mjm Consulting Engineers Ltd

Civil & Structural
Geotechnical & Environmental
Traffic & Highways
Drainage & Infrastructure

# Land North of Meltham Road, Marsden

## KCS Development Ltd

## FLOOD RISK ASSESSMENT

## &

## DRAINAGE STRATEGY

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|---|---|
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# 1.0 INTRODUCTION

## 1.1 Purpose of Assessment

MJM Consulting Engineers Ltd (MJM) have been commissioned by KCS Development Ltd to prepare a Flood Risk Assessment (FRA) and Drainage Strategy in support of an application for the Outline Planning for the proposed development of the Land North of Meltham Road in Marsden.

The application site is located within Flood_Zone_1 as defined by the Environment Agency (EA), the site is smaller than 1 hectare in size, but for completeness this Flood Risk Assessment and Drainage Strategy has been prepared in accordance with the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG).

## 1.2 Flood Risk Assessment

The assessment was commissioned principally in order to determine the risk of the site being flooded and the impacts of the proposed development on flood risk elsewhere in the catchment.

The Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG).

The report has mainly utilised information provided by the Environment Agency (EA), Kirklees Council and Yorkshire Water as well as from the topographical survey drawings for the site.

## 1.3 Report Structure

Following this introductory section:

- Section 2, describes the planning policy context within which proposals will be addressed.
- Section 3, details the existing site, considering any site specific information and current survey information obtained.
- Section 4, discusses the potential sources of flooding for the site.
- Section 5, considers the appropriate use of Sustainable Drainage Systems (SuDS).
- Section 6, presents the proposed surface water and foul water drainage strategies.
- Section 6, offers conclusions and recommendations.

## 1.4 Limitations

Floods are natural occurrences and the risks they pose are wide ranging. This study is primarily concerned with the risk to people and property from fluvial flooding and possible surface runoff flooding caused by the development. There is no statutory or regulatory requirement setting a minimum level of acceptable risk. The NPPF and PPG provide guidance on the flood zones related to the annual probability of river flooding, with 'low probability' being defined at an annual probability of <0.1%, 'medium probability' at 1% to 0.1% probability and high probability at >1%.

The risk of flood events occurring may most simply be expressed as an annual probability, e.g. a 1% annual probability flood. This event has been translated into having a 'return period' of 100 years, or the 1 in 100 year event. It is important to recognise that a 1% annual probability flood has a 26% chance of being equalled or exceeded at least once in 30 years (the typical design life for a building such as this) and a 49% probability of being equalled or exceeded at least once in 70 years. The 1% annual probability flood also has a 15% chance of occurring twice in 70 years.

Traditionally, design considerations focus on the Design Flood Event and typically the 1% annual probability of fluvial flooding (1 in 100 year flood event). This 1 in 100 year flood level value has been adopted as the design flood conditions in this study but strictly in the knowledge that this can still equate to a residual risk of flooding occurring, as discussed above.

## 2.0 PLANNING POLICY

### 2.1 National Planning Policy

The National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG) were introduced in March 2012 and were revised in December 2024. These documents set out the Government's national policies on land-use planning in England and how land-use Planning should be applied in relation to flood risk. The NPPF identifies flood risk as a specific material consideration in the Planning Process and in the allocation and release of sites for development or re-development.

The Framework seeks to strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. Through the Framework Local Planning Authorities will continue to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. The NPPF places a presumption in favour of sustainable development whilst meeting the challenge of climate change, flooding and coastal change. In accordance with Tables 1, 2 and 3 of the PPG, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk through application of the Sequential Test.

To establish the appropriateness of development at a specific site the NPPF refer to the Flood Zones which are shown on the Environment Agency Flood Map, and establishes the range of uses which are appropriate, or compatible, land uses for each Flood Zone.

The Flood Zones can be summarised as follows:

- Flood Zone 1: Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year (<0.1%).

- Flood Zone 2: Medium Probability. This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

- Flood Zone 3a: High Probability. This zone comprises land assessed as having 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

- Flood Zone 3b: Functional Flood Plain. This zone comprises land where water must flow or stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

As part of this process, it is necessary to consider the type and nature of the development. The PPG defines the type and nature of different development classifications on the context of their flood risk vulnerability. This has been summarised in Table 2.1 below.

| Flood Risk Vulnerability | Essential Infrastructure | Water Compatible | Highly Vulnerable | More Vulnerable | Less Vulnerable |
|---|---|---|---|---|---|
| Zone 1 | √ | √ | Exception Test Required | √ | √ |
| Zone 2 | Exception Test Required | √ | Exception Test Required | √ | √ |
| Zone 3a | Exception Test Required | √ | × | Exception Test Required | √ |
| Zone 3b | Exception Test Required | √ | × | × | × |
| √ Development is appropriate × Development should not be permitted. | | | | | |

Table 2.1: Flood Risk Vulnerability and Flood Zone Compatibility

The site is located within **Flood_Zone_1** and has an area less than 1.0 hectare. The site will be used for dwelling houses which is classed as a More Vulnerability use. Therefore, it is deemed that the development is appropriate, and an exception test is not required.

## 2.2 Climate Change Impacts

The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change on flooding and coastal change. The NPPF and the supporting planning practice guidance on Flood Risk and Coastal Change explain how flood risk will be managed over a lifetime of the development, taking climate change into account. Local planning authorities refer to this when preparing local plans and considering planning applications.

The climate change allowances are predictions of anticipated change for:

- Peak river flow,
- Peak rainfall intensity,
- Sea level rise,
- Offshore wind speed and extreme wave height.

The importance of climate change in regard to flooding and development is highlighted in the EA guidance, from May 2022. Based on the climate change allowance map, the site is in the Aire and Calder Management Catchment. The table is reproduced in Table 2.2 shown below.

| Annual exceedance Rainfall Event | 3.3% | | 1% | |
|---|---|---|---|---|
| Allowance Category | '2050s' (2040 to 2069) | '2070s' (2070 to 2125) | '2050s' (2040 to 2069) | '2070s' (2070 to 2125) |
| Central | 20% | 25% | 25% | 30% |
| Upper | 40% | 35% | 40% | 45% |

Table 2.2 – Peak Rainfall Intensity Allowance in Small Catchments (less than 5 km$^2$).

The proposal for the site is for Residential end use, which in this context is considered to have a lifetime expectancy of 100 years. Therefore, in order to address the effects of climate change on the proposed development peak rainfall intensities should be factored (increased) by 45% and included within the Surface Water Drainage Strategy.

For peak river flows the EA guidance states that the application of climate change should be considered based on the Flood Zone and the Appropriate Flood Risk Vulnerability Classification. As the proposed development lies wholly within Flood_Zone_1 the assessment of peak river flows is not required.

## 2.2 Local Planning Policy

The Kirklees Council Local Plan, Kirklees Local Plan Strategy and Policies , was adopted in 27th February 2019 and sets out the Council's policies on development of the borough up to 2031.

The Planning Policy of particular relevance to the site is Policy_LP4, which states that

*Policy LP4*
*Providing infrastructure*
*The council will work with partners to bring forward the necessary and proportionate essential and desirable infrastructure that is required in order to deliver the spatial strategy as set out in the Local Plan. Essential infrastructure is defined as infrastructure that is required to make development acceptable in planning terms. Desirable infrastructure is described as infrastructure which would improve the capacity and deliver place making benefits. Where new infrastructure is needed to support new development, the essential infrastructure must be operational no later than the appropriate phase of development for which it is needed. Where new infrastructure is needed, the council will expect phasing plans to be submitted as part of planning applications and where appropriate, will link the construction and occupation of that development to infrastructure provision. New development should contribute to the provision of infrastructure, taking account of local and strategic needs and financial viability. This may be achieved on-site or off-site through planning conditions*

## 3.0 SITE CONTEXT AND DEVELOPMENT DETAILS

### 3.1 Site Location and Description

The application site is located in Marsden, bounded to the north by Agricultural fields, to the east by Agricultural fields, to the south by Meltham Road with Moor Land beyond, and to the west by Residential Dwellings. The site location is presented in Figure 3.1 below.


Figure 3.1 – Site Location Plan

The site is centred on National Grid Reference SE 05815 12100 (E=405815 N=412100).

Access to the site is gained from Meltham Road to the South of site. The site extends to approximately 0.65 hectares and is currently utilised as an agricultural field. Land uses in the surrounding area have been summarised in Table 3.1 below.

| Direction | Land Uses |
|---|---|
| To the North | Agricultural |
| To the East | Agricultural |
| To the South | Moor Land |
| To the West | Residential |

Table 3.1 – Land Uses in the Surrounding Area

## 3.2 Existing Site Topography

The existing site levels can be found on Latitude Surveys drawings EH1012-001. The site lies at a general elevation of between 241.83 and 255.45 Above Ordinance Datum (AOD). The lowest part of site is located in the northwestern corner with levels rising generally in a southeastern direction. The highest part of site is the southeastern corner. The existing ground levels on site are summarised in Table 3.2 below and Latitude Surveys drawings are reproduced in full within Appendix B.

| Item | Level (mAOD) | Source | Comment |
|---|---|---|---|
| Maximum and minimum ground levels. | 241.83 – 255.45 | Latitude Surveys drawings EH1012-001 | |
| Existing ground levels on site along the northern site boundary. | 241.83 – 245.72 | Latitude Surveys drawings EH1012-001 | |
| Existing ground levels on site along the eastern site boundary. | 245.72 – 255.45 | Latitude Surveys drawings EH1012-001 | |
| Existing ground levels on site along the southern site boundary. | 250.20 – 255.45 | Latitude Surveys drawings EH1012-001 | |
| Existing ground levels on site along the western site boundary. | 241.83 – 250.20 | Latitude Surveys drawings EH1012-001 | |

Table 3.2 – Summary of Existing Land Level Information

## 3.3 Development Proposals

The application seeks planning permission for the development of Nine Residential Dwellings with associated access roads, driveways, gardens. A proposed site layout has been produced and is presented within Appendix A.

The site measures 6500m$^2$, Vehicular access to the application site will be from Meltham Road where there is a proposed access junction.

## 3.4 Geology and Hydrology

At the time of writing this report a phase 1 site investigation has been carried out, there haven't been any intrusive investigations within the site therefore, Information has been taken form the British Geological Survey (BGS) Web Site. Please refer to points 3.4.1 and 3.4.2 below.

### *3.4.1 Published Geology*

Published geology mapping from BGS indicates the site to be underlain with :-
Bedrock geology for the site is the Marsden Formation – Mudstone and Siltstone in the Southern half of the site and Midgley Grit – Sandstone in the Northern half of the site.

There are no records of the Superficial deposits for the site or immediate surrounding area. There aren't any Borehole records in close proximity with the nearest being approximately 0.25 km to the Northeast of the site boundary. These are within the Marsden Formation and show a Clay turning to Mudstone and Siltstone. These boreholes are at a much lower elevation than the site and may not reflect what would be encountered.

### *3.4.2 Published Hydrogeology*

The underlying Bedrock Deposit is classified as a 'Secondary A' aquifer.

Secondary 'A' aquifers are defined as permeable layers capable of support water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The site is not affected by any source protection zones with the nearest being 0.8 km to the East of the site

## 3.5 Existing Watercourses, Water Bodies, Drains

There are no existing watercourses, water bodies or drains within or bounding the site. The nearest main river is the River Colne which is located 0.26 km to the North with Huddersfield Narrow Canal just beyond. The nearest watercourse is 0.23 km to the East of the site boundary is Cellars Clough. With Blackmoorfoot Conduit and Deer Hill Conduit 0.26 km and 0.78km respectively to the South with Deer Hill Reservoir just beyond. There is also a drain located 45m to the Southeast of the site which runs into a culvert from records provided by the LLFA this runs into Meltham Road there is nothing shown for where this goes. Although, there are further culverted watercourses within Gate Head that would appear to drain into the River Colne and therefore it has been assumed that the drain either connects onto these or into the surface water sewers. A copy of the LLFA correspondence is within Appendix I

## 3.6 Existing Drainage Infrastructure

The sewer infrastructure network in the vicinity of the site is owned and operated by Yorkshire Water. Sewer records obtained from Yorkshire Water are presented within Appendix C.

These show that there are Foul and Surface Water sewers within Gate Head approximately 0.19 km to the West. It is expected that there will be further foul and surface water sewer within Meltham Road closer to the proposed development, but these are likely to be private sewer that have been transferred to public ownership within the private sewer transfer 2011. Therefore, it would be recommended to survey the area to determine if there are closer sewers that could be utilised for the disposal of waste water.

## 3.7 Existing (Pre-Development) Surface Water Runoff Regime

The site is currently Greenfield, therefore any rain falling on the site is considered to flow overland or discharge directly to ground over time.

Quantifying the Greenfield runoff rate from a site or area is complex and is a function of many variables, including geographic location, hydrological data, soil conditions, catchment size etc. Where the catchment is less than 50 hectares in size, current guidance indicates that the Greenfield runoff rate can be estimated using The Institute of Hydrology (IoH) Report No. 124 'Flood Estimation for Small Catchments' (Marshall & Bayliss 1994), with the Flood Studies Supplemental Report (FSSR) 14 (Institute of Hydrology 1993) Regional Growth Curve Factors then used to calculate peak Greenfield runoff rates for various return period events.

Alternatively, HR Wallingford and the EA have developed a website to enable designers to calculate the Greenfield runoff rates for the site, depending on their location and hydrological characteristics. The website has been used to calculate the Greenfield runoff rates from the site as shown in Table 3.3 below. A copy of the calculation is also presented within Appendix D.

| Storm Event Return Period | Greenfield Runoff Rate X ha (l/s) |
|---|---|
| Qbar | 2.50 |
| 1:1 Year | 2.20 |
| 1:30 Year | 4.40 |
| 1:100 Year | 5.20 |

Table 3.3 – Estimated Greenfield Runoff Rates.

Surface water runoff in excess of these rates will need to be attenuated on site prior to disposal. By limiting the runoff from the proposed development to existing pre-development rates, the existing runoff regime on the site is maintained and the water body does not receive any increased flows as a result of the proposed development.

## 4.0 POTENTIAL SOURCES OF FLOODING

Based on a review of the site characteristics, the proposed development and the flooding related information, the potential sources of flooding that could affect the subject site and proposed development are summarised in Table 4.1 below.

| Flood Source | Mechanism | Applicable to Site |
|---|---|---|
| Fluvial Flooding | Exceedance of the flow capacity of the channel of a river, stream or other natural watercourse, typically associated with heavy rainfall events. Excess water spills onto the flood plain. | Not applicable as not in close proximity to a watercourse and due to the topography would not affect the site |
| Coastal and Tidal Flooding | High tides, storm surges and wave action, often in combination. | Not applicable as not in close proximity to any coast or tidal feature. |
| Estuarial Flooding and Watercourses affected by Tidelocking | Often involving high tidal levels and high fluvial flows in combination. | Not applicable as not in close proximity to any estuary. |
| Groundwater Flooding | Raised groundwater levels, typically following prolonged rain (may be slow to recede). High groundwater levels may result in increased overland flow flooding. | SFRA has been reviewed and shows the site to be in a less than 25% chance area |
| Flooding from Overland Flow | Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water. | EA and OS maps have been reviewed. Site and surrounding topography would prevent this from affecting the proposed development. |
| Flooding from Artificial Drainage Systems | Blockage or overloading of pipes, sewers, canals, and drainage channels or failure of pumping stations. Typically following heavy rain or as a result of high water levels in a receiving watercourse. | Yorkshire Water drawings, EA and OS maps have been reviewed and show the site is not affected due to surrounding topography |
| Flooding from Infrastructure Failure | Structural, hydraulic or geotechnical failure of infrastructure that retains, transmits or controls the flow of water. | EA maps have been reviewed and show the Site won't be affected. |

Table 4.1 – Categories of Flood Mechanisms and Potential Sources of Flooding

### 4.1 Fluvial and Tidal Flooding

The 'Flood Map for Planning' presented below in Figure 4.1 shows the site is wholly located within **Flood Zone 1** and has such has a low probability of flooding (less than 1 in 1000 annual probability (<0.1%)).

A flood map for planning report created from the EA website is included within Appendix E.

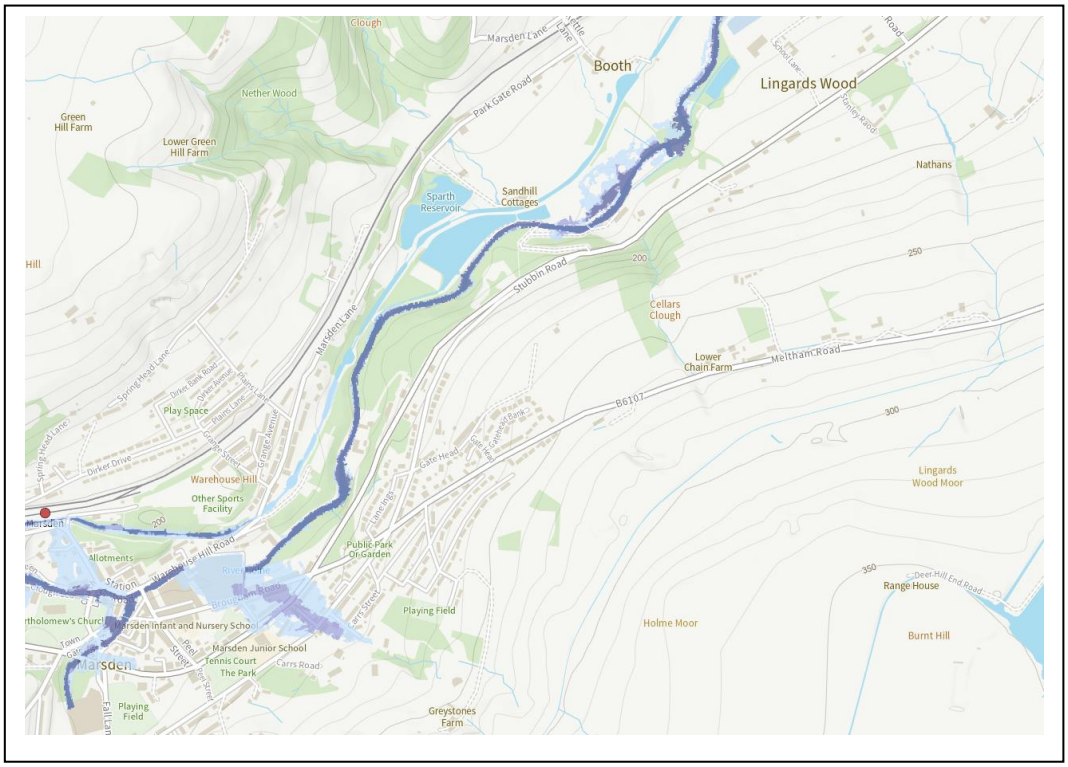



Figure 4.1 – Flood Map for Planning from EA

The development of dwelling houses, which is classed as a more vulnerable use, is compatible with the site in Flood_Zone_1.

The risk of flooding to the proposed development from fluvial and tidal sources is considered to be low.

## 4.2 Groundwater Flooding

Section 3.4 and Figure 3-5 of the Kirklees Council SFRA shows that the site is at a low risk being in an area of yellow hatch representing a less than 25% risk of groundwater emergence. Figure 4.2 below shows an extract of the Areas Susceptible to Groundwater Flooding from Calder Catchment SFRA.

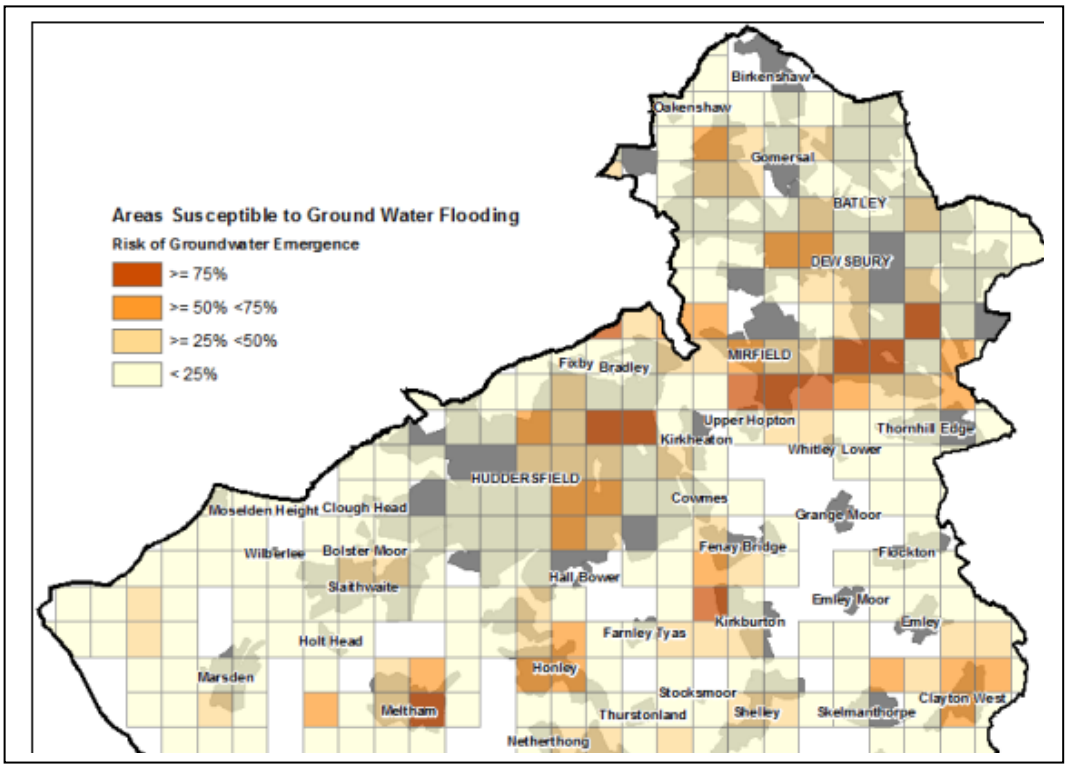



Figure 4.2 – Areas Susceptible to Groundwater Flooding from Calder Catchment SFRA Volume II (Kirklees Council)

Therefore, the risk of flooding to the proposed development from this source is considered to be Low.

## 4.3 Flooding from Land – Overland Flow and Surface Water Flooding

The EA's surface water flood risk map is presented in Figure 4.3 below. This plan indicates that the site is not at risk of overland flow or surface water flooding within the proposed site.

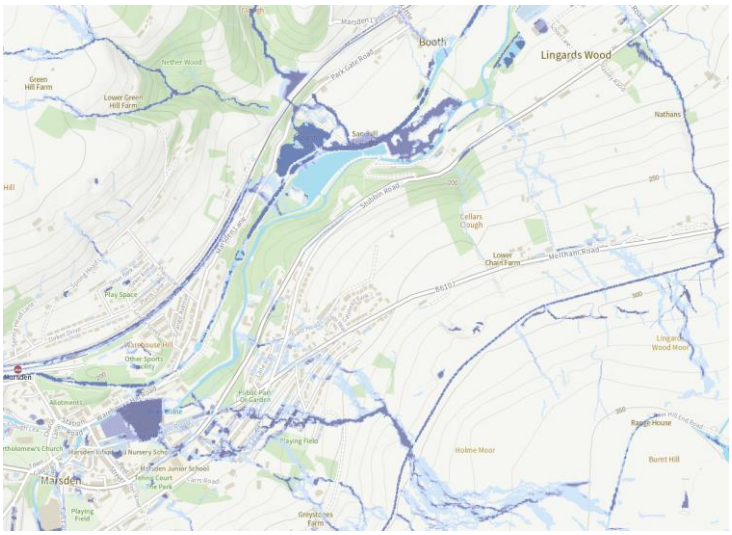



Figure 4.3 – Extent of Flooding from Surface Water from EA

As the site will be developed, the levels will be designed so that surface water is conveyed away from the buildings. The proposed buildings will have finished floor levels that will be higher than the surrounding area making sure that no surface water enters the property.

Therefore, the risk of flooding to the proposed development from surface water and overland flow is considered to be low.

## 4.4 Flooding from Sewers

In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as 'combined sewers'. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or is of inadequate capacity; this will continue until the water drains away. When this happens to combined sewers, there is a high risk of land and property flooding with water contaminated with raw sewage as well as pollution of rivers due to discharge from combined sewer overflows.

There are no known existing public sewers within the boundary. Also, the public sewer records indicate the existing sewers are not in close proximity of the site and they are also at a lower elevation than the site so any flood waters emerging from the public sewers would flow away from the Site.

Consequently, the risk of flooding to the proposed development from this source is considered to be low.

## 4.5 Flooding Reservoirs, Canals and Other Artificial Sources

Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

The EA's flood risk from reservoirs map is presented in Figure 4.4 below which shows the site is not at risk from flooding from reservoirs, canals or other artificial sources.

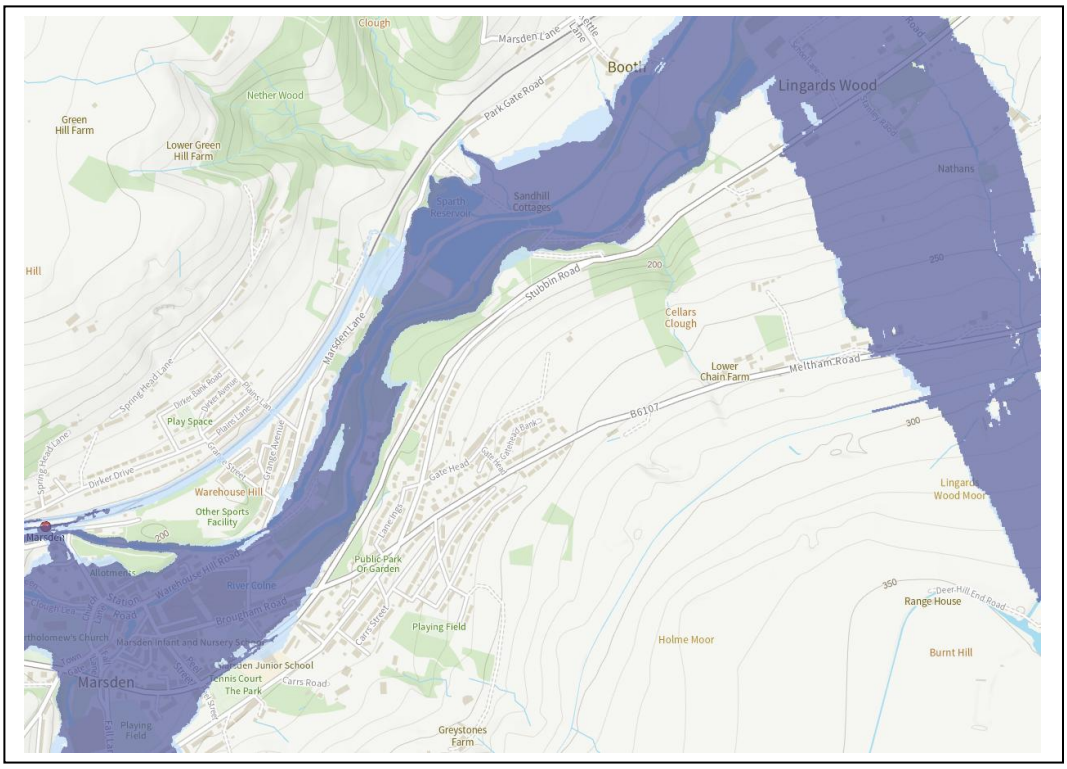



Figure 4.4 – Extent of Flooding from Reservoirs from EA

## 4.6 Flood Risk Summary

Based on the various searches and maps above, the proposed site is located within Flood Zone 1 and is therefore at low risk of flooding from fluvial and tidal sources. The site is also at low risk of flooding from all other sources applicable. Therefore, it can be considered that the proposed development is compatible with the site.

## 5.0 SuDS EVALUATION

As of 6th April 2015, all Planning Applications for 'major development' (In residential terms this is a site with 10 dwellings or more) will need to consider the use of Sustainable Drainage Systems. In this context the site is not considered a 'major' development as only 9 dwellings are proposed. Nonetheless a systematic approach to incorporation of SuDS features has been utilised due to the potential benefits they can bring.

Section 1.1 of the SuDS Manual (Ciria C753) states the following:

> *"Sustainable drainage systems (SuDS) can deliver multiple benefits. Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.*
> *The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water run-off from developed areas.*
> *The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone."*

## 5.1 Appropriate SuDS Features

### *5.1.1 Source Control*

*Green Roofs*
The implementation of a brown or green roof scheme to the buildings is not considered appropriate to the development due to the pitched roof structure and the excessive dead loads which a green roof system produces.

*Rainwater Harvesting*
Rainwater harvesting should be considered on this development. The provision of rainwater butts on roof water downpipes could be considered, details of which are subject to further design.

*Pervious/Permeable Surfaces*
*All soft landscaped areas will be naturally pervious. Hard landscaped area such as access roads and driveways will be positively drained via gullies and drainage channels. The use of porous paving should be considered for the driveways and if acceptable to Kirklees Council Highways department could be considered for the access roads.*

#### 5.1.2 *Swales and Conveyance Channels*

The steep nature of the site prevents the use of swales and conveyance channels.

#### 5.1.3 *Filtration*

The nature of the site prevents the use of filter trenches and bio-retention areas.

#### 5.1.4 *Infiltration*

*As noted by the LLFA the nature of the site prevents the use of soakaways into the ground. However, porous paving can still be used for transitioning the water from the surface to the below ground drainage, which slows flow and provides some storage at source.*

#### 5.1.5 *Retention and Detention*

*An attenuation basin to the north of the site combined with a flow control will limit discharge from site to 3l/s and provide adequate storage of water before draining to the nearby culverted watercourse to the west of the site. This will also help to improve the quality of the water.*

#### 5.1.6 *Inlets, outlets and Flow Control Structures*

*As the discharge of surface water is proposed to an attenuation basin the use of inlets and outlets and a flow control structure will be required.*

#### 5.1.7 *Proprietary Treatment Systems*

*All drainage channels and road gullies will incorporate catchpits which will provide separation at source for all the roads and driveways prior to discharging into the drainage system.*

#### 5.1.8 *Maintenance and Access Restrictions*

*The SuDS features proposed for use on this development will all be located within the hard landscaping. The proposed surface water drainage maintenance plan is presented within Appendix H.*

### 5.2 The Four Pillars of SuDS

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 5.1 below, which is a representation of The SuDS Manual Figure 2.1.

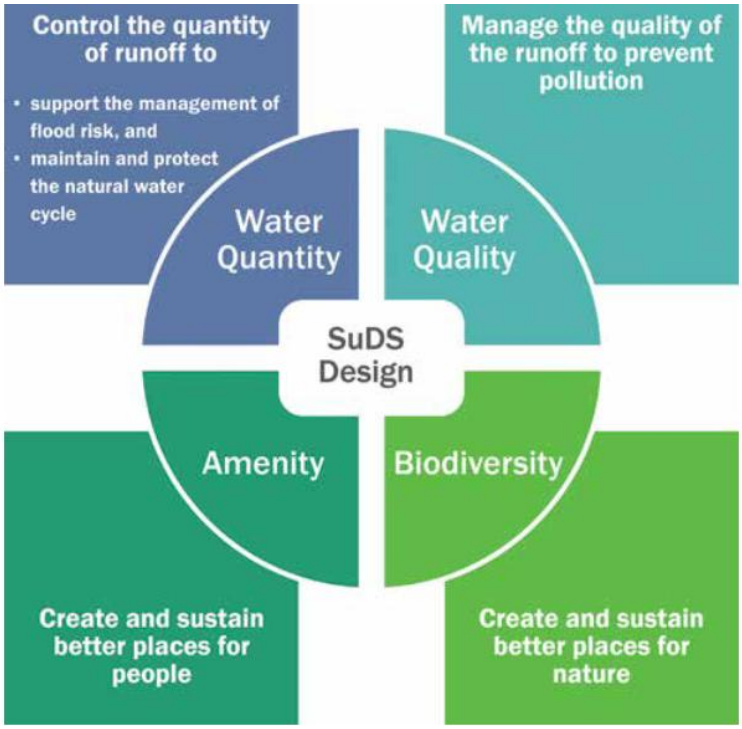


Figure 5.1 – Extract of Figure 2.1 from The SuDS Manual

### 5.2.1 Water Quantity

Water will be discharged from site using the culverted watercourse to the west of the site. The volume of the attenuation basin will be sized to limit runoff to greenfield rates for all rainfall events up to and including the 1:100 year storm event plus 45% allowance for climate change. Refer to Section 6 for more information.

### 5.2.2 Water Quality

The SuDS design for the development site should ensure the quality of any receiving water body is not adversely affected and preferably enhanced in accordance with Ciria SuDS Manual C753, Chapter 8. It is proposed to implement an attenuation basin to reduce discharge and treat the surface water from the development alongside porous paving and catchpits.

### 5.2.3 Amenity and Biodiversity

Please refer to the architect, landscape designer and ecologist submissions. These submissions will provide further detail on the steps taken to improve the amenity and biodiversity of the site.

# 6.0 POPOSED DEVELOPMENT

## 6.1 Proposed Site Layout

Refer to section 3.3 for a description of the development proposals. A proposed site plan is presented within Appendix A.

## 6.2 Surface Water Discharge

NPPF Planning Practice Guidance Paragraph 080 states that:

> *"Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:*
>
> - *Into the ground (infiltration);*
> - *To a surface water body;*
> - *To a surface water sewer, highway drain, or another drainage system;*
> - *To a combined sewer."*

### 6.2.1 Discharge to Soakaways or Infiltration Systems

A pre-application response from the LLFA has confirmed that soakaways or infiltration systems are not possible at this site as it is too steep and can risk reemergence and water around the foundations.

### 6.2.2 Discharge to Watercourse

There are no known water features on site or culverted watercourses indicated on current and historical mapping.

An open section of watercourse can be seen in land 50m to the southeast of the site (Hey Heads Farm) it is believed that this watercourse carries on in a culvert into the adjacent housing development. Sections of culverted watercourse are shown on Kirklees mapping in Gatehead and Gatehead Bank. Further survey work is required to accurately locate the culverts / watercourse

The track to the north of the site is a Public Right of Way. Engagement with Kirklees PROW department and third-party landowners is recommended to discuss rights to install sewers underneath so that flows can be conveyed to the culverted watercourse.

Pre-application consultations with the LLFA indicate that this location can be used as the discharge point for surface water

### 6.2.3 Discharge to Sewer

If connecting to the culverted watercourse proves to be unsuitable, a connection to the existing surface water sewer would be proposed.

A pre planning enquiry has been submitted to Yorkshire Water and they have confirmed further discussion will need to be held regarding alternative surface water disposal methods prior to considering a connection to the surface water sewers within Gate Head.

## 6.3 Proposed Surface Water Strategy

A surface water strategy has been designed in accordance with recognised standards to aid with future maintenance. The following criteria have been used for the design:

- The drainage system is designed to not flood any part of the site in a 1 in 30 year return period design storm.
- Some surface water flooding is permitted during the 1 in 100 year event, so as long as this occurs in controlled areas and does not pose a risk to life or property.
- An allowance for climate change of 45% will be used.
- In order to achieve the above, sufficient storm water attenuation will be provided to manage storm water discharging from site.
- Flows from rainfall in any event exceeding the 1 in 100 year event are managed in exceedance routes to minimise as far as practicable the risk of flooding to people and property both on and off site.
- The SuDS design for the development site should ensure that the quality of any receiving water body is not adversely affected and preferably enhanced in accordance with Ciria SuDS Manual, Chapter 4.
- Discharge rate off site to be restricted to 3l/s as noted with LLFA consultation response. Included in appendix I

Refer to Appendix F for the proposed drainage strategy layout and Appendix G for the associated calculations.

A 45% increase in peak rainfall intensity has been taken into account within the calculations for climate change. Based on this, the attenuation volume for the 1:100 year plus 45% climate change event is estimated to be 174 $m^3$.

The LLFA have also requested confirmation that the drain down time meets the minimum criteria of 50% in 24 hours. The discharge rate of 3l/s equates to a volume of 259$m^3$ per 24 hours which far exceeds the minimum criteria.

All surface water from impermeable areas will be collected and conveyed within a below ground gravity drainage network to the Northern landscaped area where it will discharge into a suitably sized attenuation basin. The restricted discharge will drain via gravity to the culverted watercourse.

## 6.4 Proposed Foul Water Strategy

The nearest outfall to the site is a combined sewer located to the west of the proposed development within Gate Head. This sewer then flows west. Yorkshire Water have also noted that there may be unmapped sewers in closer proximity to the proposed development that may be utilised for the foul connection point.

Yorkshire Water sewer records along with a Pre-Development Enquiry response from the Water Authority is included within Appendix C. Within the Pre Development Enquiry response Yorkshire Water confirms that foul water can discharge to the 150 mm diameter sewer recorded within Gate Head.

Proposed foul flow rates based on BS EN 12056-2 to calculate the peak foul flows based on Discharge Units with a 0.5 frequency factor gives 5.32 l/s (based on 25 wash basins, 7 showers, 9 baths, 12 sinks, 9 dishwashers, 9 washing machines and 25 toilets).

The topography of the site allows foul water to drain this way via gravity to the existing public sewers and there should be no need to pump water up the slope to the access road

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

Flood Zone mapping from the Environment Agency confirm the site is wholly located within **Flood Zone 1** and has a low probability of flooding (less than 1 in 1000 annual probability (<0.1%)).

The development of residential housing, which is classed as a more vulnerable use, is compatible with the site in Flood Zone 1.

Other sources of flooding that could potentially affect the site has been assessed and the risk is considered to be low.

The development proposals are in accordance with both National and Local Policy and Guidance relating to Flood Risk and Surface Water Management.

Following the preliminary assessment of the 1:100 year plus 45% for climate change storm event, and based on a 3l/s discharge rate, the on-site attenuation requirements will be in the order of 174$m^3$.

The proposed foul water drainage from the new development will ultimately be discharged into the existing combined sewer within Gate Head via gravity following the PROW track to the north of the site

Based on information provided to MJM Consulting Engineers, the proposed development of the site for residential use would be considered sustainable in terms of both Flood Risk and the management of Surface Water runoff.

# Appendix A – Proposed Site Layout Plan

North

0m 5 10 15 30m

1:500

All site dimensions shall be verified by the contractor on site prior to work commencing

Do not scale from this drawing
Only work to written dimensions



NOTES

Site layout subject to full engineers level review.

Landscaped buffer to development to transition to green boundarys and incorporate biodiversity net gain

Area of attenuation to engineer's details

Possible below ground route for redirected electric cable

Landscaped buffer to development to transition to green boundarys and incorporate biodiversity net gains.

Retaining walls to gardens. refer to engineers drawings for details

Existing over head powerlines to be relocated

Retaining walls to gardens refer to engineers drawings for details

New vehicle and pedestrian access created from Meltham Road. Refer to highways drawing for details.

Green enhanced landscaped entrance to incorporate biodiversity net gains

GATEHEAD BANK

MELTHAM ROAD

BCB

VP

VP

22.5m

4.8m

21.2m

21.2m

5.5m

19.4m

1

2

3

4

5

6

7

8

9

## SCHEDULE OF ACCOMMODATION

| | |
|---|---|
| TYPE 2A- 2 BED SEMI-DETACHED- 775 SQ FT (72 sq m)<br>(3 person) - Off street parking spaces - varies | 2 |
| TYPE 3A - 3 BED DETACHED -1,029 sq ft (95.8 sqm)<br>(5 person) - 2 no. off street parking spaces | 4 |
| TYPE 4A - 4 BED DETACHED - 1,253 sq ft (116 sqm)<br>(6 person) - Garage (3 X 6m minimum) 3 no. off street parking spaces | 1 |
| TYPE 4B - 4 BED DETACHED - 1,218 sq ft (113 sqm)<br>(6 person) - Integral garage (3 X 6m minimum) 3 no. off street parking spaces | 2 |
| TOTAL | 9 |

SITE AREA:
1.60 Acres (0.65 HA)

ASPECT

| Rev A | Layout updated to engineers drawings. | 30/04/2026 | DPE |
|---|---|---|---|
| Designation | Details of Revision | Date | Initials / Sign |

ellis healey
architecture

**PRELIMINARY**

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT, MELTHAM ROAD, MARSDEN

TITLE: PROPOSED SITE PLAN

DRAWING NO: **2402 P 102 (A)**

BY/CHECKED: NG / DPE DATE: APRIL 2026

SCALE @A3: 1:500

Tower Works, Globe Road, Leeds, LS11 5QG
Tel: 0113 3453090 E-mail: info@ellishealey.com

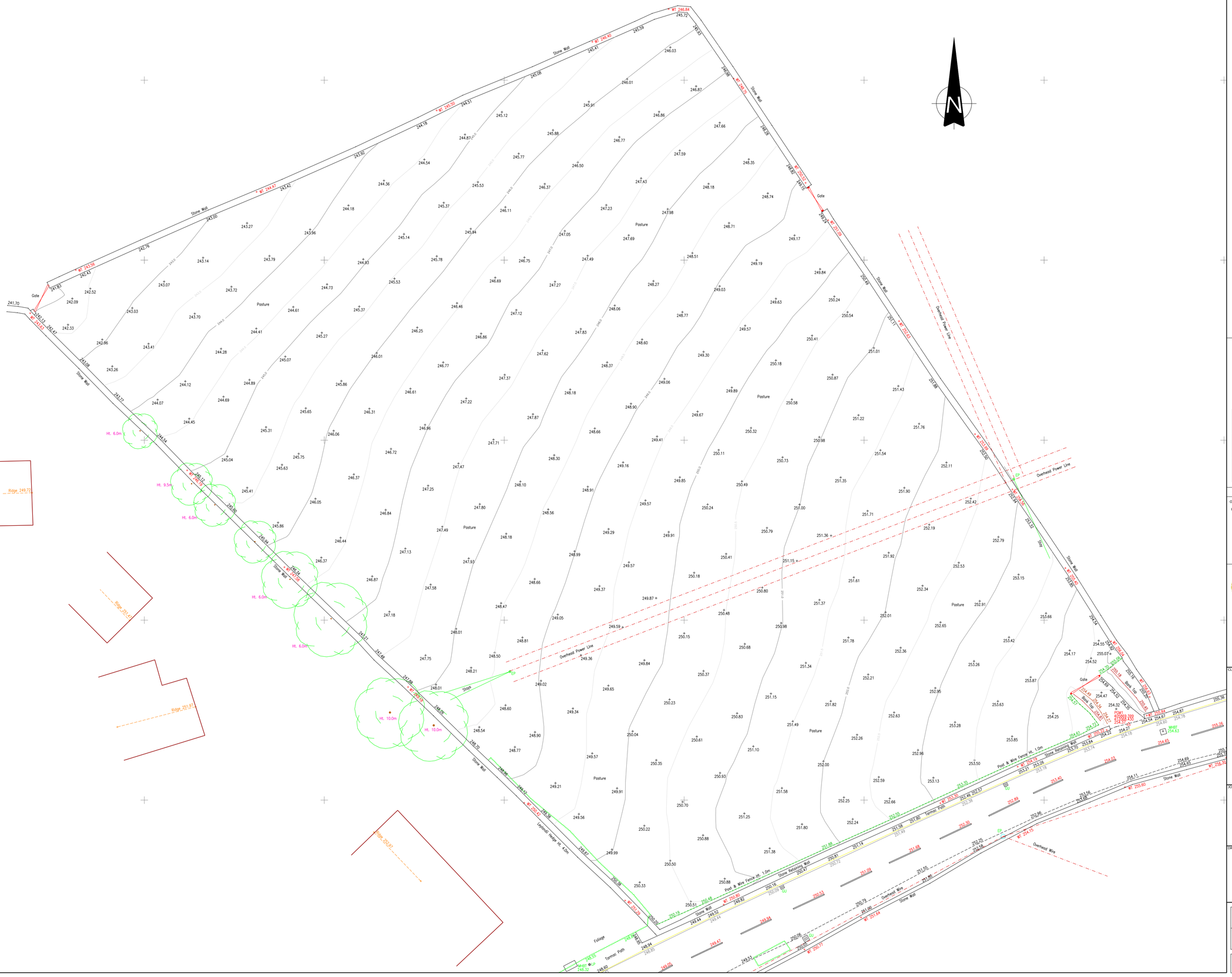
# Proposed Site Plan

Scale 1:500

# Appendix B – Topogrpahical Survey

E405740 E405760 E405780 E405800 E405820 E405840 E405860 E405880

N412140 N412120 N412100 N412080 N412060




## SYMBOL LEGEND

- Borehole
- Benchmark
- Bollard
- Bus Stop
- Electric Box
- Electricity Pole
- Fence Post
- Gas Stop Valve
- Gate Post
- Gas Marker
- Gully
- Gas Well
- Kerb Outlet
- Litter Bin
- Leachate Chamber
- Lamp Post
- Manhole Point
- MH Triangular
- Wooden Peg
- Ground Marker
- Marker Post
- Pylon
- Earth Rod
- Sample Point
- Sign Post
- Spot Height
- Eave Level
- Ridge Level
- Stile
- Survey Station
- Traffic Camera
- Telephone Box
- Trial Pit
- Telegraph Pole
- Deciduous Tree
- Road Sign
- Valve
- Vent
- Water Meter
- Letter Box
- MH Circular
- Knockout Pot

## LINETYPE LEGEND

- Bridge
- Bottom of Bank
- Building
- Canopy Edge
- Concrete Edge
- Ditch
- Drop Kerb
- Overhead Cable
- Fence
- Gate
- Kerb
- Path
- Pipe Line
- River
- Surface Water Drain
- Railway Line
- Road Centre Line
- Tarmac Edge
- Top of Bank
- Track
- Wall
- Verge
- Flagstone Paving
- Stone
- Hedgeline
- Grass Edge

## MANHOLE LEGEND

| | |
|---|---|
| MHCT | Cable Television |
| MHEL | Electricity |
| MHGA | Gas |
| MHSW | Surface Water |
| MHFW | Foul Water |
| MHBT | British Telecom |
| MHWT | Water |
| CL | Cover Level |

## ABBREVIATIONS

| | |
|---|---|
| LP. | Lamp Post |
| TP. | Telegraph Pole |
| EP. | Electricity Pole |
| SP. | Sign Post |
| TS. | Tarffic Sign |
| MH. | Manhole |
| CL. | Cover Level |
| MP. | Marker Post |
| GU. | Gully |
| TTP. | Tactile Paving |
| CATV. | Cable Television Point |
| WM. | Water Meter |
| WSV. | Water Stop Valve |
| GSV. | Gas Stop Valve |
| RE. | Rodding Eye |
| GU. | Gully |
| FH. | Fire Hydrant |
| CATV. | Cable Television Point |
| WM. | Water Meter |
| WSV. | Water Stop Valve |
| GSV. | Gas Stop Valve |
| EH. | Electric Hook Up |

SURVEY IS ORIENTED TO ORDNANCE SURVEY NATIONAL GRID. POSITIONS FIXED BY GPS ACTIVE NETWORK TO OS FLAT PLANE, ORIGIN POINT - PGM1. LEVELS TO OSGM15.

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN

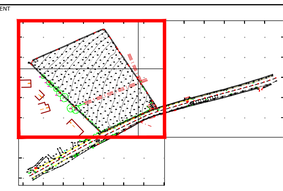
THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, CONSULT LATITUDE SURVEYS

| REV. | DESCRIPTION | DATE |
|---|---|---|
| Original | - | 05/05/2023 |
| Rev A | Extended road in both directions for Vis-Splay | 18/10/2024 |

LATITUDE SURVEYS | Chartered Land Surveyors

RICS the mark of property professionalism worldwide

CLIENT



JOB TITLE

# MELTHAM ROAD, MARSDEN

DRAWING TITLE

# TOPOGRAPHICAL SURVEY

| DRAWN | SIGNATURE | DATE | STATUS |
|---|---|---|---|
| TD | | 17/10/2025 | FOR COMMENT ☐ |
| APPROVED | SIGNATURE | DATE | FOR APPROVAL ☐ |
| | | | DRAFT ☐ |
| | | | FINAL ☑ |

| SCALE | SHEET | DRAWING NO. | REVISION |
|---|---|---|---|
| 1:200 | A1 | EH0012-001 | - |

# Appendix C – Yorkshire Water Enquiry Response and Maps

**Yorkshire Water Services**
**Land and Property**
**Western House**
**Western Way**
**Halifax Road**
**Bradford**
**BD6 2SZ**

**Tel: 0345 120 8482**
**Fax:**

**Email:**
**technical.sewerage@yorkshirewater.co.uk**

**MJM**
**Southgate House; 38 Southgate**
**Wakefield**
**West Yorkshire**
**WF1 1TL**

**Your Ref:**
**Our Ref: A/02926**

**For telephone enquiries ring:**
**George Mullaney on 0345 120 8482**

**14th November 2025**

Dear Mr Brown,

**Land off Meltham Road, Marsden Kirklees HD7 6LJ - Pre-Planning Sewerage Enquiry X127995**

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 150 mm diameter public foul sewer recorded in Gate Head, at a point to the west of the site. There may be unmapped public

sewers in closer proximity to the site, I would recommend surveying the area.

This permission is not an acceptance in respect to any planning conditions imposed under the Grant of Planning Permission.

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 (if any nearby) 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.

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 constructed in accordance with the Code for Adoption, pursuant to an agreement under

YorkshireWater

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 are valid for a period of 12 months. 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**
**Town Planning Technician**


405598 : 411942

Map Name : SE0511NE

Title

Notes

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



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 : 14/11/2025, 09:35:33

Date Gen : 14/11/2025, 09:35:44

Source : Sewer Network Enquiry

UPN: Undefined

Originator: G Mullaney, ,

# Appendix D – Greenfield Runoff Rates Estimate

# 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 | 27/11/2025 |
| Calculated by | Chris Brown |
| Reference | 25244 |
| Model version | 2.2.2 |

## Location

| | |
|---|---|
| Site name | Meltham Road |
| Site location | Marsden |


| | |
|---|---|
| Site easting (British National Grid) | 405821 |
| Site northing (British National Grid) | 412080 |

## Site details

| | |
|---|---|
| Total site area (ha) | .6517 ha |

# Greenfield runoff

## Method

| | |
|---|---|
| Method | IH124 |

## IH124

| | My value | | Map value |
|---|---|---|---|
| SAAR (mm) | 1331 mm | | 1331 |
| How should SPR be derived? | WRAP soil type | | |
| WRAP soil type | 2 | | 2 |
| SPR | 0.3 | | |
| QBar (IH124) (l/s) | 2.5 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) | 2.2 l/s |
| Flow rate 2 year (l/s) | 2.4 l/s |
| Flow rate 10 years (l/s) | 3.7 l/s |
| Flow rate 30 years (l/s) | 4.4 l/s |
| Flow rate 100 years (l/s) | 5.2 l/s |
| Flow rate 200 years (l/s) | 6.0 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

# Appendix E – EA Flood Maps

# Flood map for planning

| Your reference | Location (easting/northing) | Created |
|---|---|---|
| **Unspecified** | **405812/412095** | **14 April 2026 15:26** |

**Your selected location is in flood zone 1, an area with a low probability of flooding.**

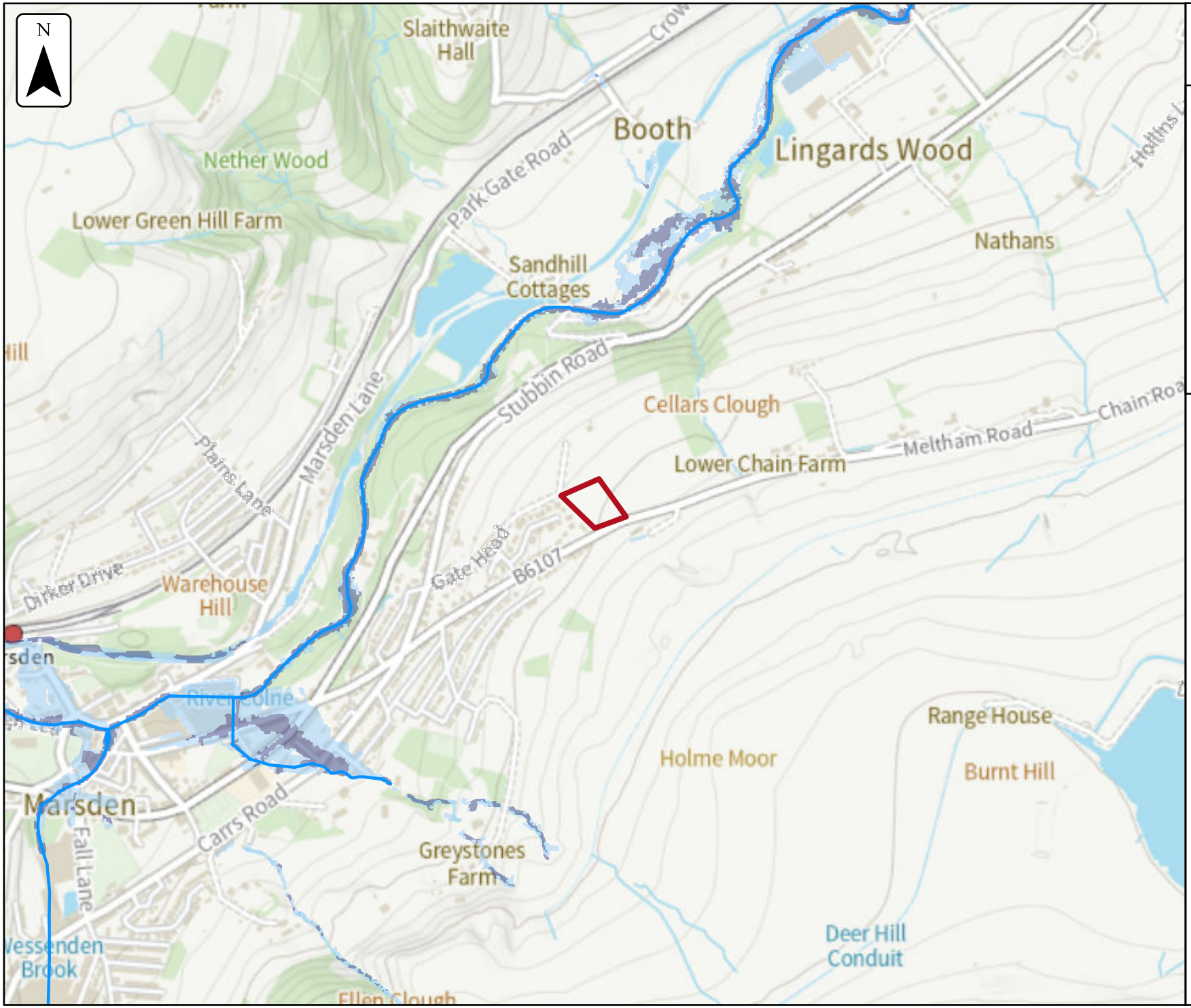
You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

**Notes**

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.




Environment Agency

## Flood map for planning

Your reference
**Unspecified**

Location (easting/northing)
**405812/412095**

Scale
**1:10,000**

Created
**14 Apr 2026 15:27**

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 100 200 300m

# Appendix F – Drainage Strategy Layout Plan

PROPOSED ATTENUATION BASIN TO ATTENUATE ALL STORM EVENTS UP TO AND INCLUDING THE 1 IN 100 YEAR EVENT WITH AN ADDITIONAL 45% ALLOWANCE FOR CLIMATE CHANGE. BASIN TO HAVE MINIMUM 1 IN 3 SIDE SLOPES WITH THE BASE AND SIDE SLOPES COVERED WITH VEGITATION AND UNDERLAIN WITH A MINIMUM 300mm LAYER OF TOPSOIL.

SUITABLE HEADWALL STRUCTURE FOR INLET AND OUTLET INTO BASIN TO HAVE A MINIMUM OF 1m x 1m STONE PITCHING TO PROTECT AND DISTRIBUTE FLOWS.

FIRST SURFACE WATER MANHOLE DOWNSTREAM OF ATTENUATION BASIN TO BE FITTED WITH A SUITABLE FLOW CONTROL RESTRICTING FLOWS TO 3 l/s

POROUS PAVEMENTS TO BE UTILISED FOR CAR PARKING SPACES FOR EACH DWELLING. TO BE TYPE A INFILTRATION 60mm BLOCK PAVIOUR ON 50mm COURSE GRADED SAND/BEDDING LAYER ON 225mm COURSE GRADED CLEAN STONE (4/20) WRAPPED WITH A SUITABLE PERMEABLE NEEDLE PUNCHED NON WOVEN GEOTEXTILE WITH MINIMUM 300MM LAPPED JOINTS.

NEW GRAVITY FOUL AND SURFACE WATER SEWER TO BE CONSTRUCTED ALONG TRACK AND CONNECTED ONTO EXISTING FOUL AND CULVERTED WATER COURSE DRAINAGE WITHIN GATE HEAD

ADDITIONAL INVESTIGATIONS TO CONFIRM ANY EXISTING UNMAPPED SEWERS WITHIN MELTHAM ROAD FOR A CLOSER CONNECTION POINT.

ALL ROOFS TO DRAIN VIA TRADITIONAL GUTTER AND DOWN PIPES (TO ARCHITECTS DESIGN) AND PIPED INTO BELOW GROUND GRAVITY DRAINAGE NETWORK. WATER BUTS TO BE UTILISED FOR RE-USE OF WATER WITHIN GARDEN, MINIMUM 1 PER PROPERTY

LOCATION OF ALL RWP'S AND SVP'S TO BE CONFIRMED BY ARCHITECT

GULLIES AND DRAINAGE CHANNELS USED TO DRAIN ALL IMPERMEABLE ACCESS ROADS LOCATIONS TO BE CONFIRMED DURING DETAILED DESIGN

## DESIGNER RISK INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:-

CONSTRUCTION:
- EXISTING SERVICES. CONTRACTOR TO ACCURATELY LOCATE PRIOR TO WORKS.
- REFER TO SITE INVESTIGATION FOR EXISTING GROUND CONDITIONS

MAINTENANCE/CLEANING:
N/A

DECOMMISSIONING/DEMOLITION:
N/A

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

## GENERAL NOTES

**KEY:**

Existing Sewers/Drains
- Surface Water
  - Pipe Run =
  - Manhole =
- Foul Water
  - Pipe Run =
  - Manhole =
- Culverted Watercourse =

Proposed Sewers/Drains
- Surface Water
  - Pipe Run =
  - Manhole =
- Foul Water
  - Pipe Run =
  - Manhole =
  - Rising Main =
- Other
  - Porous Paving =
  - Exceedance Routing =

| Rev | Date | Amendment | | |
|---|---|---|---|---|
| P03 | 28.04.26 | ATTENUATION BASIN AMENDED, EXCEEDANCE ROUTING ADDED. | AD | CB |
| P02 | 09.04.26 | DISCHARGE OFF SITE UPDATED TO SUIT LLFA COMMENTS | AD | CB |
| P01 | 02.12.25 | FIRST ISSUE | CB | CB |

mjm Consulting Engineers Ltd
Southgate House, 38 Southgate, Wakefield WF1 1TL
T: 01924 811 000 mjmc.co.uk

Project:
LAND NORTH OF MELTHAM ROAD, MARSDEN

Client:
KCS DEVELOPMENT Ltd

Drawing Title:
SCHEMATIC DRAINAGE LAYOUT

| | | |
|---|---|---|
| CB | | CB |
| MJMC Ref: 25244 | Scale: 1:250 1:1000 | Sheet Size: A1 |
| Revision Status: P03 | Suitability Status: S2 | Date: DEC 2024 |

Suitability Description: INFORMATON

Drawing Reference:
Project - Originator - Zone - Level - File Type - Discipline - Number
25244 - MJM - XX - XX - DR - C - 5200

# Appendix G – Drainage Strategy Calculations

Southgate House
Southgate
Wakefield WF1 1TL

Date 08/04/2026 6:38 PM | Designed by chrisb
File SURFACE WATER INITIAL CALC POND... | Checked by
Micro Drainage | Source Control 2020.1.3

## Summary of Results for 100 year Return Period (+45%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Control (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 242.408 | 0.208 | 2.4 | 49.3 | O K |
| 30 min Summer | 242.483 | 0.283 | 2.5 | 69.3 | O K |
| 60 min Summer | 242.564 | 0.364 | 2.5 | 92.1 | O K |
| 120 min Summer | 242.643 | 0.443 | 2.5 | 115.4 | O K |
| 180 min Summer | 242.679 | 0.479 | 2.5 | 126.7 | O K |
| 240 min Summer | 242.703 | 0.503 | 2.5 | 134.2 | O K |
| 360 min Summer | 242.729 | 0.529 | 2.5 | 142.5 | O K |
| 480 min Summer | 242.739 | 0.539 | 2.5 | 145.9 | O K |
| 600 min Summer | 242.743 | 0.543 | 2.5 | 147.2 | O K |
| 720 min Summer | 242.745 | 0.545 | 2.5 | 147.6 | O K |
| 960 min Summer | 242.741 | 0.541 | 2.5 | 146.6 | O K |
| 1440 min Summer | 242.724 | 0.524 | 2.5 | 141.0 | O K |
| 2160 min Summer | 242.689 | 0.489 | 2.5 | 129.6 | O K |
| 2880 min Summer | 242.652 | 0.452 | 2.5 | 118.1 | O K |
| 4320 min Summer | 242.579 | 0.379 | 2.5 | 96.3 | O K |
| 5760 min Summer | 242.514 | 0.314 | 2.5 | 77.7 | O K |
| 7200 min Summer | 242.459 | 0.259 | 2.5 | 62.9 | O K |
| 8640 min Summer | 242.417 | 0.217 | 2.4 | 51.7 | O K |
| 10080 min Summer | 242.383 | 0.183 | 2.4 | 43.1 | O K |
| 15 min Winter | 242.431 | 0.231 | 2.5 | 55.4 | O K |
| 30 min Winter | 242.514 | 0.314 | 2.5 | 77.9 | O K |
| 60 min Winter | 242.605 | 0.405 | 2.5 | 103.9 | O K |
| 120 min Winter | 242.692 | 0.492 | 2.5 | 130.7 | O K |
| 180 min Winter | 242.734 | 0.534 | 2.5 | 144.3 | O K |
| 240 min Winter | 242.763 | 0.563 | 2.5 | 153.6 | O K |
| 360 min Winter | 242.797 | 0.597 | 2.5 | 165.0 | O K |
| 480 min Winter | 242.814 | 0.614 | 2.5 | 171.0 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Discharge Volume (m³) | Time-Peak (mins) |
|---|---|---|---|---|
| 15 min Summer | 120.717 | 0.0 | 49.6 | 18 |
| 30 min Summer | 85.882 | 0.0 | 70.9 | 33 |
| 60 min Summer | 58.437 | 0.0 | 97.9 | 62 |
| 120 min Summer | 38.082 | 0.0 | 127.8 | 122 |
| 180 min Summer | 28.965 | 0.0 | 145.8 | 182 |
| 240 min Summer | 23.831 | 0.0 | 160.0 | 242 |
| 360 min Summer | 18.035 | 0.0 | 181.6 | 360 |
| 480 min Summer | 14.763 | 0.0 | 198.2 | 470 |
| 600 min Summer | 12.622 | 0.0 | 211.8 | 524 |
| 720 min Summer | 11.096 | 0.0 | 223.4 | 590 |
| 960 min Summer | 9.040 | 0.0 | 242.6 | 714 |
| 1440 min Summer | 6.750 | 0.0 | 271.3 | 982 |
| 2160 min Summer | 5.024 | 0.0 | 304.7 | 1388 |
| 2880 min Summer | 4.081 | 0.0 | 330.0 | 1788 |
| 4320 min Summer | 3.047 | 0.0 | 369.2 | 2552 |
| 5760 min Summer | 2.481 | 0.0 | 401.6 | 3288 |
| 7200 min Summer | 2.119 | 0.0 | 428.7 | 4032 |
| 8640 min Summer | 1.866 | 0.0 | 452.9 | 4672 |
| 10080 min Summer | 1.678 | 0.0 | 474.8 | 5352 |
| 15 min Winter | 120.717 | 0.0 | 55.6 | 18 |
| 30 min Winter | 85.882 | 0.0 | 79.5 | 33 |
| 60 min Winter | 58.437 | 0.0 | 109.7 | 62 |
| 120 min Winter | 38.082 | 0.0 | 143.1 | 120 |
| 180 min Winter | 28.965 | 0.0 | 163.3 | 178 |
| 240 min Winter | 23.831 | 0.0 | 179.2 | 236 |
| 360 min Winter | 18.035 | 0.0 | 203.4 | 352 |
| 480 min Winter | 14.763 | 0.0 | 222.0 | 466 |

## Summary of Results for 100 year Return Period (+45%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Control (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 600 min Winter | 242.822 | 0.622 | 2.5 | 173.8 | O K |
| 720 min Winter | 242.824 | 0.624 | 2.5 | 174.4 | O K |
| 960 min Winter | 242.815 | 0.615 | 2.5 | 171.4 | O K |
| 1440 min Winter | 242.789 | 0.589 | 2.5 | 162.3 | O K |
| 2160 min Winter | 242.731 | 0.531 | 2.5 | 143.1 | O K |
| 2880 min Winter | 242.670 | 0.470 | 2.5 | 123.7 | O K |
| 4320 min Winter | 242.552 | 0.352 | 2.5 | 88.6 | O K |
| 5760 min Winter | 242.456 | 0.256 | 2.5 | 61.9 | O K |
| 7200 min Winter | 242.387 | 0.187 | 2.4 | 44.0 | O K |
| 8640 min Winter | 242.341 | 0.141 | 2.3 | 32.6 | O K |
| 10080 min Winter | 242.311 | 0.111 | 2.1 | 25.4 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Discharge Volume (m³) | Time-Peak (mins) |
|---|---|---|---|---|
| 600 min Winter | 12.622 | 0.0 | 237.2 | 578 |
| 720 min Winter | 11.096 | 0.0 | 250.1 | 686 |
| 960 min Winter | 9.040 | 0.0 | 271.5 | 874 |
| 1440 min Winter | 6.750 | 0.0 | 303.3 | 1084 |
| 2160 min Winter | 5.024 | 0.0 | 341.3 | 1532 |
| 2880 min Winter | 4.081 | 0.0 | 369.6 | 1936 |
| 4320 min Winter | 3.047 | 0.0 | 413.6 | 2720 |
| 5760 min Winter | 2.481 | 0.0 | 449.8 | 3408 |
| 7200 min Winter | 2.119 | 0.0 | 480.2 | 4104 |
| 8640 min Winter | 1.866 | 0.0 | 507.3 | 4752 |
| 10080 min Winter | 1.678 | 0.0 | 532.0 | 5344 |

Southgate House
Southgate
Wakefield WF1 1TL

Date 08/04/2026 6:38 PM | Designed by chrisb
File SURFACE WATER INITIAL CALC POND... | Checked by
Micro Drainage | Source Control 2020.1.3

## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 19.900 | Shortest Storm (mins) | 15 |
| Ratio R | 0.250 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +45 |

## Time Area Diagram

Total Area (ha) 0.225

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.225 |

## Model Details

Storage is Online Cover Level (m) 243.200

## Tank or Pond Structure

Invert Level (m) 242.200

| Depth (m) | Area (m²) | Depth (m) | Area (m²) |
|---|---|---|---|
| 0.000 | 218.0 | 1.000 | 437.0 |

## Hydro-Brake® Optimum Outflow Control

| | |
|---|---|
| Unit Reference | MD-SHE-0075-2500-1000-2500 |
| Design Head (m) | 1.000 |
| Design Flow (l/s) | 2.5 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 75 |
| Invert Level (m) | 242.200 |
| Minimum Outlet Pipe Diameter (mm) | 100 |
| Suggested Manhole Diameter (mm) | 1200 |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 1.000 | 2.5 | Kick-Flo® | 0.627 | 2.0 |
| Flush-Flo™ | 0.307 | 2.5 | Mean Flow over Head Range | - | 2.2 |

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 2.1 | 0.800 | 2.3 | 2.000 | 3.4 | 4.000 | 4.7 | 7.000 | 6.2 |
| 0.200 | 2.4 | 1.000 | 2.5 | 2.200 | 3.6 | 4.500 | 5.0 | 7.500 | 6.4 |
| 0.300 | 2.5 | 1.200 | 2.7 | 2.400 | 3.7 | 5.000 | 5.3 | 8.000 | 6.6 |
| 0.400 | 2.5 | 1.400 | 2.9 | 2.600 | 3.9 | 5.500 | 5.5 | 8.500 | 6.8 |
| 0.500 | 2.4 | 1.600 | 3.1 | 3.000 | 4.1 | 6.000 | 5.7 | 9.000 | 7.0 |
| 0.600 | 2.1 | 1.800 | 3.3 | 3.500 | 4.5 | 6.500 | 6.0 | 9.500 | 7.1 |

# Appendix H – Surface Water Drainage Maintenance Strategy

# Proposed Site, Land North of Meltham Road, Marsden
# Surface Water Drainage Maintenance Plan – April 2026

The following surface water management plan applies to the development of a residential site at Land North of Meltham Road, Marsden.

The underground surface water drainage within the site boundary will be maintained by a Management Company until such time as the element in question is adopted. All proprietary systems will be maintained in accordance with manufacturer's recommendations. The current recommendations, where appropriate, are included below. However, the guidance provided below should be reviewed as and when manufacturer's guidance is updated. All installation and maintenance guides for proprietary systems will be retained on the premises in the Health & Safety file.

## Gullies

Road gullies draining the site hardstandings should be inspected regularly to ensure that they continue to operate effectively, and are free from damage and blockage by debris or solid objects.

They should be cleaned at least once a year, and incorporated into a planned maintenance schedule.

Any debris or blockages near to the surface of the gully should be removed by hand or by jet-vac. The trap element of the gully can be cleaned through the use of a high-pressure hose.

The seating areas for grates should be cleaned before they are replaced. If grates are allowed to move within their frame, this may cause damage to the frame or seating.

## Drainage channels

Drainage channels should be inspected regularly to ensure that the system continues to operate effectively, and is free from damage and blockage by debris or solid objects.

The system should be cleaned at least once a year, and incorporated into a planned maintenance schedule. Channel units can be cleaned through the use of a high-pressure hose. This can be fed into the channel system through access units which are strategically placed along the channel run.

The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface liquids into the drainage channel. Any debris within the throat should be removed.

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The seating areas for covers and grates should be cleaned before they are replaced. The covers and grates should be locked into position to prevent these being removed, stolen or dislodged by traffic. Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If grates/ covers are allowed to move within their frame, this may cause damage to the frame or seating.

**Pipes and manholes**

Manholes are to be inspected annually for signs of blockage, with pipes jet washed and CCTV inspections carried out to the pipelines as appropriate should a blockage occur.

**Balancing pond**

Vehicular access to the pond banks and control structures for maintenance is provided at all times via the building fire track. The banks of the pond are no steeper than 1 in 3 to allow for safe egress from the pond.

The following inspection and maintenance regime is recommended:

- Monthly maintenance
    - Clean and remove debris from inlet and outlet structures
    - Mow side slopes (seasonal)
- Bi-annual maintenance
    - Inspect vegetation for invasive species
- Annual maintenance
    - Inspect the inlet, outlet and control manhole structures for damage, monitor for signs of hydrocarbon and sediment build-up, check for debris and ensure structures remain operational
    - Manage and harvest wetland plants
- 5-7 year maintenance (unless required sooner through annual inspection)
    - Monitor sediment accumulations and remove sediment when the pond volume has become significantly reduced.
- As needed maintenance
    - Repair undercut or eroded areas

Vegetation and landscaping to the pond and swale should be carried out in accordance with the Landscape Architect's maintenance regime for the development. This takes precedence over any intervals stated above for the maintenance of vegetation.

Any lifesaving equipment present on the bank should be routinely maintained and replaced in accordance with the manufacturer's recommended schedule.

**Porous paving**

Maintenance of the system should be carried out to ensure that infiltration of the paving is not compromised. The following guidelines are appropriate as an initial regime, but may be increased or decreased depending on the local environment of the paving, any external contributing factors which may influence the performance of the system and whether inspections previous inspections have highlighted any issues.

- A visual inspection of the paving should be carried out on a regular basis. This will confirm the effectiveness of the agitation maintenance of the system and allow refinement of the agitation activity if necessary. This should be done bi-monthly as a minimum.
- The paving should be agitated (ie brushed, vacuumed, etc.) at least twice a year. This is to ensure no vegetation of any sort is allowed to grow and develop in the joints. Ideally, this activity should be carried out in the spring and autumn seasons. Any disturbance of filter media within the joints of the paving due to agitation should be replaced in accordance with the manufacturer's specification.
- The paving should be inspected after any heavy precipitation to ensure no organic matter is present on the surface of the paving.
- For winter maintenance, the controlled use of de-icing may be used without causing significant detrimental effects on the performance of the porous paving. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.
- The inspection of outfalls from each area of porous paving should be undertaken initially on a twice-yearly basis.
- When sedimentation occurs in areas of porous paving then there is the potential for weed growth, typically occurring where there are overhanging trees or in areas which are not over run by vehicles particularly frequently. Weeds can be removed from the surface through the application of weed killers. Glyphosate based weed killers are the most common for general purpose use (Roundup etc). Weeds should be sprayed when actively growing.
- Depending on the amount of usage the porous paving has been exposed to, the laying course material may require either cleaning or replacing after a 25 to 30 year period. This would be evident if the infiltration rate of the paving becomes prolonged, allowing ponding to develop on the surface. Should this occur, the uplifting, cleaning and re-laying may be required. As an alternative to replacing with new and if time allows, the laying course, jointing material, and blocks can be re-used once cleaned.

**General guidance for the safe inspection of underground systems and confined spaces**

- Contaminated surface water can contain substances harmful to human health. Any person carrying out maintenance on equipment which could potentially contain contaminated water should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.
- When covers are removed precautions should be taken against personnel falling into the unit.
- The working area should be adequately lit and the inspector should be familiar with the area and access points
- Correct posture should be maintained, particularly when lifting. Appropriate lifting equipment should be used when necessary. Proper footing and balance should be maintained at all times, taking care to avoid any sharp edges.

# Appendix I – LLFA Consultation

Kirklees Council
Planning and Development Service
PO Box 1720
Huddersfield

| | | |
|---|---|---|
| **Consultation Response from KC, Lead Local Flood Authority** | | |
| **2025/21251 at land north of, Meltham Road, Marsden, Huddersfield, HD7 6JZ** | | |
| **Pre application for residential development** | | |
| **Date Responded: 25th January 2026** | **Responding Officer: Paul Farndale** | **Responding Ref: 1** |

**Contours**

The site falls southeast to northwest at a 1 in 8 gradient.

**Main River Flood Risk**

The site is in main river flood zone 1 – Low Risk.

**Watercourses/Water Features**

There are no known water features on site or culverted watercourses indicated on current and historical mapping.

An open section of watercourse can be seen in land 50m to the southeast of the site (Hey Heads Farm) it is believe that this watercourse carries on in culvert into the adjacent housing development. Sections of culverted watercourse are shown on Kirklees mapping in Gatehead and Gatehead Bank. Connection to them could be difficult. We have included a copy of our mapping.

**Sequential Test/ Flood Risk Assessment**

As the site is in flood zone 1 and is less than 1 hectare in size, there is no requirement for a sequential test or a full formal flood risk assessment. We do however always advise that the applicant looks at the topography of the land and how the layout will affect flood routing and make space for water as attenuation (SUDS) will be required.

A provisional FRA has been provided. We do not agree with its conclusions and it needs to be updated to include this advice.

**Surface Water Flood Risk**

3rd generation surface water flood mapping does not reveal any concerns for catchment flood routing or localised depressions on site. The release of depth data to accompany extent data for 4th generation mapping is due to be released into the public domain by the Environment Agency by February 2026.

**Surface Water Drainage**

Although British Geological Survey Data indicates that this site would likely produce encouraging results for draining by infiltration, the land is very steep and, in our experience, this means a risk of re-

emergence and water around foundations. This is especially true where shallow bedrock is concerned and the reliance on fissures as indicated for this site. We therefore rule out this use of soakaways.

There does appear to be watercourses running through the nearby estate. A connection could be difficult.

The track to the north of the site is a public right of way. Engagement with Kirklees PROW department is recommended to discuss rights to install sewers underneath. This also may involve permission from 3rd party landowners. A feasibility study for a sewer requisition to watercourse sewer located in Gatehead is available given Yorkshire Waters powers and that the road in question is adopted by Kirklees Council as a Highways Authority.

There shall be no pumping of surface water given a gravity solution is available. A survey of the size depth and condition of the watercourse will be required before granting a connection. This is likely to be limited to 3l/s.

**Attenuation**

Space should be made for attenuation of surface water given the greenfield restriction allowance stated above. Sustainable drainage with biodiversity and amenity benefits should be considered before more carbon intensive solutions such as plastic or concrete tanks.

Given the slope of the site, we expect the critical 1 in 100-year storm event with a 45% allowance for climate change to be stored on site. The LLFA should be contacted for further discussion if drain down times do not meet the minimum criteria of 50% in 24 hours.

**Flood Routing**

The estate should be designed so that if local drainage fails then a flood route from any drainage coming in off Meltham Road and that generated by the site, including an exceedance event for the attenuation design, should avoid property curtilage and use road network and open space as a conduit.

**Section 106**

The LPA has an obligation to ensure the maintenance and management of sustainable drainage for the lifetime of the site. This includes the period between construction and adoption.

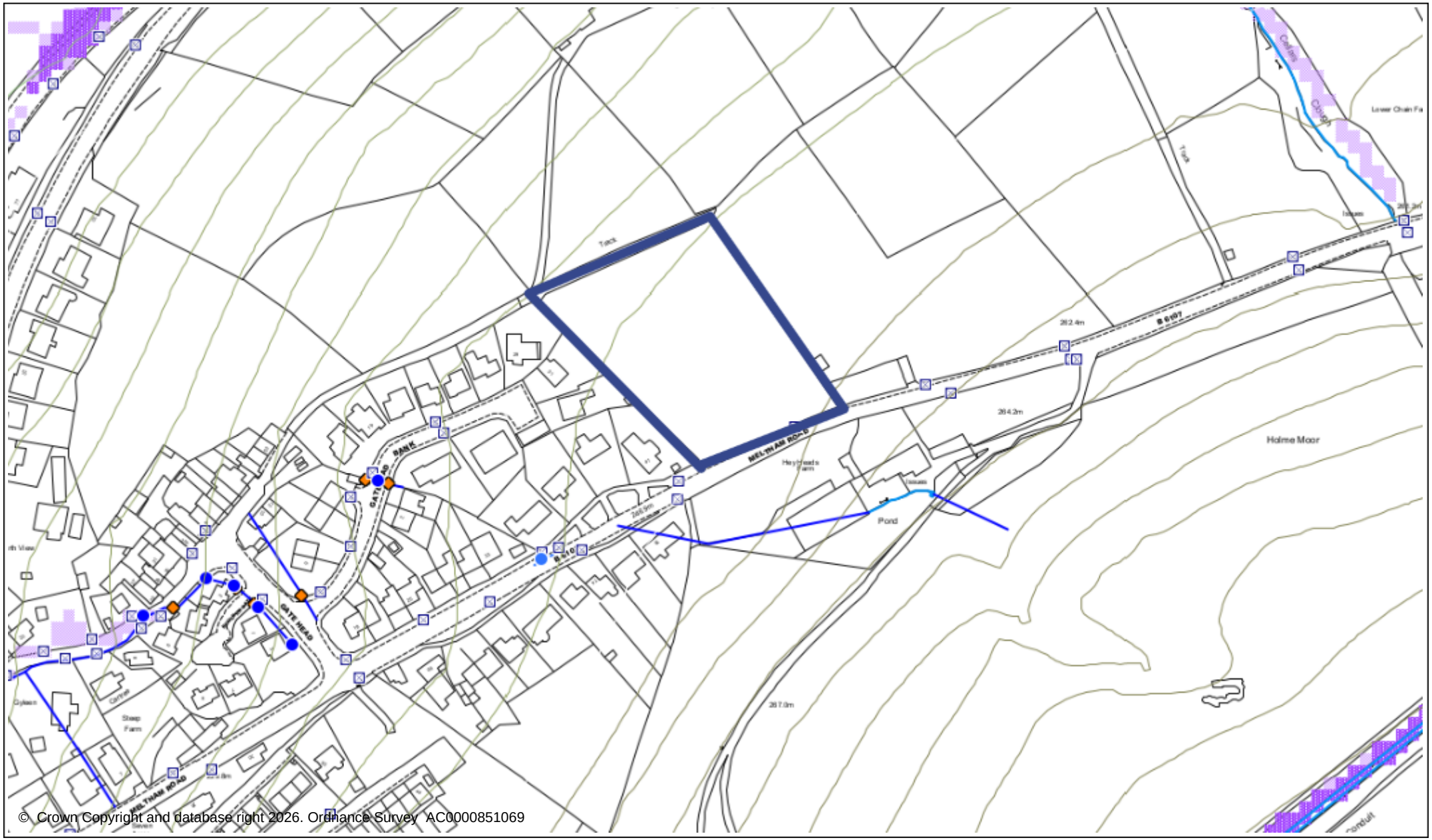
It is Kirklees policy to ensure a management company is set up and all households party to it, to carry out such tasks. Ground rent charges are a matter for the developer/management company.

In our experience there is usually a time lag between construction and adoption by the statutory undertaker of NAV equivalent. Sometimes, for various reasons, poor construction, companies liquidating, such systems have adoption delayed or it fails to occur. This agreement provides a fall back to protect the residents.

Kirklees Council
Planning and Development Service
PO Box 1720
Huddersfield

A full maintenance and management plan will be agreed by condition for the management company to carry out. This agreement will be null and void upon adoption by a NAV or Statutory Undertaker.

## Meltham Road



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Print Date : 25-Jan-2026

Kompass
Kirklees Mapping Service

Kirklees COUNCIL