



Tack Lea Works

Heywood, Bury

Flood Risk Assessment & Drainage Strategy

September 2022

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Contents

Introduction.....	1
Existing Conditions	1
Development Proposals	3
Flood Zone Classification and Policy Context	4
Consultation.....	6
Sources of Flooding and Probability	7
Mitigation.....	10
Surface Water Management	11
Maintenance.....	13
Foul Drainage.....	14
Conclusions.....	15
Recommendations.....	15

Appendices

Appendix A	Location Plan & Aerial Image
Appendix B	Topographical Data
Appendix C	United Utilities Sewer Plan & Correspondence
Appendix D	Proposed Development Plan
Appendix E	Environment Agency Flood Maps
Appendix F	LLFA Correspondence & SFRA / PFRA Mapping
Appendix G	Hydrology Calculations
Appendix H	MicroDrainage Storage Estimates
Appendix I	Concept Drainage Sketch
Appendix J	Concept Designers Risk Assessment

Tables

Table 1 – Peak Flow Estimates8

Table 2 – Pollution Hazard Indices13

Table 3 – SuDS Mitigation Indices13

Introduction

Waterco has been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in relation to a residential development at Tack Lea Works, north of Bury and Rochdale Old Road, Heywood, Bury, BL9 7UA.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk (if any). This report has been prepared in accordance with the guidance contained in the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG): Flood Risk and Coastal Change.

Rochdale Borough Council (RBC) as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

Existing Conditions

The site covers an area of approximately 1.01 hectares (ha) and is located at National Grid Reference: 383940, 412054. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed July 2022) shows that the site comprises the derelict Tack Lea Works consisting of the existing building, service yard, mill pond and peripheral soft landscaping. It is understood that the site has been vacant and derelict since 2007 when the plastic product manufacturing company previously occupying the site moved to new premises.

The site is situated within an area dominated by residential and agricultural land uses. The site is bordered to the north, east and west by agricultural land associated with Lower Tack Lea Farm. There is a row of terraced residential properties to the east of the site. Bury and Rochdale Old Road forms the southern boundary with agricultural land and woodland beyond. Access is provided off Bury and Rochdale Old Road to the south of the site.

Approximately 6,662m² or 66% of the total site area comprises hardstanding in the form of the derelict mill building and service yard. The remaining 3,438m² (34% of the site) is permeable in the form of peripheral soft landscaping.

Local Topography

Existing topographic levels have been provided within the 'Utility / CCTV Survey' produced by Survey Operations Ltd. The topographic survey indicates that the site slopes toward the existing service yard in the centre of the site. The service yard is shown to be relatively level with a slight fall to the east.

The southern extent of the site falls northward from a high point of 137.03m AOD adjacent to Bury and

Rochdale Old Road toward the service yard. The northern extent of the site falls steeply towards the existing building from a high point of 140.45m AOD north of the existing mill pond. The existing building is shown to have a finished floor level of 135.22m AOD in the eastern extent and 136.46m AOD in the western extent.

Topographic levels to m AOD have also been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data generally reflects the topographical survey.

Topographical information is provided as Appendix B.

Ground Conditions

Hydrogeological Data

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by superficial deposits of Devensian Till, generally comprising diamicton. The superficial deposits are identified as being underlain by the Pennine Lower Coal Measures Formation consisting of mudstone, siltstone and sandstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed July 2022], the Devensian Till is classified as a Secondary (Undifferentiated) Aquifer. Secondary Undifferentiated Aquifers are assigned in '*cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.*'

The underlying Pennine Lower Coal Measures Formation is described as a Secondary A Aquifer. Secondary A Aquifers are '*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.*'

The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed July 2022], indicates that the site is not located within a Groundwater Source Protection Zone.

The Cranfield University 'Soilsapes' map [accessed July 2022] indicates that the site is underlain by '*freely draining slightly acid loamy soils.*'

Ground Investigations

LK Consult Ltd produced a Phase 1 Preliminary Risk Assessment, Geo-Environmental Investigation and Risk Assessment (Interim) dated August 2016 (document ref: L-602-LKC 16 1018-02). Six windowless sampler boreholes were advanced across the site to a maximum depth of 5.44m below ground level (bgl) and six trial pits were advanced across the site to a maximum depth of 3.5m.bgl. The investigations observed strata consistent with those predicted by the British Geological Survey online mapping. Made Ground was recorded in all excavations to depths of between 0.95m.bgl and 4.8m.bgl.

During the fieldwork and subsequent monitoring visits, groundwater was encountered in all but one exploratory hole with varying depths between 0.46m.bgl and 4.30m.bgl. Elevated Mercury and TPH levels were identified in groundwater samples from window sample boreholes WS102 and WS103, located in the centre and west of the site.

Local Drainage

Public sewer records have been obtained from United Utilities and are included in Appendix C. The sewer plans indicate that there are no public sewers within the site boundary. The sewer plans show a 450mm diameter public combined sewer within Bury and Rochdale Old Road. The sewer is shown to flow eastward passing through manhole 0001 situated immediately south-east of the site becoming 750mm in diameter and then 800mm in diameter at manhole 1001 approximately 220m east of the site. Invert levels have not been provided for the manholes in the vicinity of the site.

The 'Utility / CCTV Survey' produced by Survey Operations Ltd has surveyed the Tack Lee Brook culvert which passes beneath the southern extent of the site from west to south-east. The survey identifies that the culvert splits into two before re-joining at a manhole situated at the south-eastern end of the site. The survey was unable to prove the northern culvert however it is described as a 600mm diameter pipe inserted within a brick culvert. It is understood that this culvert is redundant. The southern culvert is described as a 1050mm diameter concrete pipe. A 1160x900mm diameter culvert flows from the manhole situated in the south-eastern extent of the site. This culvert flows in a south-easterly direction before emerging from a 1150mm diameter pipe approximately 35m south-east of the site. A single 150mm surface water sewer is shown to outfall to the northern culvert approximately 13.28m upstream of the manhole situated in the south-eastern extent of the site.

There are three ponds associated with the former operation of the site. The topographical survey (Appendix B) shows an existing overflow channel from the ponds. The overflow channel diverts flows through the centre of the site and discharges upstream of the culverted section of Tack Lea Brook.

Development Proposals

The proposed development is for 27no. houses and 6no. apartments with 64no. parking spaces and associated landscaping. A proposed development plan is included in Appendix D.

The site plan identifies the primary vehicular and pedestrian access point will remain via Bury and Rochdale Old Road which forms the southern boundary of the site.

The proposed development will result in a decrease in hardstanding areas when compared with the existing site. Hardstanding in the form of buildings, roads and parking spaces will comprise 4,804m² or 48% of the total site area. The remaining permeable, soft landscaped areas will occupy 5296m² or 52% of the total site area. Hardstanding areas have been measured from a PDF copy of the 'Proposed Site Plan' by Ollier Smurthwaite Architects (drawing reference: A645_SK_10Q) and are approximately only.

Flood Zone Classification and Policy Context

The EA 'Flood Map for Planning', included in Appendix E, shows that the site is located within Flood Zone 1 - an area outside of the extreme flood extent, considered to have a less than 0.1% annual probability of flooding from rivers or the sea.

In accordance with Table 2 of the NPPG: Flood Risk and Coastal Change, residential development is classified as 'more vulnerable'. Table 3 of the NPPG states that 'more vulnerable' development is considered appropriate within Flood Zone 1. The development therefore passes the flood risk Sequential Test and the Exception Test does not need to be applied.

Local Policy

The RBC Adopted Core Strategy (October 2016, published February 2017) contains the following policies relating to flood risk & drainage:

'G1 - Tackling and adapting to climate change

...New developments will be expected to...

- d. Address the impacts of climate change by incorporating comprehensive adaptation measures, including:...*
 - ii. where possible, the opening up of covered and culverted sections of waterways and provision of new water features, to help cooling and provide biodiversity, landscape and flood prevention benefits;*
 - iii. the incorporation of appropriate water conservation and management measures, such as Sustainable Drainage Systems (SuDS), including ensuring that the rate of run-off on 'greenfield' sites is not increased and on 'brownfield' sites is significantly reduced, and avoiding the use of impermeable surfaces;*
 - iv. the retention of existing trees wherever possible and the taking of all appropriate opportunities to plant trees and other suitable vegetation on site; and*
 - v. the incorporation of 'green roofs' wherever possible, such as with flat roofs.*

G8 - Managing water resources and flood risk

We will ensure that new development (including flood risk mitigation measures) does not lead to any form of increased flooding locally or further downstream, does not impede natural water and flood risk management, is not detrimental to existing or potential flood storage areas, contributes where possible to alleviating existing flood risk, is itself well protected from flood risk and ensures prudent use of water resources. We will require:

- a. Compliance with a 'sequential' approach to new development and flood risk, directing development away from areas of high risk, in accordance with the National Planning Policy Framework;*

- b. Full regard to and compliance with the advice of the Environment Agency (or equivalent agency) and the objectives and priorities for flood risk management set out in the Local Flood Risk Management Strategy, including any mitigation measures recommended for particular sites;*
- c. Full regard to the published evidence of local flood risk and its significance as included in Strategic Flood Risk Assessments, Surface Water Management Plans and other recognised sources of flood risk data and the production of additional Flood Risk Assessments (FRAs) as appropriate;*
- d. Incorporation of appropriate measures for the management of surface and flood water, including flood storage areas, Sustainable Urban Drainage Systems (SUDS) and the protection of 'overland flow paths';*
- e. Compliance with any Surface Water Management Plan or drainage strategies produced, such as for the identified critical drainage areas of Littleborough and Heywood;*
- f. The avoidance of culverting, and support the opening up of existing culverts wherever possible;*
- g. The incorporation of measures for the conservation of water to minimise potable water consumption, including rainwater collection measures, which should be integral to the design of buildings and spaces;*
- h. Development that does not directly or indirectly lead to pollution of existing water resources such as watercourses and groundwater or the derogation of the quantity of groundwater;*
- i. The incorporation of measures to improve water quality; and*
- j. The taking of opportunities to improve the habitat value of watercourses and water bodies.*

In addition, we will identify additional flood storage areas which will be protected from development.'

The Rochdale Unitary Development Plan was adopted in June 2006. The following saved policy extract relates to flood risk and drainage:

Policy EM7 – Development and Flood Risk

Development will not be permitted in areas identified as flood plains, or other areas where development could contribute to increased flood risk, unless an appropriate flood risk assessment has been carried out and all of the following criteria are met:

- a) It will not increase the risk of flooding within the flood plain or in adjoining areas by reducing flood storage capacity, increasing flows within a flood plain or through the additional discharge of surface water;*
- b) It will not itself be at risk from flooding;*
- c) Appropriate sustainable drainage systems are used;*
- d) Adequate access adjacent to the water course for maintenance is provided;*

- e) Existing or proposed flood defences are protected;*
- f) It would not result in extensive culverting; and*
- g) Flood defence works required as a consequence of development are provided at the developer's expense.*

Local guidance documents including the Bury, Rochdale and Oldham Council Strategic Flood Risk Assessment (SFRA) Levels 1 and 2 (November 2009), the Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (PFRA) (May 2011 and its 2017 addendum) and the Rochdale Borough's Strategy for Flood Risk Management 2014-2024 (March 2014) have been reviewed and inform this report.

Consultation

As part of pre-application advice received by the Client in June 2022, RBC as the LLFA have stated the following, with correspondence included in Appendix F:

Drainage and Flood Risk

The application site is located within Flood Zone 1 and the site measures in excess of 1 hectare. Accordingly, the application should be accompanied by an outline drainage strategy/SUDs assessment and a Flood Risk Assessment is required. Rainfall runoff should be attenuated such that any rainfall discharges from the developed site are not increased. Greenfield runoff rate of 5 l/s/ha shall be applied, unless an assessment conclusively demonstrates greenfield runoff to be greater than this. The minimum practical flow control value that can be applied using a vortex flow control is 5 l/s so that the outlet diameter of the flow control does not block. A 50% reduction in the brownfield run off rate is expected.

In respect of surface water drainage proposals, the site should be drained in the most sustainable method in accordance with the hierarchy set out within the National Planning Practice Guidance. Additional advice on Sustainable Urban Drainage for major development is available on the council's website, and guidance is provided by United Utilities on their respective website.

Any new hardstanding areas will lead to surface water runoff. Before planning to discharge surface water to public sewer, it will be necessary to demonstrate that infiltration is not feasible by carrying out permeability tests on site in accordance with BRE 365 Guidance. Permeable paving is one of the optimal methods of reducing the runoff.

The capacity of SuDS must provide effective drainage for the development, taking account of the likely impacts of climate change and the likely changes in impermeable area within the site over the lifetime of the development.

New climate change allowances were published on 10 May 2022. You will need to ensure the new allowances are incorporated into the flood risk assessment and sustainable drainage design.

A detailed Drainage Plan has not been submitted with your request for advice but the Council's Drainage and

Flooding Engineer will provide detailed comments during the application process once the design and layout has been finalised.

For the building, a foul water discharge consent agreement from United Utilities will be required. Early engagement with United Utilities is recommended.

United Utilities (UU) were consulted in 2016 with regards to foul and surface water flows from the proposed development. The UU response is included in Appendix C and states:

- Foul will be allowed to drain to the public combined network at an unrestricted rate and at a point convenient to yourself;
- Surface water from this site should drain to either soak away or directly to watercourse. Discharge rates and consents must be discussed and agreed with all interested parties.

Sources of Flooding and Probability

Fluvial

The nearest designated 'main river' is the River Roch which is located approximately 595m south of the site at its nearest point. The River Roch flows westward in this location eventually joining the River Irwell at Springwater Park, approximately 6km south-west of the site. The River Roch is shown to be situated below the 90m AOD contour as derived from Ordnance Survey mapping. Site levels are a minimum of 133.89m AOD and the site is therefore approximately 44m above the River Roch. Therefore, any potential flooding of the River Roch would not affect the proposed site.

Tack Lee Brook is culverted beneath the site. The brook originates from the overflow of the Tack Lee Brook reservoir situated approximately 500m north-west of the site. The brook flows south-east before entering the culvert at the western boundary, flowing eastward beneath the existing service yard and emerging from the culvert approximately 50m south-east of the site. The culvert has been surveyed and its location is shown on the 'Utility / CCTV Survey' produced by Survey Operations Ltd (Appendix B).

An assessment of the culvert capacity has been undertaken. The peak flows for Tack Lee Brook have been derived from a simple hydrology assessment. The hydrology assessment is based on default catchment descriptors for Tack Lee Brook at the site location site (grid reference approx. 383800E 412050N) and the ReFH method of peak flow estimation only. A summary of the peak flows is provided in Table 1:

Table 1 – Peak Flow Estimates

Return Period	Peak Flow (m ³ /s)
1 in 100	2.8
1 in 100 +35% CC	3.7
1 in 1000	5.3

The culvert capacity has been assessed using the Colebrook–White formula. Given the culvert diameter of 1050mm and an estimated gradient of 1:15, the culvert can convey a maximum flow of 7.7m³/s and can therefore accommodate the flow from the Tack Lee Brook, up to and including the 1 in 1000 annual probability storm event. The Colebrook–White calculation and ReFH hydrographs are included as Appendix G.

Should the culvert inlet block, the capacity of the culvert would likely be reduced, causing water to back up behind the culvert. Given the depth (6.85m) to the invert level of the culvert (127.44m AOD) and the site level at the western end of the site (134.29m AOD), in the unlikely event that water rose to the site level (reaching a depth greater than 6.85m behind the culvert inlet), flood water would follow the local topography flowing eastward across the southern extent of the site, across Bury and Rochdale Old Road before flowing back into Tack Lea Brook. Hydraulic modelling simulating a culvert blockage scenario would be required to fully quantify the risk of culvert blockage to the site.

There are no records of fluvial flooding at or near to the site. The site is situated within Flood Zone 1 on the EA ‘Flood Map for Planning’. The site is therefore considered to be at low risk of fluvial flooding under normal conditions. The following report sections detail mitigation measures which will be implemented to ensure no flooding to property as a result of a culvert inlet blockage.

Tidal

The site is situated at a minimum of 133.89m AOD and is significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The EA ‘Flood Risk from Surface Water’ map (Appendix E) shows that the majority of the site is at very low risk of surface water flooding, with less than a 0.1% annual probability of flooding.

The EA map identifies three flow routes with a ‘high’ (an area with a 3.3% annual probability of flooding or greater), ‘medium’ (an area with between a 1% and 3.3% annual probability of flooding) and ‘low’ (an area

with between a 0.1% and 1% annual probability of flooding) risk of flooding. One of the flow routes is associated with the Tack Lee Brook, and has been assessed under fluvial flooding. Two other flow routes are associated with the channel originating from the mill pond located at the northern end of the site and the topographically lower area east of the site. Both flow routes emanate from the site and are minimal in extent. No overland flow routes originating offsite have been identified.

The PFRA maps (Appendix F) contain no records of surface water flooding at the site. Any potential surface water flooding arising on site would be directed south and eastward away from the site, towards Bury and Rochdale Old Road and Tack Lea Brook, following the local topography. It can therefore be concluded that the risk of surface water flooding is low.

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The United Utilities sewer plan (Appendix C) shows that there is a 450mm diameter public combined sewer within Bury and Rochdale Old Road to the south of the site.

The SFRA and PFRA contain no records of sewer flooding affecting the site. Any potential sewer flooding arising from the public combined sewer within Bury and Rochdale Old Road would be directed south-east towards the Tack Lea Brook and away from the site following the local topography. It can therefore be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

BGS mapping indicates that the site is underlain by superficial deposits comprising Glacial Till, further underlain by the Pennine Lower Coal Measures Formation bedrock. The bedrock is classified as a Secondary A aquifer. During the site investigation, perched groundwater was encountered in all but one exploratory hole with varying depths between 0.46m.bgl and 4.30m.bgl.

The superficial Glacial Till will impede the vertical migration of groundwater to the surface.

The SFRA contains no records of groundwater flooding at the site. The PFRA maps (Appendix F) identify the site to be situated within an area which has a less than 25% probability of groundwater flooding. The PFRA contains no records of groundwater flooding at the site. It can therefore be concluded that the risk of groundwater flooding is low.

Artificial Sources

There are no canals within the vicinity of the site. The EA 'Flood Risk from Reservoirs' map (Appendix E) shows that the site is at risk of flooding from a failure of the Tack Lee Brook reservoir.

The EA state that Reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensure that reservoirs are inspected regularly and essential safety work is carried out.

There are three ponds associated with the former operation of the site. The ponds are situated at a higher level than the area of proposed development.

The topographical survey (Appendix B) shows an existing overflow channel from the ponds in the northern extent of the site. The overflow channel diverts flows through the centre of the site and discharges upstream of the culverted section of Tack Lea Brook.

Any exceedance flows from the existing ponds would be contained within the overflow channel and diverted to the open section of Tack Lea Brook, upstream of the culvert. The developer should ensure an overflow channel from the ponds to Tack Lea Brook is retained post development.

Given the local topography, there may be a risk to the site should either pond overtop or fail. It is understood that the ponds provide wider ecological benefits and the preference is to retain them.

Overall the risk associated with flooding from other sources (such as reservoirs and canals) is considered to be low. The flood risk associated with a failure of the ponds associated with the former mill informs the flood risk mitigation measures discussed in subsequent report sections.

Summary of Potential Flooding

It can be concluded that the site is at a residual risk of fluvial flooding from a blockage at the inlet of the Tack Lee Brook culvert. There is also a residual risk of flooding from a failure of the existing ponds in the northern extent of the site. The risk of flooding from all other sources is considered to be very low.

Mitigation

In order to mitigate the risk of flood water impacting the proposed dwellings, site levels should be formed so that the access road is at a topographically lower level than adjacent properties and driveways. The access road will be designed to maintain and convey flows in the event of culvert blockage.

The existing ponds in the northern extent of the site should be refurbished and made robust prior to the development. Overflows should be maintained and/or replaced and directed into Tack Lee Brook.

In accordance with Building Regulations, finished floor levels should be set a minimum of 150mm above surrounding ground levels.

Surface Water Management

The existing site is predominantly hard landscaped (concrete) with surface water draining via runoff and gullies into the culverted Tack Lee Brook. The proposed redevelopment of the site will result in a decrease in hardstanding (buildings, access road and car parking) and an increase in soft landscaped areas. Hardstanding will comprise approximately 4,804m² or 48% of the total site area.

In order to ensure the development does not increase flood risk elsewhere, surface water runoff will be controlled through the use of sustainable drainage systems.

Rochdale Borough Council as the LLFA have stated in correspondence included in Appendix F that '*The minimum practical flow control value that can be applied using a vortex flow control is 5 l/s so that the outlet diameter of the flow control does not block.*'

Therefore, a discharge rate of 5 l/s is proposed for the 1.01ha development site.

Attenuation Storage

Based on site topography, a spilt discharge from the site will be required with separate drainage systems serving land north and land south of the Tack Lea Brook culvert. Dwellings and roads north of Tack Lea Brook cover approximately 66% (3182m²) of the post-development impermeable area. The remainder of the site including an access road and driveways south of Tack Lead Brook occupy approximately 33% (1622m²) of the post-development impermeable area.

The discharge rate of 5 l/s has been spilt pro-rata between the two areas of the site.

For the development area north of Tack Lea Brook, a discharge rate of 3.3 l/s is proposed. For the development area South of Tack Lead Brook, a discharge rate of 1.7 l/s is proposed. In order to achieve a restricted discharge rate, attenuation storage will be required. Attenuation storage estimates have been provided using MicroDrainage and are included in Appendix H. In line with EA guidance on peak rainfall allowances, a 45% climate chance allowance has been applied.

Land North of Tack Lea Brook

An estimated storage volume of 195m³ will be required to accommodate the 1 in 100 year plus 45% Climate Change (CC) event. The storage estimate is based on a discharge rate of 3.3 l/s, storage within a tank or pond structure, an impermeable drainage area of 3,182m², a design head of 1.2m and hydro-brake flow control.

Land South of Tack Lea Brook

An estimated storage volume of 100m³ will be required to accommodate the 1 in 100 year plus 45% CC event. The storage estimate is based on a discharge rate of 1.7 l/s, storage within a tank or pond structure, an impermeable drainage area of 1622m², a design head of 1m and hydro-brake flow control.

The attenuation volumes are provided for indicative purposes only and should be verified at the detailed design stage.

Discharge Method

Paragraph 080 of the NPPG: Flood Risk and Coastal Change sets out the following hierarchy of drainage options: into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain or another drainage system; to a combined sewer.

Infiltration

The first consideration for the disposal of surface water is infiltration techniques. During the site investigation undertaken by LK Consult Ltd, groundwater was encountered in all but one borehole with varying depths between 0.46m.bgl and 4.30m.bgl. The site investigation also reported elevated Mercury and TPH levels in groundwater samples from two borehole locations.

Given the identified perched groundwater, low permeability superficial deposits and the trace contamination encountered, the use of infiltration techniques is not considered to be a feasible option.

Watercourse

Tack Lee Brook is culverted beneath the site and a gravity fed connection to this watercourse appears to be a feasible option. The manhole situated at the south-eastern end of the site has an invert level of 120.55m AOD, approximately 13.9m below the ground level.

Sustainable Drainage Systems

Attenuation storage should be provided in the form of Sustainable Drainage Systems (SuDS) where practical. The following SuDS options have been considered:

Porous / Permeable Paving

Permeable paving could be incorporated within private roads, car parking spaces and driveways. Storage would be provided within the sub-grade material prior to controlled release to the receiving watercourse. The amount of storage offered by permeable paving is subject to sub-grade depth and site gradient. The use of permeable paving should be considered at the detailed design stage.

Underground Attenuation Tanks & Oversized Pipes

Storage could be provided within underground attenuation tanks or within oversized pipes. Sufficient space for oversized pipes is provided within the site access roads. An attenuation tank could be utilised beneath car parking areas or beneath non-adopted access roads.

Concept Surface Water Drainage Scheme

Surface water runoff will be discharged to Tack Lea Brook which is culverted beneath the site. A spilt discharge rate is proposed, with flows from development north of Tack Lea Brook of the site restricted to 3.3 l/s. Flows from development south of Tack Lea Brook will be restricted to 1.7 l/s. Surface water runoff up to the 1 in 100 year plus 45% climate change allowance event will be attenuated on site. Attenuation could be provided in oversized pipes and in below ground attenuation tanks. A concept drainage sketch is included in Appendix I.

The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the

development.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 45% CC event. Storm events in excess of the 1 in 100 year plus 45% CC event should be permitted to produce temporary shallow depth flooding within the access road and landscaped areas. Finished floor levels will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, with low traffic roads classified as having a 'low' pollution hazard level. Table 2 shows the pollution hazard indices for each land use.

Table 2 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

* Indices values range from 0-1.

Treatment will be provided by a suitably sized proprietary treatment system such as the SDS Aqua Swirl (or similar) placed upstream of the flow control chambers. Table 3 shows that a proprietary treatment system such as the SDS Aqua Swirl provides sufficient treatment.

Table 3 – SuDS Mitigation Indices

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.8	0.5	0.7

Data provided by the manufacturer

Maintenance

The proposed drainage system should be offered for adoption to the sewerage undertaker (United Utilities) who will then be responsible for maintenance. Where drainage features are not adopted, maintenance will be the responsibility of the site owner. Maintenance of shared surface water drainage systems can be arranged through appointment of a site management company.

Maintenance of a proprietary treatment system will be as per the manufacturer's guidance.

Foul Drainage

Foul flows from the development should discharge to the existing 450mm diameter public combined sewer within Bury and Rochdale Old Road. The invert level of the sewer has not been provided, however, given the neighbouring residential properties are shown to discharge to the sewer it is anticipated that a gravity connection will be feasible; this should be confirmed through survey. United Utilities have previously stated that, *'Foul will be allowed to drain to the public combined network at an unrestricted rate and at a point convenient to yourself'*.

Conclusions

The proposed development is for 27no. houses and 6no. apartments with 64no. parking spaces, an access road and associated landscaping.

The site is located within Flood Zone 1 on the Environment Agency (EA) 'Flood Map for Planning' – an area considered to have the lowest probability of fluvial and tidal flooding. The site is shown to be at a residual risk from blockage of the existing Tack Lea Brook culvert. The identified risk will be mitigated through consideration of site levels and maintaining a flow path within the proposed access road.

The existing ponds in the northern extent of the site will be retained for ecological purposes. The ponds will be refurbished to ensure their safe operation for the lifetime of the development. The ponds are served by an overflow channel which connects to Tack Lea Brook upstream of the culvert inlet. Overflows from the ponds should be retained.

The proposed development will reduce the impermeable drainage area through the introduction of residential gardens and soft landscaping. To comply with council requirements, flow control will be used to achieve greenfield runoff rates (5 l/s) and attenuation provided on site to accommodate storm events up to and including the 1 in 100 year plus 45% climate change event.

All methods of surface water discharge have been assessed. As soakaways are not feasible, discharge to the culverted Tack Lee Brook is the preferred option for this site. Discharge to Tack Lea Brook will be made at a combined limited discharge rate of 5 l/s as agreed with Rochdale Borough Council.

Attenuation storage will be required on site in order to restrict surface water discharge to a combined rate of 5 l/s. Attenuation can be provided within oversized pipes and attenuation tanks.

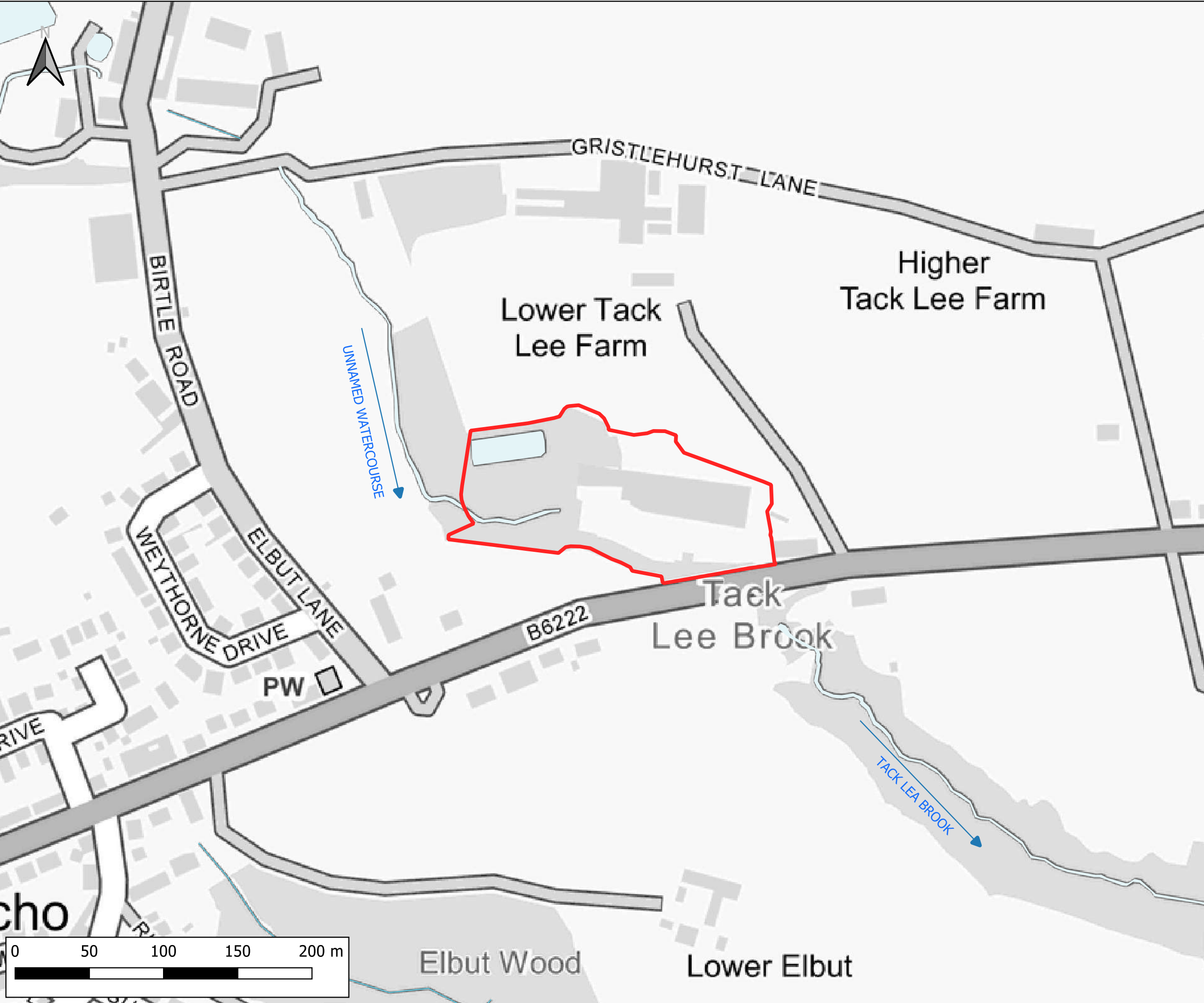
Foul flows from the development should discharge to the existing 450mm diameter public combined sewer within Bury and Rochdale Old Road.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix J.

Recommendations

1. Submit this Flood Risk Assessment and Drainage Strategy to the Planning Authority in support of the Planning Application.
2. Undertake hydraulic modelling of Tack Lea Brook, including simulations of a culvert blockage.
3. Retain overflow channels from the existing ponds in the northern extent of the site.
4. Survey the 450mm diameter public combined sewer within Bury and Rochdale Old Road to confirm invert levels.

Appendix A Location Plan & Aerial Image



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies

CLIENT:

HALL & CO PROPERTY

www.waterco.co.uk

SCHEME:

TACK LEA WORKS, HEYWOOD

PLOT TITLE:

Location Plan

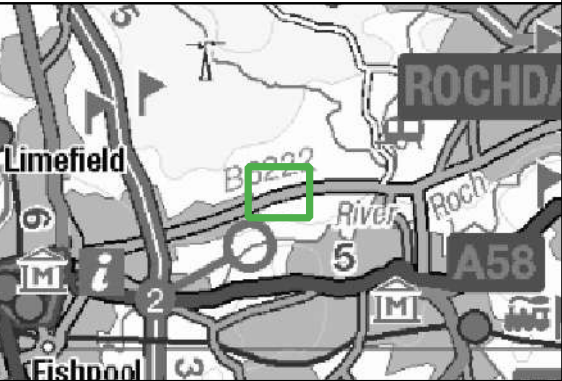
PLOT STATUS:		FINAL		DATE:	20-07-2022
DRAWN:	CHANGED:	APPROVED:	PLOT SCALE AT A3:		
IH	JJ	AW	1:2500		
PLOT NAME:				REVISION:	
14708_Location_Plan				-	



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

 Site Boundary



CLIENT:			
HALL & CO PROPERTY			
 www.waterco.co.uk			
SCHEME:			
TACK LEA WORKS, HEYWOOD			
PLOT TITLE:			
Aerial Plan			
PLOT STATUS:		DATE:	
FINAL		20-07-2022	
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	JJ	AW	1:2500
PLOT NAME:			REVISION:
14708_Aerial_Plan			-

Appendix B Topographical Data



- UNDERGROUND UTILITIES SERVICES DISCLAIMER
- We have endeavored to locate existing services using records provided by third-party authorities as a guide. Some operators were unsuccessful and details have therefore been taken from utility records drawings, which may be of poor quality. Consequently we cannot guarantee accuracy of information taken from such records.
- Where indicated, no allowance has been made for non-surface entry into manholes, other chambers or confined spaces below ground level. Therefore any details relating to depths, sizes etc. are taken from the surface and as such will be approximate.
- We have endeavored to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of pipelines and buried features, but as with all methods of detecting underground or buried utilities the information provided is based on results obtained from electromagnetic techniques, and as such may be liable to distortion or errors beyond the reasonable control of the operator or his instruments.
- It is the responsibility of the user under Health & Safety (H&S) Guidelines to satisfy himself of the suspected location of any services prior to excavation of the services shown.

NOTE 1

This utility survey has been undertaken using

A. Multi-collection REMD0 - REMD0 T10

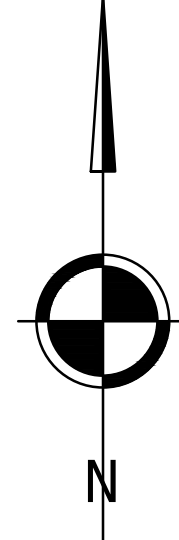
B. Multi-Collection Ground Penetrating Radar

NOTE 2

Power carrying features shown on this drawing are shown as an individual service line. This does not necessarily represent the number of cables actually present and it is possible that there could be multiple numbers of cables including HV and communications transmission cables following the same trace line. These could be at different depths, the trace signal from the deeper cables being masked by signals from the shallower services shown. Cable runs could also be present running parallel to the single line shown.

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Note:

The survey is plotted on a plane local Grid. Orientation to National Grid.

All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Survey Operations Dwg 13H213 surveyed 27/08/13 and added to Survey Operations drawing 130053

SURVEY STATIONS			
Station	Easting	Northing	Height
101	387980.12	41071.62	134.52
102	387980.12	41071.62	134.52
103	387980.12	41071.62	134.52
104	387980.12	41071.62	134.52
105	387980.12	41071.62	134.52
106	387980.12	41071.62	134.52
107	387980.12	41071.62	134.52
108	387980.12	41071.62	134.52
109	387980.12	41071.62	134.52
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111	387980.12	41071.62	134.52
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113	387980.12	41071.62	134.52
114	387980.12	41071.62	134.52
115	387980.12	41071.62	134.52
116	387980.12	41071.62	134.52
117	387980.12	41071.62	134.52
118	387980.12	41071.62	134.52
119	387980.12	41071.62	134.52
120	387980.12	41071.62	134.52

STANDARD REFERENCE & ABBREVIATIONS	
100.....Assumed Route	10.....Assumed Route
101.....Assumed Route	10.....Assumed Route
102.....Assumed Route	10.....Assumed Route
103.....Assumed Route	10.....Assumed Route
104.....Assumed Route	10.....Assumed Route
105.....Assumed Route	10.....Assumed Route
106.....Assumed Route	10.....Assumed Route
107.....Assumed Route	10.....Assumed Route
108.....Assumed Route	10.....Assumed Route
109.....Assumed Route	10.....Assumed Route
110.....Assumed Route	10.....Assumed Route
111.....Assumed Route	10.....Assumed Route
112.....Assumed Route	10.....Assumed Route
113.....Assumed Route	10.....Assumed Route
114.....Assumed Route	10.....Assumed Route
115.....Assumed Route	10.....Assumed Route
116.....Assumed Route	10.....Assumed Route
117.....Assumed Route	10.....Assumed Route
118.....Assumed Route	10.....Assumed Route
119.....Assumed Route	10.....Assumed Route
120.....Assumed Route	10.....Assumed Route

Survey
OPERATIONS

Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@surveys.co.uk - www.surveys.co.uk



Client
Urban Concepts

Drawing Title
Utility / CCTV Survey of Land at:
Tack Lea Works
Rochdale

Scale(s)
1:200

Date
AUG 13

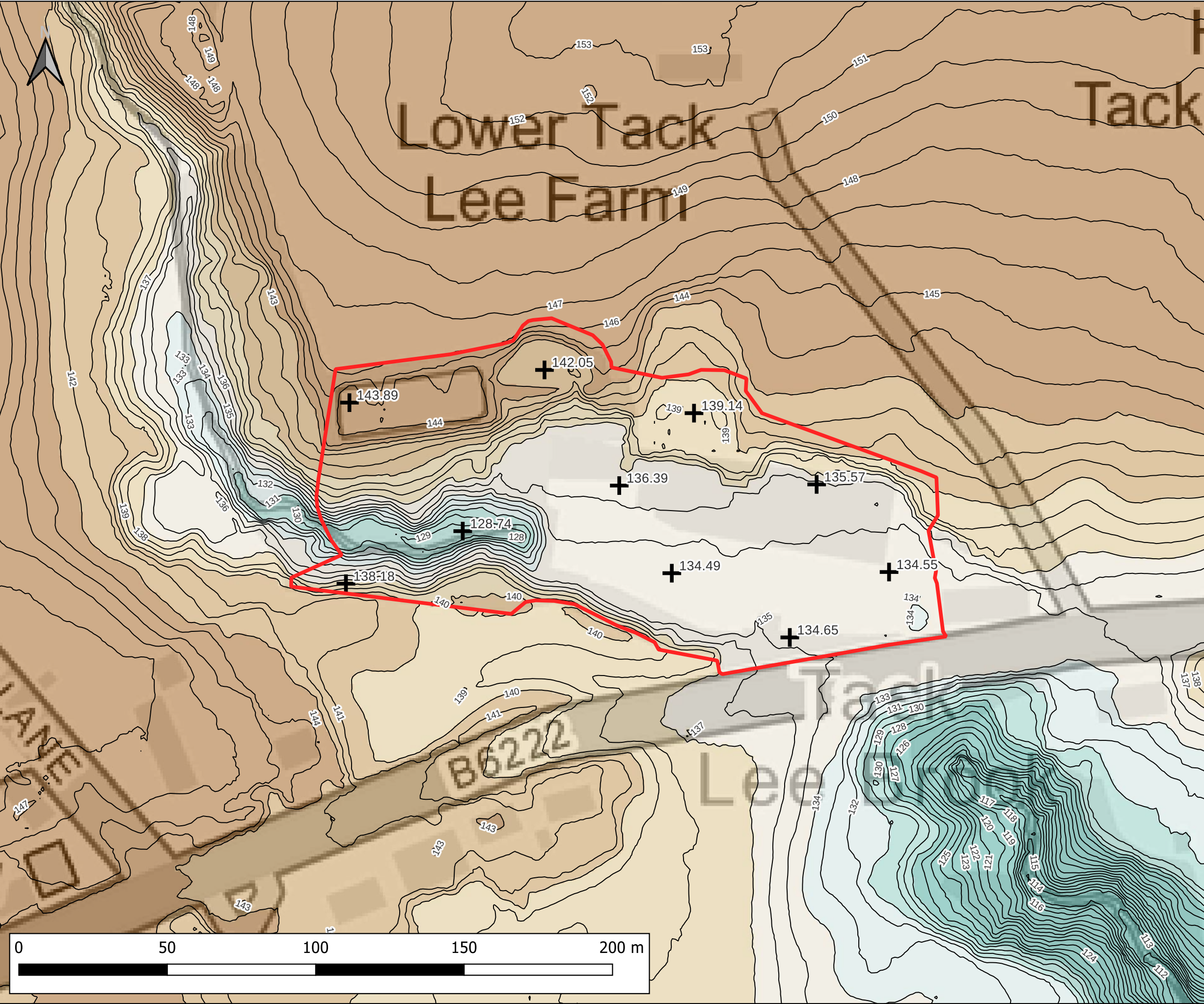
Job Number
13H213

Surveyor
JK

Draught
MP

Checked
JK/SG

Sheet Size & Drg Number & Revision
A0 13H213/001



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Site Levels (m AOD)

Ground Elevation (m AOD)

<= 128

128 - 131

131 - 134

134 - 137

137 - 140

140 - 143

> 143



CLIENT:

HALL & CO PROPERTY



SCHEME:

TACK LEA WORKS, HEYWOOD

PLOT TITLE:

LiDAR Plan
1m Resolution
Data from Environment Agency

PLOT STATUS:

FINAL

DATE:

20-07-2022

DRAWN:

IH

CHECKED:

JJ

APPROVED:

AW

PLOT SCALE AT A3:

1:1200

PLOT NAME:

14708_LiDAR_Plan

REVISION:

-

Appendix C United Utilities Sewer Plan & Correspondence



**United Utilities Water Limited
Developer Services & Planning**
Warrington North WWTW
Barnard Street off Old Liverpool Road
Gatewarth Industrial Estate
Sankey Bridges
Warrington
WA5 1DS

Telephone: 01925 679345
Planning.liaison@uuplc.co.uk

Rochdale MBC
PO Box 32 Telegraph House, Baillie Street
Rochdale
OL16 1JH

Your ref: 16/00447/out
Our ref: DC/16/3109
Date: 22-JUL-16

Dear Sir/Madam,

Location: Tack Lea Works Bury & Rochdale Old Road Heywood BL9 7UA
Proposal: Demolition of existing buildings & erection of 14No detached dwellings

Drainage Conditions

United Utilities will have no objection to the proposed development provided that the following conditions are attached to any approval:

Foul Water

Condition 1

Foul and surface water shall be drained on separate systems.

Reason: To secure proper drainage and to manage the risk of flooding and pollution.

Surface Water

Condition 2

Prior to the commencement of any development, a surface water drainage scheme, based on the hierarchy of drainage options in the National Planning Practice Guidance with evidence of an assessment of the site conditions shall be submitted to and approved in writing by the Local Planning Authority.

The surface water drainage scheme must be in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards and unless otherwise agreed in writing by the Local Planning Authority, no surface water shall discharge to the public sewerage system either directly or indirectly.

The development shall be completed in accordance with the approved details.

Reason: To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution. This condition is imposed in light of policies within the NPPF and NPPG.

The applicant can discuss any of the above with Developer Engineer, Neil O'Brien, by email at wastewaterdeveloperservices@uuplc.co.uk.

Management and maintenance of Sustainable Drainage Systems

Regardless of the stage in the planning process, we recommend the Local Planning Authority includes a condition in their Decision Notice regarding a management and maintenance regime for Sustainable Drainage Systems. We suggest the following condition should be appropriate for most instances;

Condition 3

Prior to the commencement of the development a sustainable drainage management and maintenance plan for the lifetime of the development shall be submitted to the Local Planning authority and agreed in writing. The sustainable drainage management and maintenance plan shall include as a minimum:

- a. The arrangements for adoption by an appropriate public body or statutory undertaker, or, management and maintenance by a Resident's Management Company; and*
- b. Arrangements concerning appropriate funding mechanisms for its ongoing maintenance of all elements of the sustainable drainage system (including mechanical components) and will include elements such as ongoing inspections relating to performance and asset condition assessments, operation costs, regular maintenance, remedial works and irregular maintenance caused by less sustainable limited life assets or any other arrangements to secure the operation of the surface water drainage scheme throughout its lifetime.*

The development shall subsequently be completed, maintained and managed in accordance with the approved plan.

Reason: To manage flooding and pollution and to ensure that a managing body is in place for the sustainable drainage system and there is funding and maintenance mechanism for the lifetime of the development.

We recommend the developer also contacts the Local Planning Authority along with the Lead Local Flood Authority to discuss surface water drainage as they will ultimately be the decision maker on this matter.

Water Comments

The level of cover to the water mains and sewers must not be compromised either during or after construction.

A separate metered supply to each unit will be required at the applicant's expense and all internal pipe work must comply with current water supply (water fittings) regulations 1999.

Should this planning application be approved, the applicant should contact United Utilities on 03456 723 723 regarding connection to the water mains or public sewers.

General comments

It is the applicant's responsibility to demonstrate the exact relationship between any United Utilities' assets and the proposed development. United Utilities offers a fully supported mapping service and we recommend the applicant contact our Property Searches Team on 03707 510101 to obtain maps of the site.

Due to the public sewer transfer, not all sewers are currently shown on the statutory sewer records, if a sewer is discovered during construction; please contact a Building Control Body to discuss the matter further.

Supporting information

United Utilities wishes to draw attention to the following as a means to facilitate sustainable development within the region.

Site drainage

In accordance with the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG), the site should be drained on a separate system with foul water draining to the public sewer and surface water draining in the most sustainable way.

The NPPG clearly outlines the hierarchy to be investigated by the developer when considering a surface water drainage strategy. We would ask the developer to consider the following drainage options in the following order of priority:

1. into the ground (infiltration);
2. to a surface water body;
3. to a surface water sewer, highway drain, or another drainage system;
4. to a combined sewer.

The comments made in this letter regarding site drainage reflect this approach.

Justification for Pre-commencement condition

If a 'Pre-commencement' condition has been requested in this correspondence, please consider the following information as justification of this request.

In accordance with the Town and Country Planning (Development Management Procedure) (England) Order 2015 Part 6, we have been asked to provide written justification for any pre-commencement condition we may have recommended to you in respect of surface water disposal.

The purpose of the planning system is to help achieve sustainable development. This includes securing the most sustainable approach to surface water disposal in accordance with the surface water hierarchy.

It is important to explain that the volume arising from surface water flows can be many times greater than the foul flows from the same development. As a result they have the potential to use up a significant volume of capacity in our infrastructure. If we can avoid and manage surface water flows entering the public sewer, we are able to significantly manage the impact of development on wastewater infrastructure and, in accordance with Paragraph 103 of the NPPF, minimise the risk of flooding. Managing the impact of surface water on wastewater infrastructure is also more sustainable as it reduces the pumping and treatment of unnecessary surface water and retains important capacity for foul flows.

As our powers under the Water Industry Act are limited, it is important to ensure explicit control over the approach to surface water disposal in any planning permission that you may grant.

Our reasoning for recommending this as a pre-commencement condition is further justifiable as drainage is an early activity in the construction process. It is in the interest of all stakeholders to ensure the approach is agreed before development commences.

Further information regarding Developer Services and Planning, can be found on our website at <http://www.unitedutilities.com/builders-developers.aspx>.

Yours faithfully

Jill Walker
United Utilities
Developer Services and Planning

Waterco Ltd

**Eden Court
Lon Parcwr Business Park
Ruthin
LL15 1NJ**

FAO: Johanne Williams

United Utilities Water Limited

Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0370 751 0101

Property.searches@uuplc.co.uk

Your Ref: W10206
Our Ref: 16/ 1246715
Date: 9/11/2016

Dear Sirs

Location: TACK LEA DYE WKS BURY & ROCHDALE OLD ROAD BURY BL9 7UA

I acknowledge with thanks your request dated 07/11/16 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read our access statement before you start work to check how it will affect our network.

<http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0370 7510101.

Yours Faithfully,



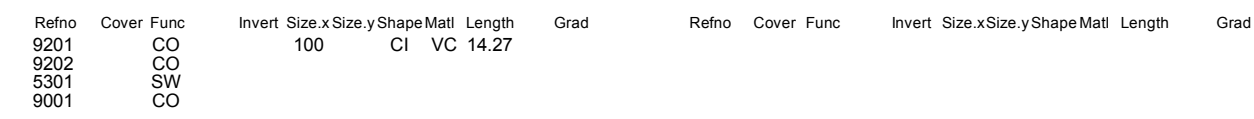
Amanda Simmonds
Property Searches Manager

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self-construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

1. This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
2. This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
3. In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only and given in accordance with the best information available. The nature of the relevant system and/or its actual position may be different from that shown on the plan and UUWL is not liable for any damage caused by incorrect information provided save as stated in section 199 of the Water Industry Act 1991. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
4. The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
5. The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
6. This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
8. If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



MANHOLE FUNCTION	
FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow
SEWER SHAPE	
CI	Circular
TR	Trapezoidal
EG	Egg
AR	Arch
OV	Oval
BA	Barrel
FT	Flat Top
HO	HorseShoe
RE	Rectangular
UN	Unspecified
SQ	Square
SEWER MATERIAL	
AC	Asbestos Cement
DI	Ductile Iron
BR	Brick
PVC	Polyvinyl Chloride
PE	Polyethylene
CI	Cast Iron
RP	Reinforced Plastic Matrix
SI	Spun Iron
CO	Concrete
ST	Steel
CSB	Concrete Segment Bolted
VC	Vitrified Clay
CSU	Concrete Segment Unbolted
PP	Polypropylene
CC	Concrete Box Culverted
PF	Pitch Fibre
PSC	Plastic/Steel Composite
MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete
MAR	Masonry, Random
GRP	Glass Reinforced Plastic
U	Unspecified

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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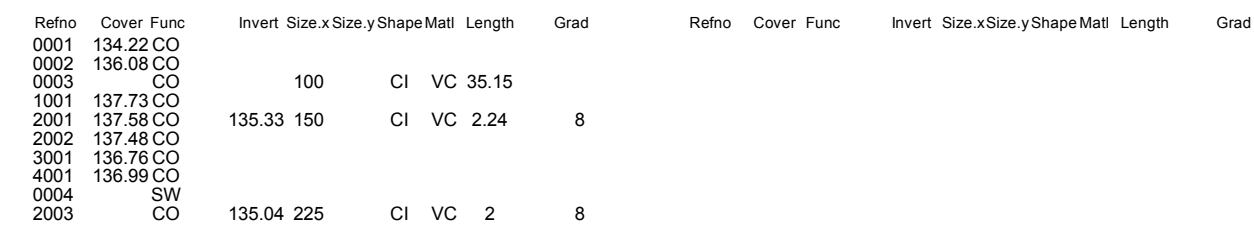


United Utilities
helping life flow smoothly

SEWER RECORDS

Scale: 1:1250 Date: 09/11/2016

Printed By: Property Searches



MANHOLE FUNCTION			
FO	Foul		
SW	Surface Water		
CO	Combined		
OV	Overflow		
SEWER SHAPE			
CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		
SEWER MATERIAL			
AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MA	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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OS Sheet No: SD8412SW
Scale: 1:1250 Date: 09/11/2016
10 Nodes
Sheet 1 of 1



SEWER RECORDS

OS Sheet No: SD8412SW

Scale: 1:1250 Date: 09/11/2016

Printed By: Property Searches

Wastewater Symbolology

Combined Foul Surface Overflow

				Manhole
				Manhole, side entry
				Public sewer
				Private sewer
				S104 sewer
				Rising main, public
				Rising main, private
				Rising main, S104
				Highway drain, private
				Screen chamber
				Discharge point
				Outfall
				Control kiosk
				Sludge main

Abandoned pipe

	Public sewer
	Rising main
	Private sewer
	Sludge main

Manhole function

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

Sewer shape

CI	Circular	U	Unspecified
EG	Egg	SQ	Square
OV	Oval	TR	Trapezoidal
FT	Flat top	AR	Arch
RE	Rectangular	BA	Barrel
		HO	Horse shoe

Sewer material

AC	Asbestos cement	DI	Ductile iron
BR	Brick	VC	Vitrified clay
CO	Concrete	PP	Polypropylene
CSB	Concrete segment	PF	Pitched fibre
CSU	Concrete segment	MA	Masonry, coursed
CC	Concrete box culverted	MA	Masonry, random
PSC	Plastic	RP	Reinforced plastic
GR	Glass reinforced	CI	Cast iron
GRP	Glass reinforced	SI	Spun iron
PVC	Polyvinyl chloride	ST	Steel
PE	Polyethelene	U	Unspecified

			WW pumping :
			Inspection cha
			Extent of surve
			Head of syste
			Soakaway
			Rodding eye
			Lamp hole
			T junction/sadc
			Gulley
			Air valve
			Non return valv
			Sewer overflow
			Cascade
			Flow meter
			Hatch box
			Hydrobrake
			Inlet
			Bifurcation
			Catchpit
			Oil interceptor
			Penstock
			Summit
			Valve
			Valve chamber
			Washout cham
			Drop shaft
			WW treatment
			Septic tank
			Vent column
			Network storag
			Orifice plate
			Vortex chambe
			Penstock chan

Appendix D Proposed Development Plan



PROPOSED SITE PLAN GROUND

Tack Lea Works, Bury

27no. Houses & 6no.
Apartments with
64no. Parking Spaces

ACCOMMODATION SCHEDULE

Residential		
	6no. 5 BED DETACHED COTTAGES (2,080sqft ave.)	12,480sqft
	6no. 4 BED SEMI-DETACHED MILL HOUSE (1,500sqft ave.)	9,000sqft
	4no. 4 BED COTTAGES (1,180sqft ave.)	4,720sqft
	6no. 3 BED COTTAGES (980sqft ave.)	5,880sqft
	4no. 3 BED MILL HOUSE (975sqft ave.)	3,900sqft
	6no. 2 BED APARTMENTS (675sqft ave.)	4,050sqft

NET SALEABLE **40,030sqft**

REVISION	DATE	DESCRIPTION

CLIENT:	
PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT	
ADDRESS: TACK LEA WORKS, BURY	
DRAWING TITLE: PROPOSED SITE PLAN	
SCALE: 1:750@A3	DATE: MAY 2021
DRAWING NO: A645_SK_10Q	

OLLIER SMURTHWAITE ARCHITECTS
106 Albert Mill, 10 Hulme Hall Road, Manchester, M15 4LY
T: 0161 883 0838
F: 0161 883 0839
E: mail@olliersmurthwaite.com