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# THE ARLEY CONSULTING COMPANY LIMITED

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Chorleian House  
49-51 St Thomas's Road  
Chorley, Lancashire, PR7 1JE

Tel: 01257 278300  
Fax: 01257 268063  
Email: mailbox@taccl.co.uk

**Report No 05292/11**

**July 2021**

**ENVIRONMENTAL SETTING AND SITE DESIGN  
for the  
FORMER SAPPI PAPER MILL  
BLACKBURN**

**Prepared for**

**BLACKBURN WATERSIDE REGENERATION LIMITED  
4th Floor  
Queen Victoria House  
41-43 Victoria Street  
Douglas  
Isle of Man  
IM1 2LF**

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## 1. INTRODUCTION

- 1.1 The Arley Consulting Company Limited (TACCL) has been commissioned by Blackburn Waterside Regeneration Limited (BWR) to prepare an environmental setting and site design (ESSD) report to support a bespoke recovery permit application for land at the former SAPPI paper mill, Blackburn, Lancashire.
- 1.2 The site comprises an area of brownfield land which previously housed two paper mills (Star Mill and Sun Mill). Paper operations ceased in 2008 and all mill buildings have been demolished and cleared. Outline planning permission (Ref 10/15/0496) has been granted by Blackburn with Darwen Borough Council (BDBC) for the redevelopment of the site for a mixed residential and commercial use up to a maximum of:
- 500 dwellings
  - 3,224 m<sup>2</sup> of B1a employment use
  - 9,192 m<sup>2</sup> B1c employment use
  - 333 m<sup>2</sup> commercial use
  - 1110 m<sup>2</sup> community building, landscaping and open space
- 1.3 As part of the development, importation of material is required to raise the level of the valley floor to provide a suitable level building platform. In addition, the Sun Reservoir will be decommissioned as recommended by the panel engineer. It is proposed to partially infill this reservoir following decommissioning to reduce the risks associated with impounding large volumes of water.
- 1.4 The engineering works have been partially completed using material imported under the CL:AIRE Definition of Waste Code of Practise, but further works are required to prepare the site for future development.
- 1.5 It is proposed to create a level building platform to enable construction of houses in Phase 4A and to partially infill the Sun Reservoir so that it can be decommissioned to remove it from the requirements of the Reservoirs Act.
- 1.6 A Waste Recovery Plan<sup>1</sup> (WRP) was submitted to the Environment Agency (EA) in September 2020 as pre-application to a bespoke permit application.
- 1.7 The EA accepted that the proposed activity was 'recovery' in advice dated 30 October 2020.

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<sup>1</sup> TACCL, September 2020, Waste Recovery Plan for the former SAPPI Paper Mill, Blackburn (Report Ref 05292/10)

- 1.8 The ESSD report has been prepared in accordance with current EA guidance, specifically *Template: Conceptual Site Model, Environmental Setting and Site Design Report*, dated 14 October 2016.
- 1.9 Sources of Information used to compile this report include:
- Geo-environmental Appraisal, Encia Environmental, May 2009
  - Geo-environmental Desk Study, Campbell Reith, May 2015
  - Supplementary Intrusive Investigation and Assessment, Capita Symonds, September 2016
  - Phase 2 Remediation Strategy, Capita Symonds, March 2017
  - Flood Risk Assessment, Eden Vale Young, November 2018
  - SAPPI Stockpile Investigation, Envestigate, November 2019

## **2. SITE DETAILS**

### **2.1 Site Location and Access**

2.1.1 The site is situated in Feniscowles, Blackburn, Lancashire approximately 4.8 km from the centre of Blackburn. It is located between Moulden Brow and Livesey Branch Road. The national grid reference (NGR) for the site is SD 64500 24900. A site location plan is contained in Appendix G.

2.1.2 The site is accessed off Star Drive which is off Livesey Branch Road.

2.1.3 The residential area of Feniscowles is situated to the north and north-east of the site.

2.1.4 The Leeds Liverpool Canal forms a boundary to the east and south-east. Beyond the canal lies farmland and the M65 motorway.

2.1.5 Immediately to the south of the development area is a power station operated by Scottish Power and a former landfill site which was used for disposal of industrial waste produced by the paper mills. Beyond the landfill site is the canal and motorway.

2.1.6 Wrapping around the site from the south the north-west are Stanworth Woods, which is a local wildlife site.

2.1.7 The Sun Reservoir is to the north-west of the site.

2.1.8 The permit boundary, areas for deposit and site ownership boundary are shown on Drawing No 05292/25.

### **2.2 Site Classification**

2.2.1 It is proposed to use suitable construction, demolition and excavation waste in order to achieve the topography required for the development in accordance with the WRP already approved by the EA. A total of 200,432 m<sup>3</sup> of additional fill will be required to achieve this.

2.2.2 Under the Environmental Permitting Regulations 2010 and supporting EA guidance, this activity should be regulated under a bespoke deposit-for-recovery environmental permit.

## **2.3 Application Boundaries and Site Security**

- 2.3.1 The application boundary is shown in green on the site layout plan, which is presented in Appendix G as Drawing No 05292/25.
- 2.3.2 The site ownership boundary is securely fenced with 1.8 m palisade fencing. The site entrance is gated part way along Star Drive with lockable palisade gates.
- 2.3.3 Additional fencing is also in place between different areas of the site. Paramesh fencing is in place along the boundary of phases 1A and 1C to separate them from Phase 4A. The boundary between phase 4A and 4B is also secured with palisade fencing to prevent access to phase 4A from the public footpath which crosses phase 4B.
- 2.3.4 There is no public access to the Sun reservoir, it is fenced and gated for private access only.

## **2.4 Adjacent Waste Management Activities**

- 2.4.1 There are a number of historic landfill sites in close proximity to the site which are listed in Table 1 below and reproduced from the Groundsure report at Appendix B. These are shown on Drawing No 05929/24. The closest to the site are the Star Mill landfill site located to the south of the power station, which is also built on waste from the paper mill. Sun Paper Mill landfill is also called Laurel Bank landfill and is located across Molden Brow to the north-east.

<b>Reference</b>	<b>Site</b>	<b>Direction</b>	<b>Approximate Distance from Site</b>
1	Star Paper Mill	S	Adjacent
2	Land at Stockclough Lane	SE	203 m
3	Biffa, Bolton Rd	SW	625 m
4	Sun Paper Mill (Laurel Bank)	N	13 m
5	Stockclough Quarry LCC	SE	103 m
6	Stanworth Farm	SW	535 m
7	Withnell Quarry	SW	684 m
8	Higher Stanworth Farm	SW	953 m
9	Higher Stanworth Farm	SW	1071 m

**Table 1: Historic Landfill Sites Within 1 km of the Site**



## **2.5 Site Context**

- 2.5.1 The site has planning permission for mixed use redevelopment.
- 2.5.2 Importation of material commenced in 2017 to backfill excavated relic foundations and ground slabs, following demolition and clearance of the former mill buildings, to provide a level site to carry out site investigation and for machine access for remediation works.
- 2.5.3 Material was imported under a materials management plan (MMP) following the Definition of Waste Code of Practice (DoWCoP) produced by CL:AIRE.
- 2.5.4 In March 2019 the EA informed the site operator that they do not consider that importation of waste has been carried out in full accordance with the DoWCoP. BWR carried out an investigation<sup>2</sup> of the imported material which revealed that the material was uncontaminated. BWR reported that a total of 88,000 m<sup>3</sup> had been imported.
- 2.5.5 In order to complete the approved earthworks BWR needs to import a further 107,771 m<sup>3</sup> of suitable fill material into Phase 4A to achieve the required levels.
- 2.5.6 The development site has been separated into a number of phases shown on the restoration master plan contained in Appendix G. Phase 1 covers the north and east of the site and sits either side of the access road. The surface consists of subsoil which has been levelled in preparation for building.
- 2.5.7 Phase 2 covers the new road and river diversion.
- 2.5.8 Phase 3 is the employment area. This area is included in the permit boundary as it contains stockpiled of material imported under the MMP which will be relocated to Phase 4A. This material is included in the 88,000 m<sup>3</sup> already imported.
- 2.5.9 Phase 4 (formerly Phase 2) is spilt into phase 4A and 4B and covers the footprint of the demolished mills along the valley floor. The mills have been demolished and the foundations and underground structures have largely been removed. Site Investigation of this area<sup>3</sup> found elevated areas of contamination and a remediation strategy<sup>4</sup> was agreed with BWDC. This involved removing contamination hotspots and placing a 1 m depth of clean fill across the site as a capping layer.

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<sup>2</sup> SAPPI Stockpile Investigation, Envestigate, November 2019

<sup>3</sup> Supplementary Intrusive Investigation and Assessment, Capita Symonds, September 2016

<sup>4</sup> Phase 2 Remediation Strategy, Capita Symonds, March 2017

- 2.5.10 Phase 4A was formerly occupied by the Star Paper Mill and the partially infilled Mill Lodge reservoir, with the culverted River Roddlesworth running through the centre. This is at a lower elevation than Phase 1 and covers approximately 82,230 m<sup>2</sup>. This area requires a substantial volume of fill to construct a platform for redevelopment.
- 2.5.11 Phase 4B was occupied by the Sun Paper Mill. This area requires further importation of material but the formation levels are yet to be determined and so this was not included in the Waste Recovery Plan. This will be determined in the near future after which the permit will be varied to include deposit in this area. It has been included within the wider permit boundary.
- 2.5.12 The Sun Reservoir sits within Stanworth Wood which is a Biological Heritage Site. Part of the wood is replanted ancient woodland. The final plans for this area are yet to be determined but the general outline is that the size of the water body will be reduced to bring it out of the Reservoirs Act. The reservoir will not be completely infilled, a smaller water body will be retained. The resulting space from the infilled area will be green space for amenity use, it will not be used for residential or employment buildings.

### **Topography**

- 2.5.13 The topography of the site has been established by surveying and is presented in a series of drawings (BWR-1357-01-EW-002 to 009) contained in Appendix G.
- 2.5.14 In general the site slopes from east to west and also from south to north, so the lowest point of the site is the north-western corner. The eastern edge of Phase 4A ranges from 95 m AOD in the south to 83 m AOD in the north. The western edge of Phase 4A ranges from 87 m AOD in the south to 81 m AOD in the north.

### **Environmental Receptors**

- 2.5.15 A summary of land uses and environmental receptors is presented in Table 2 and shown on Drawing No 05292/29.
- 2.5.16 The closest residential receptors are on Laurel Bank Terrace, Tintagell Close and Coronation Avenue. These properties are screened by mature trees and are at a higher elevation than the site.
- 2.5.17 There are a number of surface water bodies both within the site boundary and in close proximity to the site.
- 2.5.18 Stanworth Woods surrounds the site and consists of priority habitat deciduous woodland and also an area of ancient woodland.

2.5.19 A public footpath crosses Phase 4B. This is currently separated by palisade fencing from phase 4A and the Sun Reservoir. When works progress to phase 4B the footpath will either be fenced in or temporarily diverted.

Receptor Ref	Receptor	Direction from Site	Distance from Site (m)
<b>Domestic Dwellings</b>			
1	Tintagell Close	N	20
	Laurel Bank Tce, Hawthorn Cottage, Hillock Farm	N	18 - 215
	Property on Moulden Brow	NW	180
	Properties in Feniscowles	NE	50 - 500
<b>Industrial/Commercial Premises</b>			
2	Blackburn Mill Power station	S	20
	BW Caravan Storage, Aqualease UK, CSA Photonics	E	190 - 255
	Old Toll Bar	W	310
<b>Public Amenity</b>			
3	Feniscowles Sports & Recreation Club	N	230
<b>Schools, Hospitals, Care Homes</b>			
4	Feniscowles Primary School	N	360
<b>Grade II Listed</b>			
5	Millfield Bridge	S	155
	Roddlesworth Aqueduct	S	230
	Unreferenced Building	E	255
	Unreferenced Building	NE	220
<b>Highway or Minor Road</b>			
6	Star Drive	N	Site road
	Preston Old Road	N	Adjacent
	Tintagell Close	N	45
	Minor roads in Feniscowles	N	70 - 500
	Finnington Lane	W	330
	M65 Motorway	S	320
	Stockclough Lane	E	220
<b>Railways</b>			
	None identified		
<b>Public Rights of Way</b>			
7	Footpaths	NW, S, SE	transect site - 500 m
<b>Controlled Waters</b>			
8	River Roddlesworth	-	Within site
	Sun Reservoir	-	Within site
	Mill Lodge Reservoir	-	Within site
	River Darwen	N	Adjacent
	Finnington Brook	W	Adjacent
	Leeds and Liverpool Canal	S, E	80
	Unnamed Reservoir	SW	230

**Table 2 (cont over): Land Uses and Environmental Receptors within 500 metres of the Site**

<b>Ecological Receptors</b>			
8	Protected species: Brown trout and Bullhead (fish) in River Roddlesworth	-	Within site
9	Local wildlife sites: Stanworth Valley Woods Stanworth Woods and reservoir Moulden Banks  Priority Habitat: Deciduous Woodland  Ancient Woodland: Head/hole bottom woods	E, N, S, W	Adjacent - 500 m

**Table 3 continued: Land Uses and Environmental Receptors within 500 metres of the Site**

### 3. SITE DEVELOPMENT

#### 3.1 Historical Site Development

3.1.1 The history of development on and off site is detailed in the Campbell-Reith Geo-environmental Desk Study (May 2015) and relevant extracts are reproduced below. Table 3 lists the development of the site over time. Selected historical maps are contained in Appendix A.

Date	On Site Development	Development of the Surrounding Area
1846	The site was undeveloped open land, likely used in part for agricultural purposes, with the River Roddlesworth flowing through the centre from south-east to north-west.	The site was predominantly surrounded by undeveloped open land, likely used for agricultural purposes; the Leeds-Liverpool canal is present to the east and south.
1891 - 1893	The site had been largely developed. Star Paper Mill had been constructed in the central sector, comprising several large adjoined industrial buildings, tanks, a well and other infrastructure. Furthermore, significant works had been undertaken to create a reservoir adjacent to the south boundary of the site, with the River Roddlesworth re-routed and culverted through the central sector. Waterway infrastructure is also apparent to the south, including sluice gates and embankments, and a quarry was labelled to the north west of the mill buildings. In the west sector Sun Paper Mill had also been constructed and comprised several large buildings, tanks and a well.	Reservoirs had been constructed to the south and south-west of the site associated with the newly implemented paper mills. In addition, a tramway was present to the south-west of the west sector, associated with Sun Mill. The Cherry Tree and Chorley Line railway had been constructed to the east, beyond the canal.
1909 - 1911	Further development is apparent to both paper mill facilities, including several new buildings to the south elevations, whilst an area previously labelled as "tanks" was now labelled as "filter tanks". In addition, a tank, reservoir and nearby filter bed are noted to have encroached within the south east area of the site boundary.	The filter bed and reservoir noted in the south-east of the study area extend off site to the south.

**Table 4 (continued overleaf): Historical Development**

Date	On Site Development	Development of the Surrounding Area
1928 - 1931	An area labelled as "settling tanks" was noted nearby to the north of Star Mill. Star Mill had been extended to the west across the footprint of the now former quarry. A potential slag heap is also indicated between the former quarry and the southern site boundary. In the south east sector of the site several new buildings had been implemented, with an associated tank also noted nearby. The former reservoir and filter bed noted in this area were now labelled as a sludge bed and settling tanks respectively.	Residential dwellings and bowling club, football ground to the north-east
1938 - 1962	No significant changes noted.	Housing development to the north-east
1967 - 1968	Several tanks previously not shown on historic maps are apparent at the Star Mill site, noted to the south and south-east of the main buildings, as well as to the south-east of the access road approaching the reservoir dam. In addition to the above, the slag heap noted to the south-west of the main Star Mill buildings is now labelled as such.	Sand Quarry near Higher Stoneclough
1970 - 1994	The aforementioned sludge bed and settling tanks situated in the south-east sector of the site appear to have been removed and/or infilled.	A depot and engineering works have been constructed to the east of the site
2002 - 2010	By this time Sun Mill had been demolished whilst Star Mill appears to have remained unchanged.	No significant changes noted.
2014	The majority of Star Mill had been demolished, with only some buildings situated to the south west of the former main facility remaining.	

**Table 3 (continued): Historical Development**

3.1.2 Google Earth imagery for the site is available from 2000 onwards and supports the site history presented in Table 2. Figure 1 below is from 2000 which shows the Sun Mill largely demolished but the Star Mill in the centre of the site.



**Figure 1: Google Earth Image 2000**

- 3.1.3 Following demolition of the mills and the grant of outline planning permission for development, waste soil was imported under a Materials Management Plan. Around 88,000 m<sup>3</sup> of waste soil was imported under the MMP. This has been placed in stockpiles around the site, ready to be spread into engineered in according to the engineering specification.
- 3.1.4 Importation under the MMP ceased in 2019. No further development has been undertaken since this time.
- 3.1.5 Figure 2 below is a Google Earth image of the site taken in April 2020 showing Phase 4A in the centre with all buildings demolished and the Mill Lodge Reservoir partially infilled. This shows the situation at the time of permit application.



Figure 2: Google Earth Image 2020



## 4. PROPOSED DEVELOPMENT

### 4.1 Waste Activity

- 4.1.1 It is proposed to recover suitable waste as engineering fill to complete the required development platform for construction of up to 200 houses in Phase 4A as shown on the JRP Masterplan.
- 4.1.2 The valley floor, which was occupied by the Star Mill, requires importation of engineering fill to create a more level building platform. In general, the site slopes from east to west and also from south to north, so the lowest point of the site is the north-western corner.
- 4.1.3 It is proposed to raise the formation levels to 90 m AOD in the south to 84 m AOD in the north.
- 4.1.4 The eastern edge of Phase 4A ranges from 95 m AOD in the south to 83 m AOD in the north. It is proposed to raise this to range from 95 m AOD in the south to 84 m AOD in the north. The western edge of Phase 4A ranges from 87 m AOD in the south to 81 m AOD in the north.
- 4.1.5 The proposed profile of the site is contained within a series of drawings produced by Inspire Design and Development Ltd with the references BWR-1357-01-EW-002 to 009. These consist of a number of cross-sections showing the original ground level and the proposed finished level and are contained within Appendix G.
- 4.1.6 Cut and fill calculations from cross sections referenced above indicate that 195,771 m<sup>3</sup> of infill material will be required to raise the building platform from the original base level to the design level. A total of 88,000 m<sup>3</sup> has already been imported under the MMP which leaves a balance of 107,771 m<sup>3</sup> import required for Phase 4A.
- 4.1.7 Material will be deposited and dozed out in layers and rolled in accordance with the Earthworks Specification<sup>5</sup>, which has been submitted with the application. The general specification is that construction of the platform shall be in accordance with Specification for Highway Works Series 600.

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<sup>5</sup> Earthworks Specification, Inspire Design and Development Ltd, November 2019

4.1.8 The panel engineer has recommended that Sun Reservoir be decommissioned. It is proposed to partially infill this reservoir following decommissioning to provide public amenity space for use by residents of the new housing development. The required infill is 92,661 m<sup>3</sup>. The specific details of infilling the Sun Reservoir are still to be determined, including engineering and ecological considerations. It is requested that this phase of the development is subject to pre-operational conditions.

4.1.9 The completed waste recovery site will become a residential area with associated public open space as part of the wider development scheme as shown on the JRP Masterplan Drawing No 17 5150 86 contained in Appendix G.

## 4.2 Waste Types

4.2.1 Waste used will need to be suitable both physically and chemically. Table 4 lists waste types by EWC codes which are considered potentially suitable for recovery.

4.2.2 Waste acceptance procedures have been developed which include:

- Waste input criteria
- Source evaluation assessment of suitable fill
- Review of site investigation reports and chemical analysis to assess whether the soils are uncontaminated and suitable for use
- Monitoring of imported materials by way of verification testing.

EWC Code	Description
<b>17 01</b>	<b>Concrete, bricks, tiles and ceramics</b>
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixture of concrete, bricks, tiles and ceramics
<b>17 05</b>	<b>Soil (excluding excavated soil from contaminated sites) stones and dredging spoil</b>
17 05 04	Soil and stones

**Table 4: Waste Types Proposed for Recovery**

4.2.3 The proposed waste types have been chosen as very low risk waste types to minimise the environmental risks and to ensure their recovery causes no detriment to the site and surrounding areas.

## 4.3 Waste Volumes

4.3.1 The proposed volume of waste to be recovered is 200,432 m<sup>3</sup>. The justification for this volume is set out in the approved Waste Recovery Plan and the breakdown is shown in Table 5.

Phase	Area (m <sup>2</sup> )	Fill (m <sup>3</sup> )	Already Deposited (m <sup>3</sup> )	Balance (m <sup>3</sup> )	Balance (tonnes*)
4A	82,230	195,771	88,000	107,771	193,987
Sun Reservoir	20,007	92,661	0	92,661	166,789
Total	102,237	288,432	88,000	200,432	360,776

**Table 5: Materials Balance**

Note: \* Using average density of 1.8 Mg/m<sup>3</sup>

#### 4.4 Hydrogeological Risk Screening

- 4.4.1 A qualitative hydrogeological risk assessment has been produced, Report No 05292/14, to assess the risks of the activity to groundwater. The waste types proposed will be restricted to uncontaminated waste. They will not give rise to the discharge of hazardous substances or non-hazardous pollutants. The site is not sub water table. The risks of the recovery operation to groundwater have been determined to be very low.

## 5. PATHWAYS AND RECEPTORS

### 5.1 Climate

5.1.1 Information relating to wind speeds and direction has been obtained from the closest meteorological station at Warton Aerodrome, approximately 30 km west of the site. Data was obtained from IEM<sup>6</sup> and presented in Figure 3 below. The predominant wind direction is from the west.

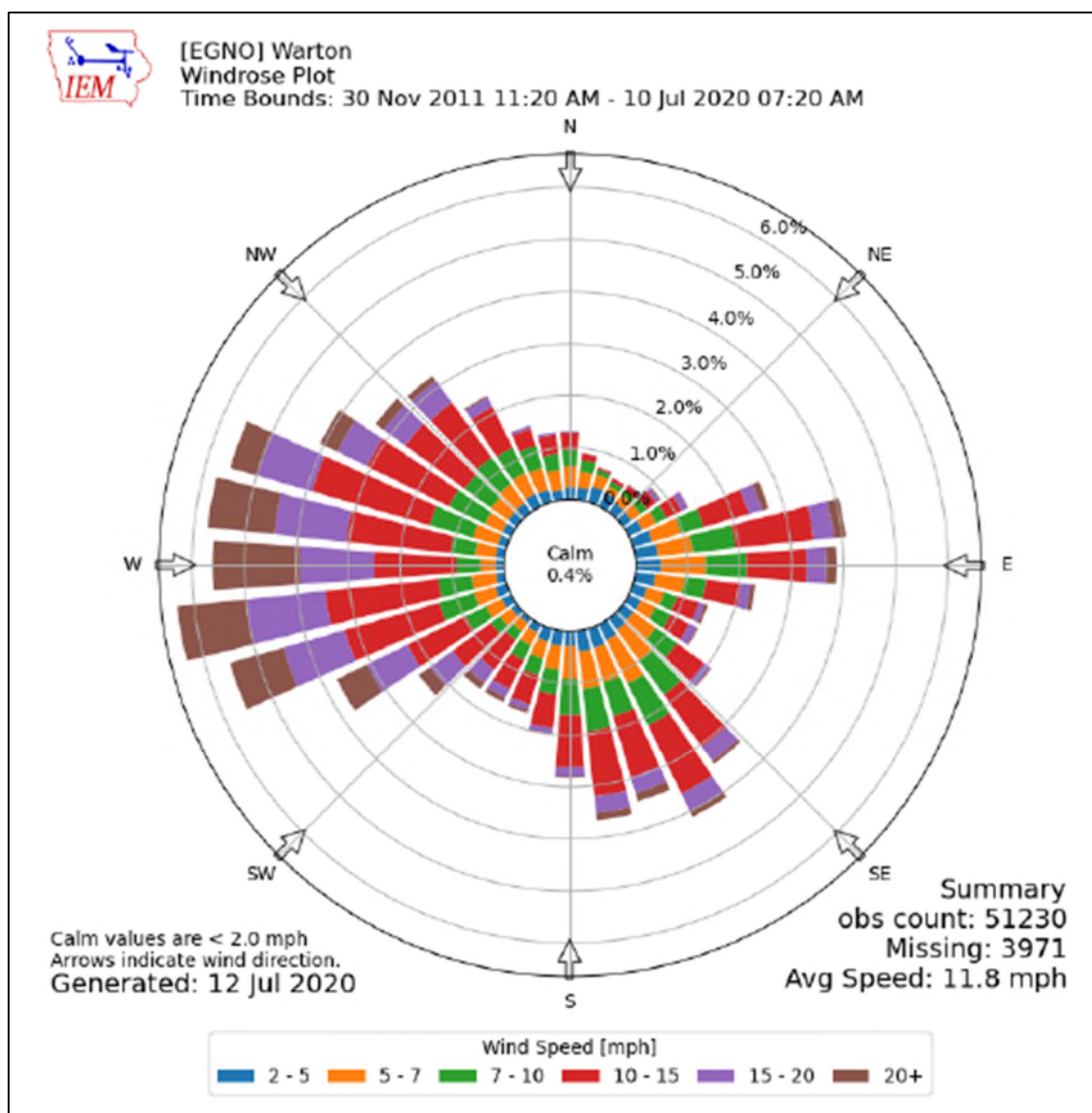


Figure 3: Annual Wind Rose for Warton Aerodrome

<sup>6</sup> Wind rose generated by Iowa Environmental Mesonet provided by Iowa State University (accessed at [https://mesonet.agron.iastate.edu/sites/locate.php?network=GB\\_ASOS](https://mesonet.agron.iastate.edu/sites/locate.php?network=GB_ASOS))

5.1.2 Long term average rainfall data has been obtained from the Met Office<sup>7</sup> for the closest monitoring station at Stonyhurst College Observatory, which is approximately 11 km north of the site. From this information it can be seen that the mean annual rainfall for the climate period 1981 to 2010 is 1294 mm, and the average number of days with greater than 1mm rainfall is 167 per year. This is presented in Table 6.

Month	Maximum temperature (°C)	Minimum temperature (°C)	Days of air frost (days)	Sunshine (hours)	Rainfall (mm)	Days of rainfall ≥1 mm (days)
January	6.5	1.5	10.1	45.8	124.2	17
February	6.8	1.2	10.4	67.9	94.2	12.4
March	9	2.9	5.4	94.8	104.4	14.7
April	11.7	4.3	2.6	148.8	66.6	11.6
May	15.3	7.1	0.4	175	73.4	11.3
June	17.8	9.7	0	166.6	90.1	11.8
July	19.7	11.8	0	156.9	96	12.1
August	19.2	11.7	0	164.9	108.2	14.1
September	16.7	9.6	0	117	114.7	14.1
October	13	7	1.4	92.5	141.4	15.6
November	9.2	4	4.9	61.8	139.4	16.9
December	6.8	1.7	10	43.1	141.6	16.1
Annual	12.7	6.1	45.2	1335	1294.2	167.8

**Table 6: Climate Data from Stonyhurst Observatory, 1981 - 2010**

5.1.3 Compared to surrounding receptors, the site is at a lower elevation within the river valley and is well sheltered by both the topography and surrounding woodland.

## 5.2 Geology

5.2.1 Online British Geological Society data shows that superficial drift strata beneath the site consist of alluvium and glacial till deposits, with solid strata comprising sandstone (Lower Haslingden Flags) and mudstone/siltstone /sandstone (Rossendale Formation).

<sup>7</sup><https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcw4rg5df>

5.2.2 On site investigations undertaken as part of site investigation works to develop the remediation method statement<sup>8</sup> confirmed the presence of alluvium and glacial till deposits. The bedrock was identified as sandstone of the (weathered) Pennine Lower Coal Measures and sandstone of the Millstone Grit Formation.

5.2.3 The Campbell Reith report produced a summary of site geology from BGS maps, the Groundsure report and nearby borehole logs which is presented in the desk study report. The summary is reproduced as Table 7.

Strata		Depth to base (m bgl)	Thickness (m)	Description
Made Ground		0.7 - 3.5	0.7 - 3.5	Made ground
Devensian Till		9-20	8.5-13.5	Diamicton
Alluvium (where present)		variable dependant on location	0.1 - 0.5	Clay, sand and gravel
Devensian Glaciofluvial Deposits (where present)		6.5 - 11.5	5.9 - 11	Gravel, sand and silt
Pennine Lower Coal Measures Formation		Variable - sub-crops beneath superficial geology in NE and W of site	> 2.4	Mudstone, siltstone, sandstone
Millstone Grit	Upper Haslingden Flags	> 13	Depth	Sandstone
	Rough Rock			Sandstone
	Rossendale Formation			Mudstone, siltstone, sandstone
	Woodhead Hill Rock			Sandstone

**Table 7: Summary of Site Geology (Campbell Reith, 2015)**

### 5.3 Hydrology

5.3.1 The River Roddlesworth flows through the site from south to north. Just inside the southern boundary it enters a 290 m long culvert. The river emerges from the culvert at the north-eastern boundary, from where it flows beneath Moulden Brow and into the River Darwen to the north. It is proposed to take the river out of culvert as part of the site development and realign the channel along the western boundary of phase 4A.

<sup>8</sup> SAPPI Phase 2 Remediation Strategy, CAPITA, March 2017

- 5.3.2 Two reservoirs were constructed to serve the paper mills: the Mill Lodge Reservoir and the Sun Reservoir. The Mill Lodge has been decommissioned and partially infilled, and the remainder will be infilled as part of phase 4A development. Any fish will first be removed from the water body and then it will be drained. Silt will be removed from the base of the reservoir before it is backfilled.
- 5.3.3 The panel engineer has recommended that the Sun Reservoir be decommissioned. It is proposed to partially infill this reservoir following decommissioning to reduce the volume of impounded water.
- 5.3.4 Finnington Brook enters the Sun Reservoir at its southern edge. At the entrance to the reservoir the brook is spilt into two channels; the main channel entering the reservoir and a smaller channel (the Mill Race) skirting the western boundary of the reservoir. The reservoir outflows at its northern edge into the Mill Race which flows partly in culvert under phase 4B and then joins the River Roddlesworth close to Moulden Brow at the northern boundary of the site.
- 5.3.5 The Sun Reservoir also receives overflow from the Leeds-Liverpool canal via a channel at its southern edge. The Leeds-Liverpool canal loops around the southern and western boundaries of the site and passes over the River Roddlesworth in aqueduct to the south. The Roddlesworth Aqueduct is a grade II listed building.
- 5.3.6 Historical water quality information for the River Roddlesworth is available from 2005 to 2009 in the Groundsure report at Appendix B. This shows that the River was classed as good (Class A and B) for both chemistry and biology.
- 5.3.7 River classification altered slightly after 2009 to align with the Water Framework Directive. The Catchment Data Explorer<sup>9</sup> available on the EA website contains details of the classification of the River Roddlesworth from 2009 to 2019.
- 5.3.8 The river was classed as ‘moderate’ overall from 2009 to 2013, then increased to ‘good’ overall in 2014 and 2015. In 2016 the classification reduced to ‘moderate’ due to phosphate levels. There is no data for 2017 or 2018 but in 2019 it is classified as ‘moderate’. Although the phosphate levels are recorded as ‘good’, the water chemistry fails on priority hazardous substances:
- Mercury and its compounds
  - PBDE (polybrominated diphenyl ethers)

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<sup>9</sup> <https://environment.data.gov.uk/catchment-planning/WaterBody/GB112071065250>

5.3.9 One round of surface water monitoring was undertaken during the 2016 site investigation. This included an upstream, downstream and on-site samples from the River Roddlesworth. This was repeated in February 2021 and the results are presented in Table 8. Laboratory certificates are contained in Appendix C.

Parameter	2016			2021			EQS* AA/MAC
	US	OS	DS	US	OS	DS	
Arsenic (µg/l)	0.5	0.6	0.8	3.4	4.4	3.7	50 / -
Boron (µg/l)	30	28	27	<0.05	<0.05	<0.05	2000 / -
Cadmium (µg/l)	<0.20	0.02	<0.02	<0.04	<0.04	<0.04	0.09**/0.6
Chromium (µg/l)	<1	<1	<1	2.18	3.1	2.11	4.7 / 32
Copper (µg/l)	3.2	2.9	3.0	5.71	5.98	5.44	1/-
Lead (µg/l)	<0.3	0.4	0.4	0.63	.071	0.61	1.2 / 14
Mercury (µg/l)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	- / 0.07
Nickel (µg/l)	<1	4	<1	2.7	3.1	2.4	4 / 34
Selenium (µg/l)	<0.5	<0.5	0.7	1.2	1.9	1.9	-
Vanadium (µg/l)	<2	<2	<2	5.1	6.3	5.9	20 / -
Zinc (µg/l)	3	7	4	3.8	4.1	3.6	10.9/-
Cyanide (mg/l)	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	1 / 5
Hardness (mg/l)	120	110	140	49	60	67	-
pH	8.1	7.9	8.0	7.4	7.5	7.6	6-9
Sulphate (mg/l)	21	19	22	10	13	16	400 / -
Sulphide (mg/l)	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	-
PAH total (µg/l)	0.01	0.02	0.03	2043	<160	<160	-
TPH (µg/l)	<10	<10	<10	<10	<10	<10	-

**Table 8: Surface Water Monitoring Results**

Notes: Copper, Nickel, Lead and Zinc EQS values apply to the bioavailable concentration, not the total concentration. The results presented are for the dissolved metal.

\* EQS values for hazardous chemicals and elements as published on <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit>

\*\* hardness dependant, value applicable for hardness range 50-100 mg/l

AA = annual average

MAC = maximum allowable concentration

5.3.10 Recent monitoring results indicated no significant change compared to 2016 monitoring. Only copper is above the EQS and this is reported as 'high' for the River Roddlesworth catchment on the EA Catchment Data Explorer web page<sup>9</sup>. One exception to this was PAH's recorded upstream was higher than found in 2016. This wasn't found in the downstream or on site samples so it may have been an anomalous result.

## 5.4 Flood Risk

5.4.1 The site is partially within flood zone 3 which is classed as having a high probability of flooding. Figure 4 is reproduced from the flood map for planning service on [www.gov.uk](http://www.gov.uk). Areas in flood zone 3 largely mirror the paths of the River Roddlesworth and Finnington Brook.



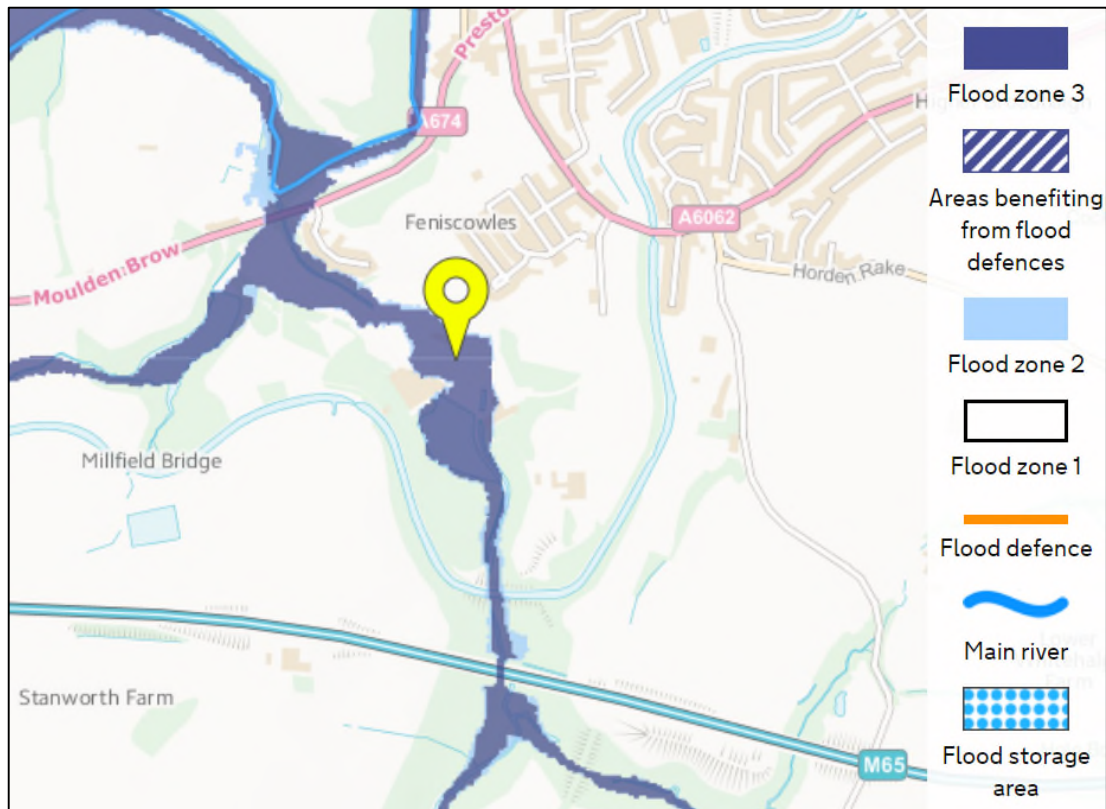


Figure 4: Flood Map for Planning

5.4.2 A Flood Risk Assessment (FRA) was undertaken by Eden Vale Young in November 2018 and submitted to BDBC to discharge planning conditions. To reduce the risk of flooding measures have been proposed including opening up the culverted River Roddlesworth and diverting it around the western boundary of the site, as detailed in the FRA. The measures proposed reduce the risk to that of flood zone 1 (low probability of flooding).

## 5.5 Hydrogeology

5.5.1 The proposed waste deposit will be above the water table.

5.5.2 The underlying strata are defined as a Secondary A aquifer by the EA. A 'Secondary A' aquifer is described by the EA as consisting of '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'.

5.5.3 The site is not located within a groundwater source protection zone.

5.5.4 Groundwater vulnerability for the site is shown on the DEFRA Magic Map application as medium to medium to low.

5.5.5 A freedom of information request was submitted to the EA in February 2021 and this revealed there are 3 licensed groundwater abstractions within 2km of the site. These are listed in Table 9.

Licence No	Details	Direction	Approximate Distance from Site (km)
NW/071/0343/001	Issued to Drax Generation Enterprises to extract cooling water for the power station. Max abstraction rate of 200,000 m <sup>3</sup> /year.	S	Adjacent
26/71/343/9	For domestic, agricultural and industrial use. Interconnected extractions from: Spring A at Old Olivers Farm, SD 628229 and Spring B at Knowles Farm, Withnell. Combined maximum abstraction rate of 2,000,000 gallons/year (9092 m <sup>3</sup> )	SW	Spring A: 2.6 Spring B: 1.8
26/71/343/13	For industrial use at Withnell Brick Terra Cotta Co (brick manufacture). Water sourced from 2 lodges: at SD642283 and at SD641236. Maximum abstraction rate of 420,000 gallons each per year (combined total of 3,800 m <sup>3</sup> )	S	Lodge 1: 1 Lodge 2: 1.2

**Table 9: Licensed Groundwater Abstractions within 2 km**

5.5.6 The power station borehole was installed in 2018. Monitoring data and borehole logs are contained in the HRA Report 05292/14.

5.5.7 Groundwater monitoring has been carried out in a number of deep extraction wells and also some shallow boreholes as part of site investigations. This is detailed in the HRA.

## 5.6 Man-Made Pathways

5.6.1 A Coal Mining Authority report for the site is presented at Appendix D. In the report the Coal Authority states that the site is not within the zone of likely influence on the surface of past or present underground working and is also not situated in an area where future mine works are planned.

5.6.2 There are 5 unused deep groundwater extraction boreholes across the site, not including the power station borehole which is in active use. These are shown on Capita Drawing No CS086248-2 – Exploratory Hole Location Plan, contained in Appendix G and include:

- Mill Abstraction
- Chimney Abstraction
- Reservoir Wall
- Sun Well
- Field Abstraction

5.6.3 TACCL is advised that two of these have been sealed: the field abstraction and the Reservoir Wall, and that the remainder will be sealed as works progress.

5.6.4 During the various site investigation works a number of boreholes have been inserted across the site to investigate shallow groundwater. These boreholes are no longer evident on site. No evidence is available to show whether they have been sealed up. If they were not sealed they may form a potential pathway for gas and groundwater.

## **5.7 Habitats and Conservation Sites**

5.7.1 The site is surrounded by priority habitat deciduous woodland classed as local wildlife sites including:

- Stanworth Woods (Priority Habitat Woodland and Biological Heritage Site)
- Moulden Bank to the north (Biological Heritage Site)
- Stanworth Valley Woods

5.7.2 Heald/Hold Bottom Woods to the south is ancient woodland.

5.7.3 The River Roddlesworth is listed as habitat for the protected fish species Brown Trout and Bullhead.

5.7.4 Appendix F contains the EA conservation screening report showing the location of these sites.

5.7.5 Although of local importance, none of the sites as classed as European habitats sites under the Habitats Directive.

## **5.8 Amenity**

5.8.1 Amenity receptors are set out in Section 2 and summarised in Table 2. Principle amenity hazards are considered to be dust, mud on the road, uncontained run-off, noise and accidents.

- 5.8.2 The Environmental Risk Assessment (Report No 05292/12) sets out the pathway and receptor relationship between these hazards and the receptors and identifies the risk. Control and mitigation measures required are also identified and these will be enacted through the Environmental Management System (EMS).
- 5.8.3 The site is not located in an Air Quality Management Area (AQMA).

## 6. POLLUTION CONTROL MEASURES

### 6.1 Site Containment

6.1.1 There is no requirement to construct any enhanced geological barrier or for the waste deposit to be capped upon completion due to:

- the low risk nature of the proposed waste types
- the site is not sub water table
- the site is not in a groundwater protection zone
- the site is not on a principal aquifer

### 6.2 Site Completion

6.2.1 The purpose of the permitted activity is to create a level building platform to enable construction of houses in Phase 4A and to partially infill the Sun Reservoir so that it can be decommissioned to remove the risks associated with impounding large volumes of water.

6.2.2 Upon achieving the required levels the waste deposit will cease and the site will be deemed complete.

6.2.3 The final constructed levels will be surveyed and compared to those proposed in the waste recovery plan.

6.2.4 The proposed waste types if laid and compacted in accordance with the specification should not undergo any significant settlement, therefore, there is no distinction between pre- and post-settlement levels.

6.2.5 The material placement will be carried out to a geotechnical specification which will be subject to approval by the planning authority, suitable for subsequent construction works.

### 6.3 Surface Water Management

6.3.1 Run-off from Phase 4A currently drains to a low point close to the Phase 4B boundary and water soaks away into the underlying strata. This area is shown as an attenuation pond on the Masterplan drawing and a small basin will be created in this location. This will allow run-off to collect and soak away. The basin will be checked for siltation every 3 months and any sediment will be dug out to retain the capacity of the basin.

6.3.2 Run-off will be prevented from entering the River Roddlesworth by the culvert for the first part of the platform construction. Once the river is diverted around the western edge of Phase 4A, a small bund will be constructed to prevent run-off from entering the river.

6.3.3 The River Roddlesworth will also be monitored upstream and downstream of the site. Monitoring is detailed in Section 7.3.

#### **6.4 Permit Surrender Conditions**

6.4.1 Once the filling activity is complete, the site will be surveyed in order to confirm the final levels and ensure compliance with relevant permit and planning conditions and then the permit will be surrendered.

6.4.2 The operator shall maintain records during the permitted activity which can be used for the production of the surrender application.

## 7. ENVIRONMENTAL MONITORING

### 7.1 Weather

7.1.1 Meteorological information will be available from a mobile weather app. Wind speed and direction will be used in order to manage the risks of dust and particulate emissions.

7.1.2 The prevailing wind speed and direction has been established by review of wind rose data for the closest monitoring station to the site, contained in Section 2. This shows that wind blows predominantly from the west.

7.1.3 The site is located in a sheltered position within the river valley.

### 7.2 Historical Gas Monitoring

7.2.1 Gas monitoring was undertaken by Encia in 2009 by Capita in 2016 and reported in the site investigation reports referenced in Section 1. Appendix E contains relevant extracts from these reports and the findings are summarised below.

7.2.2 Encia conducted hazardous gas monitoring in 'the brownfield area' which is within the proposed permit boundary. One round of monitoring results were reported in the 2009 report. The locations of the monitoring points are shown on the Encia exploratory hole location plan contained in Appendix E. Table 10 below shows the results.

Monitoring Point	Methane % v/v	Carbon dioxide % v/v	Range of flow l/hr
BH101	ND	ND	-0.6-0.0
BH102A	ND	0.1	-3.7-0.0
BH201	ND	0.6	ND
BH203	ND	0.1	ND
BH204	ND	0.2	ND
WS104	ND	0.2	0.0-6.0
WS105	ND	0.2	ND
WS106	ND	ND	ND
WS111	ND	0.2	ND

**Table 10: Gas Monitoring Results from 2009**

7.2.3 The 2009 monitoring event detected no methane and generally low levels of carbon dioxide with either none or very little associated flow.

7.2.4 In 2016 Capita carried out more extensive monitoring across the site, with 6 monitoring events carried out over 3 months. Monitoring within the proposed permit boundary was reported for phase 2 which is the current phases 4A and 4B. Monitoring location points are shown on the Capita exploratory hole location plan Maximum measured values were reported in the 2016 report as reproduced in Table 11.

Monitoring Point	Max Flow rate l/hr	Max Methane % v/v	Max Carbon dioxide % v/v	Max CH4 Qhg (l/hr)	Max CO2 Qhg (l/hr)
WS101	0.1	<0.1	6.6	0.002	0.0066
WS102	0.9	<0.1	2.2	0.0009	0.0198
WS104	<0.1	<0.1	6.0	0.0002	0.006
WS105	0.1	<0.1	0.4	0.0001	0.0004
WS107	<0.1	<0.1	1.0	0.0001	0.001
WS110	<0.1	<0.1	0.2	0.0001	0.0002
WS111A	<0.1	<0.1	1.8	0.0001	0.0018

**Table 11: Gas Monitoring Results from 2016**

**Note:** Where flow <0.1l/hr and/or gas concentration <0.1% were recorded, a value of 0.1 has been assumed to calculate the Qhg

7.2.5 The results were similar to those from 2009 with no methane detected but slightly higher levels of carbon dioxide, again with little or no flow.

7.2.6 Gas monitoring was not undertaken as part of the 2019 Envestigate site investigation.

7.2.7 A recent site inspection found that the boreholes installed as part of the Capita investigation in 2016 had been destroyed or lost.

### 7.3 Proposed Gas Monitoring

7.3.1 EA guidance states '*unless your risk assessment shows this is not necessary, if you deposit waste more than 2m below the surrounding ground surface, you must monitor your waste for:*

- methane
- carbon dioxide
- oxygen

*You should install at least 2 monitoring boreholes per hectare, with a minimum of 4 boreholes per site'.*

7.3.2 Areas and volumes of fill are listed in Table 5. The area of fill of Phase 4A is 82,230 m<sup>2</sup> and the volume is 107,771 m<sup>3</sup>. This is an average depth of 1.3 m. Gas monitoring is not proposed for this area.



7.3.3 The Sun Reservoir area is 20,007 m<sup>2</sup> and the volume is 92,661 m<sup>3</sup>. This is an average depth of 4.6 m. This area will require post completion gas monitoring. A minimum of 4 gas monitoring boreholes will be required to comply with the requirement of 2 per hectare. The exact configuration of the partial infill has yet to be determined therefore the location of the boreholes will be decided once this is resolved.

#### **7.4 Surface Water Monitoring**

7.4.1 Surface water samples shall be collected quarterly from upstream, on site and downstream locations on the River Roddlesworth and shall be analysed for the following test suite:

Ammoniacal Nitrogen  
Chloride  
Dissolved Organic Carbon  
Dissolved Oxygen  
Electrical Conductivity  
Hardness  
Metals (arsenic, cadmium, copper, chromium, lead, mercury, nickel & zinc)  
pH  
Sulphate  
Suspended Solids

7.4.2 In addition, once works commence on the Sun reservoir, samples shall also be collected upstream and downstream in Finnington Brook and analysed as listed above.

7.4.3 Sampling points are shown on Drawing No 05292/28.

**8. SITE CONDITION REPORT**

8.1 This section has been completed using the EA template and includes Sections 1 to 3 as per the EA guidance.

<b>1.0 SITE DETAILS</b>	
Name of the applicant	Blackburn Waterside Regeneration Limited
Activity address	Former Sappi Paper Mill, Livesey Branch Road, Feniscowles, Blackburn, BB2 5HX
National grid reference	SD 64500 24900

Document reference and dates for Site Condition Report at permit application and surrender	Report No 05292/11 ESSD March 2021 - permit application stage.
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Document references for site plans (including location and boundaries)	Drawing No 05292/25 Site Layout Plan shows permit boundary at application stage.
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<b>2.0 CONDITION OF THE LAND AT PERMIT ISSUE</b>	
Environmental setting including: <ul style="list-style-type: none"> <li>• geology</li> <li>• hydrogeology</li> <li>• surface waters</li> </ul>	This information is covered in the following sections of this report: Section 5.2 - Geology Section 5.5 - Hydrogeology Section 5.3 - Hydrology
Pollution history including: <ul style="list-style-type: none"> <li>• pollution incidents that may have affected land</li> <li>• historical land-uses and associated contaminants</li> <li>• any visual/olfactory evidence of existing contamination</li> <li>• evidence of damage to pollution prevention measures</li> </ul>	There are 6 recorded on site pollution incidents between 2001 - 2002 which are detailed in the Groundsure report. All are recorded as having no impact to land and either minor or no impact to water.  Historical land use and associated contaminants are detailed in the following reports: <ul style="list-style-type: none"> <li>• Geo-environmental Appraisal, Encia Environmental, May 2009</li> <li>• Geo-environmental Desk Study, Campbell Reith, May 2015</li> </ul>

**Report No 05292/11 - July 2021**  
**Former Sappi Paper Mill, Blackburn: Environmental Setting & Site Design**

	<ul style="list-style-type: none"> <li>• Supplementary Intrusive Investigation and Assessment, Capita Symonds, September 2016</li> <li>• SAPPI Stockpile Investigation, Envestigate, November 2019</li> </ul>
<p><b>Summary of contamination identified from historical activities:</b></p> <p>The reports listed above detail SI undertaken across the wider site. Report No 05292/14 HRA relates information from these reports to the permit boundary area, providing details of the baseline contamination from previous land use.</p>	
<p>Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)</p>	<p>Phase 2 Remediation Strategy, Capita Symonds, March 2017.</p>
<p>Baseline soil and groundwater reference data</p>	<ul style="list-style-type: none"> <li>• SAPPI Stockpile Investigation, Envestigate, November 2019</li> <li>• Supplementary Intrusive Investigation and Assessment, Capita Symonds, September 2016</li> </ul> <p>These 2 reports represent the baseline soil and groundwater conditions at the site, as summarised in Report No 05292/14.</p>

**3.0 PERMITTED ACTIVITIES**

<p>Permitted activities</p>	<p>Use of waste for the purposes of construction work and/or restoration, reclamation or improvement of land.</p> <p>R5: Recycling/reclamation of other inorganic compounds</p> <p>R10: Land treatment resulting in benefit to agriculture or ecological improvement</p> <p>R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced)</p>
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Non-permitted activities undertaken	None
Document references for: <ul style="list-style-type: none"><li>• plan showing activity layout;</li><li>and</li><li>• environmental risk assessment.</li></ul>	Drawing No 05292/25 Site Layout  Report No 05292/12 Risk Assessment

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**CLAIRE GETTINBY**  
BSc (Hons) PhD MCIWM  
**Director**

**Appendices supplied separately**

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# **THE ARLEY CONSULTING COMPANY LIMITED**

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Chorleian House  
49-51 St Thomas's Road  
Chorley, Lancashire, PR7 1JE

Tel: 01257 278300  
Fax: 01257 268063  
Email: [mailbox@taccl.co.uk](mailto:mailbox@taccl.co.uk)