KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- INDICATIVE RETURN LIQUOR ROUTE
- PROCESS LIQUOR / DRAINAGE TO WwTW
- ROOF WATER
- IMPERMEABLE HARDSTANDING
- TANKS
- GRASS
- OTHER STF ASSETS
- LAGOON
- BUILDINGS
- S3 — DISCHARGE TO WwTW
- W1 — ROOF WATER DISCHARGE
- W2 — ROOF WATER DISCHARGE

VERSION	DRWN	CHKD	REVD		DATE
B	MD	AW	ES	FOR PERMITTING	01.23
A	MD	SW	ES	FOR PERMITTING	07.22

YorkshireWater

Stantec

YORKSHIRE WATER SERVICES LTD
ENVIRONMENTAL PERMITTING

ESHOLT SLUDGE TREATMENT FACILTY
DRAINAGE & SURFACING
SHEET 2 OF 2

SCALE	SHEET SIZE
1:1250	A3
DRAWING NUMBER	REVISION
FIGURE 5 - DRAINAGE & SURFACING	B

Section V: Appendices

Appendix 1 Relevant Offences

Form C2 / Q3a Have you, or any other relevant person, been convicted of any relevant offence?

Yorkshire Water Services Ltd Relevant Prosecutions Record

Huddersfield Magistrates' Court 9 February 2011

On the above date YW pleaded guilty to breach of Section 85 (1) and (3) of the Water Resources Act 1991.

This incident relates to the Heaton Lodge site which partially treats sewage and then transports this treated sewage to the Cooper Bridge site.

On 9 August 2009 at approximately 4.10pm, an Environment Agency officer found a discharge to the River Don from the Heaton Lodge site. This was reported to YWS at 4.47pm but an off-duty YW colleague had already noted the discharge and reported it proactively 30 minutes earlier. An operator attended site at 4.30pm and identified the cause of the discharge to be a burst from a cracked rising main on the Heaton Lodge site.

The sludge pumps were immediately isolated, stopping the discharge some 30 – 40 minutes after it had first been noted by the off duty YW operator and the matter was escalated to senior management to inform them of the incident in line with the usual process.

YW offered to clean up the affected area but were informed by the EA officer that no clean-up was necessary. Service partners for YW attended on 10 August to locate the exact position of the main burst which was caused by excessive pressure thought to have been due to a blockage. The discharge from the main occurred in the area where it goes under the river. The area around the main was also bunded to contain any future spillages pending confirmation of the structural condition of the main. Visual inspections of the pipe work were maintained for a number of weeks following this incident as part of the site visits that are routinely undertaken.

Repairs were completed by 12 August when sludge transfer and full operations returned. The length of damaged pipe, 20m, was replaced and 75 metres of the main were jetted and CCTV was also carried out to ensure there were no other defects in the main. The total cost of the works was £16,800.

Since the incident, the main had been pressure tested to ensure the integrity of the main – no further incidents have occurred since August 2009 and the further testing did not establish any need for further repair works. The volumes and pressures pumped in this main were reduced following the incident due to a change in the process of transporting the sludge.

The evidence from the EA covered the potential effect, and the actual chemistry/biology however there's no indication that this incident affected the watercourse in terms of its flora and fauna. There was no fish kill. In fact, YWS offered to clean up the watercourse on the day of the incident and were informed that this was not necessary.

The watercourse recovered rapidly. There was no evidence put forward by the EA to suggest that the effect was medium or long term, supported by the EA's contention that a clean-up was not required.

There was no evidence that the recreational use around the discharge point had been adversely affected. The Magistrates accepted that there had been no "flaunting of the law" by the Company. They noted that there was no significant damage to flora or fauna and that the watercourse recovered rapidly. On the issue of culpability, they accepted that the Company did not deliberately break the law and they further noted that the Company did not achieve any economic gain through the commission of this offence.

YWS was fined £10,000 and ordered to pay the EA's costs of £1,164.34.

Huddersfield Magistrates' Court 9 February 2011

On the above date YW pleaded guilty to breach of Section 85 (1) and (3) of the Water Resources Act 1991. This incident occurred on what is known as the Deighton site. This site receives crude sewage and undertakes preliminary treatment in the form of screening of any debris. The main in question transports this treated sludge to the Calder Valley incinerator, at the time of this incident.

At 7.45pm on 9 September 2009, a call was received from the EA that there had been a report of sewage from a local resident and it is noted what the EA state this resident said when reporting this issue. I would ask the Court to be mindful of the terminology used and place the appropriate reliance on this when considering what the customer may or may not have meant by this comment as there is no further evidence with regard to this statement and it clearly could not relate to actual measured flow. RTS which is the alarm system used by Yorkshire Water on its assets was checked immediately for any alarms but none were found.

An operator attended site at 8.30pm and was unable to safely locate the discharge as daylight was fading and for health and safety reasons, the operator ceased his investigation. Service partners for YW had previously been isolating the pumps on a daily basis as the pumps were being commissioned and therefore these pumps were only running between the hours of 7.30am – 6.00pm at the time of this incident. On 9 September, the pumps had been turned off when the operator attended so there was not a discharge left to continue by the operator leaving site.

On the morning of 10 September, the pumps were set running again at 9.05am. The exact point of the discharge which had proved difficult to find due to the excess of overgrowth on the wall was then located. An EA officer was on site and aware that the pumps had been set to run again and at 10.15am witnessed the discharge point. The pumps were immediately stopped.

On 10 September at 11.30am, service partners for YW began the repairs to the main which resulted in a 4m length being replaced. The repairs were made difficult by the presence of a large tree adjacent to the burst. This is believed to have been a contributing factor to the cause of the burst as the tree had displaced the main. CCTV operations were also undertaken on the main, 100m to establish its overall condition with no defects found.

All sludge was tankered from site and any debris observed in the river was completely removed by YW operations. The main was subsequently flushed with treated final effluent

and a full CCTV survey was undertaken with no defects identified, the main was found to be in good condition and was brought back into service on 12 September.

Following this incident, the tree and its roots were completely removed to avoid any repeat incident once YW were aware of the contribution of this tree to this incident. The entire length of the main has been cleaned out and a pressure monitor has been placed on the main so that in future, if the pressure rises due to a blockage or any problem, the pumps will cease pumping to avoid a burst. The monitor is alarmed to notify YW of a problem. Together with the cost of the repair works immediately after the incident and the further cleaning works, a total of approximately £375k has been spent on this main.

The evidence from the EA covers the potential effect, and the actual chemistry/biology however there's no indication that this incident affected the watercourse in terms of its flora and fauna.

There was no fish kill. YWS offered to clean up the watercourse and carried out these operations immediately with the agreement of the EA. No further actions were requested by the EA following their further investigations.

There was no evidence put forward by the EA to suggest that the effect was medium or long term. There was no evidence that the recreational use around the discharge point has been adversely affected. They noted that this was a Category 1 offence. It was however noted that there was no significant permanent damage to the flora or fauna. In respect of culpability, there was no deliberate pollution to the watercourse and no economic gain. They had considered all the environmental credentials and investment for the company and they also noted the significant investment in this main since the incident had occurred.

YWS was fined £12,000 and ordered to pay the EA's costs of £1,897.93.

Scarborough Magistrates' Court 6 May 2011

YWS was prosecuted for an offence that on or before 26 April 2010 it did cause a water discharge, namely the entry of waste into the Runswick Beck, Runswick Bay other than in accordance with an environmental permit contrary to Regulations 12 (1) (b) and 38 1 (a) of the Environmental Permitting (England and Wales) Regulations. This was the first offence to be prosecuted under the new regulations.

At 4:26pm on 26 April, YWS was contacted by the EA via Loop informing it of potential pollution incident at Runswick Beck. YWS was directly informed by Loop at 4.40pm and a job was raised for the standby operator who was on site for 5:05pm (some 40 minutes after the first contact).

The operator confirmed that the detention tank on site was full and the overflow was active. The pumps appeared to be running but they were failing to keep on top of the flow. No alarms had been received from the site as it was established that the ultrasonic head that records levels in the tank was inoperable as it had been removed from the tank and placed on top of the tank. The reasons for this were unknown as was both the identity of the person who removed the ultrasonic head and when this was done.

The tank was pumped down by the operator by putting both pumps on hand. The site was not designed to operate using both pumps and was on a duty standby arrangement, however, to try to solve the problem both pumps were in use. At 6:45pm, approximately two hours from the report of the incident by the EA, the discharge was stopped. The operator later noted a discharge from the rising main at Hinderwell and believed the rising main to be blocked which would have had the effect of reducing the SPS's capacity to pump in any event. As the operator had stopped the discharge, before he left site, he checked the watercourse and beach for any signs of debris. He found no such debris as the detention tank has a screened overflow.

A high-level flow was placed in the tank as a temporary indicator for any future high levels. The operator confirmed to the EA that he had stopped the discharge. The EA informed YWS that it would be attending the following day to take samples and requested a clean-up of the beck.

A job was raised for Lumsden and Carroll to clean up Runswick Beck but it did seem that the vegetation in the Beck had contained the majority of the flow. No debris was found. In agreement with the EA, only the top 20 metres of the Beck were cleaned for health and safety reasons. Investigations into YWS's own assets on 27 April established that the detention tank was full of sewage debris. The STRATE pump unit was also cleaned out.

On 28 April, the STRATE tank was cleaned out and its controls were also checked by an electrician. A large quantity of silt was found in the unit and the pumping propellers were also found to be worn. The detention tank had been cleaned out two years prior to this in accordance with our accepted process. It was cleaned out on 29 April and impellors were ordered which had to be delivered from Germany.

The rising main was found to have two of the three air valves clogged with fat and the third valve was found to be damaged – all of which were cleaned and replaced. Approximately £6k in costs was incurred in both the clean-up operation and repair and replacement of the relevant assets. Following the incident, the site was visited every other day, with daily monitoring of RTS.

Sample results taken by the EA showed a significant impact at the point of discharge. Sample results 300 metres downstream of the discharge point on 26 April, showed a lesser impact. Samples taken from the same place 300 metres downstream on 27 April showed a greatly reduced impact suggesting that the watercourse had improved significantly within 24 hours of the incident. The site now has an updated maintenance plan and the telemetry has been fully tested.

The Magistrates made the following comments: "We have listened very carefully to all that has been said today regarding this unfortunate incident at Runswick Bay. We have acknowledged that Yorkshire Water did respond exceedingly quickly. In our view, a response time of 25 minutes is exceptional. We have also noted the early guilty plea and given maximum credit for this."

YWS was fined £7,500 fine and ordered to pay the EA's costs of £1,581.67.

Rotherham Magistrates' Court 10 June 2011

YWS was prosecuted for an offence that on or before 24 April 2010 it did cause a water discharge, namely the entry of waste into the Blackwater Dyke, Aldwarke Lane, Rotherham other than in accordance with an environmental permit contrary to Regulations 12 (1) (b) and 38 1 (a) of the Environmental Permitting (England and Wales) Regulations.

At 11:05am on 26 April, YWS was informed via the EA of a discharge to Blackwater Dyke. YWS operatives were on site at Aldwarke Lane SPS at 12:30pm and found that both pumps at the site were inoperative. Pump no 1 was found to be blocked and the fuses had blown at pump no 2.

A job was immediately raised for an electrician and fitter to attend site. In the interim, straw bales were delivered to site and placed at the confluence of the Dyke and River Don to prevent solids moving into the River Don. Pump No 1 was lifted, unblocked and restored to normal operation on the same afternoon but pump no 2 was found to be burnt out so was removed from the wet well. The pumping station operated on a duty/standby basis and therefore one pump was capable of dealing with the flows.

The site was monitored overnight by standby operatives to ensure the pumping station continued to operate satisfactorily using one pump. No further issues were noted. On 27 April, a replacement pump no 2 was delivered but was not immediately fitted due to wet well restrictions. The site was monitored again overnight. Pump No 2 was installed on 28 April. On 30 April, the EA requested a clean-up of the Dyke and a recycler/vactor unit was requested which removed the surface liquids from the Dyke. No further works were required by the EA.

Aldwarke Lane SPS was monitored by telemetry, however, a telemetry failure was identified on 9 December 2009 which was not rectified until 28 April 2010. The pumping station was visited on a monthly basis prior to the incident and the last visit prior to the incident being on 1 April. The EA did not take any samples of the Dyke nor did it produce any photographs. There was therefore no evidence of the impact on the Dyke.

An employee of the EA witnessed this incident on Saturday 24 April whilst in the area socially. For reasons which had not been explained in his statement or elsewhere, he did not report this incident to any party until two days later on 26 April.

The Magistrates made the following comments: "We have been hearing a case prosecuted by the Environment Agency against Yorkshire Water. We have taken into account the statement from the Environment Agency that the breakdown of the telemetry had no bearing on the subsequent breakdown of the pumps. However, telemetry would have given an early indication of the problem and should not have taken 5 months to repair. We do however appreciate that Yorkshire Water took early action on being informed by the Environment Agency. We would have fined the company £5,000 but give maximum credit for the early guilty plea".

YWS was fined £3,750 fine and ordered to pay the EA's costs of £835.38.

Wakefield Magistrates' Court 18 July 2011

YW was prosecuted for an offence that on or before 7 April 2010 it did cause the entry of polluting matter, namely sewage waste, into the un-named tributary of the River Don to the North of Pugneys Country Park in the district of Wakefield, a controlled water, other than in accordance with a discharge consent contrary to section 85 (1) and 85 (6) of the Water Resources Act 1991.

On 7 April at 11.38am, YWS were informed of a discharge to the tributary by the EA. An operator was sent to site and noted a problem with the Denby Dale Road CSO. Around 1.5 tonnes of fat, rags, silt and grit were removed from the CSO chamber. At the time of the incident, the CSO telemetry data was not visible due to a fault with the alarm points. Data recovered since the incident indicates that the CSO began to discharge to the site detention tank on 11 February 2010 and ceased on 7 April 2010. The flow was being returned to sewer and there is no recorded data to indicate when the discharge to the watercourse may have commenced.

On the day of the incident, a bund was created using straw bales to prevent solid material reaching the River Don. A litter pick around the CSO outfall was also carried out. On 9 April, fat was again found to be accumulating in the CSO chamber which became partially blocked again. This blockage was cleared on the same day and the asset was proactively checked over the weekend and the watercourse also monitored.

On 12 April, the CSO and continuation sewer were completely cleansed by high pressure jetting. One storm pump was also found to be blocked, this blockage was also cleared that day. During that week, the CSO telemetry was also repaired and modified to make graphical data visible and a supplementary "pollution incident" alarm was created. On 13 April, YWS met with the EA and agreed to bund off the dyke upstream of the overflow and that the site would be monitored daily.

Since this incident, potential sources of the fact have been investigated but have not identified a source. All of these businesses who could be the potential source of the fat have been contacted to inform them of the problem and provide guidance on the correct disposal method. A cyclical monthly inspection of the asset has been raised to help identify any future accumulations of fat. This involves checking the CSO itself and a visual check of the outfall.

Prior to the incident, the Detention Tank was inspected on a routine visit on 2 March with no faults found. The pumping station was visited on 11 March which found a partial blockage in the CSO caused by fats which was removed during the same visit. The CSO itself receives a 3-monthly inspection – YWS guidance is that it should be every 6 months so the asset was already being visited more frequently.

The EA took two sets of samples on 8 April and 16 April. The former sample was taken from the point where the drain emerges from culvert into an open ditch. This sample does demonstrate an impact on the watercourse. The second sample taken by the outfall itself some 9 days after the incident was reported, show significantly lower levels for all of the components tested on 8 April. A number of photographs have also been provided.

YWS was fined £10,500 and ordered to pay the EA's costs of £2,324.67.

Calderdale Magistrates' Court 4 January 2012

On 4 January 2012 YWS pleaded guilty to an offence that on or before 1 April 2011 it failed to comply with Schedule 1, Conditions 11 (a) and 9 (a) (iii) of an environmental permit for waste water treatment and discharge, number WRA7510 in that the levels of biochemical oxygen demand and suspended solids discharged from the works were in excess of the permitted maximum amounts allowed under the said permit and caused pollution of the River Don contrary to Regulations 12 (1) (a) and 38 (2) of the Environmental Permitting (England and Wales) Regulations 2010 and Section 2 of the Pollution Prevention and Control Act 1999. The levels of BOD were 3.6mg/l over the levels normally permitted to be discharged to the watercourse being 73.6 mg/l rather than 70 mg/l or under.

The works in question suffered greatly as a result of the intense winter of 2010/11. The weather had affected a great deal of authorities and the public alike. By way of background, during this period maintenance work in the area, including this sewage treatment works, increased by 374% in January and 240% in February. The impact on the Copley works was severe. A number of assets were affected at the works which resulted in the increase in the levels of sludge being held back for treatment which resulted in the breach of the permit. It can be described almost as a domino effect on preceding treatment assets caused by the winter which then impacted the operation of the centrifuges which were required to operate consistently in a manner for which they are not designed.

A centrifuge is a large drum which is motorised and spins very fast like a washing machine. Wet sludge enters the drum and is spun such that the water is removed and the thickened sludge is passed forward as a cake. It is one part of the overall treatment process at the works.

At the works, there are two centrifuges and the design is for them to operate on what is known as a duty/standby basis. The importance of that is that only one centrifuge is ever required to operate. The standby is there to be called into operation should a problem arise with the duty asset.

The centrifuges are maintained on a 6-monthly basis by a specialist contractor and were last inspected on 3 February 2011 and in July 2010 prior to that. An issue was identified with one of the centrifuges which in turn led to its removal for repair on 10 February leaving one still in situ which is still within the design capacity.

The remaining centrifuge continued to operate at a lower continuous level of operation. It is important to note that this asset did not fail. However, as it was struggling to maintain required levels, a decision was made to bring in a further centrifuge unit which eventually ran on a 24-hour basis, 7 days a week. This arrived on site on 2 April. The levels of BOD on 10 March were 136mg/l. By 1 April 2011, YW had reduced the level of BOD by 50% to 73.6mg/l, 3.6mg/l over the permitted levels of discharge i.e. the levels which are set by the EA that can be safely discharged without any impact. Therefore, clearly the activity by YW had made a significant impact to the BOD levels.

This incident came to the prosecution's attention as a result of self-reporting by YW, there was no attempt to conceal the events on site nor any potential impact on the watercourse. YW were proactive in their communication to the EA to ensure there was full visibility of what was occurring on site. The EA attendance on site was solely in response to the YW contact.

There was no evidence from the EA of any impact on the watercourse other than the sample results provided and some photographic evidence. The sample results show that the levels of BOD were 3.6mg/l over the levels normally permitted to be discharged to the watercourse. It was submitted therefore that taking this into account, the impact on the watercourse was minimal given the close proximity of the final sample result to what is allowed to be safely discharged in all normal circumstances. Any impact in any event was short term if at all.

There was no fish kill nor is there any evidence submitted by the EA of any damage to flora/fauna or impact on recreational or amenity value.

The Yorkshire Water response was timely and effective with costs of approximately £60k being incurred as an immediate and subsequent consequence of the incident. Since the incident occurred, a full root cause analysis was undertaken resulting in a full review of the maintenance procedures to equipment upstream as it were of the centrifuge assets. Those assets were already on an appropriate system of inspection and maintenance which was adhered to prior to this incident. A further new action is a robust two-phase escalation process to reinforce monitoring levels on site in terms of sludge levels which now instigate new actions within the company. A new team leader has also been brought to the site to give more focus to these sorts of issues.

Yorkshire Water self-reported this incident to the EA and fully cooperated with them under interview. Yorkshire Water now has an understanding as to the impact of such a severe winter event which had not previously been seen for in excess of 30 years.

A fine of £5,000 was imposed against a maximum of £50,000. Costs were also awarded to the EA in the sum of £1,593.98.

Bradford Magistrates' Court 20 March 2012

On 20 March 2012 YWS pleaded guilty to 3 offences all contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2010 as follows:

1. Between 17 April and 3 June 2011 at Copley Sewage Treatment Works there was a failure to comply with the permit in that the works were not operated in accordance with that permit through the storage of sludge in external areas.
2. Between 1 April and 24 June 2011 at South Elmsall Sewage Treatment Works there was a failure to comply with the permit in that sludge originating from Copley works and Wheldale works was stored and treated at the site.
3. Between 1 April and 24 June 2011 at South Elmsall Works there was a failure to comply with the permit through the storage of sludge in external areas for more than 2 days and was not stored in sludge skips.

The works at Copley suffered greatly as a result of the intense winter of 2010/11 which affected a great deal of authorities and the public alike.

By way of background, during this period maintenance work in the area, including this sewage treatment works, increased by 374% in January and 240% in February of 2011. The impact on the Copley works was severe. A number of assets were affected at the works which resulted in the increase in the levels of sludge being held back for treatment which resulted in a discharge outside of the permit for Copley. The Company having seen this discharge occur wished to take all measures to repeat a discharge to the watercourse outside of permitted levels.

There were 3 offences before the court relating to permits at 2 sites Copley and South Elmsall sewage treatment works (STW). The background to all 3 offences is as described above. As a result of the issues being seen on site against the backdrop of the situation referred to, a Company Response Management Team (CRMT) was set up on 5 April to make risk based assessments and decisions on the process to be undertaken to deal with the sludge storage. Both sites have permits to regulate the storage of sludge, at Copley, there is an internal storage area and at South Elmsall, the sludge is permitted to be stored externally in skips for no more than 2 days. The offences were not financially motivated. The Company having set up a CRMT which consists of senior management and operators alike, considered all options for the storage of this sludge. The usual process would have been to send the sludge to the Calder Valley incinerator. This incinerator was undergoing its annual programme of planned maintenance between 1-18 April. This is done on an annual basis with no previous impact on operations.

The other appropriate option was another site which due to potential employee risk, had been temporarily closed down pending works to remove that risk.

The final potential option, other than that taken, was to take this matter to landfill. As an environmental option, due to this not being a particularly environmentally friendly option against all others, the decision was taken not to do so. Therefore, the option to store this substance elsewhere or indeed to use alternative containers was not appropriate or indeed a viable option. In all the circumstances, considering availability and indeed environmental impact, the decision taken was the only decision available so it certainly was not a decision taken without full consideration and assessment of the company's responsibilities both with regards to its regulatory duties but also its duties to the environment.

Offence 1:

The internal storage area was full to capacity by 14 April. The decision was made to store the overflow externally which could be safely stored on areas which were considered appropriate to avoid any external impact via drainage or ground impact. Bales of hay were also placed around the stored substance to protect against any issues in the event of rainfall and to protect against seepage outside of these areas. As soon as the incinerator was available, the sludge was removed from site starting from 23 April and completely removed by 3 June with the vast majority having been removed by 27 May.

Offence 2:

This relates to the transporting of sludge from Copley and Wheldale STW to South Elmsall STW. The sludge was only stored on site but no treatment actually took place. In respect of this offence, during the Environment Agency's (EA) own visit report of 11 May 2011, it was deemed that this was "a non-compliance which has no potential environmental impact". The sludge was transported from Wheldale to South Elmsall from 1 April to ensure as much storage was available at Copley as possible.

Offence 3:

It is permitted to store sludge externally at South Elmsall although it is accepted that this should be carried out by virtue of the use of skips and for no more than 2 days. The background explained above explains the duration and it is estimated that approximately 38 skips would have been required for this storage. As the company was continually making arrangements for transporting of this sludge appropriately and it was not known where 38 skips could have been obtained from, the option was taken to store the substance on the ground which was protected from any escape from the site whether by virtue of drains or ground contamination.

The removal of sludge from Copley was prioritised but as soon as possible with complete removal in accordance with the date on the summons.

The context of these incidents was to be considered amongst Yorkshire Water's regional operations. The issues explained on these sites due to the winter and its longstanding impact were felt regionally. Had the Company been in a position to consider any other options, it would have done so but was heavily constricted by events occurring which were caused by issues outside its control.

Effect on environment

There is no evidence from the EA of any impact on the environment save for reference to complaints of odour which the company does not seek to disregard or indeed argue against the impact. The EA's own guidance on incident classification for odour for significant effects is in summary, odour offensive and persistent enough to cause significant effect on human senses… which lead to some disturbance and significantly more intrusive than normal background and potentially with a significant effect on amenity value. There were two odour complaints on 3 May for South Elmsall over the period of external storage for the duration between 1 April to 24 June. There were 6 complaints from the same two customers over the period of external storage for Copley between 17 April and 3 June.

It was submitted that the odour complaints did not fall within this classification and therefore the incidents should be considered against the EA's own guidance of what constitutes a significant impact.

Further the considered actions taken by Yorkshire Water with regard to actual storage areas were to avoid an impact to the environment via a discharge to a watercourse or otherwise as previously seen.

The response by Yorkshire Water

It was submitted that the Yorkshire Water response was as timely and effective as possible in all the circumstances considering the options available in respect of the shut down for planned and unplanned reasons, of the usual process sites. Costs of approximately £55k were incurred as an immediate and subsequent consequence of the incident. Since these incidents occurred, the level of resource focused on audits and compliance has been increased with further training to be provided for responsible managers and teams.

Yorkshire Water now has an understanding as to the impact of such a severe winter event and the impact this had on assets and resulting operations such as the storage of sludge.

Following the EA's visit on 5 May, an action plan was agreed with them for South Elmsall in which Yorkshire Water confirmed that no additional material would be added to that already in placer and it was fully communicated that all of the cake would be removed by 4 July. There was no requirement by the EA at that stage to remove this material any quicker.

For the Copley site, from 10 May, the Company was in contact with the EA regarding its plans for removal of the sludge from the site. To this extent, in respect of both sites, from 5 May onwards, Yorkshire Water was in regular communication informing them of their plans and next steps.

A fine of £17,000 was imposed per offence against a maximum of £50,000. Costs were also awarded to the EA in the sum of £3,935.70.

Huddersfield Magistrates' Court 25 September 2012

On 25 September 2012 YWS pleaded guilty to one offence contrary to Regulations 12 and 38 (2) of the Environment Permitting (England and Wales) Regulations 2010 as follows:

That on or before 14th June 2011 at Huddersfield (Upper Brighouse) Sewage Treatment Works, Yorkshire Water Services Limited did fail to comply with an Environmental Permit, namely conditions 9 and 10 of Schedule 7 of the conditions of consent to discharge number WRA7409 in that a standby pump was not present.

Upper Brighouse is part of a complex of waste water treatment works which treats effluent from Huddersfield town and the surrounding area. Upper Brighouse is subject to conditions contained within permit number WRA7409. In particular, the discharge of settled sewage in an emergency is subject to conditions set out in Schedule 7 to permit WRA7409. Conditions 9 and 10 provide:-

> "9. The duty pump(s) shall be maintained in good working order, and at least one standby pump shall be provided and maintained.
>
> 10. Standby pump(s) shall automatically activate should the duty pump(s) become inoperative for reasons other than power failure. The pumping station shall be maintained so that the pump shall automatically reactivate as soon as is practical after the power is restored after interruption to the supply".

Conditions 9 and 10 relate to an interstage pumping station at Upper Brighouse. There are three pumps available within the pumping station. Pump A acts as a duty pump which pumps flows forward to treatment, pump B is used intermittently to assist the duty pump at times of high flow following heavy rainfall and pump C acts as the standby pump.

At the end of October 2010 pump A failed and could not be repaired in situ. The pump was removed and sent to the manufacturer for assessment. A decision was taken at that time, based on an assessment of operational risk not to source an alternative pump as pump B was capable of pumping flows to treatment and that pump C (formerly the standby pump) could be used as the assist pump. The permit does not, in any event, specify that an assist pump has to be provided. At the end of January 2011 the manufacturer (Hydrosteel) confirmed that the pump was capable of being repaired and gave a lead time for the work of approximately 3 weeks. As there had been no operational difficulties with the pumping arrangements at Upper Brighouse, the decision not to source a temporary third pump was not reviewed.

As with most large organisations, YWS operates a dedicated work and job scheduling system (SAP). The system has been in place for approximately 10 years and is used to schedule and allocate individual jobs. Each job is given its own individual SAP number but there is no overall unique number given to the whole life of a problem or a piece of work, so that a job such as the removal, repair and reinstatement of a pump is not given a single unique SAP reference number which allows it to be traced and remain "visible" until completed in its entirety. Instead, the current operation of the SAP system breaks jobs down into individual stages with each stage having to be separately scheduled and being capable of being completed without there being visibility for the whole job.

The repaired pump was returned to site at the beginning of March and a job raised for its installation. Throughout this period, there were no operational difficulties with the pumping arrangements and again, the decision to use two pumps was not reviewed. A pump was installed at the interstage pumping station in early May however, that pump that was not correctly rated and had to be removed. On 14th June prior to the correct pump (the repaired pump A) being installed, pump B developed an electrical fault which meant that although it was running and showing on the monitoring system as running, it was not actually pumping. At the same time, pump C which was acting as the assist pump, developed a mechanical failure. The failure of pumps B and C resulted in a discharge of settled storm sewage into the River Don. That discharge was permitted under the terms of condition 3 of Schedule 7 to consent number WRA7409.

Effect on the Environment

There was no impact on the environment as a result of this offence.

Response by Yorkshire Water

YWS had, prior to the instigation of the prosecution, identified limitations within its current organisational working practices and structures and the current use of the SAP system for allocating and assigning jobs. A review and a programme for change (Operating for Excellence) commenced in 2011 and aims to ensure across all of YWS's business and operational functions that there are effective systems and processes in place, so that there is greater clarity and visibility as to how, when and why decisions are taken and work programmed. One of the issues to be taken into account in considering the criticality of a particular asset will be ensuring full permit compliance can be achieved and maintained. The Operating for Excellence project, which commenced in September 2011, is now in its pilot phase. In relation to Engineering & Reliability, one of the outcomes identified to date, is the need for there to be a central engineering reliability hub to allow improvements in the way that workflows are managed within operational teams including scheduling, planning and procurement.

The Magistrates made no comment when imposing the fine and costs award, save for confirming that the company had been given credit for an early guilty plea. A fine of £1,200.00 was imposed against a maximum of £50,000.00. Costs were also awarded to the Environment Agency in the sum of £913.42.

01 October 2013

Beverley magistrates' court in connection with an offence contrary to Regulation 12 and 38 of the EPR 2010 on 12 October 2011 at Beverley Waste Water Treatment Works, Beverley.

Fine - £4,000.
Costs - £1,248.70.

01 October 2013

Beverley magistrates' court in connection with an offence contrary to Regulation 12 and 38 of the EPR 2010 on 18 April 2012 at Beverley Waste Water Treatment Works.

20 February 2014

Wakefield magistrates' court in connection with an offence contrary to Regulation 12 and 38 of the EPR on 06 March 2013 at Wash Dyke, Pontefract (Sowgate Lane SPS).

19 January 2016 – Shay Lane Pumping Station

Shay Lane pumping station Single offence of causing a water discharge activity contrary to Regulation 12 and 38 of the EPR 2010 05 October 2013.

Negligent Harm 2 £600,000 £24,000.

28 April 2016 – Naburn WWTW

3 charges of contravening Regulations 12 and 38 EPR 2010:

1. Discharge of polluted water from Naburn WwTW into the River Ouse on 23 August 2013.

2. Failure to provide and maintain at least one standby pump at Naburn WwTW between March and October 2013.

3. Failure to provide and maintain at least one standby pump at Naburn WwTW between 17 August and 29 September 2014 See under "Offence(s).

Charges 1 and 2 - high degree of negligence.

Charge 3 – Reckless.

Charges 1 and 2 – Harm 3.

Charge 3 – Harm 4 Charges 1 and 2 - £500,000.

Charge 3 - £600,000.

17 August 2016 – Sherwood CSO

Single offence of causing a water discharge activity contrary to Regulation 12 and 38 of the EPR 2010 12 April 2013.

Negligent Harm 2 £350,000 £30,000.

13 July 2017 – Hinderwell WWTW

Single offence of causing a water discharge activity contrary to Regulation 12 and 38 of the EPR in July 2015.

Culpability – Reckless.
Harm – 2.
Fine - £600,000.

27 November 2017 – Sandy Lane (aka Belle Vue) Pumping Station, Doncaster

Single offence of causing a water discharge activity contrary to Regulation 12 and 38 of the EPR in 24 / 25 April 2014.

Culpability – Negligent.
Harm – 3.
Fine - £45,000.

8 September 2021 – Potteric Carr Nature Reserve (Balby STW)

Sheffield magistrates' court in connection with two offences on 28 March 2017 at Mother Drain at Potteric Carr Nature Reserve (Balby STW). Yorkshire Water pleaded guilty to a water discharge activity contrary to Reg 12 and 38 of the EPR and a breach of condition of the environmental permit. A fine of £150,000 was imposed against offence 1.

28 January 2022 – Dale Road SPS

Leeds Crown Court in connection with one offence on 3-9 November 2017 at Dale Road SPS. Yorkshire Water pleaded guilty and a fine of £233,000 was imposed.

18 July 2022 – Bradford Beck (George Street Detention Tank)

Leeds Magistrates' Court in connection with three offences between September 2017 and June 2019. Yorkshire Water pleaded guilty and a fine of £1,600,750.00 and £22,112.79 in costs was imposed.

Appendix 2 Technical Competence

wamitab

Continuing Competence Certificate

This certificate confirms that

David Shaw

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 07/10/2021

TMNH	Treatment - Non Hazardous Waste
AD	Anaerobic Digestion

Expiry Date: 07/10/2023

Verification date: 05/10/2021

Authorised:

Learner ID: 27521

Certificate No.: 5185842

Date of Issue: 07/10/2021

Director of Qualifications and Standards

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00156375

Operator Competence Certificate

The Chartered Institution
of Wastes Management

wamitab

Ofqual

Corff dyfarnu cydnabyddedig
CYMWYSTERAU CYMRU
QUALIFICATIONS WALES
Recognised awarding body

wamitab

Qualification Title:

WAMITAB Level 4 Medium Risk Operator Competence for Anaerobic Digestion

Qualification Accreditation Number:

601/8515/6

This Certificate is awarded to

David Shaw

Awarded: 19/07/2017

Serial No:27521/MROC5/1

Authorised

Chris James
Chief Executive Officer, WAMITAB

Regulated by Ofqual

For more information see http://register.ofqual.gov.uk

Corff dyfarnu cydnabyddedig
Cymwysterau Cymru Qualifications Wales
Recognised awarding body

The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England, Wales and Northern Ireland.

00123938

Credit certificate
This certificate determines credit awarded to:
David Shaw

Units gained:

		Credit Value	Credit Level
A/508/1003	Manage site operations for the anaerobic digestion of non-hazardous waste	6	4
T/508/0979	Manage transfer and disposal from anaerobic digestion operations	5	4
Y6015875	Monitor procedures to safely control work operations		
M6009712	Manage the environmental impact of work activities		
R6021609	Manage the reception of non hazardous waste		
A6021670	Manage the movement, sorting and storage of waste		

Awarded: 19/07/2017

Serial No.: 27521/OCS32/1

Authorised

Chris James
Chief Executive Officer, WAMITAB

Regulated by Ofqual

For more information see http://register.ofqual.gov.uk

Corff dyfarnu cydnabyddedig
CYMWYSTERAU CYMRU QUALIFICATIONS WALES
Recognised awarding body

The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England, Wales and Northern Ireland.

00123944

Certificate No. OCC7968

Operator Competence Certificate

Title:

Anaerobic Digestion

This Certificate is awarded to

David Shaw

Awarded: 19/07/2017

Authorised

WAMITAB Chief Executive Officer

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

This certificate is jointly awarded by WAMITAB and the Chartered Institution of Wastes Management (CIWM) and provides evidence to meet the Operator Competence requirements of the Environmental Permitting (EP) Regulations, which came into force on 6 April 2008.

00123951

Appendix 3 ISO14001 Certificate

Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015

This is to certify that:

Yorkshire Water Services Ltd
Western House
Western Way
Halifax Road
Bradford
BD6 2SZ
United Kingdom

Holds Certificate Number: EMS 685749

and operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope:

The management and operation of clean and waste water assets and associated services.

For and on behalf of BSI:

Andrew Launn, EMEA Systems Certification Director

Original Registration Date: 2015-04-01
Latest Revision Date: 2021-03-24

Effective Date: 2021-04-02
Expiry Date: 2024-04-01

...making excellence a habit.™

Appendix 4 Quality and Environmental Policy

Quality and Environmental Policy

Yorkshire Water's purpose is "To play water's role in making Yorkshire a brilliant place to be – now and always" and our plan to deliver this purpose is set out in our Integrated Management System (IMS). To achieve our plan, it is essential that we protect and enhance the natural environment, recognising that this is fundamental to our source to sea process. This requirement informs all the stages of our operations as we provide clean drinking water and then return water safely back into the environment.

We drive for continual improvement of our approach and this is supported by our Integrated Management System. This will enable us to enhance our environmental and quality performance, maintain a clear focus on meeting the needs of our customers and the environment and to work effectively in partnership with our key stakeholders. This is at the heart of our approach.

To achieve our company purpose and our Big Goals, we will:

- Deliver clean, safe water to our customers, remove their wastewater and return it to the environment without causing harm.
- Maintain and enhance the resilience of services to an acceptable level for our customers in the face of disruption, uncertainty and change, for example relating to extreme weather and the changing climate.
- Ensure that all our colleagues and those working on our behalf have received appropriate environmental and quality training.
- Ensure we learn lessons from incidents to prevent them from occurring again.
- Ensure the senior management community visibly demonstrate their commitment to environment and quality.
- Prevent pollution to air, land and water through innovative technology, effective management control systems and through investment.
- Champion the responsible use of sewers throughout our operations and with colleagues, customers and suppliers in order to reduce risk of flooding and water pollution.
- Conserve and enhance biodiversity by working in partnership to deliver lasting improvements across our estate and the wider region.
- Manage our land, catchments and bathing waters in a socially and environmentally responsible manner, balancing the needs of our customers and tenants with our duty as custodian of the natural environment.
- Play our part in mitigating future climate change by reducing to net zero the greenhouse gas emissions produced in our operations. We will also: reduce the greenhouse gas emissions in our asset investment programme; engage with our supply chain to reduce emissions; and by managing our land to lock carbon away.
- Be energy efficient by using less and increasing the amount of renewable energy we generate ourselves.
- Use resources efficiently, striving to use and build less, reuse or recycle, and encourage our supply chain to do the same.
- Comply with legal and other requirements.
- Be open by default.
- Work collaboratively with our colleagues, stakeholders, contractors and suppliers.
- Champion water efficiency with colleagues, customers and suppliers.
- Manage change in a controlled manner using our agreed company processes.
- Balance all of the above aims whilst keeping bills low for customers and ensuring the company is financially resilient.

Yorkshire Water will incorporate the above commitments into our processes to achieve our 5 Big Goals. We will ensure this policy is embedded and well understood by our colleagues, stakeholders, contractors and suppliers, and it will be made available to our customers. We welcome comments and suggestions for improvements and will review this policy periodically in light of new knowledge, changing legislation and the views of our customers and our advisory panels.

Liz Barber
Chief Executive, Yorkshire Water Services Ltd
Date: 1st April 2020
Issue: 3

Appendix 5 Site Condition Report

Esholt Sludge Treatment Facility
Environmental Permit Site Condition Report

Application for Environmental Permit Variation

Permit Reference: EPR/VP3130GZ

January 2023

YorkshireWater

Stantec

Sign-off sheet

Project details	
Project number	331001762-100.2101-2
Project name	Environmental Permitting IED sites
Date	January 2023

Client details	
Client name	Yorkshire Water Services Limited
Client address	Western House Halifax Road Bradford West Yorkshire BD6 2SZ

Document details	
Document title	Esholt Sludge Treatment Facility Environmental Permit Site Condition Report
Document version	FINAL_vISSUE(JAN23)
Report author	Jemma Prydderch / Alan White
Report reviewed by	Emma Stewart
Report approved by	Philip Smith / Peter Duncan
Report by	Stantec

Contents

Executive summary

This document presents the Site Condition Report (SCR) for the Esholt Sludge Treatment Facility (STF) operated by Yorkshire Water (YW) and forms part of an application to the Environment Agency (EA) for a permit variation to operate the anaerobic digestion facility and related activities under the Environmental Permitting (England and Wales) Regulations 2016 (EPR), as amended.

The role of the SCR is to document the baseline conditions present at the start of the permit, assess the likelihood of ground contamination occurring during the life of the permit, and to prevent and control contamination of the ground during operation of the permit.

This assessment has involved a desk study review and site reconnaissance and has been produced in accordance with the EA's Technical Guidance Note, H5 (2013). Records of the site and surrounding area have been reviewed in order to describe the condition of the site and, in particular, to identify any polluting substance in, on or under the land that may constitute a pollution risk to land or groundwater. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken. This information has been used to produce a conceptual model for the site.

The main findings of the SCR are as follows:

- Activities under the varied permit will involve operation of an anaerobic digestion (AD) plant to treat indigenous and imported sludges.
- The River Aire meanders through the centre of the site, and therefore represents a sensitive receptor at potential risk of pollution.
- The underlying geology comprises of superficial alluvium and River Terrace Gravels over Glacial Deposits, over solid geology of the Millstone Grit Series. All mapped geologies are classified as Secondary A Aquifers. These are defined as formations with permeable layers capable of supporting water supplies at a local rather than strategic scale and, in some cases, forming an important source of base flow to rivers. In some areas of the site these aquifers are classified highly vulnerable.
- The site is not within a Drinking Water Safeguard Zone nor a Source Protection Zone (Environment Agency, 2021).
- The site has been subject to long-term industrial use as a wastewater treatment works (WwTW) and waste management facility; the conceptual site model has identified a number of potential pollutant linkages which pre-date the current environmental permit (Reference 1).

A moderate - low risk[1] of future pollution occurring has been assessed from the bulk storage of raw materials, sludge and liquors at the site. However, given the continuing management practices and mitigation measures in place, the risks are considered to be effectively managed. A comprehensive review of site history and a conceptual site model have been produced which demonstrate the long-term industrial history of the site and the potential for legacy contamination to exist. Where available, data from previous ground investigation is provided to indicate conditions prior to regulation of the AD plant and associated sludge treatment under the environmental permitting regime. Further collection of baseline data is not proposed, although the applicant (YW) would seek to provide additional characterisation information to the EA relating to ground and groundwater quality within the installation area, should future intrusive investigation works be required as part of any forthcoming site developments.

[1] CIRIA C552 Contaminated Land Risk Assessment: A guide to good practice

1 Introduction

This document supports the permit variation application for authorisation under the Environmental Permitting Regulations 2016 (England & Wales) (EPR) (as amended) to vary the permit to operate the Esholt sludge treatment facility (STF) which is operated by Yorkshire Water (YW).

1.1 EP Regime

This permit application is being made due to changes to the Environment Agency (EA) interpretation of the environmental permitting exclusion for Urban Wastewater Activities (under Environmental Permitting (England and Wales) Regulations 2016 (EPR) Schedule 1, Part 2, Chapter 5, Section 5.4). The EA interpretation now requires that anaerobic digestion (AD) plants with a treatment capacity of over 100 tonnes/day (t/d) are classified as installations for the purposes of EPR. Therefore, given the Esholt STF exceeds the 100t/d capacity limit, a variation to an existing waste permit is required to add Schedule 5.4 Part A(1)(b)(i) for AD treatment activities.

YW holds an environmental permit for the Combined Heat and Power (CHP) plant at Esholt; this was issued as a waste operation permit on 7th December 2012 (permit reference number EPR/VP3130GZ/V004). The scope of this permit comprises biogas combustion in the CHP Energy Centre and its directly associated activities (DAAs) (including biogas cleaning, storage and combustion in engines, boilers and/or flare). The permit also covers import of sludge from YW Wastewater Treatment Works (WwTW) for the generation and utilisation of biogas. The application for this permit included the submission of a SCR[2].

This application will vary this CHP permit; CHP and sludge intake activities will transition from being permitted waste operations to being DAAs to anaerobic digestion (i.e. DAAs to a Schedule 1 listed activity). The installation boundary in this area will also be extended to include the land occupied by sludge digestion activities, as well as an area of land to the southeast which is used for digested sludge treatment and handling.

YW holds a completely separate waste operations permit covering sludge conditioning activities (permit reference number DP3192ZP). This permit will remain entirely separate and will be surrendered in the future (the permit cannot currently be surrendered as legacy sludge phyto-conditioning (SPC) material remains on site on the SPC pad to the northwest of the digestion area).

A composting operation is active on an area of land to the south / southwest of the proposed new installation boundary. This permit was established via a partial transfer of permit reference DP3192ZP and is held by a third-party operator (Biowise). This permit will also remain entirely separate from the new STF permit.

[2] Morgan Sindall Grontmij Joint Venture. May 2012. Esholt CHP EPR Variation: Site Condition Report

1.2 Site Condition Report (SCR)

The purpose of this SCR is to describe and record the condition of the land and groundwater on site and to demonstrate that land and groundwater are protected during the lifetime of the permit, ultimately so that the site is in a 'satisfactory state' when the permit is surrendered.

As detailed in the EA's Technical Guidance Note, H5 (2013) the intention is that this is demonstrated by the following sequence of events:

- Producing the application part of the SCR when applying for an environmental permit (or permit variation);
- Updating the SCR during the lifetime of the permit; and
- Completing the surrender SCR and submitting the full completed SCR when applying to surrender the permit.

In the case of Esholt, due to the sequential way the site has been subject to developing regulatory regimes and authorisations, an SCR does not exist for the whole of the currently permitted areas, despite the fact that waste activities and IED permitted activities have taken place across the installation for a number of years. Recognising this inherent limitation, this report will provide an indicative baseline against which any future surrender can be assessed.

The scope and content of this SCR will therefore aim to set a robust baseline for the areas within which ongoing IED permitted activities will take place. The SCR will discuss land use history, activities undertaken by YW during their long-term ownership, present existing site investigation information, and discuss the potential for the ongoing IED permitted activities to impact on land quality given the containment, mitigation and management systems in place. This will provide a robust SCR, aligning documentation in the longer term with IED activities and the issued permit.

2 Site Details

2.1 Site Location

Table 1 Site Details

Aspect	Details
Address	Esholt Waste Water Treatment Works CHP Plant, Ainsbury House, Idle, Bradford, West Yorkshire, BD10 0TW
NGR	418654, 439479 [3]
Details of facility	The Esholt STF treats indigenous sewage sludges arising from sewage treatment processes operated within the wider Esholt WwTW as well as sewage sludges generated by smaller YW sewage works. Areas actively used and managed for IED activities comprise approximately 7 hectares and include: sludge import, processing and digestion activities in the north and interim raw undigested cake storage, digested sludge dewatering and cake maturation in the southern area.
Main Facility Components	The principal activities currently undertaken within the installation as described in the permit variation include: Sludge reception and screening; Raw sludge thickening; Anaerobic digestion; Thermal hydrolysis; Biogas collection and storage (including flaring if operationally necessary); Use of biogas (a renewable energy source) to fuel combined heat and power (CHP) and, generating electricity and / or heat to support the AD process; Combustion of gas oil in boilers to support the AD process; Digested sludge dewatering; Storage and maturation of digested sludge prior to transfer off site for landspreading as an agricultural soil conditioning agent; Occasional interim storage of raw sludge cake on a contingency basis; Collection and treatment of potentially odorous process gases; Raw material storage and use; Surface water and process liquor collection and return back to the Esholt WwTW for treatment; and Waste collection, storage and transfer off site. The location of these activities is illustrated in Figures A1 and A2.
Surrounding land uses	Parts of the site are immediately surrounded by the wider Esholt WwTW and extensive Esholt estate. The River Aire meanders adjacent to and through the site, separating the northern and southern areas. The two are connected by overland and underground pipelines, crossing the River Aire on a pipe bridge. The Leeds and Liverpool Canal is located to the west, running adjacent to parts of the installation boundary. More widely, the surrounding land use is rural in nature, interspersed with small groups of residential properties, Esholt village, and the commercial properties of Esholt Hall (operated by YW as a training/conference centre) and Home Farm Industrial Park. The nearest properties are: Esholt Hall (commercial) 140m to the north of the digester area Residential property 200m to the north of the digester area Home Farm Industrial Estate 315m to the east of the digester area.

[3] Based on an approximate mid-point, reflecting that the physical extent of the permit boundary is large, extending into several discrete areas.

2.2 Identification of Potentially Polluting Substances

An assessment of the pollution potential of substances associated with the activities has been made based upon their properties, toxicity and the volume stored.

Materials have been screened according to their potential to cause concern in respect of future soil and / or groundwater contamination. The potential to pollute, and for any contaminant linkage pathway to be realised, is influenced by the physio-chemical nature of the substance; materials of low mobility are less likely to be transmitted through soil or groundwater if released, and materials of low persistence in soil and groundwater may be of lower impact with regards identified receptors. This approach has been used in Table 2 (Raw Materials), Table 3 (Process Materials) and Table 4 (Waste Materials) to screen substances of potential concern in relation to their toxicity, mobility or persistence in the soil or groundwater environment. The location of material use and storage is illustrated in Figure A2.

Table 2 Raw Materials Associated with the Facility and their Potential to Pollute

Substance (Contaminants)	Use	State	Storage Arrangements	Toxicity/ Fate/ Mobility	Potential Pollutant?
Polymer (powder) and mixed polymer	Coagulant used for raw and digested sludge dewatering	Solid	Raw sludge dewatering: External storage silo (steel, 15 tonne capacity) located on hardstanding. Feeds adjacent mixing tank (GRP, 25 litre capacity). Digested sludge dewatering (sludge export facility): External storage silo (steel, 15 tonne capacity) located on hardstanding. Feeds adjacent mixing tank (GRP, 25 litre capacity). Digested sludge dewatering (conditioning area): 750kg bags stored internally.	Polluting if mobilised to watercourses in the event of a spillage/loss	✓
Polymer (liquid)		Liquid	Use and storage in IBCs within GRP kiosk.		✓
Polymer (liquid)	Diluted coagulant used for thickening undigested surplus activated sludge (SAS).	Liquid	Liquid polymer is delivered to the SAS thickener building in either 1 m^3 IBCs or via bulk tanker deliveries. Bulk polymer deliveries are transferred into a 10 m^3 bunded GRP bulk storage tank located within the thickener building and from there are transferred to the 3 m^3 bunded GRP polymer prep tank. IBC deliveries directly feed the liquid polymer prep tank. Liquid polymer is diluted with potable water within the 3 m^3 bunded GRP polymer prep tank before being transferred to the adjacent 3 m^3 bunded GRP polymer make up tank. Both the make up and prep tanks are located within a common bund. The polymer solution is injected into the sludge stream before being transferred to thickener drums.	Polluting to soil and watercourses in the event of a spillage/loss	✓

Substance (Contaminants)	Use	State	Storage Arrangements	Toxicity/ Fate/ Mobility	Potential Pollutant?
Antifoam	Digester antifoaming agent	Liquid	IBC (1 m^3) stored on bunded pallet with associated dosing pump and pipework within dosing cabinet.		✓
Water treatment chemicals	Boiler treatment	Liquid and solid	Some storage of small quantities within locked containers in CHP compound. 3 No. 220litre drums stored within specified area in boiler house. Boiler water softener (bagged) stored on pallet within boiler house.		×
Glycol	Antifreeze for use in CHP equipment	Liquid	2 No.IBC (1 m^3) stored on bunded pallet within locked containers in CHP compound.		✓
Biogas	Generated within the AD	Gas	Transferred from AD to gas holder for use in the CHP	Volatile and unlikely to pollute watercourses or land in the event of escape	×
Gas oil	Stand-by boiler fuel	Liquid	Double bunded tank of 108,000litre capacity. Fill point is contained within bunding. Tertiary containment on surrounding hardstanding	Polluting to soil and watercourses in the event of a spillage/loss	✓
Lubricating oil	For use in CHP equipment	Liquid	1m^3 IBC (internal). Small intermediary containers in use for compressor maintenance and stored locally (internal).		✓
Diesel	Fuel for mechanical loaders working on cake pad / barn	Liquid	2,500 litre integrally bunded tank		✓
Transformer oil	Transformer only	Liquid	No storage other than volume in use		✓
Propane	Gas oil preheat	Gas	Bottles stored within boiler house and designated storage cage adjacent to the stack	Volatile and unlikely to pollute watercourses or land in the event of escape.	×

Table 3 Bulk Storage of Sludge, Sludge Cake and Process Liquors and their Potential to Pollute

Material	Nature of material	Storage Arrangements	Nominal capacity (m^3)	Potential Pollutant?
Raw sludge (un-screened, un-thickened)	Liquid	Incoming underground pipes from Esholt WwTW	-	✓
		Sludge screen feed tank, concrete. High level alarms, linked to SCADA	655	✓
Screened sludge	Liquid	Consolidation tank 5, construction concrete	2,500	✓
		Mixed sludge tanks x 2, concrete construction	1,200 and 1,130	✓
SAS	Liquid	SAS storage tanks x 2, concrete construction	2,000 each	✓
		SAS transfer tanks x 2, concrete construction	400 each	✓
Dewatered sludge	Liquid	THP feed silos x 2, steel construction	210 each	✓
		THP feed hopper, steel construction	16.2	✓
		THP vessels x 6, steel construction	22.7 each	✓
		Buffer tank, steel construction	39.5	✓
Sludge within digester	Liquid	Digester tanks x 4, concrete construction, aluminium clad	3,533 each	✓
Digested sludge	Liquid	Degassing tanks x 2, GRP coated concrete	685 each	✓
		Export dewatering feed tanks x 2, steel construction	1,604	✓
		Conditioning dewatering feed tanks x 2, concrete construction	1,200 and 1,130	✓
Sludge transfer	Liquid	Above ground and below ground sludge transfer pipework	-	✓
Dewatering liquor	Liquid	Centrate pumping stations and associated underground pipework	-	✓
		Liquor balance tank	800	✓
Run-off / washwater from concrete pad	Liquid	Return pipework (underground, running from southern to northern installation area)	-	✓
Cake	Solid	Imported, undigested cake reception unit	30	✓
		Storage areas (barn and pad)	5,500 tonnes (estimated maximum)	✓

Table 4 Process Wastes and Potential to Pollute

Waste Type	Nature of material	Storage Arrangements	Storage and Disposal Method	Potential Pollutant?
Sludge screenings	Non-hazardous	Open skip on hardstanding	Collected by approved waste contractor for off-site disposal	✓
Waste oil	Hazardous	Bunded container within bunded containment	Collected by approved waste contractor for off-site disposal	✓
General waste	Non-hazardous	Dedicated skips on hardstanding and gravel areas	Collected by approved waste contractor for off-site disposal	✓
Metals	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal	×
Mixed recycling	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal	×
Wood	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal (recycled or treated via EfW)	×
Empty IBCs	Hazardous	Dedicated area prior to collection	Collected by approved waste contractor for off-site disposal	×
Oil contaminated absorbents	Hazardous	Dedicated drum containers	Collected by approved waste contractor for off-site disposal	✓
Oil filters	Hazardous	Dedicated drum containers	Collected by approved waste contractor for off-site disposal	✓

All waste materials are stored in accordance with YW Environmental Management System (Reference 2).

2.3 Site Drainage

All liquor from raw and digested sludge dewatering processes, condensate (e.g. from biogas handling), and surface water runoff is collected and discharged via underground drainage systems to Esholt WwTW for full treatment prior to discharge to the River Aire.

Runoff from the STF cake pad combines with surface water drainage arising from adjacent composting site (previously permitted as part of YW conditioning activities currently being transferred to Biowise). This run-off will be similar in nature and character to that arising from the YW operated installation (given that they both originate from organic processes) and as such there are no differential risks posed in terms of receptors, or control measures required.

Drainage plans are provided in Figure A3.

2.4 Surfacing

The majority of active process areas within the installation are covered by buildings and hardstanding, with some peripheral areas of gravel and soft landscaping (grass cover). Surfacing was generally observed to be in good condition across the site with no significant evidence of cracks or erosion. Site surfacing is illustrated on Figure A4.

2.5 Electrical Transformers and Sub-stations

A transformer is located to the west of the CHP, within the associated compound area. A legacy transformer is located in the west of the northern area, adjacent to the digester control room. It has reportedly been decommissioned. Both are managed and maintained by YW.

A substation is located directly adjacent to the site boundary, to the north of the northern area. This is managed by the DNO.

3 Site History

Ordnance Survey (OS) historical maps were obtained as part of an Envirocheck Report (Landmark Information Group, 2020). These maps have been reviewed to provide information relating to the historical development of the site and surrounding area. The Envirocheck report is provided in Appendix 1. In addition, other sources of information have been used including aerial photography (Google, 2021).

The summary of land condition within this report places emphasis on the areas in which permitted activities will continue under the new permit, outlining potentially contaminative historical land uses or sensitive land uses within the surrounding area. The current CHP permit boundary (permit reference EPR/VP3130GZ/V004, Reference 1) covers a proportion of the northern site area.

The scope and content of this SCR will aim to set a robust baseline for the areas within which permitted activities will take place. It will discuss land use history, activities undertaken by YW during their long-term ownership, present existing site investigation information, and discuss the potential for the proposed IED activities to impact on land quality given the containment, mitigation and management systems in place. This will provide a robust SCR, aligning documentation in the longer term with IED activities and the issued permit.

3.1 Historical Land Use

Historical maps and aerial photographs covering the site are available between 1851 and 2020; these have been reviewed and the findings are presented in Table 5. Descriptions of ‘on-site’ refer to areas situated within the proposed permit installation boundary[4], which comprises broadly of two parts, to the north and south of the River Aire. All other areas of YW landholding are ‘off-site’.

[4] The environmental search area covered by the Envirocheck report varies slightly to the existing permit installation boundary. Descriptive text provided in Section 3 relates to the permit area and distances have been adjusted correspondingly.

Table 5 Historical map review

Historical Map	On Site	Off Site
1851 - 52 (1:10,560)	The earliest mapping dated 1851/52 shows the site to be occupied by open fields, field boundaries, and in part rough pasture. In the north of the site buildings are noted at Strangford Hill.	The River Aire flows between the northern and southern areas and is located along the boundary in parts. A canal (existing Leeds and Liverpool Canal) is located along the western boundary of the northern site area. Esholt Hall is shown approximately 150m north of the site, beyond the River Aire. A railway line (Midland Railway) is shown approximately 180 m south of the site, aligned roughly east to west and crosses the River Aire. The railway line is shown to be constructed on an embankment. Several significant railway cuttings are shown approximately 240 m to the southwest. The land surrounding the site is generally shown to be undeveloped and comprises open fields with field boundaries.
1893 (1:2,500), 1894 - 95, (1:10,560)	No significant changes on site.	A watercourse flowing from northeast to southwest is shown to enter the northeast corner of the southern site, to join the River Aire. No significant changes in the surrounding area.
1908 / 1909 (1:2,500 / 1:10,560)	No significant changes on site.	An old quarry is shown approximately 200 m to the southwest of the northern Site. No other significant changes in the surrounding area.
1921 (1:2,500)	The northern area is marked as a Sewage Works. Several railway lines and tramways are shown entering, possibly associated with the adjacent canal. Associated small structures and earth moving is also evident. No significant changes are shown across the southern area.	The former buildings at Strangford Hill have been replaced by a much larger structure. It is considered likely these buildings, or part of them, comprise the 'grease house' noted by several former reports summarised in Section 4.7. A chimney is shown to the north of the northern area. 'Settling tanks' are marked approximately 30 m to the west, beyond the canal, with associated embankments and evidence of earth moving.

Historical Map	On Site	Off Site
1934 (1:2,500 / 1:10,560)	Northern Area Circular and rectangular storage tanks, and a large triangular lagoon, are shown. A water tower and travelling crane are shown along the western boundary. Southern Area A pump house and humus tanks are shown (consistent with the current cake pad). Evidence of ground raising adjacent to the River Aire. The watercourse entering the site from the northeast corner is no longer shown.	A large clarification lake is shown to the south of the River Aire, between the northern and southern areas. Several large storm water tanks are shown to the west, covering an area c. 400 m by 150 m. Significant reprofiling of the ground has taken place in the surrounding area. Further tanks are shown approximately 160 m to the north. A significant area (c. 850 m by 400 m) to the east has been developed into bacterial filters. A mineral railway is shown to the west along the canal. The old quarry approximately 200 m to the southwest of the northern Site is no longer shown.
1938 (1: 10,560), 1956 (1: 10,560)	No significant changes on site. Pump house noted adjacent the humus tanks is no longer marked.	No significant changes noted.
1959, 1959-62, 1963-64, 1964 / 1967 (1:2,500 / 1:10,000)	Northern Area Some minor development including new railway sidings, earthworks and several new structures. Southern Area Humus tanks are marked as being filled with water	A sludge lagoon is shown to the north of the site, beyond the River Aire. Mineral railway no longer shown.
1978, 1978-85 / 1976-78 (1:2,500 / 1:10,000)	Northern Area One of the storage tanks and previously mapped lagoon are no longer shown. Several of the tramways no longer present. Several circular filter tanks and unknown buildings have been constructed. Southern Area No significant changes on site.	Several additional structures constructed to the north. Five circular filter tanks constructed to the north of the southern area.

Historical Map	On Site	Off Site
1984-89, 1985, 1985-89, 1985-88, 1989 / 1987-1989 (1:5,500 / 1:10,000)	Northern Area The railway line, sidings and associated earthworks are no longer shown. An electricity sub-station is shown in the northeast. Southern Area No significant changes on site.	Four rectangular sludge beds are shown adjacent to the northeast (current consolidation tanks)..
1993 (1:2,500)	No significant changes on site.	Development adjacent southern area; construction of eight settlement tanks and additional buildings.
1999 (aerial imagery)	Northern Area All railway infrastructure and associated structures have been removed. Southern Area The humus tanks are no longer present with the area now serving as a cake pad.	The slurry lagoons to the southwest are no longer shown, presumed to be overgrown.
2000 - 2006 (1:10,000)	No significant changes on site.	Drainage conduits marked from the adjacent settlement tanks to the River Aire. New structures are marked in the southern area, consistent with the tertiary treatment tanks.
2009 (Google Earth Imagery)	Northern Area The site appears largely consistent with current layout. Southern Area No significant changes on site.	Activated sludge tanks have been constructed between the northern area and the River Aire. Storm tanks beyond the canal to the west are no longer shown.
2020 (Google Earth Imagery)	Norther Area The THP is now evident. Southern Area New tanks and buildings have been constructed, including the centrifuge building, cake barn and adjacent tanks.	New tanks and buildings have been constructed adjacent to the southern area, which is now labelled 'Green Waste Area'.

4 Environmental Setting

The following information was derived from information contained within the Landmark Envirocheck report (2020) (1), other published sources (referenced within) and previous site investigations and assessments (Section 4.7).

4.1 Geology and Hydrogeology

Geological map extracts taken from the British Geological Survey (BGS) digital geological map of Great Britain (BGS, 2021), BGS Map Sheet 69 Bradford (BGS, 2098) and the Envirocheck (Landmark Information Group, 2020) BGS solid geology at 1:50,000 scale have been reviewed. A summary of the geological maps is discussed below.

4.1.1 Artificial Ground

Artificial ground is shown across the western part of the northern permit area, described by the BGS (BGS, 2020) as Made Ground (an area where pre-existing ground level has been raised by artificial deposits with variable composition). Artificial ground is not mapped on the southern area however, site history and previous investigations would suggest it is likely to be present in some areas.

Made Ground from the excavation and backfill of tanks, sludge beds, filter beds and other structures is likely to be present, particularly in association with the following observed site development:

- Former sludge lagoons and storage tanks within and adjacent to the northern area;
- Construction and dismantling of railway sidings, earthworks and associated infrastructure to the west of the site; and
- Presence of former water body (clarification lake) to the north of the southern area.

Historical ground investigations within the site indicated variable thickness of Made Ground extending to a maximum depth of 10m below ground level (BGL), though depths of 1.5 to 5m are more typical. Further details are included in Section 4.7.

4.1.2 Superficial Deposits

Superficial Deposits are shown across the site comprising:

- Alluvium, aligned with the River Aire;
- River Terrace Deposits; and
- Glacial Till.

Alluvial deposits run through the northern area and part of the southern area, described by the BGS (BGS, 2020) as comprising soft to firm unconsolidated compressible silty clay with layers of silt, sand, peat and basal gravels, possibly with a stronger desiccated surface.

River Terrace Deposits are shown across the western sections of both the northern southern areas and are likely to be present underlying the alluvium across all areas. River Terrace Deposits are described by the BGS (BGS, 2020) as comprising sand and gravel, locally with lenses of silt, clay and peat.

Although not shown to underlie the site, Glacial Till is mapped to the east and southwest and is likely to be present across all areas underlying the Alluvium and River Terrace Deposits. The BGS does not provide a description for Glacial Till, though the deposits typically consist of over-consolidated stiff to very stiff sandy gravely clay with lenses of sand and gravel.

Superficial deposits are shown to be absent to the west of the site, in the location of the raised inlet works, beyond the Leeds and Liverpool Canal. A small area absent of superficial deposits is also shown within the northern area adjacent the sludge import facility.

4.1.3 Solid Geology

The majority of the northern area is underlain by the Millstone Grit Group, comprising fine to very coarse-grained sandstones, interbedded with grey siltstones, mudstones and subordinate marine shaly mudstone, clay, coals and seatearths (BGS, 2020).

The central part of the northern area and the southern area are underlain by the Guiseley Grit, comprising coarse grained, massively bedded sandstone, fining towards the base (BGS, 2020).

The published mapping shows the solid geology across the site and surrounding areas to be complex with numerous faults shown and folding evident, it is therefore not possible to assign dip/strike to the solid geology and it should be assumed that the dip/strike is variable across the site. Several faults are shown on and in the general vicinity of the site and are summarised as follows:

- Northwest to southeast striking fault straddling both the sites, with the downthrown side of the fault to the north.
- Northeast to southwest striking fault is shown immediately west of the Southern Site, with the downthrown side of the fault to the south.
- Northwest to southeast striking fault is shown immediately to the south of the Southern Site, with the downthrown side of the fault to the south.

4.2 Coal Mining

A Coal Authority coal mining report (Coal Authority, 2020) has been obtained and is provided in Appendix 2. Some of the key points are summarised below.

4.2.1 Mining Activity

The Coal Authority does not have any record of past underground coal mining, probable unrecorded shallow workings, or abandoned mine plan catalogue numbers for the site. There are no recorded mine entries within 100 m of the site. There are no recorded opencast mines within 500 m of the site. There is no outcropping coal recorded at the site.

The Coal Authority does not have any record of faults, fissures or breaklines at the site.

4.2.2 Investigative or remedial activity

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50m of the STW site boundary, since 31 October 1994.

The Coal Authority is not aware of any request having been made to carry out preventative works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.

The Coal Authority has no record of any mine gas emissions requiring action, or mine water treatment schemes within 500m of the site boundary.

4.3 Non-Coal Mining

The Envirocheck Report (Landmark, 2020) indicates there is one recorded BGS mineral site located c. 250 m to the west of the Northern Site and is situated on the area of raised ground. The mineral site is recorded as Dawson Wood and is a former opencast site where sandstone was quarried. The site is indicated to have ceased operation.

4.4 BGS Records

There are a number of available BGS borehole records within the site area and on surrounding land. Given the age of these records, and the subsequent site development, they may not represent the current site conditions, especially in the Made Ground. Details are summarised in Table 6.

Table 6 Summary of ground conditions in the BGS borehole records

Material and Description	Depth to Top of Stratum (m BGL)	Range of Thickness (m)
Northern Area (7 No. boreholes drilled beneath console tanks 1 to 4)		
Topsoil	Ground Level	0.5 – 0.7
Made Ground Not described.	Ground Level	0.5 – 2.5
Superficial Deposits- Alluvium Described as silty SAND and firm very sandy clayey SILT, overlying SAND.	0.5 – 2.5	2.5 – 4.0
Superficial Deposits- River Terrace Deposits Described as SAND and GRAVEL or GRAVEL.	3.0 – 5.2	1.2 – 4.5
Superficial Deposits - Glacial Till Described as stiff silty sandy stony CLAY.	6.2 – 9.0	2.0 – 4.1
Weathered Bedrock Described as SAND and GRAVEL or GRAVEL.	9.0 – 10.3	0.1 – 1.0
Intact Bedrock Typically described as weak to strong highly fractured to slightly fractured SANDSTONE, very weak MUDSTONE and very weak to strong interbedded SANDSTONE and MUDSTONE.	9.2 – 11.5	Proven between 2.5 and 9.1 into formation
Southern Area (49 No. boreholes across the immediately surrounding area)		
Topsoil	Absent	-
Made Ground Soft to firm silty sandy CLAY with fine to coarse gravel. Horizons of soft clay with traces of peat recorded in one location. Described as sandstone gravel, brick debris, wood fragments, ash and sandstone cobbles and boulders with some sandy/silty clay in two locations.	Ground level to 0.35	1.7 – 5.2
Superficial Deposits- Alluvium Typically described as soft to firm (occasionally very soft) silty sandy CLAY occasionally with fine to coarse gravel.	0.25 – 5.2	1.9 – 9.15

Material and Description	Depth to Top of Stratum (m BGL)	Range of Thickness (m)
Superficial Deposits- River Terrace Deposits Typically described as medium dense SAND and GRAVEL with cobbles. A 0.7m thick horizon of soft SILT was recoded at the base.	3.6 – 9.4	2.9 – 6.55
Superficial Deposits - Glacial Till Typically described as stiff to very stiff silty sandy CLAY with fine to coarse gravel and occasional cobbles.	8.3 – 15.5	0.8 – 4.2
Weathered Bedrock Described a highly fractured fine-grained SANDSTONE in a clayey matrix and medium dense SAND and GRAVEL of sandstone.	11.4 – 15.35	0.7 – 1.5
Intact Bedrock Typically described as moderately strong to strong highly to moderately fractured coarse-grained SANDSTONE. A band of interbedded SILTSTONE and SANDSTONE was recorded in one location.	12.9 – 16.8	Proven between 0.45 and 10.3 into formation

A summary of the groundwater strikes recorded in the BGS borehole records is presented in Table 7.

Table 7 Summary of groundwater strikes in the BGS borehole records

Stratum	Groundwater Strike Depth (m BGL)	Rise (m BGL)	Comment
Northern Area			
Alluvium	2.0	No rise	-
River Terrace Deposits	4.5	No rise	-
	4.5	0.5	-
	3	No rise	-
Weathered bedrock	9.5	No rise	-
	8	No rise	-
Southern Area			
Made ground	2.1	No rise	-
	3.2	No rise	-
Alluvium	5.95	No rise	Described as seepage
	5.5	7.0	Possible standing water
	3.5	No rise	-
River Terrace Deposits	7.8	6.4	Rise in 20mins
	9.4	3.3	Rise in 10mins
Weathered bedrock	15.45	8.25	Final rise of 13.35m
Intact bedrock	Not recorded	-	Heavy water flow during drilling

4.5 Hydrogeology

4.5.1 Aquifer Classification

The superficial deposits of Alluvium and River Terrace Deposits and underlying bedrock of the Millstone Grit Group and Guiseley Grit are classified by the Environment Agency as Secondary A Aquifers. These are defined as formations with permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers.

The historical BGS boreholes and historical ground investigation data indicates that Glacial Till is present underlying the River Terrace Deposits across the northern and southern areas. The Glacial Till is classified as a Secondary Undifferentiated Aquifer, which is a classification assigned in cases where it has not been possible to attribute either category A or B. It is likely that these glacial deposits extend across the site beneath the mapped superficial deposits.

4.5.2 Groundwater Quality

The site is not located within a groundwater Source Protection Zone (SPZ).

The Envirocheck Report shows the Alluvium and River Terrace Deposits underlying the Northern Site and western section of the Southern Site to be highly vulnerable secondary aquifers. The eastern section of the Southern Site is shown to be a low vulnerability secondary aquifer.

Outcropping bedrock to the north of the site is shown as a highly vulnerable secondary aquifer.

4.5.3 Groundwater Abstraction

The Envirocheck Report indicates there is one potentially active abstraction, registered to Yorkshire Water Services Ltd, licence number 2/27/16/196 (permit version 101) for the abstraction of groundwater from the Millstone Grit for use as process water. Extraction rates are not provided. The permit start date is indicated to be the 1 April 2015. It is not currently in use by Yorkshire Water.

4.5.4 Groundwater Flooding

The site is potentially susceptible to groundwater flooding both below ground and at surface according to the BGS susceptibility map (Envirocheck, 2020).

4.6 Hydrology

4.6.1 Surface Water Features

The River Aire runs adjacent to the installation boundary in the northern area, and meanders between northern and southern areas, flowing in a southerly direction. Guiseley Brook, a tributary to the River Aire, is shown to the northeast of the site, in close proximity to Esholt Hall.

The Leeds and Liverpool Canal runs to the west of both site areas, within close proximity of the boundary of the northern area.

Several conduits (most likely culverted) are shown flowing from the land surrounding the southern site area into the River Aire.

Two small ponds are shown to the south of the southern area.

4.6.2 Flooding

Sections of the northern and southern Sites are shown to be at low (1000 year return) to high risk (30 year return) of surface water flooding.

Large parts of the northern and southern areas are indicated to be within a Flood Risk Zone 3 (flooding from river without defences). This is land which has a 1 in 100 (>1%) or greater annual probability of river flooding.

The remaining areas are within a Flood Risk Zone 2 (extreme flooding from rivers without defences). This is land which has a 1 in 100 and 1 in 1000 (1% - 0.1%) probability of river flooding.

The River Aire does not appear to benefit from flood defences in the vicinity of the site.

4.6.3 Surface Water Quality

There are records of three river quality sampling points located in proximity to the site (exact location of sampling points not provided), detailed as follows:

- Rive Aire (reach Gill Beck (Guiseley) to Esholt STW) – River quality C (fair), sampled in 2000;
- Rive Aire (reach Esholt STW to Apperley Bridge) – River quality C (fair) sampled in 2000; and
- Leeds and Liverpool Canal (reach Greenberfield Lock to Apperley Bridge) – River quality C (fair), sampled in 2000.

There are records of two river quality biological sampling points within 250 m of the site, details as follows:

- River Aire (reach Esholt STW to Apperley) located to the south of the Southern Site and last sampled in 2009. The record indicates the river quality to be fair.
- River Aire (reach Gill Beck (Guiseley) Esholt STW) to the north and last sampled in 2009. The record indicates the river quality to be fair.

The site is not located within a surface water drinking water safeguard zone (Environment Agency, 2021). The site is not located in a surface water Nitrate Vulnerable Zone (NVZ).

4.6.4 Surface Water Abstractions

There are no surface water abstraction licences within 250 m of the site.

4.7 Previous Site Investigations

Previous geotechnical and geo-environmental reports were provided for the site:

- Geotechnical Engineering (Northern) Ltd. Ground Investigation Report. August 1989
- Soil Mechanics (2005) Report No. A4178. Factual Report on Ground Investigation. April 2005
- Ove Arup & Partners (2005) Esholt WwTW- FFD Scheme. Geotechnical Information Pack
- Esholt WwTW FFD Scheme. Site Condition Report for CHP Plant Application. Ove Arup & Partners Ltd. August 2008.
- Esholt WwTW: Proposed CHP Plant 11/03788/FUL, Phase 2 Land Quality Assessment Final. Morgan Sindall Grontmij Joint Venture (December 2011).

A summary of the reports has been provided in the following sections, with references to the reports where relevant.

4.7.1 Geotechnical Engineering (Northern) Ltd. August 1989

A draft factual ground investigation report was produced by Ground Engineering in preparation for the Phase 2 humus tank extensions. Factual report containing 21 No. borehole records (conducted by Geotechnical Engineering Ltd, referenced BH47 to BH68) located in the area of the existing eight STW final settlement tanks to the north east of the southern area.

Table 8 Summary of Ground Conditions

Strata	Depth to Top of Stratum (m bgl)	Level at Top (m AOD)	Thickness (m)	Groundwater strikes
Topsoil	GL	+55.39 to 59.25	0.1 to 0.4	-
Made Ground Described as soft black silty clayey TOPSOIL with fine to coarse gravel of sandstone and brick with timber fragments and rootlets.	GL	+55.92	1.25	-
Alluvium (noted in 15 of 22 locations) Typically soft to firm silty CLAY with fine to coarse sandstone gravel. Occasional peaty/organic horizons encountered. A stiff upper crust was recorded in several locations. Frequent cobble obstructions recorded.	GL to 1.25	+54.67 to +56.96	1.1 to 7.75	+47.92 to +53.85
River Terrace Deposits (noted in 5 of 22 locations) Typically ranges in density from loose to dense (generally medium dense) silty SAND and GRAVEL with occasional/frequent cobbles. Occasionally described as clayey.	2.4 to 6.1	+49.75 to +54.34	3.9 to 6.65	+49.85 to +59.89
Glacial Till Typically encountered with subordinate bands of granular Glaciofluvial Deposits. Described as stiff to very stiff (occasionally firm) silty sandy CLAY with fine to coarse gravel of sandstone. Rare soft/firm bands of silt recorded. Frequent cobble obstructions recorded.	0.15 to 12.0	+43.64 to +59.05	Up to 15.1 Frequently encountered as bands interbedded with Glaciofluvial Deposits	+52.80 to 52.52
Glaciofluvial Deposits (noted in 18 of 22 locations) Typically medium dense (occasionally ranging between loose and dense) clayey silty SAND and GRAVEL. Occasional clay bands recorded.	4.0 to 11.9	+44.7 to +52.6	1.4 to 4.7	+47.19 to +52.07
Weathered bedrock Typically weathered SANDSTONE or MUDSTONE	10.4 to 17.9	+38.82 to +45.99	Up to 1.45, overlying intact bedrock	+43.95

Strata	Depth to Top of Stratum (m bgl)	Level at Top (m AOD)	Thickness (m)	Groundwater strikes
Intact Bedrock (noted in 5 of 22 locations) Typically described as moderately strong to strong highly to moderately fractured coarse-grained SANDSTONE.	12.05 to 17.0	+39.62 to +44.54	Proven between 4.5 and 6.03 into formation	-

The report did not include any laboratory analysis or ground gas monitoring.

4.7.2 Soil Mechanics (2005) Esholt WwTW Factual Report on Ground Investigation. Report No. A4178. April 2005

Soil Mechanics were commissioned by Ove Arup on behalf of YW to carry out a ground investigation to obtain geotechnical and geo-environmental information in preparation for the renovation of the treatment works. This included cable percussive and rotary drilled boreholes (16 No. in total), window sampling (7 No.), trial pitting (10 No.) and laboratory testing. Intrusive works took place between December 2004 and January 2005. The report provided a factual record of these works and the subsequent laboratory testing. A summary of ground conditions, based on those intrusive locations on or immediately adjacent to the current installation boundary, is provided in Table 9.

Table 9 Summary of Ground Conditions

Strata	Depth to Top of Stratum (m bgl)	Level at Top (m AOD)	Thickness (m)	Groundwater strikes
Northern Area (based on 15 No. intrusive locations)				
Topsoil	0	+53.00 - +57.60	0.1 – 0.4	-
Made Ground Medium to stiff sandy gravelly CLAY with mudstone, brick and concrete, to very sandy GRAVEL with sandstone, concrete and ash.	0 – 0.5	+54.81 - +61.60	0 – 5.8	+50.56
Alluvium Soft to firm silty CLAY with fine to coarse sandstone gravel.	0.8 – 5.8	+52.58 - +59.10	0.7 – 4.6	+50.27 - +53.00
Glacial Deposits Medium dense clayey silty SAND and GRAVEL. Occasional clay bands recorded.	1.6 – 6.7	+44.21 - +58.0	0.7 – 6.8	+50.27 - +55.40
Weathered bedrock Locally clayey GRAVEL of sandstone, mudstone and siltstone with cobbles.	5.6 – 12.8	+44.21 - +54.50	0.2 - 5.2	+43.60 - +51.00
Intact bedrock Weak SILTSTONE and MUDSTONE, and moderately strong medium grained SANDSTONE	7.3 - 14.2	+39.87 - +50.90	Proven to 7.9m into horizon	+41.86

Strata	Depth to Top of Stratum (m bgl)	Level at Top (m AOD)	Thickness (m)	Groundwater strikes
Southern Area (based on 7 No. intrusive locations				
Topsoil	0	+53.81	0.15 - 0.25	-
Made Ground Medium to stiff sandy gravelly CLAY with mudstone, brick and concrete, to very sandy GRAVEL with sandstone, concrete and ash.	0 - 0.3	+51.02 - +53.82	0.3 - 1.85	-
Alluvium Soft to firm silty CLAY with fine to coarse sandstone gravel.	0.3 – 2.7	+49.55 - +53.66	1.2 – 5.9	+47.32
Glacial Deposits Medium dense clayey silty SAND and GRAVEL. Occasional clay bands recorded.	1.0 - 4.6	+47.32 - +49.22	3.0 – 5.7	+46.40 – +50.56
Weathered bedrock Locally clayey GRAVEL of sandstone, mudstone and siltstone with cobbles.	5.0 - 7.5	+45.70 - +46.32	1.1 – 5.5	+45.70
Intact bedrock Weak SILTSTONE and moderately strong medium grained SANDSTONE	8.5 - 14.4	+39.42 - +43.70	Proven to 3.0m into horizon	+42.11

Chemical analysis was performed on 17 No. soil samples obtained from within or immediately adjacent to the active installation boundary. The results are summarised in Table 10. Plans showing the locations of each relevant location are provided in Appendix 3.

Table 10 Summary of Soil Analysis

Compound	Units	No.	Min	Max	Mean	Location of Max
pH		17	4.8	10.3	4.6	BH111
Antimony	mg/kg	17	0.2	11.2	2.1	BH202
Arsenic		5	6.7	25.3	14.4	BH110
Cadmium		17	0.35	124.6	25.2	TP102
Chromium		17	10.1	403.2	60.9	BH202 (northern site – adjacent the access road to the north between active permit areas and former SPC pad)
Copper		17	7.3	291.1	48.9	
Lead		17	10.7	345.6	70.1	
Mercury		9	<0.1	2.9	0.6	
Nickel		17	6.2	51.2	19.5	
Selenium		14	<0.5	2.3	1.1	
Zinc		6	38.6	454.4	93.0	
Cyanide (total)		17	<1	<2	-	BH113

Selected samples were also analysed for polycyclic aromatic hydrocarbons (PAH), semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs) and tentatively identified compounds (TICs). Concentrations above the laboratory limit of detection were noted in 4 out of 5 samples.

Three samples were also subject to leachate analysis, all from excavations within the northern site area. The results are summarised in Table 11.

Table 11 Summary of Soil Leachate Analysis

Compound	Units	No.	Min	Max	Mean
pH		3	8.0	8.0	8.0
Arsenic	mg/l	3	0.001	0.003	0.002
Cadmium		3	0.001	0.002	0.001
Chromium		3	0.003	0.007	0.005
Copper		3	0.002	0.005	0.003
Lead		3	0.002	0.011	0.007
Mercury		3	<0.001	<0.001	<0.001
Nickel		3	0.002	0.003	0.002
Selenium		3	<0.001	<0.001	<0.001
Zinc		3	0.017	0.053	0.047

4.7.3 Ove Arup & Partners (2005) Esholt WwTW- FFD Scheme. Geotechnical Information Pack

This report provided a summary of the information obtained by the Soil Mechanics investigation (undertaken on behalf of Ove Arup and described in Section 4.7.2 above). It provided an outline of the environmental setting of the wider WwTW and its history, identifying potential sources of contamination relevant to the installation boundary as follows:

- Former grease house and press house (located immediately adjacent to the northern installation area) which was used to process the contents of sulphuric acid tanks, historically located adjacent to the primary tanks to the north of the River Aire. A process was installed to remove the grease from incoming wastewater, which arose due to the prolific wool industry in the surrounding areas. The contents of the tanks were processed and refined at the grease house to produce lanolin and grease for the shipping industry.
- Infilling of several former sludge and settlement lagoons including:
  - Infilled clarification lake to the north of the southern area;
  - Infilled sludge lagoon to the south of the southern area;
  - Infilled former humus tanks beneath the cake pad within the southern area;
  - Infilled lagoon beneath the central northern area; and
  - Infilled lagoons beneath the SPC area to the north.
- Historic flooding may have resulting in the deposition of contaminated soils on site originating from the upstream, heavily industrialised areas of Baildon and Shipley.

4.7.4 Esholt WwTW FFD Scheme Site Condition Report for CHP Plant Application. Ove Arup & Partners Ltd. August 2008

A SCR was prepared by Ove Arup on behalf of Yorkshire Water to support the application for an Environmental Permit for the combustion of biogas in new CHP engines. The report outlined the environmental site setting and site history of the area where CHP development are located, and provided copies of some of the previous investigations discussed herein. It also outlined the proposed new activities to be introduced as follows:

- Biogas storage, in a double membrane 'bubble' type gasholder;
- Fuel oil storage;
- Backup oil and biogas fuelled hot water boiler, and;

- Two biogas fuelled CHP engines.

The report identifies substances which will be used by the CHP process including:

- Final effluent from the onsite washwater system is used during the bioscrubber processes prior to biogas entering the CHP engines.
- No chemicals are used on a regular basis by the CHP engines although CHP engine oil will be changed periodically. The CHP engines internal water circuit will require the addition of small volumes of antiscalant and coolant which will generally be done during service intervals. These chemicals will not be stored on site.
- Standby fuel oil is stored in a double contained fuel tank on site.
- Softened potable water will be used to top up the CHP internal water circuit and overall hot water circuit.

It also identifies substances produced by the CHP process;

- Condensate is produced prior to the gasholder as the biogas cools. Condensate is passed back into the site drainage system.
- In the event that the biogas holder is full and the gas feed rate exceeds the gas withdrawal rate, then a biogas flare will be used to burn biogas until the level in the gasholder drops to a preset value. Carbon dioxide (CO2) and water are produced during the process of methane flaring with the potential inclusion of carbon monoxide (CO), nitrogen oxide [SIC, oxides of nitrogen] (NOx) and sulphur dioxide (SO2) within waste gases.
- CO, NOx, SOx and particulate matter may be produced in addition to CO2 and H2O during the CHP combustion process.

The report provides a conceptual site model for the area of the CHP permit which identifies ground conditions, based on a number of historical intrusive investigations[5] as described in Table 12:

Table 12 Summary of Ground Conditions

Strata	Depth (m bgl)	Comments
Made Ground	0 – 10	Maximum depth of made ground noted in area of infilled storage tank. Typically noted to be between 0 and 2m thickness.
Superficial deposits Sand with gravel, clayey in places and the alluvium in the vicinity of Esholt consists of loam, sand and gravel, over clay with boulders	2 -13	-
Milestone Grit Huddersfield White Rock	2 – unproven depth	-

Groundwater levels were noted to vary significantly; in some areas (not specified) water levels / strikes were observed at surface, and in other areas at a maximum of 9.7m bgl.

[5] Soil Mechanics 2003 and 2005

Ground gas monitoring was undertaken in 2003 and 2005 during the first assessment, comprising three locations, CH_4 and C were not detected above the limits of the detection equipment. However, in 2005 the assessment comprised twenty-one locations and identified elevated methane and carbon dioxide concentrations across the site, potentially indicative of historical infilling and land-raising. The locations of these investigation locations are not known.

Following a review of site history, the report summarises the potential on and off-site sources of pollution as follows:

- Sewage sludge typically contains elevated levels of nitrogen (predominantly in the form of ammonium and organic-N), metals and metalloids (including Hg, Cu, Ni, Pb, Zn, As, Cd, Se, Mo, Co, Cr and Ag), phosphate, pathogens, and organic compounds.
- It is potentially possible that some of the tanks present on site may have leaked in the past and it is possible that, especially at times of heavy rainfall, the tanks may have overflowed onto the surrounding land.
- Sewage sludge may have been historically spread near to the site. The typical contamination of soil that might potentially be caused by sludge spreading includes heavy metals, particularly cadmium and zinc, ammoniacal nitrogen and phosphate
- Waste material, such as sludge or screenings, may have been historically buried near to the site. Burial of material is likely to have taken place in discrete 'hotspots'. It is unlikely that any burial areas were lined or capped. The nature of the material buried will determine whether it would biodegrade readily, the volumes and concentrations of leachate generated, and the potential for gas generation and accumulation.
- Historically, any chemicals or fuels stored or used in the sewage treatment works may potentially have leaked or been spilled. Such chemicals might include aluminium sulphate, ferric chloride or sulphate, lime, polymeric substances (generally biodegradable), fuel oils or lubricating oils, insecticides and herbicides.
- As the site lies adjacent to the floodplain of the River Aire, and is downstream of heavy historic industries in Baildon and Shipley, it is possible that historic flooding may have deposited contaminated soil across parts of the site.

The report concludes that for all relevant activities at the facility there is little likelihood that land pollution or leaks to the land will occur during the future life of the facility. The report states that the collection of further reference data is not required.

4.7.5 Esholt WwTW: Proposed CHP Plant 11/03788/FUL, Phase 2 Land Quality Assessment Final. Morgan Sindall Grontmij Joint Venture (December 2011)

Morgan Sindall Grontmij Joint Venture (MGJV) were instructed by YW to undertake a Phase 1 and Phase 2 Land Quality Assessment (LQA) to support a planning application for the proposed CHP plant and associated functions at Esholt WwTW. The purpose of this desk based LQA was to determine the likelihood that historical and more recent land use at and in the immediate vicinity of the site has led to ground contamination, and to assess the potential for health and environmental risks to be realised either during the course of construction / development, or during subsequent site use for the intended purpose.

A Phase 1 assessment was undertaken in August 2011 which was summarised within the Phase 2. This included a summary of the development areas and the potential for contamination to be present at each, provided in Table 13.

Table 13 Summary of Sampling Location Detail

Development	Current Use	Historical use	Regional Use	Potentially Contaminative Use
Boiler house	Grassland	Undeveloped	WwTW, agriculture	Possible sludge spreading
CHP units	Grassland	Undeveloped		
MCC 25	Concrete hardstanding	Grease house		
Pre THP centrifuges	Concrete hardstanding	Undeveloped		
Dosing enclosure	Grassland	Undeveloped		
MCC 26	Concrete hardstanding	Undeveloped		
MCC 27	Concrete hardstanding	Undeveloped		
MCC 3	Grassland	Undeveloped		
Poly Dosing Enclosure	Grassland	Undeveloped		
Centrifuges	Grassland	Undeveloped		
MMC 28	Grassland	Undeveloped		

Based on the findings of the Phase 1 it was determined that further assessment was necessary given the potential for past historical and more recent land uses at the site to have generated contamination.

The development areas identified where targeted by a series of boreholes, trial pits, and monitoring wells. The soil conditions encountered are summarised in Table 14. Plans showing the locations of each borehole are provided in Appendix 3.

Table 14 Summary of Soil Conditions at Target Locations

Development	Intrusive Locations	Soil Profile	Groundwater	Evidence of contamination
Boiler house	BH11/10 BH11/13 TP1 TP2 TP3	0m MADE GROUND, GRAVEL including concrete, limestone, mudstone and sandstone. ~1.7m SAND and GRAVEL -6.0m CLAY with gravel ~9.0m SANDSTONE.	~ 3.0m	None
CHP units	BH11/10 TP1			None
MCC 25	BH11/9			None
Pre THP centrifuges	BH11/5	0m MADE GROUND. Gravel including sandstone, brick and clinker. ~ 1.5m SAND and GRAVEL ~ 7.0m CLAY with gravel ~ 10.0m SANDSTONE	~ 3.0m	None
Dosing enclosure	BH11/5			None
MCC 26	BH11/5			None
MCC 27	BH11/5			None

Development	Intrusive Locations	Soil Profile	Groundwater	Evidence of contamination
MCC 3	TP4	0.0 m TOPSOIL ~ 0.1m sandy CLAY ~ 0.25 coarse SAND with cobbles.	~ 1.0m	None
Poly Dosing Enclosure Cake storage barn	TP11/10	0.0m TOPSOIL ~ 0.4m CLAY with gravel. ~ 15.0m SANDSTONE	~ 6.5m	None
Centrifuges Cake storage barn	TP11/10 TP11/11			None
MMC 28 Cake storage barn	TP11/3 TP11/11			None

0 & Table 14 Note: 'MCC' denotes an electrical control asset

Soil monitoring standpipes were installed in three locations (BH5, BH9 and BH10). Soil samples were obtained at regular intervals and a selection were submitted for analysis specific to the contaminants of concern which were:

- Sewage sludge spreading - Mercury, copper, nickel, lead, zinc, arsenic, cadmium, selenium, chromium, and PAH; and
- Grease House – PAH and petroleum hydrocarbons.

A total of 24 soil samples were obtained and analysed. The figures provided (included within Appendix 3) show only some of these locations, in the areas associated with the planned development works as outlined in Table 14. It is not clear where the remaining excavations were located but it is presumed that these were in the immediately surrounding area and the results are therefore applicable to establishing general site condition for the purposes of this SCR. The results of all analyses are summarised in Table 15.

Table 15 Summary of Soil Analysis

Compound	Units	No.	Min	Max	Mean	Location of Max	
Arsenic	mg/kg	16	4.2	26.8	10.2	TP11/8	Location not clear
Cadmium		16	0.2	1.9	0.7	TP11/11	Southern area - cake storage barn
Chromium		16	16.8	69.2	34.1	TP11/9	Location not clear
Copper		16	16.7	75.8	30.4	TP11/8	Location not clear
Lead		16	17.6	114.9	49.6	TP11/1	Southern area – adjacent cake storage barn
Mercury		16	0.1	0.6	0.2	TP11/8	Location not clear
Nickel		16	17.4	51.1	23.9	TP11/11	Southern area - cake storage barn
Selenium		16	0.5	1	0.6	TP11/1	Southern area - adjacent cake storage barn
Zinc		16	51.4	122.2	78.6	TP11/8	Location not clear
TPH		7	18	547	106.9	TP11/9	Location not clear

A single round of ground gas monitoring was also undertaken, at five locations, measuring concentrations of methane, carbon dioxide, and gas flow. A limiting borehole gas volume was calculated for each and used as a gas screening value. Low flow rates were recorded across all monitoring locations, resulting in low gas screening values and consequently, a low risk classification, indicative of “characteristic situation 1” (CIRIA Report C665) and as such no special gas protection measures were recommended for new structures.

The report concluded that the levels of contaminants present did not represent a human health risk in relation to the proposed development of the areas in question.

5 Environmental Data and Regulatory Information

A summary of the various regulatory and other environmental data is presented below, based on the data obtained in the Envirocheck Report (Appendix 1).

5.1 Discharge Consents

There is one historical discharge consent to surface water listed within the installation boundary and relating to storm overflow. This was located in close proximity to the THP feed hoppers and the associated infrastructure / storm tanks are considered to have been superseded by the later development of STF assets. There are three further discharge consents to surface water recorded in the Envirocheck report within 50 m of the site, all revoked, these are:

- Sewage discharge licensed to YW– final/ treated effluent to the River Aire adjacent to the southern area,
- Sewage discharge licensed to YW– final/ treated effluent to the River Aire 80m south of the southern area,
- Trade effluent discharge licensed to Property Services Department c. 50m to the north of link road between the northern and southern areas; and
- Sewage discharge licensed to YW – storm overflow adjacent to access road to the north of the northern area.

There are no active discharge consents within a 50m radius of the site.

5.2 Pollution Prevention and Control

There are no Local Authority Integrated Pollution Prevention and Control (IPPC) or Local Authority Pollution Prevention and Controls (LAPPC) shown within 50 m of the site.

There is an Envirocheck entry for an ‘Integrated Pollution Control (IPC)’ registered waste site within close proximity to the installation boundary, issued to YW for incineration of non-hazardous waste. This is understood to be the disused sewage sludge incinerator at Esholt WwTW.

The site and its surrounds have a long consenting history which includes historical waste management activities, including waste management licensed areas, EPR permits for waste activities and EPR permits for installation activities. The Envirocheck has not captured all of these, however a separate review has confirmed that EPR/DP3192ZP and EPR/VP3130GZ are the relevant permits for consideration.

5.3 Pollution Incidents

There are four pollution incidents to controlled waters recorded by the Envirocheck report within 50 m of the site. All of the incidents originate from the wider Esholt WwTW and entered a freshwater stream / river, assumed to be the River Aire. YW have recorded a further nine incidents within the past five years, relating to the STF, the wider WwTW, and other YW assets on Esholt estate; all of these were classified as Category 3 incidents which impacted the River Aire (minor or minimal impact on the environment). A summary is listed in Table 16.

Table 16 Pollution Incident Summary (within 50m of Esholt WwTW)

Date	Incident Ref.	Approx. Distance from Site	Pollutant	Incident severity
11/5/1996	SL960524	20m W	Sewage – treated effluent	Category 3 – minor incident
19/4/1989	SL970291	10m NE	Sewage – treated effluent	Category 3 – minor incident
7/11/1989	104887	0m	Unknown	Category 3 – minor incident
10/5/1990	110360	50m N	Unknown	Category 3 – minor incident
27/1/2016	1406457	170m S	Sewage final effluent	Category 3 – minor incident
01/3/2016	1415445	170m S	Sewage final effluent	Category 3 – minor incident
28/3/2016	1422521	170m S	Sewage final effluent	Category 3 – minor incident
13/10/2016	1478355	170m S	Sewage final effluent	Category 3 – minor incident
9/11/2016	1483844	170m S	Sewage liquid	Category 3 – minor incident
21/8/2016	1735307	1km SE	Sewage (crude)	Category 3 – minor incident
13/8/2019	1837320	250m N	Sewage (crude)	Category 3 – minor incident
23/6/2020	1820764	0m	Sewage (crude)	Category 3 – minor incident
5/1/2020	1766770	80m S	Sludge	Category 3 – minor incident

5.4 Landfills and Waste Sites (landfill)

There are no records of current or historic landfills on site.

Four historical landfill sites are recorded within 250 m of the Northern and Southern Sites, these include historical landfill sites, formerly licenced waste management facilities (landfill), Local Authority Recorded Landfills, and Registered Landfill Sites. These records are summarised within Table 17.

Table 17 Landfill and Waste Sites Summary (within 250m of the site)

Name, Licence holder (Ref)	Location	Approx. Distance from Site (m)	Status (first / last input)	Waste Accepted
Esholt STW Yorkshire Water (EAHLD06829)	Esholt WwTW	5 N	Not supplied	Inert and industrial waste
Esholt STW Yorkshire Water (927)	Esholt S.T Works	5 N	5th April 1991	Ash from Esholt sewage incinerator. Inert excavation waste from YWS roadworks
Esholt STW Yorkshire Water (EAHLD30241)	Between the River Aire and the Leeds and Liverpool Canal	150 W	Not supplied	Inert and industrial waste
Yorkshire Water Authority (EAHLD05830)	Ainsbury Avenue, Thackley	215 W	Inputs 1965 - 1988	Liquid sludge (industrial, commercial, household waste)
Yorkshire Water Services (494)	Land off Ainsbury Avenue, Thackley	250m W	1st January 1985	Sewage press cake

5.5 Waste Sites (non-landfill)

There are four recorded Licensed Waste Management Facilities within 250 m of the site:

Table 18 Landfill and Waste Sites Summary (within 250m of the site)

Name, Licence holder (Ref)	Location	Approx. Distance from Site (m)	Status (first / last input)	Waste Accepted
Yorkshire Water Services (104473)	Ainsbury House, Idle	0 N	Issued 7th December 2012	Not supplied
Yorkshire Water Services (65472)	Esholt WwTW	50 E	Active 2006 - 2016	Biological treatment
Yorkshire Water Services (60668)	Idle	175 NE	Issued April 1991	Industrial waste
Yorkshire Water Services (60671)	Ainsbury House, Idle	175 NE	Active 1991 - 2002	Household, commercial or industrial waste transfer

5.6 Contemporary Trade Directory Entries

There are no active or inactive Contemporary Trade Directory Entries within 50 m of the site.

5.7 COMAH Sites

There are no Control of Major Accident Hazards sites (COMAH) recorded within 50 m of the site.

5.8 Contaminated Land Register Entries and Notices

There are no sites on the Contaminated Land register entries or notices within 250 m of the site.

5.9 Fuel Station Entries

There are no fuel station entries within 250 m of the site.

5.10 Sensitive Land Use

The following sensitive land uses have been identified within 2km of the site:

- One Site of Special Scientific Interest (SSSI) Yeadon Brickworks and Railway Cutting located 1.7km to the north east (site of geological interest).

There are no National Nature Reserves, RAMSAR sites, Special Areas of Conservation (SACs) or Special Protection Areas (SPAs) within 2km of the site and no internationally designated sites within 10km.

6 Conceptual Site Model

The guiding principle of IED is to accept no further deterioration of land during the lifetime of the permit. The aim of the SCR is therefore to develop a conceptual site model (CSM) which identifies past and future potential sources of contamination and assesses the vulnerability of the site and sets a baseline against which any potential future deterioration of site condition can be judged at the point of surrender.

The information presented above and in previous sections of this report have been collated and evaluated to develop the CSM for the site. This has been undertaken following procedures outlined in 'Land Contamination: Risk Management (LCRM) published by the Environment Agency (Environment Agency, 2020) and EA's Technical Guidance Note H5 (2013). The CSM outlines:

- Sources: substances that are capable of causing pollution or harm;
- Pathways: routes by which the contaminant can reach a receptor;
- Receptors: something which could be adversely affected by the contaminant including human health, properties and controlled waters.

The establishment of pollutant linkages and assessment of pollution potential enables pollution prevention measures to be identified which will mitigate any potential environment impacts of the permitted activities.

6.1 Sources

A number of potential sources of contamination (PSCs) have been identified on site and in the surrounding area which may have impacted soil and groundwater quality in the areas where the ongoing permitted activities will take, both historically, and which could potentially impact land quality in the future. The following PSCs have been identified within 250 m of the site:

6.1.1 Historical

On-Site:

- Long-term sewage and sludge treatment activities including buildings and former structures (former storage tanks, filter tanks, railway sidings, lagoons, evidence of reprofiling and earthworks, and sewage treatment process areas);
- Deposition / landfilling of ash derived from off-site incineration of sludge;
- Demolition of structures and potential infilling / levelling with materials which could include spent filter media, sludge, cake, grits, incinerator ash and screened arisings;
- General infilling (previous site investigations outlined in Section 4 confirmed Made Ground to depths of up to 10m in the east of the site); and
- Deposition of contaminated soils from upstream industrialised areas due to historical flooding.

Off-site:

- Further areas of sewage and sludge treatment (adjacent);
- Railway land and sidings (adjacent to the north and west);
- Incineration (located to the north) and associated infilling of areas with ash;
- Processing of waste greases and sulphuric acid derivatives; and
- Infilling of former lagoons and tanks (across the areas owned by YW in all directions, landfilling (adjacent to the north, and 200m northwest).

Potential contaminants that may impact soils and groundwater beneath the site derived from these historical land uses include metals, petroleum hydrocarbons, benzene, toluene, ethylbenzene and xylene (BTEX), PAHs, polychlorinated biphenyls (PCBs), VOCs and SVOCs, ammonia, dioxins, pathogens and asbestos. In addition, there is potential for ground gas (e.g. methane, carbon dioxide, hydrogen sulphide, and carbon monoxide) to be present. Soil analysis obtained as part of a previous investigations of the wider YW site provides an indication of soil conditions (summarised in Section 4.7). It is recognised that since these investigations have taken place, site development and associated earthworks may have altered the soil profile and material from these sampled areas may has been excavated and distributed around other areas of the site. However, as a general indication of soil condition, prior to the commencement of the majority of the permit activities, the data summarised in Section 4.7 provides a reasonable baseline against which future soil condition could be assessed.

6.1.2 Potential Contaminant Sources Associated with Permitted Activities

Potential sources of pollution which are present as a result of activities covered by the scope of this permit variation application have been outlined in Section 2. These include raw materials (Table 2), process liquors (Table 3) and waste materials (Table 4).

There are no direct discharges from the process to land or water. All process liquor and surface water is collected and discharged via underground drainage systems to Esholt WwTW for full treatment prior to discharge to the River Aire. They comprise liquor from raw and digested sludge dewatering processes, condensate e.g. from biogas handling, and surface water runoff. The largest area of surface water runoff is from the digested sludge cake pad. Surface water runoff from this area is directed to a liquor collection system and directed to Esholt WwTW for treatment in combination with other liquors.

The Esholt WwTW is a very large works treating sewerage discharges from a large area. Effluent generated at Esholt STF contributes only a proportion of overall loading to the treatment works (both in terms of hydraulic and organic/chemical loading). Processes and controls in place in respect of process liquor and surface water handling and treatment are adequate to prevent significant negative impacts on the receiving environment as a result of site activities.

A secondary containment risk assessment (Reference 3) is provided in support of the current permit application which considers whether measures to protect the environment in the event of a failure of containment of primary storage tanks are adequate. A series of control enhancements are identified and evaluated against a range of criteria including BAT compliance, carbon footprint, safety and operational risk and cost. This resulted in the identification of potential improvements (for which detailed technical and engineering review is now proposed), designed to reduce the risks associated with potential containment failure and identified receptor impact in discrete areas.

6.2 Pathways and Receptors

- Human health exposure via direct contact with contamination, ingestion of contamination and inhalation of contaminated dust, vapours or asbestos. For site users and operational staff proposed building cover, hardstanding ground cover, gravel, or clean topsoil are expected to break any potential pathway in respect of this risk. Human health is not a focus of the H5 methodology.
- Human health exposure of potential ground gases and volatile contaminants beneath the site (if present) to impact site users and operational staff via the inhalation pathway. Human health is not a focus of the H5 methodology.

- Leaching and migration of contaminants within shallow soils beneath the site (if present) to the underlying Secondary A aquifers and nearby River Aire. Contaminants may also migrate off-site within groundwater in shallow permeable soils and impact off-site human health receptors via the direct contact, ingestion and vapour inhalation pathways, although the primary pathway is likely to be towards the River Aire. Contaminants, ground gas, and vapours may also migrate onto site from potential off-site sources.
- Infrastructure, including pipelines, are considered to be a potential pathway to receptors.

6.3 Vulnerability of the Site to Contamination

Sensitive aspects of the site setting are identified in Table 19.

Table 19 Sensitivity of Environmental Receptors in the Vicinity of the Site

Receptor Type	Receptor(s)	Sensitivity	Reasoning
Groundwater	Secondary A Aquifer (superficial and solid geology)	Moderate	Site underlain by superficial deposits of alluvium and River Terrace Deposits and underlying bedrock of Millstone Grit Group and Guiseley Grit are classified as Secondary A Aquifers. No overlying protection to infiltration. One groundwater abstraction is listed on site for use of water by YW. The site not located within SPZ.
Surface water	River Aire	High	The River Aire meanders through the permitted installation areas. There are no active surface water abstractions within 250 m of the site.
Ecological	None	Very low	No statutory ecological designations within 1km.

6.4 Assessment of Pollution Potential from Installation Activities

An environmental risk assessment in line with H1 guidance (Reference 4) has been completed to identify the possibility of land or groundwater pollution from facility activities to impact the sensitive environmental receptors identified in Table 19. This is presented in Table 20.

Table 20 H1 Risk Assessment of Pollution Potential from Activities within the Facility

Potentially Polluting Substance Relevant System / Activity			Managing the risk	Assessment of Risk		
Hazard	Pathway	Receptor	Pollution prevention measures	Probability	Consequence	Overall Risk
Failure of containment / management practices at sludge unloading facility	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Raw sludge: Activity carried out on hardstanding by approved contractors and supervised by YW staff. Management procedures in place. Rapid manual intervention in the event of a failed connection or hose.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Failure of process tank / containment measure: digester tanks, feed tanks, SAS tanks, dewatering feed tanks and liquor balancing tank	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Bulk tanks of sludge and liquor: All process tanks are located on hardstanding, although surrounded by areas of grass. All tanks and pipework are subject to periodic inspections and maintenance. Potential for run off to areas of soft ground. A secondary containment risk assessment has been undertaken (Reference 3) and improvements to further enhance pollution prevention measures in the event of failure of the primary tank have been proposed.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Pipe blockage requiring line entry	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Sludge and liquor: manual intervention, carried out by trained operatives with the intention of minimising the loss of material. Appropriate and timely clean-up of any losses.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Failure of pumps and valves transferring process liquors	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Sludge and liquor: Valve and pump operation indicated on the SCADA. Planned maintenance programme to ensure line integrity is maintained.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Failure of raw materials storage tank: liquid polymer, powder polymer,	Direct site drainage /	Land, surface water groundwater	Antifoam, glycol and boiler treatment chemicals stored in relatively small quantities in intermediary containers.	Low likelihood	Impact on soil and/or groundwater quality	Moderate / low risk

Potentially Polluting Substance Relevant System / Activity			Managing the risk	Assessment of Risk		
Hazard	Pathway	Receptor	Pollution prevention measures	Probability	Consequence	Overall Risk
Antifoam, glycol, boiler treatment chemicals	infiltration / runoff		Bulk tanks of polymer (liquid and powder, mixed polymer): All potentially polluting materials are located on concrete hardstanding and secondary containment for the primary tank and fill points are provided. Potential for run off to areas of soft ground. Tank and pipework subject to periodic inspections and maintenance.		[Medium]	
Failure of subsurface pipes and/or sumps transporting liquor and raw sludge	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Liquor transported in below ground pipes between vessels. Existing underground pipework will be surveyed using in-pipe crack detection technology every 2 years where there are mechanical joints, and a minimum of every 5 years elsewhere.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Failure of tank or supply lines, spillage during filling: Gas fuel oil	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Tank is integrally bunded. Fill point contained within bund. Tertiary containment provided by roll over bunding around tank area with drain gully inside.	Low likelihood	Impact on soil and/or groundwater quality [Medium]	Moderate / low risk
Failure of engine: Engine oil	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Engine enclosed and located on concrete hardstanding. All associated pipework is above ground. Engine subject to periodic inspections and maintenance.	Unlikely	Impact on soil and/or groundwater quality [Medium]	Low risk
Failure of transformer: Transformer oil	Direct site drainage / infiltration / runoff	Land, surface water groundwater	Transformer subject to periodic inspections and maintenance by appointed contractor.	Unlikely	Impact on soil and/or groundwater quality [Medium]	Low risk

Table 21 Risk Assessment methodology

Consequence	Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined in the Environmental Protection Act, Part IIA. Short-term risk of pollution of sensitive water resource (note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000)
	Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act 1991 contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem. (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000)
	Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/services or the environment
	Minor	Harm, although not necessarily significant, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.). Easily repairable effects of damage to buildings, structures and services.
Probability	High likelihood	There is a contaminant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution
	Likely	There is a contaminant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
	Low Likelihood	There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
	Unlikely	There is a contaminant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Risk level

		Probability			
Consequence		Severe	Medium	Mild	Minor
	High Likelihood	Very high risk	High risk	Moderate risk	Moderate low risk
	Likely	High risk	Moderate risk	Moderate low risk	Low risk
	Low Likelihood	Moderate risk	Moderate low risk	Low risk	Very low risk
	Unlikely	Moderate low risk	Low risk	Very low risk	Very low risk

Risk description	Very high	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to the designated receptor is currently happening. Urgent investigation (if not undertaken already) and remediation are likely to be required
	High	Harm is likely to arise to a designated receptor from an identified hazard. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely in the long term.
	Moderate	It is possible that harm could arise to a designated receptor for an identified hazard. However, if it is either unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk, and to determine the potential liability. Some remedial works may be required in the long term.
	Moderate low	It is possible that harm could arise to a designated receptor for an identified hazard, but it is likely that this harm, if realised, would at worst be mild
	Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Source: CIRIA document 552: 'Contaminated Land Risk Assessment; A Guide to good practice'.

The risk assessment indicates that the risk of pollution potential from activities to be operated within the facility is moderate low to low. A separate Accident Management Plan has been prepared which assesses other accidental / unexpected events which could increase the risk of release of a potential polluting substance (Reference 5).

7 Protection of Land and Groundwater During Operation

7.1 Site Operational Controls

The Esholt STF installation is operated in accordance with an Environmental Management System (EMS) and controls to minimise point source and fugitive emissions to air, water and land. The YW EMS is certified to ISO14001 and a planned maintenance and inspection programme is in place to optimise the operation of plant. Control measures specific to the containment of raw materials and process liquors include:

- High level alarms on bulk process tanks, linked to site SCADA, which cease pumping if the set point level is reached;
- Certain tanks also include emergency overspill arrangements, which would direct sludge to liquor return if overfilled;
- Hardstanding in key process areas and to immediate surrounds of key vessels and tanks;
- Drainage of process areas and associated hardstanding to liquor sumps and return to head of works for treatment;
- Tanker unloading connections contained within areas of hardstanding;
- Secondary or tertiary containment and level detection on key tanks and certain vessels; and
- Planned infrastructure inspection programme.

An Accident Management Plan (Reference 5) is also in place to assess risks and identify controls associated with accidents and other unplanned events.

7.2 Waste Handling

EMS procedures specify appropriate measures to ensure compliance with applicable legislation and to control and minimise pollution risks in relation to the generation, storage and disposal of wastes. Controls to minimise environmental risks associated with waste storage, handling and transfer include:

- Waste materials arising from the process are stored on site for the minimum period of time, in suitable, fit for purpose containers located on areas of hardstanding and away from sensitive receptors such as the River Aire. Waste containers are clearly labelled with their intended contents and container storage capacities are not permitted to be exceeded. Site housekeeping inspections are undertaken to ensure these standards are maintained.
- Very limited quantities of hazardous waste are generated by site activities. This is limited to items such as batteries, aerosols, waste oil and fluorescent tubes. Hazardous waste is always stored in secure containers, away from sensitive receptors and segregated from other waste types.
- Procedures are in place to ensure waste ‘duty of care’ requirements are met including ensuring that waste is only removed from site by contractors properly licenced and approved for use and accompanied by a fully completed waste transfer or hazardous waste consignment note. Waste transfer and consignment note records are retained electronically or as paper copies on site. Effective implementation of these procedures is supported by training for YW personnel as appropriate.

7.3 Environmental Monitoring Programme

The objectives of the monitoring programme are:

- To demonstrate that the pollution prevention measures will be inspected, tested and maintained over the lifetime of the permit; and
- To ensure that future pollution to land is not caused by installation activities.

Environmental monitoring of groundwater, surface water, soil and soil vapour is not considered to be required over the lifetime of the permit. It is considered that formalised inspection and testing procedures of the pollution prevention infrastructure will be sufficient to control the risk of future pollution from activities with the potential for releases to ground.

7.3.1 Infrastructure

A Secondary Containment Risk Assessment has been undertaken (Reference 3).

The site will maintain an inventory of tanks. The tanks will be:

- Impermeable and resistant to the stored materials; and
- Subject to visual inspection for rusting, leakage or other damage.
- Subject to programmed inspection incorporating visual examinations and non-destructive testing (e.g. ultrasonic thickness measurements).

Bunded areas will:

- Be impermeable and resistant to the stored materials;
- Be designed to catch leaks from the tanks or fittings;
- Be subject to regular visual inspection and any contents pumped out or otherwise removed under manual control after checking for contamination;
- Have fill points within the bund where possible or otherwise provide adequate additional containment; and
- Have a routine programmed inspection of bunds (normally visual but extending to water testing where structural integrity is in doubt).

7.4 Infrastructure Monitoring Programme

YW will continue to formally inspect and maintain site infrastructure in line with the requirements of the site's EMS and Inspection Procedures. This includes a programme of visual inspections by site staff of all tanks and bunds, pipework, drainage and hardstanding. The Technically Competent Manager also undertakes regular inspections on site to identify any potential issues and arrange resolution as necessary. All inspections are recorded in a site log and action taken as required. The log also records the work that has been carried out and any other issues noted within the operating period. Table 22 details the infrastructure inspection and testing programme which will continue to be utilised on site. The inspections will be carried out on a frequency defined in maintenance and management procedures and will primarily be visual to identify any signs of corrosion, cracks or other damage.

Table 22 Details of infrastructure inspection and testing

Activity	Specific Activities	Inspection & Testing Details	Frequency
Process tanks, bunds and associated pipework and valves	Sludge processing	In accordance with YW Inspection Procedures include periodic visual inspection of shell, concrete collars, valves and above ground pipework. Regular check on condition and functioning of gauges, level floats and alarms. Tanks subject to periodic drain down for condition inspections, and NDT to check shell thickness.	In accordance with Inspection Procedures (IP), visual checks as set out in daily, weekly and monthly tasks, frequency of NDT to be determined by asset age and condition.
Underground pipework	Sludge processing	Underground pipework surveyed using in-pipe crack detection technology.	Every 2 years where there are mechanical joints, and a minimum of every 5 years elsewhere else.
Raw materials tanks and bunds	Sludge treatment, biogas combustion	In accordance with YW Inspection Procedures to include periodic visual inspection of shell, concrete collar, valves and pipework. Regular check on condition and functioning of gauges, level floats and alarms. Tanks subject to periodic drain down for condition inspections, and NDT to check shell thickness.	In accordance with IP, visual checks as set out in daily, weekly and monthly tasks, frequency of NDT to be determined by asset age and condition.
Boilers, biogas bulk storage and associated pipelines	Combustion of biogas	Visual checks of the pipe work and connections. Visual checks of plant for signs of leaks, corrosion or damage.	Subject to daily walk around. Weekly inspections of gas holder membrane, blowers, burners.
Oil / fuel storage and pipework	Storage and use of light fuel oil, lubricating oil and waste oil	Tank bunds will be visually checked for accumulated rainwater. Visual checks of the pipe work and connections, and any leaks, corrosion or damage rectified as appropriate.	Monthly (more frequently in periods of high rainfall).
		Visual checks of the tank/ bund to check integrity, if the integrity of the bund is suspect then water testing of the bund will be undertaken.	Monthly
		Associated underground pipework will be surveyed using in-pipe crack detection technology	Every 2 years where there are mechanical joints, and a minimum of every 5 years elsewhere else.

Activity	Specific Activities	Inspection & Testing Details	Frequency
Surface water and process area drains	Transport of rainwater and liquors.	Site drainage plans will be maintained with any changes made incorporated. Any suspected leaks will be inspected promptly and the necessary remedial action taken.	Every 5 years where there are mechanical joints, and a minimum of every 10 years elsewhere else.
Surfacing	All areas within the facility including around bulk storage tanks, fill points, and waste storage areas.	Areas of hardstanding inspected by detailed visual inspection to assess condition, wear, cracks and surface break up.	Periodic checks carried out under daily, weekly and monthly IP
Site Maintenance	Routine maintenance to process equipment	Maintenance to all pumps, electrical activated valves (EAVs), isolating / non-return valves and associated infrastructure.	As per manufacturer requirements and more often when necessary due to identified defects.

7.5 Personnel Issues

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure will be trained to an appropriate level to ensure compliance with the infrastructure monitoring programme.

Staff will be trained in the use of spill kits and spillage response procedures as part of the site's Environmental Management System.

7.5.1 Reporting Procedure

A log of site inspections will be maintained for the life of the permit. Any maintenance or actions identified during inspections will be recorded using the current procedures for environmental incident reporting. Subsequent actions taken (such as repair of damaged structures and leaking containers) will be recorded in the site log.

At time of surrender, the site's inspection and maintenance records are to be made available for inspection by the EA to demonstrate that the containment and risk control mitigation measures have been maintained for the duration of the permit, such that no deterioration of land or water quality has occurred as a result of the site's activities. The evidence will need to show that:

- Measures to protect land and groundwater have worked;
- Pollution incidents that may have affected the land were investigated and remediated; and
- Any risk of pollution by decommissioning has been investigated and remediated.

8 Statement of Site Condition

The SCR is based on a desk study review of the historical land use, a series of previous ground investigations and reviews, and observations made during a site reconnaissance visit. It has confirmed the following ground conditions:

- Made ground is present across the site, to an estimated maximum thickness of 10m. Typically it ranges between 2 and 5m thick and comprises of variable cohesive and granular materials with cobbles of sandstone, brick, and concrete.
- Made ground overlies superficial deposits of alluvium, River Terrace Deposits and glacial till which vary in thickness between 0.25m and 9m.
- Solid geology of the Millstone Grit Group comprising fine to medium grained sandstones, siltstones and mudstones, was also encountered at depths of between 5.0 and 16.8m bgl.
- Groundwater was encountered within superficial deposits at depths and within deeper geology. Records suggest that water strike depths are highly variable across the site, potentially indicating perched groundwater retained by low permeability deposits or infilled structures. Groundwater levels are also likely to be influenced by the River Aire.
- Given the long-term historical use of the site and its surroundings, legacy contamination including metals, ammoniacal nitrogen, organic compounds including petroleum hydrocarbons and poly-aromatic hydrocarbons and asbestos is likely to be present and plausible pathways to potential receptors have been identified. Previous site investigation data provides a useful indicative baseline of conditions prior to IED.
- The permitted installation will result in the storage, use, and processing of a number of potentially contaminative materials, including sewage sludge, cake, liquor, liquid and powder raw materials associated with their treatment, and oils, fuels and lubricants associated with the operation of the CHP plant.
- The principal potential receptors for existing and future contamination are considered to comprise site operational staff and visitors, soil, groundwater and the River Aire.
- The permitted activities include a range of containment and management measures for the process areas which will limit the potential for spills or leaching of pollutants from the site directly to the underlying soils and adjacent River Aire.
- All potentially contaminated flows are directed via the site's liquor collection system and returned to the WwTW for treatment.
- It is considered that the permitted activities to be undertaken at the site will not present a significant risk of pollution or harm due to the various containment measures provided by site infrastructure and the implementation of a planned preventative maintenance programme.

9 References

1. Esholt Waste Water Treatment Works CHP Plant. Environmental Permit number EPR/VP3130GZ. Issued to Yorkshire Water Services Limited. First issued 25th November 2008, last varied (EPR/ VP3130GZ /V004) 7th December 2012

2. Yorkshire Water Environmental Management System

3. Yorkshire Water: Esholt Sludge Treatment Facility. Supporting Technical Assessment: Secondary Containment Risk Assessment. June 2021

4. Horizontal Guidance Note H1. Environment Agency

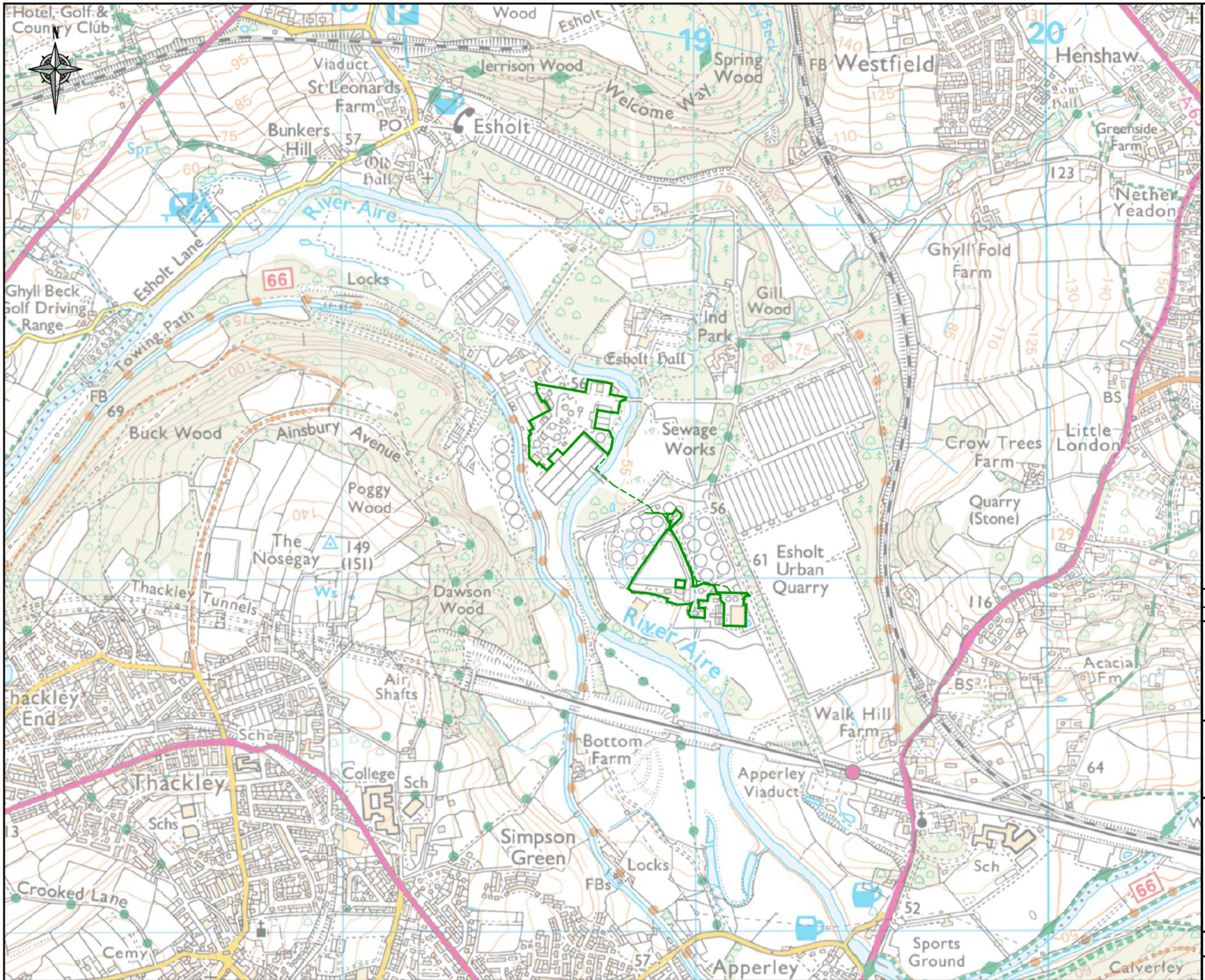
5. Yorkshire Water: Esholt Sludge Treatment Facility Accident Management Plan. June 2021

Other studies cited:

A. Geotechnical Engineering (Northern) Ltd. Ground Investigation Report. August 1989
B. Soil Mechanics (2005) Report No. A4178. Factual Report on Ground Investigation. April 2005
C. Ove Arup & Partners (2005) Esholt WwTW- FFD Scheme. Geotechnical Information Pack
D. Esholt WwTW FFD Scheme. Site Condition Report for CHP Plant Application. Ove Arup & Partners Ltd. August 2008.
E. Esholt WwTW: Proposed CHP Plant 11/03788/FUL, Phase 2 Land Quality Assessment Final. Morgan Sindall Grontmij Joint Venture (December 2011).

Figures

Figure A1 Site Layout



KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- INDICATIVE RETURN LIQUOR ROUTE

VERSION	DRWN	CHKD	REVD		DATE
A	MD	AW	ES	FOR PERMIT PLANNING	01.23

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ESHOLT SLUDGE TREATMENT FACILTY

SITE CONDTION REPORT

SITE LOCATION PLAN

SCALE	SHEET SIZE
1:10,000	A3
DRAWING NUMBER	REVISION
FIGURE 1A - SITE LOCATION PLAN	A

Figure A2 Potential Sources of Pollution (Sheets 1 and 2)

N

KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- STORAGE OF RAW MATERIALS
- WASTE STORAGE
- STORAGE OF SLUDGE & PROCESS LIQUORS

VERSION	DRWN	CHKD	REVD		DATE
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SITE CONDITION REPORT
POTENTIAL SOURCES OF POLLUTION
SHEET 1 OF 2

SCALE	SHEET SIZE
1:1000	A3
DRAWING NUMBER	REVISION
FIGURE 2A - POTENTIAL SOURCES OF POLLUTION	A

KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- INDICATIVE RETURN LIQUOR ROUTE
- STORAGE OF RAW MATERIALS
- WASTE STORAGE
- STORAGE OF SLUDGE & PROCESS LIQUORS

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POTENTIAL SOURCES OF POLLUTION
SHEET 2 OF 2

SCALE	SHEET SIZE
1:1250	A3
DRAWING NUMBER	REVISION
FIGURE 2A - POTENTIAL SOURCES OF POLLUTION	A

Figure A3 Site drainage (Sheets 1 and 2)

KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- PROCESS LIQUOR / DRAINAGE TO WwTW
- ROOF WATER

VERSION	DRWN	CHKD	REVD		DATE
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SITE CONDITION REPORT
KEY DRAINAGE ROUTES
SHEET 1 OF 2

SCALE	SHEET SIZE
1:1000	A3
DRAWING NUMBER	REVISION
FIGURE 3A - KEY DRAINAGE ROUTES	A

N

RETURN ROUTE TO WwTW

KEY.

- INSTALLATION BOUNDARY
- INDICATIVE DIGESTED SLUDGE PIPEWORK ROUTE
- INDICATIVE RETURN LIQUOR ROUTE
- PROCESS LIQUOR / DRAINAGE TO WwTW
- ROOF WATER

VERSION	DRWN	CHKD	REVD		DATE
A	MD	AW	ES	FOR PERMITTING	01.23

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ESHOLT SLUDGE TREATMENT FACILTY
SITE CONDITION REPORT
KEY DRAINAGE ROUTES
SHEET 2 OF 2

SCALE	SHEET SIZE
1:1250	A3
DRAWING NUMBER	REVISION
FIGURE 3A - KEY DRAINAGE ROUTES	A

Figure A4 Site surfacing (Sheets 1 and 2)