficial deposits. It is noted that the majority of water strikes within the superficial deposits were encountered within the cohesive strata.

Groundwater has not been noted within the SANDSTONE deposits during the cable percussive with rotary follow-on boreholes or generally within the shallow weathered bedrock deposits recovered as SANDs and GRAVELs with the exception of WS144 where a seepage at 3.00 m bgl was encountered.



3.2. GROUNDWATER MODELLING

Based on the current site topography and recorded groundwater levels from the intrusive site investigations, the direction of perched groundwater within the Made Ground and true groundwater within the underlying superficial deposits is indicated to be towards the west/southwest, in the direction of the off-site landfill and Kirkby Brook. The Depth to Groundwater within the Made Ground and Superficial Deposits are presented on Drawings 15-280-049 to 15-280-052 (appended to this letter), with snapshots presented as Figure 3.1 and Figure 3.2.

Figure 3.1 Depth to Groundwater Plan – Made Ground

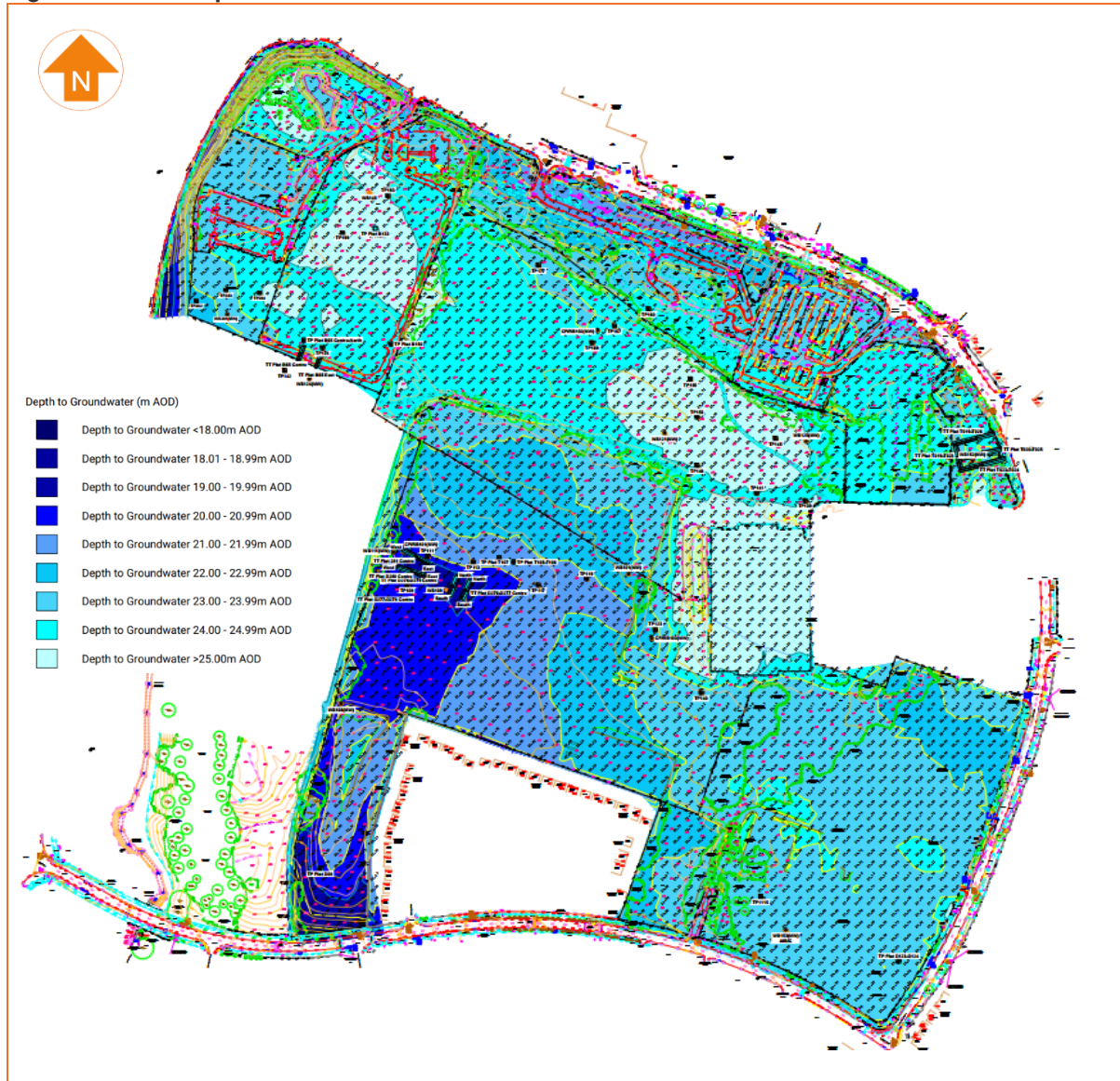
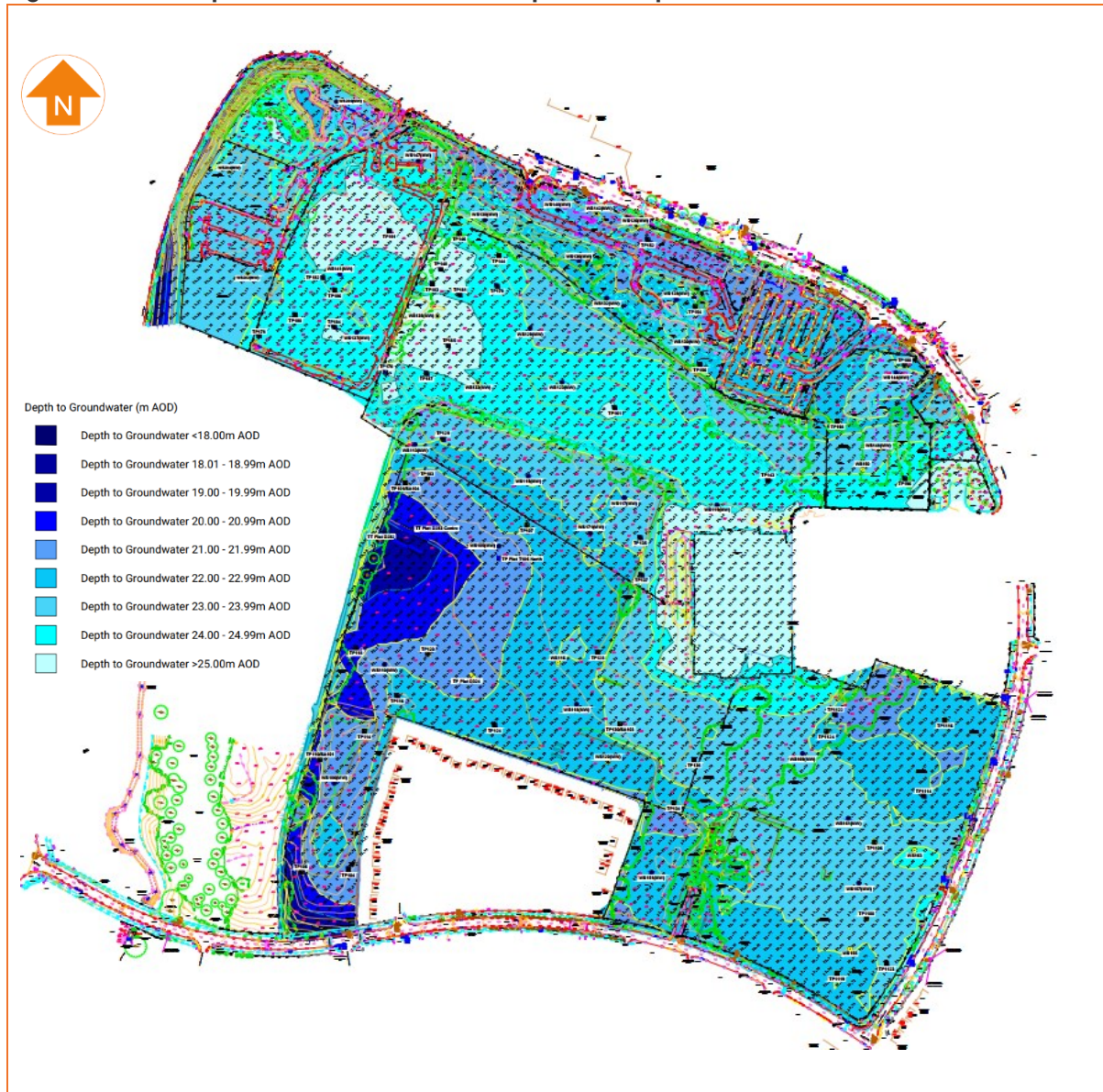




Figure 3.2 Depth to Groundwater Plan – Superficial Deposits



The proposed gas cut-off barrier will intercept the Made Ground/Landfill horizon and be keyed into the underlying natural superficial deposits. Whilst this may locally alter shallow perched and true groundwater movement and temporarily redirect flow laterally around the barrier, it is not expected to impound a significant groundwater body or create a flooding risk, for the following reasons.

- The site is underlain by a mixture of Glacial Clay, Shirley Hill Sand, and Sandstone bedrock. The site currently comprises of soft standing (approximately 90% of the site) with limited areas of hardstanding (approximately 10% of the site). This equates to:
 - Total Area of Site – 22.51 Ha (225,100 m²)
 - Approximate Current Soft Standing – 20.26 Ha (202,600 m²)
 - Approximate Current Hardstanding – 2.25 Ha (22,500 m²)



- This large area of soft standing currently allows for a significant amount of rainwater infiltration to occur, which is considered to be the primary source of the shallow groundwater table. This interpretation is supported by observed seasonal variability during intrusive site investigations and monitoring.
- During trial pitting undertaken in May 2025, following a prolonged dry period, the deeper Made Ground/fill was observed to be dry. In contrast, during remedial works undertaken in Q1 2026, following an extended wet winter period, perched groundwater was encountered at approximately 2.00–3.00 m bgl within the fill materials. This seasonal variation was also observed during the year-long ground gas monitoring regime, where groundwater levels fluctuated within the Made Ground, cohesive, and granular superficial deposits, depending on the time of year. This indicates that shallow groundwater levels are predominantly influenced by seasonal infiltration of surface water and rainfall recharge, rather than sustained groundwater flow through the underlying strata.
- This observation is further reinforced by groundwater cross sectional drawings (Ref: 15-280-051 and 15-280-052, appended to this letter), which indicates that the Made Ground and Superficial groundwater bodies are interchangeable, and are therefore both likely to be fed by surface water and rainfall recharge.
- The shallow groundwater table is anticipated to be fundamentally altered by the proposed development due to the construction of residential plots, hardstanding, and drainage across the site. The hardstanding and drainage network will largely intercept the surface water infiltration and subsequently nullify the presence of perched water within the Made Ground and shallow groundwater within the superficial deposits. Furthermore, the drainage annulus surrounding the newly installed drainage network will likely act as a conduit for any shallow groundwater, with flows directed around the gas cut-off barrier towards the west and south.
- A review of publicly available metrological data indicates that the Kirkby area receives an annual average rainfall of 1079 mm per year (1.079 m/year), with rainfall noted to be generally consistent throughout the year, but with higher amounts during the winter months. Utilising an infiltration volume formula ($\text{Infiltration volume} = \text{Annual rainfall (m/yr)} \times \text{Area (m}^2\text{)}$), and based on the approximate current area of soft standing (20.26 Ha / 202,600 m²), the site is estimated to receive up to 218,600 m³/year of rainfall available for infiltration under a theoretical 100% infiltration scenario. However, following the construction of the residential development, the total area of soft standing is anticipated to be reduced down to approximately 40% (i.e. 9 Ha / 90,000 m²). This results in an estimated post-development infiltration of up to 97,110 m³/year, which is a total infiltration reduction of 121,500 m³/year. This reduction in infiltration will further reduce the risk of potential groundwater flooding.
- The area in the vicinity of the proposed gas cut-off barrier along the northern and western boundaries will predominantly comprise infrastructure (i.e. roads and footpaths), and public open space. As such, the risk of potential groundwater flooding to plots and gardens within the vicinity of the gas cut-off barrier is reduced.
- The proposed gas cut-off barrier does not form a complete hydraulic enclosure around the site and is not expected to create a significant groundwater impoundment. It is a linear feature of limited extent relative to the overall site area, allowing shallow groundwater to continue to migrate laterally around the ends of the barrier and through adjacent permeable horizons. Consequently, any localised groundwater mounding immediately up-gradient of the barrier is expected to be limited in both magnitude and spatial extent.
- The proposed surface water drainage network will also provide preferential pathways for shallow groundwater movement. The granular drainage surround and trench backfill are expected to exhibit a significantly higher hydraulic conductivity than the surrounding Made Ground and Glacial Deposits and will therefore intercept and convey shallow groundwater towards the wider drainage network. This will further reduce the potential for groundwater accumulation adjacent to the barrier.



- Furthermore, the barrier is not anticipated to prevent vertical groundwater recharge into the underlying Sherwood Sandstone where hydraulic connectivity exists. The sandstone is a regionally important aquifer with groundwater movement occurring through both the rock matrix and secondary permeability associated with fractures and bedding discontinuities. Consequently, the barrier will not act as a complete hydraulic cut-off to the wider groundwater regime, and shallow groundwater will continue to dissipate through both lateral and vertical flow mechanisms where conditions permit.

In relation to regional (deep) groundwater within the underlying bedrock, the British Geological Survey Hydrogeological 'Map of Clwyd and the Cheshire Basin' (1:100,000, dated 1989) indicates the potentiometric surface of the Sherwood Sandstone Group underlying the site is between +10 and +20 m AOD (ground surface of site is between approximately 16 and 28 m AOD). Based on the potentiometric surface contours on this map, the direction of regional (deep) groundwater flow in the Sherwood Sandstone aquifer is considered to be towards the south in the direction of a regional cone of depression associated with a Public Supply Pumping Station. As such, the installation of the gas cut-off barrier is considered unlikely to have any detrimental effect on the regional (deep) groundwater table.

Overall, the available site investigation data, long-term groundwater monitoring, conceptual hydrogeological model and proposed development layout indicate that the gas cut-off barrier may locally influence shallow groundwater flow immediately adjacent to the barrier, but it is not expected to result in significant groundwater impoundment or materially increase groundwater levels across the site.

When considered alongside the substantial reduction in rainfall recharge resulting from the proposed development, the provision of an extensive surface water drainage network, the availability of alternative lateral and vertical groundwater flow pathways, and the absence of elevated regional groundwater pressures within the Sherwood Sandstone aquifer, it is concluded that the installation of the gas cut-off barrier presents a negligible risk of groundwater flooding to proposed residential plots, gardens or associated infrastructure.

We trust this information is satisfactory to your requirements, and should we be able to be of any further assistance, please do not hesitate to contact us.

Yours sincerely,

For and on behalf of E3P Ltd

Written by:

Mark Wilson
Principal Consultant

Approved by:

Martin Dyer
Director



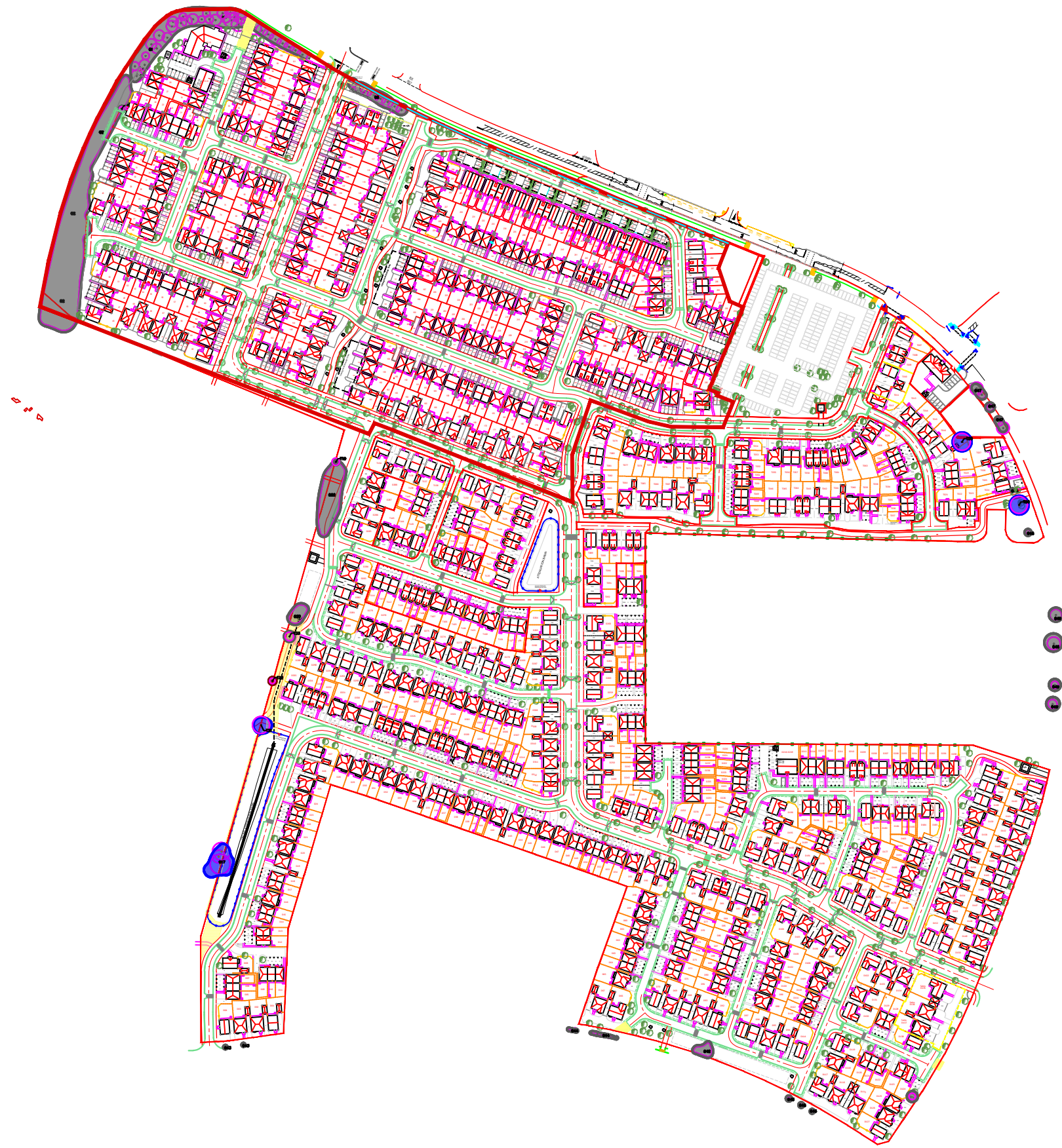


Enclosed:

E3P Drawings:

- 15-280-001 – Site Location Plan
- 15-280-002 – Proposed Development Plan
- 15-280-020 – Ground Gas Zoning Plan
- 15-280-049 – Depth to Groundwater Plan (Made Ground)
- 15-280-050 – Depth to Groundwater Plan (Superficial Deposits)
- 15-280-051 – Groundwater Cross Section Location Plan
- 15-280-052 – Groundwater Cross Section Plan





Notes:				
P1	REVE	05.03.2025	CB	NS
P1	REVD	28.02.2025	TG	BH
P1	REVC	03.05.2024	OW	BH
P1	REVB	04.12.2022	LM	BH
P1	REVA	20.04.2022	LM	BH
Phase	Issue	Date	Drawn	Checked

Client:

DWH

Job Title:

Cherryfield Drive, Kirkby

Job No:

15-280

Drawing No:

002

Date:

05.03.2025

Scale:

NTS

Drawing Title:

Proposed Development Plan



Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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To Be Confirmed Following
Post Remediation
Assessment - Currently CS4



Location Symbols

- Window Sample with Monitoring Well
- Approximate Cable Percussive/Rotary Borehole Location With Install

Key

- Plots Classified As CS1 - No Protection Measures Required
- Plots Require CS2 Protection Measures
- Location Classified As CS1
- Location Classified As CS2
- Location Classified As CS4

Notes:				
P1	REVC	07.04.2025	TG	NS
P1	REVB	11.03.2025	TG	NS
P1	REVA	05.03.2025	CB	NS
Phase	Issue	Date	Drawn	Checked

Client:

DWH

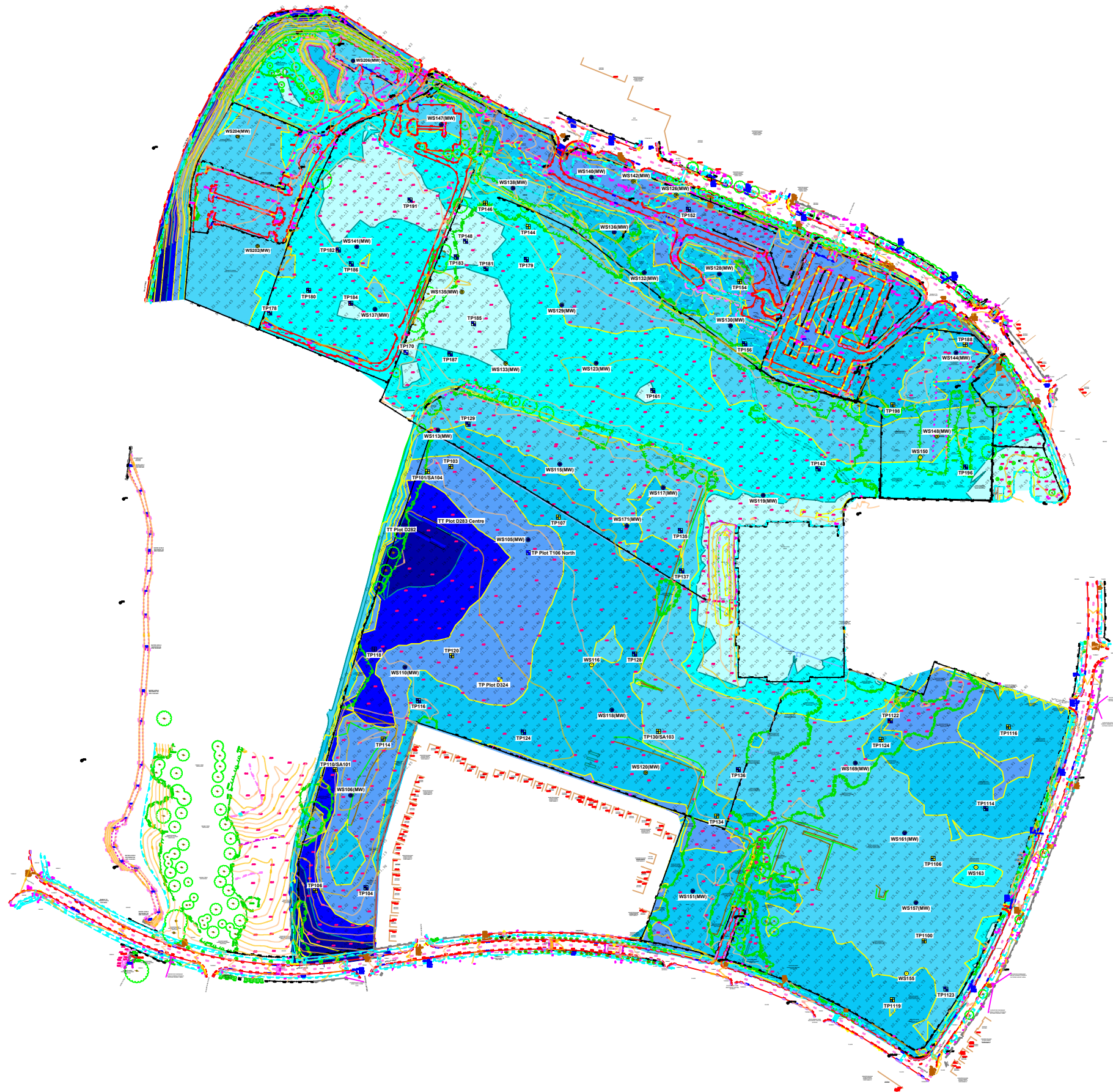
Job Title:

Cherryfield Drive, Kirkby

Job No:	15-280	Date:	07.04.2025
Drawing No:	020	Scale:	NTS
Drawing Title:		Gas Zoning Plan	

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- Location Symbols**
- WS101 Approximate Window Sample Probehole Location (E3P January 2022)
 - TP101 Approximate Trial Pit Location (E3P January 2022)
 - WB101 Approximate Rotary Borehole Location (E3P January 2022)
 - WS101 Approximate Window Sample Probehole Location (E3P November 2023)
 - WS101(MW) Approximate Window Sample Probehole Location with Install (E3P November 2023)
 - TP101 Approximate Trial Pit Location (E3P November 2023)
 - TT Plot Approximate Trial Trench Location - Supplementary SI Locations
 - TP Plot Approximate Trial Pit Location - Supplementary SI Locations

- Depth to Groundwater (m AOD)**
- Depth to Groundwater <18.00m AOD
 - Depth to Groundwater 18.01 - 18.99m AOD
 - Depth to Groundwater 19.00 - 19.99m AOD
 - Depth to Groundwater 20.00 - 20.99m AOD
 - Depth to Groundwater 21.00 - 21.99m AOD
 - Depth to Groundwater 22.00 - 22.99m AOD
 - Depth to Groundwater 23.00 - 23.99m AOD
 - Depth to Groundwater 24.00 - 24.99m AOD
 - Depth to Groundwater >25.00m AOD

Notes:

P1	REVA	18.06.2026	CB	MW	MW
Phase	Issue	Date	Drawn	Checked	PM

Client:

BDW Trading

Job Title:

Cherryfield Drive, Kirkby

Job No:

15-280

Drawing No:

050

Date:

18.06.2026

Scale:

NTS @ A3

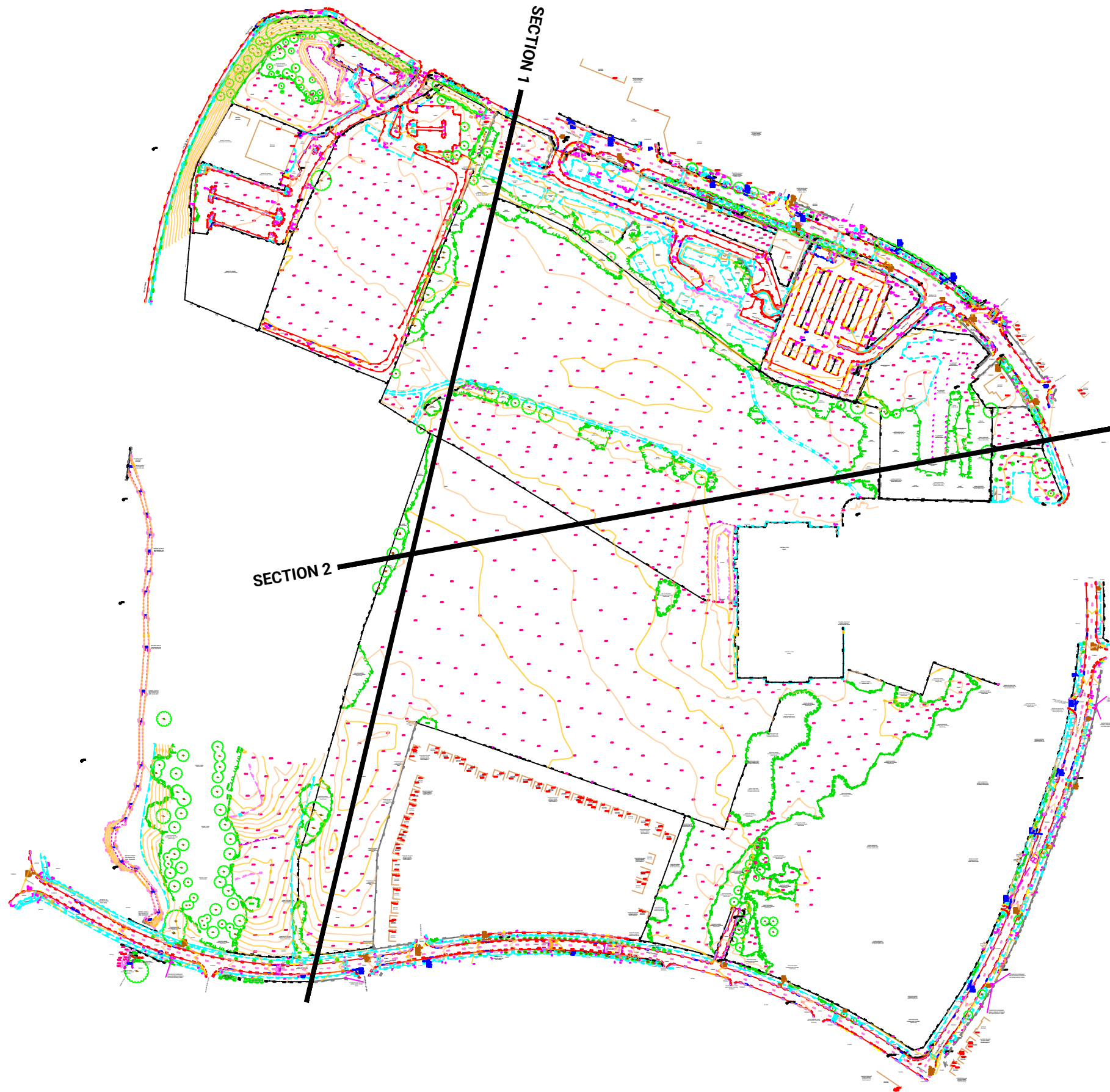
Drawing Title:

Depth to Groundwater Plan
(Superficial - mAOD)



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Notes:					

P1	REVA	18.06.2026	CB	MW	MW
Phase	Issue	Date	Drawn	Checked	PM

Client:
BDW Trading

Job Title:
Cherryfield Drive, Kirkby

Job No:
15-280
Drawing No:
051

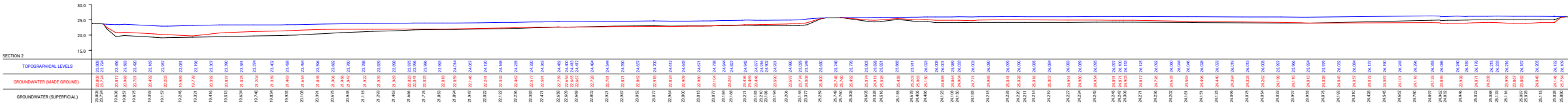
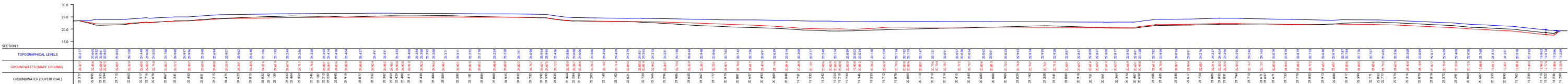
Date:
18.06.2026
Scale:
NTS @ A3

Drawing Title:
Groundwater Cross Section Location Plan



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Notes:					
P1	REVA	18.06.2026	CB	MW	MW
Phase	Issue	Date	Drawn	Checked	PM

Client:		BDW Trading	
Job Title:		Cherryfield Drive, Kirkby	

Job No:	15-280	Date:	18.06.2026
Drawing No:	052	Scale:	NTS @ A3
Drawing Title:		Groundwater Cross Section Plan	



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