West House, Oxford Road, Gomersal

Flood Risk Summary & Drainage Strategy

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Empire Real Estate Development Ltd

AMA Project Number: 21124

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1 INTRODUCTION

1.1.1 This Flood Risk Summary (FRS) and Drainage Strategy (DS) has been provided at the request of Empire Real Estate Development Ltd, hereafter referred to as "the client", to assess the flood risks associated with the proposed development of West House, Oxford Road, Gomersal, Cleckheaton, hereafter referred to as "the site".

1.1.2 The purpose of this FRS and DS is to:

- Identify the possible hazards posed from all major sources of flooding (fluvial, surface water, groundwater, infrastructural and coastal sources);
- Provide a qualitative assessment of the probability of each potential flood hazard representing a constraint on the proposed development, based on the proposed land use type for the development and likelihood of flood occurrence;
- Investigate and define any potential drainage impacts associated with the site;
- Determine and define necessary surface water management controls to ensure no exacerbation of flood risk on the site or to external receptors due to any increase in surface water runoff; and
- Recommend appropriate and necessary mitigation measures and additional assessments that may be required to progress the sustainable development of the site.

1.1.3 The FRS and DS comprises the following:

- A desktop review of publicly available information, including information from the Environment Agency (EA) and Kirklees Council who are the Lead Local Flood Authority (LLFA) for the proposed development area; and
- An assessment and outline design of hydraulic controls and drainage requirements and drainage elements required to support the development of the site.

1.1.4 This report further details the methodologies employed within this study and provides recommendations as to any further work or investigations required to support the development of the site through the planning application process.

1.2 REGULATORY POLICY AND LEGISLATION

1.2.1 This assessment has been carried out in line with the current Government legislation, the National Planning Policy Framework (NPPF) 2024.

1.2.2 It has been assessed with reference to the following documents and legislative guidelines:

- CIRIA 753 The SUDS Manual V8 (2018);
- DEFRA "Flood Risk Assessment Guidance for New Developments" (2006);
- DEFRA "Surface Water Management Plan Technical Guidance" (2010);
- BS 8533 2017 Assessing & Managing Flood Risk in Development Code of Practice (2017);
- BS 8582:2013 Code of practice for surface water management for development Sites (2013);
- National Planning Practice Guidance (2012 – updated 2022);
- C624 Development and Flood Risk – Guidance for the Construction Industry' (2004);
- Sewage Sector Guidance (2022);
- Planning Policy Guidance – Flood Risk and Climate Change (2014 – updated 2022).

1.2.3 In addition to the above, this report has also been informed by the following documents:

- Kirklees Local Plan Strategy and Policies 2019
- Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume 1
- Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume 2

1.3 SCOPE OF FLOOD RISK SUMMARY

1.3.1 The objective of this analysis and report is to provide an FRS in accordance with local and national guidance.

1.3.2 The detail and complexity of the FRS will reflect the level of risk to the site and consider the appropriateness of the proposed development type. This will also include assessment of potential risk to property and livelihoods, consideration of climate change, and the definition of appropriate flood risk mitigations required to satisfy the planning process.

1.3.3 Based on the assessment of requirements for a site-specific FRS as defined within NPPF 2024 technical guidance, the site is indicated as being located within Flood Zone 1, therefore it is necessary to provide a site-specific FRS. Flood Zone 1 refers to an area assessed as having less than a 1 in 1,000 annual probability (<0.1%) of river or sea flooding in any one year.

1.3.4 Similarly, as the site is indicatively located in an area that may be subject to other assessable sources of flooding, such as pluvial (surface water) flooding, it is necessary to undertake a further site-specific assessment to verify the proposals for development.

1.3.5 Policy LP27 of the Kirklees Local Plan states that all future development must ensure that:

- Proposals for development which require a Sequential Test in accordance with national planning guidance will need to demonstrate that development has been directed to areas at the lowest probability of flooding, following a sequential risk based approach. The whole Kirklees district should be the starting point for the sequential test with applicants required to provide justification where a smaller area of search is proposed. If following application of the sequential test, there are no reasonably available sites which could accommodate the development in zones with a lower probability of flooding, it should also be demonstrated that a sequential approach has been applied within site. This is to ensure that highly vulnerable and more vulnerable uses are directed towards the areas of lowest flood risk within the site. Proposals will also need to demonstrate that the exception test is passed, where applicable, as set out in national planning policy.
- Proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but with all of the following additional restrictions:
    - a. no new highly vulnerable or more vulnerable uses will be permitted;
    - b. less vulnerable uses may only be permitted provided that the sequential test has been passed and;
        - i. where extensions are linked operationally to an existing business or,
        - ii. where redevelopment of a site provides buildings with the same or a smaller footprint;
    - c. all proposals will be expected to include flood mitigation measures such as compensatory storage which should be identified and considered through a site specific Flood Risk Assessment;
    - d. development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role.
- Proposals must be supported by an appropriate site specific Flood Risk Assessment in line with national planning policy. This must take account of all sources of flooding set out in the Strategic Flood Risk Assessment and demonstrate that the proposal will be safe throughout the lifetime of the development (taking account of climate change). The proposal must also not increase flood risk elsewhere and where possible should reduce flood risk. Mitigation measures, where necessary, should be proposed.
- Proposals involving building over existing culverts or the culverting or canalisation of water courses will not be permitted unless it can be demonstrated to be in the interests of public safety or to provide essential infrastructure and that there will be no detrimental effect on flood risk and biodiversity. Where feasible, development proposals should incorporate re-

opening of culverts, modification of canalised water courses and consideration of mitigation measures to achieve a more natural and maintainable state.

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

1.3.6 Potential flood risk at the site has been assessed against the site layout plan, which has been provided as **Appendix A** to this report. Significant changes to the site's developable area may necessitate a further review of this document to ensure that risk of flooding is not exacerbated and has been satisfactorily addressed within the development proposal.

1.4 SCOPE OF DRAINAGE STRATEGY

1.4.1 Surface water runoff must be effectively managed to ensure that there is no exacerbation of potential surface water flooding issues on the site, or at any external receptors, due to any potential increases in surface water runoff rates and volumes.

1.4.2 The drainage hierarchy will be applied in determining the most suitable type and point of discharge of surface waters runoff from impermeable areas on the site. This will ensure that surface water is sustainably managed on the site, and that there is no exacerbation of flood risk elsewhere as a result of undertaking the development. This will be undertaken in accordance with industry best practice principles and guidance, such as the C753 SUDS Manual (2016), Design and Construction Guidance for Sewage Sector (DCGSS) (2020) and applicable sections of the Planning Policy Guidance (PPG).

1.4.3 Any increase in surface water runoff rate associated with the development of the site must also be managed in accordance with the guidelines set by LPA, the LLFA for the area.

1.4.4 As indicated in Policy LP28 of the Kirklees Local Plan, surface water run-off from the site must adhere to the following:

- The presumption is that Sustainable Drainage Systems (SuDS) will be used to assist in achieving the following on each site:
    - a. for proposals on greenfield sites, typical greenfield run-off rates should not be exceeded;
    - b. for proposals on brownfield sites there should be a minimum 30% reduction in surface water run-off where previous positive surface water connections from the site can be proven. New connections will be subject to at least greenfield restrictions;
    - c. No negative impact on local water quality and improvements in water quality where practicable;
    - d. Consider whether proposed open spaces and green infrastructure within sites can contribute to the sustainable drainage of the site.
- Local conditions including the existence of critical drainage areas may require a lower run-off rate to be agreed to reflect volume control, local surface water risks, water course capacity and flood risk further downstream.
- There will be a general presumption against pumping surface water. It must also be demonstrated that the surface water management solution is designed to meet requirements over the lifetime of the development including evidence that management and maintenance arrangements have been secured to cover that period. This includes ensuring proposals to store water meet national standards and latest best practice.
- Flow paths accommodating water from outside the site or due to an exceedance event should be designed to avoid buildings and curtilages.
- Development will only be permitted if it can be demonstrated that the water supply and waste water infrastructure required is available or can be co-ordinated to meet the demand generated by the new development.

1.4.5 The DS will identify potential opportunities and locations for attenuation infrastructure, as well as potential connection points and provide calculations of permissible discharge rates for runoff generated on site.

1.4.6 The DS therefore aims to provide surety that any drainage provided as part of the project development can safely and appropriately convey all flows from the site to appropriate discharge locations. This is to ensure sustainable and safe operation within the site, as well as ensuring sustainable operation of any receiving infrastructure. These assessments have been undertaken in accordance with prescribed best practice and building codes, including prioritising the incorporation of SuDS, where appropriate and practicable for the management of surface water.

1.4.7 Following the completion of a final site masterplan the drainage scheme proposed within this report should be reassessed to ensure surface water runoff and foul water drainage can be appropriately managed in accordance with best practise and local and national standard requirements.

2 METHODOLOGY

2.1 INTRODUCTION

2.1.1 This report aims to demonstrate that the proposed development is sustainable and will not be impacted by or exacerbate flood risk elsewhere through the development of the site. This assessment will account for the effects of climate change, as well as identifying further opportunities to reduce the probability and consequences of flooding within the site locality.

2.1.2 This report aims to identify constraints and opportunities for the site based on the development proposals provided by the client (**Appendix A**) and provide recommendations for the sustainable provision of drainage and mitigation of any potential flood risk for the site.

2.1.3 The assessment methodology is as follows:

- Desktop review of the geology, hydrology, and other pertinent environmental characteristics of the site, and how these affect flood risk of the proposed development and site drainage.
- Obtain and review existing baseline flood risk and drainage guidance information from relevant environmental authorities (EA, LLFA, etc.) as to site specific flood risk from all applicable sources.
- Review the findings from the above and advise on the suitability of developing the site for the proposed development in consideration of the applicable flood risk and comment on limitations and opportunities for the site, with recommendations of further mitigation where applicable and appropriate
- Produce design calculations for the DS to determine the requirements for developing the site's surface water drainage and providing adequate storage in line with local planning policy and guidance. This will include the presentation of drawings with a layout for any additional drainage and attenuation infrastructure located on the site.
- Review the findings from the above and advise on the suitability of developing the site for the proposed development in consideration of the applicable flood risk and drainage and comment on limitations and opportunities for the site, with recommendations of further mitigation where applicable and appropriate.

3 PROJECT BACKGROUND

3.1 DEVELOPMENT DESCRIPTION AND LOCATION

3.1.1 Andrew Moseley Associates (AMA) was appointed by Empire Real Estate Development Ltd to provide a Flood Risk Summary and Drainage Strategy in support of a residential development, located at West House, Oxford Road, Swincliffe, Gomersal, Kirklees, West Yorkshire, BD19 4JZ at NGR: SE 20453 26901.

3.1.2 The proposed development is located in the area of Gomersal, approximately 4.5 miles southeast of Bradford. Proposals for the site are for residential use, consisting of nine residential dwellings, with associated hardstanding, landscaping, and infrastructure. A site layout can be found in **Appendix A**.

3.1.3 The Local Planning Authority for this development is Kirklees Council, who are also the Lead Local Flood Authority for the area.

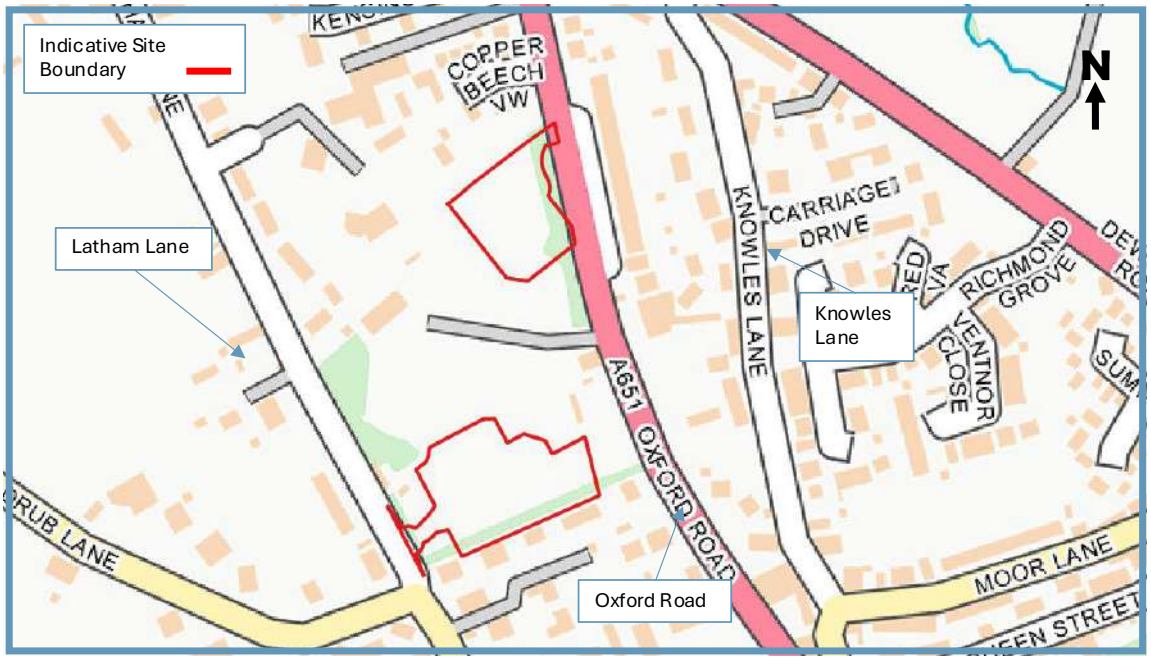
3.1.4 This report has been prepared in accordance with the National Planning Policy Framework (NPPF) and the accompanying technical guidance to assess all forms of flooding including the management of surface water on-site.

3.1.5 The site is referenced in **Table 3-1** and **Figure 3-1** below.

Table 3-1 Site Context

Site Name	West House, Oxford Road
Location	Gomersal, Cleckheaton
NGR (approx..)	SE 20453 26901
Application Site Area (ha)	1.02
General Locality	The site is located on undeveloped greenfield land and borders residential development to the north, east, south and west. Pedestrian and vehicular access to the site is provided via Oxford Road, which is located along the eastern boundary of the site.
Development Type	Residential
EA Flood Zone	Flood Zone 1
Local Planning Authority	Kirklees Council

Figure 3-1 Site Location Plan



3.2 TOPOGRAPHY

3.2.1 A topographic survey provided by the client shows ground levels at the site are shown to be in the region of 141.7 to 155 m Above Ordnance Datum (m AOD). The topographic survey can be seen in **Appendix B**.

3.2.2 Further review of topographical data shows site levels to be lowest in the northeast of the site, while greatest levels are located in the west of the site. A general fall in gradient from west to east is observed across the site. Additionally, the topographic survey includes details of existing manholes and drainage infrastructure surrounding the existing buildings located in the northwest of the site.

3.2.3 As indicated by aerial imagery, the previously developed site consists of areas of hardstanding which make up approximately 5% of the site, with the remainder consisting of grassland consisting of light to medium vegetation.

3.3 GEOLOGY AND GROUND CONDITIONS

3.3.1 British Geological Survey (BGS) Open Geoscience website indicates that the entire site is underlain by Lepton Edge Rock – Sandstone, with no overlying superficial deposits.

3.3.2 The BGS website information indicates that there are no borehole records within close proximity to the site.

3.3.3 Information obtained from the Cranfield University's Soilscape website indicates that the west of the site is located in an area classified as being Soilscape 17, which is defined as having slowly permeable seasonally wet acid loamy and clayey soils. The east of the site is located in an area classified as being Soilscape 6, which is defined as having freely draining slightly acid loamy soils.

3.4 HYDROGEOLOGY

3.4.1 According to the Department for Environment, Food and Rural Affairs (DEFRA) MAGIC map, the site is indicated as not being in a Groundwater Source Protection Zone (SPZ), as defined by the Environment Agency for the protection of a potable groundwater supply.

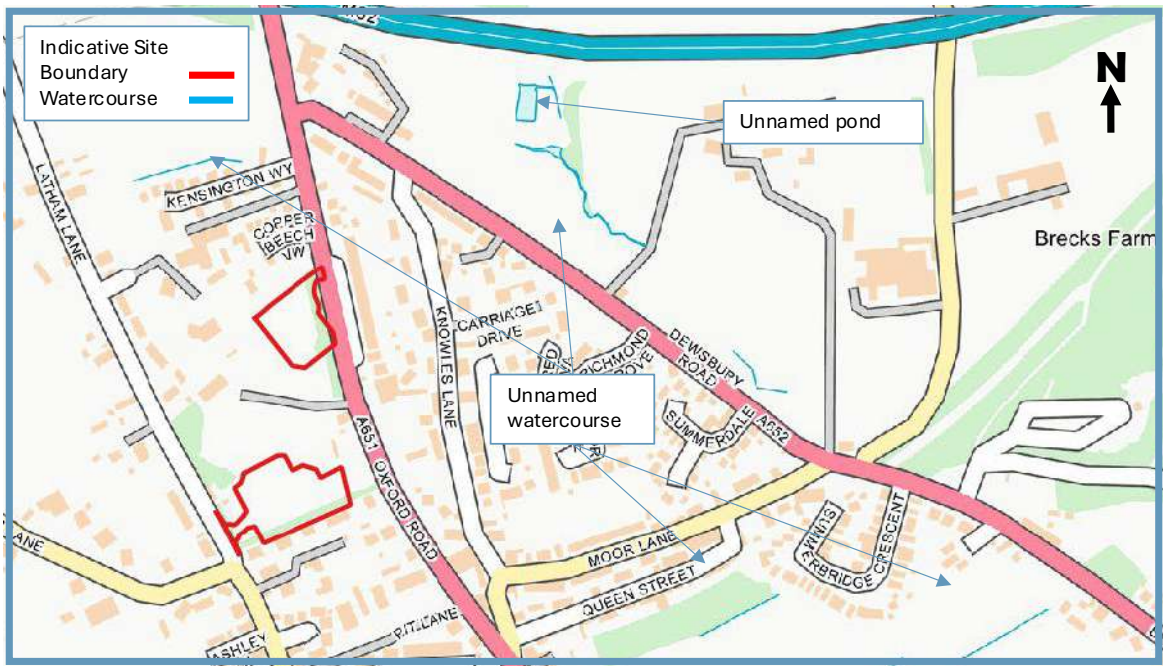
3.4.2 The site is located as being in an area of medium groundwater vulnerability and located above a Secondary A bedrock aquifer.

3.5 HYDROLOGY

3.5.1 There are a number of unnamed watercourses located within the vicinity of the site which all flow generally in a southeast direction. There is also an unnamed pond located to the north of the site.

3.5.2 The EA's Catchment Data Explorer website indicates that the site resides within the Calder Lower operational catchment and the Batley Beck from Source to River Calder sub catchment.

Figure 3-2 Watercourse Location



4 POTENTIAL FLOOD RISK

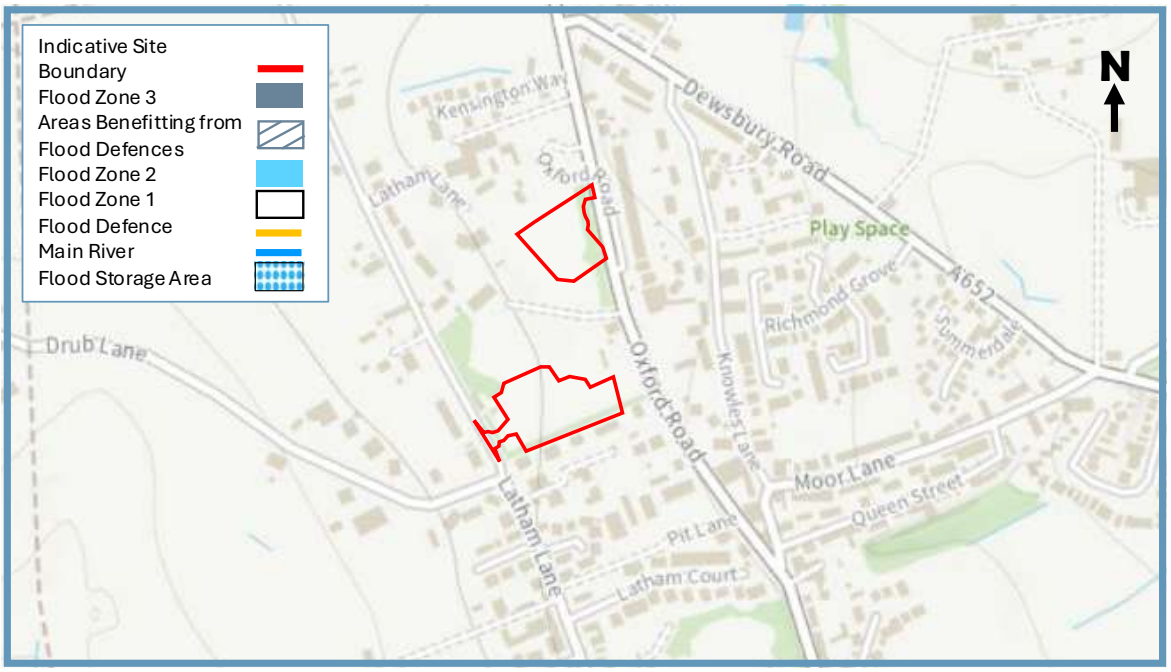
4.1 SOURCES OF FLOODING

4.1.1 This report is to consider flood risk from all potential sources. **Section 5** then discusses in further detail the probability of flooding, any potential impacts and necessary mitigation, where required.

4.2 ENVIRONMENT AGENCY FLOOD ZONES

4.2.1 The EA Flood Map for Planning shows the site is located within Flood Zone 1, which is designated as land having less than a 1 in 1,000 annual probability of river or sea flooding. This potential fluvial/coastal flood risk to the site has been illustrated in **Figure 4-1**.

Figure 4-1 Environment Agency Long Term Flood Map for Planning

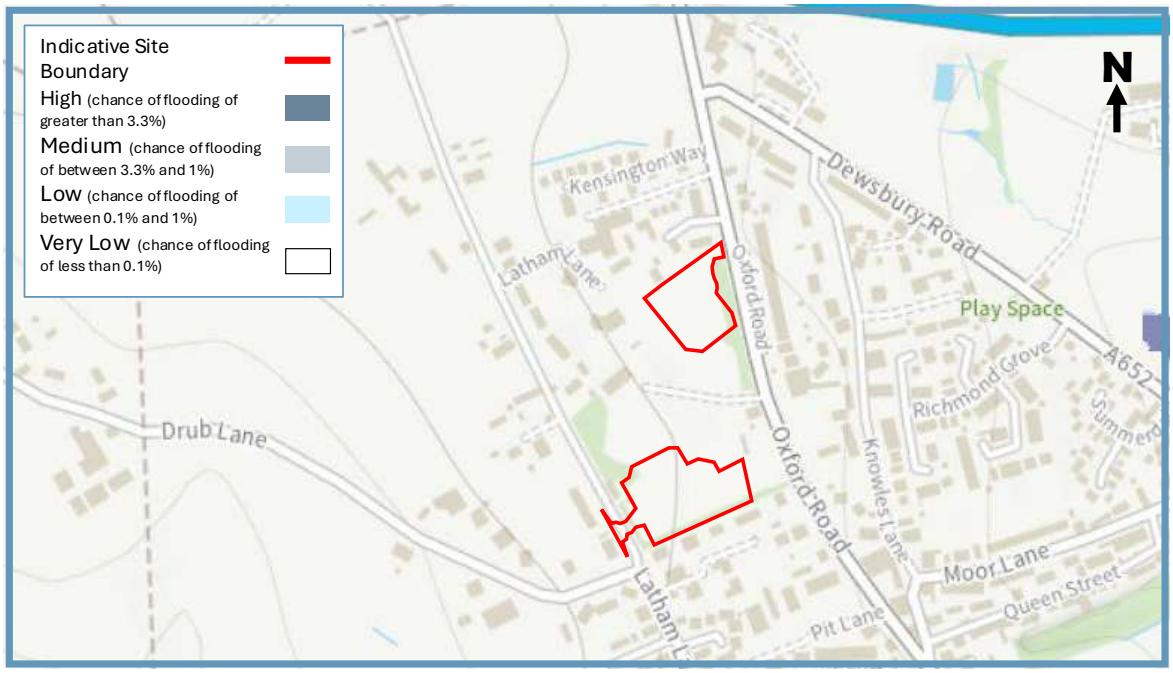


4.3 FLUVIAL AND COASTAL FLOODING

4.3.1 It is necessary to consider the risk of fluvial and coastal flooding at the site during both present times and with the impacts of climate change. Therefore, the EA Long Term Flood Risk Map for fluvial and coastal flooding between the years 2036 and 2069 has been presented below in **Figure 4-2**. This figure indicates that the site is at very low risk of fluvial and/or coastal flooding.

4.3.2 As the site is located approximately 55 miles from the nearest coastline, the site is not considered to be at risk of coastal flooding.

Figure 4-2 Environment Agency Long Term Flood Map – Rivers and Sea – Yearly Chance of Flooding between 2036 and 2069



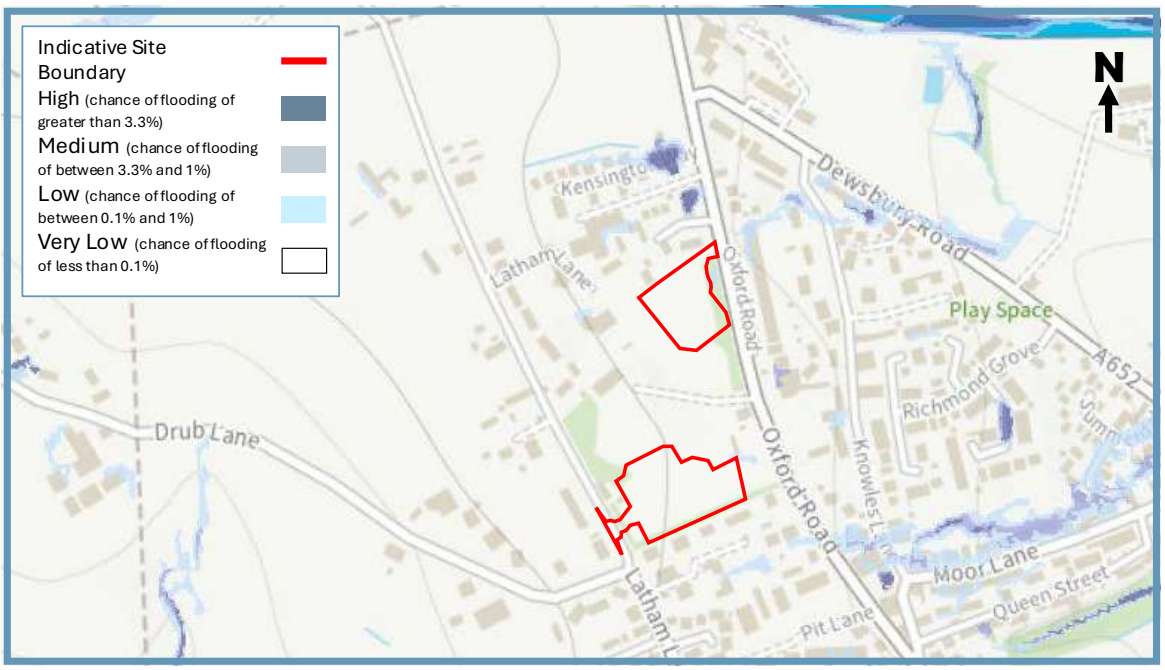
4.4 PLUVIAL (SURFACE WATER) FLOODING

4.4.1 Similarly to that discussed in **Section 4.3**, the impacts of climate change on the potential for surface water flooding should be considered within the assessment of the flood risk at the site. The EA Long Term Flood Risk Map for surface water flooding between the years 2040 and 2060 is shown below in **Figure 4-3**. This figure shows that the site is located within an area at very low risk of surface water flooding.

4.4.2 As the proposed development of the site may potentially reduce the overall site permeability and potentially increase surface water run-off rates and volumes, the surface water discharge controls must ensure that any proposal for drainage, or discharge, does not adversely impact upon downstream drainage infrastructure or offsite receptors.

4.4.3 The site is therefore considered to have very low potential risk of flooding from pluvial sources.

Figure 4-3 Environment Agency Long Term Flood Risk Map – Pluvial (Surface Water) Flooding – Yearly Chance of Flooding between 2040 and 2060



4.5 GROUNDWATER FLOODING

4.5.1 Ground conditions in the west of the site consist of slowly permeable seasonally wet acid loamy and clayey soils. Ground conditions in the east of the site consist of freely draining slightly acid loamy soils. Therefore, the propensity for groundwater emergence at the site is considered to be low, and the potential risk of groundwater emergence affecting the site development is considered to be low.

4.5.2 Given the impermeable nature of the proposed site's hardstanding areas subsequent to development, potential elevation of groundwater or groundwater emergence within the superficial geology causing flooding within the site post-development will be largely eliminated.

4.5.3 According to the Calder Catchment Level 2 SFRA areas susceptible to groundwater flooding map presented in **Appendix C**, the site is located in an area that is less than 25% susceptible to groundwater flooding.

4.5.4 During long periods of heavy rainfall, the water table within an area can rise above the natural ground level, resulting in groundwater flooding.

4.5.5 Site specific investigations should be able to prove the presence of ground water and propose remedial mitigation where required. Flood risk to the proposed development due to groundwater emergence is therefore considered to be low.

4.5.6 Flood risk to the proposed development due to groundwater emergence is considered to be low provided that all reasonable and practicable mitigation measures for any subsurface construction associated with the development are adhered to.

4.6 FLOODING FROM ARTIFICIAL SOURCES

4.6.1 In accordance with information taken from the EA Long Term Flood Risk information, the site and its surroundings are unlikely to experience flooding from artificial sources such as dam or canal failure. In addition, reservoirs and canals are regularly maintained by relevant local authorities and failure is extremely unlikely. Therefore, the potential risk of flooding from reservoir and/or canal failure is considered to be negligible.

4.7 FLOODING FROM SEWERS

4.7.1 The site currently contains existing buildings and as such has existing drainage, as evidenced through the topographic survey. There is no evidence within the Calder Catchment Level 2 SFRA that there has been any sewer flooding historically within the vicinity of the site.

4.7.2 The site is therefore considered to have low potential risk of flooding from sewer flooding.

4.8 HISTORIC FLOODING

4.8.1 The EA historic flood map shows the site to not have experienced historic flooding.

4.8.2 A review of the Calder Catchment Level 2 SFRA confirms the EA historic flood mapping and indicates that the site has not experienced any historic flooding.

5 CONCLUSION

5.1.1 In light of this assessment against the sites applicable flood zone (Flood Zone 1), further assessment against the sequential or exception test is not required.

5.1.2 Table 5-1 summarises the pre mitigation flood risk associated with the site as well as the impacts of the flood risk on the wider catchment prior to mitigation. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within Section 3.

Table 5-1 Pre-Mitigation Flood Risk Summary

Sources	Probability of Flood Risk	Impacts	Description
Tidal	N/A	N/A	The site is located inland and therefore, is not tidally influenced.
Fluvial	Very Low	Very Low	The site is not shown to be located in an area susceptible to fluvial flooding.
Surface Water (Pluvial)	Very Low	Very Low	The site is not shown to be located in an area susceptible to surface water flooding.
Groundwater	Low	Low	Groundwater flood risk is considered to be low.
Artificial Sources	Very Low	Very Low	Review of information from multiple sources (EA, LLFA) reveals no evidence of flooding from reservoirs or canals.
Sewers	Low	Low	The risk of flooding from the surcharging of sewers is considered to be low.
Effect of development on wider catchment	Low	Low	The impermeable area of the site is being altered.

5.1.3 Based on the assessable information presented, the site is considered to meet the requirements of the NPPF, given the assessed potential flood risk posed from all applicable sources, the means of adopting suitable mitigation measures to prevent increase in the potential for flood risk and based on the vulnerability of the development type. Further consideration of necessary surface water run-off mitigation measures will be provided, so as to address the potential for increase of surface water arising from the proposed development of the site.

6 FLOOD RISK MITIGATION

6.1 INTRODUCTION

6.1.1 Section 4 has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be considered within the proposed development detail design to address and reduce the risk of flooding to within acceptable levels.

6.2 EFFECT OF DEVELOPMENT ON WIDER CATCHMENT

Development Drainage

6.2.1 The majority of the current site is considered to be greenfield, with some existing buildings in the northwest of the site. The amount of impermeable area will be altered. Therefore, the existing drainage systems will not be suitable to discharge the surface water from the site alongside the additional run-off from the proposed development. A sufficient drainage strategy will be therefore provided by AMA.

6.3 SITE ARRANGEMENTS

Sequential Arrangement

6.3.1 The Flood Zone mapping shows the site to be located within Flood Zone 1. Therefore, a Sequential Test has not been completed for this site.

Finished Floor Levels

6.3.2 Given the site's location within Flood Zone 1, there are no specific requirements for finished floor levels with regard to flood risk. However, it is recommended that an FFL of 0.15m is set for the proposed development.

7 FOUL WATER DRAINAGE

7.1 INTRODUCTION

7.1.1 It is proposed to install a new foul drainage system to serve the proposed residential development.

7.1.2 The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN:752 'Drainage and Sewer Systems Outside Buildings', the Local Authority Building Control specifications and requirements, Sewers for Adoption 8th Edition and the Civil Engineering Specification for the Water Industry.

7.2 EXISTING SEWERS

7.2.1 AMA attained a Yorkshire Water pre-development enquiry which can be seen in **Appendix D**. They state no information regarding the existence of public sewers within the site boundary.

7.2.2 As the site contains existing buildings, and as evidenced in the topographic survey of the site, there is existing drainage located within the site which could be utilised within the drainage strategy for the proposed development. A CCTV drainage survey should be undertaken of the site to confirm the nature and outfall of the existing drainage.

7.3 FOUL WATER DISCHARGE RATES

7.3.1 The estimate design Dry Weather Flow (DWF) generated by the proposed development, based on a gravity system, has been calculated as 0.42 litres per second.

7.3.2 This figure is based on nine dwellings at 4,000 litres per dwelling as prescribed in Sewers for Adoption.

7.4 FOUL WATER CAPACITY AND POINT OF CONNECTION

7.4.1 Yorkshire Water have advised that foul water can discharge to the existing 225mm foul water sewer located to the east of the site, within Oxford Road. They have not advised of any known capacity issues with the public sewer network in the area which would hinder development at the site.

7.4.2 No depth/level information is available for these sewers and therefore further survey work in the form of a drainage CCTV and tracing survey will be required to confirm whether a gravity connection will be feasible.

7.4.3 Any proposed connection onto the public recorded sewers will require a S106 connection application.

8 SURFACE WATER DRAINAGE STRATEGY

8.1 INTRODUCTION

8.1.1 The National Planning Policy Framework (NPPF) and accompanying Technical Guidance indicate that surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

8.1.2 Consideration should therefore firstly be given to using sustainable drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2015) sets out a hierarchy for the disposal of surface water which encourages a SuDS approach.

8.2 OVERVIEW AND CONCEPT

8.2.1 As detailed in **Section 3.1**, development proposals for the site consist of residential use, consisting of nine residential dwellings, with associated hardstanding, landscaping, and infrastructure. The site plan shows the developable area of the site to be restricted to the red line boundary, as shown in **Appendix A**, with an approximate total developable area of 1.02 ha.

8.2.2 Review of the site plan shows proposals to consist of an approximate total new impermeable area of 0.36 ha, which equates to approximately 35% of the total proposed developable area (**Table 8-1**), this does not account for the existing impermeable area. The contributing areas have been identified within the Drainage Layout Drawing, in **Appendix E**.

8.2.3 It is considered that green open space and landscaped areas will not produce or contribute run-off to the surface water management infrastructure proposed as part of this strategy. This has been taken into account when deriving the impermeable area for the site.

Table 8-1 Contributing Surface Water Drainage Areas

Drainage Area	Area (ha)	% Impermeable	Contributing area
Green open spaces and landscape areas and existing impermeable areas	0.66	0	0
Plots 1-5 and Access Road	0.19	100	0.19
Plots 6-9 and Access Road	0.17	100	0.17
Totals	**1.02**	**-**	**0.36**

8.3 PRE-DEVELOPMENT SURFACE WATER RUN-OFF

Greenfield

8.3.1 The site is approximately 1.02 ha in area and currently comprises of undeveloped greenfield land, with an existing dwelling in the northwest of the site.

8.3.2 For the purposes of determining the existing rate of surface water run-off the site is considered to greenfield therefore the run-off will be estimated using the IH124 method.

8.3.3 The table below summarises the existing greenfield run-off rates generated by the development for a range of storm return periods. A calculation summary sheet from the UK SuDS website can be found in Appendix F.

Table 8-2 Existing Run-Off Rates

Area	Q_1	Q_{10}	Q_{30}	Q_{100}	Q_{200}
1.02	0.47	7.8	9.5	11.3	12.8

8.3.4 Provision of suitable controls for the management of the on-site surface water run-off may be developed in conjunction with the future masterplan and existing site levels, especially if the footprints of development change meaning an increase in impermeable areas. Additional investigation would then need to be undertaken to determine if the site required betterment and attenuation.

8.4 GROUNDWATER PROTECTION

8.4.1 The proposed development site is not identified as being within a groundwater source protection zone (SPZ), as such no special measures are required to prevent risk to drinking water supplies.

8.5 METHODS OF SURFACE WATER MANAGEMENT

8.5.1 There are three methods that have been reviewed for the management and discharge of surface water which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- Discharge via Infiltration
- Discharge to a Watercourse
- Discharge to Surface Water Sewer or Highway Drain
- Discharge to Public Sewer

8.6 INFILTRATION

8.6.1 Any impermeable areas that can drain to a soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems.

8.6.2 The British Geological Society (BGS) Geology of Britain Viewer indicates that the entire site is underlain by Lepton Edge Rock – Sandstone, with no overlying superficial deposits.

8.6.3 Information obtained from the Cranfield University's Soilscape website indicates that the west of the site is in an area classified as being Soilscape 17, which is defined as having slowly permeable seasonally wet loam and clayey soils. The east of the site is in an area classified as being Soilscape 6, which is defined as having freely draining slightly acid loamy soils.

8.6.4 From a desktop review of the geology and soil at the site, it is believed that infiltration would not be an acceptable way of discharging surface water from the site.

8.6.5 To further confirm the desktop review of the possibility for infiltration at the site, an infiltration test was undertaken on site by ARP. The test report can be found in Appendix G and concludes that ground conditions at the site do not support infiltration, and as such soakaways will not be possible at the site.

8.7 WATERCOURSE

8.7.1 As discussed in Section 3.5 there are a number of watercourses located within the vicinity of the site.

8.7.2 Each of the unnamed watercourses are separated from the site by third party land and residential developments, as such it would be unviable to discharge surface water into a watercourse.

8.8 PUBLIC SEWERS

8.8.1 As a last resort and following the hierarchy of surface water, disposal discharge to the public sewer system may need to be considered.

8.8.2 In the Yorkshire Water pre development enquiry (**Appendix D**) they state that the local sewer network does not have capacity to accept additional flows from the proposed development.

8.8.3 As infiltration and an outfall to a watercourse have been discounted as viable options for discharging surface water from the site, AMA contacted Yorkshire Water regarding the possibility of discharging surface water to the public sewer network. Yorkshire Water confirmed that surface water from the site may discharge to the 225mm foul/combined sewer located in Oxford Road, at a maximum discharge rate of 3.5 l/s. This correspondence can be found in **Appendix H**.

8.9 PROPOSED DISCHARGED RATES

8.9.1 Surface water from the site will be discharged via an outfall to the public sewer network.

8.9.2 As the site will be drained by discharging surface water into the public sewer, surface water will be restricted to 3.5 l/s, to reduce the risk of blockages.

8.9.3 Typically, any discharge rate less than 5.0 l/s is prone to blockage and will create maintenance issues because of the small size of the orifice required. Where the greenfield discharge suggests a discharge rate of less than 3.5 l/s the figure of 3.5 l/s shall be used to reduce the risk of blockages. This would need to be confirmed by the approving authority.

8.10 ATTENUATION REQUIREMENTS

8.10.1 As discussed earlier the site will be drained into the public sewer network at a restricted discharge rate of 3.5 l/s. Therefore, attenuation will have to be provided.

8.10.2 Causeway Flow drainage design software has been used to estimate the maximum storage volume required on-site for the 100-year storm event plus 30% allowance for climate change and 10% for urban creep. The results of these calculations can be found in **Appendix I**.

8.10.3 The results below are based on two private attenuation tanks located in the north and south of the site to serve each area.

8.10.4 A Drainage Layout Drawing can be found in **Appendix E**.

Northern Attenuation

8.10.5 This volume is based on using an attenuation tank with a discharge rate of 3.5 l/s. The details on the attenuation of the tank can be found in **Table 8-3** below.

Table 8-3 Northern Attenuation Volume

Gross Area (ha)	Max Discharge (l/s)	Imp. Area (ha)	Q100+40% Volume (m^3)
0.40	3.5	0.17	83.6

Southern Attenuation

8.10.6 This volume is based on using an attenuation tank with a discharge rate of 3.5 l/s. The details on the attenuation of the tank can be found in **Table 8-4** below.

Table 8-4 Southern Attenuation Volume

Gross Area (ha)	Max Discharge (l/s)	Imp. Area (ha)	Q100+40% Volume (m^3)
0.62	3.5	0.19	109.25

8.11 DRAINAGE NETWORK

8.11.1 A network hydraulic model has been developed so as to assess the conveyance requirements for the proposed drainage strategy. This includes a combination of surface water pipes and manholes, which will direct surface water run-off from impermeable areas to each attenuation tank with both the north and south of the site. This will ensure that surface water flows from the site are internally managed before they leave the site and further reduce the potential for impact elsewhere.

8.11.2 The final surface water drainage network servicing the site should ideally consist of permeable paving to limit the run-off from any paved areas, whilst extending time of concentration for discharge to the accompanying drainage network.

8.11.3 For any portion of the network crossing a highway or an area to be trafficked by heavy grade vehicles (HGV's), a minimum cover requirement of 1.20 m below cover level should be provided where practically possible for the internal drainage network to satisfy Sewers for Adoption standards.

8.11.4 Proposals for the drainage network are to discharge to the Yorkshire Water public sewer network located in the vicinity of the site, subject to agreement with Yorkshire Water.

9 SUSTAINABLE DRAINAGE SYSTEMS

9.1.1 Where possible, Sustainable drainage (SuDS) systems/techniques should be used to drain the site of surface water runoff. These could be in the form of permeable paving, rainwater harvesting, ponds, and other above ground green systems. Swales could also be incorporated into the layout to convey surface runoff rather than below ground pipes (which tend to have a higher velocity).

9.2 SUSTAINABLE DRAINAGE (OVERVIEW)

9.2.1 Drainage systems can contribute to sustainable development and improve urban design, by balancing the different issues that influence the development of communities. Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) and amenity issues are collectively referred to as Sustainable Drainage Systems (SuDS).

9.2.2 SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to slow water down (attenuate) before it enters streams, rivers, and other watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).

9.2.3 SUDS are technically regarded as a sequence of management practices, control structures and strategies designed to drain surface water efficiently and sustainably, while minimising pollution and managing the impact on water quality of local water bodies.

9.2.4 SuDS are more sustainable than traditional drainage methods because they:

- Manage runoff volumes and flow rates from hard surfaces, reducing the impact of urbanisation on flooding,
- Protect or enhance water quality (reducing pollution from runoff),
- Protect natural flow regimes in watercourses,
- Are sympathetic to the environment and the needs of the local community,
- Provide an attractive habitat for wildlife in urban watercourses,
- Provide opportunities for evapotranspiration from vegetation and surface water,
- Encourage natural groundwater/aquifer recharge (where appropriate),
- Create better places to live, work and play.

9.3 SUDS PRINCIPALS

9.3.1 Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:

- Storing runoff and releasing it slowly (attenuation)
- Allowing water to soak into the ground (infiltration)
- Slowly transporting (conveying) water on the surface
- Filtering out pollutants
- Allowing sediments to settle out by controlling the flow of the water

9.3.2 The above was replicated from www.susdrain.org.

9.4 SUDS TECHNIQUES

9.4.1 The following table is a list of SuDS features that may/may not be feasible for the proposed site.

Table 9-1 SuDS Feasibility Table

SuDS Technique	Can they be feasibly incorporated into the site?	Comments
Green Roofs	✖	The sloping roofs of the proposed development would not permit a green roof design.
Basins and Ponds	✖	The proposed development could not be designed to incorporate these elements due to site constraints such as the topography.
Filter Strips, Swales and Bio-Retention	✖	The proposed development could not be designed to incorporate these elements due to site constraints.
Infiltration Techniques	✖	Infiltration testing undertaken at the site has confirmed that infiltration techniques are not feasible at the site.
Permeable Surfaces and Tree Pits	✓	Surfacing of the external areas could be in a permeable material, such as permeable paved access roads and driveways.
Rainwater Harvesting	✓	New roofs could be directed to rainwater harvesting tanks for reuse.

10 SUDS MAINTENANCE PLAN

10.1 SURFACE WATER MAINTENANCE AND MANAGEMENT SCHEDULE

Attenuation Tank Maintenance Schedule

Table 10-1 Attenuation Tank Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment and build-up and remove if necessary.	Every 5 years or as required

Hydrobrake Manhole Maintenance Schedule

Table 10-2 Hydrobrake Manhole Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes.	Monthly for first 12 months, then 6 monthly.
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs.	As necessary
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event

11 SUMMARY

11.1.1 The proposals for the site are for residential use, consisting of nine residential dwellings, with associated hardstanding, landscaping, and infrastructure.

11.1.2 The site is in an area identified as having a low probability of flooding on the EA Flood Map and is located in Flood Zone 1.

11.1.3 The site is shown to not be at risk of tidal, coastal, fluvial, pluvial, or groundwater flooding. The site is also not considered to be at risk of flooding from artificial sources or sewers.

11.1.4 As the site is situated in Flood Zone 1, there are no specific requirements for finished floor levels at the site. It is recommended that FFLs for the proposed development are set at 0.15m above the adjacent ground level.

11.1.5 As with any drainage system, blockages within the surface water sewer systems constructed to serve the development has the potential to cause flooding or disruption. Any drainage systems which are not to be offered for adoption to either the Water Company or the Local Authority will have a suitable maintenance regime scheduled, and an appropriate management company appointed to carry out the works.

11.1.6 The primary option for surface water disposal is to form a connection into the public sewer system.

11.1.7 Infiltration testing has been undertaken at the site and has confirmed that infiltration methods would not be a suitable option for draining surface water from the site.

11.1.8 There is not a suitable watercourse in the vicinity of the site which could be utilised to dispose of surface water from the site, due to the intervening third party land separating the site from each watercourse.

11.1.9 Attenuation is required as the means of surface water disposal is through a connection into the public sewer system. Furthermore, there will be a restricted discharge limit of 3.5 l/s, to reduce the risk of blockages.

11.1.10 There is a formal point of connection into a Yorkshire Water public foul water sewer in close proximity to the site. Foul water domestic waste can discharge to the 225mm diameter public foul water sewer recorded in Oxford Road, at a point to the east of the site

12 LIMITATIONS

12.1.1 This report has been prepared for exclusive use by Empire Real Estate Development Ltd for the purpose of assisting them in evaluating the potential constraints imposed by flood risk and drainage in making a Planning Application.

12.1.2 AMA accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of AMA. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.

12.1.3 AMA has endeavoured to assess all information provided to them during this appraisal. The report summarises from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

12.1.4 This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

12.1.5 A topographic survey has been completed for the site and was supplied to AMA by the client. AMA accepts no liability for the accuracy of this survey, and it is recommended that it is verified on-site prior to the commencement of any construction work.

12.1.6 Existing drainage information is based on third party survey data and record information which is considered to be incomplete. It is therefore recommended that a FULL drainage investigation survey is commissioned to establish the precise alignment, level, and condition of ALL existing drainage within the development site to inform the masterplan and future detailed design proposals.

APPENDICES

Appendix A Proposed Site Layout

Appendix B Topographic Survey

Appendix C Calder Catchment Level 2 SFRA Areas Susceptible to Groundwater Flooding Map

Appendix D Yorkshire Water Pre-Development Enquiry

Appendix E Drainage Layout Drawing

Appendix F UK SuDS Greenfield Run-Off Rates

Appendix G ARP Infiltration Test Report

Appendix H Correspondence with Yorkshire Water

Appendix I Causeway Flow Calculations

Appendix A
Proposed Site Layout

P:\3427 West House, Gomersal\0.00 Drawings\0.01 Project Drawings\3427 - Proposed Site Model 011.rvt

Copyright of this drawing remains the sole property of Den Architecture Ltd unless otherwise assigned in writing. Do not scale from this drawing, figured dimensions are to be worked in all cases with any discrepancies reported to Den Architecture Ltd prior to commencement of any work.

Northpoint:

Rev	Date	Amendments	By	Chkd



Landscape Key

- Site boundary
- Land with applicants ownership

Existing Features

- Existing trees retained
- Existing trees removed
- Existing Root Protection Area
- Existing stone wall retained
- Existing pond retained

Proposed Landscape Features

- Privet/ Beech hedgerow with estate railing (within public space)
- Privet hedgerow with estate railing (within privet ownership)
- Estate railings
- Low stone wall with estate railings
- Proposed native trees (extra heavy standard)
- Proposed native woodland with individual standard trees
- Mown amenity grassland
- Species rich neutral grassland with native bulb planting
- Species rich neutral grassland
- Ornamental feature shrub planting
- Access roads - Tobermore, Tegula block paving (Colour: Slate)
- Tarmac
- Private drives and patios - Tobermore, Tegula block paving (Colour: Bracken)
- Proposed Bin Store location
- Line of Visibility Splay

(Site Plan to be read in conjunction with landscape drawing prepared by Draw (UK) Ltd - 041-25-D1)

All tree information taken from Drawing 22308 Tree Constraints Plan produced by JCA Limited

0 5 10 50 M

Proposed Site Plan - Overall 1 : 500

den architecture

8 Wharf Street,
Leeds, LS2 7EQ

T: 0113 244 5038
info@den.uk.com
www.den.uk.com

Project: Proposed Residential Development, West House, Gomersal, BD19 4AU			
Client: Empire Real Estate Developments Ltd			
Dwg Title: Proposed Site Plan - Overall			
Date: Dec 2025	Scale: As indicated	Drawn: ND	Checked: ADP
Project No: 3427	Size: A1	Status: -	
Drawing Number: 3427-DEN-X-ZZ-DR-A-1100			Revision:

Appendix B
Topographic Survey

Lowood

Pond

OXFORD ROAD

LATHAM LANE

S1
148.641

S2
151.711

S3
152.219

W1
143.533

W2
142.480

W3
143.123

W4
152.285

W5
151.553

STONE HOUSE

BRICK HOUSE

452

448

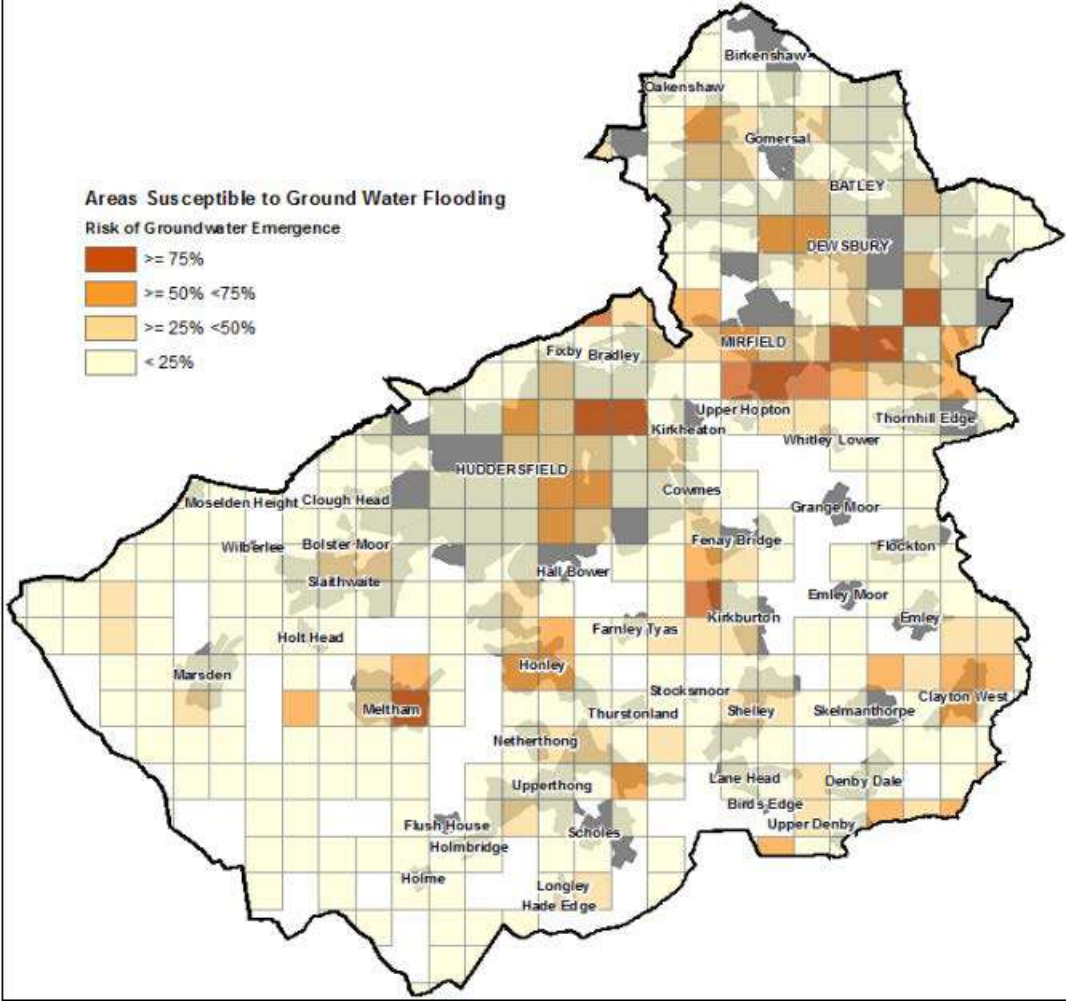
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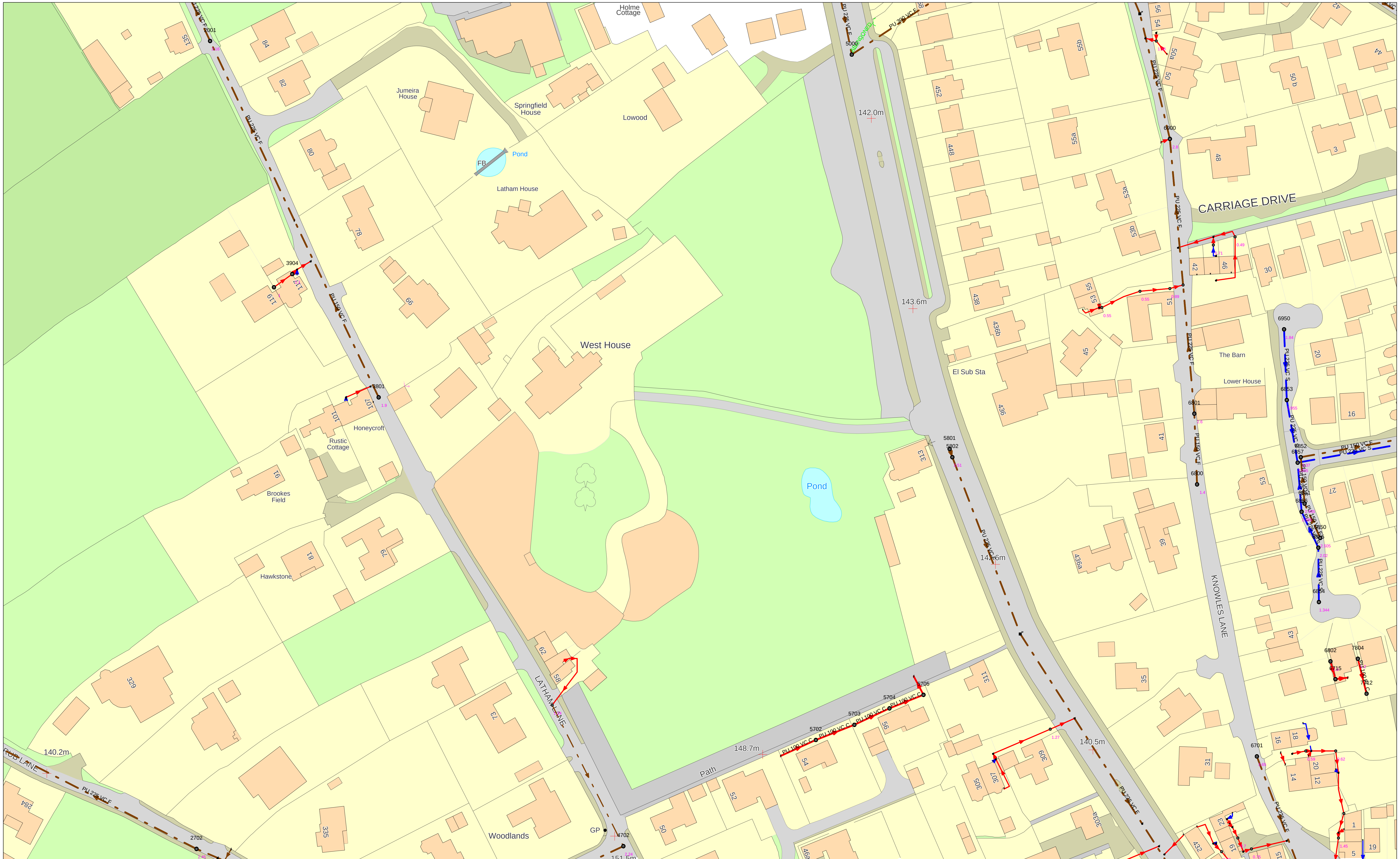
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54

Appendix C
Calder Catchment Level 2 SFRA Areas Susceptible to Groundwater Flooding Map


Areas Susceptible to Ground Water Flooding
Risk of Groundwater Emergence
>= 75%
>= 50% <75%
>= 25% <50%
< 25%
Birkenshaw
Oakenshaw
Gomersal
BATLEY
DEWSBURY
MIRFIELD
Fixby
Bradley
Upper Hopton
Kirkheaton
Thornhill Edge
Whitley Lower
HUDDERSFIELD
Cowmes
Grange Moor
Moselden Height
Clough Head
Wilberlee
Bolster Moor
Fenay Bridge
Flockton
Slaithwaite
Hall Bower
Emley Moor
Kirkburton
Emley
Farnley Tyas
Holt Head
Honley
Marsden
Stocksmoor
Clayton West
Meltham
Thurstonland
Shelley
Skelmanthorpe
Netherthong
Lane Head
Denby Dale
Upperthong
Bird's Edge
Upper Denby
Flush House
Scholes
Holmbridge
Holme
Longley
Hade Edge

Appendix D
Yorkshire Water Pre-Development Enquiry



420391 : 426842

Map Name : SE2026NW

Title

Notes

Yorkshire Water,
PO Box 500,
Halifax Road,
Bradford BD6 2LZ
Contact Name :
G Mullaney
Contact Tel :

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Partial Key

Foul Sewer = F
Combined Sewer = C
Surface Water Sewer = SW
Trade Sewer = TD
Partially Separate = PS

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Req : 11/03/2024, 15:25:34

Date Gen : 11/03/2024, 15:26:51

Source : Sewer Network Enquiry

UPN: Undefined

Originator: G Mullaney, ,

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

Tel: 0345 120 8482
Fax:

Email:
technical.sewerage@yorkshirewater.co.uk

For telephone enquiries ring:
George Mullaney on 0345 120 8482

Andrew Moseley Associates
15 St Pauls Street
Leeds
LS1 2JG
jasmine@amatp.co.uk

Your Ref:
Our Ref: A000944

11th March 2024

Dear Ms Ellenor,

West House, Oxford Road, Gomersal, BD19 4AU - Pre-planning Enquiry V413364

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

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

Foul Water

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

Foul water domestic waste can discharge to the 225 mm diameter public foul sewer recorded in Oxford Road, at a point to the east of the site.

Surface Water

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

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

As the proposed site is currently undeveloped no surface water is known to have previously discharged to the public sewer network.

As such, the local public sewer network does not have capacity to accept any surface water from the proposed site. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority/Internal Drainage Board* with a view to establishing a suitable watercourse for discharge.

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

Other Observations

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

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

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

Prospectively adoptable sewers and pumping stations must be designed and

YorkshireWater

constructed in accordance with the Code for Adoption, pursuant to an agreement under Section 104 of the Water Industry Act 1991. We are happy to offer pre-development technical advice on any prospective sites that you would like to put forward for adoption, prior to submission of your adoption application.

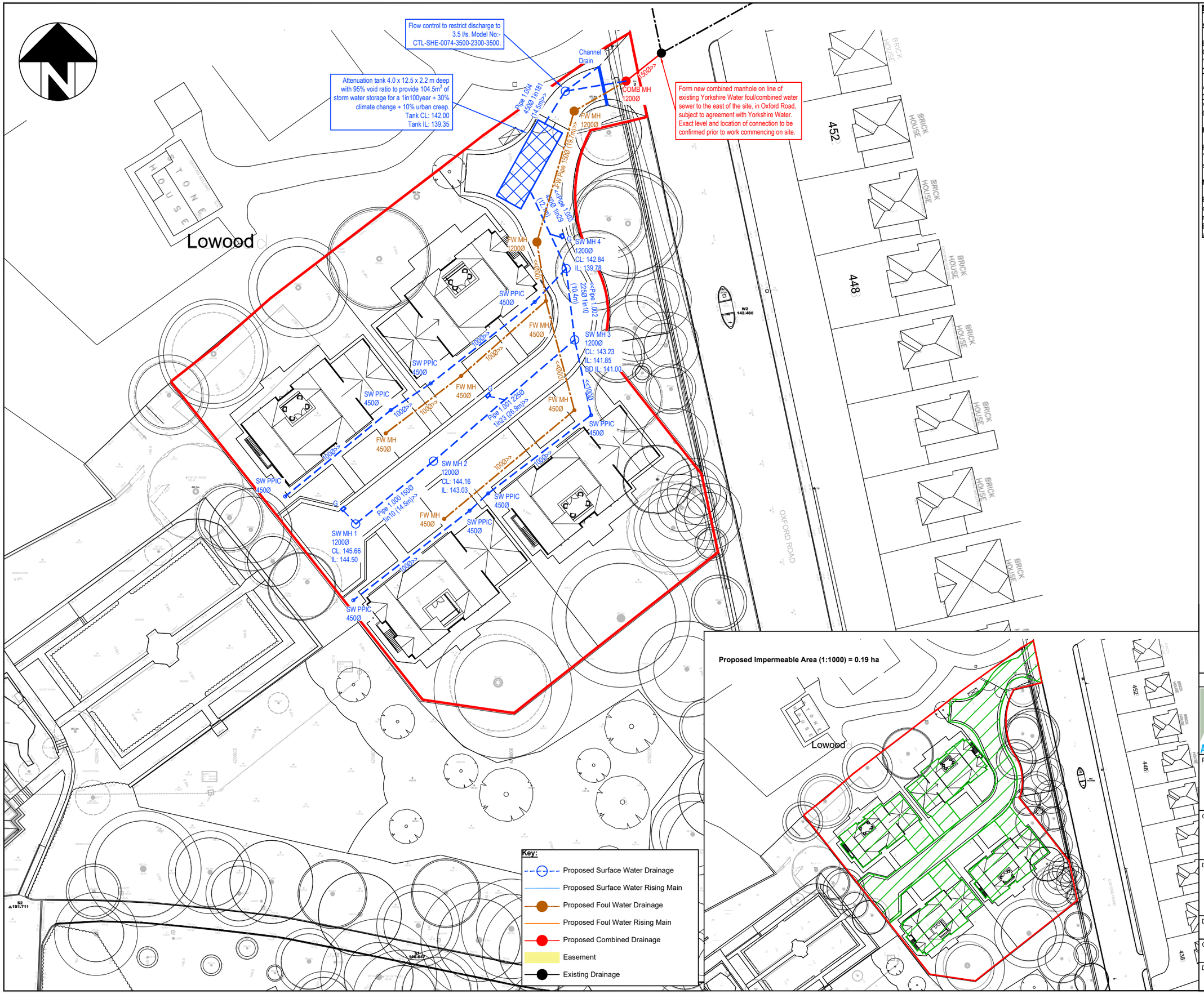
An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Sewer Adoption, Diversion and Requisition (telephone 0345 120 84 82) or email technical.sewerage@yorkshirewater.co.uk or visit - https://www.yorkshirewater.com/developers/sewerage/sewer-adoptions/ for further information.

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

Yours sincerely

George Mullaney
Development Services Technician

Appendix E
Drainage Layout Drawing



Drainage Strategy:

Surface Water

Based on a flow restriction of 3.5 l/s and modeling using Causeway Flow software, the attenuation requirement for a 1in100year + 30% climate change + 10% urban creep is **104.5m³**.

Attenuation will be provided via **ATTENUATION TANK 4.0 x 12.5 x 2.2 m DEEP** with 95% void ratio. Flows will be attenuated via a Hydrobrake Manhole model no:- CTL-SHE-0074-3500-2300-3500.

Foul Water

Foul water from the development is proposed to discharge to the Yorkshire Water foul/combined sewer located to the east of the site, in Oxford Road, subject to agreement with Yorkshire Water.

Notes

Exact level and location of outfall to public sewer should be confirmed prior to work commencing on site. Pumping may be required if a gravity connection is not achievable.
Exact locations of RWP and SVP subject to confirmation by architect.

P01	Preliminary Issue	19.12.25	JE

ANDREW MOSELEY ASSOCIATES
Transport & Infrastructure Consultants
15 St Paul's Street
Second Floor
Leeds
LS1 2JG
www.amatp.co.uk

Project:
West House, Oxford Road, Gomersal

Client:
Empire Real Estate Development Ltd

Drawing:
Drainage Layout Drawing (North)

Drawn By: JE	Date: 19.12.2025	
Checked: TD	Scale: 1:500	Paper: A3
Drawing No.: AMA-21124-DS-001		Rev.: P01

Drainage Strategy:

Surface Water

Based on a flow restriction of 3.5 l/s and modeling using Causeway Flow software, the attenuation requirement for a 1in100year + 30% climate change + 10% urban creep is **114m³**.

Attenuation will be provided via **ATTENUATION TANK 12.0 x 10.0 x 1.0 m DEEP** with 95% void ratio. Flows will be attenuated via a private pump station with integrated flow control.

Foul Water

Foul water from the development is proposed to discharge to the Yorkshire Water foul/combined sewer located to the west of the site, in Latham Lane, subject to agreement with Yorkshire Water.

Notes

Exact level and location of outfall to public sewer should be confirmed prior to work commencing on site.
Exact locations of RWP and SVP subject to confirmation by architect.

Private pump station with integrated flow control to restrict discharge to 3.5 l/s.

Attenuation tank 12.0 x 10.0 x 1.0 m deep with 95% void ratio to provide 114m³ of storm water storage for a 1in100year + 30% climate change + 10% urban creep.
Tank Min CL: 144.65
Tank IL: 143.05

Private Foul Pump Station

FW Pipe 150Ø (7.2m)>>

FW MH 12000

SW PPIC 450Ø

Pipe 1.003 225Ø 1in10 (12.1m)>>

SW MH 4 12000 CL: 146.50 IL: 144.31

SW MH 5 12000 CL: 145.20 IL: 143.10

Pipe 1.004 300Ø 1in28 (1.4m)

Pipe 1.002 225Ø 1in10 (18.4m)>>

SW MH 3 12000 CL: 148.28 IL: 146.11

Pipe 1.001 150Ø 1in11 (25.5m)>>

SW MH 2 12000 CL: 149.55 IL: 148.43

Pipe 1.000 150Ø 1in20 (20.0m)>>

SW MH 1 12000 CL: 150.46 IL: 149.41

FW MH 450Ø

SW PPIC 450Ø

100Ø>>

<<Rising Main

G

Highway drainage to be captured and drained separately from plot drainage.

COMB MH 12000Ø

<<150Ø

Form new combined manhole on line of existing Yorkshire Water foul/combined water sewer to the west of the site, in Latham Lane, subject to agreement with Yorkshire Water. Exact level and location of connection to be confirmed prior to work commencing on site.

W3 143.123

W4 152.285

WS 151.553

56

54

BRICK HOUSE

Key:

- Proposed Surface Water Drainage
- Proposed Surface Water Rising Main
- Proposed Foul Water Drainage
- Proposed Foul Water Rising Main
- Proposed Combined Drainage
- Easement
- Existing Drainage

Proposed Impermeable Area (1:1000) = 0.22 ha

P01	Preliminary Issue	19.12.25	JE

ANDREW MOSELEY ASSOCIATES
Transport & Infrastructure Consultants
15 St Paul's Street
Second Floor
Leeds
LS1 2JG
www.amatp.co.uk

Project:

West House, Oxford Road, Gomersal

Client:

Empire Real Estate Development Ltd

Drawing:

Drainage Layout Drawing (South)

Drawn By:	Date:	
JE	19.12.2025	
Checked: TD	Scale: 1:500	Paper: A3
Drawing No. AMA-21124-DS-002		Rev. P01

Appendix F
UK SuDS Greenfield Run-Off Rates

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

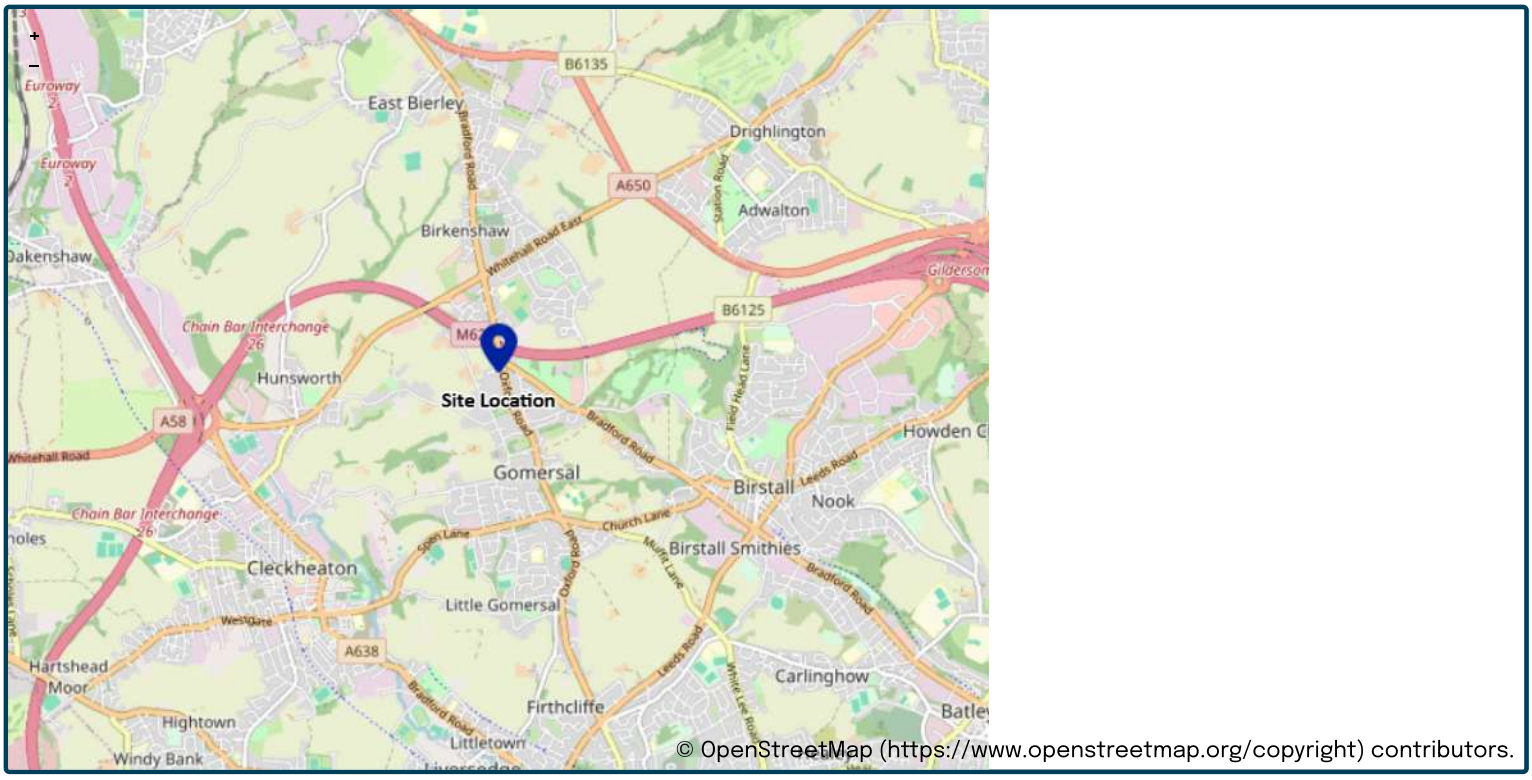
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	05/12/2025
Calculated by	Jasmine Ellenor
Reference	21124
Model version	2.2.2

Location

Site name	West House
Site location	Gomersal



Site easting (British National Grid)	420471
Site northing (British National Grid)	426935

Site details

Total site area (ha)	1.02 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	759 mm		759
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	5.4 l/s		

Growth curve factors

	My value		Map value
Hydrological region	3		3
1 year growth factor	0.86		
2 year growth factor	0.94		
10 year growth factor	1.45		
30 year growth factor	1.75		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	IH124
Flow rate 1 year (l/s)	4.7 l/s
Flow rate 2 year (l/s)	5.1 l/s
Flow rate 10 years (l/s)	7.8 l/s
Flow rate 30 years (l/s)	9.5 l/s
Flow rate 100 years (l/s)	11.3 l/s
Flow rate 200 years (l/s)	12.8 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix G

ARP Infiltration Test Report

Chartered Consulting Engineers

ARP Geotechnical Ltd 5 & 6 Northwest Business Park, Servia Hill, Leeds, LS6 2QH
☎ 0113 245 8498 ✉ leeds@arpgeotechnical.co.uk 🌐 www.arpconsultingengineers.co.uk

Mr R Gorji
Empire Real Estate Development Ltd
Legrams Commercial Centre
Legrams Lane
Bradford
BD7 1NH

BY EMAIL

Our Ref: ERE/01/JPjcl1

9th April 2024

Dear Rio

West House, Oxford Road, Gomersal
Infiltration Testing

In accordance with our commission, we visited the above site on Wednesday 27th March 2024, to carry out infiltration testing, and infiltration rate calculations, in general accordance with BRE Digest 365 'Soakaway Design'. The purpose of this testing was to assess the suitability of soakaways for use in surface water drainage. Tests were implemented at three locations referenced TP1, TP7 and TP8 on the appended location plan. The trial pits were excavated to depths of 1.9m (TP1), 1.1m (TP7) and 0.9m (TP8).

Environmental Setting

The site, shown on the attached plan, comprises a grassed open space part of the large garden that belongs to West House. The site is bound on all sides by residential areas, Oxford Road runs along the eastern boundary with Latham Lane along the western boundary. To the north and south of the site are residential properties with associated gardens. The site slopes gently towards the north, with levels ranging between approximately 150m A.O.D to 145m A.O.D. The nearest watercourse is Spen Beck, approximately 150m to the east.

The geological map shows the site to be underlain by the Lepton Edge Rock Sandstone. No superficial deposits are shown to be present. The maps do not indicate any potential for the site to be adversely affected by any faults.

Trial Pits

Eight trial pits were excavated using an excavator at the positions shown on the attached plan, three of which were chosen to undertake soakaway testing. The trial pits chosen for soakaways revealed a surface covering of brown slightly gravelly clayey sandy topsoil to 0.3m depth. The strata underlying the topsoil varied in each pit, TP7 identified a brown slightly gravelly clayey sand to 0.6m overlying weathered sandstone recovered as gravel and cobbles. TP1 showed a yellowish brown mottled grey sandy clay to 0.6m, overlying dark brown and grey sandy gravel made ground where the gravel consists of shale, mudstone and clinker, to a depth of 1.3m. Beneath this a natural sandy clay was identified. TP8 showed a very clayey sand beneath the topsoil to a depth of 0.6m followed by the same sandy clay found in TP1. The excavation faces generally remained stable throughout and no groundwater was encountered in any of the trial pits.

Managing Director: Andrew Radcliffe BEng (Hons) CEngMIStructE
Directors: Andy Hawkin BSc (Hons) IEngAMIStructE • Martin Ingram MCIHT
Associate Directors: David Bass BEng (Hons) CEngMIStructE • Matthew Wilson BEng (Hons) MCIWEM • Mike Harper BSc (Hons) MSc CEnv • Dave Griffiths
Consultants: Paul Carter BEng (Hons) CEng MICE • John Race BSc (Hons) CGeol FGS EurGeol

Company Registered No. 3771811

Infiltration Tests

Infiltration testing was implemented in the three trial pits, TP1, TP7 and TP8, using a 2,000 gallon tractor-towed water bowser to discharge water quickly into each hole. The intention was to monitor the water levels for a period until either the level had fallen below 25% of the maximum filled level, or the end of the working day had been reached. If time permitted, a further two tests were to be carried out in each pit. The percolation testing data is attached.

In each test location, only one test was undertaken due to low infiltration rates. The 25% of filled level mark was not reached at all within any of the pits after being monitored for over four hours, and were calculated to not reach this level during the working day. The results are summarised in the table below.

Location/Test/Material	Water level drop (m)/Time	Infiltration rate (m/s)
TP1/Test 1/Sandstone	0.04m in 240 minutes	N/A*
TP7/Test 1/Sandstone	0.27m in 300 minutes	5.86×10^{-6}
TP8/Test 1/ Sandstone	0.31m in 270 minutes	N/A*

*Infiltration rates too slow to be calculated

Interpretation and Conclusion

Infiltration rates were found to be low in TP7, with a magnitude of $x10^{-6}$. It is likely that, if it had been possible to carry out two further tests, the infiltration rates would likely be slower still. It should also be noted that the test in TP8 showed an initial drop at the start of the test which then proceeded to stay at the same water level for the remainder of the test. This is likely due to the granular nature of the strata beneath the topsoil to a depth of 0.6m, with cohesive material beneath which is where the water level remained. The infiltration rate was unable to be calculated for TP8 and TP1, as the water level did not fall significantly in the strata targeted.

In the light of the results, disposal of surface water using soakaway pits is not considered to be viable on the site.

We trust that the above information is satisfactory. However, if you have any queries, please do not hesitate to contact us at your convenience.

Yours sincerely
for ARP GEOTECHNICAL LTD

REDACTED

J Pemberton

Encs



0m 50m

Approximate Scale

Proposed Trial Pit Location

Proposed Hand Pit Location

ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS
Northwest House 5-6 Northwest Business Park• Servia Hill • Leeds LS6 2QH
Telephone : 0113 245 8498 Fax : 0113 244 3864• E-Mail : leeds@arpassociates.co.uk

Project
WEST HOUSE, OXFORD ROAD, GOMERSAL

Client
EMPIRE REAL ESTATE DEVELOPMENTS Ltd

Title
Proposed Investigation Plan

Date
MARCH 2024

Drawn
WW

Scale
AS SHOWN

Job No.
ERE/01

ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
West House, Oxford Road, Gomersal	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	Top of Pit: 0.6m x 2.5m Bottom of pit: 0.6m x 2m	143.00	Empire Real Estate Development Ltd	ERE/01
	Location	**Dates**	**Engineer**	**Sheet**
	420505 E 426990 N	27/03/2024	W.W	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20 0.20-0.20	D J				(0.30)	MADE GROUND: Brown slightly gravelly clayey sandy topsoil. Sand is fine. Gravel is fine to coarse subangular to subrounded sandstone. Frequent roots and rootlets.		
				142.70	0.30			
					(0.30)	MADE GROUND: Firm yellowish brown, grey mottled slightly sandy CLAY. Sand is fine.		
				142.40	0.60			
0.70-0.70 0.70-0.70	D J				(0.70)	MADE GROUND: Dark brown and grey sandy platy gravel and cobbles of shale and shaley mudstone rare sub angular clinker.		
				141.70	1.30			
1.50-1.50 1.50-1.50	D SV 110kN/m2				(0.60)	Stiff yellowish brown, grey mottled sandy CLAY. Sand is fine. At 1.70m becomming very stiff.		
				141.10	1.90			
						Complete at 1.90m		

Plan

Remarks

Ground checked for services with CAT prior to excavation.
Trial pit terminated at 1.9 m below ground level due to increasingly stiff material.
No groundwater encountered.
Pit walls stable. Soakaway SA03 carried out in pit. Water removed and pit Infilled with arisings to surface upon completion.
Machine: KUBOTA U27-4 Mini-Digger Excavator with 600mm toothed bucket.

Scale (approx)	Logged By	Figure No.
1:25	W.W	ERE/01.TP01

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ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
West House, Oxford Road, Gomersal	TP07

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	Top of Pit: 0.6m x 2.5m Bottom of pit: 0.6m x 2m	151.00	Empire Real Estate Development Ltd	ERE/01
	Location	**Dates**	**Engineer**	**Sheet**
	420440 E 426796 N	27/03/2024	W.W	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.20 0.10-0.20	D J				(0.30)	Brown slightly gravelly clayey sand TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to subrounded sandstone. Frequent roots and rootlets.		
0.40-0.40 0.40-0.40	D J			150.70	0.30			
					(0.30)	Brown slightly gravelly clayey SAND. Sand is fine. Gravel is fine to coarse subangular to subrounded sandstone. Occasional rootlets.		
				150.40	0.60			
					(0.30)	Yellowish brown thickly laminated fine grained SANDSTONE. Recovered as angular to subangular fine to coarse gravel and cobbles.		
				150.10	0.90	Complete at 0.90m		

Plan

Remarks

Ground checked for services with CAT prior to excavation.
Trial pit terminated at 0.9 m below ground level due to bucket scraping on sandstone.
No groundwater encountered.
Pit walls stable. Soakaway SA01 carried out in pit. Water removed and pit Infilled with arisings to surface upon completion.
Machine: KUBOTA U27-4 Mini-Digger Excavator with 600mm toothed bucket.

Scale (approx)	Logged By	Figure No.
1:25	W.W	ERE/01.TP07

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CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
West House, Oxford Road, Gomersal	TP08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	Top of Pit: 0.6m x 2.5m Bottom of pit: 0.6m x 2m	146.00	Empire Real Estate Development Ltd	ERE/01
	Location	**Dates**	**Engineer**	**Sheet**
	420491 E 426864 N	27/03/2024	W.W	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20 0.20-0.20	D J				(0.30)	Brown slightly gravelly clayey sand TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to subrounded sandstone. Frequent roots and rootlets.		
				145.70	0.30			
					(0.30)	Yellowish brown, grey mottled very clayey fine SAND. With pockets of stiff yellowish brown, grey mottled sandy clay.		
				145.40	0.60			
0.70-0.70 0.70-0.70	D J					Stiff yellowish brown, grey mottled sandy CLAY. Sand is fine.		
					(0.50)	At 0.8m becoming very stiff.		
1.00-1.00	SV 100kN/m2							
				144.90	1.10	Complete at 1.10m		

Plan

Remarks

Ground checked for services with CAT prior to excavation.
Trial pit terminated at 1.1 m below ground level due to increasingly stiff material.
No groundwater encountered.
Pit walls stable. Soakaway SA02 carried out in pit. Water removed and pit Infilled with arisings to surface upon completion.
Machine: KUBOTA U27-4 Mini-Digger Excavator with 600mm toothed bucket.

Scale (approx)	Logged By	Figure No.
1:25	W.W	ERE/01.TP08

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ARP GEOTECHNICAL LTD

Soakaway Calculations

SITE:	**West House, Oxford Road, Gomersal**
CLIENT:	**Empire Real Estate Development Ltd**
JOB No:	**ERE/01**

TP7 TEST 1			**TP7 TEST 2**			**TP7 TEST 3**		
Depth of Pit	0.90	m	Depth of Pit		m	Depth of Pit		m
Depth to water at start	0.20	m	Depth to water at start		m	Depth to water at start		m
25% effective Depth	0.73	m	25% effective Depth	0.00	m	25% effective Depth	0.00	m
Time (mins)	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**
0	0.20	0.70						
0.5	0.21	0.69						
1	0.21	0.69						
1.5	0.22	0.68						
2	0.22	0.68						
2.5	0.22	0.68						
3	0.23	0.67						
4	0.23	0.67						
5	0.24	0.66						
10	0.25	0.65						
20	0.26	0.64						
25	0.26	0.64						
30	0.27	0.63						
60	0.29	0.61						
75	0.32	0.58						
90	0.36	0.54						
120	0.37	0.53						
150	0.38	0.52						
210	0.44	0.46						
240	0.44	0.46						
270	0.45	0.45						
300	0.47	0.43						

ARP GEOTECHNICAL LTD

Soakaway Calculations

SITE:	**West House, Oxford Road, Gomersal**
CLIENT:	**Empire Real Estate Development Ltd**
JOB No:	**ERE/01**

TP8 TEST 1			**TP8 TEST 2**			**TP8 TEST 3**		
Depth of Pit	1.10	m	Depth of Pit		m	Depth of Pit		m
Depth to water at start	0.30	m	Depth to water at start		m	Depth to water at start		m
25% effective Depth	0.90	m	25% effective Depth	0.00	m	25% effective Depth	0.00	m
Time (mins)	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**
0	0.30	0.80						
1	0.32	0.78						
2	0.35	0.75						
3	0.38	0.72						
4	0.42	0.68						
5	0.44	0.66						
6	0.48	0.62						
7	0.49	0.61						
8	0.50	0.60						
9	0.52	0.58						
10	0.53	0.57						
15	0.56	0.54						
20	0.58	0.52						
30	0.58	0.52						
40	0.59	0.51						
50	0.60	0.50						
60	0.61	0.49						
90	0.61	0.49						
120	0.61	0.49						
180	0.61	0.49						
210	0.61	0.49						
270	0.61	0.49						

ARP GEOTECHNICAL LTD

Soakaway Calculations

SITE:	**West House, Oxford Road, Gomersal**
CLIENT:	**Empire Real Estate Development Ltd**
JOB No:	**ERE/01**

TP1 TEST 1			**TP1 TEST 2**			**TP1 TEST 3**		
Depth of Pit	1.90	m	Depth of Pit		m	Depth of Pit		m
Depth to water at start	1.26	m	Depth to water at start		m	Depth to water at start		m
25% effective Depth	1.74	m	25% effective Depth	0.00	m	25% effective Depth	0.00	m
Time (mins)	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Effective Depth of Water (m)**
0	1.26	0.64						
1	1.27	0.63						
2	1.27	0.63						
3	1.27	0.63						
4	1.27	0.63						
5	1.27	0.63						
6	1.27	0.63						
7	1.27	0.63						
8	1.27	0.63						
9	1.27	0.63						
10	1.27	0.63						
15	1.27	0.63						
20	1.28	0.62						
25	1.28	0.62						
30	1.28	0.62						
60	1.28	0.62						
90	1.28	0.62						
120	1.29	0.61						
150	1.29	0.61						
180	1.30	0.60						
210	1.30	0.60						
240	1.30	0.60						

ARP GEOTECHNICAL LTD SOAKAWAY TEST RESULTS

TP1 TEST 1

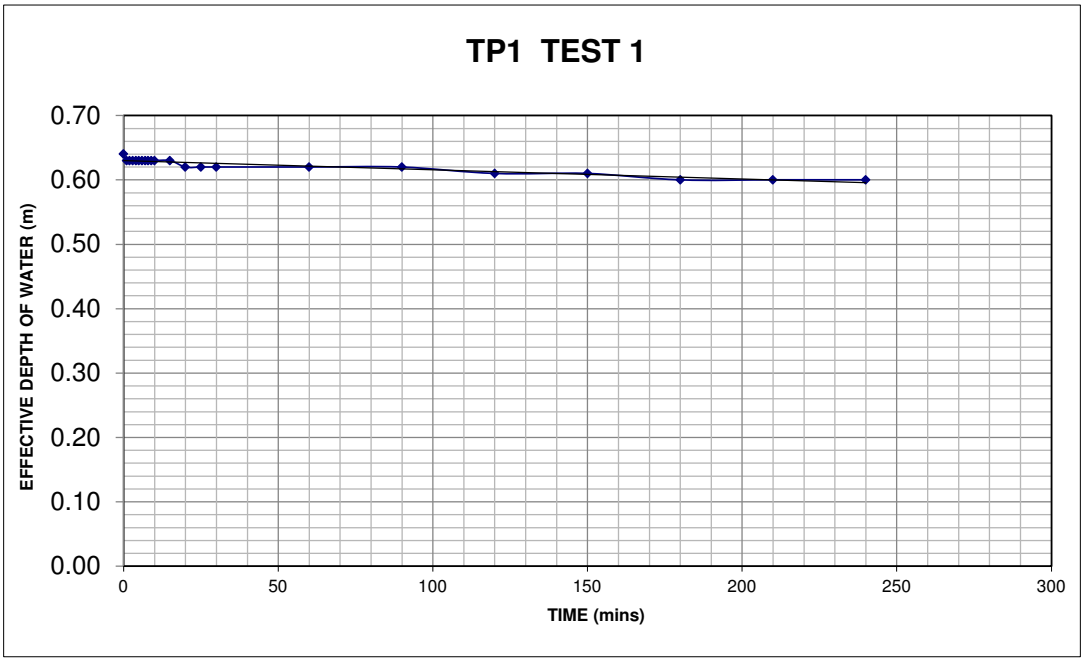
Depth of pit	1.900
Depth to water at start	1.260
Length of hole at max. filled water level	3.100
Length of hole at base	3.100
Average	3.100
Width of hole at surface	0.600
Width of hole at base	0.600
Average	0.600
Maximum effective depth	0.64
75% effective depth	**0.480**
50% effective depth	0.320
25% effective depth	**0.160**
Depth of hole	1.900
50% Effective depth	0.320
Time in mins at 75% effective depth (see curve)	N/A
Time in mins at 25% effective depth (see curve)	N/A

Volume outflow (75% - 25% effective depth):
$V_{p75=}$ 0.60 m^3

Mean surface area (inc. base of pit)
$a_{p50=}$ 4.228 m^2

Time for discharge (75% and 25% effective depth):
$t_{p75-25=}$ #VALUE! minutes

Soil infiltration rate:
f = #VALUE! m/s



ARP GEOTECHNICAL LTD SOAKAWAY TEST RESULTS

TP7 TEST 1

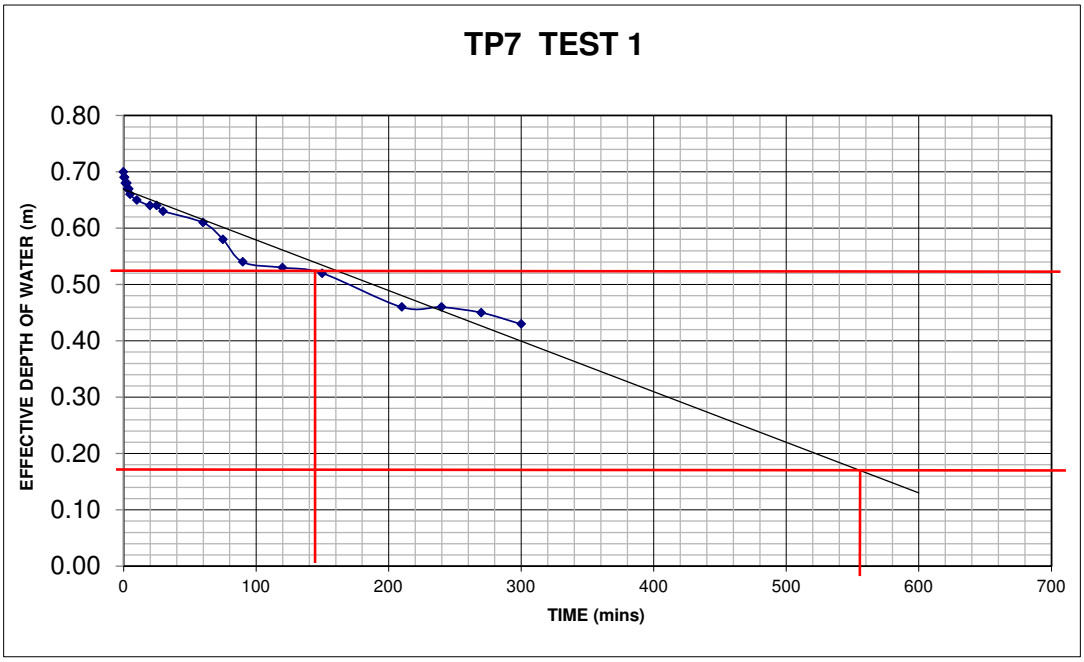
Depth of pit	0.900
Depth to water at start	0.200
Length of hole at max. filled water level	2.700
Length of hole at base	2.700
Average	2.700
Width of hole at surface	0.600
Width of hole at base	0.600
Average	0.600
Maximum effective depth	0.70
75% effective depth	**0.525**
50% effective depth	0.350
25% effective depth	**0.175**
Depth of hole	0.900
50% Effective depth	0.350
Time in mins at 75% effective depth (see curve)	145
Time in mins at 25% effective depth (see curve)	555

Volume outflow (75% - 25% effective depth):
$V_{p75} =$ 0.57 m^3

Mean surface area (inc. base of pit)
$a_{p50} =$ 3.93 m^2

Time for discharge (75% and 25% effective depth):
$t_{p75-25} =$ 410 minutes

Soil infiltration rate:
f = 5.86E-06 m/s



ARP GEOTECHNICAL LTD SOAKAWAY TEST RESULTS

TP8 TEST 1

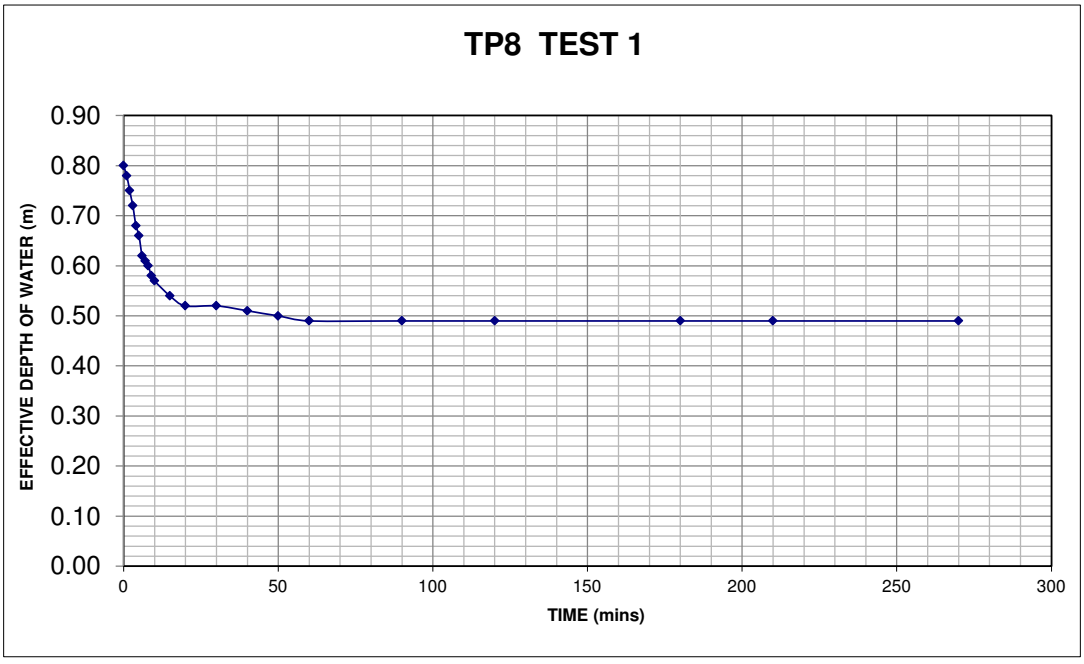
Depth of pit	1.100
Depth to water at start	0.300
Length of hole at max. filled water level	3.000
Length of hole at base	3.000
Average	3.000
Width of hole at surface	0.600
Width of hole at base	0.600
Average	0.600
Maximum effective depth	0.80
75% effective depth	**0.600**
50% effective depth	0.400
25% effective depth	**0.200**
Depth of hole	1.100
50% Effective depth	0.400
Time in mins at 75% effective depth (see curve)	n/a
Time in mins at 25% effective depth (see curve)	n/a

Volume outflow (75% - 25% effective depth):
$V_{p75=}$ 0.72 m^3

Mean surface area (inc. base of pit)
$a_{p50=}$ 4.68 m^2

Time for discharge (75% and 25% effective depth):
$t_{p75-25=}$ #VALUE! minutes

Soil infiltration rate:
f = #VALUE! m/s



Appendix H
Correspondence with Yorkshire Water

From:	Technical Sewerage
To:	Jasmine Ellenor
Subject:	RE: West House, Gomersal - Drainage Strategy
Date:	28 August 2025 15:39:57
Attachments:	image003.png image005.png

Hi Jasmine,

Thanks for that, I note the low rate of infiltration I have no issue with surface water discharging to the public sewer system at a rate of 3.5 litres/second.

Kind regards

YorkshireWater

George Mullaney
Town Planning Technician
Land and Property

0345 120 8482
yorkshirewater.com/developers

From: Jasmine Ellenor <jasmine@amatp.co.uk>
Sent: 14 August 2025 15:48
To: George Mullaney <george.mullaney@yorkshirewater.co.uk>
Cc: Technical Sewerage <technical.sewerage@yorkshirewater.co.uk>
Subject: RE: West House, Gomersal - Drainage Strategy

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Hi George,

Thanks for confirming, please see attached infiltration test report for reference

Kind regards,

Jasmine Ellenor
Flood Risk and Drainage Engineer
BSc Grad.CIWEM

Mobile: 0774 266 8250
Leeds Office: 0113 418 2615
Newcastle Office: 0191 486 2745
Web: www.amatp.co.uk

Andrew Moseley Associates Ltd
Yorkshire: 15 St Pauls Street, Leeds, LS1 2JG
North East: Haylofts, 5 St Thomas' Street, Newcastle upon Tyne, NE1 4LE



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From: George Mullaney <george.mullaney@yorkshirewater.co.uk>
Sent: 14 August 2025 15:18
To: Jasmine Ellenor <jasmine@amatp.co.uk>
Cc: Technical Sewerage <technical.sewerage@yorkshirewater.co.uk>
Subject: RE: West House, Gomersal - Drainage Strategy

Good afternoon Jasmine,

I'm doing well thanks hope you are too, would you be able to provide the results of the infiltration testing? Subject to this, surface water may discharge to the 225mm diameter foul/combined sewer in Oxford Road. The surface water discharge rate should be limited to maximum rate of 3.5 litres/second.

Kind regards

YorkshireWater
George Mullaney
Town Planning Technician
Land and Property
0345 120 8482
yorkshirewater.com/developers

From: Jasmine Ellenor <jasmine@amatp.co.uk>
Sent: 29 July 2025 14:51
To: George Mullaney <george.mullaney@yorkshirewater.co.uk>

Subject: West House, Gomersal - Drainage Strategy

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Afternoon George,

Hope you're well. I am emailing regarding a drainage strategy that AMA are undertaking for a residential development located at West House, Oxford Road, Swincliffe, Gomersal, Kirklees, West Yorkshire, BD19 4JZ at NGR: SE 20453 26901.

Back last year you provided us with the attached pre-development enquiry response. In this response you state that there is no capacity for surface water within the public sewer network. Infiltration testing has been undertaken on site which confirmed that soakaways are not viable at the site, and there are no watercourses located within close proximity to the site. As such, we would look to discharge surface water from the site to the surrounding foul sewer network. I note from the plans provided there are a number of combined sewers outfalling to the public foul sewer, so would assume discharging surface water in this scenario would also be acceptable.

Please can you confirm if this is an acceptable outfall of surface water from the site and any required restrictions to discharge rates

Thanks in advance

Kind regards,

Jasmine Ellenor
Flood Risk and Drainage Engineer
BSc Grad.CIWEM

Mobile: 0774 266 8250
Leeds Office: 0113 418 2615
Newcastle Office: 0191 486 2745
Web: www.amatp.co.uk

Andrew Moseley Associates Ltd
Yorkshire: 15 St Pauls Street, Leeds, LS1 2JG
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Appendix I
Causeway Flow Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SW 1	0.038	5.00	145.660	1200	1.160
SW 2	0.038	5.00	144.160	1200	1.130
SW 3	0.038	5.00	143.230	1200	2.230
SW 4	0.038	5.00	142.840	1350	3.065
Flow Control	0.038	5.00	141.720	1350	2.450
Tank	0.000	5.00	142.000	1350	2.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW 1	SW 2	14.500	0.600	144.500	143.100	1.400	10.4	150	5.08	50.0
1.001	SW 2	SW 3	26.900	0.600	143.030	141.850	1.180	22.8	225	5.24	50.0
1.002	SW 3	SW 4	10.400	0.600	141.000	140.000	1.000	10.4	225	5.28	50.0
1.003	SW 4	Tank	12.100	0.600	139.775	139.350	0.425	28.5	450	5.33	50.0
1.004	Tank	Flow Control	14.500	0.600	139.350	139.270	0.080	181.3	450	5.50	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.148	55.6	6.9	1.010	0.910	0.038	0.0	35	2.149
1.001	2.752	109.4	13.7	0.905	1.155	0.076	0.0	53	1.887
1.002	4.080	162.2	20.6	2.005	2.615	0.114	0.0	54	2.827
1.003	3.821	607.7	27.5	2.615	2.200	0.152	0.0	65	1.979
1.004	1.507	239.6	27.5	2.200	2.000	0.152	0.0	102	1.018

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.350	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	30	10	0

Node Flow Control Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	139.270	Product Number	CTL-SHE-0074-3500-2300-3500
Design Depth (m)	2.300	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	139.350
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	0.0	2.200	50.0	0.0	2.201	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	10	144.535	0.035	6.2	0.0391	0.0000	OK
15 minute summer	SW 2	10	143.082	0.052	12.3	0.0585	0.0000	OK
15 minute summer	SW 3	10	141.054	0.054	18.4	0.0609	0.0000	OK
15 minute summer	SW 4	9	139.836	0.061	24.5	0.0877	0.0000	OK
120 minute summer	Flow Control	90	139.635	0.365	5.3	0.5224	0.0000	OK
120 minute summer	Tank	88	139.631	0.281	11.6	13.7672	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	6.1	2.043	0.110	0.0436	
15 minute summer	SW 2	1.001	SW 3	12.2	1.804	0.111	0.1819	
15 minute summer	SW 3	1.002	SW 4	18.3	2.619	0.113	0.0727	
15 minute summer	SW 4	1.003	Tank	24.4	1.910	0.040	0.4092	
120 minute summer	Flow Control	Hydro-Brake®		2.4				29.0
120 minute summer	Tank	1.004	Flow Control	5.3	0.188	0.022	1.7541	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	10	144.556	0.056	15.1	0.0629	0.0000	OK
15 minute summer	SW 2	10	143.113	0.083	30.1	0.0940	0.0000	OK
15 minute summer	SW 3	10	141.089	0.089	44.9	0.1002	0.0000	OK
180 minute winter	SW 4	176	140.322	0.547	14.4	0.7821	0.0000	SURCHARGED
180 minute winter	Flow Control	176	140.322	1.052	6.0	1.5048	0.0000	OK
180 minute winter	Tank	176	140.322	0.972	17.3	47.5395	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	15.0	2.603	0.270	0.0836	
15 minute summer	SW 2	1.001	SW 3	29.8	2.302	0.273	0.3486	
15 minute summer	SW 3	1.002	SW 4	44.8	3.290	0.276	0.1416	
180 minute winter	SW 4	1.003	Tank	14.3	1.263	0.024	1.9172	
180 minute winter	Flow Control	Hydro-Brake®		2.4				54.2
180 minute winter	Tank	1.004	Flow Control	-3.7	0.140	-0.016	2.2974	

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Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.64%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	10	144.580	0.080	27.9	0.0904	0.0000	OK
15 minute summer	SW 2	10	143.149	0.119	55.6	0.1349	0.0000	OK
240 minute winter	SW 3	232	141.510	0.510	16.2	0.5772	0.0000	SURCHARGED
240 minute winter	SW 4	232	141.510	1.735	21.6	2.4829	0.0000	SURCHARGED
240 minute winter	Flow Control	232	141.510	2.240	5.4	3.2055	0.0000	OK
240 minute winter	Tank	232	141.510	2.160	22.8	105.6952	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	27.7	3.026	0.498	0.1329	
15 minute summer	SW 2	1.001	SW 3	55.2	2.680	0.504	0.5538	
240 minute winter	SW 3	1.002	SW 4	16.2	2.376	0.100	0.4136	
240 minute winter	SW 4	1.003	Tank	20.6	1.263	0.034	1.9172	
240 minute winter	Flow Control	Hydro-Brake®		3.5				82.6
240 minute winter	Tank	1.004	Flow Control	4.2	0.141	0.017	2.2974	

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SW 1	0.043	5.00	150.460	1200	1.050
SW 2	0.043	5.00	149.550	1200	1.120
SW 3	0.043	5.00	148.280	1200	2.170
SW 4	0.043	5.00	146.500	1200	2.190
SW 5	0.043	5.00	145.200	1200	2.100
Tank	0.000	5.00	144.650	1200	1.600
Flow Control	0.000	5.00	145.000	1500	2.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW 1	SW 2	20.000	0.600	149.410	148.430	0.980	20.4	150	5.15	50.0
1.001	SW 2	SW 3	25.500	0.600	148.430	146.110	2.320	11.0	150	5.29	50.0
1.002	SW 3	SW 4	18.400	0.600	146.110	144.310	1.800	10.2	225	5.36	50.0
1.003	SW 4	SW 5	12.100	0.600	144.310	143.100	1.210	10.0	225	5.41	50.0
1.004	SW 5	Tank	1.400	0.600	143.100	143.050	0.050	28.0	300	5.42	50.0
1.005	Tank	Flow Control	4.300	0.600	143.050	143.000	0.050	86.0	300	5.46	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.239	39.6	7.8	0.900	0.970	0.043	0.0	45	1.742
1.001	3.056	54.0	15.5	0.970	2.020	0.086	0.0	55	2.642
1.002	4.116	163.6	23.3	1.945	1.965	0.129	0.0	57	2.928
1.003	4.161	165.5	31.1	1.965	1.875	0.172	0.0	65	3.205
1.004	2.982	210.8	38.9	1.800	1.300	0.215	0.0	87	2.297
1.005	1.696	119.9	38.9	1.300	1.700	0.215	0.0	117	1.518

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.350	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	30	10	0

Node Flow Control Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	143.000	Product Number	CTL-SHE-0086-3500-1200-3500
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	143.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	120.0	0.0	1.000	120.0	0.0	1.001	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	10	149.453	0.043	7.0	0.0482	0.0000	OK
15 minute summer	SW 2	10	148.483	0.053	14.0	0.0596	0.0000	OK
15 minute summer	SW 3	10	146.164	0.054	20.9	0.0614	0.0000	OK
15 minute summer	SW 4	10	144.372	0.062	27.8	0.0701	0.0000	OK
15 minute winter	SW 5	6	143.282	0.182	32.2	0.2063	0.0000	OK
120 minute summer	Tank	86	143.209	0.159	21.2	18.3388	0.0000	OK
120 minute summer	Flow Control	82	143.220	0.219	10.7	0.3878	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	7.0	1.448	0.176	0.0963	
15 minute summer	SW 2	1.001	SW 3	13.9	2.464	0.257	0.1435	
15 minute summer	SW 3	1.002	SW 4	20.8	2.561	0.127	0.1493	
15 minute summer	SW 4	1.003	SW 5	27.7	1.916	0.167	0.2102	
15 minute winter	SW 5	1.004	Tank	32.2	2.114	0.153	0.0317	
120 minute summer	Tank	1.005	Flow Control	10.7	0.450	0.090	0.2001	
120 minute summer	Flow Control	Hydro-Brake®		3.4				32.4

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Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	10	149.479	0.069	17.1	0.0778	0.0000	OK
15 minute summer	SW 2	10	148.520	0.090	34.1	0.1016	0.0000	OK
15 minute summer	SW 3	10	146.198	0.088	51.0	0.0997	0.0000	OK
15 minute summer	SW 4	10	144.410	0.100	67.9	0.1127	0.0000	OK
120 minute winter	SW 5	118	143.545	0.445	27.0	0.5035	0.0000	SURCHARGED
120 minute winter	Tank	118	143.538	0.487	27.0	56.1225	0.0000	SURCHARGED
120 minute winter	Flow Control	118	143.537	0.537	10.1	0.9496	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	17.0	1.802	0.430	0.1888	
15 minute summer	SW 2	1.001	SW 3	33.9	3.114	0.628	0.2776	
15 minute summer	SW 3	1.002	SW 4	50.8	3.239	0.310	0.2886	
15 minute summer	SW 4	1.003	SW 5	67.7	2.429	0.409	0.3322	
120 minute winter	SW 5	1.004	Tank	26.7	1.444	0.127	0.0986	
120 minute winter	Tank	1.005	Flow Control	10.1	0.472	0.084	0.3028	
120 minute winter	Flow Control	Hydro-Brake®		3.5				68.3

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Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 90.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW 1	12	149.697	0.286	31.6	0.3240	0.0000	SURCHARGED
15 minute summer	SW 2	12	149.136	0.706	61.8	0.7988	0.0000	SURCHARGED
15 minute summer	SW 3	10	146.226	0.116	84.3	0.1311	0.0000	OK
15 minute summer	SW 4	11	144.467	0.157	115.4	0.1780	0.0000	OK
180 minute summer	SW 5	132	144.106	1.006	55.0	1.1374	0.0000	SURCHARGED
120 minute winter	Tank	100	144.060	1.010	49.8	115.1990	0.0000	SURCHARGED
120 minute winter	Flow Control	100	144.065	1.065	11.7	1.8810	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW 1	1.000	SW 2	30.2	1.924	0.763	0.3521	
15 minute summer	SW 2	1.001	SW 3	54.2	3.296	1.004	0.4107	
15 minute summer	SW 3	1.002	SW 4	84.4	3.422	0.516	0.4621	
15 minute summer	SW 4	1.003	SW 5	114.3	3.047	0.691	0.4201	
180 minute summer	SW 5	1.004	Tank	54.2	1.482	0.257	0.0986	
120 minute winter	Tank	1.005	Flow Control	11.7	0.433	0.097	0.3028	
120 minute winter	Flow Control	Hydro-Brake®		3.5				63.9

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