



CONSULTING ENGINEERS LTD

FLOOD RISK ASSESSMENT

DODWORTH GREEN ROAD,
DODWORTH

On Behalf of

NEWETT HOMES





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QUALITY MANAGEMENT

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Date	18 May 2022			
Signature				
Reviewed By	A Bottomley			
Date	18 May 2022			
Signature				

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TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	4
2.0 EXISTING SITE	5
3.0 ENVIRONMENT AGENCY CONSULTATION	7
4.0 WATER AUTHORITY CONSULTATION	9
5.0 LEAD LOCAL FLOOD AUTHORITY CONSULTATION	11
6.0 INTERNAL DRAINAGE BOARD CONSULTATION	12
7.0 MATERIAL CONSIDERATION IN RESPECT OF NPPF AND PPG	13
8.0 EXISTING AND PROPOSED DRAINAGE	19
9.0 CONCLUSION	22

APPENDICES

APPENDIX A	SITE LOCATION PLAN
APPENDIX B	TOPOGRAPHICAL SURVEY
APPENDIX C	ENVIRONMENT AGENCY CONSULTATION
APPENDIX D	WATER AUTHORITY CONSULTATION
APPENDIX E	LEAD LOCAL FLOOD AUTHORITY CONSULTATION
APPENDIX F	PLANNING LAYOUT
APPENDIX G	INDICATIVE GREENFIELD RUNOFF RATE CALCULATIONS
APPENDIX H	INDICATIVE SURFACE WATER DRAINAGE CALCULATIONS

1.0 INTRODUCTION

- 1.1 Newett Homes are proposing to develop a parcel of land located off Dodworth Green Road, Dodworth with new residential dwellings. As part of the viability of the site and to supplement a planning application, it was decided that a Flood Risk Assessment Report should be undertaken.
- 1.2 It is within the general development strategy of the country for development in areas where there is a risk of flooding to be assessed to avoid unnecessary increase in the requirement for flood defence. Under the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG), consultation is required with the Environment Agency, Water Authority, Lead Local Flood Authority and Internal Drainage Board and a Flood Risk Assessment Report should be prepared considering the development proposals and make recommendations for any flood mitigation measures.
- 1.3 OEC has been appointed to carry out an assessment of the site, implement appropriate consultations and prepare a Flood Risk Assessment Report, in accordance with NPPF, to satisfy the requirements of the Planning Authority.
- 1.4 The consultations and walkover survey have been undertaken in April and May 2022.
- 1.5 This report is based on the interpretation and assessment of data provided by third parties. Whilst every effort has been taken to ensure this information is accurate and up-to-date, OEC cannot guarantee the accuracy of third-party data and the findings of this report may change if the data is amended or updated after the date of consultation.

2.0 EXISTING SITE

General

- 2.1 The site is an irregular shaped piece of land equating to an area of approximately 2.3ha. The site is located on the south-western side of Dodworth and is situated at Ordnance Survey Grid Reference SE 314 049.
- 2.2 A site location plan is presented in Appendix A.

Current Use

- 2.3 The site is greenfield, consisting of unused shrub land or gardens associated with three residential dwellings that encroach into the site boundary.

Boundaries

- 2.4 The site is bound by a series of fencing or walls and is accessed via Dodworth Green Road that abuts the north-western boundary. Existing residential dwellings are located to the north, east and west. To the south is a small allotment and agricultural farm land.

Topography and Vegetation

- 2.5 The site has a prominent fall in a south-easterly direction, with levels in the north-western corner being at the high point of approximately 133.0m A.O.D, dropping to approximately 113.56m A.O.D. in the south-eastern corner. There is also a central cutting through the site where a watercourse is present.
- 2.6 Extensive mature vegetation in the form of trees, bushes and shrubs are present adjacent to the watercourse crossing the site, along the southern boundary and sporadically located along all other boundaries.

2.7 A topographical survey is presented in Appendix B.

Existing Drainage

2.8 There is no obvious positive drainage system on the site, although land drainage may be present. Surface water run-off would clearly discharge in a northerly direction.

2.9 There are two watercourses within close proximity to the site, both un-named, ultimately discharging into Dodworth Dike. The first watercourse crosses the site in a north-east to south-west alignment, exiting the site centrally along the eastern boundary. The second watercourse follows the full extent of the southern boundary.

2.10 There are no rivers recorded within the vicinity of the site.

Geology and Hydrogeology

2.11 The Geological Survey Maps of Great Britain available on the BGS website indicates that the site is underlain by the Pennine Lower Coal Measures Formation – Mudstone, Siltstone and Sandstone.

2.12 The Environment Agency website designates the bedrock under the site as a Secondary A Aquifer. This is a permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers.

2.13 The Environment Agency website shows that the site does not lie within a Groundwater Source Protection Zone.

3.0 ENVIRONMENT AGENCY CONSULTATION

3.1 A consultation was requested from the Environment Agency (EA), however, at the time of writing the report a response was still to be received.

3.2 The Environment Agency Flood Map, which shows area of land that could flood from rivers or the sea and are shaded blue are provided is presented in Appendix C. These areas do not take into account defences as water can overtop or can fail in extreme conditions. The EA flood zone classifications are defined as:-

3.2.1 Flood Zone 1 - 'Low Probability' is assessed as having a less than 1 in 1,000 annual probability of river or sea flooding in any year (less than 0.1%).

3.2.2 Flood Zone 2 - 'Medium Probability' is assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding in any year (1% - 0.1%) and between a 1 in 200 and 1 in 1,000 annual probability of flooding from the sea (0.5% - 0.1%).

3.2.3 Flood Zone 3 - 'High Probability' is assessed as having a 1 in 100 or greater annual probability of river flooding in any year (greater than 1%) and a 1 in 200 chance or greater annual probability of flooding from the sea (less than 0.5%).

3.3 The EA flood map for planning shows that the site is located within Flood Zone 1 and the site, therefore, has a low risk of fluvial flooding.

3.4 The flood map for surface water, which shows areas where surface water only would be expected to flow or pond in England & Wales, is also presented in Appendix C. All land in England and Wales will be within 'one' of a possible 'four' categories. The four categories shown on the map are:-

3.4.1 High - This area has a chance of flooding greater than 1 in 30 in any given year (annual probability of flooding 3.3%).

-
- 3.4.2 Medium - This area has a chance of flooding between 1 in 100 (1%) and 1 in 30 (3.3%) in any given year.

 - 3.4.3 Low - This area has a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%) in any given year.

 - 3.4.4 Very low - This area has a chance of flooding of less than 1 in 1000 (0.1%) in any given year.

 - 3.5 The proposed development is shown to be within a very low risk area for surface water flooding, with no flood routes from third party land affecting the site. However, medium to high risk areas are associated with the channels of the watercourses and flood rate in the south-eastern corner of the site.

4.0 WATER AUTHORITY CONSULTATION

- 4.1 A consultation was requested from Yorkshire Water (YW), who are the Water Authority for this area, and a copy of their response, reference U637075, dated 12 May 2022, is presented in Appendix D for reference purposes.
- 4.2 As of October 2011, and the private to public sewer transfer, there are many unchartered Yorkshire Water assets currently not shown on their records.
- 4.3 There is a 300mm diameter public combined sewer recorded crossing the site. No buildings or other obstructions are to be erected within 3 metres each side of the sewer centre-line, nor trees planted within 5 metres of this public sewer.
- 4.4 There is a sewage pumping station (SPS), under the control of Yorkshire Water, located near to the site. Vehicular access, including large tankers, could be required at any time.
- 4.5 The proximity of the existing sewage pumping station (SPS) to the site may mean a loss of amenity for future residents/workers. In order to minimise the risk of odour, noise and nuisance, industry standards recommend that habitable buildings should not be located within 15 metres of the existing SPS. To reduce the visible impact of the installation, the erection (by the developer) of suitable screening is advised.
- 4.6 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.
- 4.7 Foul water domestic waste shall discharge to the 300mm diameter public combined sewer recorded to the south of the site.
- 4.8 In respect of surface water, reference is made to Requirement H3 of Building Regulations 2000 and Sustainable Drainage Systems. This establishes a hierarchy of surface water disposal. Consideration should firstly be given to discharge to

soakaways, infiltration and watercourse, in that priority order, before connection to sewer will be considered.

- 4.9 It is understood that curtilage surface water will discharge to watercourse.
- 4.10 Restrictions on surface water disposal from the site may be imposed by other parties. It is strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regards to surface water disposal from the site.

5.0 LEAD LOCAL FLOOD AUTHORITY CONSULTATION

- 5.1 A consultation was requested from Barnsley Metropolitan District Council (BMDC) who are the Lead Local Flood Authority (LLFA) for this area, and a copy of their response dated 22 April 2022 and is presented in Appendix E.
- 5.2 The LLFA are not aware of any flooding incidents on the site and are not aware of any other watercourses except for the one's highlighted on OS Maps.
- 5.3 Attenuation should be sized for the 1 in 100 year plus climate change event. No surcharging for the 1 in 1 year event and no flooding for the 1 in 30 year event
- 5.4 A 30% allowance for climate change and a 10% allowance for urban creep will be required.
- 5.5 Any connection to sewer will require Ordinary Watercourse Consent and a restricted discharge rate of 6 l/s would be acceptable to the LLFA.

6.0 INTERNAL DRAINAGE BOARD CONSULTATION

- 6.1 The proposed development site is not located within an Internal Drainage Board catchment.

7.0 MATERIAL CONSIDERATION IN RESPECT OF NPPF AND PPG

Flood Classification

- 7.1 The Environment Agency Flood Map has identified that the site falls within land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding in any year (less than 0.1%). In accordance with Table 1 of the PPG, the site falls within Flood Zone 1 "low probability".
- 7.2 Therefore, all uses of the land are appropriate within this zone, but an assessment of the effect of surface water run-off will need to be incorporated in any Flood Risk Assessment.

End Use

- 7.3 The development proposal is for the construction of residential development on the site, and a planning layout is presented in Appendix F.
- 7.4 When applying Table 2 of the PPG, the flood risk vulnerability classification shows that the proposed end use will fall into a "more vulnerable" classification.

Sequential & Exception Test

- 7.5 As set out in the NPPF, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding (Zone 1).
- 7.6 When the development site is evaluated in accordance with Table 3 of the PPG, the development shows that the Sequential Test is not applicable.
- 7.7 As the Sequential Test is not applicable, it is not a requirement for an exception test to be provided.

Flood Sources

7.8 The risk of flooding to the site from all current and future potential sources of flooding has been assessed as follows:-

7.9 Flooding from Rivers (Fluvial)

There are no rivers recorded within the vicinity of the site, therefore, flooding from this source is considered low risk. This is evident from the Environment Agency Flood Maps.

7.10 Flooding from Local Watercourses (Fluvial)

Two un-named watercourses could cause flooding to the site and this will need to be considered as part of the proposed development.

7.11 Due to the topography of the site, flooding from this source is considered highly unlikely, however, in the event of blockage of the outfall or proposed culvert that will be required as part of the proposed development, appropriate mitigation measures will be required.

7.12 Flooding from the Sea (Tidal/Coastal)

The site is not located near enough to the sea to cause a problem of flooding from this source.

7.13 Flooding from Land (Surface Water)

The Environment Agency surface water flood map shows the site to have a very low risk of surface water flooding, with no flood routes affecting the proposed development. Medium to High risk areas are associated with the channel of the watercourse and the south-eastern corner where the watercourse crossing the site would flood if the outlet from site became blocked. Whilst flooding from this source is considered low risk, it should still be considered as part of the proposed development.

7.14 Flooding from Groundwater

The Geological Survey Maps of Great Britain available on the BGS website indicates that the site is underlain by the Pennine Lower Coal Measures Formation – Mudstone, Siltstone and Sandstone. Considering the anticipated geology beneath the site and topography, flooding from the source is considered to be low risk. Nevertheless, it should still be considered as part of the proposed development.

7.15 Flooding from Sewer

Existing public sewers are recorded within the vicinity of the site and there will also be a new drainage system introduced for the proposed development. It is possible that any blockage of these sewers will result in flooding from the lowest cover level of manholes or gullies and this will need to be considered as part of any proposed development. Flooding from this source is considered to be low risk.

7.16 Flooding from Reservoirs, Canals or Artificial Sources

The Environment Agency produce maps which show the expected inundation area should a reservoir fail and release its capacity. It should be noted, however, that reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The proposed development site is shown to be outside of the maximum extent of reservoir flooding.

7.17 There are no canals or other artificial sources within the vicinity of the proposed development site that would pose a risk of flooding on site, therefore, the risk from this source is deemed to be negligible.

7.18 Table 1.0 below, summarises the findings of the detailed assessment and explanations of the flood risk issues on the site.

Table 1.0 – Degree of risk from each source of flooding

FLOOD SOURCE	RISK
River (Fluvial)	Negligible
Watercourse (Fluvial)	Low / Medium
Sea (Tidal/Coastal)	Negligible
Land (Surface Water)	Low
Groundwater	Low
Sewer	Low
Other – Reservoir	Negligible
Other - Canals	Negligible

Climate Change

- 7.19 The NPPF and PPG has indicated that the Global Sea level will continue to rise, depending on greenhouse gas emissions, and the sensitivity of the climate system and there will be an increase in rainfall across the country.
- 7.20 United Kingdom climate change guidance was revised in July 2021 for peak river flows and in February 2016 for peak rainfall intensities. With regards to peak river flows, a regionalised approach has now been adopted to climate change impacts, based upon management catchments of the river basin district of the proposed development site and the flood risk vulnerability classification.
- 7.21 The proposed development site is situated within the Don and Rother Management Catchment, which, based on the “central allowance” climate change scenario, could see peak river flows increase by 28% by the 2080s. As the site is located in Flood Zone 1, an increase of 28% in river flows is deemed unlikely to affect the proposed development site.
- 7.22 In accordance with the revised climate change data, the published figures show that, for an expected life of greater than 50 years for any new development, the anticipated increase in rainfall could be up to 40%, subject to the location within the country and

the drainage system should be designed in accordance with this requirement. However, the Barnsley Metropolitan District Council flood risk requirements for managing on/off-site flood risk from fluvial flooding is to assess the development using a 30% allowance for climate change for the 1 in 100 year event and a 10% increase on impermeable areas to accommodate urban creep.

- 7.23 Due to the topography of the land and surrounding area, overland run-off from adjoining land is unlikely to be an issue. Therefore, any run-off from outside the site will be insignificant and, on this basis, only rainfall falling within the site boundaries will need to be considered in respect of climate change.

Flood Mitigation

- 7.24 As the site falls within Flood Zone 1, flood mitigation measures are only required in the event of a catastrophic storm, overland run-off or blockage of the existing watercourse or proposed/existing drainage systems. The following precautionary flood mitigation measures are, therefore, recommended:-

- 7.23.1 The finished floor levels (FFL) to the properties shall be raised a minimum of 600mm above the adjacent watercourse embankment level or a minimum of 150mm above external levels, whichever is higher.
- 7.23.2 Properties shall be designed without any basements and ground floors shall comprise solid concrete slabs or beam and block with screed construction.
- 7.23.3 Incoming electricity supplies shall be raised above ground floor level and ground floor electric sockets shall be served by loops from upper level.
- 7.23.4 In the unlikely event of flooding of the site, it would be appropriate to design external levels with falls to non-critical areas, such as landscape, where the water can pond without causing flooding to buildings.

7.23.5 If any water issues are found on the site or boundary levels result in flow of water into the site, these shall be accommodated by introducing "cut-off" drains to direct the flow back into the watercourse.

7.23.6 Levels should be designed to ensure that in the event of a blockage of the existing watercourse, the flow of water will not cause flooding to buildings and is directed back into the watercourse.

Consents

7.25 The discharge of surface water to watercourse and/or the introduction of headwalls or works to the watercourse will require the consent of the LLFA by submitting an Application for Consent to Work Within a Watercourse.

7.26 There will be a requirement for a 9m strip to be provided from the top of the banking where no development can take place, and access arrangements will need to be agreed for future improvements or maintenance.

7.27 The discharge of foul or surface water to sewer and/or the introduction of manholes or works to a public sewer will require the consent of the Water Authority.

Emergency Egress During Times of Flood

7.28 It is a requirement under the PPG that occupants should be able to egress any building during times of flood, without being trapped by flood conditions.

7.29 As the site falls within Flood Zone 1, no special mitigation measures are required for emergency egress during times of flood.

8.0 EXISTING AND PROPOSED DRAINAGE

Sustainable Drainage

- 8.1 In order to comply with the requirements of NPPF, it will be necessary to consider aspects of Sustainable Drainage techniques for the new development. The Geological Survey Maps of Great Britain available on the BGS website indicates that the site is underlain by the Pennine Lower Coal Measure Formation – Mudstone, Siltstone and Sandstone. Considering the anticipated geology beneath the site, in conjunction with the topography and presence of local watercourses suggesting that the ground is impermeable, it is considered that the site is unsuitable for the disposal of surface water using infiltration techniques, and a positive drainage system to watercourse or sewer will be required for surface water drainage. It will be necessary to carry out appropriate infiltration tests in accordance with BRE Digest 365 'Soakaway Design' prior to construction on site and the results presented in a report for the approval of the Planning Authority. However, for the purpose of this report, a positive drainage system to watercourse or sewer will be required for surface water drainage.

Drainage

- 8.2 It is a requirement to ensure that surface water run-off from any proposed development has negligible consequence on downstream areas either in sewer capacity or discharge to watercourse.

Existing Surface Water Run-Off

- 8.3 The site is greenfield and, therefore, in accordance with current guidelines and Regulations, indicative surface water calculations have been undertaken using the IH124 method of calculating greenfield run-off rates. The calculations are presented in Appendix G.

- 8.4 It is unusual to use the IH124 method for calculating greenfield runoff rates with an area less than 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required.
- 8.5 For the proposed developed area of approximately 1.5ha, the existing greenfield runoff rates have been linearly interpolated with the results presented in Table 2.0 below.

Table 2.0 – Existing greenfield run-off rates

Storm Event	Discharge Rate
1 year	6.6 l/s
Q_{BAR}	7.7 l/s
30 year	13.5 l/s
100 year	16.0 l/s

- 8.6 Based on the above, whilst a proposed discharge rate of 6 l/s has been agreed with the LLFA for a connection into the watercourse located along the southern boundary, it should be possible to agree a slight increase based on the calculated QBar run-off rate.

Proposed Surface Water Drainage

- 8.7 Consideration of the proposed drainage should firstly be given to infiltration techniques (to ground). However, as the use of infiltration techniques was still to be investigated at the time of writing this report, in the event that infiltration techniques prove impractical, it will be necessary to provide a positive drainage system to watercourse or sewer.
- 8.8 Two watercourses are recorded crossing the site, therefore, connection to the watercourse located adjacent to the southern boundary, as agreed with the LLFA, would be the most suitable outfall location.

- 8.9 It is anticipated that the proposed layout will have an impermeable area of approximately 1.3ha for semi-detached and detached properties. Indicative calculations have been carried out using the WinDES Source Control Computer Program. The proposed surface water sewer system should be designed to accommodate the 1 in 1 year storm without surcharging, the 1 in 30 year storm event without flooding and a 1 in 100 year storm plus climate change event should be retained within the site in an area that does cause flooding to properties or third parties. A 10% increase on impermeable areas will also be required for urban creep.
- 8.10 Restricting the discharge rate to no greater than 6.0l/s, on site storage of 534.3m³ will need to be provided for a 1 in 30 year storm. This can be achieved by several methods, including oversized pipes, underground tanks and balancing ponds. The drainage system will also need to accommodate the 1 in 100 year plus 30% climate change event without causing flooding or property or third-party land. In the event that levels dictate that the 1 in 100 year plus climate change flood water will flow off site, an additional or larger storage facility will be required. Therefore, on site storage would increase to 975.1m³. The indicative surface water calculations are presented in Appendix H. However, detailed calculations and proposals will need to be prepared and submitted to the Planning Authority for approval prior to construction.

Proposed Foul Water Drainage

- 8.11 Foul water domestic waste shall discharge to the 300mm diameter public combined sewer recorded to the south of the site.

9.0 CONCLUSION

- 9.1 The site falls within Flood Zone 1 and the Sequential Test is satisfied. However, in order to accommodate the possibilities of flood from a catastrophic storm, overload run-off or blockage of the existing watercourse or proposed/existing drainage systems, the following precautionary flood mitigation measures are recommended:-
- 9.1.1 The finished floor levels (FFL) to the properties shall be raised a minimum of 600mm above the adjacent watercourse embankment level or a minimum of 150mm above external levels, whichever is higher.
 - 9.1.2 Properties shall be designed without any basements and ground floors shall comprise solid concrete slabs or beam and block with screed construction.
 - 9.1.3 Incoming electricity supplies shall be raised above ground floor level and ground floor electric sockets shall be served by loops from upper level.
 - 9.1.4 In the unlikely event of flooding of the site, it would be appropriate to design external levels with falls to non-critical areas, such as landscape, where the water can pond without causing flooding to buildings.
 - 9.1.5 If any water issues are found on the site or boundary levels result in flow of water into the site, these shall be accommodated by introducing "cut-off" drains to direct the flow back into the watercourse.
 - 9.1.6 Levels should be designed to ensure that in the event of a blockage of the existing watercourse, the flow of water will not cause flooding to buildings and is directed back into the watercourse.
- 9.2 A 30% increase in rainfall shall be incorporated into any new positive drainage system to satisfy the requirements of climate change.

-
- 9.3 Sustainable Drainage Systems of infiltration techniques have been considered unsuitable for surface water disposal. It will be necessary to carry out appropriate infiltration tests in accordance with BRE Digest 365 'Soakaway Design' prior to construction on site and the results presented in a report for the approval of the Planning Authority. For the purpose of the report, it has been assumed that a positive drainage system to watercourse will be required.
- 9.4 The proposed surface water drainage system shall be restricted to the agreed discharge rate with appropriate attenuation for a 1 in 100 year storm plus climate change event incorporated into the design, prior to discharge to watercourse. A 10% increase on impermeable surfaces shall also be accommodated to allow for urban creep. The detailed design and calculations shall be submitted to the Planning Authority for approval prior to construction on the development site.
- 9.5 The discharge of surface water to watercourse and/or the introduction of headwalls or works to the watercourse will require the consent of the LLFA by submitting an Application for Consent to Work Within a Watercourse.
- 9.6 There will be a requirement for a 9m strip to be provided from the top of the banking where no development can take place, and access arrangements will need to be agreed for future improvements or maintenance.
- 9.7 The discharge of foul or surface water to sewer and/or the introduction of manholes or works to a public sewer will require the consent of the Water Authority.
- 9.8 Foul water domestic waste shall discharge to the 300mm diameter public combined sewer recorded to the south of the site.
- 9.9 No special mitigation measures are required for emergency egress during times of flood.

9.10 Subject to compliance with the above, the proposed development can satisfy the requirements of the National Planning Policy Framework and the Planning Practice Guidance in relation to flood risk.

A P P E N D I X A: SITE LOCATION PLAN

NEWETT HOMES

DODWORTH GREEN ROAD, DODWORTH

SITE LOCATION PLAN



GRID REFERENCE: SE 314 049

A P P E N D I X B: TOPOGRAPHICAL SURVEY

A P P E N D I X C: ENVIRONMENT AGENCY CONSULTATION

Flood map for planning

Your reference
159.001

Location (easting/northing)
431441/405014

Created
21 Apr 2022 14:01

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.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>





Flood map for planning

Your reference
159.001

Location (easting/northing)
431441/405014

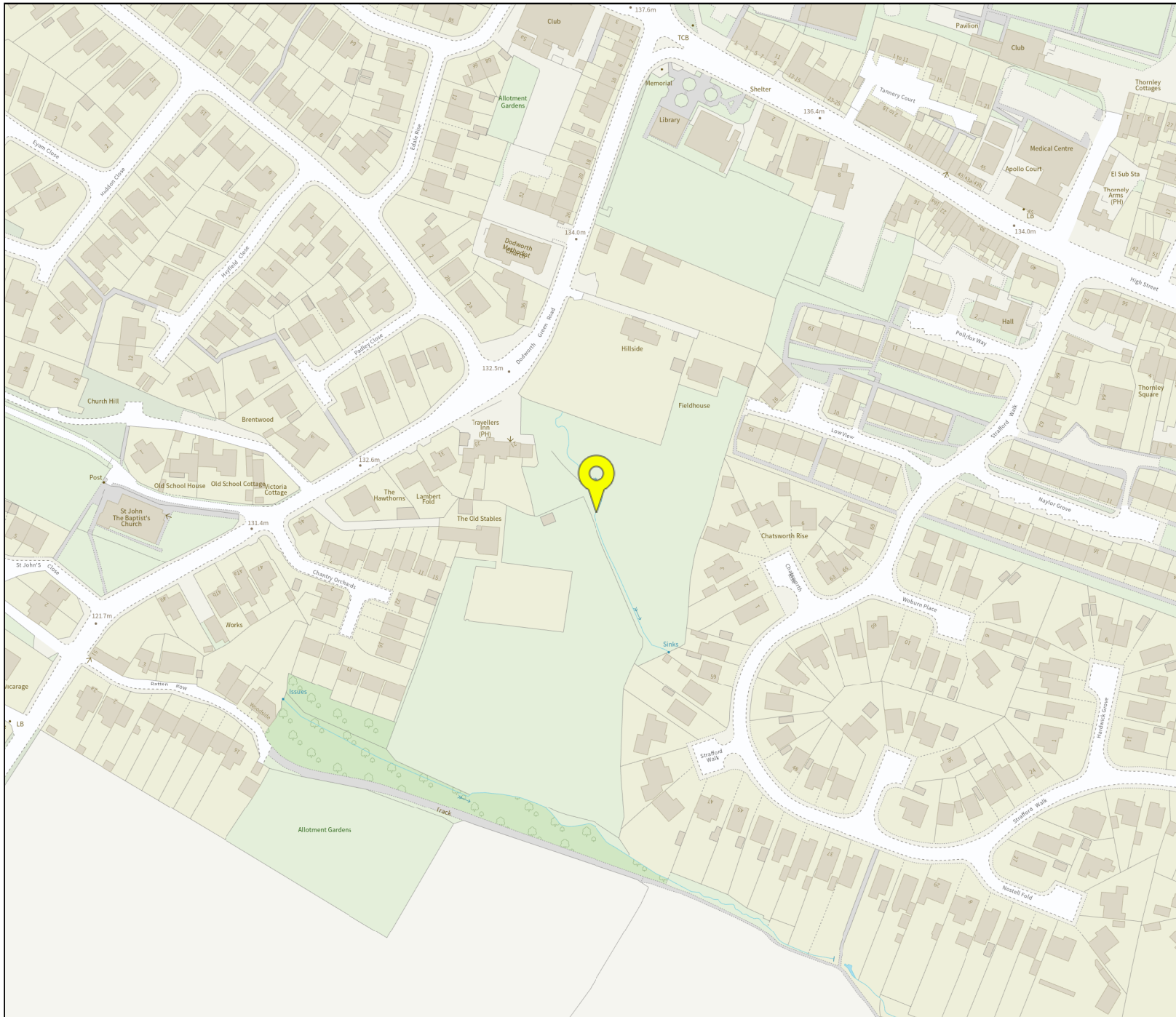
Scale
1:2500

Created
21 Apr 2022 14:01

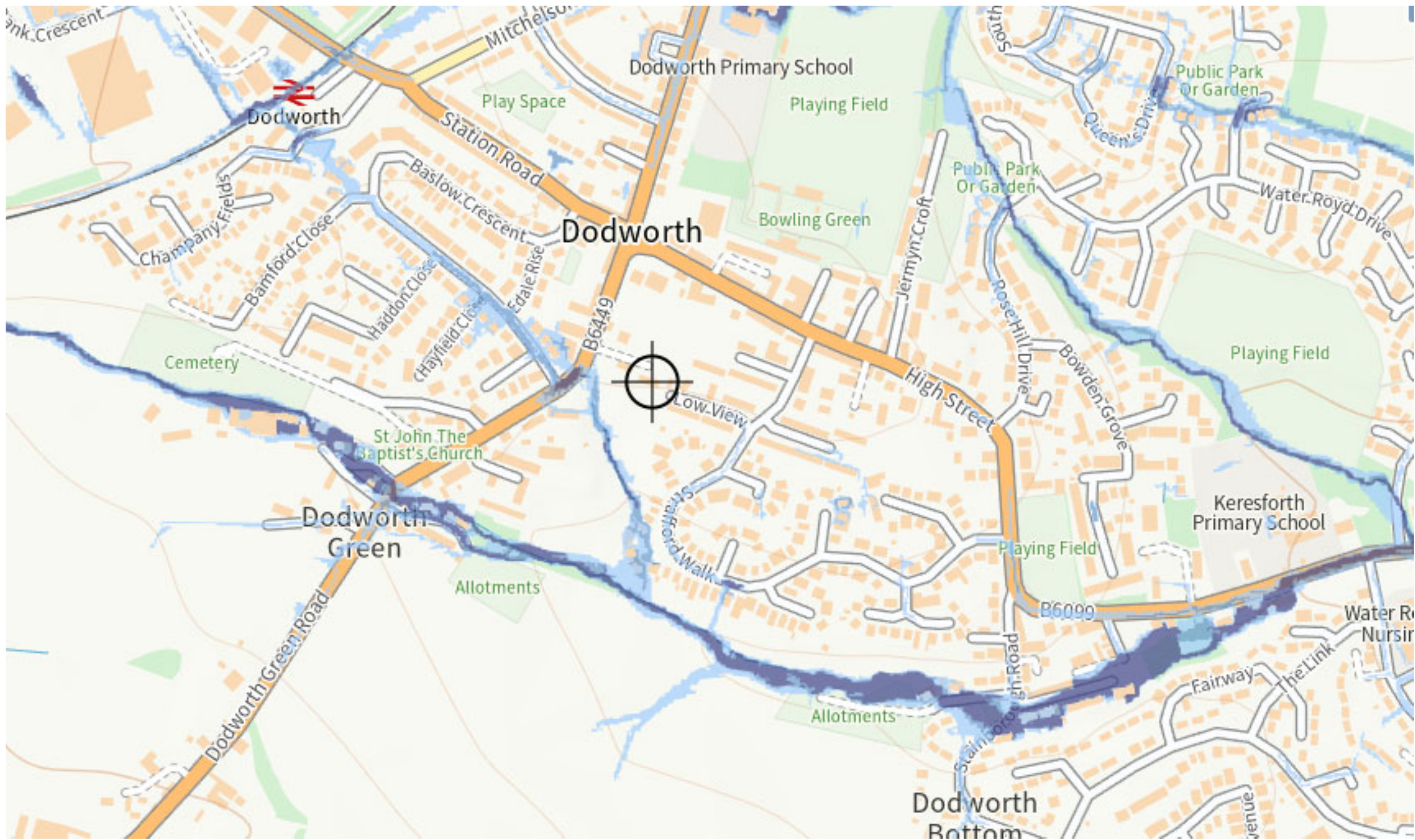
-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefiting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

0 20 40 60m

Page 2 of 2



ENVIRONMENT AGENCY SURFACE WATER FLOOD MAP



A P P E N D I X D: WATER AUTHORITY CONSULTATION



YorkshireWater

Wayne Walker
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Aberford Road
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Developer Services
Pre-Development Team
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BD3 7AY

Tel: 0345 120 8482
Fax:

Email:
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Your Ref:
Our Ref: Y006610

For telephone enquiries ring:
George Mullaney on 0345 120 8482

12th May 2022

Dear Mr Walker,

Green Road, Dodworth, Barnsley – Pre Planning Sewerage Enquiry U637075

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

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

Existing Infrastructure

There is a 300mm diameter public combined sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 3 (three) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

There is a sewage pumping station (SPS), under the control of Yorkshire Water, located near to the site. Vehicular access, including with large tankers, could be required at any





time.

The proximity of the existing sewage pumping station (SPS) to the site may mean a loss of amenity for future residents / workers. In order to minimise the risk of odour, noise and nuisance, industry standards recommend that habitable buildings should not be located within 15 (fifteen) metres of the existing SPS. To reduce the visible impact of the installation, the erection (by the developer) of suitable screening is advised.

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 300 mm diameter public combined sewer recorded to the south 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.

It is understood that curtilage surface water will discharge to watercourse.

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 on line or obtain an application form from our website (www.yorkshirewater.com) 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 interfere with the free flow of its contents or affect the treatment and disposal of its contents. Amongst



YorkshireWater

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.

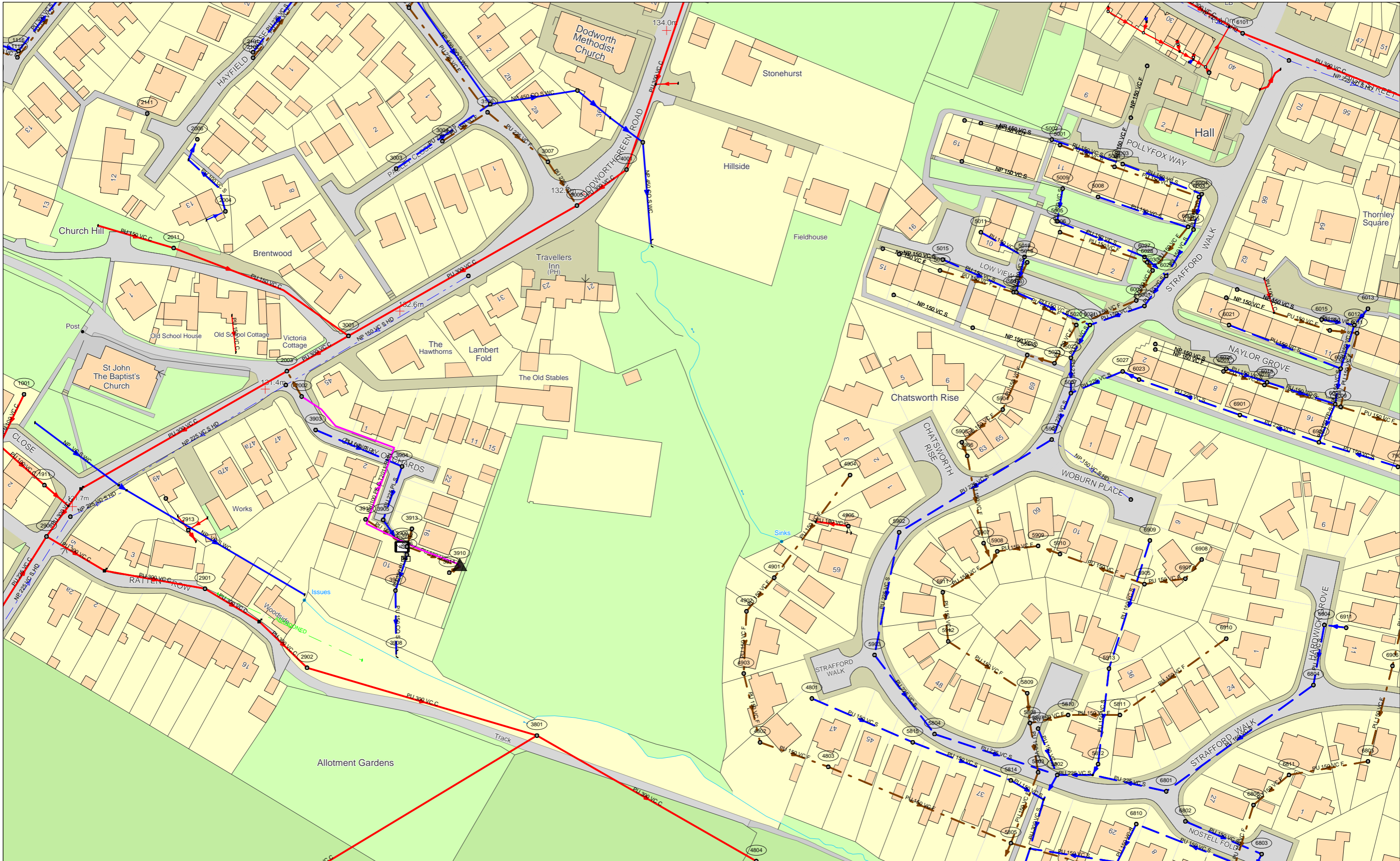
Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the Code for Adoption 2021/22, pursuant to an agreement under Section 104 of the Water Industry Act 1991. We are happy to offer pre-development technical advice on any prospective sites that you would like to put forward for 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



431278 : 404888

Map Name : SE3104NW

Title

Partial Key

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



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

Notes

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

Date Req : 12/05/2022, 15:27:32

Date Gen : 12/05/2022, 15:27:35

Source : Sewer Network Enquiry

A P P E N D I X E: LEAD LOCAL FLOOD AUTHORITY CONSULTATION

Wayne Walker

From: Grayson , Ian (SENIOR ENGINEER - ASSETS) <iangrayson@barnsley.gov.uk>
Sent: 22 April 2022 09:42
To: Wayne Walker
Subject: RE: 159.001 - Green Road, Dodworth - Consultation

Morning Wayne

1. I am not aware of any flooding incidents but the site appears on the EA surface water flood maps
2. There are 2 watercourses which are indicated on the OS Maps, not aware of any others
3. I can confirm that attenuation should be sized for the 1 in 100 year plus climate change event. No surcharging for the 1 in 1 year event and no flooding for the 1 in 30 year event.
4. We still require 30% allowance for climate change
5. We will require a 10% allowance for urban creep
6. You will need to apply for OWC to discharge to the watercourse
7. The proposed Discharge Rate is acceptable to ourselves

Thanks

From: Wayne Walker <wayne@oecconsult.co.uk>
Sent: 21 April 2022 14:32
To: Grayson , Ian (SENIOR ENGINEER - ASSETS) <iangrayson@barnsley.gov.uk>
Subject: 159.001 - Green Road, Dodworth - Consultation

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Afternoon Ian,

Our client is proposing to redevelop the above site for new residential dwellings and we are pleased to provide a site location plan and planning layout showing the site boundary for your information. The Ordnance Survey Grid Reference is SE 314 050 (431437, 405003) with the nearest post code of S75 3RP. The site area is approximately 2.29ha.

We have been appointed to prepare a Flood Risk & Drainage Strategy Report for the site and would thank you for information relating to the following: -

- Known flooding incidents
- Known watercourse locations (open or culvert that are not indicated on OS Maps)
- Confirmation that attenuation should be sized for the 1 in 100 year plus climate change event. No surcharging for the 1 in 1 year event and no flooding for the 1 in 30 year event.
- Do you still require 30% allowance for climate change?
- Do you require a 10% allowance for urban creep?
- Any other information relating to flood risk or drainage to assist with the proposals.

With regards to the proposed surface water discharge rate, assuming infiltration is discounted, which is highly likely due to the anticipated underlying geology, we propose a restricted surface water discharge from the site to the watercourse along the southern boundary at 6l/s. This is based on a developed site area of 1.2ha, using 5 l/s/ha, that we trust is acceptable to the LLFA?

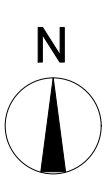
We trust that the above and enclosed is satisfactory and thank you in anticipation of your response.

Regards

APPENDIX F: PLANNING LAYOUT

ACCOMMODATION SCHEDULE							
Market Units							
House type	Elm	Beds	Storey Height	SCM	Number	2 Bed %	
N201		2	2	71	4	4	8%
Total							
House type	Beds	Detached	Storey Height	SCM	Number	3 Bed %	
N302	3	2	2	90	2		
N303A	3	2	2	93	7		
N305	3	2	2	103	3		
SL03 ALT	3	2	2	110	6		
N306	3	2	2	133	2		
N308	3	2	2	99	4		
N313	3	2	2.5	99	13		
Total					37	74%	
House type	Beds	Detached	Storey Height	SCM	Number	4 Bed %	
N400	4	2	2.5	125	2		
N402	4	2	2	116	1		
N403B	4	2	2	129	1		
N404	4	2	2	132	3		
N405	4	2	2	144	1		
Total					8	16%	
House type	Beds	Arrangement	Storey Height	SCM	Number	2 Bed %	
N503	5	Detached integral	2	202	1	2%	
Total					1		
Sub-total					50	100%	
GRAND TOTAL:					Number	SCF I	
					50		

- Key**
- Site Location
 - Proposed dwelling
 - Category A Tree
 - Category B Tree
 - Category C Tree
 - Root Protection Area
 - Tree to be removed
 - ↑ Mine Adit
 - Existing Building to be retained
 - Listed Building



DRAFT
 Drawing Title
 Planning Layout
 Site
 Land off Green Road, Dodworth

Thorpe Arch Grange
 Walton Road
 Thorp Arch
 LS23 7BA

01937 543599
 www.newetthomes.co.uk



Scale @ A2	1:500	Date	14/04/22
Drawn	MC	Checked	WN
Drawing No.	Z087.002	Rev.	B

A P P E N D I X G: INDICATIVE GREENFIELD RUN-OFF RATE CALCULATIONS

Clarke Hall Farm
Aberford Road, Wakefield
WF1 4AL



Date 17/05/2022 07:29
File

Designed by Wayne Walker
Checked by

Innovyze Source Control 2020.1.3

IH 124 Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	50.000	Urban	0.000
SAAR (mm)	800	Region Number	Region 3

Results 1/s

QBAR Rural 256.8
QBAR Urban 256.8

Q1 year 220.8

Q1 year 220.8
Q2 years 242.3
Q5 years 321.0
Q10 years 372.4
Q20 years 421.7
Q25 years 438.1
Q30 years 451.4
Q50 years 486.4
Q100 years 534.1
Q200 years 606.0
Q250 years 629.2
Q1000 years 780.7

A P P E N D I X H: INDICATIVE SURFACE WATER DRAINAGE CALCULATIONS

Clarke Hall Farm
 Aberford Road, Wakefield
 WF1 4AL

Dodworth Green Road
 Newett Homes
 159.001 - 30yr calcs



Date 17/05/2022 08:12
 File 159.001 - 30yr.SRCX

Designed by W.Walker
 Checked by

Innovyze Source Control 2020.1.3

Summary of Results for 30 year Return Period


Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	100.371	0.371	5.2	181.0	O K
30 min Summer	100.489	0.489	5.2	238.8	O K
60 min Summer	100.614	0.614	5.2	299.8	O K
120 min Summer	100.740	0.740	5.2	361.0	O K
180 min Summer	100.809	0.809	5.2	394.6	O K
240 min Summer	100.852	0.852	5.2	415.7	O K
360 min Summer	100.905	0.905	5.2	441.8	O K
480 min Summer	100.934	0.934	5.2	455.8	O K
600 min Summer	100.947	0.947	5.2	462.2	O K
720 min Summer	100.950	0.950	5.2	463.8	O K
960 min Summer	100.941	0.941	5.2	459.3	O K
1440 min Summer	100.910	0.910	5.2	444.2	O K
2160 min Summer	100.846	0.846	5.2	413.0	O K
2880 min Summer	100.782	0.782	5.2	381.4	O K
4320 min Summer	100.659	0.659	5.2	321.7	O K
5760 min Summer	100.551	0.551	5.2	268.8	O K
7200 min Summer	100.458	0.458	5.2	223.4	O K
8640 min Summer	100.383	0.383	5.2	186.8	O K
10080 min Summer	100.322	0.322	5.1	157.3	O K
15 min Winter	100.416	0.416	5.2	202.9	O K
30 min Winter	100.550	0.550	5.2	268.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	68.836	0.0	177.6	19
30 min Summer	45.828	0.0	237.2	34
60 min Summer	29.238	0.0	310.1	64
120 min Summer	18.112	0.0	384.5	122
180 min Summer	13.534	0.0	431.0	182
240 min Summer	10.952	0.0	465.0	242
360 min Summer	8.106	0.0	515.9	362
480 min Summer	6.544	0.0	554.8	482
600 min Summer	5.539	0.0	586.3	600
720 min Summer	4.832	0.0	612.9	720
960 min Summer	3.892	0.0	655.7	876
1440 min Summer	2.866	0.0	709.5	1124
2160 min Summer	2.108	0.0	811.1	1492
2880 min Summer	1.693	0.0	868.6	1876
4320 min Summer	1.242	0.0	954.5	2676
5760 min Summer	0.996	0.0	1024.4	3408
7200 min Summer	0.839	0.0	1078.3	4112
8640 min Summer	0.730	0.0	1124.7	4840
10080 min Summer	0.648	0.0	1164.5	5544
15 min Winter	68.836	0.0	199.3	19
30 min Winter	45.828	0.0	265.5	33

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	100.691	0.691	5.2	337.2	O K
120 min Winter	100.836	0.836	5.2	407.8	O K
180 min Winter	100.917	0.917	5.2	447.7	O K
240 min Winter	100.969	0.969	5.2	473.0	O K
360 min Winter	101.032	1.032	5.2	503.8	O K
480 min Winter	101.068	1.068	5.2	521.1	O K
600 min Winter	101.087	1.087	5.2	530.3	O K
720 min Winter	101.095	1.095	5.2	534.3	O K
960 min Winter	101.092	1.092	5.2	532.8	O K
1440 min Winter	101.050	1.050	5.2	512.4	O K
2160 min Winter	100.976	0.976	5.2	476.4	O K
2880 min Winter	100.879	0.879	5.2	428.8	O K
4320 min Winter	100.674	0.674	5.2	328.8	O K
5760 min Winter	100.507	0.507	5.2	247.5	O K
7200 min Winter	100.378	0.378	5.2	184.5	O K
8640 min Winter	100.285	0.285	5.0	139.3	O K
10080 min Winter	100.221	0.221	4.8	107.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	29.238	0.0	347.5	62
120 min Winter	18.112	0.0	430.7	122
180 min Winter	13.534	0.0	482.7	180
240 min Winter	10.952	0.0	520.5	238
360 min Winter	8.106	0.0	577.1	356
480 min Winter	6.544	0.0	620.2	470
600 min Winter	5.539	0.0	654.7	584
720 min Winter	4.832	0.0	683.4	694
960 min Winter	3.892	0.0	726.7	914
1440 min Winter	2.866	0.0	745.1	1168
2160 min Winter	2.108	0.0	908.4	1624
2880 min Winter	1.693	0.0	972.7	2080
4320 min Winter	1.242	0.0	1069.0	2856
5760 min Winter	0.996	0.0	1147.5	3624
7200 min Winter	0.839	0.0	1207.9	4320
8640 min Winter	0.730	0.0	1260.0	4936
10080 min Winter	0.648	0.0	1305.0	5640

Clarke Hall Farm Aberford Road, Wakefield WF1 4AL	Dodworth Green Road Newett Homes 159.001 - 30yr calcs	
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Date 17/05/2022 08:12 File 159.001 - 30yr.SRCX	Designed by W.Walker Checked by	
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Innovyze	Source Control 2020.1.3
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Rainfall Details


Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 1.430

Time (mins) Area
From: To: (ha)

0 4 1.430

OEC Consulting Engineers Ltd		Page 4
Clarke Hall Farm Aberford Road, Wakefield WF1 4AL	Dodworth Green Road Newett Homes 159.001 - 30yr calcs	
Date 17/05/2022 08:12 File 159.001 - 30yr.SRCX	Designed by W.Walker Checked by	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 105.000

Tank or Pond Structure

Invert Level (m) 100.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	488.0	0.700	488.0	1.400	488.0	2.100	488.0
0.100	488.0	0.800	488.0	1.500	488.0	2.200	488.0
0.200	488.0	0.900	488.0	1.600	488.0	2.300	488.0
0.300	488.0	1.000	488.0	1.700	488.0	2.400	488.0
0.400	488.0	1.100	488.0	1.800	488.0	2.500	488.0
0.500	488.0	1.200	488.0	1.900	488.0		
0.600	488.0	1.300	488.0	2.000	488.0		


Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0101-6000-2000-6000
Design Head (m)	2.000
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	100.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	6.0
Flush-Flo™	0.438	5.2
Kick-Flo®	0.900	4.1
Mean Flow over Head Range	-	4.8

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)
0.100	3.3	1.200	4.7	3.000	7.3	7.000	10.8
0.200	4.7	1.400	5.1	3.500	7.8	7.500	11.2
0.300	5.1	1.600	5.4	4.000	8.3	8.000	11.5
0.400	5.2	1.800	5.7	4.500	8.8	8.500	11.9
0.500	5.2	2.000	6.0	5.000	9.2	9.000	12.2
0.600	5.1	2.200	6.3	5.500	9.7	9.500	12.5
0.800	4.7	2.400	6.5	6.000	10.1		
1.000	4.3	2.600	6.8	6.500	10.5		

OEC Consulting Engineers Ltd		Page 1
Clarke Hall Farm Aberford Road, Wakefield WF1 4AL	Dodworth Green Road Newett Homes 159.001 - 100yr + 30% calcs	
Date 17/05/2022 08:10 File 159.001 - 100yr + 30%.SRCX	Designed by W.Walker Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	100.628	0.628	5.2	306.3	O K
30 min Summer	100.840	0.840	5.2	409.9	O K
60 min Summer	101.069	1.069	5.2	521.6	O K
120 min Summer	101.301	1.301	5.2	634.7	O K
180 min Summer	101.427	1.427	5.2	696.6	O K
240 min Summer	101.507	1.507	5.3	735.5	O K
360 min Summer	101.608	1.608	5.4	784.6	O K
480 min Summer	101.668	1.668	5.5	814.1	O K
600 min Summer	101.704	1.704	5.6	831.7	O K
720 min Summer	101.724	1.724	5.6	841.4	O K
960 min Summer	101.734	1.734	5.6	846.2	O K
1440 min Summer	101.702	1.702	5.6	830.4	O K
2160 min Summer	101.638	1.638	5.5	799.3	O K
2880 min Summer	101.572	1.572	5.4	767.0	O K
4320 min Summer	101.444	1.444	5.2	704.4	O K
5760 min Summer	101.322	1.322	5.2	645.4	O K
7200 min Summer	101.206	1.206	5.2	588.6	O K
8640 min Summer	101.096	1.096	5.2	534.6	O K
10080 min Summer	100.984	0.984	5.2	480.4	O K
15 min Winter	100.704	0.704	5.2	343.5	O K
30 min Winter	100.943	0.943	5.2	460.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	115.731	0.0	298.9	19
30 min Summer	77.804	0.0	391.7	34
60 min Summer	49.937	0.0	529.8	64
120 min Summer	30.956	0.0	654.8	124
180 min Summer	23.058	0.0	727.9	184
240 min Summer	18.577	0.0	775.9	242
360 min Summer	13.656	0.0	823.8	362
480 min Summer	10.974	0.0	830.6	482
600 min Summer	9.254	0.0	829.4	602
720 min Summer	8.046	0.0	826.1	722
960 min Summer	6.447	0.0	818.0	960
1440 min Summer	4.709	0.0	803.3	1240
2160 min Summer	3.432	0.0	1319.3	1620
2880 min Summer	2.739	0.0	1400.3	2020
4320 min Summer	1.989	0.0	1431.6	2852
5760 min Summer	1.583	0.0	1628.2	3688
7200 min Summer	1.325	0.0	1703.6	4536
8640 min Summer	1.147	0.0	1768.9	5360
10080 min Summer	1.015	0.0	1825.2	6152
15 min Winter	115.731	0.0	333.5	19
30 min Winter	77.804	0.0	414.4	34

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	101.199	1.199	5.2	585.3	O K
120 min Winter	101.462	1.462	5.2	713.6	O K
180 min Winter	101.608	1.608	5.4	784.7	O K
240 min Winter	101.701	1.701	5.6	829.9	O K
360 min Winter	101.820	1.820	5.7	888.1	O K
480 min Winter	101.895	1.895	5.8	924.7	O K
600 min Winter	101.942	1.942	5.9	947.9	O K
720 min Winter	101.972	1.972	6.0	962.5	O K
960 min Winter	101.998	1.998	6.0	975.1	O K
1440 min Winter	101.977	1.977	6.0	964.9	O K
2160 min Winter	101.895	1.895	5.8	924.6	O K
2880 min Winter	101.808	1.808	5.7	882.5	O K
4320 min Winter	101.624	1.624	5.4	792.3	O K
5760 min Winter	101.443	1.443	5.2	704.0	O K
7200 min Winter	101.268	1.268	5.2	619.0	O K
8640 min Winter	101.099	1.099	5.2	536.4	O K
10080 min Winter	100.908	0.908	5.2	443.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	49.937	0.0	592.7	64
120 min Winter	30.956	0.0	729.9	122
180 min Winter	23.058	0.0	803.4	180
240 min Winter	18.577	0.0	834.0	240
360 min Winter	13.656	0.0	844.7	356
480 min Winter	10.974	0.0	846.0	472
600 min Winter	9.254	0.0	845.8	588
720 min Winter	8.046	0.0	845.5	702
960 min Winter	6.447	0.0	846.3	926
1440 min Winter	4.709	0.0	852.5	1356
2160 min Winter	3.432	0.0	1475.6	1692
2880 min Winter	2.739	0.0	1560.1	2164
4320 min Winter	1.989	0.0	1501.1	3072
5760 min Winter	1.583	0.0	1823.7	3984
7200 min Winter	1.325	0.0	1908.0	4896
8640 min Winter	1.147	0.0	1981.3	5784
10080 min Winter	1.015	0.0	2045.0	6664

Clarke Hall Farm Aberford Road, Wakefield WF1 4AL	Dodworth Green Road Newett Homes 159.001 - 100yr + 30% calcs
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Date 17/05/2022 08:10 File 159.001 - 100yr + 30%.SRCX	Designed by W.Walker Checked by
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Innovyze	Source Control 2020.1.3
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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)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.430

Time (mins) Area		
From:	To:	(ha)
0	4	1.430

OEC Consulting Engineers Ltd		Page 4
Clarke Hall Farm Aberford Road, Wakefield WF1 4AL	Dodworth Green Road Newett Homes 159.001 - 100yr + 30% calcs	
Date 17/05/2022 08:10 File 159.001 - 100yr + 30%.SRCX	Designed by W.Walker Checked by	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 105.000

Tank or Pond Structure

Invert Level (m) 100.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	488.0	0.700	488.0	1.400	488.0	2.100	488.0
0.100	488.0	0.800	488.0	1.500	488.0	2.200	488.0
0.200	488.0	0.900	488.0	1.600	488.0	2.300	488.0
0.300	488.0	1.000	488.0	1.700	488.0	2.400	488.0
0.400	488.0	1.100	488.0	1.800	488.0	2.500	488.0
0.500	488.0	1.200	488.0	1.900	488.0		
0.600	488.0	1.300	488.0	2.000	488.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0101-6000-2000-6000
Design Head (m)	2.000
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	100.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	6.0
Flush-Flo™	0.438	5.2
Kick-Flo®	0.900	4.1
Mean Flow over Head Range	-	4.8

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)
0.100	3.3	1.200	4.7	3.000	7.3	7.000	10.8
0.200	4.7	1.400	5.1	3.500	7.8	7.500	11.2
0.300	5.1	1.600	5.4	4.000	8.3	8.000	11.5
0.400	5.2	1.800	5.7	4.500	8.8	8.500	11.9
0.500	5.2	2.000	6.0	5.000	9.2	9.000	12.2
0.600	5.1	2.200	6.3	5.500	9.7	9.500	12.5
0.800	4.7	2.400	6.5	6.000	10.1		
1.000	4.3	2.600	6.8	6.500	10.5		