



## Point of Ayr Gas Terminal




# Hydrogeological Impact Assessment

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P01	20.11.2025	Initial issue.	James Pettengell	David Wright	Mark Pickett

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## Document Control Sheet

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## CONTENTS

1.	Introduction .....	4
2.	Step 1 - Regional Water Resource Status.....	4
3.	Step 2 - Conceptual Model.....	5
3.1.	Ground Conditions .....	5
3.2.	Hydrology.....	9
3.3.	Hydrogeology .....	9
3.3.1.	Aquifer Properties .....	9
3.3.2.	Groundwater and Surface Water Abstractions.....	11
3.3.3.	Proposed Works .....	11
3.3.4.	Temporary Dewatering Design.....	15
4.	Step 3 - Potential Receptors Susceptible to Flow Impacts .....	16
4.1.	Water Features.....	16
4.2.	Sites of Special Scientific Interest (SSSI) and Conservation Sites .....	16
5.	Step 4 - Apportion of flow impacts to the potential receptors .....	16
6.	Step 5 - Mitigation Effects of Discharges.....	17
7.	Step 6 – Significance of net flow impacts.....	18
8.	Step 7 – Defining the search area for drawdown impacts .....	18
9.	Step 8 - Water Features susceptible to drawdown impacts .....	20
10.	Step 9 – Predicted maximum drawdown impacts .....	20
11.	Step 10 – Mitigation of drawdown impacts.....	21
12.	Step 11 – Significance of Drawdown Impacts .....	21
12.1.	Derogation of existing abstractors .....	21
12.2.	Environmental impacts on water bodies and wetlands .....	21
12.3.	Subsidence and Desiccation.....	22
13.	Step 12 - Water Quality Impacts .....	22
13.1.	Assessment of Groundwater Quality.....	22
13.2.	Potential contamination sources within anticipated dewatering distance of influence 23	
13.3.	Groundwater flow direction and surface water quality .....	31
13.4.	Anticipated Impacts of Dewatering on Groundwater Quality .....	31
14.	Step 13 – Redesign of mitigation measures.....	32
15.	Step 14 Monitoring and reporting plan.....	32
16.	References.....	32

## 1. Introduction

Stuart Wells Limited (SWL) has been appointed by Saipem Ltd (the Client) to undertake a Hydrogeological Impact Assessment (HIA) for the proposed temporary works groundwater control requirements at the Point of Ayr Gas Terminal, Liverpool Bay, Talacre, Holywell CH8 9RD (the Site). Following this introduction, the report is structured as follows:

The Environment Agency (EA) has published a Scientific Report 'Hydrogeological Impact Appraisal for Dewatering Abstractions' (EA, 2012), which provides a methodology describing how to complete a HIA. The site is under the environment regulatory jurisdiction of National Resources Wales (NRW), and for the purposes of this report it is assumed that NRW HIA methodology is the same as the EA and as advised by the EA (2012).

This report presents a HIA of a temporary works groundwater control system to reduce groundwater levels in the Tidal Flat Deposits to allow the proposed sub-surface construction works that will be affected by groundwater, to be undertaken in dry and stable conditions.

This document summarises the hydrogeological conceptual model for the Site, the findings of the Water Features Survey (WFS) undertaken by SWL in February 2025 (SWL, 2025a), and the pumping test undertaken by SWL in August 2025 (SWL, 2025b). The document then considers the impacts of dewatering on any nearby sensitive environmental receptors (identified during the WFS), and outlines mitigation measures and any details on monitoring strategy.

## 2. Step 1 - Regional Water Resource Status

The Site is located in the Dee Catchment Abstraction Management Strategy area (NRW, 2015) (herein referred to as 'the CAMS document'). The CAMS document states:

*'The area around the Dee Estuary has not been assessed in detail, however, it is likely some water is available there'.*

As a result, surface water and groundwater have not been assigned a water availability status in the CAMS document. For the purposes of this assessment, it is therefore assumed, based on the statement above, that the water availability status for both surface water (under the Q95, Q70, Q50 and Q30 river flow scenarios) and groundwater is 'water available'. The water availability map from the CAMS document is presented in Figure 1.

### 3. Step 2 - Conceptual Model

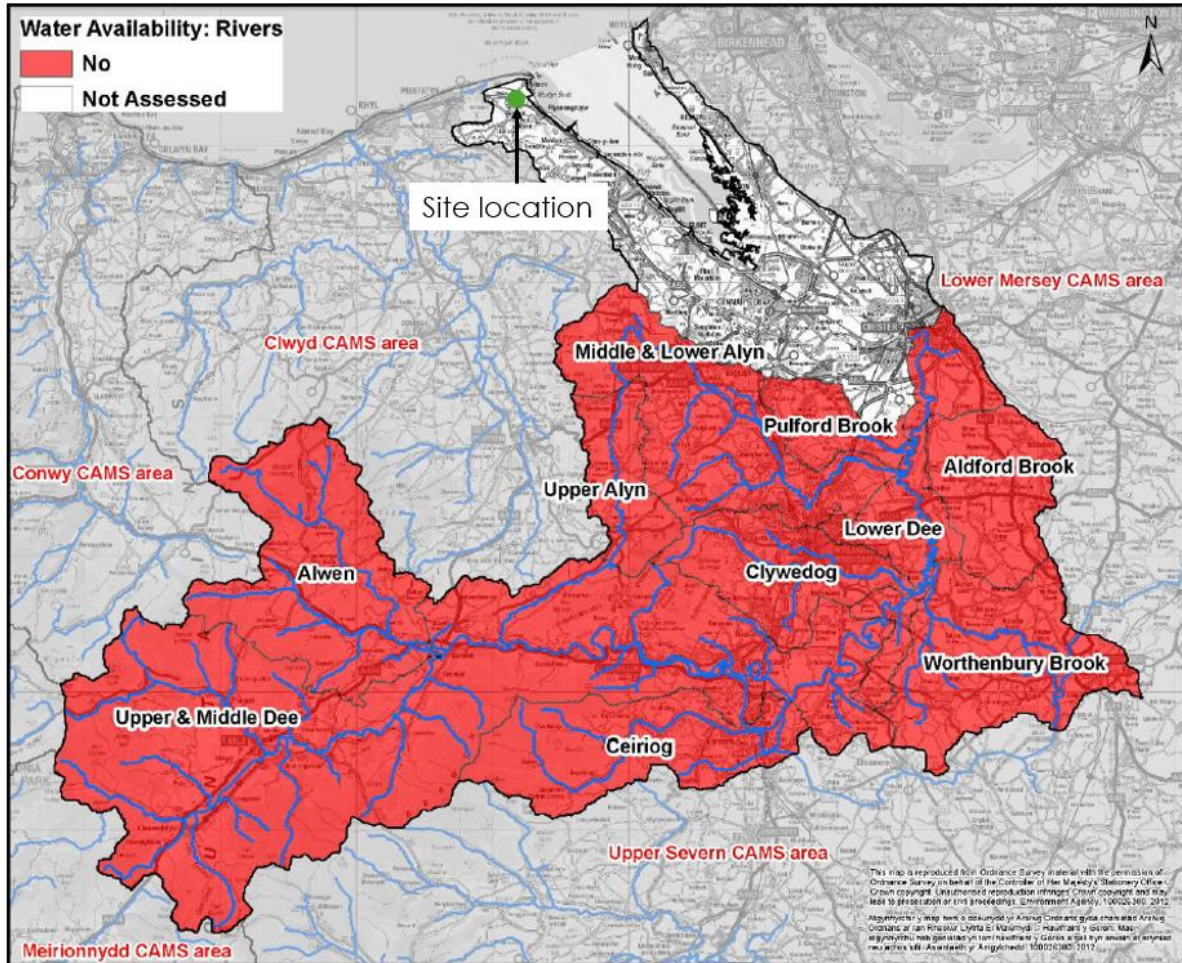
#### 3.1. Ground Conditions

Public domain mapping by the British Geological Survey (BGS, 2025) indicate that superficial deposits at the Site are Tidal Flat Deposits comprising clay, silt and sand. BGS mapping indicates the bedrock geology at the Site comprises the Pennine Lower Coal Measures Formation (mudstone, siltstone and sandstone). Superficial and bedrock geology maps are presented in Figures 2 and 3, respectively.

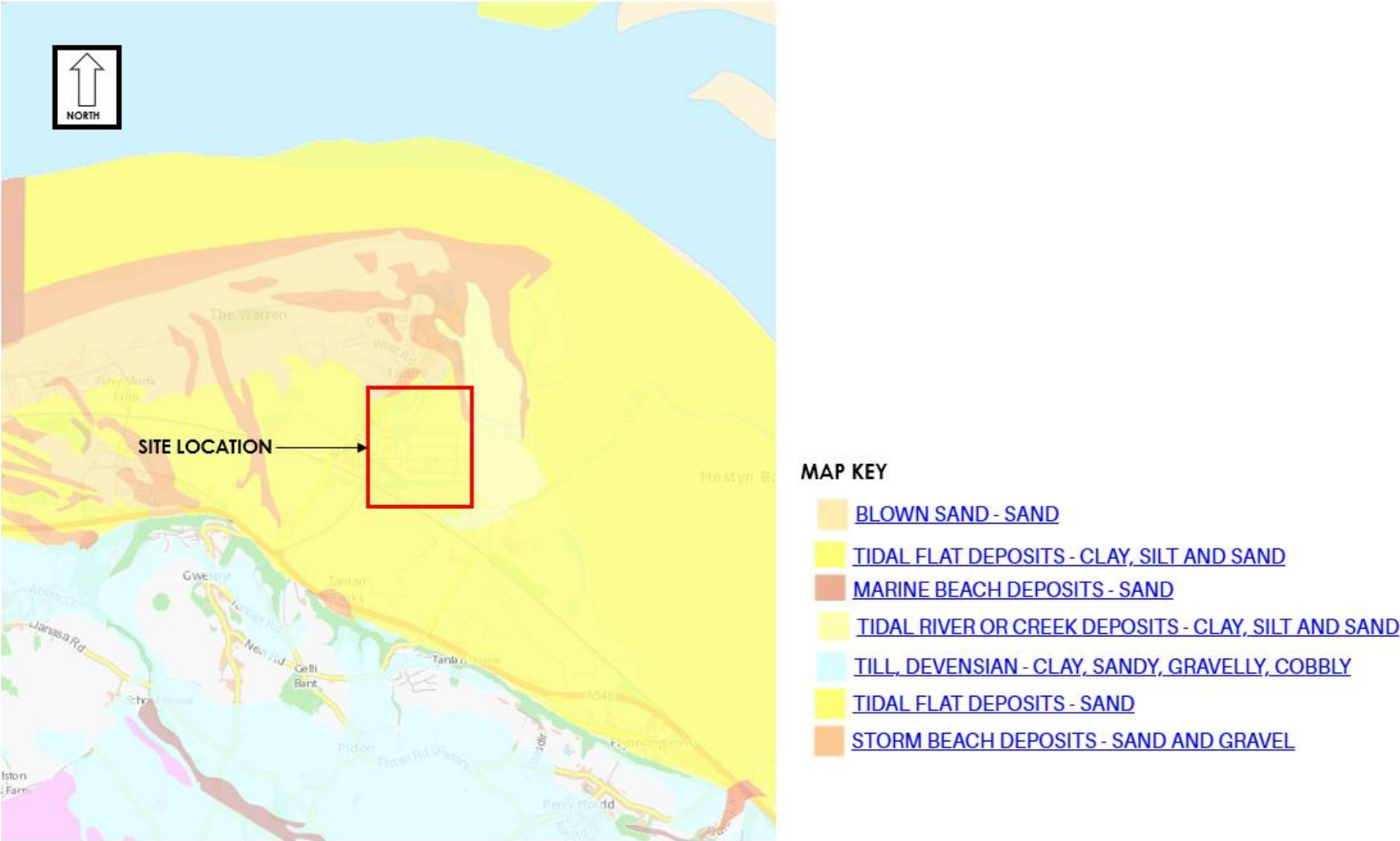
Several ground investigations have been undertaken at the Site (SWL, 2025b; Soil Engineering, 2025 and Fugro, 1992). There are some discrepancies as to what geological formations parts of the superficial deposits fall under (whether the upper portion of the superficial deposits are Tidal Flat Deposits or part of the Saltmarsh Formation). All the investigations report the same geotechnical properties of these deposits and therefore for the purposes of this report, the superficial deposits where these discrepancies occur are to be referred to as Tidal Flat Deposits. A general sequence of strata following a review of this ground investigation data is presented in Table 1.

**Table 1:** General sequence of strata

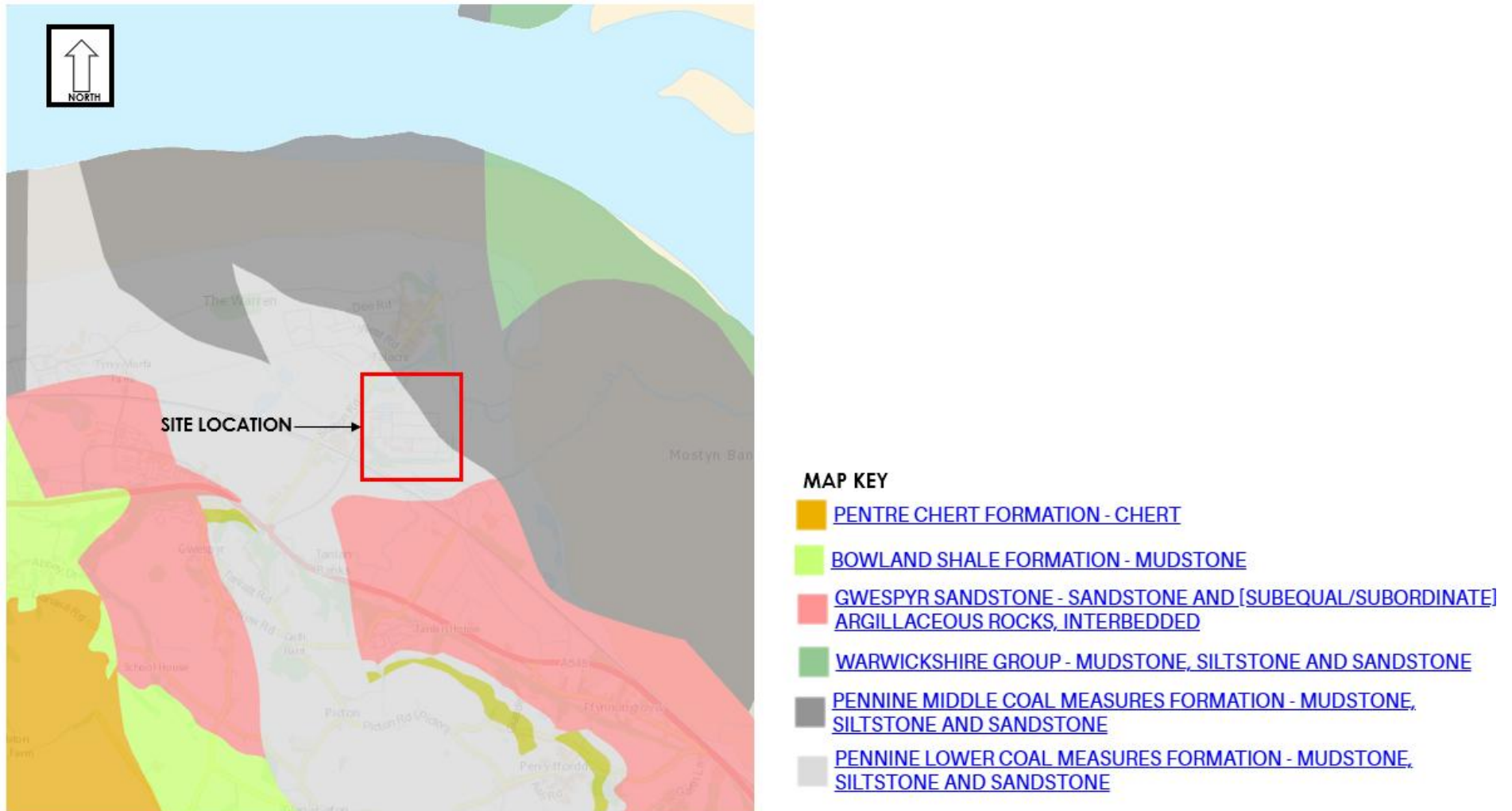
Unit	Level of Top of Stratum (mAOD)	Description
<b>Made Ground</b>	Ground Level (Approximately 4.5)	Variable sandy gravel and sandy gravelly clay with geotextile membrane present
<b>Tidal Flat Deposits</b>	4.4 to 2.9	Slightly sandy slightly gravelly CLAY, silty SAND and slightly sandy coarse GRAVEL
<b>Glacial Till</b>	-14.2 to -18.6	Stiff slightly sandy slightly gravelly CLAY
<b>Pennine Lower Coal Measures Formation</b>	-28.1 to -39.9	Mudstone, siltstone and sandstone



**Figure 1:** Water availability map and Site location (extracted from the Dee Catchment abstraction management strategy document (NRW, 2015).



**Figure 2:** Superficial Deposits geological map (contains BGS Materials Copyright NERC May 2025).



**Figure 3:** Bedrock geological map (contains BGS Materials Copyright NERC May 2025).

## 3.2. Hydrology

The site walkover identified six surface water bodies within 1.5 km of the Site: River Dee, Dee Estuary, surface water for a wetland bird reserve, an outfall from the Point of Ayr Gas Terminal Site, a tributary of the Dee Estuary and surface water lakes.

Distances from the proposed dewatering to each surface water body (to its closest point) are summarised in Table 2 and shown in Figure 4.

**Table 2:** Distance from proposed dewatering to identified surface water bodies within WFS (SWL, 2025a)

Surface water body	Approximate distance from proposed dewatering (m)
Dee Estuary	110
Surface Water Lakes	160
Site discharge stream	190
Tributary of the River Dee	230
Bird wetland reserve	660

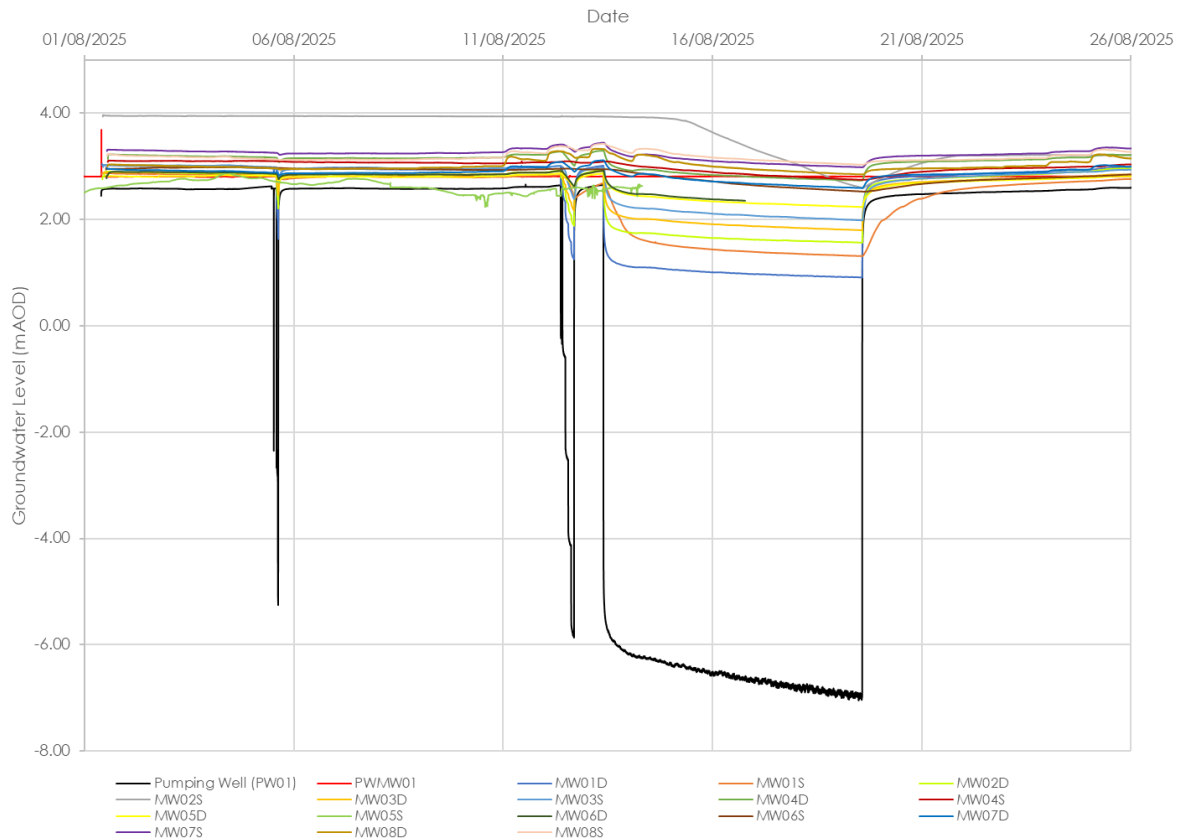
## 3.3. Hydrogeology

### 3.3.1. Aquifer Properties

The aquifer in consideration at the Site is the shallow Tidal Flat Deposits. In August 2025, Stuart Wells undertook a pumping test in the Tidal Flat Deposits at the Site to allow the hydrogeological properties to be better understood. The pumping test time-hydrograph is presented in Figure 5. The test comprised utilising an electric submersible borehole pump installed in the pumping well, and abstracted groundwater during the was discharged to the firewater pond on-site. The constant rate test was undertaken at an average flow rate of 5.3 l/s between the 13 and 19 August 2025.



**Figure 4:** Identified surface and groundwater features within the Water Features Survey (SWL, 2025a).



**Figure 5:** Pumping test time-hydrograph (SWL, 2025b).

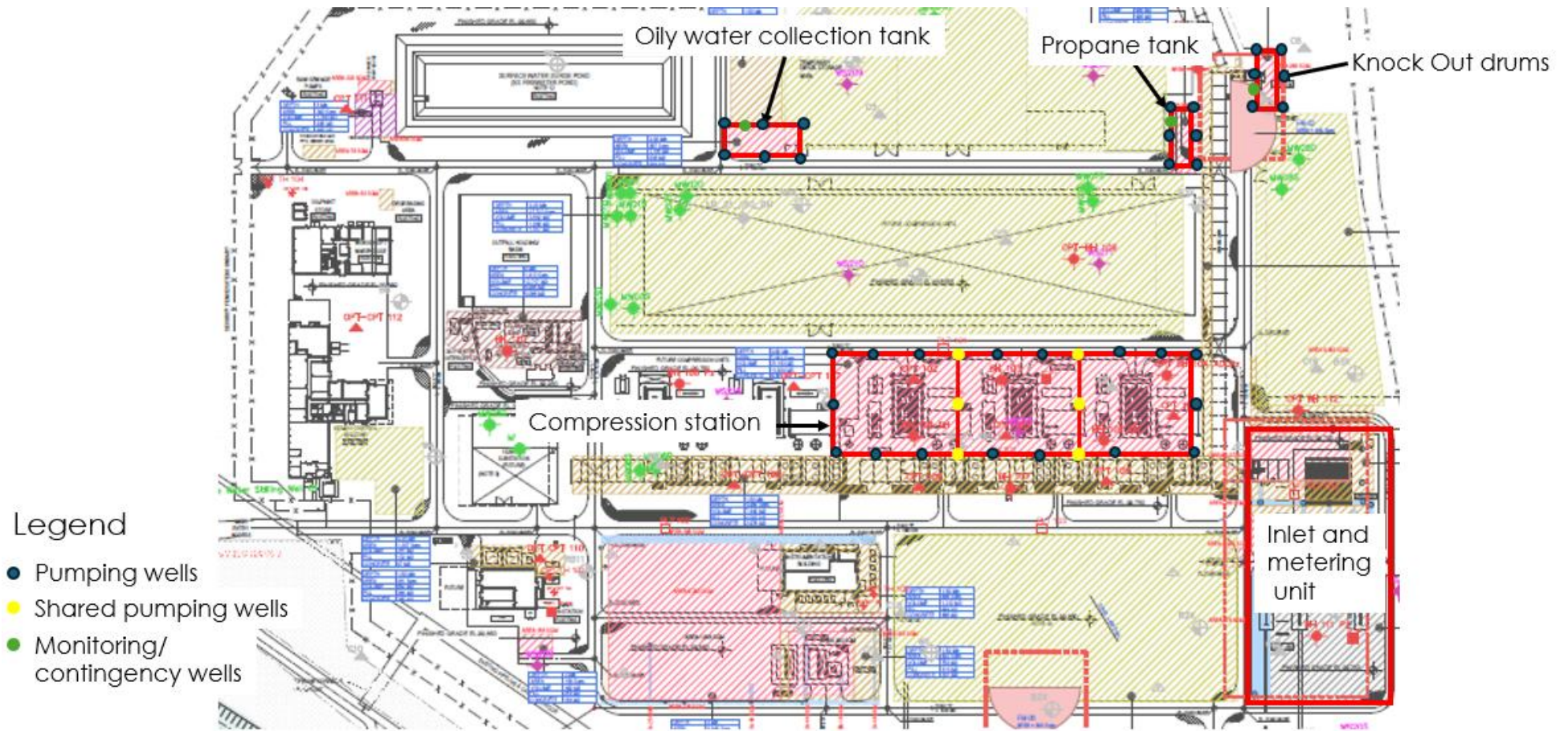
The pumping test was analysed as part of the dewatering design report (SWL, 2025c) to estimate the hydrogeological properties of the Tidal Flat Deposits. The permeability of this stratum was estimated to be in the range of  $1.0 \times 10^{-4}$  to  $2.5 \times 10^{-4}$  m/s.

### 3.3.2. Groundwater and Surface Water Abstractions

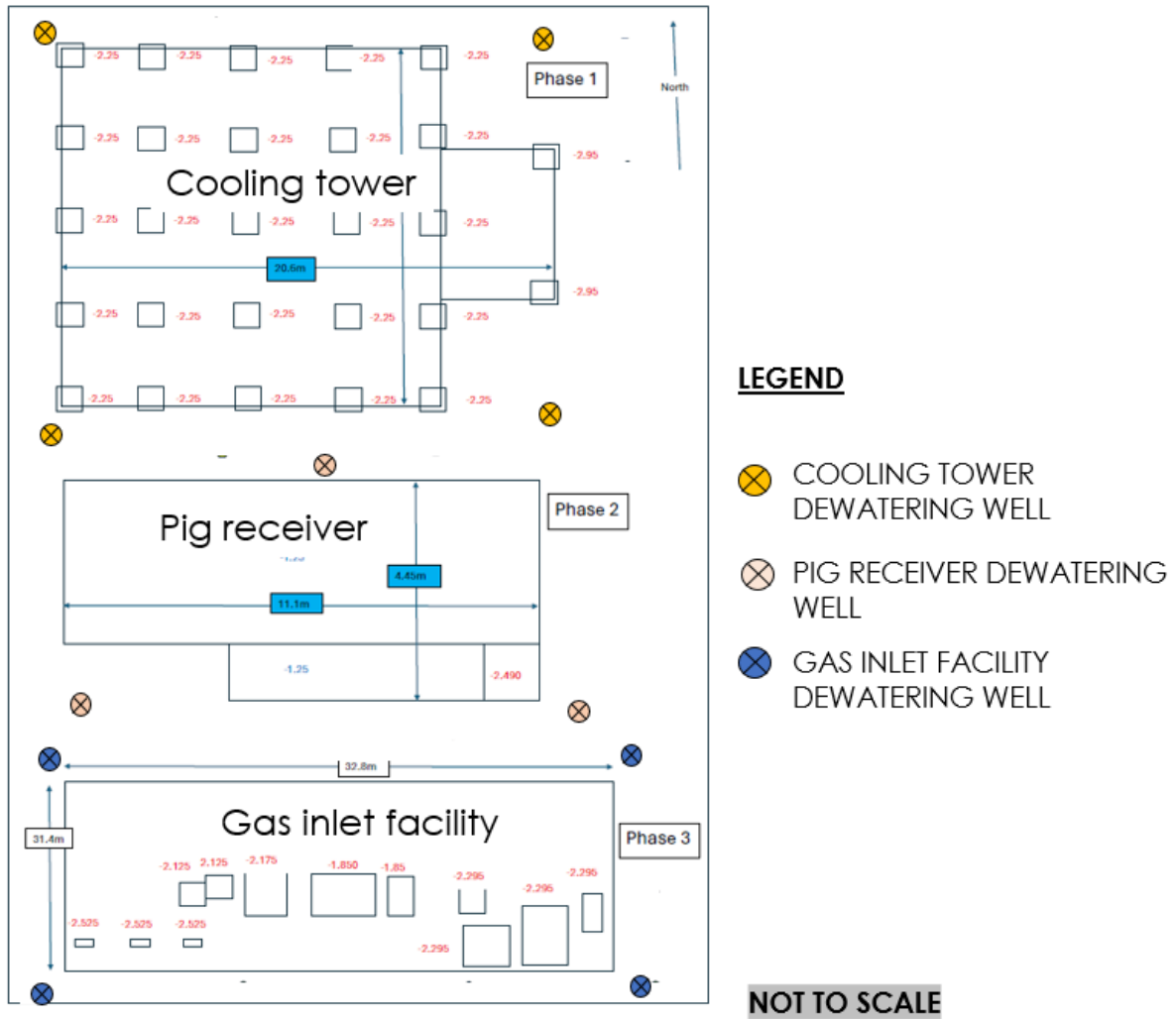
There are no licensed active groundwater or surface water abstractions within 1.5 km of the Site.

### 3.3.3. Proposed Works

A series of excavations are required to be made as part of the demolition works at the Site. The proposed excavations are shown in Figure 6. There are three structures within the inlet and metering unit shown in Figure 6: the cooling tower, the pig receiver and the gas inlet facility. For the presentation of Figure 6, these areas are grouped together under the inlet and metering unit, however, these excavation areas are shown individually in Figure 7. Proposed deep well dewatering wells are also shown for all structures other than those in the inlet and metering unit in Figure 6; dewatering wells for structures within the inlet and metering unit are shown in Figure 7.



**Figure 6:** Site layout map with proposed dewatering well locations shown



**Figure 7:** Layout of structures within the Inlet and Metering Unit with dewatering well location shown

Approximate excavation dimensions for the battered excavations are given in Table 3. Corresponding calculated dewatering flow rates using the methods of CIRIA C750 are presented in Table 4, while dewatering flow rates calculated using the pumping test data and the principle of superposition are presented in Table 5.

**Table 3:** Summary of excavation details including slope batters.

Proposed Excavations	Excavation length	Excavation width	Excavation Formation Level	
			(mAOD)**	(mBGL)
Cooling tower	29	25	2.25	2.25
Pig receiver	19	13	2.0	2.5
Gas inlet facility	41	40	2.0	2.5
Knock Out drums	30	15	1.5	3.0
Propane Tank	30	15	1.5	3.0
Compression station***	53	46	1.5	3.0
Oily water collection tank	35	17	1.5	3.0

**Notes:** \*Excavation footprints not given; dimensions measured from (Saipem (2025)).  
 \*\*Excavation formation given in mBGL only; assumed ground level of 4.5 mAOD utilised.  
 \*\*\* Excavation split into 3 equally sized areas; dimensions given are per area

**Table 4:** Anticipated dewatering flow rates using the methods of CIRIA C750.

Proposed Excavation	Drawdown required (m)*	Anticipated dewatering flow rate (l/s)		
		$1.0 \times 10^{-4}$ m/s	$2.0 \times 10^{-4}$ m/s	$2.5 \times 10^{-4}$ m/s
Cooling tower	1.5	4.3	7.1	8.4
Pig receiver	1.7	3.5	6.0	7.2
Gas inlet facility	1.7	5.8	9.5	11.2
Knock Out drums	2.2	4.7	8.0	9.6
Propane Tank	2.2	4.7	8.0	9.6
Compression station**	2.2	7.2	11.8	13.9
Oily water collection tank	2.2	5.0	8.6	10.2

**NOTES:** \*Allowing for a 0.5 m contingency below the excavation formation level.  
 \*\* Excavation split into 3 equally sized areas; flow rates given are per area

**Table 5:** Anticipated dewatering flow rates using the principle of superposition.

Proposed Excavation	Drawdown required (m)*	Anticipated dewatering flow rate (l/s)
Cooling tower	1.5	10.0
Pig receiver	1.7	9.6
Gas inlet facility	1.7	13.2
Knock Out drums	2.2	15.0
Propane Tank	2.2	15.0
Compression station**	2.2	17.6
Oily water collection tank	2.2	15.0

**Notes:** \* Allowing for a 0.5 m contingency below the excavation formation level.  
 \*\* Excavation split into 3 equally sized areas; flow rates given are per area

### 3.3.4. Temporary Dewatering Design

The groundwater control requirements have been assessed within Stuart Wells Dewatering Design Report (SWL, 2025c). A summary of the indicative groundwater control design is presented in Table 6.

**Table 6:** Summary of the outline dewatering design.

Proposed Excavation	Number of Pumping wells	Number of monitoring/contingency wells	Approximate Well Spacing (m)	Well Depth (m)	Well Bore Diameter (mm)
Cooling tower	4	0	20	8	300
Pig receiver	3	0	20	8	300
Gas inlet facility	4	0	20	8	300
Knock Out drums	6	1	15	8	300
Propane Tank	6	1	15	8	300
Compression station*	10	1	20	8	300
Oily water collection tank	6	1	20	8	300

**Notes:** \*Excavation split into 3 equally sized areas; number of wells given are per area, however, anticipated 4 wells can be shared between each area

## **4. Step 3 - Potential Receptors Susceptible to Flow Impacts**

### **4.1. Water Features**

Receptors potentially susceptible to flow impacts have been identified within both the desk study and site walkover elements of the WFS (SWL, 2025a) and are summarised in Table 2. Locations of these water features (at their closest point) to the proposed dewatering is shown on Figure 4.

### **4.2. Sites of Special Scientific Interest (SSSI) and Conservation Sites**

The desk study and site walkover identified that two of Special Scientific Interest (SSSI) are present within 1.5 km of the Site: the Dee Estuary and the Talacre SSSI. The Dee Estuary is also designated as a Special Area of Conservation (SAC) and a RAMSAR site and is designated as such as it hosts a variety of habitats as the mud and sand flats are not covered by seawater at low tide. The estuary is also important for shoreline stabilisation through dissipation of erosive forces. The Talacre sand dunes are designated as a SSSI for botanical, entomological and ornithological reasons.

At its closest point, the Dee Estuary is situated approximately 110 m east of the Site while the Talacre SSSI is situated approximately 940 m north.

## **5. Step 4 - Apportion of flow impacts to the potential receptors**

The proposed dewatering is to occur within the Tidal Flat Deposits. These deposits are variable at the Site, with locally confined groundwater conditions present where cohesive material overlies granular material to a depth below the groundwater level. It is assessed, however, that overall, these deposits behave as an unconfined aquifer at the Site as the cohesive material isn't completely laterally extensive throughout the Site and does not extend to below the groundwater level and thus act as a confining layer throughout the whole Site.

For the purposes of apportioning flow impacts, it has been assumed that the Tidal Flat Deposits are unconfined and homogeneous. As a result, a calculation of hydraulic resistance to apportion flow impacts as per EA, 2012 is not required as the flow impacts to potential receptors can merely be apportioned by the relative distances of the potential receptors to the proposed dewatering. This is summarised in Table 7. There is no evidence to suggest the Talacre SSSI represents a water feature in the area, or that it could be impacted by flow or drawdown impacts as it does not appear to rely on groundwater and/or surface water (due to it being sand dunes). This SSSI is therefore excluded from Table 7 and is no longer considered as part of this assessment.

**Table 7:** Apportion of flow impacts.

Potential receptor	Distance to potential receptor (m)	Apportion of flow impact
Dee Estuary	110	34%
Surface Water Lakes	160	24%
Site discharge stream	190	12%
Tributary of the River Dee	230	16%
Bird wetland reserve	660	6%

## 6. Step 5 - Mitigation Effects of Discharges

Abstracted groundwater is to be discharged to the site discharge stream, which is connected to the surface water lakes, the tributary of the River Dee and subsequently the River Dee itself. The flow path from the Site discharge stream to the River Dee is not apparent from aerial mapping; an assumed flow path has been superimposed on Figure 8 in blue for clarity.

This discharge arrangement is therefore a mitigation measure to the discharge stream, the surface water lakes and the Dee Estuary.



**Figure 8:** Assumed flow path from site discharge stream to the River Dee.

## 7. Step 6 – Significance of net flow impacts

The main water feature in the area around the Site is the River Dee and the Dee Estuary. Flow of the River Dee adjacent to the Site is unknown, however, data are available for the River Dee at the Chester suspension bridge. The location of this flow monitoring point is shown in Figure 9. While this monitoring station is relatively far from the Site, it is the closest station to the Site. The Q95 exceedance flow rate for the River Dee is 5.13 m<sup>3</sup>/s (National River Flow Archive, 2025) The maximum anticipated dewatering flow rate at the Site is 0.0176 m<sup>3</sup>/s (17.6 l/s). This means that even if there was a direct hydraulic connection between the proposed dewatering and the River Dee, the flow of the river would only be reduced by 0.3 %. The flow impact is therefore assessed to be negligible.



**Figure 9:** Location of Chester Suspension bridge flow monitoring station relative to Site location

## 8. Step 7 – Defining the search area for drawdown impacts

As per the HIA guidance (EA, 2007) the distance of influence for the purposes of this HIA will be taken as the radial distance to the furthest potential receptor; in this case, this will be taken as 660 m (the distance to the bird wetland reserve). A map showing the search area for drawdown impacts is presented blue in Figure 10.



**Figure 10:** Map showing defined search area for drawdown impacts.

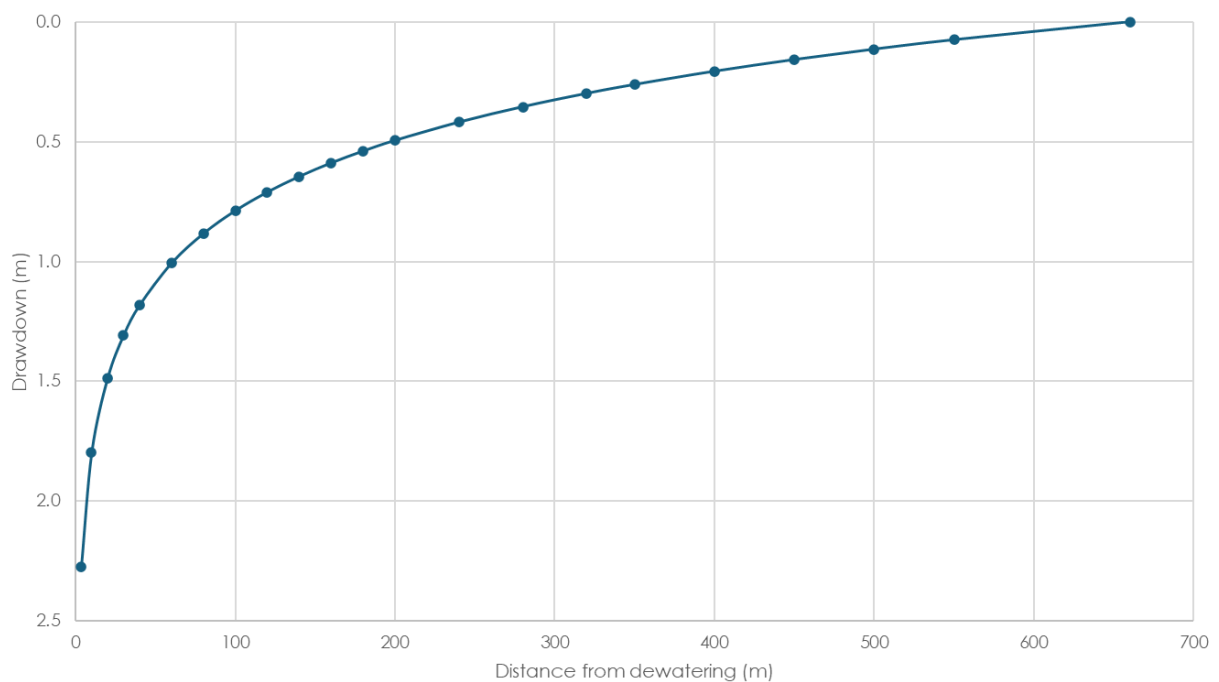
## 9. Step 8 - Water Features susceptible to drawdown impacts

The water features that are within the defined search area are the site discharge stream, the surface water lakes, the Dee Estuary and the bird wetland reserve.

## 10. Step 9 – Predicted maximum drawdown impacts

To predict the maximum drawdown impacts, the rearranged Theim-Dupuit equation has been used to estimate drawdown with radial distance from the proposed dewatering as per the HIA guidance (EA, 2012). The drawdown curve using this analysis is presented in Figure 11. As there are multiple excavations of consideration at the Site, the excavation which requires the most drawdown (each of the compression station dewatering areas) has been used for this analysis as a worst-case scenario.

The predicted drawdowns at the locations of the potentially sensitive receptors, based on these assumptions, are summarised in Table 8.



**Figure 11:** Distance drawdown curve for each dewatering area of the compression station.

**Table 8:** Summary of predicted drawdowns at receptors within distance of influence.

Potential receptor	Distance to potential receptor (m)	Calculated drawdown (m)
Dee Estuary	110	0.7
Surface Water Lakes	160	0.6
Site discharge stream	190	0.5
Tributary of the River Dee	230	0.4
Bird wetland reserve	660	0.0

## 11. Step 10 – Mitigation of drawdown impacts

The flow path presented in Figure 8 suggests the steam the groundwater is to be discharged to is connected to the surface water lakes, the tributary of the River Dee and the Dee Estuary itself. This discharge arrangement may act as a mitigation measure and maintain the water balance as the abstracted groundwater is being returned to the environment. The proposed discharge arrangement means the proposed dewatering is non-consumptive.

## 12. Step 11 – Significance of Drawdown Impacts

### 12.1. Derogation of existing abstractors

There were no groundwater or surface water abstractions identified within 1.5 km of the Site (SWL, 2025a).

### 12.2. Environmental impacts on water bodies and wetlands

It has been demonstrated that drawdown impacts are unlikely for the Dee Estuary and River Dee due to the vast expanse of the river and the dewatering flow rate being less than 0.5% of the river flows. Furthermore, drawdown impacts are unlikely for the surface water lakes, discharge stream or the tributary of the River Dee as the discharge arrangement may allow any drawdowns from these water features to be replenished by the discharge activity, maintaining the water balance.

The bird wetland reserve that is situated approximately 660 m from the Site does not have any mitigation measures, however, from the data presented in Figure 11 and Table 8, due to the distance of this wetland from the Site, no groundwater drawdown is anticipated to occur here.

### 12.3. Subsidence and Desiccation

Due to the relatively low density of the Tidal Flat Deposits at the Site, subsidence as a result of dewatering related settlement has been identified as a risk at the Site, however, it is anticipated based on the distance drawdown curve presented in Figure 11 that any settlement would be contained within the Site boundary.

Due to the presence of clay within the upper portion of the Tidal Flat Deposits, desiccation as a result of groundwater lowering could theoretically occur, however, the groundwater level at the Site has been monitored to be a minimum of 1.3 mBGL, and at times up to 3.5 mBGL; is therefore unlikely that drawdown in the granular Tidal Flat Deposits would have a negative impact on the degree of saturation of the clay at the top of this stratum.

### 13. Step 12 - Water Quality Impacts

In assessing the water quality impacts of the dewatering scheme we have adopted a line of evidence approach, in which we have assessed existing water chemistry, potential sources of contamination, current and anticipated groundwater flow direction and saline incursion.

As per the HIA guidance document (EA, 2012), professional judgement and expert opinion from a technical specialist has been used to assess the water quality impacts.

#### 13.1. Assessment of Groundwater Quality

The following observations have been made following the groundwater sampling undertaken at the Site during the pumping test:

- pH is neutral.
- The conductivity levels suggest the groundwater is brackish to saline.
- The chloride concentration suggests the groundwater is brackish.
- Phosphate concentrations were normal.
- Ammoniacal nitrogen concentrations were elevated
- Total Petroleum Hydrocarbon (TPH) concentrations were below the detectable limits
- Concentrations of copper, manganese, nickel and zinc were in excess of the annual average of the freshwater environmental quality standards (EQS)
- PFAS concentrations were found to be elevated in specific wells and locations.

The following observations have been made following the surface water sampling undertaken at the Site during the pumping test within the discharge stream and tributary to the River Dee:

- pH is neutral.

- The conductivity levels suggest the groundwater is brackish to saline.
- The chloride concentration suggests the groundwater is brackish.
- Phosphate and ammoniacal nitrogen concentrations are indicative of pollution from sources such as agricultural runoff, sewage or industrial waste.
- TPH and PAH concentrations were below the detectable limits
- With the exception of manganese, all metals were below the annual average of the freshwater EQS.

### **13.2. Potential contamination sources within anticipated dewatering distance of influence**

Both on site and within in the wider area, colliery and railway land has been identified. Both sources have the potential to give rise to various contaminants including PAH and metals.

It is understood that significant site investigation and remediation has already been completed at the Site. Following redevelopment, any exposure to residual contamination will be further reduced.

Concentrations of PAH in groundwater have been seen to be very low while the concentration of specific metals is relatively high.

Acidification via the biological breakdown of pyrite within coal has the potential to acidify any aquifer/surface water. However, given the fact that coal is no longer stored on Site in significant quantities, any such breakdown and resultant acidification will long have ceased. The risk to the aquifer/surface water is considered to be very low. Similarly, any leaching of soluble metal sulphates will have ceased since the loose coal stopped being stored on site in bulk. Again, the risk to the aquifer/surface water is considered to be very low.

PFAS represent a group of "forever chemicals" that pose significant detrimental health and environmental effects at very low concentrations. These chemicals are problematic in that they are both persistent (being very slow to breakdown in the environment) and bioaccumulating (easily ingested but not being excreted from the body, so they build up in the body over time). SWL have assessed the PFAS laboratory testing undertaken and have made the following observations:

- One or more individual PFAS compounds were reported above the limit of detection (0.05 ug/l) in wells MW02S & D, MW03S & D, MW04S & D, MW05S, MW08D, PW01 and Stilling Well 1, as shown in Figure 12.
- Of the 39 PFAS compounds tested for, 11 were reported above the limit of detection (0.05 ug/l), shown in Figure 13.

Figure 13 plots the concentration of PFAS compounds in each sample. The concentration of each individual compound detected above the limit of detection has been stacked to represent a total of detected PFAS in each sample.

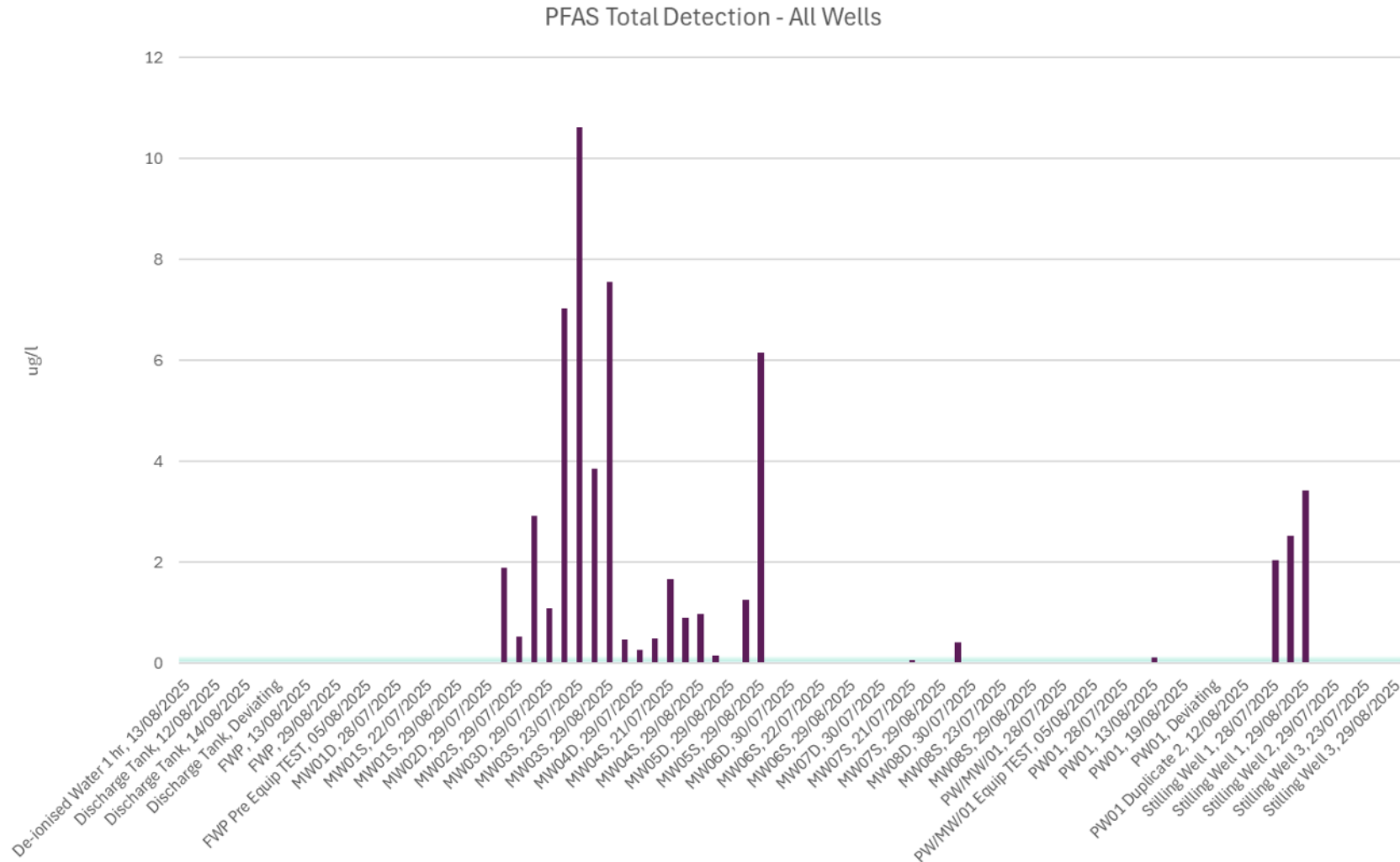
The total concentration of detected PFAS was between 0.06 and 11.5 ug/l. By way of comparison, the UK drinking water standard for total PFAS is 0.1 ug/l. No other UK guidance value is known for water.

The majority of the PFAS detected were PFHxA, PFHxS, and PFOS. These are known to have been used historically as "legacy" aqueous film-forming firefighting foam (AFFF). Smaller concentrations of more "modern" AFFFs (6:2 FTS, so called fluorotelomer PFAS) were detected. The remaining PFAS likely derive from the breakdown of these chemicals into daughter products.

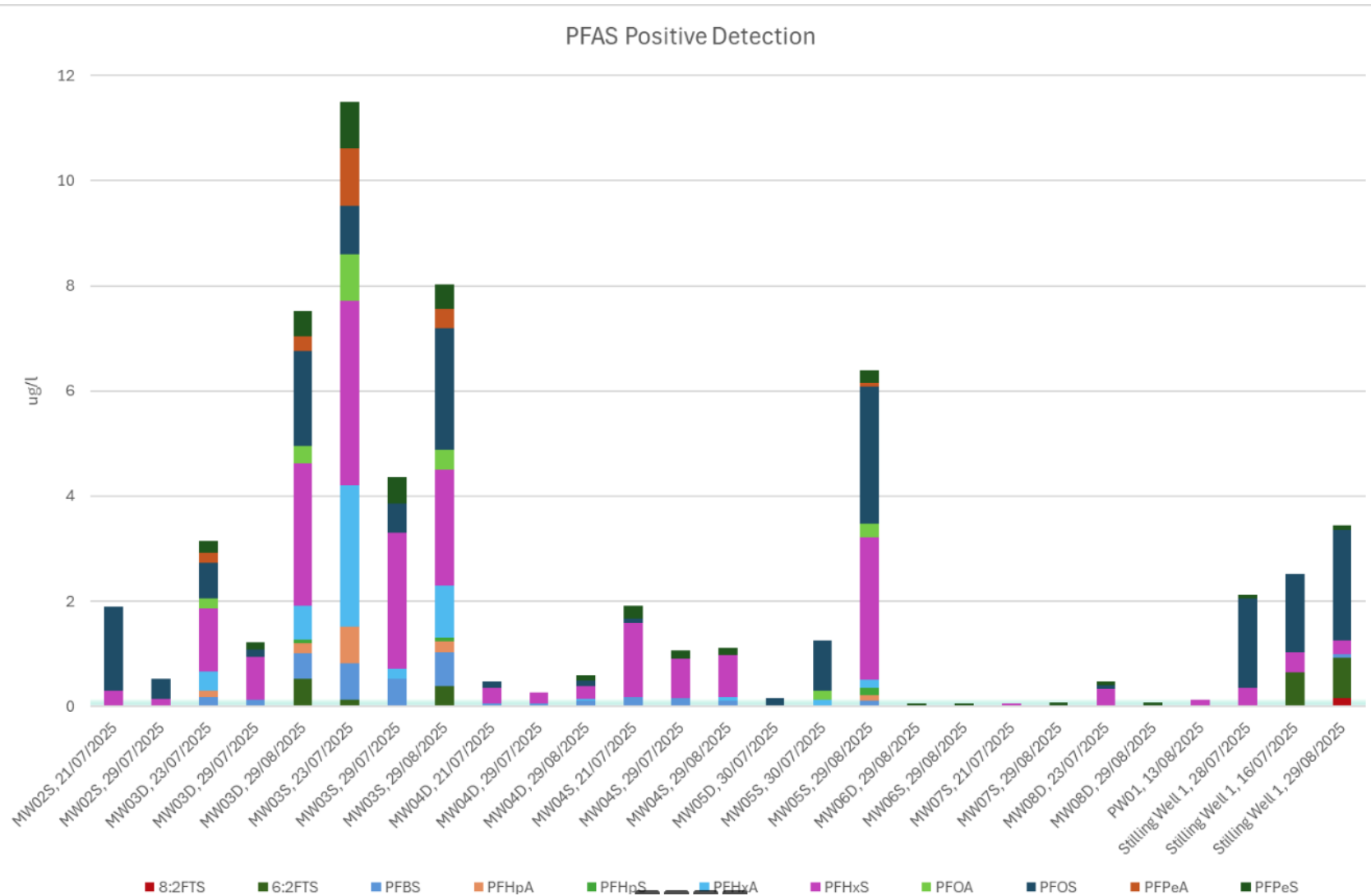
Figure 14 plots the detected PFAS concentration against the sampling date. Positive detection was made in samples taken before the pumping test was started (during pre-test monitoring). This period of time is highlighted in Figure 15.

No PFAS were detected in samples taken during the equipment test or step test. Only one sample recorded a positive detection of PFAS during the Constant rate test (CRT).

On completion of the test, further PFAS detection was recorded during the recovery monitoring, as shown in Figure 16.



**Figure 12:** PFAS concentrations identified during the pumping test



**Figure 13:** PFAS compounds found to be above the limit of detection during the pumping test







The detections have been plotted geographically in the following two heat maps. The First map shows PFAS detections during pretest monitoring (Figure 17) while the second heat map shows the detections during recovery (Figure 18).



**Figure 17:** PFAS distribution – pre-test monitoring



**Figure 18:** PFAS distribution – recovery monitoring

As can be seen, the concentration of PFAS is lower during recovery than it was before the pumping test was started. In addition, MW05S and D were more heavily impacted during recovery than in pretest. One possible interpretation is that the pumping test diluted the concentration of PFAS below the limit of detection. When the pumps were turned off and water levels returned to normal, PFAS in the area around MW03 flowed back to MW05, likely against the natural hydraulic gradient.

Other off site potential sources of contamination have been identified in the area.

Heaps may be associated with excavation or waste processes. Generally, they are limited in extent and duration as features and are unlikely to represent a significant risk of contaminants leaching to groundwater. The nearest heap was identified 1898 m southeast of the site.

Unspecified Works, in our experience, may be associated with a number of contaminants, particularly liquid fuels and coal. The feature is identified 91 m southeast of the site and dates from around 1968. These features have a low to moderate likelihood of contamination being present in the immediate area around the depot itself.

Several tanks have been identified in the area. Tanks may be associated with any number of liquid contaminants. The nearest tanks identified were located 188 m east of the site and dated from between 1959 - 1968. It is considered unlikely that given the distance from the site and date of the feature, any significant impact would be seen in the wider environment.

Electrical Substation located 208 m southeast of the site. Substations and transformer stations are historically associated with PCBs which possess very low mobility, with a retardation factor in the order of  $2E+4$ . A retardation factor of 1 means the solute moves at the same speed as water through the aquifer. This low mobility inhibits migration away from source areas and is unlikely impact the proposed works.

### **13.3. Groundwater flow direction and surface water quality**

Limited information is available on the regional groundwater flow direction or water quality in the area, however, anecdotally, the groundwater flow direction at the site is west to east, as might be expected from the topography and proximity to the sea.

### **13.4. Anticipated Impacts of Dewatering on Groundwater Quality**

Upon pumping, groundwater will be drawn into the pumping wells. It is assumed that this induced flow direction will be equal in all directions around the dewatering system.

Regarding these structures, there is a risk that despite remediation works potentially contaminated groundwater will be abstracted. With the potential that contaminants may flow towards the dewatering system, due to the induced hydraulic gradient.

All abstracted groundwater will be discharged under an agreed site discharge licence arrangement. With all abstracted groundwater undergoing treatment prior to discharge via a Granular Activated Carbon (GAV) system.

The groundwater at the site is believed to be brackish and a tidal influence is identified in groundwater monitoring data. However, pumping is not expected to draw significant saltwater into the dewatering system. Any such marginal increase in salinity would be transitory and naturally return to normal soon after the cessation of pumping.

#### **14. Step 13 – Redesign of mitigation measures**

As a result of the potential for contaminated groundwater at the Site, it is proposed for all abstracted groundwater to be passed through a granular activated carbon vessel prior to discharge. This is expected to reduce the concentration of contaminants to acceptable levels before water is discharged to the environment.

#### **15. Step 14 Monitoring and reporting plan**

Groundwater quality monitoring is to be undertaken continuously throughout the dewatering activities to ensure the groundwater has been adequately treated and is of a suitable discharge quality.

#### **16. References**

Environment Agency, (EA) 2012. Hydrogeological Impact Appraisal for Dewatering Abstractions. Science Report – SC040020/SR1.

National Resources Wales (NRW) (2015). Dee Catchment Abstraction Management Strategy, 2015.

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SWL (2025b) SWL24-380-01-PT-02 Liverpool Bay - Pumping Test Factual Report, September 2025.

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