

**LAND AT
GIB LANE
BLACKBURN**

**FLOOD RISK ASSESSMENT
& OUTLINE DRAINAGE STRATEGY**



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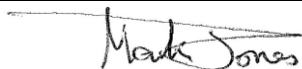
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EXECUTIVE SUMMARY

Scope and Background

This Flood Risk Assessment (FRA) has been undertaken by LK Consult to assist with the planning for the development at Gib Lane, Feniscowles, Blackburn. The proposed development comprises residential housing of varying type with associated car parking soft landscaping and access highways.

Government policy with respect to development in flood risk areas is contained within the Department of Communities and Local Government National Planning Policy Framework (DCLG, 2012) and accompanying Technical Guidance of March 2014 (DCLG 2014) which supersedes Planning Policy Statement 25 (PPS25) 'Development and Flood Risk' which was issued in December 2006 and revised in April 2010.

In considering the proposals the following key principles have therefore been applied:-

- Identification of flood risks.
- Protection of users of the new development.
- No increased flood risk to third parties.

Consultations

The Environment Agency (EA) has been consulted to inform the preparation of this report. They have confirmed the sites flood zone classification and utilisation of their online website has produced flood risk maps from a variety of sources.

The Blackburn with Darwen Borough Council (BwDBC) has been consulted concerning flood risk; raising some concerns and providing images of overland flow and localised ponding on site as well as photographic evidence of flooding further downstream off Old Gates Drive to the north of the site. They also forwarded some photographs taken by local residents following a build-up of surface water behind their properties; these are included in Appendix E.

United Utilities (UU) have been consulted and have replied with useful comments to note. UU also have an online utility services mapping system from which drainage and sewer maps have been produced.

There is no Internal Drainage Board (IDB) acting in this area.

Flood Risk

The site is considered at 'Low Risk' of fluvial flooding, despite a number of un-named ordinary watercourses on-site which appear to convey surface water towards the topographic lows. The topographic survey (Appendix A) indicates the site slopes steeply towards the low from the south-eastern corner to the north-western boundary of the study area.

The site is shown on the EA's website based Flood Zone Mapping as being in Flood Zone 1, (NPPF Technical Guidance; page 3, Table 1), which has been confirmed via correspondence, (Appendix B). Flood Zone 1 represents 'Low Risk' of fluvial flooding with an annual probability of flooding less than 0.1% (1 in 1000).

The EA's web based Surface Water Mapping suggests that parts of the site are at 'High Risk' from surface water flooding and presents corridors through which water may be conveyed.

There are a number of springs noted on the OS plans which imply there may be a high water table that would contribute to ground water flooding. Upon further investigation it may be found that the springs are the locations for the outlets from land drains. The excavations produced by former quarrying were seen to be dry, and the plot is on high ground relative to its surroundings, and this suggests that ground water is not a source for the wet ground behind the existing housing to the north.

Mitigation

Design

Site falls will be arranged to allow reasonably level access for occupants and visitors and allowing the site to be free-draining in case of local ponding at times of heavy rainfall. Floor levels of dwellings will be set above finished ground levels giving regard to necessary access for the less-able. The existing outfalls are of limited capacity so the designed floor levels of dwellings in the north along the rear of the existing housing on Livesey Branch Road should be set above the potential ponding level to allow for restrictions to flow within the drainage system.

The current land drainage system feeds runoff to the outfalls at a rate greater than would be expected from overland Greenfield runoff; this being the likely main source for the flooding behind Livesey Branch Road. The developed site will manage these sources in a more controlled manner. Surface water runoff arising from the development will be managed via attenuation and infiltration elements as well as discharge into various un-named ordinary watercourses at a rate to be agreed with the EA and United Utilities. The drainage of this site will be designed with existing residents in mind. By providing appropriate mitigation measures the situation for the existing properties downstream of the site will not be worsened.

There are two accessible combined sewers for the discharge of foul sewage arising from the development subject to the agreement of the sewerage undertaker, UU. The first is on Livesey Branch Road through the access adjacent to No. 451, and the second accessible point is the access onto Gib Lane adjacent to number 14.

Access

The site is generally elevated above the surrounding area and safe access will be available from Horden Rake, Broken Stone Road and Gib Lane under all conditions.

There may be some ponding adjacent to Livesey Branch Road if the existing culverted watercourses are compromised, but this is unlikely to be deep as the land falls to the north and west away from the plot.

Conclusion

The development site is deemed at 'Very Low Risk' of fluvial flooding according to current modelling and correspondence with relevant consultees. However, there is significant risk of pluvial surface water flooding, particularly along the northern edge of the plot. It would therefore be prudent to set the finished floor level of new dwellings at a nominal height above ponding levels in accordance with EA good practice, and ensure existing housing is suitably protected.

Currently the study area is served by a reasonably effective land drainage system that drains the surface water and ground water relatively rapidly to the ordinary watercourses and hence on through the culverted drainage outfalls. The provision of a sustainable drainage system with adequate attenuation will control the runoff more effectively than the current drainage system.

The development will not increase flood risk to others provided surface water runoff is managed effectively.

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1. INTRODUCTION

Government policy with respect to development in flood risk areas is contained within the Department of Communities and Local Government National Planning Policy Framework (DCLG, 2012) and accompanying Technical Guidance of March 2014 (DCLG 2014) which supersedes Planning Policy Statement 25 (PPS25) 'Development and Flood Risk' which was issued in December 2006 and revised in April 2010.

The NPPF technical Guidance builds on the previous guidance contained in; PPS25, and Planning Policy Guidance Note 25 (PPG25) 'Development and Flood Risk' which was issued in 2001, itself based on the DoE Circular 30/92 (MAFF Circular FD 1/92).

LK Consult has prepared this Flood Risk Assessment (FRA) in line with the NPPF and Technical Guidance.

This FRA has been prepared to aid the planning application for a residential scheme on land at Gib Lane, Blackburn. The current development plan is shown in Appendix A.

The Local Planning Authority (LPA) will make the final decision with regard to any planning application.

2. PROPOSED DEVELOPMENT SITE

2.1 The Site

The site is located approximately 2km to the south-west of Ewood Park (Blackburn Rovers football ground), within the large town of Blackburn. The study area is currently 'Greenfield' in nature due to its agricultural land use surrounding the residential buildings of Horden Farm. The approximate centre point for the site is located at National Grid Reference 365820 E, 425320 N with the proposed end land use of a residential nature. The site is 55.08ha in area and is shown on the drawings included in Appendix A. The site surfacing consists of largely Greenfield agricultural land which has historically been used for livestock (sheep) with evidence of localised quarrying represented by quarries shown in historic maps. The site slopes steeply from the high point in the south-east corner towards the north-western boundary and Livesey Branch Road.

2.2 Development Proposals

It is proposed to develop the land using a mixture of medium/high (30-40 dwellings per hectare (dph)), low/medium (20-30dph) and low density (<20dph) housing and therefore could accommodate around 700 residential units. The development will include; areas of car parking, public open spaces, accesses and highways, a new primary school, soft landscaping and sustainable drainage facilities (see indicative site plan in Appendix A). The finished floor levels (FFL) have not yet been determined; however they are expected to be set at a nominal height above finished local ground levels (FGL), (also yet to be determined), across the majority of the site.

2.3 Vulnerability

The development is shown on the Environment Agency's (EA) website Flood Zone Mapping as being in Flood Zone 1 (NPPF Technical Guidance page 3, Table 1).

The proposed development is for a residential end use. This is classified within the 'More Vulnerable' category in Table 2 of NPPF Technical Guidance which is deemed as an appropriate land use in Flood Zone 1. This site also requires the completion of an FRA based on the size of the site which, at 55.08ha, is greater than the 1ha minimum size requirement stated in Table 1 of the NPPF.

2.4 The Sequential and Exception Tests

NPPF requires that the Sequential Test be applied to development proposals in Flood Zones 2 and 3 to determine if there are any 'reasonably available' and suitable alternative sites at lower flood risk. Given that the study area is located in Flood Zone 1, a sequential test should not be required for planning purposes.

Although an exception test is not required for planning, the issues of safety and reduction in flood risk to others required by an Exception Test are addressed in this document.

2.5 Site and Access Levels

A topographic survey of part of the site has been undertaken to OS GPS datum, and information is included on the drawings in Appendix A. The site is steeply sloped towards the north-west with an approximate fall of 65m over 1km from the eastern extent of the site to the residential properties adjacent to Livesey Branch Road. The site has an elevation ranging from 135m AOD to 200m AOD respectively. There is the potential for a number of different vehicular site accesses off the surrounding roads including proposed primary site entrances located off Horden Rake (approximately 135m AOD), Livesey Branch Road (approximately 135m AOD) as well as two secondary proposed entrances off Gib Lane (approximately 190m AOD and 195m AOD respectively) and a further access can be achieved via Broken Stone Road (approximately 160m AOD). In addition to this pedestrian access is proposed off Gib Lane and Broken Stone Road, with allowances made for the retention of the existing route of Witton Weavers Way.

3. ASSESSMENT OF FLOOD RISK

The level of detail entered into in any flood risk assessment is dependent upon the scale and potential impact of the proposed development, and the vulnerability classification of the proposed land-use. In this case the applicant is seeking planning consent to develop the site for a residential end use which is classified within the 'More Vulnerable' categories in Table 2 of the NPPF Technical Guidance. The site is significant in scale, at 55.08 hectares, and there is potential for around 700 new homes.

3.1 Sources of flooding

The risk of flooding from the following flood sources has been considered:

- **Fluvial** – The Environment Agency has confirmed the study area is within Flood Zone 1. However there appear to be several on-site Ordinary Watercourses conveying surface water along internal field boundaries and one, towards the eastern boundary of the site, which is largely culverted south of Cockridge Wood. Thus the flood risk emanating from these sources can be considered to be significant.
- **Tidal** – The study area is remote from the sea and tidally influenced water bodies; therefore, the flood risk associated with this source is considered negligible.
- **Pluvial (Rainfall) / Surface Water** – The only impermeable areas at a level generally above that of the study area are to the east of Gib Lane. The filter drain and stone conduit running beneath Gib Lane appears to connect to the open watercourse running within Cockridge Wood. Due to the size of the development a significant volume of runoff could be developed internally from within the site. Photographs have been supplied by local residents showing areas of flooding behind the housing on Livesey Branch Road. The chance of flooding in the existing situation is considered significant but limited in depth, (largely below 300mm and to the east of the site according to EA surface water mapping, see Appendix B), due to the topography.

There are multiple land drains within the study area, particularly in the south-easterly section of the site. Some of these drains convey water south-west towards Green Hills Wood whilst others flow north towards Cockridge Wood, (see Appendix E). There are a number of stone water tanks in the north west corner of the development that were probably the historic water source for some of the properties to the north of Livesey Branch Road. It is not known if these still feed properties downstream but they appear to be fed by the previously mentioned land drains and were observed to be full on the site inspection. These land drains require investigation at detailed design stage and the effects on drainage design and construction should be considered throughout the development stage.

There are a number of culverted watercourses discharging from the northern boundary; the exact routes of these have become uncertain over time as new housing has been constructed along the Livesey Branch Road corridor and routes have been diverted. The upstream ends coincide with the internal field boundary ditches. West of No. 527 Livesey Branch Road the culverted watercourses appear to connect to the UU surface water sewers. Some of these connections are shown crossing between or under properties adjacent to the northern boundary and some do not have a connection shown

but have short watercourse connections in Livesey Branch Road that start on the projected line of the field boundaries within the study area. To the east of No. 461 Livesey Branch Road the culverted watercourses shown on the UU plans do not appear to connect into UU surface water sewers but continue northwards as culverted ordinary watercourses.

Due to the quantity of surface water to be managed within the study area, the flood risk emanating from this source is considered to be significant.

- **Groundwater** – The Strategic Flood Risk Assessment refers to there being a “Secondary A” aquifer beneath the plot within the sandstone bedrock; however, groundwater vulnerability mapping shows the area to be within an area unlikely to be at risk from groundwater. Hand auger excavations undertaken during the walkover did not encounter groundwater at levels close to the ground surface although there have been a number of springs recorded on the mapping. On investigating the location of the springs, and troughs fed from springs, it was observed that they were coincidental with the location of the land drainage located within the study area. Although the site is wet at the lower end this is from surface water that cannot drain quickly due to the clay within the superficial ground and the limited capacity on the culverted watercourses. The risk of flooding from groundwater is therefore negligible.
- **Sewers** – United Utilities sewerage records show foul, combined, and surface water sewers outside of the development to the north, east and west of the study area. United Utilities confirmed that they have no records of any flooding related to their apparatus. Therefore, the flood risk associated with this source is considered negligible.
- **Water Mains** – Service records show that there is a large trunk main crossing the site that may affect the northern part of the study area if there is a burst. The main within the site boundary may require diversion or accommodation within the final layout of the development. It is assumed that the pipeline will be regularly inspected and maintained if it is to remain in place and therefore the risk of flooding is considered low.
- **Artificial sources** – The runoff from the highway drainage on Gibb Lane is partially collected by the verge drainage and gullies on the lane and fed into the watercourse running through Cockridge Wood. In general the study area is above the level of the lane so excessive flows will not enter the site but will remain on Gib Lane. Any flooding from the highway drainage on Broken Stone Road and Horden Rake will remain within the highway with the carriageway being at a lower level than the study area.

The site is remote from any reservoirs and EA Reservoir Flood Maps state that the study area is not at risk. The risk of flooding at this location, from this source is therefore considered to be negligible.

3.2 Information from the Environment Agency

Flood risk information was requested from the Environment Agency and information has been downloaded from their website. This, along with relevant correspondence, is included in Appendix B and is summarised below.

The initial phase in identifying whether a site is potentially at risk of flooding is to consult the Environment Agency's Flood Zone maps, available on the Environment Agency's website. However, these are (often) based on coarse scale modelling and provide only an initial indication of the flood risk to a site. The Environment Agency Flood Zone maps were

developed using a very coarse Digital Elevation Map (DEM), and are superseded by a more detailed analysis of modelled flood levels and topographic survey levels.

The Flood Zones divide the floodplain into three categories of flood risk, and do not take flood defences into account. The NPPF Technical Guidance defines the Flood Zones as:-

- Flood Zone 1 – Low Probability – Land having less than 1 in 1000 (0.1%) annual probability of river or sea flooding.
- Flood Zone 2 – Medium Probability – Land having between a 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding; or land having between a 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of sea flooding.
- Flood Zone 3a – High Probability – Land having 1 in 100 (1%) or greater annual probability of river flooding; or land having a 1 in 200 (0.5%) or greater annual probability of sea flooding.
- Flood Zone 3b – The Functional Floodplain – Land where water has to flow or be stored in times of flood.

The Environment Agency's maps do not distinguish between Flood Zones 3a and 3b.

The development area is within Flood Zone 1 for flooding risk from rivers and the sea. A copy of the flood map is provided (see Appendix B).

The EA do not have any records of flooding for this site (verbal confirmation) and the EA does not provide a Flood Warning Service according to their website. However the site is shown in a 'Flood Alert' area to warn residents when flooding is possible. The EA website shows that the site is not at risk of flooding from reservoirs (see Appendix B).

The EA provided a map which shows parts of the site to be susceptible to surface water flooding; however it is only indicative due to the method used. Extensive surface water flooding is unlikely given the proximity to the river and the general fall of the site, but there are localised areas adjacent to the culverted watercourses that are damp and marshy, possibly due to capacity issues.

3.3 Information from other Consultees

Blackburn with Darwen Unitary Authority was consulted during the early stages of the FRA. They have stated that they have had reports from local residents of flooding behind their properties; these have been illustrated within plans supplied by the local authority drainage engineers, discussed within a public consultation document included in Appendix C and have been substantiated by images provided by a local resident.

The council reported requests have been made to the current owners of the land within the north east of the area under consideration to undertake their riparian maintenance responsibilities. There were a number of recent engineering improvements observed within this part of the plot including some bunding behind some of the properties on Livesey Branch Road to limit any flows towards the housing; this action was taken under the insistence of the Agricultural Land Tribunal. This bunding may act to increase the potential depth of flooding on-site but should act as a form of attenuation, reducing the off-site risk downstream.

The council have also provided a map stating that the culvert downstream of the north-easterly section of the site is deteriorating and flooding has been seen off Old Gates Drive.

United Utilities have reported they have no records of any flooding incidents from their sewers and are unaware of any further details regarding any of the outfalls to the north of the site.

3.4 Information from the Client

The Client has provided development proposals and a partial topographical survey to OS GPS datum of the site, (see Appendix A). A red edge plan has also been included showing the area of the study and general location plan. Finally a provisional outline Masterplan has been provided for the total site area.

3.5 Information from SFRA & PFRA

A Level 1 SFRA¹ (Strategic Flood Risk Assessment) was produced by Blackburn and Darwen Borough Council in December 2008. The historic flooding events recorded did not include any reports from the area of the development.

The historical flood map shown in the Preliminary Flood Risk Assessment (PFRA) reports no historical flooding incidents at the site from any source including sewer flooding.

3.6 Geology and Groundwater

The Groundwater Source Protection Zone mapping from the EA website shows that the site is not within any identified protection zones. The BGS website mapping for the site area shows that the site is underlain by Diamicton – Devensian Till which are likely to comprise clay, sand and silts with coarse gravel and occasional boulders. The bed rock is Woodhead Hill Rock; a form of sandstone. The site lays on a 'Secondary A' bedrock aquifer (Sandstone). Due to the clay content in the superficial layer, shallow level infiltration based drainage methods are likely to be largely ineffective; however deep level infiltration methods on the site are unlikely to be constrained by this.

There is a consistent slope over the site which means that any groundwater in the vicinity of the site would drain north towards Livesey Branch Road. This may result in a higher water table in localised areas to the north of the site.

3.7 Surface Water

The current regime of improved agricultural grassland allows the surface water to be collected in an extensive system of land drainage conduits which feed the water quicker to the outfalls rather than by purely overland flow. The current system of culverted watercourses from the site has limited capacity and effectiveness for dealing with the flows from within the study area and entering the site from Gib Lane.

The filter drain and stone conduit running beneath Gib Lane appears to connect to the open watercourse running within Cockridge Wood.

To the north of the western section of Cockridge Wood a ditch has been constructed to lead any overland flows towards the culverted watercourse. To the northwest corner there is a bund to limit surface water from entering the back gardens of the properties. In the western corner there is a very wet marshy area where two overflow pipes within the boundaries of residential properties to limit the depth of the flood waters, where they discharged to could not be ascertained.

Surface water collected from the culverted outfalls discharges into a number of United Utilities surface water drains which eventually drain into the River Darwen.

3.8 Mitigation Measures

3.8.1 *Proposed Site levels and Development Level*

There is very little external area contributing to the potential fluvial overland flows within the site except for the stone culvert feeding flows from the hillside to the east of Gib Lane, and this could have a significant influence on flows within the east of the plot. Any excess flows originating outside the site will run down Gib Lane and not influence the site. The downstream culverted section running into Livesey Branch Road is likely to be the main restriction on flow and this may cause a backup of the fluvial flows causing some localised flooding behind the existing housing on Livesey Branch Road.

Similarly, there appear to be capacity issues with the remainder of the existing outfalls from the plot. Although the flows from the land drainage may be reduced and diverted into sustainable drainage systems, if the development is completed in phases there may still be contributions from the land drains outside the developed areas which would have to be accommodated during the intermediate and construction phases.

When the site is developed the current contribution from the land drainage is likely to be incorporated into a new sustainable drainage system. It would nevertheless be prudent to set finished floor levels of any new properties above any potential ponding levels in the area adjacent with the northern boundary. In higher areas of the site the risk of fluvial overland flow is minimal but it could still be possible for overland flows to occur in exceptional circumstances, like blockage or collapse of drainage. Therefore, to allow for any overland pluvial flows, the grading of the site should be designed with this in mind to allow flow paths through the site avoiding 'dead ends', and finished floor levels of dwellings should be set at a nominal height above local final ground levels (see consultation in Appendix C) to protect property.

3.8.2 *Safe Access*

There is the potential for a number of different site accesses off the surrounding roads including multiple site entrances located along Broken Stone Road to the south of the site. The site is generally elevated above the surrounding area and access will be available from Horden Rake, Broken Stone Road, and Gib Lane to provide safe access to and from the site under all conditions.

There may be some ponding adjacent to the existing Livesey Branch Road access, if the existing culverted watercourses are compromised, but this is unlikely to be deep as the land falls to the north and west away from the plot, and should not restrict vehicular access.

3.8.3 *Flood Resistance and Resilience*

The proposed floor levels should be set as stated in section 3.8.1, subject to approval, so that pluvial flood risk is limited. It may still be prudent to incorporate flood resilience measures into the ground floor construction of some properties at highest risk to aid recovery after any extreme event. Typical measures would include solid floors, use of suitable materials and services fed from upper floors. Actual measures can be discussed and agreed with Building Control Officers during detailed design.

3.8.4 *Surface Water flooding*

Currently there is a risk of surface water flooding for the northern part of the site and adjacent to Cockridge Wood, firstly where the flows are restricted from entering into the existing culverted watercourses or there is not enough capacity within these culverts to deal with the flows; and secondly where the current land drainage system has partially failed allowing the water collected upstream to spill across the open ground creating the marshy areas that can be observed. There have been reports from residents of flooding behind their properties on Livesey Branch Road, with a series of protective measures already in place including bunding, intercepting ditches, and overflow connections from low spots.

The development is likely to eventually remove the existing shallow land drainage system and pick up the potential flows into a sustainable drainage system that will limit the discharges to the existing culverted watercourses to a level below the existing discharge rates thus reducing the risk of flooding to the existing properties from the current level.

3.9 Residual Risks

It is impossible to completely guard against flooding since extreme events greater than the design standard event are always possible. However, the study area is within Flood Zone 1 and elevated in comparison to surrounding area with the exception of a small area to the east of Gib Lane so is unlikely to be subject to extensive fluvial flooding. The amount of flow that can enter from the east is limited by the size of the culvert crossing of Gib Lane and the excess flows would continue northwards along Gib Lane. The relatively elevated position of most of the development will safeguard it from localised pluvial flooding during extreme rainfall events and fluvial flooding events outside the scope of this assessment. The greatest residual risk relates to the capacity and condition of the existing culverted watercourses that discharge from the northern boundary of the study area.

The extent and level of any temporary ponding within the main part of the development will be limited due to the steep topography and consideration of the potential for overland flows in site profiling. However existing and proposed properties may be affected adjacent to the northern boundary where overland flow is restricted. Although the ground to the north falls away from the plot the capacity of the existing culverted watercourses routed through the housing will limit the scope of providing means for the excess waters to escape away from the residential area. The sustainable drainage systems incorporated within the development will reduce the probability of flooding the existing housing by the provision of detention basins designed to at least the 1 in 100 year standard, including allowance for climate change, in accordance with good practice and building regulations. However, off-site discharge may be limited to less than this by the capacity of the outfalls. If this is so then the on-site management of flows should seek to exceed the required 1 in 100 year plus climate change event and provide additional storage to allow for this.

4. SUSTAINABLE DRAINAGE SYSTEMS

4.1 Existing Drainage

The existing drainage within the site boundary consists of a series of stone conduit land drains that collect groundwater and surface water and channel it towards open watercourses or field boundary drains before discharging off site at various locations. This fairly extensive land drainage system appears to convey water to the culverted outlets at a higher peak rate than they can accommodate. The existing drainage system appears to flow west along Livesey Branch Road, under the Leeds and Liverpool Canal, eventually discharging into the River Darwen.

Any rainfall which falls on site, outside of the area served by land drains, should run-off over the ground surface following the topography, often within open field boundary ditches towards outfalls on the site boundary, most of which are to the north of the study area.

4.2 Requirements for surface water drainage at the study area.

The NPPF requires that runoff from the development does not cause a negative impact elsewhere.

The guidance states that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface run-off from development sites through the use of Sustainable Drainage Systems (SuDS), this being complementary to the control of development within the floodplain.

SuDS will not alleviate flooding in an area prone to flooding; however, properly designed SuDS have the potential to prevent the surface water runoff from new development worsening the flood risk.

Although SuDS are an important tool in managing surface water drainage in the district, at a site specific level, the requirements of any discharge of surface water from a site are dictated by the specifics of the water level management system operated by the local drainage authority receiving that discharge.

The accepted principles are that surface water arising from a developed area should, as far as practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

The Building Regulations Requirement H3 stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of priority:

- a) an adequate soakaway or other adequate infiltration system,
- b) a watercourse or, where that is not practicable,
- c) a sewer.

4.2.1 SuDS selection

The concept of a sustainable drainage system (SuDS) has been incorporated into the outline drainage strategy for the study area in order to comply with the Flood and Water Management Act 2010. The strategy will involve surface water retention features within the scheme that will store rainwater for subsequent discharge to the surface water sewer

outfalls to the north of the site. The aim of the SUDS scheme is to ensure that the drainage from the proposed development does not cause or add to any existing flooding issues in the area, such as those mentioned by Blackburn with Darwen Borough Council (see Appendix C).

It is essential that such schemes do not compromise the existing properties and the new development. The detailed design of the drainage scheme should follow on from consideration of the planning application. The detailed designs must ensure the management of any flows in excess of the existing Greenfield runoffs.

The clay content of the superficial Till deposits within the study area, along with the Sandstone bedrock (see section 3.6) indicate that the use of shallow infiltration SuDS might not be feasible, but deep infiltration SuDS may be feasible for the development. The potential would be subject to extensive testing and agreement with the relevant authorities, who usually require evidence that all superficial drainage options have been considered. As such, the outline drainage strategy presently considers the use of attenuation and storage based SuDS to be the most appropriate technique, based on the existing understanding of the site.

The table below provides a summary of the SuDS options appraisal for the development:

SuDS Option	Appropriate to Development	Comments
Soakaways	*	Due to the nature of the ground conditions, the use of infiltration systems is possibly feasible at the development depending upon the depth of the superficial clay deposits. It may be possible to utilise soakaways for difficult to drain areas depending on the depth of the superficial clay deposits.
Infiltration basin	*	Depressions that store and dispose of water via infiltration. Unlikely to be appropriate in all locations given the ground conditions. Further investigation would be required as to permeability, and potential for water emergence downhill of the basin.
Sand filter	*	Treatment devices using sand beds as filter media.
Filter strip	✓	Engineered filters that use vegetation to remove and treat runoff. The filter strip is sloped to allow sheet flow across the vegetated strip. A filter strip offers no storage and is used solely to remove pollutants from surface water.
Filter drains	*	Linear trenches filled with a permeable granular material, often with a perforated pipe in the base of the trench.
Detention basin	✓	Dry depressions designed to hold water for a specific retention time.
Swales	✓	Swales are shallow grass-lined channels that provide capacity for conveying flows at a controlled rate into ponds, watercourses, and surface water sewers. These may only be suitable on the flatter areas of the site.
Rain water harvesting	*	Rainwater harvesting collects the rain which falls onto roofs, then stores it in a tank until required for a non-potable use. When required, the water is pumped to the point of use, thus displacing what would otherwise be a demand for mains-water. In the process, a volume of water is kept out of the storm-water management system, thereby helping to reduce flooding risks. Rainwater harvesting systems are currently not included in the development proposals.

Green roofs	*	Green roof installations can help to reduce surface water runoff from roof areas depending on the system specified. Green roofs are not currently included in the development proposals.
Geo-cellular storage systems	✓	Modular block systems can be used to provide an underground storage facility. Any geo-cellular storage systems should be tanked with a geo-membrane to provide attenuation storage rather than infiltration at the development.
Permeable Pavements - constructed in conjunction with granular and underground/geo-cellular storage systems	✓	Permeable pavements allow inflow of rainwater into underlying construction. Areas of permeable macadam/paving have been considered to accommodate climate change flows, connecting to geo-cellular storage before out falling to the private drainage network. Any geo-cellular storage systems on the sloping ground would have to be lined with an impermeable membrane to provide storage rather than infiltration to limit the water seeping out downhill of the geocells.
Ponds	✓	Attenuation ponds will be used to offset the increase in surface water flows attributable to climate change and increased area of hard standing, in order to minimise the risk of flooding to and from the proposed development. Ponds will attenuate the surface water flow prior to discharge to the public surface water sewers. The storage volume afforded by these features should not include any permanent water in the pond.
Oversized Pipes	✓	Oversizing the pipes that make up the on-site drainage network is a cost effective method for providing attenuation storage within the network. Such systems could be considered on the parts of the development where gradients are relatively flat.
Tanks	✓	Prefabricated underground tanks could be considered at the in order to provide storage to attenuate surface water runoff.
Flow control devices	✓	The peak flow rates will be controlled by flow control devices e.g. hydro-brakes, pump stations and restricted orifices. Flow control devices enable the discharge to be restricted to a constant rate from the development. Discharge rates are to be in line with the Greenfield runoff rate for the study area or as instructed by United Utilities.
Key: ✓ Suitable for use given the nature and scale of the development * Possibly suitable for use – not included in the client and architect design proposal at present ✗ Not suitable		
Fig.1		

4.3 Surface Water Storage Requirements

Surface water storage and Greenfield Runoff calculations based on the HR Wallingford procedure (IH 124 Greenfield runoff method) have been undertaken for the development and the output report is presented in Appendix 'D'.

The plot has a total area of 55.08ha. This includes two significant areas of woodland that are to remain to be incorporated within the development and an area of significant public open space together equalling approximately 30% of the total development area. As these percentages have not been fixed, and housing density and size are still to be determined,

it is conservatively assumed that the remaining land is 50% impermeable and 50% permeable garden areas etc. giving an area of 19.28Ha each.

The Wallingford report provides the following key information for the development using the above assumptions:

- 1 in 1 year Greenfield runoff rate: **299.84 l/s**
- 1 in 30 year Greenfield runoff rate: **585.90 l/s**
- 1 in 100 year Greenfield runoff rate: **716.87 l/s**
- Interception Storage **771.20 m³**
- Attenuation storage volume: **11631.21 m³** (1 in 30 year storage)
- Long term storage volume: **0m³**
(1 in 100 year + climate change storage less the 1 in 30 year)
- Total Storage **12402.41m³**

Attenuation storage aims to limit the peak rate of runoff from the development to the receiving sewer to a limit to be agreed with UU, LA or others to meet the capacity of the receiving surface water drainage system (see Appendix C).

Long-term storage aims specifically to address the additional volume of runoff caused by the development. This is particularly critical for catchments that are susceptible to flooding downstream of the proposed development. The basis for sizing this storage is the 100 year 6 hour rainfall event. In this case the topography and location dictate that no further storage is required.

The potential SuDS components that could provide this volume of storage for the development are indicated on Figure 1. These features could comprise a series of tanks, lined geocellular systems or balancing ponds situated at the area of lower elevation. Assuming an operating level of 1m in tanks and ponds an area of 1.24ha would be required for attenuation features. Permeable paving should also be considered for use where possible on driveways and public parking areas to reduce the impermeable area and hence the required attenuation volume.

There are a number of piped outfalls along the boundary with the housing on Livesey Branch Road. The size of any storage requirements prior to each particular outfall will also be dependent upon the capacity of each of the downstream systems.

Flow control devices such as hydrobrakes and/or restricted orifice plates would be required downstream of each of the storage features.

Assuming that the outline drainage strategy is acceptable to the Local Authority in principle, a more detailed design can be presented and agreed with the appropriate regulatory bodies during the detailed design phase.

5. SUMMARY & CONCLUSIONS

- The site is shown on published mapping to be located within the Environment Agency's Flood Zone 1 – minimum risk of fluvial flooding
- The existing un-attenuated peak flows towards the eastern outfall behind 425 Livesey Branch Road are likely to be at a greater rate than an undeveloped Greenfield runoff rate due to the existing watercourse that enters the east of the site crossing Gib Lane, this drains part of Bunkers Hill and part of Gib Lane; and the flows from the existing land drainage system.
- The existing peak flows towards the other existing outfalls are likely to be above the flows generated by the Greenfield runoff due to the flows from the existing land drainage system.
- A precautionary approach should be taken to setting floor levels of the majority of the dwellings, which should be set at a nominal freeboard above local final ground levels and attenuation features. In the proposed properties adjacent to Livesey Branch Road the FFL should be set above the potential flood storage levels. Finished floor levels are subject to agreement with the Local Authority.
- Pedestrian and vehicular safe access to and from the site will be achievable under all conditions via Livesey Branch Road to the north, Gib Lane to the east and both Horden Rake and Broken Stone Road to the south.
- Surface Water arising from the development will be managed via SuDS before discharging into the existing surface water outfalls at multiple locations along the northern boundary at a rate not exceeding the Greenfield runoff, in accordance with UU and the EA requirements.
- The assumptions made for the percentages of impermeable area used for estimating the storage required are conservative and will probably be reduced following the detailed design. The resulting calculated attenuation volume is therefore conservative but demonstrates that the likely required storage can be accommodated within the site boundary.
- Without the use of infiltration SUDS, the viability of which will be investigated at a later date, the development will require attenuation in the order of 12,400m³ to limit the flows to Greenfield runoff equivalent using the current assumptions.
- There are a number of combined sewers running within Livesey Branch Road. Foul sewage arising from the development is likely to be discharged into one or a combination of these sewers that flow under Livesey Branch Road towards the north subject to the agreement of the sewerage undertaker, UU.
- A formal evacuation plan is not considered to be required.

6. REFERENCES

¹ Blackburn with Darwen: Strategic Flood Risk Assessment Stage 1 (December 2008).

² Blackburn with Darwen: Local Flood Risk Management Strategy.

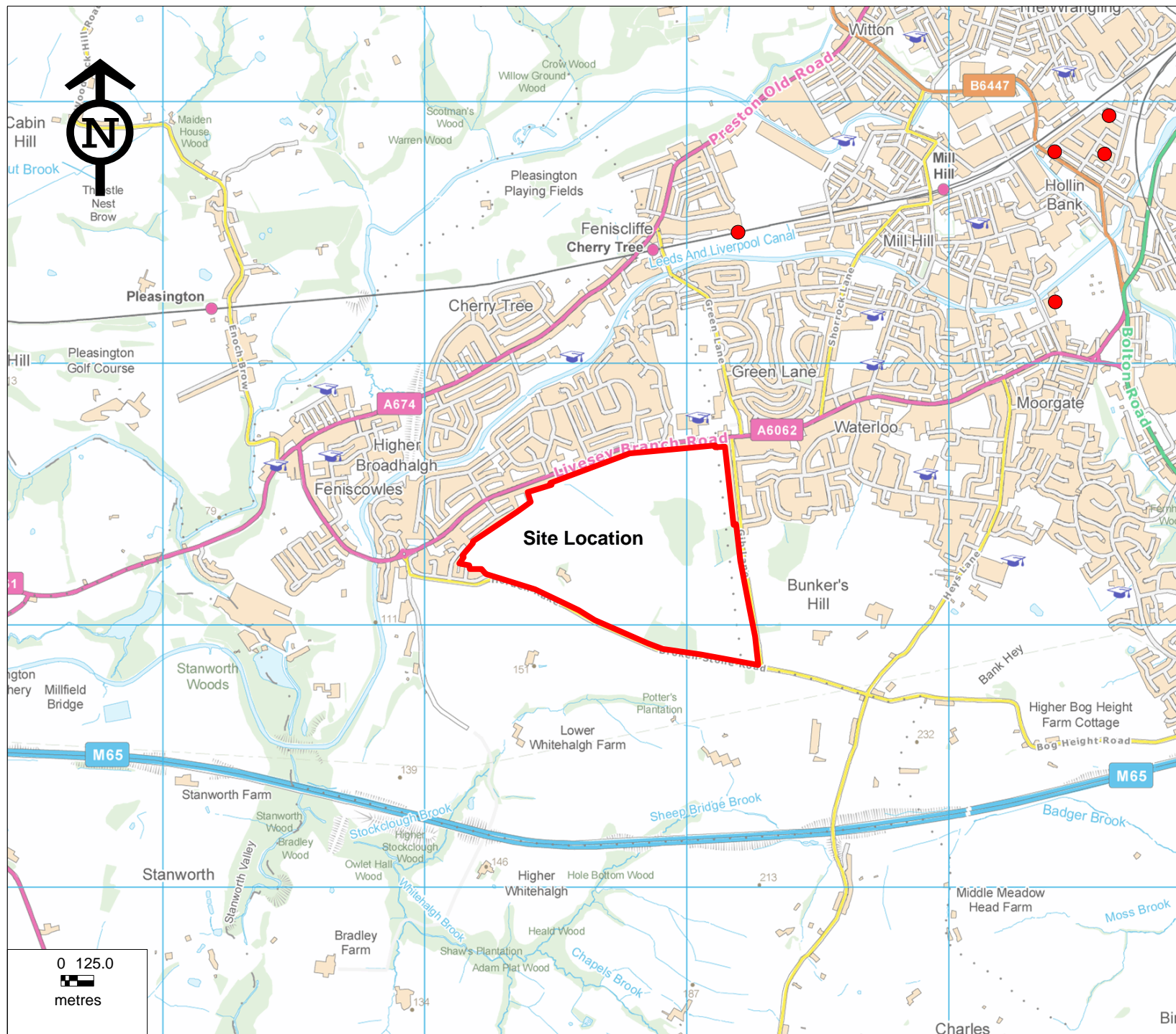
³ Flood Risk Regulations 2009, Preliminary Flood Risk Assessment; Lancashire Area Preliminary Assessment Report (May 2011).

⁴ Flood Risk Regulations 2009, Preliminary Flood Risk Assessment; Lancashire Area Preliminary Assessment Report Spreadsheet (May 2011).

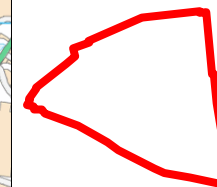
APPENDIX A

SITE DATA

- **Location Plan**
- **Illustrative site layout**
- **Topographical Data**



KEY



Site Boundary



Client: Rule Five Land Ltd			
Site: Gib Lane, Blackburn			
Title: Site Location Plan			
Job No.: LKC FRA 13 1077	Scale (See Scale Bar): 1 :20000 @ A4	Figure: 1	Revision: 0
Drawn By: RB	Checked By: MJ	Date: December 2013	



Notes

Existing Trees:

- Retained for screening, habitat and amenity value within new development;
- Allows integration with both new green corridors and wider landscape setting;
- Existing woodland and hedgerow regeneration opportunities.

1. Cockridge Wood

a) Eastern section (G20) is generally a good quality space within open understorey / deadwood habitats and ancient woodland characteristics. Access path(s) to be maintained and formalised. Light thinning / coppice management.

b) Western section (G35) is of poor quality having been invaded by Rhododendron and natural regeneration of woodland trees / woody vegetation from adjacent seed banks with modest initial planting and creation of paths.

c) Extend to line of historic woodland with further planting and open space provision.

2. Green Hills Wood (G79 - G82)

Historic maps show this as woodland, but dispersed tree cover / character resembles wood pasture. This is a good quality space with mature trees and opportunities for creation of new public space. Modest maintenance / new tree planting recommended.

3. Horden Farm

Green corridor to Wilton Weavers Way and proposed footpath links and additional woodland planting to provide a buffer to existing Horden Farm, enhancing existing tree cover and wildlife habitat opportunities. Provides existing character to southern boundary of built form within tree belt.

Boundaries:

4. Soft Edge to boundary with residential properties to Livesey Branch Road with additional buffer and tree planting and water attenuation features within informal linear open space.

5. Broken Stone Road is lined with trees and hedges. The road runs parallel to the south of a ridgeline. The area south of the ridgeline links visually to the wider countryside south of the M65 and is important in providing a semi rural setting to Blackburn. It is however considered that due to existing developments such as Horden Farm, this area could accommodate sensitive low density development within a wider and enhanced buffer zone.

6. Gib Lane - Vehicular and pedestrian access links into development with retention of hedgerows to soften boundary yet maintain open character.

7. Wilton Weavers Way

This existing strategic footpath is a key element of the site around which the design can be developed. It is an important recreational resource and offers long ranging views. It can be used, along with other foot / cycle ways, to develop connectivity with West Pennine Moors (to south).

Preservation of Wilton Weavers Way's open character with key new green spaces proposed at northern gateway and new 'Village Green'. This is proposed to be located at the intersection of the regenerated / enhanced Cockridge Wood open space.



Key:

1 - 7

Reference to strategic landscape features (see notes)



Existing trees and vegetation (refer to URS Tree Survey).



Woodland planting or as open space provision.



Public open space and water attenuation features.



Soft planted edge.



Existing ridgeline.



Primary route.



Primary access.



Secondary access.



Pedestrian access.



Wilton Weavers Way.



Gateway / node / focal point.



Footpath connection.



Development blocks.



Potential sensitive design (low density) development blocks.



Existing residential.



SUDS features.

GIB LANE, BLACKBURN | LANDSCAPE STRATEGY (LS001) | DRAFT (NOT TO SCALE) | URS JANUARY 2014



KEY

- PRIMARY ROUTE
- WITTON WEAVERS WAY
- SOFT EDGE
- RETAINED WOODLAND
- GREEN SPACE
- SUDS FEATURES
- SCHOOL / COMMUNITY USE
- HIGHER DENSITY FRONTAGE
- PRINCIPAL ACCESS
- SECONDARY ACCESS
- FOOTPATH CONNECTIONS

- Medium / High 30 - 40 dph
- Low / Medium 20 - 30 dph
- Low - under 20 dph



Area 1 Vision

High to medium density residential neighbourhood fronting and connecting a network of green spaces.
Limited through traffic prioritises an attractive pedestrian environment.
Strongly defined streets of 2-3 storey contemporary town houses establishes a distinct identity.

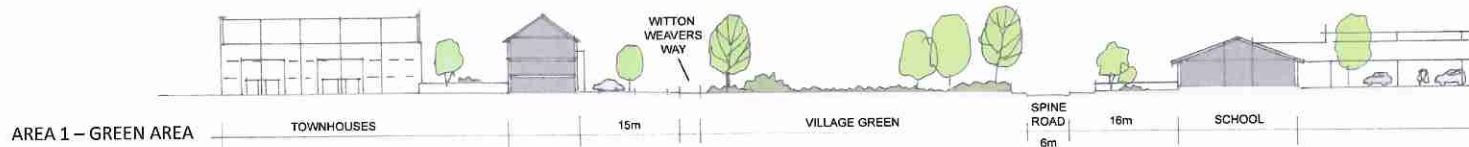
Frontages provide a backdrop and active frontage to a landscaped focal point – village green, and the Witton Weavers Way.

Open spaces will be well overlooked and provide a variety of functions including informal play and relaxation, SUDS drainage and biodiversity.

Density and height.

40 dph average with transition to adjacent areas.

2-3 storey terraces and townhouses.



DENSITY STUDIES AREA 1 (with images)



Area 2

Vision

Medium to low density residential areas within a strong landscaped structure framework.

Housing arranged along a leafy avenue vehicular through route and bounded by the strategic Witton Weavers Way retained as a landscaped pedestrian spine.

Semi-detached and detached houses with larger gardens provide frontages to the green infrastructure.

Landscaped buffer provides SUDS drainage, pedestrian through routes and separation from existing houses

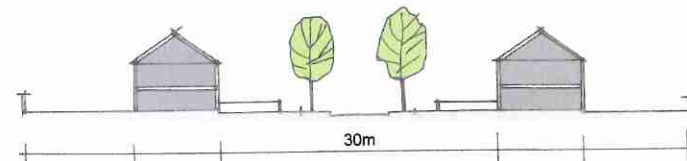
Density and height.

20-30dph becoming lower density to the south and west.

Predominately 2 storey detached and semi-detached houses.

Some 2.5 or 3 storey houses in strategic locations.

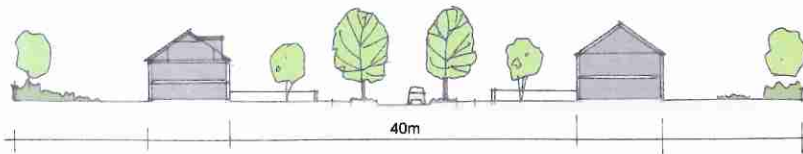
Some flats may be used over garages in conjunction with parking courts.



AREA 2 – PRELIMINARY STREET



DENSITY STUDIES AREA 2 (with images)



AREA 3 – PRIMARY STREET

Area 3 Vision

Low to very low density leafy residential area with a rural feel.
Large detached houses in large plots fronting perimeter to south.
Some mews type houses and parking incorporated within the block structure.

Existing hedgerows and mature trees together with new planting to maintain character of Horden Rake /Broken Stone Road and setting of Horden Farm house.

Strategically placed gateway entrance from Horden Rake

Green space incorporated at strategic point to retain skyline views of higher part of the site and provide pedestrian linkages.

Density and height

Below 20 dph

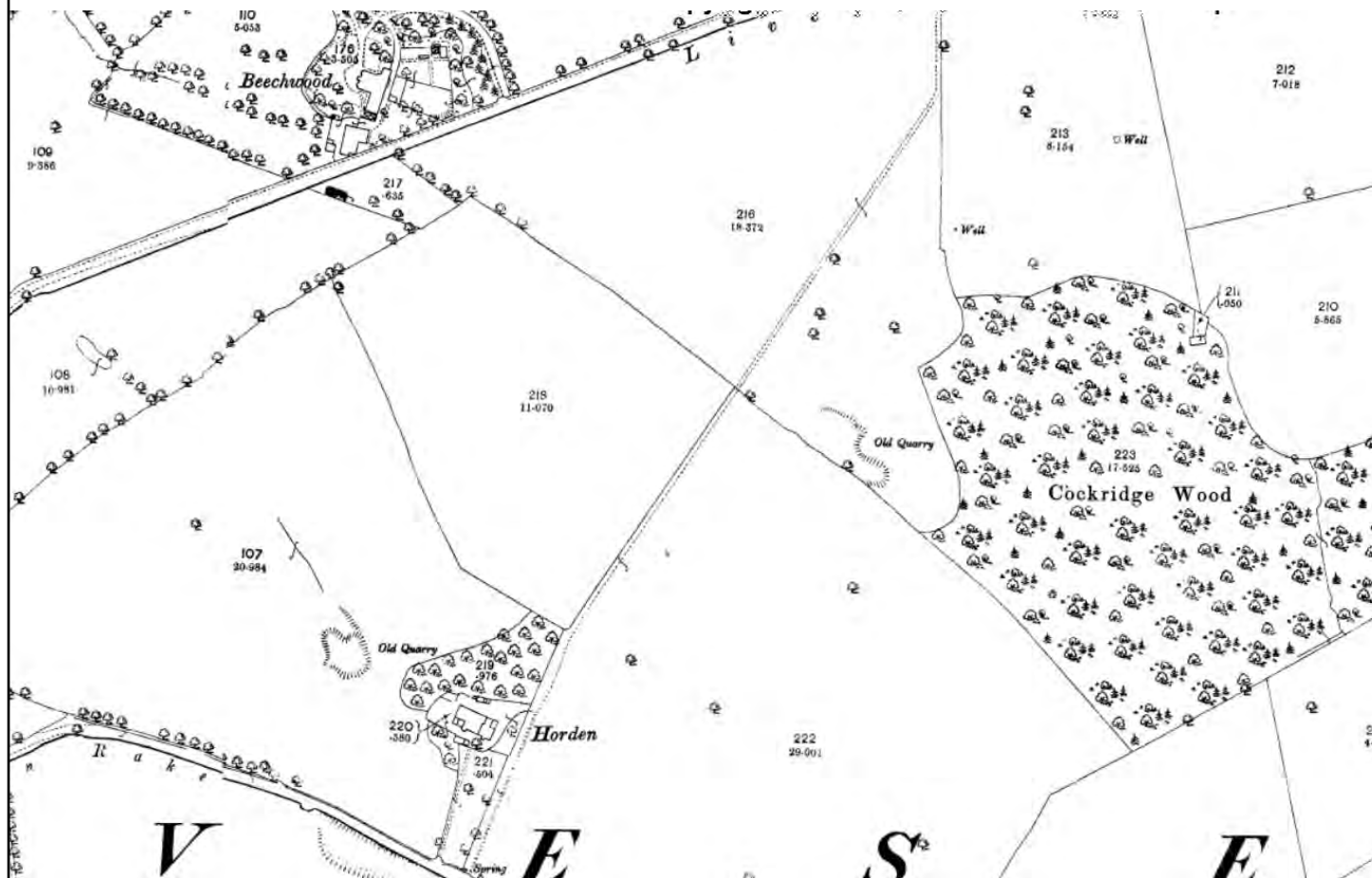
Predominately large 2-2.5 storey detached houses set within generous gardens.



DENSITY STUDIES AREA 3 (with images)



COMBINED SKETCH PROVING LAYOUT – WESTERN PART OF SITE



Key



Client:
Rule Five Land Ltd

Site:
Gib Lane, Blackburn

Title:
1893-1894 Pre WWII Historic Map

Job No:
LKC FRA 13 1077

Scale:
1:2500

Figure:
1

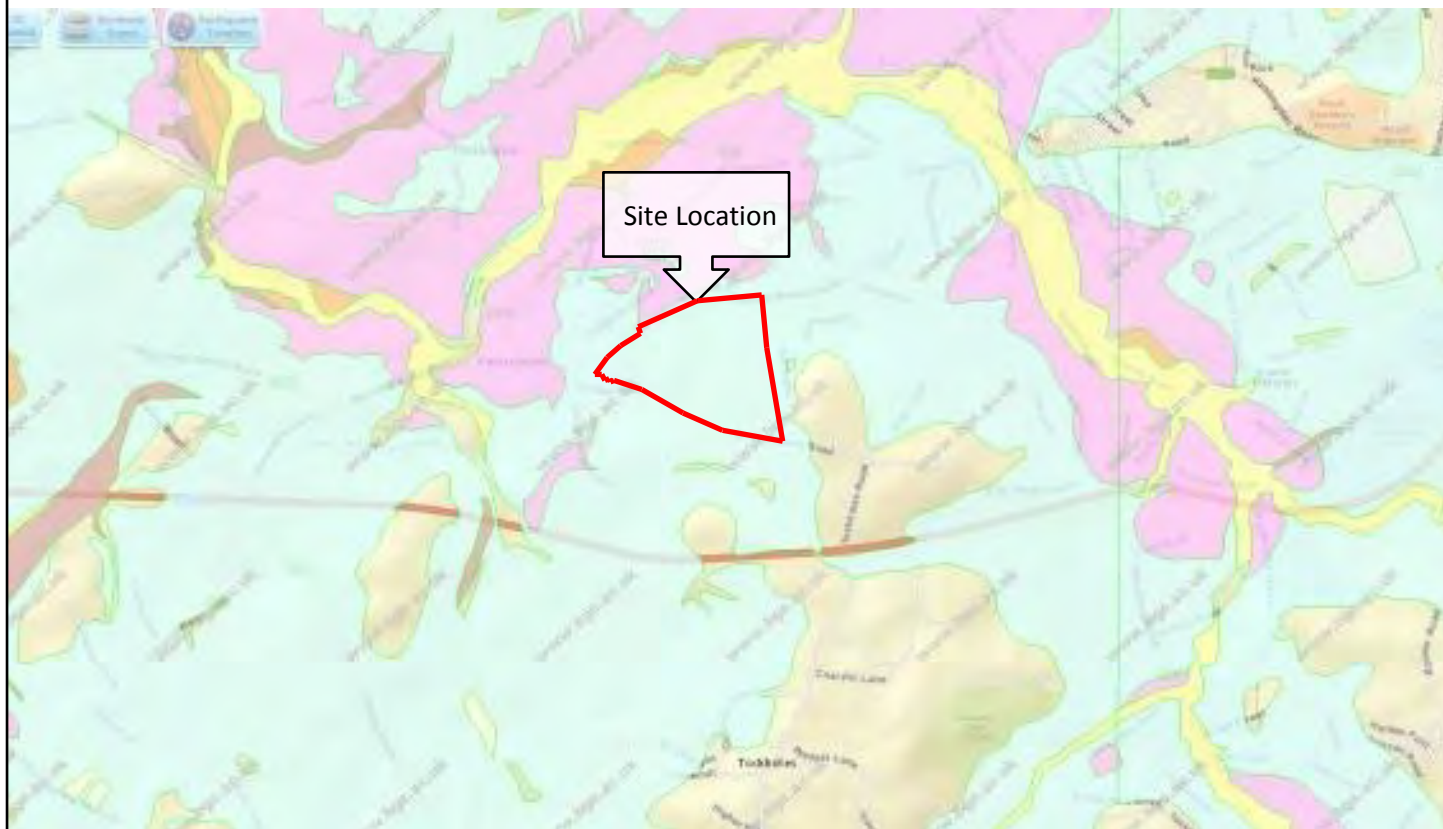
Rev:
N/A

Drawn
By: RB

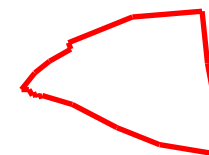
Checked
By: MJ

Drawn:
Dec 2013

Drawing Reference No: LKC_FRA_13_1077_HistoricMap



Key



Site Boundary



Diamicton – Devensian Till



Glaciofluvial Deposits -
Devenisan



None Recorded



Client:
Rule Five Land Ltd

Site:
Gib Lane, Blackburn

Title:
British Geological Survey Superficial Geology Map

Job No:
LKC_FRA_13_1077

Scale:
1:50000

Figure:
1

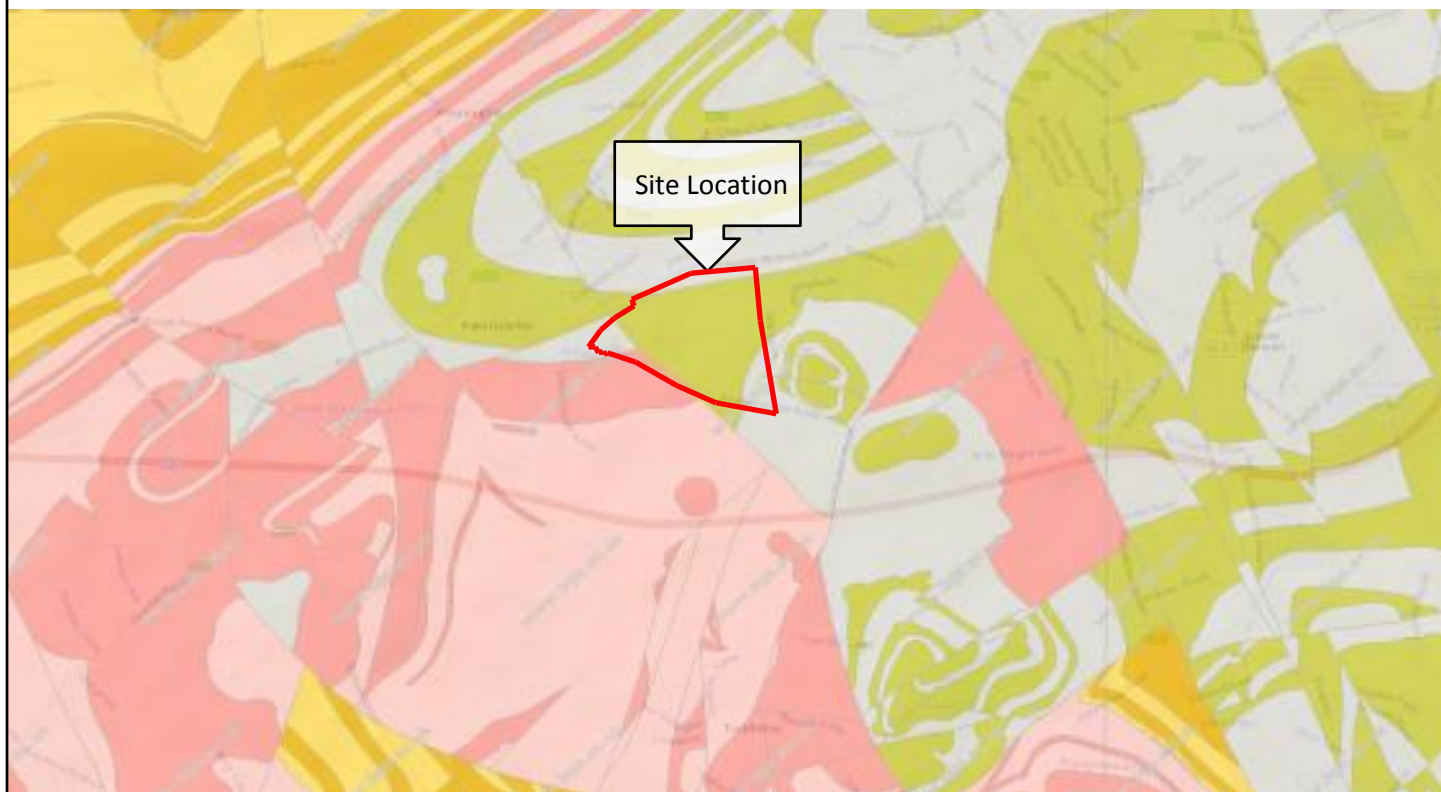
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Drawn
By: RB

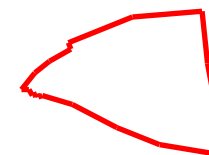
Checked
By: MJ

Drawn:
Jan 2013

Drawing Reference No: LKC_FRA_13_1077_ BGSSuperficialGeologyMap



Key



Site Boundary



Woodhead Hill Rock - Sandstone



Pennine Lower Coal Measures
Formation –
Mudstone/Siltstone/Sandstone



Rough Rock - Sandstone



Client:

Rule Five Land Ltd

Site:

Gib Lane, Blackburn

Title:

British Geological Survey Bedrock Geology Map

Job No:

LKC FRA 13 1077

Scale:

1:50000

Figure:

1

Rev:

N/A

Drawn

By: RB

Checked

By: MJ

Drawn:

Jan 2013

Drawing Reference No: LKC_FRA_13_1077_BGSBedrockGeologyMap

Norwest Holst Soil Engineering Ltd.

Borehole No.

A44

Contract No. F7267

BOREHOLE LOG

Location BLACKBURN S. BY PASS

Client DEPARTMENT OF TRANSPORT

Method of Boring CABLE PERCUSSION AND ROTARY AIR FLUSH

Diameter of Borehole 150 mm, 105 mm

SD 62 SE 46

65032 24838

Sheet 1 of 3

Chainage

Ground Level 118.2 m.A.O.D.

Date 30/3/87 - 2/4/87

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/R.Q.D. %	Daily Progress
Topsoil		0.30	117.9				
Firm, yellow brown mottled grey silty, slightly sandy CLAY with a little fine to medium subangular gravel. WEATHERED GLACIAL TILL (CLS)		0.70	117.5		0.50		
					1.00		
					(69)		
					1.50		
Stiff mottled brown and grey, silty slightly gravelly CLAY with some sand. Gravel is fine to medium, angular to subrounded WEATHERED GLACIAL TILL (CLG)		1.80	116.4		1.80		
		2.20	116.0		2.00		
					(48)		
					2.50		
Stiff grey very clayey SILT with rootlets. FLUVIOGLACIAL (ML)					3.00		
					(45)		
Stiff grey silty, slightly sandy CLAY with some fine to coarse, angular to subrounded gravel. GLACIAL TILL CLG or CLS		4.00	114.2	3.50m 150mm	3.50		
					4.00		
					(69)		
Firm becoming stiff by 5.50 M, grey silty, slightly gravelly CLAY with some sand. Gravel is angular to subrounded, fine to medium. GLACIAL TILL CLG					4.50		
					5.00		
					(98)		
Very stiff brown, silty, slightly gravelly CLAY with some sand. Gravel is fine to medium, angular to subrounded. Occasional cobbles and boulders. GLACIAL TILL CLG		6.00	112.2		5.50		
					6.00		
					(110)		
					6.50		
					7.10		
Grey and purple, highly weathered coarse SANDSTONE. Moderately strong. ...From 9.40m becoming SANDSTONE: Pink brown, coarse grained thickly bedded, moderately weathered sandstone, moderately strong with slight laminations throughout. Fracture index 8.					(103)		
					7.60		
					8.00		
					(119)		
		8.80	109.4	8.50m 150mm	8.50		
					9.00		
					9.10		
					9.40		
					9.40-9.50		

30/3/87

31/3/87

Type of Sample

- ☒ S.P.T. ☒ Undisturbed
☒ C.P.T. ☒ Vane
☒ Jar ☒ Water
☒ Bulk ☒ Piezometer

Remarks (Observations of Ground Water etc.)

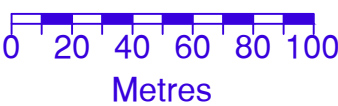
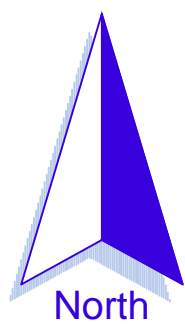
NO GROUND WATER ENCOUNTERED WHILST CABLE TOOL BORING
 CHISELLING: SANDSTONE 8.80 - 9.50 - 1½ HOURS
 * SEATING BLOWS

Water levels are subject to seasonal or tidal variations and should not be taken as constant



Notes

All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.



ABBREVIATIONS

- CL Cover Level
- DK Drop Kerb
- IC Inspection Cover
- MH Man Hole
- SP Sign Post
- TP Telegraph Pole
- TW Top of Wall
- WL Water Level

NOTE

All levels and coordinates relate to OSGB36 using GNSS data.
Levels defining edge of carriageway are observed at channel (bottom of kerb)

Rev.0 Description. Issued



2 Berkshire Close | Wilpshire | Blackburn | Lancashire | BB1 9NG
tel 01254 614055 fax 01254 209754 e-mail sales@tricadsolutions.co.uk

Site Address

Horden Rake
Blackburn

Project Description

Existing Site Survey

Drawing Title

Existing Site Survey

Scale	Date	Drawn By
1:2500@A1	27/09/2013	AD

Drawing Number

TRI-1083-09

APPENDIX B

FLOOD RISK DATA

- EA correspondence
- EA Rivers and Sea Flood Risk Map
- EA Surface Water Flood Risk Map


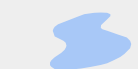

Flood Level Map: Gibb Lane, Blackburn

Produced: 16 January 2014

Our Ref: NTH1081KE

NGR: SD6580025319

Key

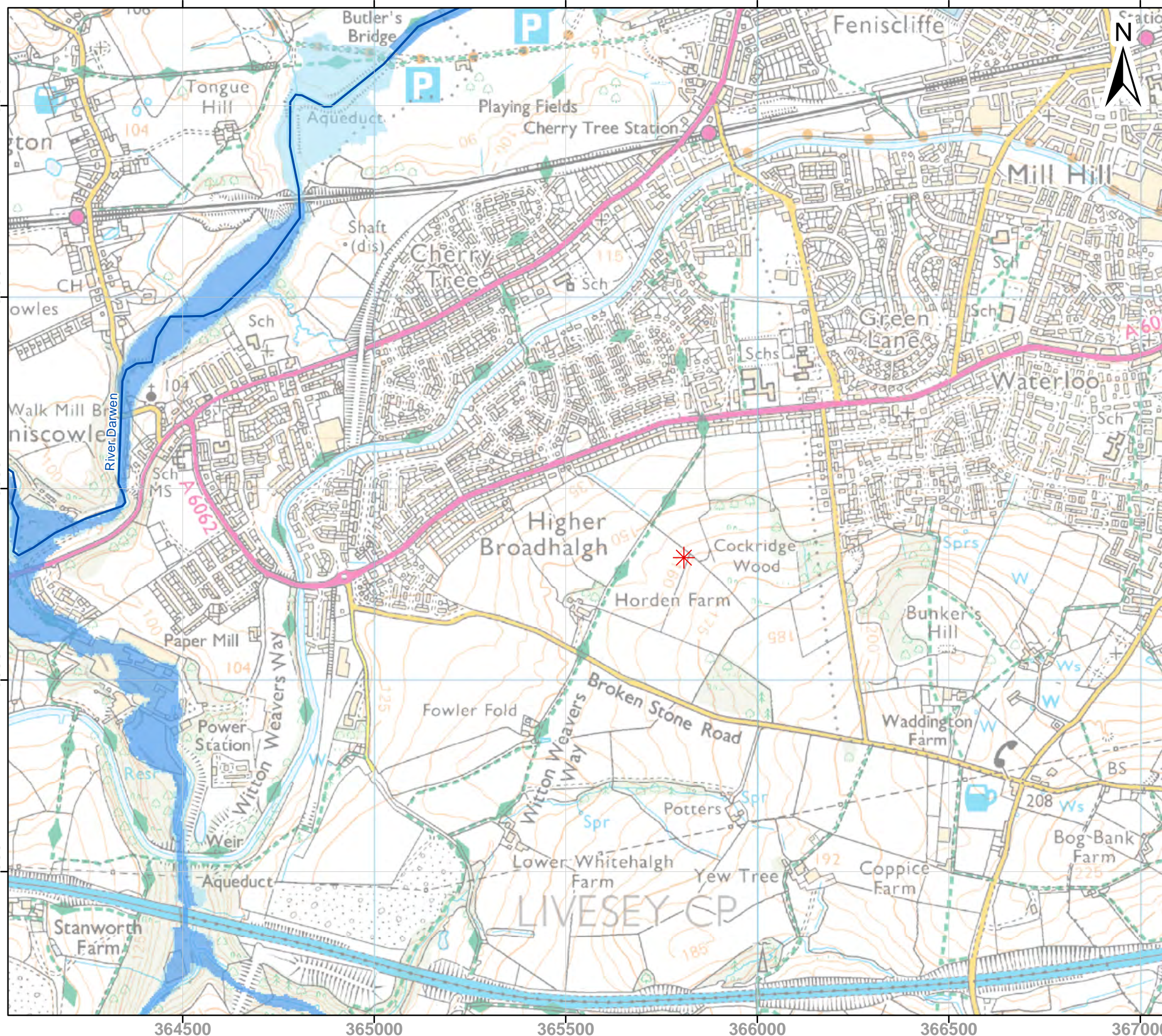
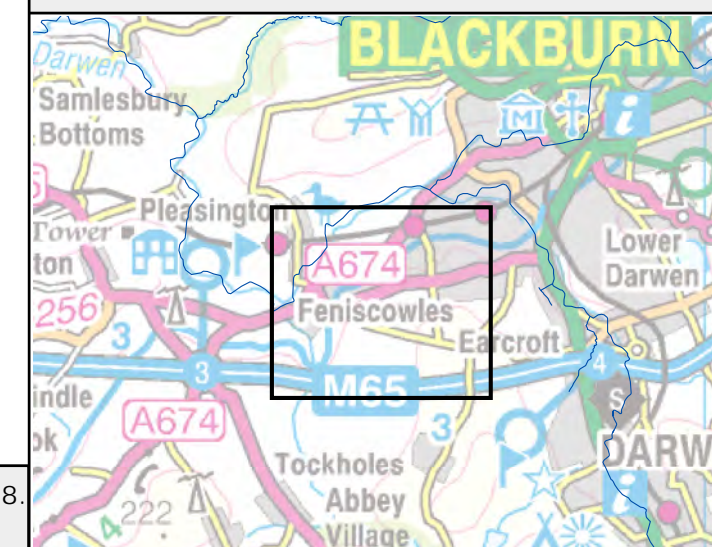
-  Main River
-  Flood Zone 3
-  Flood Zone 2

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

ABDs (Areas Benefiting from Defences) show the area benefiting from defences during a 1 in 200 tidal, or 1 in 100 fluvial flood event.



Mark Jones

From: NW Info Requests <NWInfoRequests@environment-agency.gov.uk>
Sent: 29 January 2014 10:59
To: Rob Brenton
Subject: PROTECT-NTH1081KE - Land at Gibling, Blackburn
Attachments: Standard_Notice[1].pdf; NTH1081KE - Blackburn EFO.PDF; Standard_Notice[1].pdf

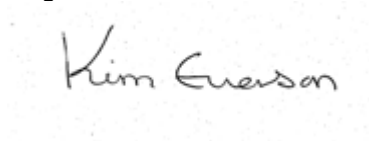
Dear Robert,

Thank you for your information request.

I have spoken to the officer who informed me that one of the officers has spoken to you on the phone. I'm not sure if the officer forwarded you the above attached map therefore I thought I would forward it over to you.

With regards to foul and surface water please contact the local authority for this information.

Regards,



Kim Everson
Customer Engagement Officer
Richard Fairclough House,
Knutsford Road,
Warrington
WA4 1HT

Phone: 01925 542915

kim.everson@environment-agency.gov.uk

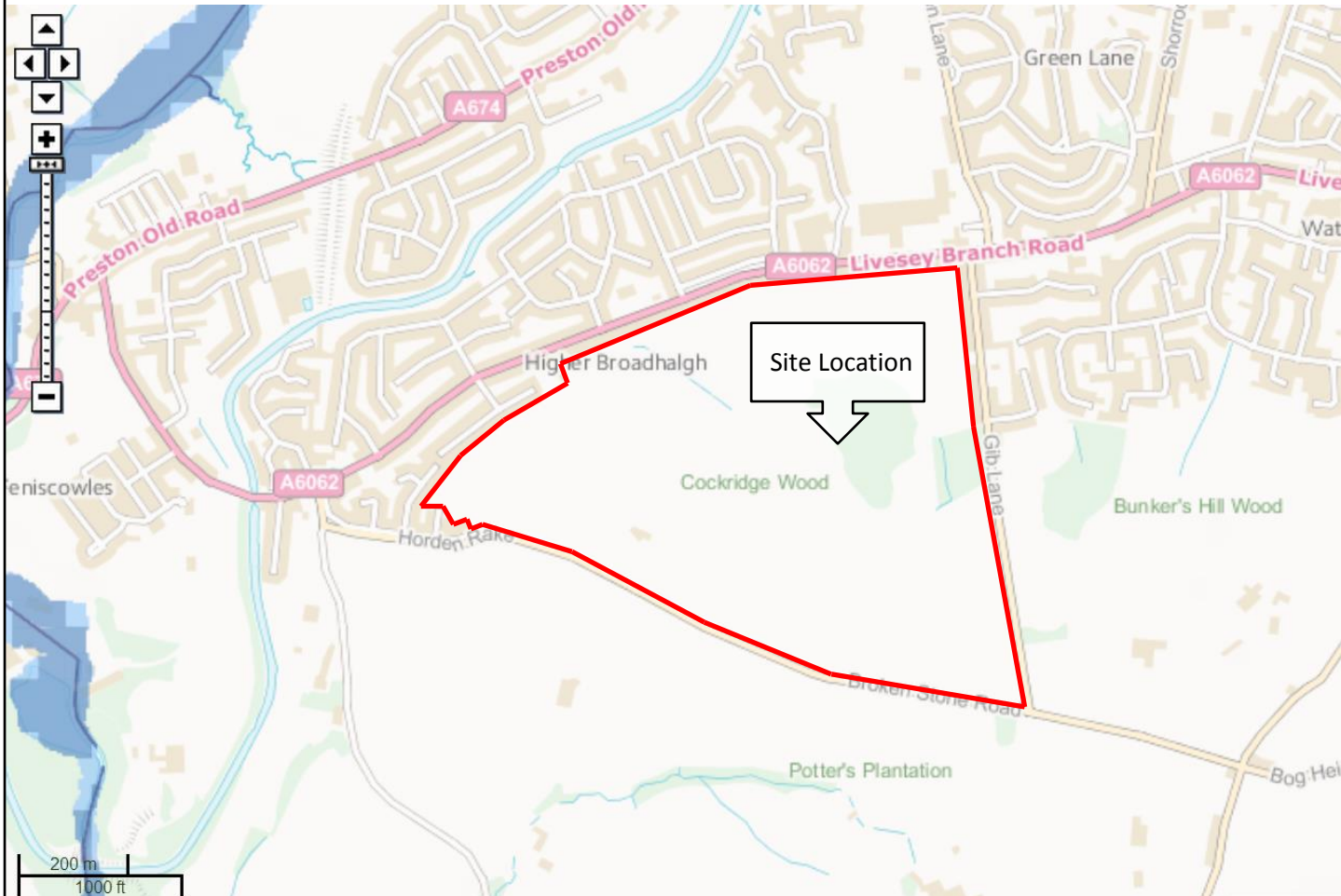
You can contact me on my direct dial or if you have a general query please ring our customer contact team on 03708 506 506 or visit the website at www.environment-agency.gov.uk

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:
<http://www.surveymonkey.com/link/d5ea8>

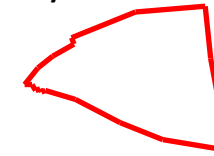
Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else.

We have checked this email and its attachments for viruses. But you should still check any attachment before opening it.

We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.



Key



Site Boundary



Main River



High Risk



Medium Risk



Low Risk



Very Low Risk



Client:

Rule Five Land Ltd

Site:

Gib Lane, Blackburn

Title:

Environment Agency Rivers and Sea Flood Risk Map

Job No:

LKC FRA 13 1077

Scale:

1:10000

Figure:

1

Rev:

N/A

Drawn

By: RB

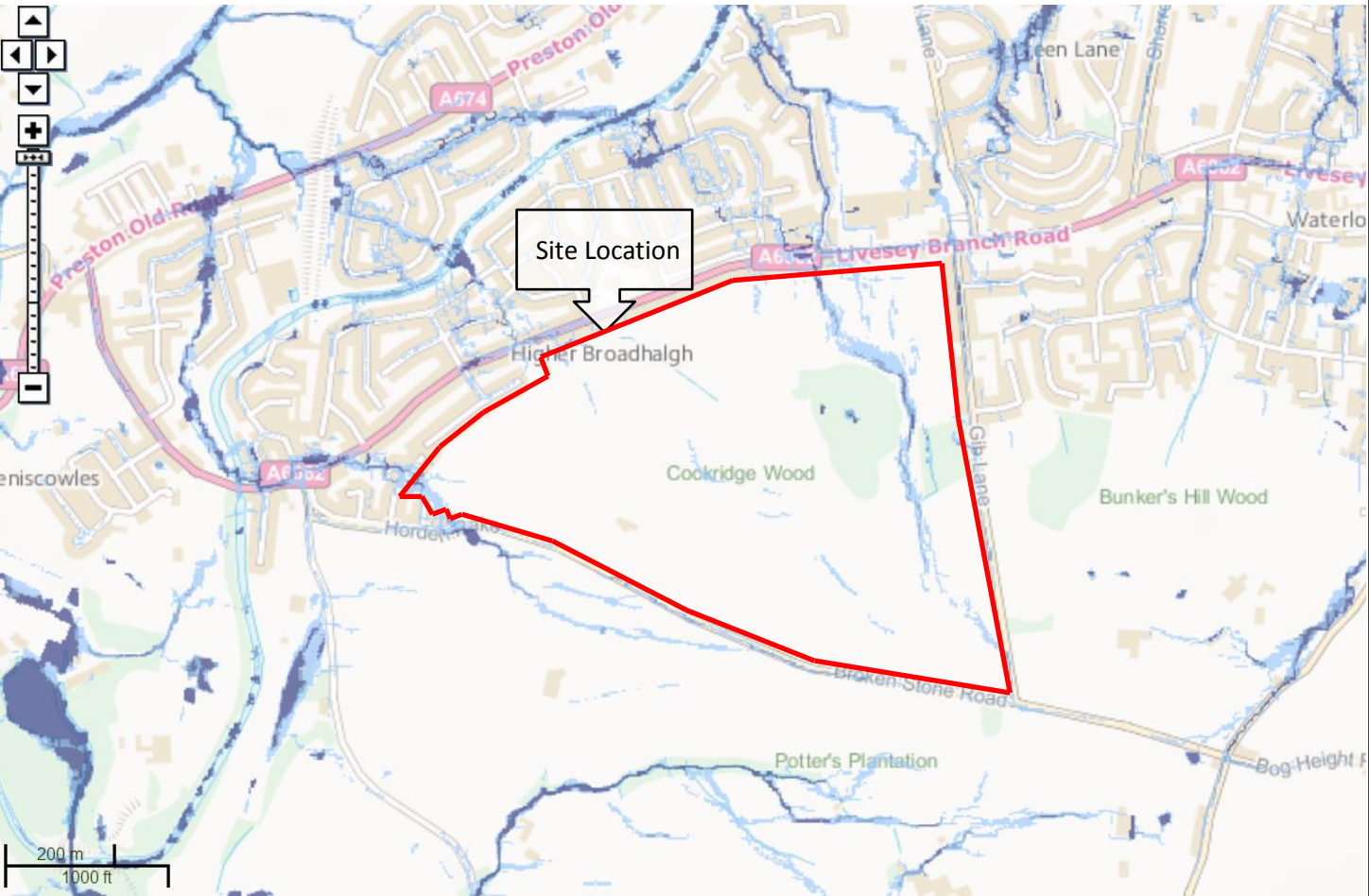
Checked

By: MJ

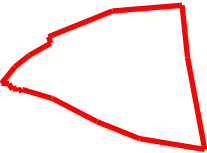
Drawn:

Jan 2013

Drawing Reference No: LKC_FRA_13_1077_EARiversandSeaFloodRiskMap



Key



Site Boundary



High Risk



Medium Risk



Low Risk



Very Low Risk



Client: Rule Five Land Ltd

Site: Gib Lane, Blackburn

Title: Environment Agency Surface Water Flood Risk Map

Job No:
LKC FRA 13 1077

Scale:
1:10000

Figure:
1

Rev:
N/A

Drawn
By: RB

Checked
By: MJ

Drawn:
Jan 2013

APPENDIX C

CONSULTEE CORRESPONDENCE

- **Blackburn with Darwen Borough Council**
- **United Utilities**

Mark Jones

From: Lever Roger <roger.lever@blackburn.gov.uk>
Sent: 14 February 2014 12:41
To: Rob Brenton; Mark Jones
Cc: Munshi Imran
Subject: RE: Gib Lane site, Blackburn

Gents

Your site work over seems very comprehensive. In the parts where I have some knowledge of the drainage, I am in complete agreement with your findings however I did not know how the drainage worked on a lot of the site. The new works at Cockridge Wood was done by the landowner on the insistence of the Agricultural Land Tribunal in response to complaints from residents on Livesay Branch Road.

You investigation has highlighted the significant amount of water that is stored on this land so we will expect this to be taken into account when designing the overall drainage system.

Regards
Roger

Roger Lever
Senior Technical Officer
The Drainage Team
Regeneration Department

Tel/ 01254 585312
Fax 01254 662916
Mobile 07734 099 057
Web www.blackburn.gov.uk

From: Rob Brenton [mailto:R.Brenton@thelkgroup.com]
Sent: 28 January 2014 15:56
To: Lever Roger
Subject: FW: Gib Lane site, Blackburn

Apologies Roger,

I just sent this email out, copying you in, but yours pinged back due to a misspelt address.

Kind regards,

Robert Brenton

Environmental Consultant



CONTACT NUMBERS:

BURY 0161 763 7200 | LIVERPOOL 0151 235 8716 | GLASGOW 0141 773 6269

GROUP WEBSITES:

thelkgroup.com | code4homes.com | sapcalc.com | lksustainability.co.uk | invasiveplantcompany.com

LK GROUP - COMPANY ACCREDITATIONS:



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Liverpool Office: The Corn Exchange, Fenwick Street, Liverpool. L2 7QL

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From: Rob Brenton

Sent: 28 January 2014 15:49

To: 'imran.munshi@blackburn.gov.uk'

Cc: highways@blackburn.gov.uk; 'rodger.lever@blackburn.gov.uk'; I.Munshi@blackburn.gov.uk

Subject: Gib Lane site, Blackburn

Dear Imran,

I apologise if these emails have not been getting through to you, I may have had an incorrect address.

I have attached the original email that I sent out which contains an information request as well as the site location plan. I have also attached the flooding issues which your colleague, Rodger Lever has provided and a copy of our findings, thoughts and assumptions based on a site visit.

If you have any other thoughts they would be greatly appreciated. Also as the plans show, there are a number of ordinary watercourses/ditches, particularly to the east of the site which drain into culverts under the residential houses off Livesey Branch Road. To your knowledge is there any available capacity within these piped watercourses?

Kind regards,

Robert Brenton

Environmental Consultant

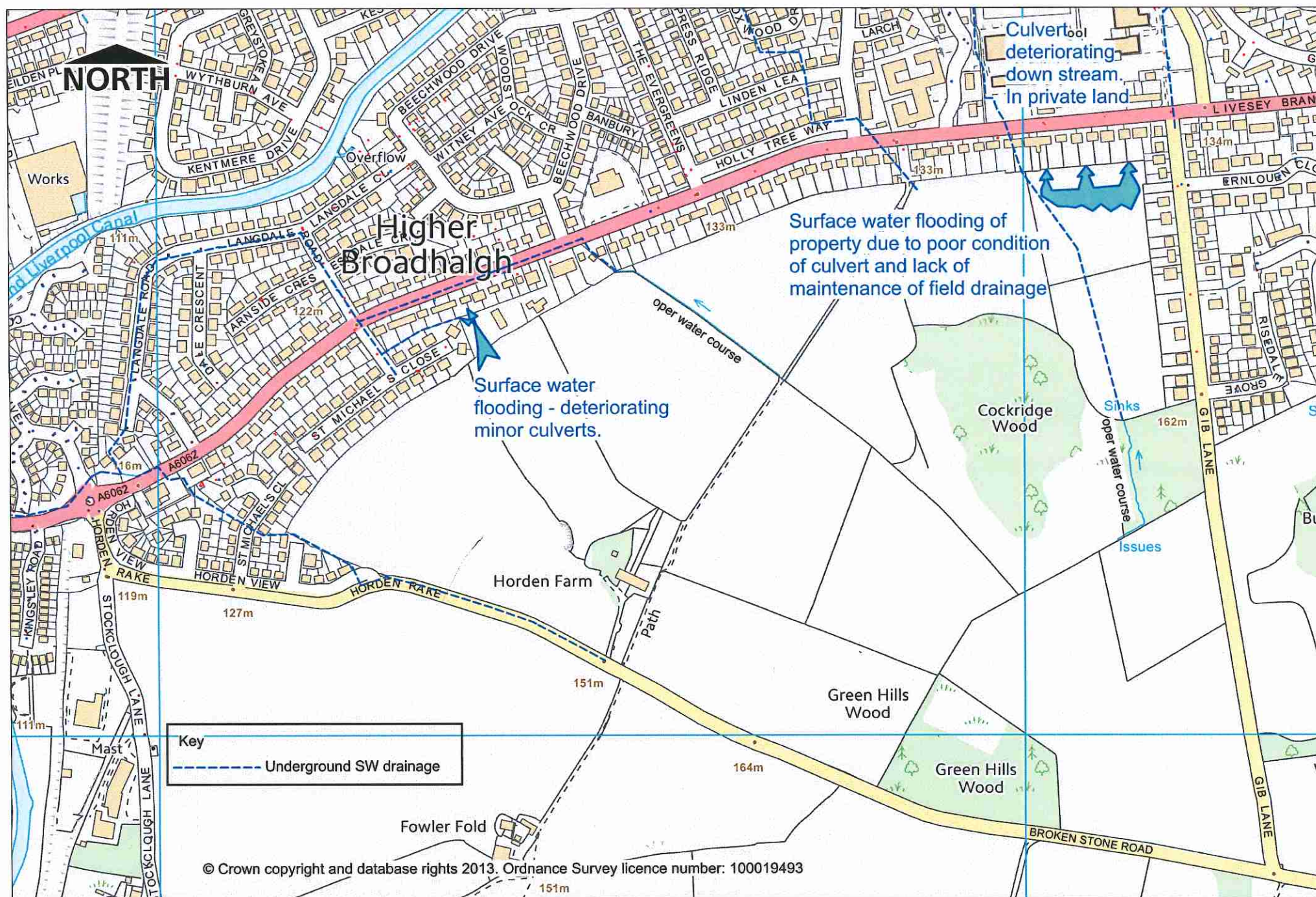


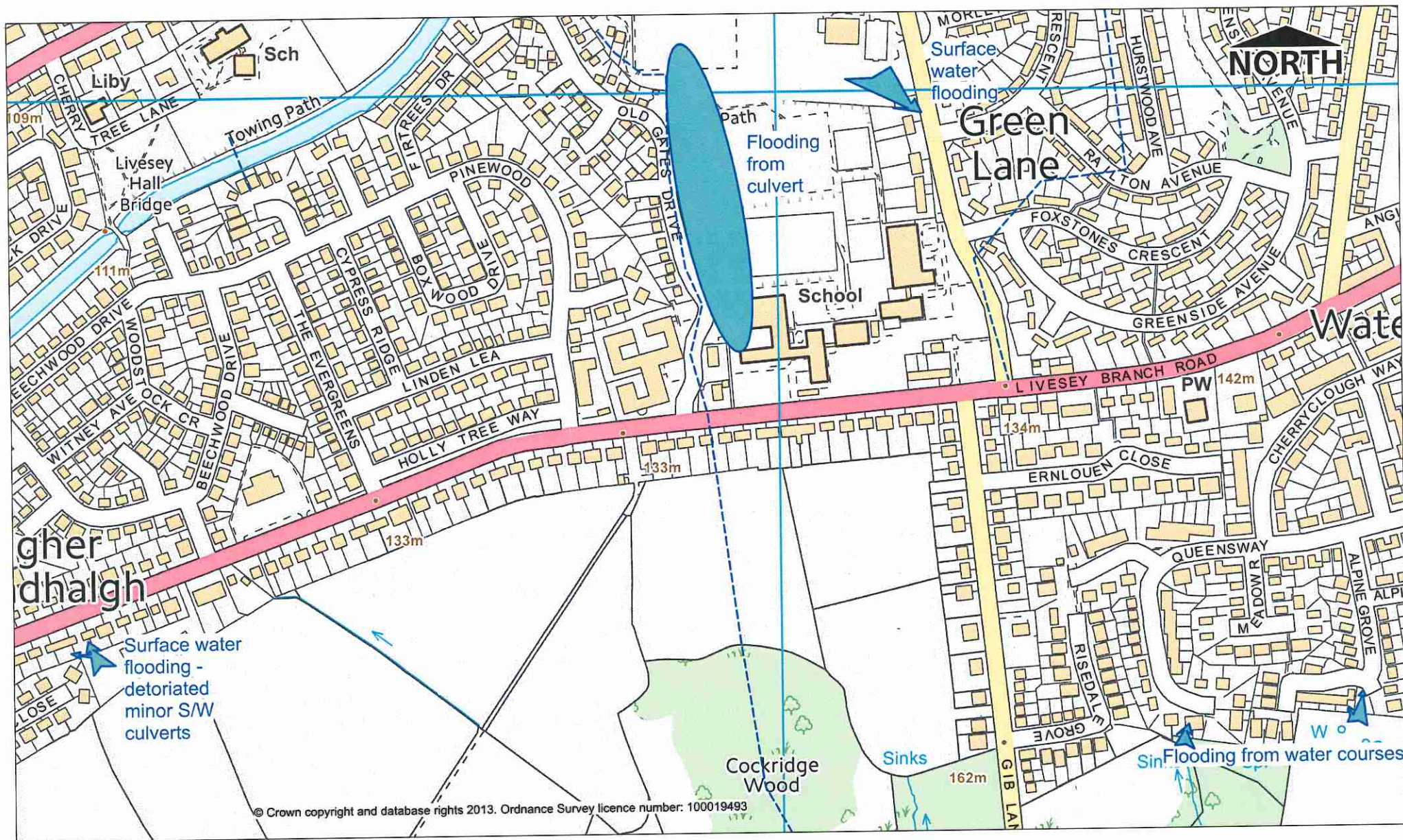
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Mark Jones

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 23 December 2013 16:40
To: Rob Brenton
Subject: FW: Land at Gib Lane, Blackburn
Attachments: Site Location (MI).pdf

Hello Rob

For the purpose of you FRA, I can confirm that there are no known historical flooding issues in the immediate vicinity of the site.

I would also comment that there appears to be several watercourses within the boundary of the site and would expect any surface water drainage strategy to drain all surface water generated by any new development into these watercourses and not to the public sewer as this could have a detrimental impact to the sewer network and increase the risk of flooding downstream.

Please note that United Utilities Water plc (U UW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the 'at risk' register.

Also, this does not include any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which U UW has no control and not a facet of sewer capacity.

Thanks

Graham Perry
Development Engineer
Developer Services and Planning
Business Operations
United Utilities
T: 01925 679405 (internal 79405)
unitedutilities.com

From: Rob Brenton [mailto:R.Brenton@thelkgroup.com]
Sent: 23 December 2013 15:46
To: Perry, Graham
Subject: Land at Gib Lane, Blackburn

Dear Graham,

I have sent this request to UU Planning Liaison but given you seem to cover the Blackburn area I would appreciate any comments you could make in the meantime with regards to the below site:

We, at LK Consult have been commissioned to undertake a Flood Risk Assessment, (FRA) of a site located at Gib Lane, Feniscowles, Blackburn, BB2 5JP. The site is located approximately 2km to the south-west of Ewood Park (Blackburn Rovers football ground) and is currently 'Greenfield' in nature surrounding the residential buildings of Horden Farm. The Ordinance Survey Grid Reference for the centre of the site is 365818 E, 425322 N and is bound by Gib Lane to the east, residential houses off St. Michael's Close to the west, Livesey Branch Road (A6062) to the north, Horden Rake to the south-west and Broken Stone Road to the south-east. The area of interest measuring approximately 56 ha in size, is shown on attached location plan.

The site is in Flood Zone 1 according to the EA website, but given the size of the site an FRA is required.

Could you please provide us with any information in your possession regarding any incidences of, or possible problems with, flooding associated with foul, surface water and land drainage in the area of the site?

We will be in contact with Environment Agency as the Statutory Consultee as well as Blackburn with Darwen Borough Council as both the Local Planning Authority and Lead Local Flood Authority in order to obtain all appropriate information relating to the FRA.

Thank you for your assistance. If you require any further information please do not hesitate to contact me.

Please let us know as soon as possible if there is a charge for this information so that we can raise the necessary payment.

Kind regards,

Robert Brenton

Environmental Consultant



CONTACT NUMBERS:

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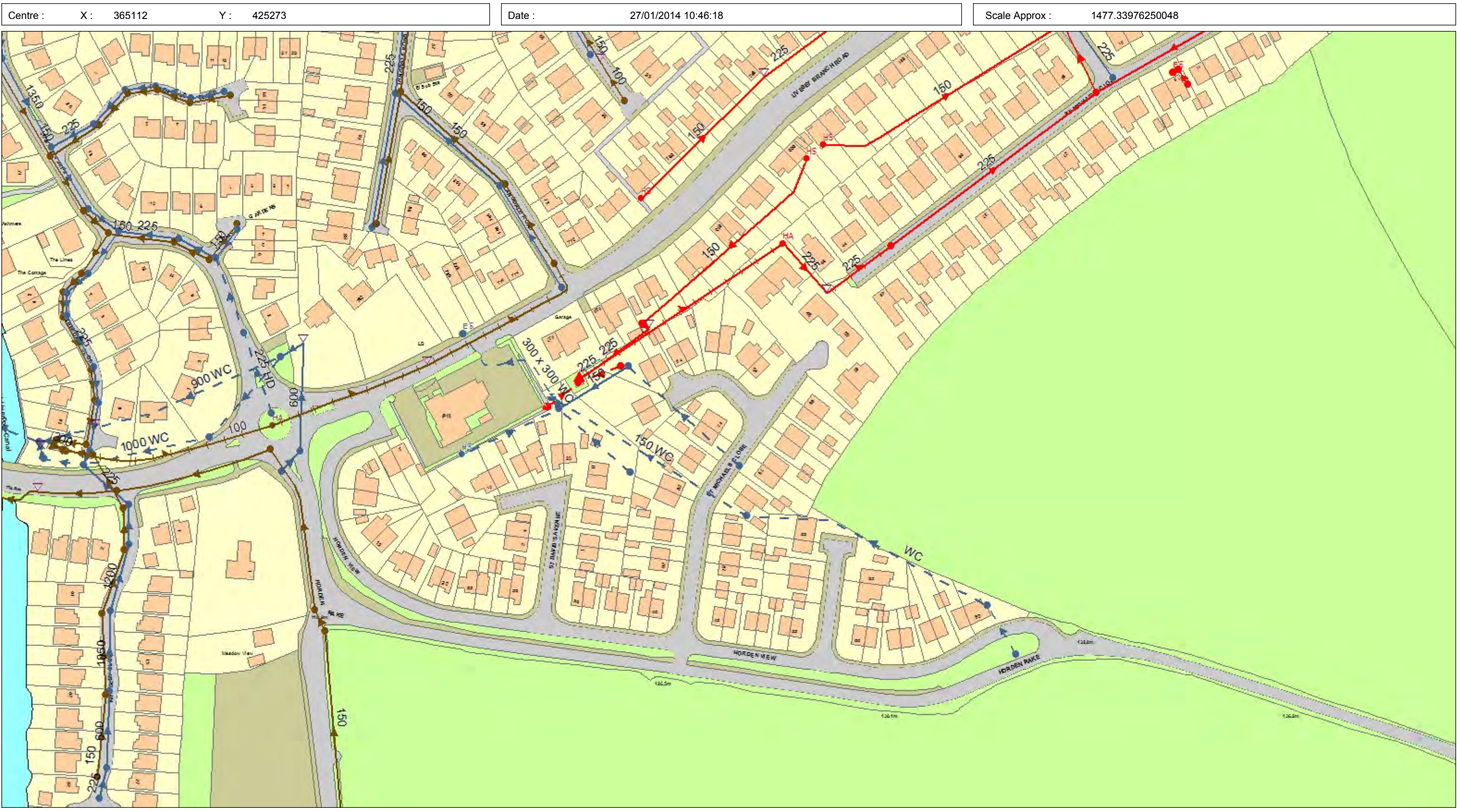
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The information contained in this e-mail is intended only

UU Maps for Safe Dig



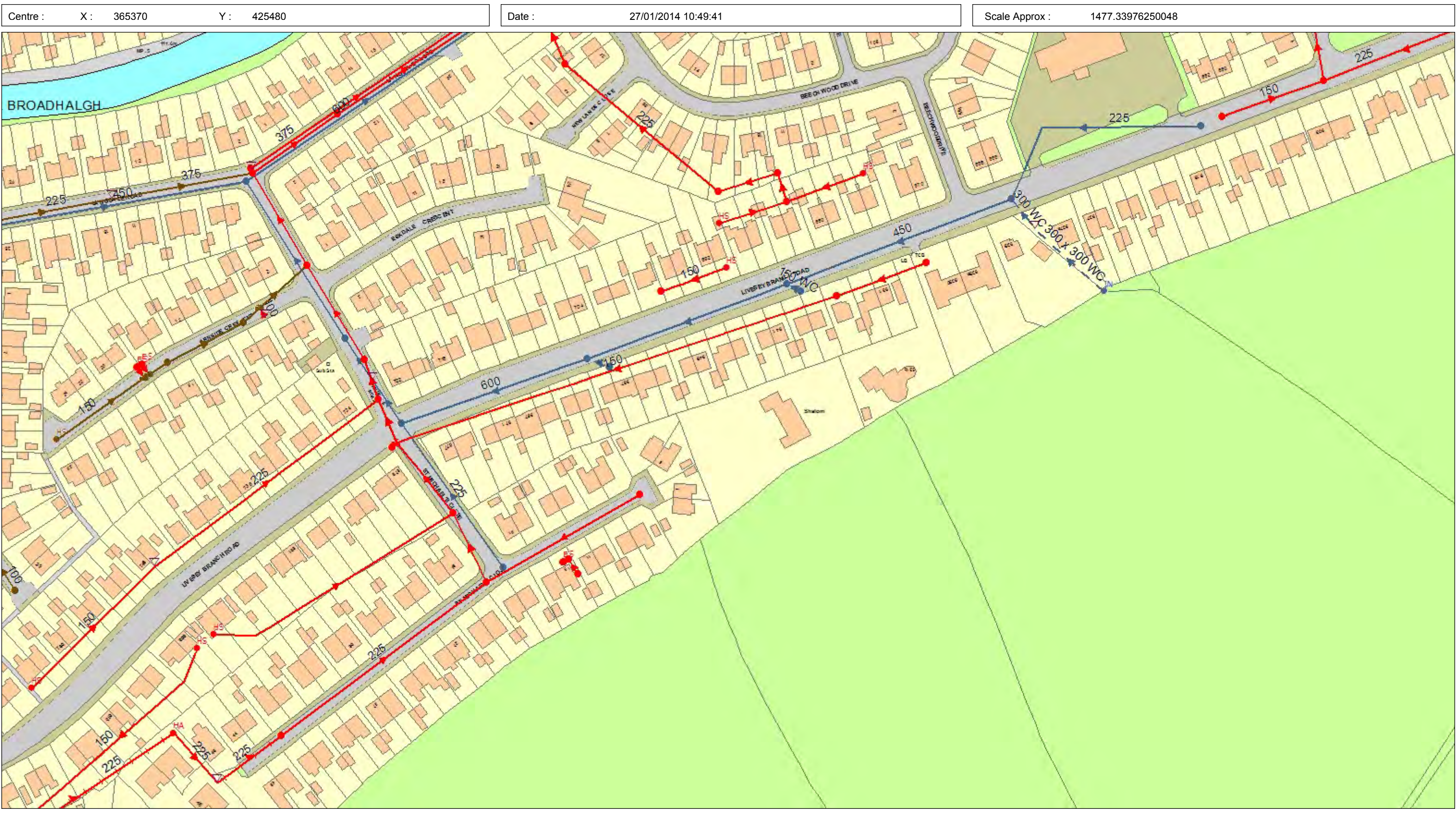
Extract from maps of United Utilities' Underground Assets

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

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Extract from maps of United Utilities' Underground Assets

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UU Maps for Safe Dig



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APPENDIX D

SITE CALCULATIONS

Surface water storage requirements for sites

Site name: Gib Lane

Site location: Feniscowles

Site coordinates

Latitude: 53.72351° N

Longitude: 2.52146° W

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Reference: gcw1ws5fjsph / 38.56

Date: 4 Mar 2014

Site characteristics

Total site area	55.08	ha
Significant public open space	16.52	ha
Area positively drained	38.56	ha
Impermeable area	19.28	ha
Percentage of drained area that is impermeable	50	%
Impervious area drained via infiltration	0	ha
Return period for infiltration system design	10	year
Impervious area drained to rainwater harvesting systems	0	ha
Return period for rainwater harvesting system design	10	year
Compliance factor for rainwater harvesting system design	66	%
Net site area for storage volume design	38.56	ha

Methodology

Greenfield runoff method	IH124
Volume control approach	Use Long Term Storage
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	4
HOST class	N/A
SPR	0.47

Hydrological characteristics

	Default	Edited	
SAAR	1185	1185	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	0.84	0.84	
Hydrological region	10	10	
Growth curve factor: 1 year	0.87	0.87	
Growth curve factor: 10 year	1.38	1.38	
Growth curve factor: 30 year	1.7	1.7	
Growth curve factor: 100 year	2.08	2.08	

Design criteria

Climate change allowance factor	1.3	
Urban creep allowance factor	1.1	
Interception rainfall depth	5	mm

Greenfield runoff rates

	Default	Edited	
Qbar	344.65	344.65	l/s
1 in 1 year	299.84	299.84	l/s
1 in 30 years	585.90	585.90	l/s
1 in 100 years	716.87	716.87	l/s

Please note that a minimum flow of 5 l/s applies to any site

Estimated storage volumes

	Default	Edited	
Interception storage	771.20	771.20	m ³
Attenuation storage	11,631.21	11,631.21	m ³
Long term storage	0.00	0.00	m ³
Treatment storage	2,313.60	2,313.60	m ³
Total storage	12,402.41	12,402.41	m ³

APPENDIX E

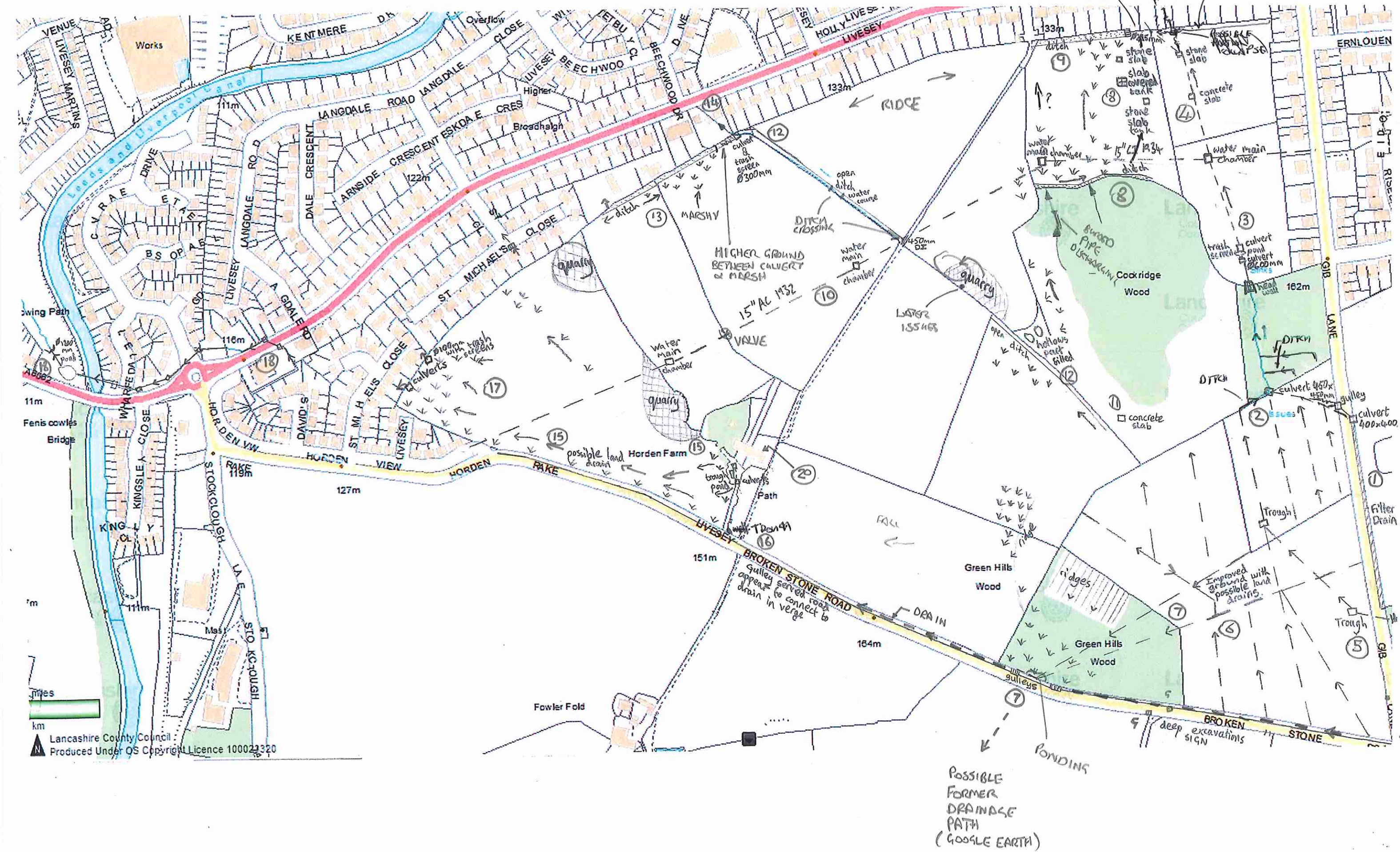
WALKOVER REPORT AND PHOTOGRAPHS

- Investigation Report with Photographs
- Residents Photographs

stone slab tanks
possibly private water
supplies to properties off
Livesey Branch Road

sounded like
water dropping
down into other
draw

BUNDGO



Gib Lane, Blackburn – Site Walk Over Notes and Observations

1. Gib Lane to the east of the site falls steeply northwards towards Livsey Branch Road, to the east of the road is a rise to the local high ground. The lower part of Gib Lane has housing on both sides whilst the upper half is undeveloped. There is a filter drain partway along its length, approximately 200m, within the verge on the eastern side of the lane catching the ground and surface water from the high ground to the east. This filter drain also collects run-off directly from the highway and via a small number of gullies. The filter drain discharges into an old 400x400mm stone culvert before crossing the road diagonally, entering the site and continuing towards the open watercourse in Cockridge Wood.
2. The drain which issues on the southern boundary of Cockridge Wood through a 450x450 old stone square culvert, flows north in an open watercourse, through the wood. The flow is increased by two visible tributaries from the east, within the wood, most likely from the land drains which serve the improved ground to the south. On exiting the wood on the northern boundary the ordinary watercourse enters a 500x500mm stone box culvert with a head wall and trash screen.
3. From the headwall the Ordinary Watercourse again flows north and has a short open section whereby it exits an open Ø600mm culvert, into a formal stone channel, before entering a large twinwall plastic pipe, the size of which was unclear due to the quantity of leaves caught by a trash screen.
4. Following the line path the piped watercourse takes downhill, it crosses the line of a large water main that can be observed by the Water Main Valve Chambers constructed from engineering brickwork; it was unknown whether it passes above or below the water main. Further downstream there is a concrete slab followed by a stone slab on what appears to be the line these may be sealed chambers (possibly draw off points for private water supplies) it continues towards the housing on Livesey Branch Road (LBR). The houses have a bund behind them to limit overland flow entering the properties but there wasn't any observable means of draining water that may be trapped in the field by the bund. United Utilities sewer plans show the watercourse flowing under the houses off Livesey Branch Road in a 450mm pipe and on, eventually discharging into the Main River Darwen in Witton Country Park.
5. To the south of the filter drain in Gib Lane there is a small wooded hollow to the east of the lane, the runoff from this woodland appears to be collected and piped across the lane. Discharge from this hollow enters the plot and flows into a buried old iron bath trough through a small (100mm) pipe. It then overflows into a square stone drain which enters a land drainage system and flows towards an old stone trough which in turn over flows into another drain prior to entering a ditch that runs towards the open watercourse in Cockridge Wood.

6. The fields to the south-east of the area are at the site's topographic high, show evidence of improved ground due to an extensive network of square stone land drains serving the area the lines can now been observed as regular wet depressions have occurred around the open joints. Possible drainage layout shown on the plan has been described via the use of on-site observations and satellite imagery.
7. Two of these collector land drains appears to flow towards Green Hills Wood where several shallow ditches can been seen, some of which contained water on the day of the site visit. The ditches within the wooded area flow towards the boundary wall on Broken Stone Road where they pond before flowing through the wall this has created a large marshy area within the Green Hills Wood area. The boundary wall separates the site from Broken Stone Road which is drained by means of kerbs and gullies. Besides the gullies there was no other iron works in the road and there was evidence of course drain-stone beneath the grass verge on the north side of the road so it is a reasonable assumption that there is a drain within the verge. There was no formal connection from the ditches to the drain in the road observed at the time. It is possible that historically this water crossed the road to discharge into Stockclough Brook via Potter's Plantation but may now be picked up via the verge drainage or via percolation under or through the wall before entering the highway drainage.
8. Cockridge Wood is split into two, east and west. The east contains the mapped ordinary watercourse described above. The western part has a ditch along its northern boundary that collects flows from the woodland from overland flows and land drains. The land either side of the ditch is marshy which is probably due to the lack of maintenance of the outfalls from this collector ditch. Within the field to the north of the collector ditch there are a number of old water tanks that have stone sough drains leading to them from the direction of the ditch. These were possibly private water supplies to the properties on Livesey Branch Road the tanks are 2x2m and 3.5x3.5m respectively, and were full of water. It is likely these tanks had overflows that continue northwards to connect to the drains that cross Livesey Branch Road. Excess water from the ditch has soaked into the ground at either side causing the ground to become marshy.
9. To the east of the Witton Way in the field behind the houses on Livesey Branch Road numbers 451 – 427 a ditch has been excavated to intercept any overland flows from the above ditch and land drains. The field boundary ditch falls to the east into a Ø225mm pipe with a trash screen which is assumed to combine with the known ordinary watercourse in the 450Ømm pipe that runs beneath number 425. Although it wasn't observed there was a splashing sound similar to water dropping down.
10. There were four Water Main Valve Chambers (shown on the plan), crossing the site and of similar construction and on the line of the Water Main Records obtained from United Utilities.
11. South and west of the western section of Cockridge Wood is more marsh land that follows the western field boundary to the woods at the downstream end of the marshland there is a culverted drain that discharges into the ditch on the northern boundary of the woods.

Upstream of this and south of the woods there is a chamber sealed with a concrete slab, this may have been a collection chamber from the land drains crossing the improved fields to the south and possibly feeding the above culverted drain. We could not access the chamber to confirm this.

12. To the west of the chamber there is a field boundary that runs to the northwest, adjacent to this boundary there runs a shallow open ditch that runs through some marshy ground downstream of this ditch there is a pipe running along the wall side at one point water issues from the ground and soaks into the adjacent ground above the old quarry. Further downstream the pipe discharges into an open watercourse after it crosses beneath the Witton Way in a 450mm pipe. The watercourse continues to the northwest along a field boundary until behind number 523 LBR it turns slightly to the west prior to entering a 300mm Ø pipe with a trash screen that continues the watercourse between the houses on LBR.
13. Adjacent to the outfall there is a marshy area behind numbers 527 to 531b that ponds behind a number of the houses there is no observable outfall although there appears to be a ditch behind 531b. A local resident said that when the water builds up it issues within the garden of number 529a, there were some plastic pipes laid on the ground behind number 529 which the resident said he had cleaned out in an attempt to remove the water. There is a note on the local authority records relating to surface water flooding-deteriorating minor culverts.
14. The Ø300mm culvert mentioned in point 12. Takes water from the watercourse flowing north-west and into a surface water system on Livesey Branch Road. According to United Utilities Sewer Records the system turns north onto Langdale Road in a Ø450mm pipe and finally north-east onto Langdale Close where the increased diameter pipe (first to Ø600mm and then Ø825mm) ends at a headwall structure. There is an overflow from the Canal that appears to drop into some form of culverted watercourse heading northeast beneath the canal or into the combined drain.
15. Adjacent to the Horden Farm buildings is the site of an old sandstone quarry. Between the farm buildings and the quarry is a mains fed water trough along the fence line. It appears that the surface water from the former farm buildings is discharged from a couple of land drains into a pond/marshy area and trough to the south of the buildings which seems to drain in a south westerly direction through a land drain and outfall into another land drain running parallel to Hordon Rake at about 10m from the field boundary both are marked by straight lines of marsh grass.
16. There is a trough on the junction at the entrance to the Horden Farm residential buildings and one in the field to the east of the Horden Farm track these appear to be fed by land drains. Across the access junction there are a number of gullies and a linear drainage channel that appear to feed the overflow water into the roadside drainage.

17. At the western point of the site there is significant ponded area and dense marshland. This is due to the general topography of the area which means that a large area drains to this topographic low point. There are two outfalls above ground taking excess water away from this area. The most southern one was of a reasonable size but exact dimensions could not be determined and it most likely connects into the watercourse which appears to be piped along Horden Rake, according to Blackburn with Darwen Borough Council's Drainage investigations. The other outfall located to the north was a small Ø 100mm size but is more likely to be a resident installed pipe connected directly to a sewer.
18. A verge drain which runs, (piped) along Horden Rake on the plans provided by Blackburn with Darwen Borough Council's Drainage Engineers. These plans then show it joins a piped watercourse shown on the United Utilities sewer records at the entrance to Horden View. The exact route of the watercourse is not visible beneath St. Michael's Close but it issues in the garden of number 782 LBR prior to being culverted adjacent to LBR to cross beneath the Leeds and Liverpool Canal as shown on the plan. It is not clear whether the watercourse connects into the pond to the west of the canal or whether it passes beneath it entirely but it discharges via a 1200mm Ø pipe.
19. The routes of many of the watercourses from the plot have become obscured following the housing development either side of Livesey Branch Road over the last 100 years or have been incorporated into the public drainage system. The form and extent of the field drainage system implies that historically the plots were improved from boggy pasture which in the subsequent years has deteriorated through limited maintenance. It is unclear whether a fully maintained land drainage system would have caused capacity problems downstream by allowing storm flows to be drained quicker or by having an improved land drainage system there would be more opportunity to soak up rainfall, although the superficial geology is a glacial till which implies there would be little absorbency on the surface.
20. Holden Farm has permission to discharge foul sewerage to a soakaway.



Photograph 1 (facing S):
View of roadside filter drain on Gib Lane falling north intercepting road and hillside runoff to the east of the plot.



Photograph 2 (facing N):
Entrance to culvert that appears to cross Gib Lane towards watercourse in east Cockridge Woods, connecting verge drains and gullies.



Photograph 3 (facing NW):
Gully on Gib Lane likely to connect to culvert crossing the lane to cross the plot.



Photograph 4 (facing E):
Valve chamber on water main crossing the site.



Photograph 5 (facing NW):
Watercourse downstream of crossing of the Witton Weavers Way.



Photograph 6: (facing S)
Upper end of watercourse as above fed by land drains.



Photograph 7 (facing E):
Sealed chamber near
watercourse above.



Photograph 8 (facing SW):
Line of depressions
showing path of land drain
heading towards Green
Hills Wood. Rectangular
stone conduits
approximately 100mm
below grass surface.



Photograph 9 (facing W):
Typical ditch running
through Green Hills Wood
falling towards Broken
Stone Road.



Photograph 10 (facing NW):

Water from ditches ponding adjacent to the boundary wall with Broken Stone Wall in Greenhills Wood.



Photograph 11 (facing S):

Gully grating in Broken Stone Road.



Photograph 12 (facing E):

Hollow east of Gib Lane that appears to catch the water being fed to a trough inside the plot south of the eastern section of Cockridge Wood. The excess entering the filter drain shown in picture 1.



Photograph 13 (facing E):

Trough fed from hollow above, small plastic pipe inflow, stone conduit for overflow to land drainage system. Flanged DI pipe from south was dry.



Photograph 14 (facing W):

Second trough in adjacent field fed by land drains south of Cockridge Woods. Overflow heads north to the ditches leading to the open watercourse within the woods.



Photograph 15 (facing E):

Outlet from land drainage downstream of above trough fed by land drains south of Cockridge Woods. Outlet leads to a ditch that outfalls to the main watercourse through the wood.



Photograph 16 (facing NW):

Land drain depressions leading towards Cockridge Woods.



Photograph 17 (facing S):

Assumed outlet from culvert crossing Gib Lane discharging into open watercourse at south end of Cockridge Woods.



Photograph 18 (facing S):

Open watercourse within Cockridge Woods flowing northwards.



Photograph 19 (facing S):

Open section of the watercourse leaving the north end of Cockridge Woods.



Photograph 20 (facing N):

Blocked trash screen at downstream end of the channel shown above.



Photograph 21 (facing N):

Stone slabs sealing chambers on line or just offline of the watercourse north of Cockridge Woods. Possible private water supply.



Photograph 22 (facing E):

225mm outfall from intercepting ditch behind housing 451 to 427 Livesey Branch Road that appears to connect into the 450mm piped watercourse.



Photograph 23 (facing W):

Intercepting ditch behind housing 451 to 427 Livesey Branch Road. Outfalls via 225mm plastic pipe that appear to connect into the 450mm piped watercourse.



Photograph 24 (facing W):

Marshy/Pond area behind housing in western corner of the site behind St Michael's Close.



Photograph 54 (facing N):
Overflow from Marshy/Pond area behind housing towards western corner of the site behind St Michael's Close.



Photograph 26 (facing N):
Small Resident/Builder constructed overflow, located towards Marshy/Pond area behind housing in western corner of the site behind St Michael's Close.



Photograph 27 (facing N):
Small outlet from ditch behind 531b Livesey Branch Road.



Photograph 28 (facing W):

Ditch behind 529 to 531b Livesey Branch Road. To collect water from marshy area possible outfall behind 531b.



Photograph 29 (facing W):

300mm outlet from watercourse shown in photos 5 & 6 behind 527 Livesey Branch Road. Connects to UU SW sewer in the road, runs between 527 and 529a.



Photograph 30 (facing W):

Connecting ditch leading to the 300mm outlet above from the watercourse.



Photograph 31 (facing N):

Marshy area at the north end of Cockridge Woods western section.



Photograph 32 (facing N):

Outfall from piped drain discharging towards the ditch surrounding the north end of Cockridge Wood western section.



Photograph 33 (facing N):

The ditch surrounding the north end of Cockridge Wood western section.



Photograph 34 (facing N):

Water Tank to the north of Cockridge Wood western section. Possibly old private water supply to properties off Livesey Branch Road.



Photograph 35 (facing E):

Water crossing pavement on St Michael's Close, adjacent to number 19. Source not determined.



Photograph 36 (facing E):

Waterlogged area south of Horden Farm containing trough and a number of outlets from the building area.



Photograph 37 (facing SE):

Naturally fed water trough at the entrance to Horden Farm off Horden Rake with gullies and linear drainage catching overflow and carriageway runoff and discharging to the verge drainage.



Photograph 38 (facing NW):

Line of marsh grass running parallel to Horden Rake possibly indicating the line of land drainage leading to the western corner of the site.



Photograph 39 (facing NW):

Outfall of buried and culverted watercourse draining western corner of the plot. Located to the west of the Canal after flowing through diversion running along the northern side of Livesey Branch Road.

Residents Photographs



Photograph 1 (facing W):

View of plot immediately to the rear of Livesey Branch Road showing build-up of surface water adjacent to easternmost residential properties.



Photograph 2 (facing S):

Surface Water running over field towards above area.



Photograph 3
(facing S):
As above.



Photograph 4
(facing E):
View of plot immediately to the rear of Livesey Branch Road showing build-up of surface water adjacent to easternmost residential properties.



**Photograph 5
(facing S):**
Water entering
culverted
watercourse
near the rear of
419 Livesey
Branch Road.



**Photograph 6
(facing S):**
Surface Water
running over
field towards
above area.



**Photograph 7
(facing S):**
Surface Water
running over
field towards
above area.

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