Weetwood
Development • Planning • Environment

PHOENOX TEXTILES, WOOD STREET, WAKEFIELD ROAD, SCISSETT, HD8 9JS

FLOOD RISK AND DRAINAGE ASSESSMENT

Final Report v1.0
March 2024

Report Title	**Phoenox Textiles, Wood Street, Wakefield Road, Scissett, HD8 9JS** Flood Risk and Drainage Assessment Final Report v1.0
Client	Phoenox Textiles
Date of issue	20 March 2024

Prepared by	Keely Bonser BSc (Hons) MSc PhD MCIWEM *Director* Tim Brook BSc (Hons) *Technical Director*
Checked by	Adam Edgerley BSc (Hons) *Director* Keely Bonser BSc (Hons) MSc PhD MCIWEM *Director*
Approved by	Adam Edgerley BSc (Hons) *Director*

Contents

List of Tables

List of Figures

List of Appendices

1 INTRODUCTION

1.1 Purpose of Report

Weetwood Services Ltd ('Weetwood') has been instructed by Phoenox Textiles to prepare a Flood Risk and Drainage Assessment (FRDA) report to accompany a planning application for the proposed redevelopment of Phoenox Textiles, Scissett ("the site") for industrial use.

The assessment has been undertaken in accordance with the requirements of the revised National Planning Policy Framework (NPPF) updated on 20 December 2023 and the Planning Practice Guidance (PPG) updated on 14 February 2024.

1.2 Structure of the Report

The report is structured as follows:

Section 1 Introduction and report structure
Section 2 Provides background information relating to the development site
Section 3 Presents national and local flood risk and drainage planning policy
Section 4 Assesses the potential risk of flooding to the development site
Section 5 Presents an illustrative surface water drainage scheme
Section 6 Presents an illustrative foul water drainage scheme
Section 7 Presents a summary of key findings and the recommendations

1.3 Relevant Documents

The assessment has been informed by the following documents:

- Set A - Strategic Flood Risk Assessment, Flood Risk Map PP – Scissett, Clayton West, Kirklees Council, Website accessed February 2024
- Leeds City Region Sustainable Drainage Systems Guidance, West Yorkshire Combined Authority, February 2020
- Kirklees Local Plan Strategy and Policies, Kirklees Council, February 2019
- Calder Catchment Strategic Flood Risk Assessment Volume II, Kirklees Council, July 2016
- Calder Catchment Strategic Flood Risk Assessment Volume I, Kirklees Council, Calderdale Metropolitan Borough Council and Wakefield Council, April 2016

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The approximately 0.49 ha site is located at Wood Street, to the east of Wakefield Road, Scissett at Ordnance Survey National Grid Reference SE 248 101, as shown in **Figure 1**.

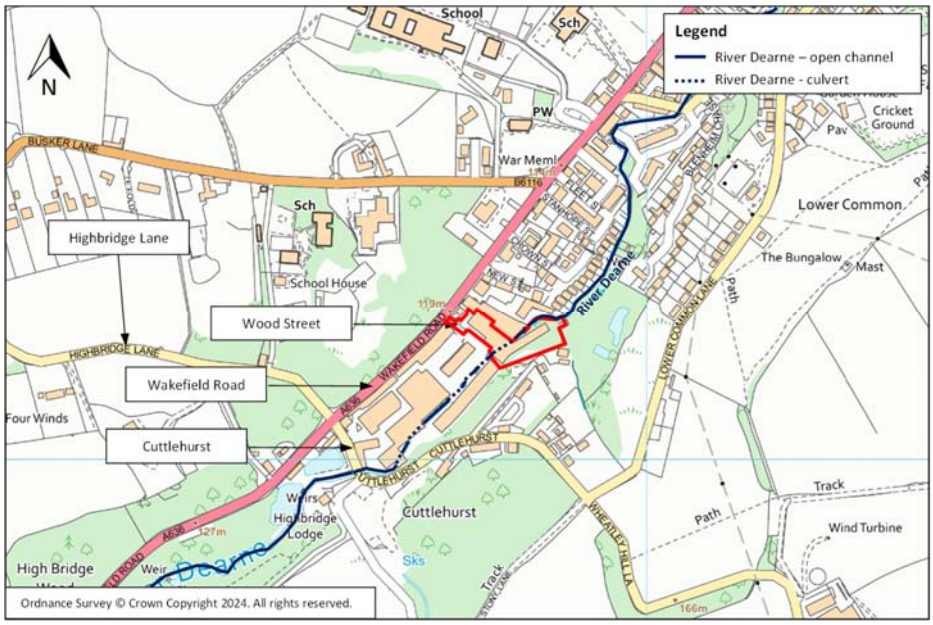


Figure 1: Site Location and Location of Surface Waterbodies

2.2 Existing and Proposed Development

The existing site comprises an approximately 2,327 m² industrial unit and areas of hardstanding.

The proposals entail the demolition of the existing unit and the construction of a similar sized industrial unit (approximately 2,187 m²) with associated car parking and areas of hardstanding. Vehicular access will continue to be provided via Wood Street off Wakefield Road.

The proposed site plan is provided in **Appendix A**.

The NPPF classifies general industry development as Less Vulnerable to flood risk.

2.3 Surface Waterbodies in the Vicinity of the Site

The River Dearne flows in a north-easterly direction in open channel and culvert throughout Scissett. With regards to the site, the river flows in open channel to the north-east and south-west of the site and in culvert beneath the existing industrial unit, as illustrated in **Figure 1**.

A small unnamed watercourse flows in a northerly direction in an open channel approximately 20 m to the south-east of the site. It is assumed that the watercourse is hydraulically connected to the River Dearne.

Two small ponds are located a minimum of approximately 35 m to the east of the site.

2.4 Topographic Levels

A topographic survey of the site has been undertaken by Holden Surveys Ltd (**Appendix B**) and LiDAR data has been used to develop a digital terrain model of the site and surrounding area as illustrated in **Figure 2**.

Site levels are shown to slope down towards the River Dearne, with levels to the west of the River Dearne ranging between approximately 115 to 119 m AOD and to the east approximately 113 to 124 m AOD.

The finished floor level of the existing building is shown to be predominantly set at a lower level than external levels with the finished floor level ranging between 115.40 in the western portion of the building, falling to 114.23 m AOD towards the centre of the building, and rising to 114.85 m AOD in the eastern portion of the building (as shown within **Appendix B**).

Ground levels within the proximity of the junction between Wood Street and Wakefield Road are shown to be in the region of 118 – 119 m AOD with levels falling in a north-easterly direction.

Figure 2: Digital Terrain Model from LiDAR Data

2.5 Ground Conditions

According to the Soilscapes soils dataset produced by the Cranfield Soil and AgriFood Institute[1], soil conditions at the site and within the surrounding area are described as freely draining loamy soils.

The National Geoscience Data Centre's Single Onshore Borehole Index[2] holds records of two boreholes on and within the vicinity of the site. The records indicate ground conditions to comprise of clay and shale underlain by sandstone, mudstone and shale.

British Geological Survey mapping of surface geology[3] indicates the underlying bedrock formation comprises Pennine Lower Coal Measures Formation (mudstone, siltstone and sandstone), overlain by superficial deposits of Alluvium (clay, silt, sand and gravel).

A Phase 1 desk study was undertaken by Solmek Ltd in January 2024. The study reaffirms the surface geology reported by British Geological Survey mapping.

According to the MAGIC website[4] the superficial deposits and bedrock geology at the site are classified as Secondary A aquifers. The site is not shown to be located within a designated groundwater source protection zone.

1 www.landis.org.uk/soilscapes/
2 https://www.bgs.ac.uk/map-viewers/geoindex-onshore/
3 https://www.bgs.ac.uk/map-viewers/geoindex-onshore/
4 https://magic.defra.gov.uk/MagicMap.aspx

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Policy Guidance

The thrust of national planning policy, as articulated in the NPPF is that inappropriate development in areas at risk of flooding should be avoided where possible, as summarised below:

- Inappropriate development in areas at risk of flooding should be avoided and that development should be directed away from areas at highest risk (whether existing or future), but where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere (NPPF para. 165).
- The policy of seeking to steer development to areas with the lowest risk of flooding, from any source, is implemented through the application of the flood risk Sequential Test. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development in areas with a lower risk of flooding. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding (NPPF para. 168).
- If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives) the Exception Test may have to be applied. The need for the test will depend on the potential vulnerability of the site and of the development proposed (as set out in Annex 3 of NPPF; also PPG Table 2) (NPPF para. 169). For example, the Exception Test need not be applied for less vulnerable development in any flood zone, or for more vulnerable development in flood zones 1 or 2.
- Where the Exception Test must be applied, application of the test for development proposals at the application stage should be informed by a site-specific flood risk assessment. For the test to be passed it should be demonstrated that: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; (b) and the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall (NPPF para. 170). Both elements of the test should be satisfied for the development to be permitted (NPPF para. 171).
- A site-specific flood risk assessment should be provided for all development in flood zones 2 and 3 [whilst] in flood zone 1, an assessment should accompany all proposals involving: sites of 1 ha or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use (NPPF para. 173).
- Development should not increase flood risk elsewhere (NPPF para. 173).
- Development should only be allowed in areas at risk of flooding where the flood risk assessment (and the sequential and exception tests, as applicable), demonstrate that: a) within the site, the most vulnerable development is located in areas of lowest flood risk (unless there are overriding reasons to prefer a different location); b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; c) the development incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual (flood) risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (NPPF para.173).
- Applications for some minor development and changes of use should not be subject to the sequential or exception tests (NPPF para. 174). The exceptions are stated in Footnote 60.
- Major development should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits (NPPF para. 175).

Guidance on application of the sequential and exception test is provided in the PPG - Flood Risk and Coastal Change. For example:

- The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future (i.e. taking climate change into account) medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding (PPG para. 023).
- Where it is not possible to locate development in low risk areas, the Sequential Test should go on to compare reasonably available sites within medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high risk areas (PPG para. 024).
- Initially, the presence of existing flood risk management infrastructure should be ignored, as the long-term funding, maintenance and renewal of this infrastructure is uncertain. Climate change will also impact upon the level of protection infrastructure will offer throughout the lifetime of development (PPG para. 024).
- The Sequential Test should be applied to 'Major' and 'Non-major development' proposed in areas at risk of flooding, but it will not be required where; the site has been allocated for development and subject to the test at the plan making stage (provided the proposed development is consistent with the use for which the site was allocated and provided there have been no significant changes to the known level of flood risk to the site, now or in the future which would have affected the outcome of the test); the site is in an area at low risk from all sources of flooding, unless the Strategic Flood Risk Assessment, or other information, indicates there may be a risk of flooding in the future; the application is for a development type that is exempt from the test, as specified in footnote 60 of the NPPF (PPG para. 027).
- For individual planning applications subject to the Sequential Test, the area to apply the test will be defined by local circumstances relating to the catchment area for the type of development proposed. For some developments this may be clear, for example, the catchment area for a school. In other cases, it may be identified from other Plan policies. For example, where there are large areas in Flood Zones 2 and 3 (medium to high probability of flooding) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives. Equally, a pragmatic approach needs to be taken where proposals involve comparatively small extensions to existing premises (relative to their existing size), where it may be impractical to accommodate the additional space in an alternative location. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary (PPG para. 027).
- 'Reasonably available sites' are those in a suitable location for the type of development with a reasonable prospect that the site is available to be developed at the point in time envisaged for the development. These could include a series of smaller sites and/or part of a larger site if these would be capable of accommodating the proposed development. Such lower-risk sites do not need to be owned by the applicant to be considered 'reasonably available' (PPG para. 028).
- The Exception Test should only be applied as set out in Table 2 [of the PPG ("Flood Risk Vulnerability and Flood Zone Incompatibility")] and only if the Sequential Test has shown that there are no reasonably available, lower risk sites, suitable for the proposed development, to which the development could be steered (PPG para. 032).

3.2 Local Planning Policy

The Kirklees Local Plan Strategy and Policies was adopted by Kirklees Council in February 2019. The following policies are relevant in respect of flood risk and drainage:

Policy LP27: Flood Risk

Proposals for development which require a Sequential Test in accordance with national planning guidance will need to demonstrate that development has been directed to areas at the lowest probability of flooding, following a sequential risk based approach. The whole Kirklees district should be the starting point for the sequential test with applicants required to provide justification where a smaller area of search is proposed. If following application of the sequential test, there are no reasonably available sites which could accommodate the development in zones with a lower probability of flooding, it should also be demonstrated that a sequential approach has been applied within sites. This is to ensure that highly vulnerable and more vulnerable uses are

directed towards the areas of lowest flood risk within the site. Proposals will also need to demonstrate that the exception test is passed, where applicable, as set out in national planning policy.

Proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but with all of the following additional restrictions:

- *a. no new highly vulnerable or more vulnerable uses will be permitted;*
- *b. less vulnerable uses may only be permitted provided that the sequential test has been passed and;*
  - *i. where extensions are linked operationally to an existing business or,*
  - *ii. where redevelopment of a site provides buildings with the same or a smaller footprint;*
- *c. all proposals will be expected to include flood mitigation measures such as compensatory storage which should be identified and considered through a site specific Flood Risk Assessment;*
- *d. development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role.*

Proposals must be supported by an appropriate site specific Flood Risk Assessment in line with national planning policy. This must take account of all sources of flooding set out in the Strategic Flood Risk Assessment and demonstrate that the proposal will be safe throughout the lifetime of the development (taking account of climate change). The proposal must also not increase flood risk elsewhere and where possible should reduce flood risk. Mitigation measures, where necessary, should be proposed.

Proposals involving building over existing culverts or the culverting or canalisation of watercourses will not be permitted unless it can be demonstrated to be in the interests of public safety or to provide essential infrastructure and that there will be no detrimental effect on flood risk and biodiversity. Where feasible, development proposals should incorporate re-opening of culverts, modification of canalised watercourses and consideration of mitigation measures to achieve a more natural and maintainable state.

Proposals for natural management such as targeted vegetation planting in upper catchments and along river banks will be supported in appropriate locations where consistent with national and local plan policies and relevant water catchment management plans to reduce flood risk and improve water quality.

Policy LP28: Drainage

The presumption is that Sustainable Drainage Systems (SuDS) will be used to assist in achieving the following on each site:

- *a. for proposals on greenfield sites, typical greenfield run-off rates should not be exceeded;*
- *b. for proposals on brownfield sites there should be a minimum 30% reduction in surface water run-off where previous positive surface water connections from the site can be proven. New connections will be subject to at least greenfield restrictions;*
- *c. No negative impact on local water quality and improvements in water quality where practicable;*
- *d. Consider whether proposed open spaces and green infrastructure within sites can contribute to the sustainable drainage of the site.*

Local conditions including the existence of critical drainage areas may require a lower run-off rate to be agreed to reflect volume control, local surface water risks, watercourse capacity and flood risk further downstream.

There will be a general presumption against pumping surface water. It must also be demonstrated that the surface water management solution is designed to meet requirements over the lifetime of the development including evidence that management and maintenance arrangements have been secured to cover that period. This includes ensuring proposals to store water meet national standards and latest best practice.

Flow paths accommodating water from outside the site or due to an exceedance event should be designed to avoid buildings and curtilages.

Development will only be permitted if it can be demonstrated that the water supply and wastewater infrastructure required is available or can be co-ordinated to meet the demand generated by the new development.

Policy LP34: Conserving and Enhancing the Water Environment

Proposals must:

1. *Ensure no deterioration of watercourses or waterbodies (including groundwater) by conserving and, where practicable, enhancing:*
    a. *the natural geomorphology of watercourses, including reinstating watercourses to their natural state through removal of modifications resulting from past industrial uses;*
    b. *water quality; and*
    c. *the ecological value of the water environment, including the functionality of habitat networks.*
2. *Ensure Source Protection Zones are protected from contamination as a result of the proposal in line with national guidance*
3. *Dispose of surface water appropriately (in accordance with the Local Plan drainage policy) adhering to the following networks in order of preference:*
    a. *to an infiltration based system wherever possible (such as soakaways);*
    b. *discharge into a watercourse with the prior approval of the landowner, navigation authority or Environment Agency, where applicable. To comply with part 1 of this policy this must be following treatment where necessary or where no treatment is required to prevent pollution of the receiving watercourse;*
    c. *discharge to a public sewer.*

Proposals are encouraged to:

4. *Make positive progress towards achieving 'good status or potential' under the Water Framework Directive in surface and groundwater bodies.*
5. *Manage water demand and improve water efficiency through appropriate water conservation techniques including rainwater harvesting and grey-water recycling as well as considering water availability from surface water and groundwater sources.*
6. *Improve water quality through the incorporation of appropriately constructed and maintained SuDS and surface water management techniques taking into account the sensitivity of groundwater.*

3.3 Drainage Technical Guidance

Non-statutory technical standards for sustainable drainage published by DEFRA in March 2015 set out how surface water runoff generated during the present day 1 in 30 and 1 in 100 annual exceedance probability (AEP) rainfall events and for events exceeding the present day 1 in 100 AEP event should be managed, how peak runoff rates should be restricted and how runoff volumes should be controlled.

3.4 Water Framework Directive

The Water Framework Directive (WFD) provides a legal framework for the protection, improvement and sustainable use of inland surface waters, groundwater, transitional waters, and coastal waters across England, and seeks to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters
- Achieve at least 'good' status for all waterbodies by 2015
- Promote the sustainable use of water as a natural resource
- Conserve habitats and species that depend directly on water
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- Contribute to mitigating the effects of floods and droughts.

The WFD applies to any proposed development which has the potential to impact on a waterbody. Where this is the case, the Environment Agency may require evidence demonstrating that the proposed development does not compromise the aims of the WFD.

3.5 Environmental Permitting and Land Drainage Consent

Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit for Flood Risk Activities[5] is required from the Environment Agency for any permanent or temporary works, including works:

- In, over or under a designated main river
- Within 8 m of the top of bank of a designated main river or of the landward toe of a flood defence (16 m if it is a tidal main river or a sea defence).

In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. A permit is separate to and in addition to any planning permission granted.

Land drainage consent may be required from the lead local flood authority or drainage board for work to an ordinary watercourse.

Undertaking activities controlled by local byelaws also requires the relevant consent.

[5] https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

4 REVIEW OF FLOOD RISK

4.1 Historical Records of Flooding

The Environment Agency Historic Flood Map[6] and Set A – Strategic Flood Risk Assessment Flood Risk Map PP of the 2016 Strategic Flood Risk Assessment ("Kirklees Flood Risk Map PP") indicate that there are no records of flooding within 750 m of the site.

Flood incident records (refer to **Figure 3**) provided by Kirklees Council in February 2024 indicate historic flood events within the vicinity of the site; however, no specific details have been provided and there are no records of flooding at or directly adjacent to the site, including adjacent to the River Dearne and Cuttlehurst bridge.

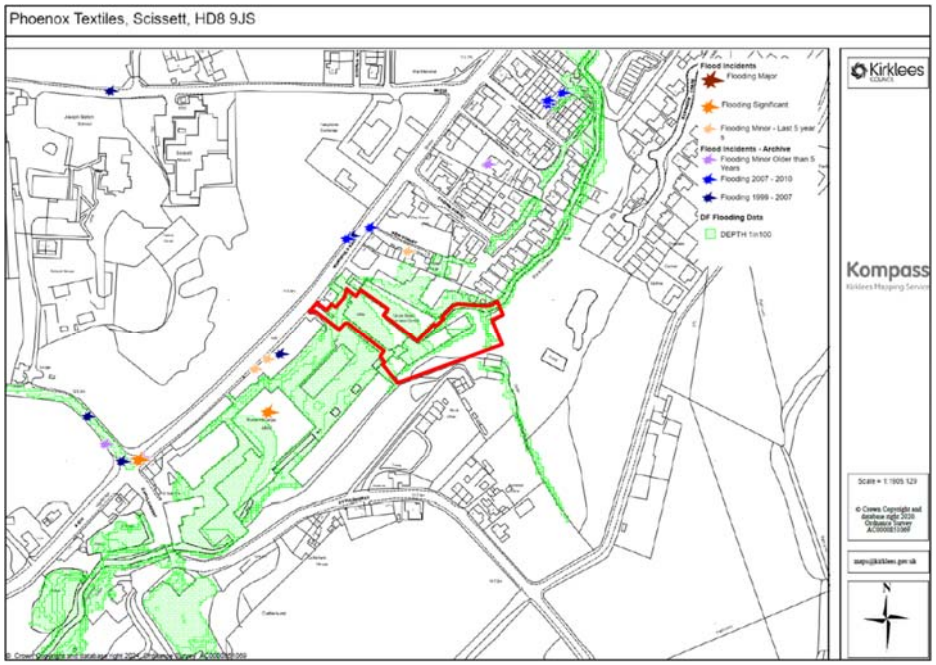


Figure 3: Kirklees Council Flood Incident Records
Source: Kirklees Council; provided February 2024

4.2 Flood Risk from Rivers (Fluvial)

The Environment Agency Flood Map for Planning (Rivers and Sea)[7] (**Figure 4**) indicates the site to be predominantly located in flood zone 1, with part of the site adjacent to the River Dearne located in flood zones 3 and 2. However, the flood zone 3 extent appears to be within the alignment of the River Dearne within the vicinity of the site. This is reiterated on Set A – Strategic Flood Risk Assessment Flood Risk Map PP of the 2016 Strategic Flood Risk Assessment ("Kirklees Flood Risk Map PP").

Table 1 of the PPG defines flood zones as follows:

- Flood zone 1: Low Probability. Land having a less than 0.1% annual probability of river or sea flooding
- Flood zone 2: Medium Probability. Land having between a 1% and 0.1% annual probability of river flooding or between a 0.5% and 0.1% annual probability of sea flooding
- Flood zone 3a: High Probability. Land having a 1% or greater annual probability of river flooding or a 0.5% or greater annual probability of sea flooding
- Flood zone 3b: Functional Floodplain. Land where water from rivers or the sea has to flow or be stored in times of flood. Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively or land that is designed to flood (such as a flood

[6] https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map
[7] https://flood-map-for-planning.service.gov.uk/

attenuation scheme), even if it would only flood in more extreme events (such as a 0.1% annual probability of flooding).

Set A – Strategic Flood Risk Assessment Flood Risk Map PP of the 2016 Strategic Flood Risk Assessment ("Kirklees Flood Risk Map PP") appears to show the alignment of flood zone 3 as functional floodplain within the vicinity of the site.

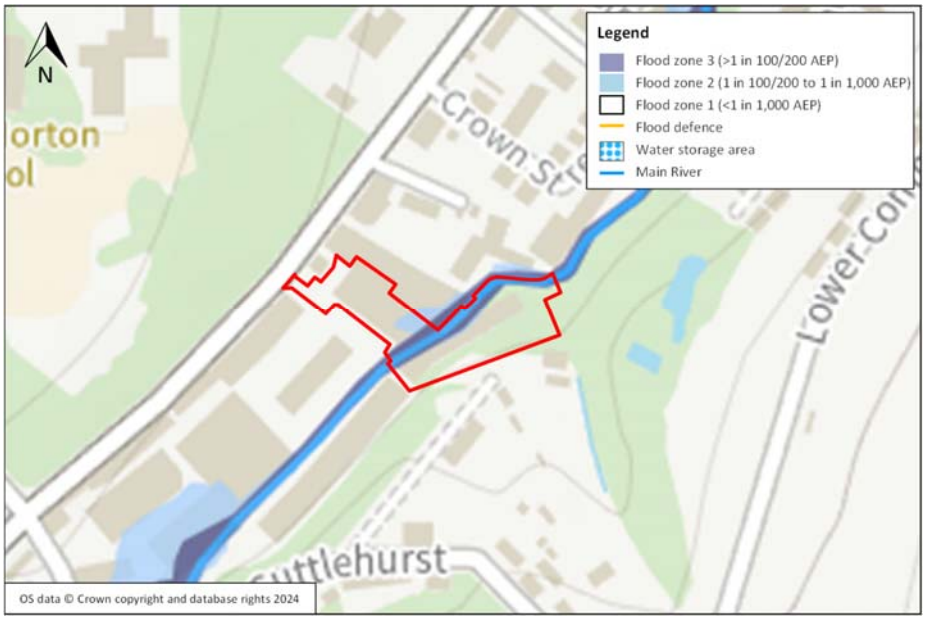


Figure 4: Flood Map for Planning
Source: gov.uk website; Accessed: February 2024

Environment Agency records indicate that private flood defences in the form of natural high ground are present along the River Dearne (left and right banks) within the vicinity of the site. No further information is recorded.

A 1D ISIS hydraulic model of the River Dearne was developed on behalf of the Environment Agency by Halcrow Group Ltd as part of the Upper Dearne Flood Mapping Study (May 2010). This assesses the risk of flooding from the River Dearne for the present day 1 in 100 and 1 in 1,000 AEP events and the 1 in 100 AEP event +20% climate change.

The current Environment Agency guidance on climate change allowances (May 2022) advises that for Less Vulnerable development in flood zones 2 and 3, the Central allowance should be used to assess flood risk for the lifetime of the development. The Central allowance for the Don and Rother management catchment is +28% (2080s). A simple level-discharge relationship has been developed to estimate peak in-channel water levels for the 1 in 100 AEP event +28% climate change.

Modelled peak in-channel water levels provided by the Environment Agency including the estimated 1 in 100 AEP event +28% climate change for the model nodes illustrated on **Figure 5** are provided in **Table 1**.

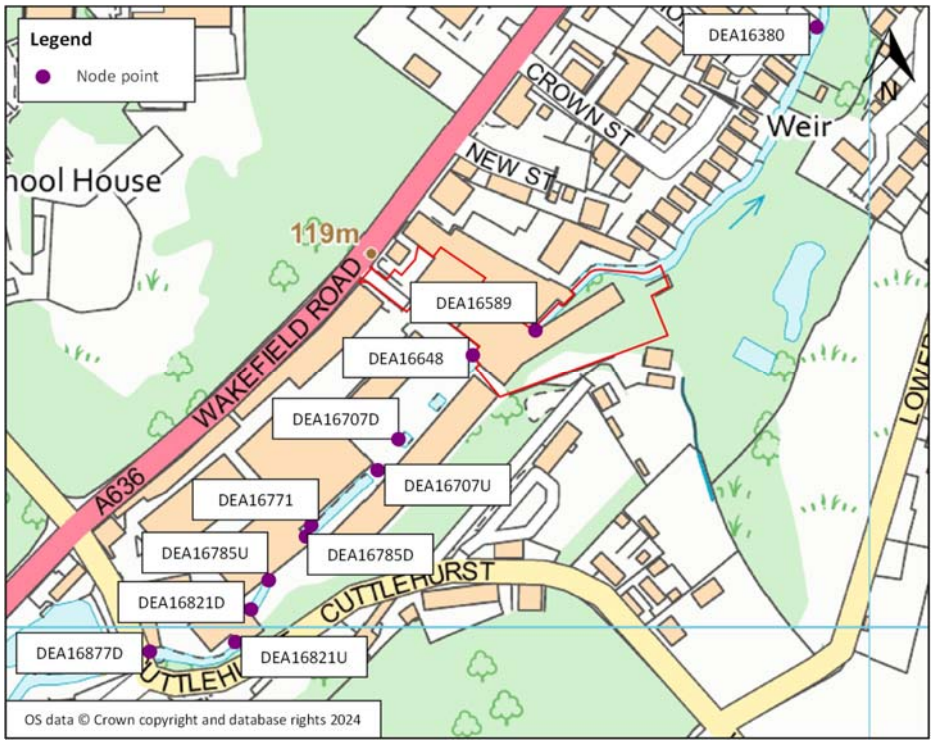


Figure 5: River Dearne Modelled Node Locations
Source: Upper Dearne Flood Mapping Study, Halcrow Group Ltd, May 2010

Table 1: River Dearne Modelled Peak In-Channel Water Levels
Source: Upper Dearne Flood Mapping Study, Halcrow Group Ltd, May 2010

Model Node	AEP Event Flood Level (m AOD)			
	Present day 1 in 100	1 in 100 +20% climate change	1 in 100 +28% climate change*	Present day 1 in 1,000
DEA16877D	115.63	115.83	115.89	116.43
DEA16821U	115.55	115.75	115.82	116.38
DEA16821D	115.22	115.40	115.47	116.01
DEA16785U	115.20	115.41	115.48	116.07
DEA16785D	114.76	114.95	115.02	115.55
DEA16771	114.66	114.82	114.91	115.48
DEA16707U	114.50	114.67	114.74	115.25
DEA16707D	114.10	114.23	114.30	114.76
DEA16648	113.82	113.91	114.01	114.47
DEA16589	113.45	113.55	113.57	113.79
DEA16380	110.36	110.48	110.50	110.75

*Estimated

A comparison of site levels, LiDAR and modelled peak in-channel water levels has been undertaken within the vicinity of the site. The comparison indicates the following:

- To the south-west of the site some out of bank flows may be expected between model nodes DEA16877D and DEA16771 during all modelled events, albeit during the present day 1 in 100 AEP event, floodwater is contained within close proximity to the channel; however, within proximity of the site peak in-channel water levels are expected to remain in channel during all modelled flood events.
- To the north-east of the site (in proximity to model node DEA16589), peak in-channel water levels are indicated to remain in channel during the present day 1 in 100 AEP event and the 1 in 100 AEP event +28% climate change, but some out of bank flows may be expected during the present day 1 in 1,000 AEP event within the eastern portion of the site.

- Access and egress to the site via Wood Lane is expected to remain dry during all modelled events.

4.3 Flood Risk from Small Watercourses and Surface Water (Pluvial)

As detailed in **Section 2.3**, a small watercourse is located approximately 20 m to the south-east of the site. No modelled information is available for this watercourse. The Flood Risk from Surface Water map (**Figure 6**) has therefore been utilised to assess the risk of flooding from this source. This mapping indicates the presence of a flow pathway stemming from the watercourse along the eastern edge of the site, however, the existing industrial unit is not shown to be at risk of flooding from this source.

The Flood Risk from Surface Water map (**Figure 6**) indicates that the site is at a Very Low to High risk of flooding from pluvial surface water. However, during less extreme events (i.e. 1 in 30 and 1 in 100 AEP) this mapping indicates that surface water flooding is predominantly linked with fluvial flooding of the River Dearne, with overland flow pathways stemming from the River Dearne adjacent to the bridge on Cuttlehurst. Furthermore, an overland flow pathway is indicated to develop during a 1 in 100 AEP event (i.e. Medium Risk) on Highbridge Lane, however, the extent of the pathway only increases towards Wakefield Road and land between Wakefield Road/Cuttlehurst and the River Dearne during a low frequency/high severity (1 in 1,000 AEP) event.

As discussed in **Section 4.2**, the River Dearne has been modelled in greater detail by Halcrow Group Ltd on behalf of the Environment Agency. The outputs indicate that the River Dearne has sufficient capacity to convey the present day 1 in 100 AEP flows within the vicinity of the site, with floodwater contained within close proximity to the channel within the vicinity of Cuttlehurst during this event. As such, no flooding during the 1 in 100 AEP event would be expected within the immediate vicinity of the site. This conflicts with the information provided in the Flood Risk from Surface Water map which shows that flooding to depths > 1.2 m may occur at the site during the 1 in 100 AEP event (i.e. Medium Risk).

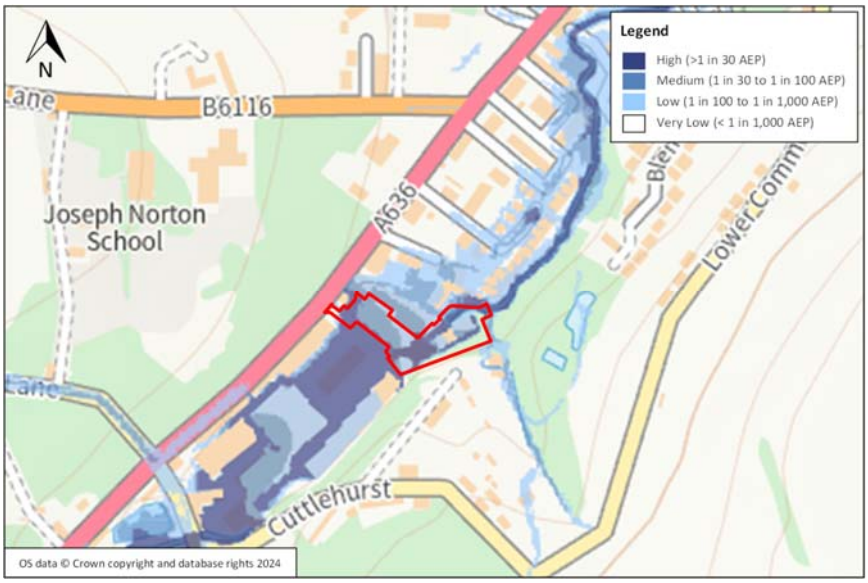
The modelling used to derive the Flood Risk from Surface Water map is unlikely to have accurately represented the channel of the River Dearne and the associated hydraulic structures (bridges, culverts and weirs) do not appear to have been represented in the model[8]. Consequently, the flooding shown on the Flood Risk from Surface Water map within the floodplain is considered to be inaccurate and significantly overestimated.

Given that the River Dearne has been modelled by the Environment Agency to have the capacity to convey the present day 1 in 100 AEP flows within the vicinity of the site with floodwater contained within close proximity to the channel within the vicinity of Cuttlehurst, the flooding in and around the River Dearne between the site and Cuttlehurst to > 1.2 m for the same AEP event (as shown on the less-detailed/less-accurate Flood Risk from Surface Water map) is not likely to be an accurate representation of flood risk at the site. Therefore, it is considered that more weight should be given to the more detailed/accurate assessment in **Section 4.2** to quantify flood risk at the site.

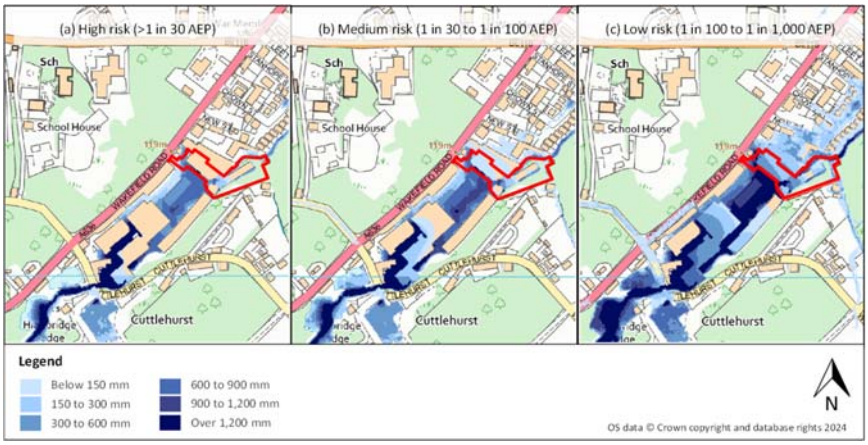
Further evidence to suggest that the risk of surface water flooding at the site is overestimated is provided on the Flood Incident Records provided by Kirklees Council (refer to **Figure 3**). This figure confirms that there have been no records of surface water flooding within close proximity to the River Dearne/Cuttlehurst bridge or adjacent to the site. The recorded flood incidents are expected to relate to overland flows from the west that flow eastwards along highways towards the A636, rather than from the River Dearne.

It is concluded that the Flood Risk from Surface Water map (**Figure 6**) significantly overestimates the risk of flooding from this source and that significantly more weight should be given to the more detailed assessment presented in **Section 4.2**.

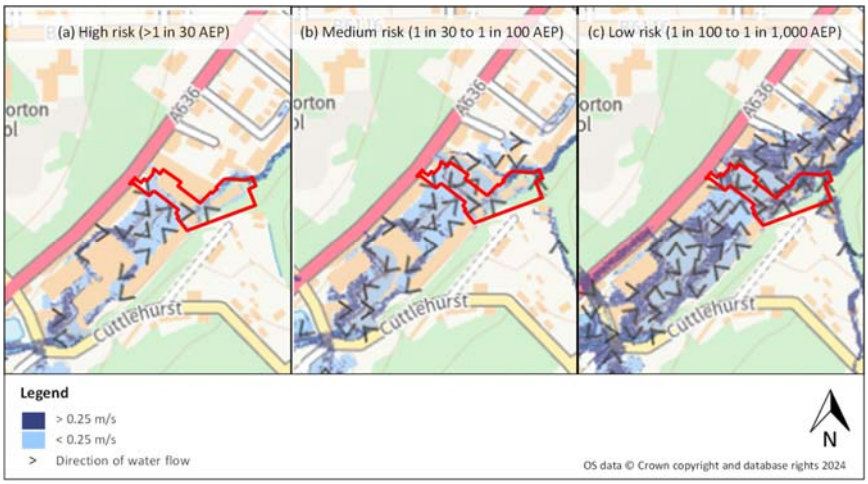
[8] Section 4.1.1 of What is the Risk of Flooding from Surface Water Map? Environment Agency, April 2019



(a) Extent



(b) Depth



(c) Velocity

Figure 6: Flood Risk from Surface Water
Source: gov.uk website; Accessed: February 2024

4.4 Flood Risk from Reservoirs, Canals and Other Water Impounding Structures

There are no canals located within the immediate vicinity of the site.

Any flooding from the ponds to the east of the site would be expected to be minimal with floodwater flowing towards the River Dearne away from the location of the industrial unit. In addition, the Flood Risk from Surface Water map (**Figure 6**) indicates that the site is not at risk of flooding from the pond.

The Flood Risk from Reservoirs map (not shown) indicates that the site is not at risk of flooding from such sources.

It is concluded that the site is not at risk of flooding from reservoirs, canals or other water impounding structures.

4.5 Flood Risk from Groundwater

The JBA Groundwater Flood Risk Indicator map (**Figure 7**) indicates that the site is predominantly at a Negligible risk during a 1 in 100 AEP groundwater flood event. Groundwater levels at the southern boundary of the site may be <0.025 m bgl (defined as High risk) during the aforementioned event, however, given the extensive hardstanding nature of the existing site and surrounding area the emergence of groundwater at the surface is expected to be limited.

It is concluded that the site is at a Low risk of flooding from groundwater.

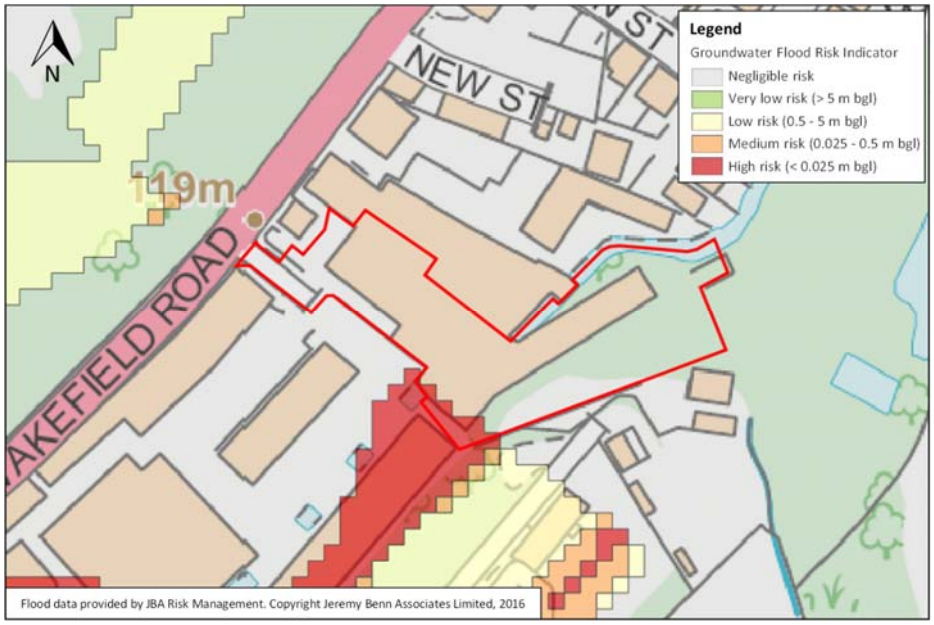


Figure 7: JBA Groundwater Flood Risk Indicator Map
Source: Blue Sky Maps; Accessed: February 2024

4.6 Flood Risk Mitigation

The mitigation measures proposed are in the context of the proposed development being like for like, with the risk of flooding already existing to the current building. Therefore, it is proposed to provide flood risk betterment compared to the existing site as follows:

- Finished floor levels to be set at a minimum of 114.80 m AOD (as stipulated in **Appendix A**). This provides a freeboard of 790 mm above the peak modelled in-channel water level for the 1 in 100 AEP event +28% climate change (model node DEA16648). This level is effectively at or above the vast majority of the existing building finished floor level, with the exception of a small area in the far western portion (refer to **Appendix B**).

- The building should have designed in resilience to flooding. e.g. raised power sockets, non-return valves on ground floor drainage, in line with government guidance[9].
- The conveyance capacity of a replacement culvert/any remedial works to the existing culvert should maintain existing channel conveyance capacity so as not to increase flood risk elsewhere.
- It is recommended that a Flood Warning and Evacuation Plan is prepared in consultation with Kirklees Council emergency planning team. The site is included in an Environment Agency flood alert and warning area. This provides the opportunity for the relevant response procedures set out in the plan to be invoked in response to receipt of a flood warning from the Environment Agency

These measures will, subject to the implementation of an appropriately designed surface water drainage scheme (**Section 5**), enable any potential overland flows to be conveyed safely across the site without affecting property.

4.7 Flood Risk Elsewhere

The site is not at risk of flooding in up to a 1 in 100 AEP fluvial event including an allowance for climate change. As such the proposals would not be expected to impact flood risk elsewhere and no compensatory flood storage would need be provided on site.

[9] Guidance on the Code of Practice for Property Flood Resilience, Edition 2, C790B. CIRIA London 2020.

5 SURFACE WATER MANAGEMENT

5.1 Surface Water Drainage at the Existing Site

Yorkshire Water public sewer records (refer to **Appendix C**) indicate that a 375 mm diameter public combined sewer crosses the site below the existing building and flows in a north-easterly direction. The sewer is located to the north side of the River Dearne.

The topographic survey identifies several rainwater downpipes, channel drains and manhole covers across the site, both internally and externally of the existing building. A culvert survey (refer to **Appendix D**) provides photographic evidence of downpipes discharging runoff directly into culvert. It is therefore assumed that all runoff from the site discharges unrestricted into the River Dearne.

The site has a total area of 0.49 ha of which 0.28 ha comprises impermeable area.

Runoff rates from existing impermeable areas have been calculated using the Modified Rational Method. Details of the input parameters and the output results are provided in **Appendix E**.

The runoff rates from the existing site are presented in **Table 2**.

Table 2: Peak Runoff Rate - Existing Site

AEP of rainfall event	Impermeable Runoff Rate 0.28 ha (l/s)
1 in 1	41.3
1 in 2	52.7
1 in 30	96.1
1 in 100	121.1

5.2 Surface Water Drainage at the Redeveloped Site

5.2.1 Disposal of Surface Water

In accordance with PPG - Flood Risk and Coastal Change para. 056, surface water runoff should be disposed of according to the following hierarchy: Into the ground (infiltration); To a surface water body; To a surface water sewer, highway drain, or another drainage system; To a combined sewer.

As detailed in **Section 2.5**, the site is underlain by soils with impeded drainage, i.e. clay and shale. As such the disposal of surface water via infiltration is unlikely to be feasible; however, infiltration tests have not been undertaken at this stage. Such tests may be undertaken at the detailed design stage in accordance with the guidelines in BRE365[10]. It is subsequently proposed to direct all runoff from the redeveloped site to the River Dearne.

5.2.2 Post Development Impermeable Area

The area of impermeable surfaces within the proposed development has been calculated to be 0.26 ha, based on **Appendix A**.

5.2.3 Peak Flow Control

It is proposed to restrict surface water runoff to the existing 1 in 1 AEP event rate, as outlined in **Table 2**, with a 30% betterment post development i.e. 28.9 l/s.

5.2.4 Volume Control

The volume of runoff is not expected to increase following development given that impermeable areas at the site will not be increasing.

[10] BRE Digest 365 Soakaway Design, Building Research Establishment, 2016

5.2.5 Attenuation Storage

Attenuation storage will be provided to store surface water runoff generated across roofs and hardstanding.

The attenuation storage facility has been modelled using Causeway Flow (**Appendix F**). The required storage volume has been sized to store the 1 in 100 AEP rainfall event including a 45% increase in rainfall intensity to allow for climate change in accordance with Environment Agency guidance[11].

Assuming a peak discharge rate of 28.9 l/s, a total storage volume of 112.2 m^3 would be required.

The storage volume could be accommodated within the pipe network and a concrete storage tank with an area of 72.0 m^2 and a depth of 1.0 m.

A preliminary surface water drainage layout is provided in **Appendix G**.

5.2.6 Pollution Control

The CIRIA SuDS Manual and Table G3.1 of the Statutory Standards for Sustainable Drainage Systems identifies commercial roofs and non-residential car parking as having a low pollution hazard level. Table 26.2 of the CIRIA SuDS Manual 2015 indicates that the pollution hazard indices associated with such uses for total suspended solids, hydrocarbons and metals are 0.3, 0.2 and 0.05, and 0.50, 0.40 and 0.40 respectively.

It is proposed that permeable paving will be utilised in parking bays which will help prevent debris from entering the surface water drainage system, reducing the risk of blockage. Table 26.3 of the CIRIA SuDS Manual indicates that the SuDS mitigation indices for permeable pavement for total suspended solids, hydrocarbons and metals are 0.70, 0.60 and 0.70.

In addition, silt traps in rainwater downpipe gully pots and catchpit manholes will help prevent contaminants discharging into the downstream receptor.

5.2.7 Maintenance of SuDS

The surface water drainage system will remain private and would be the responsibility of the site owner. An indicative maintenance schedule is presented in **Table 3**.

Table 3: Maintenance Requirements

Schedule	Required action	Frequency
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required

[11] Flood Risk Assessments: climate change allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances)

Schedule	Required action	Frequency
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies accumulation rates and establish appropriate removal frequencies	Annually
	Monitor inspection chambers	
Concrete Storage Tank		
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlets and vents	As required
Monitoring	Inspect catchpit manholes and note rate of sediment accumulation	Monthly in the first year and then annually
	Inspect/check inlets, outlets and vents to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years, or as required
Flow Control Unit		
Routine maintenance	Remove litter and debris and inspect for sediment accumulation	Six Monthly
	Remove sediment from sump	As necessary – Indicated by system inspections
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six Monthly
	Inspect flow control unit and establish appropriate replacement frequencies	Six Monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first year of operation, then every six months

6 FOUL WATER MANAGEMENT

6.1 Existing Assets

As noted in **Section 5.1**, Yorkshire Water public sewer records (**Appendix C**) indicate the presence of a 375 mm diameter public combined sewer crossing the site. The sewer records also indicate two 150 mm diameter combined sewers crossing the site from the south-east, connecting to the 375 mm diameter sewer to the north of the River Dearne.

6.2 New Connections

The anticipated domestic foul loading from the site has been calculated in accordance with Design and Construction Guidance[12]. The expected total peak flow rate from the development would be 0.3 l/s.

Under the Water Industry Act (1991), developers have a right to connect foul water flows from new developments to public sewer. The Act places a general duty on sewerage undertakers to provide the additional capacity that may be required to accommodate additional flows and loads arising from new domestic development.

Yorkshire Water has advised, by way of a pre-planning sewerage enquiry response (**Appendix H**), that there is existing capacity in the local foul sewerage network to receive and treat domestic foul water from the proposed development and that foul water can discharge without restriction into the 375 mm diameter combined sewer crossing the site.

It is likely a Section 106 application will need to be made to Yorkshire Water for the new connection of the proposed network into the existing sewer, this will need to be made at the detailed design stage.

A preliminary foul water drainage layout is provided in **Appendix G**.

6.3 Easements, Diversions and Disconnections

Yorkshire Water has confirmed (refer to **Appendix H**) that building over the two 150 mm diameter combined sewers may take place under the control of Part H4 Building Regulations 2010.

The existing 375 mm diameter combined sewer is located below the proposed building footprint. As such, a formal build over agreement would need to be established to avoid an easement for the sewer. Confirmation from Yorkshire Water that a build over agreement is feasible is currently awaited.

[12] Sewerage Sector Guidance Appendix C, Water UK, Approved Version 2.0, March 2020

7 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Phoenox Textiles and relates to the proposed redevelopment of Phoenox Textiles, Scissett for industrial use.

The Environment Agency Flood Map for Planning indicates the site to be predominantly located in flood zone 1, with part of the site adjacent to the River Dearne located in flood zones 3 and 2. However, the flood zone 3 extent appears to be within the alignment of the River Dearne within the vicinity of the site.

A 1D hydraulic model of the River Dearne was developed on behalf of the Environment Agency by Halcrow Group Ltd as part of the 2010 Upper Dearne Flood Mapping Study. A comparison of site levels, LiDAR and modelled peak in-channel water levels has been undertaken within the vicinity of the site and indicates the following:

- To the south-west of the site some out of bank flows may be expected near Cuttlehurst bridge during all modelled events, albeit during the present day 1 in 100 AEP event, floodwater is contained within close proximity to the channel; however, within proximity of the site peak in-channel water levels are expected to remain in channel during all modelled flood events.
- To the north-east of the site peak in-channel water levels are indicated to remain in channel during the present day 1 in 100 AEP event and the 1 in 100 AEP event +28% climate change, but some out of bank flows may be expected during the present day 1 in 1,000 AEP event within the eastern portion of the site.
- Access and egress to the site via Wood Lane is expected to remain dry during all modelled events.

The Flood Risk from Surface Water map significantly overestimates the risk of flooding from this source at/within the vicinity of the site and that significantly more weight should be given to the more detailed assessment of flood risk from the River Dearne.

The site is assessed to be at a low risk of flooding from groundwater and not at risk of flooding from reservoirs and canals or other artificial sources.

The mitigation measures proposed are in the context of the proposed development being like for like, with the risk of flooding already existing to the current building. Therefore, it is proposed to provide flood risk betterment compared to the existing site as follows:

- Finished floor levels to be set at a minimum of 114.80 m AOD (as stipulated on the proposed site layout plan).
- The building should have designed in resilience to flooding e.g. raised power sockets, non-return valves on ground floor drainage.
- The conveyance capacity of a replacement culvert/any remedial works to the existing culvert should maintain existing channel conveyance capacity.
- A Flood Warning and Evacuation Plan to be prepared in consultation with Kirklees Council.

Surface water runoff from the redeveloped site can be sustainably managed, with flows continuing to be discharged to the River Dearne. Flows are proposed to be restricted to the existing 1 in 1 year brownfield rate with 30% betterment in up to the 1 in 100 +45% climate change rainfall event.

Surface water runoff will be treated via permeable paving, silt traps in gullies/channel drains, and catchpit manholes to an appropriate level, as demonstrated by application of the 'Simple Index Approach' presented in CIRIA's SUDS Manual.

Domestic foul water generated at the site will be directed to the 375 mm diameter public combined sewer crossing the site. No formal build over agreement will be required for the two 150 mm diameter public combined sewers crossing the site, however, a formal build over agreement will be required for the 375 mm diameter public combined sewer.

In conclusion, this report demonstrates that the proposed development may be completed in accordance with the requirements of planning policy.

APPENDIX A

Proposed Site Plan

410200m

410150m

WOOD STREET

WAKE

195

Rose Cottage

Union Street Business Centre

14no. parking spaces

Solar PV Panels

Maintenance Pathway

Proposed Retaining Wall

Repair / replace culvert as required

FA03 North-West Elevation

FA03 North-East Elevation

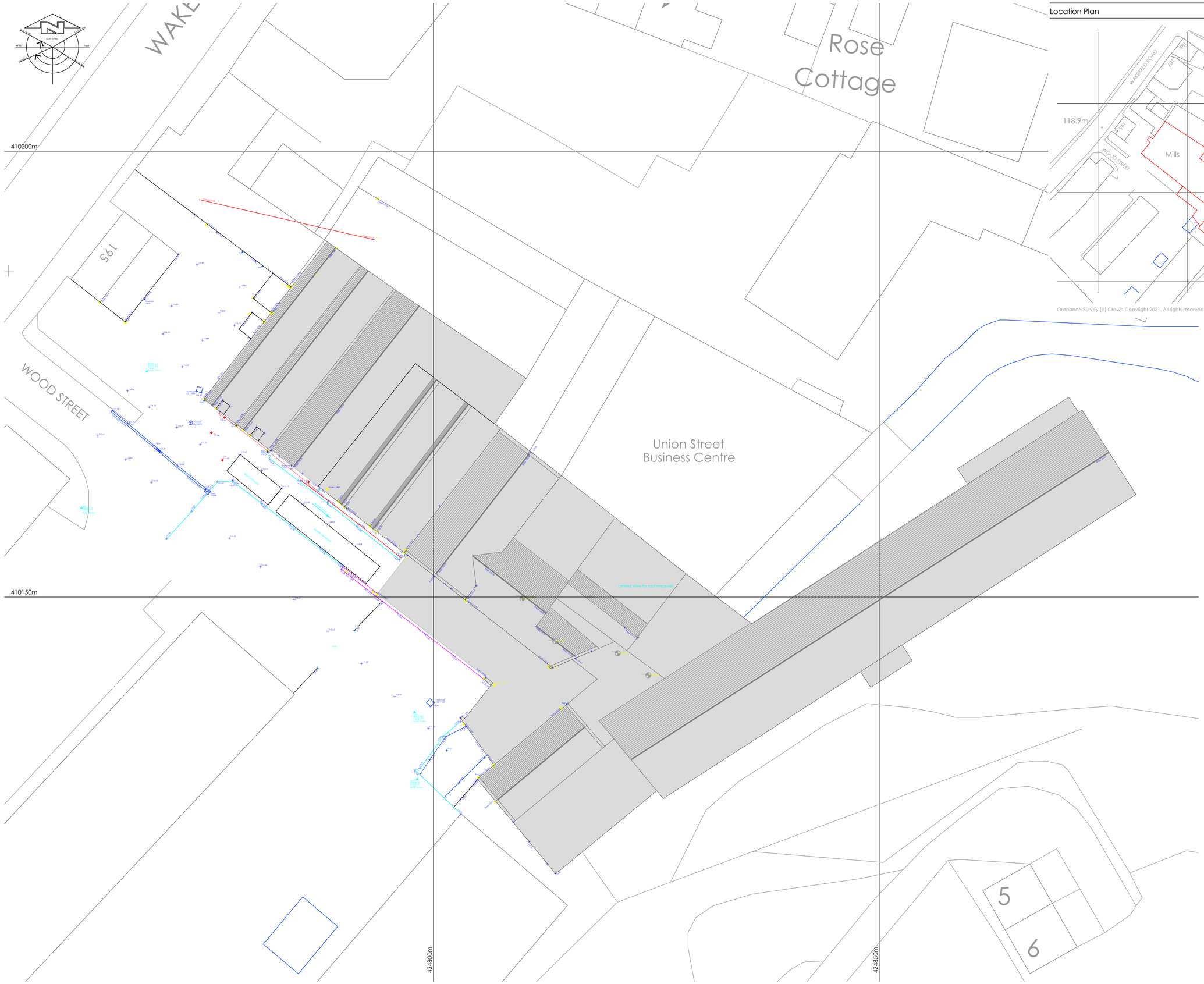
FA03 North-East Elevation 2

FA03 South-East Elevation

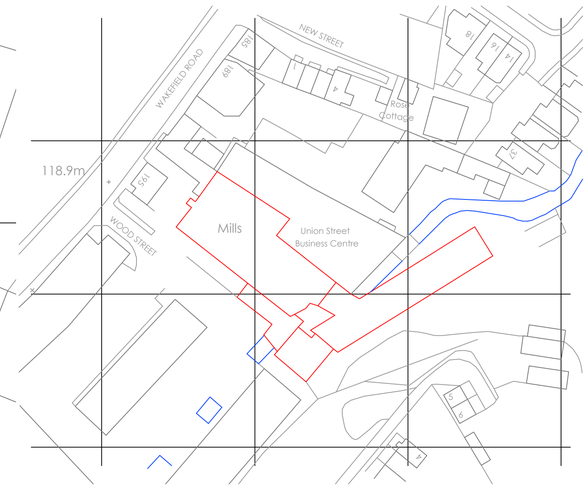
FA03 South-West Elevation

APPENDIX B

Topographic Survey



Location Plan Scale 1:1000



Abbreviation & Symbol Key.

B	Bollard	GV	Gas Valve	PB	Post Box	SWG	Storm Water Gully
BT	BT Cover	IC	Inspection Cover	RE		TFP	Tarmac Footpath
CL	Cover Level	LB	Letter Box	RL	Roofline	ToW	Top of Wall
DK	Drop Kerb	LP	Lamp Post	RS	Road Sign	TP	Telegraph Pole
EL	Electricity Cover	MB	Multi Bole	SS	Street Name Sign	VP	Vent Pipe
EP	Electricity Pole	MH	Man Hole	RWP	Rain Water Pipe	WM	Water Meter
FH	Fire Hydrant	Mkr	Marker Post	SP	Sign Post	WP	Waste Pipe
G	Gully	NB	Notice Board	SV	Stop Valve	WT	Wall Top
GM	Gas Meter	P	Post	SVP	Soil Vent Pipe		

Survey Control Co-ordinates

Reference	East	North	Elevation	Description
GPS01	424767.851	410175.296	116.33	Survey Station
H02	424760.513	410159.983	116.98	Survey Station
H03	424797.880	410137.033	115.35	Survey Station
H03A	424798.167	410129.351	115.32	Survey Station

Site Survey Control & Datum Information

Grid Orientation:
Survey related to Ordnance Survey "OSGB36" at control point GPS10 and the survey data was processed on a plane grid. (No Scale Factor)

Level Datum:
OS Orthometric Hts

Rev	Description	By	Date

Surv.	Drawn	Date	Chkd	Date
NH	NH	21.04.21		

MARTIN WALSH ARCHITECTURAL
MWA
Firth Buildings, 99 - 103 Leeds Rd, Dewsbury, WF12 7BU t: 01924 464342
e: info@martinwalsh.co.uk w: www.martinwalsh.co.uk

Holden Surveys Ltd
Topographical Building & Site Surveys - CAD Services
T/F: 0773 493 6469 E: holdensurveys@msn.com

Title. Site Plan

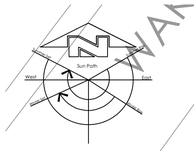
Site. Pheonox Textiles
Nortonthorpe Ind. Park.
Wakefield Rd
Scissett
West Yorkshire

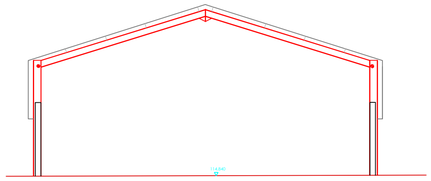
COMPUTER GENERATED DRAWING - DO NOT ALTER

Dwg No. MWA_233_Pheonox

Sheet No. 1

SCALE	1/200	REV.	

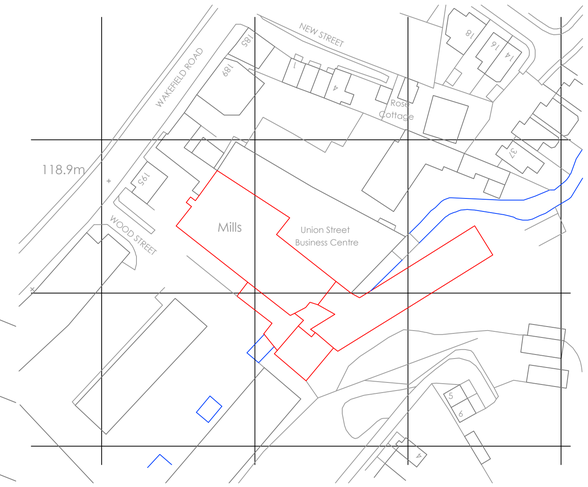




Section Scale 1:100

Location Plan

Scale 1:1000



410200m

410150m

424800m

424850m

Union Street
Business Centre

Abbreviation & Symbol Key.

B	Bollard	GV	Gas Valve	PB	Post Box	SWG	Storm Water Gully
BT	BT Cover	IC	Inspection Cover	RE		TFP	Tarmac Footpath
CL	Cover Level	LB	Letter Box	RL	Rootline	ToW	Top of Wall
DK	Drop Kerb	LP	Lamp Post	RS	Road Sign	TP	Telegraph Pole
EL	Electricity Cover	MB	Multi Bole	SS	Street Name Sign	VP	Vent Pipe
EP	Electricity Pole	MH	Man Hole	RWP	Rain Water Pipe	WM	Water Meter
FH	Fire Hydrant	MM	Marker Post	SP	Sign Post	WP	Waste Pipe
G	Gully	NB	Notice Board	SV	Stop Valve	WT	Wall Top
GM	Gas Meter	P	Post	SVP	Soil Vent Pipe		

Survey Control Co-ordinates

Reference	East	North	Elevation	Description
GPS01	424767.851	410175.296	116.33	Survey Station
H02	424760.513	410159.983	116.98	Survey Station
H03	424797.880	410137.033	115.35	Survey Station
H03A	424798.167	410129.351	115.32	Survey Station

Site Survey Control & Datum Information

Grid Orientation:

Survey related to Ordnance Survey "OSGB36" at control point GPS10 and the survey data was processed on a plane grid. (No Scale Factor)

Level Datum:

OS Orthometric Hts

Rev	Description	By	Date

Surv.	Drawn	Date	Chkd	Date
NH	NH	21.04.21		

MARTIN WALSH
ARCHITECTURAL
MWA
Firth Buildings, 99 - 103 Leeds Rd, Dewsbury, WF12 7BU t: 01924 464342
e: info@martinwalsh.co.uk w: www.martinwalsh.co.uk

Holden Surveys Ltd
Topographical Building & Site Surveys - CAD Services
T/F: 0773 493 6469 E: holdensurveys@msn.com

Title. Site Plan

Site. Pheonox Textiles
Nortonthorpe Ind. Park.
Wakefield Rd
Scissett
West Yorkshire

COMPUTER GENERATED DRAWING - DO NOT ALTER

Dwg No.	MWA_233_Pheonox
Sheet No.	2

SCALE	1/200	REV.	

APPENDIX C

Public Sewer Records

424766 : 410113	Map Name : SE2410SE	Title	Partial Key Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS	This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.
Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : G Mullaney Contact Tel :		Notes		
		(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432	Date Req : 19/02/2024, 12:11:18	Date Gen : 19/02/2024, 12:11:52
			Source : Sewer Network Enquiry	

UPN: Undefined Originator: G Mullaney, ,

APPENDIX D

Culvert Survey

l01rad

TERRA VAC (UK) Ltd
Unit 1, Lakeside
Calder Island Way
Wakefield WF2 7AW

29 March 2019

Dear Paul

Wood Street Culvert Survey

This survey was undertaken on 17.01.19 in order to inspect and photographically record the condition of the walls and soffit of the culvert.

The culvert flows SE to NW under the Phoenox textile factory and is approximately 37m in length.

Access to the culvert was gained via the fenced open area at the SW end of the culvert in the parking area adjacent to the Phoenox factory.

The survey progressed downstream along the left-hand wall (looking downstream).

Once the NW end of the culvert was examined the survey progressed upstream alongside the right-hand wall (looking downstream).

Points of interest were photographed and their distance from the SW (upstream) entrance spray-painted on the wall or written down.

This inspection report records area of damage/dilapidation in the soffit and walls of the culvert.

It is clear the culvert walls have been repaired/patched-up in places and some sections of the soffit and supporting beams have failed.

Photographs 13, 14, 15, 16, 17 and 18 record areas of cracked or spalling reinforced concrete between chainage 14m and 18m approximately.

Depending upon the bearing of the slab onto the banks of the culvert the poor condition of the culvert walls may be less significant.

Photographs 20 and 21 show voids in the culvert roof through which one can see the inside of the factory. These must be a hazard in the factory floor and should be addressed expeditiously.

Yours sincerely

Andy Fraser
Director

enc.

Photograph 1
Entering upstream end (SW) of culvert, chainage zero spray paint
on left-hand wall (looking downstream).

Photograph 2
3.8m LHS RSJ supporting soffit is badly corroded.
Exposed rusted metal grille to soffit upstream of RSJ.

Photograph 3
3.8m LHS similar view to RSJ.

Photograph 4
3.8m LHS close-up of RSJ, metal grille to soffit, padstone and infill.

Photograph 5
5.7m LHS second RSJ and timber soffit formwork.

Photograph 6
5.7m LHS close-up of corroded RSJ, padstone, timber soffit formwork and trapped debris.

Photograph 7
10.0m LHS 4” drainpipe through concrete soffit.

Photograph 8
10.0m LHS close-up of 4” drainpipe mostly blocked with debris/cobwebs.

Photograph 9
11.7m LHS rectangular void through soffit.

Photograph 10
11.7m LHS close-up of rectangular void through soffit
showing roots/debris growing through.

Photograph 11
13.0m LHS concrete beam.

Photograph 12
13.0m LHS close-up of bearing of in-situ beam onto stone wall.

Photograph 13
14.4m LHS concrete beam showing crack to upstream face of beam.

Photograph 14
14.4m LHS concrete beam showing extent of crack
to upstream face of beam and spalling concrete to soffit.

Photograph 15
14.4m centre of stream showing extent of crack to upstream face of beam.

Photograph 16
17.0m approximate concrete beam showing crack to underneath and spalling to soffit.

Photograph 17
17.0m approximate close-up of spalling to soffit.

Photograph 18
18.0 approximately central. Crack and spalling of concrete soffit.

Photograph 19
19.6m LHS close-up of rusted RSJ and other steelwork/timber soffit.

Photograph 20
19.6m LHS looking up. Rusted RSH and hole in culvert roof.
Internal factory wall can be seen above.

Photograph 21
19.6m LHS. Looking up through hole in culvert roof.
Internal factory wall visible above.

Photograph 22
26.6m LHS. Supporting wall in poor condition.
Corroded steel strut across culvert at mid height. Exit (downstream) visible of RHS.

Photograph 23
26.6m LHS square-on view of corroded steel strut
showing poor condition of supporting wall.

Photograph 24
32.7m LHS corroded RSJ built-in across culvert at mid height.
Poor quality of supporting wall.

END OF LEFT HAND SIDE

Re-enter culvert from downstream (NE) end. Walk RHS using same chainages.

Photograph 25
29m RHS poor quality breezeblock and loose stone supporting wall. Pigeons nest.

Photograph 26
25m RHS poor quality breezeblock and loose stone supporting wall.

Photograph 27
25m RHS close-up of poor breezeblock and stone supporting wall.

Photograph 28
22m RHS corroded RSJ with timber pack supporting soffit

Photograph 29
22m RHS close-up of picture 28 above

Photograph 30
19m RHS badly corroded RSJ support with additional steel members above.
Badly corroded soffit support steel work (‘L’ members).
Drainpipe through culvert wall and additional white plastic pipe (drain?) through soffit.

Photograph 31
19m RHS close-up of picture 30 above

Photograph 32
11.5m RHS ledge sticking out of wall. Note crack to side of reinforced concrete beam.

Photograph 33
3.8m RHS. Rusted RSJ. Build-up of silt and debris against right-hand wall.

APPENDIX E

Peak Runoff Rate from Existing Site

The peak discharge rates of surface water runoff from the impermeable areas at the site have been calculated based on the Modified Rational Method[13].

The following parameters have been obtained from the maps in Volume 3 of the Wallingford Procedure:

M5-60 minute rainfall depth:	20 mm
Ratio of M5-60 to M5-2 day rainfall:	0.3
Average Annual Rainfall:	876 mm
Winter Rain Acceptance Potential / Soil Type:	4 / 0.45
The Urban Catchment Wetness Index (UCWI) value:	95.8

A time of concentration/flow of 5 minutes has been used given the close proximity between the site and the outfall location.

A rainfall estimation calculation has been carried out to convert the M5-60 minute rainfall to the 5 minute duration rainfall for the 1 in 1 and 1 in 100 annual exceedance probability (AEP) rainfall events. The calculated rainfall intensities for these events are 50.9 and 149.5 mm/hr respectively.

The flow rate as given by the Modified Rational Method is:

$Q=2.78 \times C_v \times C_r \times$ rainfall intensity x impermeable area

where:

C_v is the volumetric runoff coefficient = P_r/PIMP = 0.8092
where P_r is Percentage Runoff and PIMP is Percentage Impermeable Area
C_r is the routing coefficient = 1.3
Impermeable Area = 0.277 ha

The peak discharges of surface runoff from impermeable areas of the existing site are shown in the table below:

AEP of rainfall event	Peak discharge for 0.277 ha impermeable area (l/s)
1 in 1	41.3
1 in 2	52.7
1 in 30	96.1
1 in 100	121.1

[13] The Wallingford Procedure, Volume 4, 1981

APPENDIX F

Surface Water Attenuation - Storage Volume Calculation

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	0.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1.0	0.095	5.00	114.900	475	900	52.734	66.525	0.601
1.1	0.047	5.00	115.400	1500		23.828	87.991	1.602
1.2			115.450	1500		1.940	87.566	1.668
1.3	0.066	5.00	115.500	1500		-20.194	61.307	1.750
1.4			115.350	1500		-3.875	46.457	1.617
1.5			114.800	1200		45.275	7.995	1.273
Headwall			114.800	100		49.511	4.463	1.800
Outfall			114.800	100		65.061	18.704	1.825

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1.0	1.1	21.400	0.600	114.299	114.173	0.126	170.0	225	5.36	0.0
1.001	1.1	1.2	6.200	0.600	113.798	113.786	0.012	500.0	600	5.45	0.0
1.002	1.3	1.4	8.600	0.600	113.750	113.733	0.017	500.0	600	5.13	0.0
1.003	1.4	1.5	35.000	0.600	113.733	113.527	0.206	170.0	225	5.72	0.0
1.004	1.5	Headwall	5.300	0.600	113.527	113.496	0.031	170.0	225	5.80	0.0
1.005	Headwall	Outfall	10.000	0.600	113.000	112.975	0.025	400.0	900	5.91	0.0

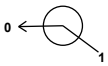
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.000	39.7	0.0	0.376	1.002	0.095	0.0	0	0.000
1.001	1.082	305.9	0.0	1.002	1.064	0.142	0.0	0	0.000
1.002	1.082	305.9	0.0	1.150	1.017	0.066	0.0	0	0.000
1.003	1.000	39.7	0.0	1.392	1.048	0.066	0.0	0	0.000
1.004	1.000	39.7	0.0	1.048	1.079	0.066	0.0	0	0.000
1.005	1.560	992.5	0.0	0.900	0.925	0.066	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	21.400	170.0	225	Circular	114.900	114.299	0.376	115.400	114.173	1.002
1.001	6.200	500.0	600	Circular	115.400	113.798	1.002	115.450	113.786	1.064
1.002	8.600	500.0	600	Circular	115.500	113.750	1.150	115.350	113.733	1.017
1.003	35.000	170.0	225	Circular	115.350	113.733	1.392	114.800	113.527	1.048
1.004	5.300	170.0	225	Circular	114.800	113.527	1.048	114.800	113.496	1.079
1.005	10.000	400.0	900	Circular	114.800	113.000	0.900	114.800	112.975	0.925

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1.0	475	900	Manhole	Adoptable	1.1	1500	Manhole	Adoptable
1.001	1.1	1500		Manhole	Adoptable	1.2	1500	Manhole	Adoptable
1.002	1.3	1500		Manhole	Adoptable	1.4	1500	Manhole	Adoptable
1.003	1.4	1500		Manhole	Adoptable	1.5	1200	Manhole	Adoptable
1.004	1.5	1200		Manhole	Adoptable	Headwall	100	Manhole	Adoptable
1.005	Headwall	100		Manhole	Adoptable	Outfall	100	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
1.0	52.734	66.525	114.900	0.601	475	900				
							0	1.000	114.299	225
1.1	23.828	87.991	115.400	1.602	1500		1	1.000	114.173	225
										
							0	1.001	113.798	600
1.2	1.940	87.566	115.450	1.668	1500		1	1.001	113.786	600
										
1.3	-20.194	61.307	115.500	1.750	1500					
							0	1.002	113.750	600
1.4	-3.875	46.457	115.350	1.617	1500		1	1.002	113.733	600
										
							0	1.003	113.733	225
1.5	45.275	7.995	114.800	1.273	1200		1	1.003	113.527	225
										
							0	1.004	113.527	225
Headwall	49.511	4.463	114.800	1.800	100		1	1.004	113.496	225
										
							0	1.005	113.000	900

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
Outfall	65.061	18.704	114.800	1.825	100		1	1.005	112.975	900

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node Outfall Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.470	300	1.470	600	1.470	900	1.470	1200	1.470	1500	1.470
100	1.470	400	1.470	700	1.470	1000	1.470	1300	1.470		
200	1.470	500	1.470	800	1.470	1100	1.470	1400	1.470		

Node 1.4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(CU) Linear Discharge
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	113.733	Product Number	CTL-SCU-0156-2440-1000-2440
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	24.4	Min Node Diameter (mm)	1200

Node 1.3 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	15.900
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	113.750	Main Channel Slope (1:X)	500.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.050

Inlets

1.2

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	72.0	0.0	1.000	72.0	0.0	1.001	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 92.59%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1.0	1350	114.467	0.168	1.0	0.6024	0.0000	OK
1440 minute winter	1.1	1320	114.467	0.669	1.5	1.5751	0.0000	SURCHARGED
1440 minute winter	1.2	1350	114.467	0.685	1.4	1.2101	0.0000	OK
1440 minute winter	1.3	1350	114.467	0.717	1.6	1.8069	0.0000	SURCHARGED
1440 minute winter	1.4	1350	114.466	0.733	0.9	1.2954	0.0000	SURCHARGED
1440 minute winter	1.5	1350	114.445	0.918	0.5	1.0385	0.0000	SURCHARGED
1440 minute winter	Headwall	1320	114.446	1.446	0.5	0.0116	0.0000	SURCHARGED
15 minute summer	Outfall	1	114.445	1.470	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1.0	1.000	1.1	1.0	0.426	0.025	0.7655	
1440 minute winter	1.1	1.001	1.2	1.4	0.323	0.005	1.7464	
1440 minute winter	1.2	Flow through pond	1.3	1.5	0.007	0.001	50.4634	
1440 minute winter	1.3	1.002	1.4	0.9	0.151	0.003	2.4224	
1440 minute winter	1.4	Hydro-Brake®	1.5	0.5				
1440 minute winter	1.5	1.004	Headwall	0.5	0.329	0.013	0.2108	
1440 minute winter	Headwall	1.005	Outfall	1.3	0.002	0.001	6.3377	5.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 92.59%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1.0	304	114.537	0.238	4.1	0.8538	0.0000	SURCHARGED
480 minute winter	1.1	312	114.539	0.740	6.1	1.7431	0.0000	SURCHARGED
480 minute winter	1.2	312	114.535	0.753	6.0	1.3308	0.0000	OK
480 minute winter	1.3	312	114.535	0.785	12.2	1.9800	0.0000	SURCHARGED
480 minute winter	1.4	312	114.537	0.804	5.4	1.4201	0.0000	SURCHARGED
960 minute winter	1.5	570	114.447	0.920	5.0	1.0409	0.0000	SURCHARGED
360 minute winter	Headwall	272	114.450	1.450	5.0	0.0116	0.0000	SURCHARGED
15 minute summer	Outfall	1	114.445	1.470	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1.0	1.000	1.1	4.1	0.639	0.103	0.8511	
480 minute winter	1.1	1.001	1.2	6.0	0.366	0.020	1.7464	
480 minute winter	1.2	Flow through pond	1.3	10.2	0.017	0.005	55.4195	
480 minute winter	1.3	1.002	1.4	5.4	0.199	0.018	2.4224	
480 minute winter	1.4	Hydro-Brake®	1.5	5.6				
960 minute winter	1.5	1.004	Headwall	5.6	0.405	0.140	0.2108	
360 minute winter	Headwall	1.005	Outfall	3.6	0.006	0.004	6.3377	21.7

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 92.59%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1.0	116	114.794	0.495	15.4	1.7770	0.0000	FLOOD RISK
180 minute winter	1.1	112	114.785	0.987	21.9	2.3231	0.0000	SURCHARGED
180 minute winter	1.2	116	114.790	1.008	24.0	1.7817	0.0000	OK
240 minute winter	1.3	156	114.783	1.033	25.6	2.6034	0.0000	SURCHARGED
180 minute winter	1.4	116	114.793	1.060	15.2	1.8726	0.0000	SURCHARGED
180 minute winter	1.5	124	114.454	0.927	14.6	1.0489	0.0000	SURCHARGED
180 minute winter	Headwall	128	114.461	1.461	15.9	0.0117	0.0000	SURCHARGED
15 minute summer	Outfall	1	114.445	1.470	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1.0	1.000	1.1	14.3	0.871	0.361	0.8511	
180 minute winter	1.1	1.001	1.2	20.9	0.462	0.068	1.7464	
180 minute winter	1.2	Flow through pond	1.3	52.9	0.029	0.026	71.9262	
240 minute winter	1.3	1.002	1.4	16.6	0.224	0.054	2.4224	
180 minute winter	1.4	Hydro-Brake®	1.5	14.6				
180 minute winter	1.5	1.004	Headwall	15.9	0.616	0.399	0.2108	
180 minute winter	Headwall	1.005	Outfall	34.8	0.055	0.035	6.3377	82.6

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	0.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
2.0	0.044	5.00	114.800	675	1200	-1.115	15.874	1.520
2.1			114.800	675	1200	76.080	88.888	1.710
3.0	0.011	5.00	114.800	600		-13.182	84.878	0.900
3.1			114.800	600		24.385	118.344	1.057
2.2			114.800	1200		67.162	113.690	1.732
Outfall			113.800	100		78.309	130.132	0.798

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.000	2.0	2.1	76.100	0.600	113.280	113.090	0.190	400.0	525	6.14	0.0
2.001	2.1	2.2	8.900	0.600	113.090	113.068	0.022	400.0	525	6.27	0.0
3.000	3.0	3.1	15.700	0.600	113.900	113.743	0.157	100.0	150	5.26	0.0
3.001	3.1	2.2	8.000	0.600	113.743	113.068	0.675	11.9	150	5.31	0.0
2.002	2.2	Outfall	6.600	0.600	113.068	113.002	0.066	100.0	150	6.38	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.000	1.114	241.0	0.0	0.995	1.185	0.044	0.0	0	0.000
2.001	1.114	241.0	0.0	1.185	1.207	0.044	0.0	0	0.000
3.000	1.005	17.8	0.0	0.750	0.907	0.011	0.0	0	0.000
3.001	2.942	52.0	0.0	0.907	1.582	0.011	0.0	0	0.000
2.002	1.005	17.8	0.0	1.582	0.648	0.055	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	76.100	400.0	525	Circular	114.800	113.280	0.995	114.800	113.090	1.185
2.001	8.900	400.0	525	Circular	114.800	113.090	1.185	114.800	113.068	1.207
3.000	15.700	100.0	150	Circular	114.800	113.900	0.750	114.800	113.743	0.907
3.001	8.000	11.9	150	Circular	114.800	113.743	0.907	114.800	113.068	1.582

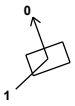
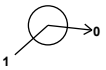
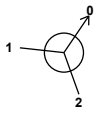
Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
2.000	2.0	675	1200	Manhole	Adoptable	2.1	675	1200	Manhole	Adoptable
2.001	2.1	675	1200	Manhole	Adoptable	2.2	1200		Manhole	Adoptable
3.000	3.0	600		Manhole	Adoptable	3.1	600		Manhole	Adoptable
3.001	3.1	600		Manhole	Adoptable	2.2	1200		Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.002	6.600	100.0	150	Circular	114.800	113.068	1.582	113.800	113.002	0.648

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
2.002	2.2	1200		Manhole	Adoptable	Outfall	100		Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
2.0	-1.115	15.874	114.800	1.520	675	1200				
							0	2.000	113.280	525
2.1	76.080	88.888	114.800	1.710	675	1200		1	2.000	113.090	525
							0	2.001	113.090	525
3.0	-13.182	84.878	114.800	0.900	600					
							0	3.000	113.900	150
3.1	24.385	118.344	114.800	1.057	600		1	3.000	113.743	150
										
							0	3.001	113.743	150
2.2	67.162	113.690	114.800	1.732	1200		1	3.001	113.068	150
							2	2.001	113.068	525
										
							0	2.002	113.068	150
Outfall	78.309	130.132	113.800	0.798	100		1	2.002	113.002	150
										

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node Outfall Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.790	300	0.790	600	0.790	900	0.790	1200	0.790	1500	0.790
100	0.790	400	0.790	700	0.790	1000	0.790	1300	0.790		
200	0.790	500	0.790	800	0.790	1100	0.790	1400	0.790		

Node 2.2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	113.068	Product Number	CTL-SHE-0100-4500-1000-4500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.5	Min Node Diameter (mm)	1200

Results for 1 year Critical Storm Duration. Lowest mass balance: 91.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	2.0	1650	113.636	0.356	0.4	0.4938	0.0000	OK
1440 minute winter	2.1	1530	113.636	0.546	0.4	0.4419	0.0000	SURCHARGED
15 minute winter	3.0	10	113.931	0.031	1.4	0.0162	0.0000	OK
15 minute winter	3.1	11	113.760	0.017	1.4	0.0047	0.0000	OK
1440 minute winter	2.2	1500	113.636	0.568	0.1	0.6420	0.0000	SURCHARGED
15 minute summer	Outfall	1	113.792	0.790	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	2.0	2.000	2.1	0.3	0.136	0.001	14.1421	
1440 minute winter	2.1	2.001	2.2	-0.1	0.060	0.000	1.9227	
15 minute winter	3.0	3.000	3.1	1.4	0.764	0.077	0.0288	
15 minute winter	3.1	3.001	2.2	1.4	0.725	0.026	0.0736	
1440 minute winter	2.2	Hydro-Brake®	Outfall	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 91.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	2.0	435	113.845	0.565	1.4	0.7852	0.0000	SURCHARGED
960 minute winter	2.1	555	113.852	0.762	1.2	0.6170	0.0000	SURCHARGED
15 minute winter	3.0	10	113.949	0.049	3.5	0.0259	0.0000	OK
720 minute winter	3.1	435	113.846	0.103	0.4	0.0293	0.0000	OK
720 minute winter	2.2	435	113.844	0.776	4.5	0.8773	0.0000	SURCHARGED
15 minute summer	Outfall	1	113.792	0.790	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	2.0	2.000	2.1	1.3	0.172	0.005	16.4401	
960 minute winter	2.1	2.001	2.2	1.5	0.027	0.006	1.9227	
15 minute winter	3.0	3.000	3.1	3.5	0.997	0.194	0.0555	
720 minute winter	3.1	3.001	2.2	0.8	0.048	0.015	0.1222	
720 minute winter	2.2	Hydro-Brake®	Outfall	1.3				9.7

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 91.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	2.0	128	114.522	1.242	7.1	1.7251	0.0000	FLOOD RISK
180 minute winter	2.1	128	114.523	1.433	5.5	1.1610	0.0000	FLOOD RISK
180 minute winter	3.0	128	114.523	0.622	1.8	0.3280	0.0000	FLOOD RISK
180 minute winter	3.1	128	114.522	0.779	1.8	0.2205	0.0000	FLOOD RISK
180 minute winter	2.2	128	114.521	1.453	4.9	1.6432	0.0000	FLOOD RISK
15 minute summer	Outfall	1	113.792	0.790	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	2.0	2.000	2.1	5.5	0.288	0.023	16.4401	
180 minute winter	2.1	2.001	2.2	4.5	0.123	0.019	1.9227	
180 minute winter	3.0	3.000	3.1	1.8	0.829	0.101	0.2764	
180 minute winter	3.1	3.001	2.2	1.8	0.177	0.035	0.1408	
180 minute winter	2.2	Hydro-Brake®	Outfall	4.5				17.4

APPENDIX G

Preliminary Drainage Layout

N

WAKEFIELD ROAD

NEW STREET

WOOD STREET

Rose Cottage

Union Street Business Centre

S1.1
CATCHPIT MH
CL=115.40
IL=114.175 (225Ø)
IL=113.800 (600Ø)
IL=114.350 (SILT TRAP)

S1.2
CL=115.45
IL=113.79

1.001 6.2m 600Ø 1:500

PERMEABLE PAVING SUB-BASE

70 m² x 0.3 m DEEP
30% VOIDS (BARDON SUDSAGG OR SIMILAR PRODUCT)

1.000 21.4m 225Ø 1:170

GROUND LEVELS TO ENSURE RUNOFF IS DIRECTED TOWARDS THE PERMEABLE PARKING BAYS

SUB-BASE OUTLET

1.002 8.6m 600Ø 1:500

S1.3
CATCHPIT MH
CL=115.50
IL=113.75 (600Ø)
IL=113.95 (SILT TRAP)

ONLINE CONCRETE STORAGE TANK

72 m² x 1.0 m = 72 m³
CL=115.50
SL=114.75 (0.75 m COVER)
IL=113.75

1 IN 1 AEP RAINFALL EVENT WATER LEVEL = 114.467 m AOD
1 IN 30 AEP RAINFALL EVENT WATER LEVEL = 114.535 m AOD
1 IN 100 +45%CC AEP RAINFALL EVENT WATER LEVEL = 114.750 m AOD

S1.4
FLOW CONTROL MH
FLOW RATE=24.4 l/s
CL=115.53
IL=113.74

1.000 38.0m 225Ø 1:170

S1.5
CL=114.80
IL=113.53

1.004 4.3m 225Ø 1:170

NORTH-WESTERN NETWORK DESIGNED WITH A SURCHARGED OUTFALL, BASED ON THE 1 IN 1,000 AEP RAINFALL EVENT FLOOD LEVEL OF 114.470 m AOD AT DEA16548

EX.C8101
CL=NO INFO
IL=NO INFO

DEA16548

FLAP VALVE OUTFALL
IL=113.50

S2.0
CL=114.80
IL=113.28

EX.375Ø COMBINED SEWER

EX.C8102
CL=NO INFO
IL=NO INFO

EX.C8103
CL=NO INFO
IL=NO INFO

EX.375Ø COMBINED SEWER 1:150

EX.375Ø COMBINED SEWER

S3.1
CL=114.80
IL=113.74

3.001 8.0m 150Ø 1:12

2.002 6.6m 150Ø 1:100

HEADWALL OUTFALL
IL=113.00

3.000 15.7m 150Ø 1:100

S3.0
CL=114.80
IL=113.90

S2.2
FLOW CONTROL MH
FLOW RATE=4.5 l/s
CL=114.80
IL=114.07

2.003 5.5m 150Ø 1:100

SOUTH-EASTERN NETWORK DESIGNED WITH A SURCHARGED OUTFALL, BASED ON THE 1 IN 1,000 AEP RAINFALL EVENT FLOOD LEVEL OF 113.790 m AOD AT DEA16589

S2.1
CL=114.80
IL=113.09

C1.0
CL=14.80
IL=TBC

INTERNAL FOUL WATER DRAINAGE CONNECTIONS TO DISCHARGE INTO MANHOLE C1.0 OR C2.0

DEA16589

C2.0
CL=14.80
IL=TBC

2.000 76.1m 525Ø 1:400

PROPOSED DISCHARGE RATE

EXISTING IMPERMEABLE AREA = 0.277 Ha

EXISTING 1 IN 1 AEP RAINFALL EVENT FLOW RATE = 41.3 l/s

30% FLOW REDUCTION IN ACCORDANCE WITH KIRKLEES COUNCIL (LLFA) REQUIREMENTS = 41.3 x 0.7 = 28.9 l/s

RIVER DEARNE WATER LEVELS

ASSUMED DRY WEATHER FLOW WATER LEVEL = 113.00 m AOD (BASED ON TOPOGRAPHICAL SURVEY LEVELS AND CULVERT SURVEY PHOTOGRAPHIC EVIDENCE - TO THE WEST OF THE SITE)

NODE DEA16648

1 IN 100 AEP RAINFALL EVENT FLOOD LEVEL = 113.82 m AOD
1 IN 1,000 AEP RAINFALL EVENT FLOOD LEVEL = 114.47 m AOD

NODE DEA16589

1 IN 100 AEP RAINFALL EVENT FLOOD LEVEL = 113.45 m AOD
1 IN 1,000 AEP RAINFALL EVENT FLOOD LEVEL = 113.79 m AOD

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT WEETWOOD DRAWINGS.
2. PROPOSED SITE LAYOUT TAKEN FROM MARTIN WALSH ARCHITECTURAL 'PROPOSED SITE PLAN' DRAWING (REF: PTWR-MWA-XX-XX-M2-A-0004_S1_P2, RECEIVED FEB 2024).
3. EXISTING LEVEL INFORMATION TAKEN FROM HOLDON SURVEYS 'TOPOGRAPHIC SURVEY' (REF: MTA_233_PHOENOX, APR 2021).
4. EXISTING DRAINAGE INFORMATION TAKEN FROM YORKSHIRE WATER SEWER RECORDS (SEP 2018).

KEY

- EXISTING PUBLIC COMBINED WATER SEWER
- EXISTING WATERCOURSE
- PROPOSED SURFACE WATER SEWER
- EXISTING PUBLIC COMBINED MANHOLE
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED COMBINED MANHOLE
- PROPOSED DRAINAGE CHANNEL
- ROOF GUTTER
- PROPOSED PERMEABLE PAVING (TREATMENT ONLY)
- PROPOSED CONCRETE TANK
- EXISTING LEVEL
- PROPOSED LEVEL (BY OTHERS)
- SITE BOUNDARY
- OWNERSHIP BOUNDARY

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

REV	DATE	DESCRIPTION	DRAWN	CHECK
P1	20.03.24	INITIAL ISSUE	WC	TB

Weetwood
Development • Planning • Environment
Park House, Fforddd Byrnwr Gwair, Mold CH7 1FQ
Tel 01352 700045
info@weetwood.net
www.weetwood.net

Client
PHOENOX TEXTILES

Drawing Status
PLANNING

Date
MAR 2024

Scale (A0)
1:200

Project
PHOENOX TEXTILES
SCISSETT

Drawn
WC

Checked
TB

Project No
6074

Title
PROPOSED DRAINAGE LAYOUT

Drawing No
104

Revision
P1

APPENDIX H

Yorkshire Water Pre-Planning Enquiry

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482
Fax:

Your Ref:
Our Ref: A000795

19th February 2024

Dear Mr Brook,

Phoenox Textile, Wakefield Road, Scissett, HD8 9JL - Pre Planning Sewerage Enquiry V406518

Thank you for your recent enquiry and remittance. Our official VAT receipt has been sent to you under separate cover. Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records.

The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Existing Infrastructure

There is a 375mm diameter public combined water sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 3 (three) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

There are two 150mm diameter public combined sewer recorded on the site. In this instance, building-over may take place under the control of Part H4 Building Regulations 2010. No trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

Foul water domestic waste can discharge to the 375mm diameter public combined sewer recorded crossing the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

It is understood that a watercourse (River Dearne) is located running through the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable). Please note Yorkshire Water cannot provide plans of culverted watercourses or highway drains. To obtain plans please contact the Lead Local Flood Authority for more details.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply online or obtain an application form from our website (www.yorkshirewater.com/developers/sewerage/sewerage-connections/) or by telephoning 0345 120 84 82.

YorkshireWater

Under the provisions of section 111 of the Water Industry Act 1991 it is unlawful to pass into any public sewer (or into any drain or private sewer communicating with the public sewer network) any items likely to cause damage to the public sewer network or interfere with the free flow of its contents or affect the treatment and disposal of its contents. Amongst other things this includes fat, oil, nappies, bandages, syringes, medicines, sanitary towels and incontinence pants. Contravention of the provisions of section 111 is a criminal offence.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for Code for Adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

George Mullaney
Development Services Technician

Weetwood
Development • Planning • Environment

Delivering client focussed services nationally

Flood Risk Assessments
Flood Consequences Assessments
Surface Water Drainage
Foul Water Drainage
Environmental Impact Assessments
River Realignment and Restoration
Water Framework Directive Assessments
Environmental Permit and Land Drainage Applications
Sequential, Justification and Exception Tests
Utility Assessments
Expert Witness and Planning Appeals
Discharge of Planning Conditions

www.weetwood.net