
Development at the former Orgill School site Egremont

Flood Risk Assessment

Client:**Gleeson Developments Ltd**

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REVISION HISTORY

Revision	Date	Details
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ABBREVIATIONS

AEP:	Annual exceedance probability
AOD:	Above Ordnance Datum
CCA:	Climate change allowance
FRA:	Flood risk assessment
LiDAR:	Light detection and ranging
LLFA:	Lead Local Flood Authority
MBC:	Metropolitan Borough Council
OWC:	Ordinary watercourse
PPG:	Planning Practice Guidance
ReFH2:	ReFH2: Revitalised flood hydrology model, version 2
SFRA:	Strategic Flood Risk Assessment
SuDS:	Sustainable drainage systems

1.0 INTRODUCTION

- 1.1. JOC Consultants Ltd is instructed by Gleeson Developments Ltd (the Client), to prepare a flood risk assessment (FRA) for a proposed residential development at the site of the former Orgill Primary School and on land at How Bank Farm, Egremont, Cumbria. The development is the subject of a planning application to Copeland District Council. This report deals only with the Orgill School site and the How Bank Farm site is the subject of a separate FRA report.
- 1.2. The Environment Agency was consulted by the planning authority on the application and responded by letter dated 10th December 2020. This revision of the FRA report addresses the matters raised by the Environment Agency and the report reflects the most recent guidance on flood risk and climate change.
- 1.3. References in this report to “the site” are references to the site to which the planning application applies. Specific references to sources of information used in the report are shown in square brackets and are listed in section 11. Figure 1 is presented immediately following page 18 and the appendices follow thereafter.
- 1.4. This report is prepared specifically for Gleeson Developments Ltd for the purpose of the aforementioned planning application and the report may not be used for any purpose other than for the purpose for which it was commissioned, and it may not be assigned to any third party without our written permission.
- 1.5. In the preparation of this FRA report, JOC Consultants Ltd has relied on published information and on information provided by the Environment Agency and the Client and accepts no liability for its accuracy or adequacy or for the consequences of any changes to or re-assessment of this data in the future.

2.0 OBJECTIVES

- 2.1. The objectives of this flood risk assessment are to:
 - whether a proposed development is likely to be affected by current or future flooding from any source;
 - whether it will increase flood risk elsewhere;
 - whether the measures proposed to deal with these effects and risks are appropriate;

- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

3.0 PLANNING POLICY ON FLOOD RISK

3.1 National Policy

- 3.1.1. National Planning Policy in relation to flood risk is set out in the National Planning Policy Framework (NPPF) [1].

3.2 Local Policy

- 3.2.1. Proposed local policy on development and flood risk is set out in Policy ENV 1 and Policy DM24 of the Copeland Local Plan, adopted on 5th December 2013 [2]. The local planning policies on development and flood risk reflect the requirements of the NPPF and are informed by the Copeland Strategic Flood Risk Assessment (SFRA) published in October 2021 [3].

3.3 Planning Practice Guidance

- 3.3.1. In addition to national and local policy, the Planning Practice Guidance for Flood Risk and Coastal Change [4] provides advice to planning authorities to assist them when considering planning applications in areas at risk of flooding. The Environment Agency Standing Advice [5] also provides guidance to assist local planning authorities when considering planning applications in areas at risk of flooding.
- 3.3.2. This report has been prepared with reference to the Planning Practice Guidance and the Standing Advice.

4.0 LOCATION AND DESCRIPTION OF THE SITE

- 4.1. The site is situated to the west of Egremont, as shown in Figure 1 and extends to approximately 0.65ha. The area available for development however, excluding an Environment Agency easement adjacent to the western and southern boundaries, is approximately 0.45ha.
- 4.2. The NGR coordinates at the approximate centre of the site are 300480E, 511080N.

- 4.3. The topographical survey plan reproduced in Appendix A shows ground levels to fall generally towards the south, from 56.75m AOD at the northern boundary to 53.25m AOD at the south east corner, adjacent to Croadalla Avenue.
- 4.4. The nearest watercourse is Skirting Beck, a Main River which flows towards the south-east in a 900mm diameter culvert adjacent to the western boundary of the site. Whangs Beck, an OWC, is approximately 300m to the south-west of the site. Both watercourses are within the River Ehen catchment area.
- 4.5. The BGS Geology of Britain shows the site to overly the Brocram-Breccia formation bedrock which is overlain by superficial alluvium deposits comprising clay, silt, sand and gravel.

5.0 THE PROPOSED DEVELOPMENT

- 5.1. A development of 15 dwellings is proposed, as shown on the site layout plan provided in Appendix B.
- 5.2. The development is classified as **More Vulnerable** in accordance with Table 2 of the Planning Practice Guidance, paragraph 066.
- 5.3. The proposed drainage layout plan prepared by Thomas Consulting shows a surface water sewerage system which discharges to an attenuation storage basin at the south end of the site. The basin discharges to the culverted watercourse via a flow control chamber which limits the peak flow rate to 5.6 l/s at 1.125m head.

6.0 FLOOD RISK

6.1 Assessment methodology

- 6.1.1. The development and proposed or recommended mitigation measures are assessed against the Design Flood, as defined in PPG paragraph 055 [4], taking into account existing flood defences.
- 6.1.2. Events which exceed the Design Flood and breach events are assessed as residual risks
- 6.1.3. Flood risk at the site has been assessed using data published by the Environment Agency and the local planning authority.

6.2 History of Flooding

- 6.2.1. Egremont has a well documented history of flooding, caused by a combination of insufficient capacity in the sewerage network and culverted watercourses which is exacerbated by the back-up effect of the River Ehen when it is in spate. The SFRA refers at section 5.6 to 30 properties having been affected by flooding during a prolonged and intense rain storm in 1999.
- 6.2.2. The 2007 SFRA referred at paragraph 199 to a “recently completed” hydraulic assessment of the Orgill Estate which identified parts of the sewer network in need of upgrading and it anticipated that work would “soon be underway” to address the problems. The 2021 SFRA makes no mention of this, from which it is inferred that the upgrading of the sewer network must have been completed.
- 6.2.3. Although there is no specific evidence in the SFRA of flooding of the Orgill School site, it is likely that it will have been affected by fluvial flooding from Skirting Beck in the past.

6.3 Flood zones

- 6.3.1. The site is affected by all three flood zones, as shown in the Flood Map for Planning in Appendix C.
- 6.3.2. The 2007 SFRA Character Area 3 Map of Egremont shows a margin of land adjacent to the western and southern boundaries to be in the functional floodplain: flood zone 3b. The 2021 SFRA maps are not available on the Copeland Borough Council website but it is understood from the Environment Agency that, following completion of the flood alleviation scheme, discussed below, Skirting Beck will be re-modelled and it is expected that the site will no longer fall within the definition of Functional Floodplain.

6.4 Skirting Beck and Whangs Beck Flood Alleviation Scheme

- 6.4.1. In assessing the risk of flooding to the development the effect of the Skirting Beck and Whangs Beck Flood Alleviation Scheme, proposed by the Environment Agency has been considered. The scheme has been developed in response to the high risk of flooding in the town of Egremont and is described in the FRA report [6] submitted with the planning application to Copeland District Council under reference 4/19/2044/0F1.
- 6.4.2. In summary, the scheme comprises the creation of four main flood storage areas at:

- How Bank on Skirting Beck, to the north of How Bank Farm, providing 10,000m³ of storage retained by an earth embankment with a crest level in the range 67.65m to 68.50m AOD;
- Whangs Beck Upper on Whangs Beck, to the west of the site, providing 6,000m³ of storage retained by an earth embankment with a crest level in the range 78.0m to 78.80m AOD;
- Whangs Beck Lower on Whangs Beck, to the south of the site, providing 4,500m³ of storage retained by an earth embankment with a crest level in the range 69.8m to 70.62m AOD;
- West Lakes Academy to the east of the site, providing 6,000m³ of storage retained by earth embankments and retaining walls up to 1.5m high.

6.4.3. The How Bank storage reservoir is designed to release a controlled flow not exceeding 2m³/s. This is designed to greatly reduce flood risk to the area downstream, including the area in which the development is located.

6.4.4. In addition to the storage areas, the scheme also includes for improvements to existing culverts; the creation of sustainable drainage features to manage overland flows; the raising of kerbs and the creation of low walls to manage overland flows in the highway, and flood resilience measures to selected properties that are exposed to residual risks. A new 1,050mm diameter culvert is currently being constructed parallel to the existing 900mm diameter culvert passing through the site, in order to provide additional capacity for flows in Skirting Beck.

6.4.5. It is understood from discussions with Environment Agency personnel that, on completion, validation modelling will be carried out and the results of the model will provide evidence for the flood zone maps to be updated.

6.4.6. The scheme is now substantially complete and we understand from the Environment Agency that the flood storage embankments have been inspected by a reservoirs panel engineer¹.

6.6 Fluvial flood risk

6.5.1. The spillway level at the How Bank Storage area is 67.65m AOD but, as shown in the data in Appendix D, the 1% AEP flood level including an allowance for climate change is 67.48m AOD,

¹ Telephone call: JOC/Graham Stanger 08/09/22

which indicates no overtopping of the spillway in this event. The site will not therefore be at risk from this storage area under normal operating conditions.

6.7 Surface water flood risk

- 6.6.1. The Updated Surface Water Flood Map shows the site is at a 'Very Low' risk of surface water flooding, (see Appendix E). No overland flow paths are indicated within the site.

6.8 Risk of sewer flooding

- 6.7.1. Sewer flooding can occur when the capacity of a sewerage system is exceeded, or when the outflow from the sewer is restricted to the extent that the water level in the system rises and emerges from gullies or manholes at low points. There is no existing risk of sewer flooding to the site as there are no sewers in the immediate vicinity, and given the topography of the site, the risk of this type of flooding following development is assessed to be low.

6.9 Risk of groundwater flooding

- 6.8.1. Groundwater flooding of land occurs when the water table rises above the ground surface or enters basements and is typically associated with permeable rock such as chalk. These conditions are not present at the site and no basements are proposed in the development. The risk of this type of flooding is negligible, given the geology and topography of the site.

6.10 Risk of flooding from reservoirs and canals

- 6.9.1. The reservoirs flood map shows the site is not in an area at risk of flooding from the uncontrolled release of water from reservoirs (see Appendix F). A catastrophic failure of the How Bank impounding embankment however, could result in the sudden release of up to 10,000m³ of water. The likelihood of such an event is very low, provided the embankment and spillway are adequately maintained by the Environment Agency but, should such a release of water occur, the site would be in the flow path and at risk.
- 6.9.2. With a storage capacity of 10,000m³, How Bank storage reservoir is at the threshold at which the requirements of the Reservoirs Act 1975, as amended by the Flood and Water Management Act 2010, apply. The reservoir would therefore be subject to the safety inspection regime imposed by the Act and therefore the likelihood of a catastrophic failure is assessed to be very low.
- 6.9.3. The site is not at risk of flooding from canals.

7.0 EFFECTS OF CLIMATE CHANGE

7.1 Effect on rivers

- 7.1.1. The effects of climate change must be assessed over the lifetime of the development. The Planning Practice Guidance states at paragraph 026 that residential development should be considered for a minimum period of 100 years. For the purposes of this assessment, climate change effects are therefore considered up to the year 2122.
- 7.1.2. Current guidance on the application of climate change allowances was issued in February 2016 and updated on 27th May 2022 [7]. The guidance recommends the use of the Central peak river flow allowance for more vulnerable developments in flood zones 2 or 3a. The Upper End peak rainfall allowance should be used when assessing flood risk in the 2070s epoch.
- 7.1.3. The site is in the South West Lakes Management Catchment and the peak river flow central allowance in the 2080s epoch is 30%.
- 7.1.4. The Capita/Aecom Modelling Report states that a 20% CCA has been applied, based on the Central allowance, adjusted from the 2012 estimates in an earlier report by Atkins.

7.2 Effect on peak rainfall intensity

- 7.2.1. For developments having a lifetime beyond 2100, the Upper End CCA is to be used which, in the South West Lakes Management Catchment, is 45% for the 3.3% AEP event and 50% for the 1% AEP rainfall event.
- 7.2.2. The drainage system was designed before the current climate change guidance was published, so it is recommended that the design calculations are checked to assess the effect of the increased allowances for climate change.
- 7.2.3. The drainage system was designed before the current climate change guidance was published, so it is recommended that the design calculations are checked to assess the effect of the increased allowances for climate change.
- 7.2.4. Estimates of peak rainfall rates and runoff have been prepared using FEH 2013 point data for the site and the ReFH2 model. The results for return periods between 1 year (100% AEP) and 1000 years (0.1% AEP) are provided in Appendix G. The effects of the CCA allowances on the site in its existing and post-development conditions are shown in Tables 7.3 and 7.4 below.

Table 7.3: Effect of climate change – existing condition		
	Peak runoff rate increase	Runoff volume increase
3.3% AEP_45% CCA	61.2%	63.7%
1% AEP_50% CCA	74.2%	76.0%

Table 7.4: Effect of climate change – post-development condition		
	Peak runoff rate increase	Runoff volume increase
3.3% AEP_45% CCA	46.7%	47.8%
1% AEP_50% CCA	52.7%	54.1%

8.0 EFFECT OF THE DEVELOPMENT ON FLOOD RISK

8.1 Fluvial flood risk

- 8.1.1. Although part of the site is currently in flood zones 2 and 3, the completion and verification of the Environment Agency flood alleviation scheme is likely to result in the site being mainly in flood zone 1 with a possible margin of flood zone 2 along the eastern and southern margins of the site. The proposed development will have no effect on floodplain storage in a 1% AEP event and will not therefore affect fluvial flood risk elsewhere.

8.2 Surface water flood risk

- 8.2.1. It is estimated for the purposes of this FRA that the development will create an impervious area over approximately 50% of the site. This is a conservative estimate as the impervious area in Gleeson developments is usually between 40% and 50% of the gross site area. The ReFH2 model results in Appendix G show that this could increase the 1% AEP peak runoff rate and runoff volume by factors of approximately 3.4 and 3.1 respectively. These increases can be mitigated by the proposals for surface water management in section 9.2 below.

9.0 FLOOD RISK MANAGEMENT

9.1 Fluvial flood risk

- 9.1.1. The site is potentially at risk from fluvial flood events in Skirting Beck which exceed the spillway level of 67.65m AOD at the How Bank storage reservoir. The model data in Appendix D shows that events up to the 1% AEP_20% CCA event would be contained, but more extreme events may pass over the spillway and flow down the watercourse to Chaucer Avenue where there could be overland flow across the road and through the site.
- 9.1.2. It is therefore recommended that ground levels are raised by 600mm within the development area, but excluding the area within the 8m easement to watercourse along the western and southern boundaries. This will create an exceedance flow route through the easement and it is important that, should any fences be erected within the easement, these should be of a type that allows the passage of floodwater. These measures should be reviewed and, if necessary, adjusted when the results of the Environment Agency verification modelling are known.
- 9.1.3. Proposed finished floor levels should be at least 150mm above finished raised ground levels adjacent to the houses, in accordance with normal practice.

9.2 Surface water flood risk

- 9.2.1. The effect of the proposed development on surface water run-off volumes can be mitigated by the implementation of sustainable drainage principles. The Building Regulations require surface water to be discharged according to the following preference hierarchy:
1. to ground by infiltration;
 2. to a watercourse;
 3. to a sewer, if options (1) and (2) are not reasonably practicable.
- 9.2.2. The underlying geology suggests that infiltration drainage may not be feasible. Should field tests prove this to be the case, surface water should be discharged to the Skirting Beck culvert at a rate to be agreed with the LLFA and the Environment Agency.
- 9.2.3. Attenuation storage will be required and it is proposed to provide a storage basin within the public open space at the south of the site. The UK SuDS preliminary estimate of storage in Appendix H indicates a required storage capacity of 154m³. The actual required storage capacity will be verified in the detailed design of the drainage system for the development.

- 9.2.4. It is recommended that a detailed drainage design is prepared for the development in accordance with the technical standards for sustainable drainage [8] and the Building Regulations 2015. The design should be submitted to Copeland District Council for approval prior to construction.

9.3 Residual risks

- 9.3.1. Residual risks are those which persist after any flood risk management measures designed to protect against the design flood event. These risks include:

- flood events that are greater than the design event;
- greater climate change effects than the 20% CCA used in the Environment Agency flood alleviation scheme;
- catastrophic failure of the impounding embankments; and
- an increase in the design event resulting from updated flood forecasting.

- 9.3.2. As noted in paragraph 9.1.1 above, the site is potentially at risk from events which exceed the spillway level at the How Bank storage reservoir. The recommended measures in paragraphs 9.1.2 and 9.1.3 should minimise the risk of flooding to the development but the Environment Agency's verification model should be reviewed when its results are available and an assessment should be made of the effects of a 0.1% AEP event on the development site. This may result in further flood risk mitigation measures, such as flood resilience, being required.

- 9.3.3. The residual risk associated with greater climate change effects can be mitigated by the recommendation in 9.3.2 above.

- 9.3.4. The effects of a catastrophic failure of the impounding embankments, resulting in a sudden release of stored water do not appear to have been considered in the FRA report for the flood alleviation scheme. As noted in paragraph 6.9.2, the risk of such a failure is assessed to be very low but the consequences would be potentially life-threatening. This is true for all development within the area affected by reservoir failure but the safety regime imposed by the Reservoirs Act 1975 is designed to ensure such a failure does not occur.

- 9.3.5. Should updated flood forecasting and climate change predictions result in increased flow rates in Skirting Beck, the spillway would be overtopped more frequently, but the measures recommended to mitigate the residual risk in 9.1.2 above are likely to be sufficient to mitigate this risk also.

- 9.3.6. It is recommended that the above recommendations for flood risk management are reviewed and, if necessary, adjusted when further details of the proposals for managing exceedance flows are received from the Environment Agency.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

- 10.1.1. The development is classified as More Vulnerable and is currently partly in Flood Zones 1, 2 and 3. The Skirting Beck and Whangs Beck Flood Alleviation Scheme, implemented by the Environment Agency however, will reduce flood risk at the site and the flood zones will be re-assessed following completion of the scheme when the results of verification modelling are known.
- 10.1.2. Egremont has a history of severe flooding, caused by rapid response runoff from the upper catchment; inadequate capacity in the sewerage and culvert network; and high water levels in the River Ehen preventing drainage. The location of the site in relation to Skirting Beck suggests that flooding in the past is likely to have occurred.
- 10.1.3. The risks of surface water flooding and sewer flooding to the development are very low and the site is not currently within an area at risk from the uncontrolled release of water from reservoirs. The Skirting Beck and Whangs Beck Flood Alleviation Scheme will however create a 10,000m³ storage reservoir at How Bank, above the downstream ground level and the development will be at risk of a catastrophic failure of the embankment. The likelihood of such an event is assessed to be very low, as the reservoir will be subject to safety inspections under the Reservoirs Act 1975.
- 10.1.4. The site is not at risk of flooding from any canal.
- 10.1.5. The use of a 20% CCA in the Skirting Beck and Whangs Beck Flood Alleviation Scheme is not in accordance with current guidance.
- 10.1.6. The effect of climate change on peak rainfall intensity is estimated to increase peak runoff rates in the 1% AEP event by approximately 53% over the lifetime of the development. Runoff volumes in the same event are estimated to increase by approximately 54%.
- 10.1.7. The creation of impervious area within the development could increase surface water runoff rates and volumes in the 1% AEP event by factors of approximately 3.4 and 3.1 respectively.

These increases will be mitigated by the application of sustainable drainage principles in the drainage design for the development, including the provision of attenuation storage.

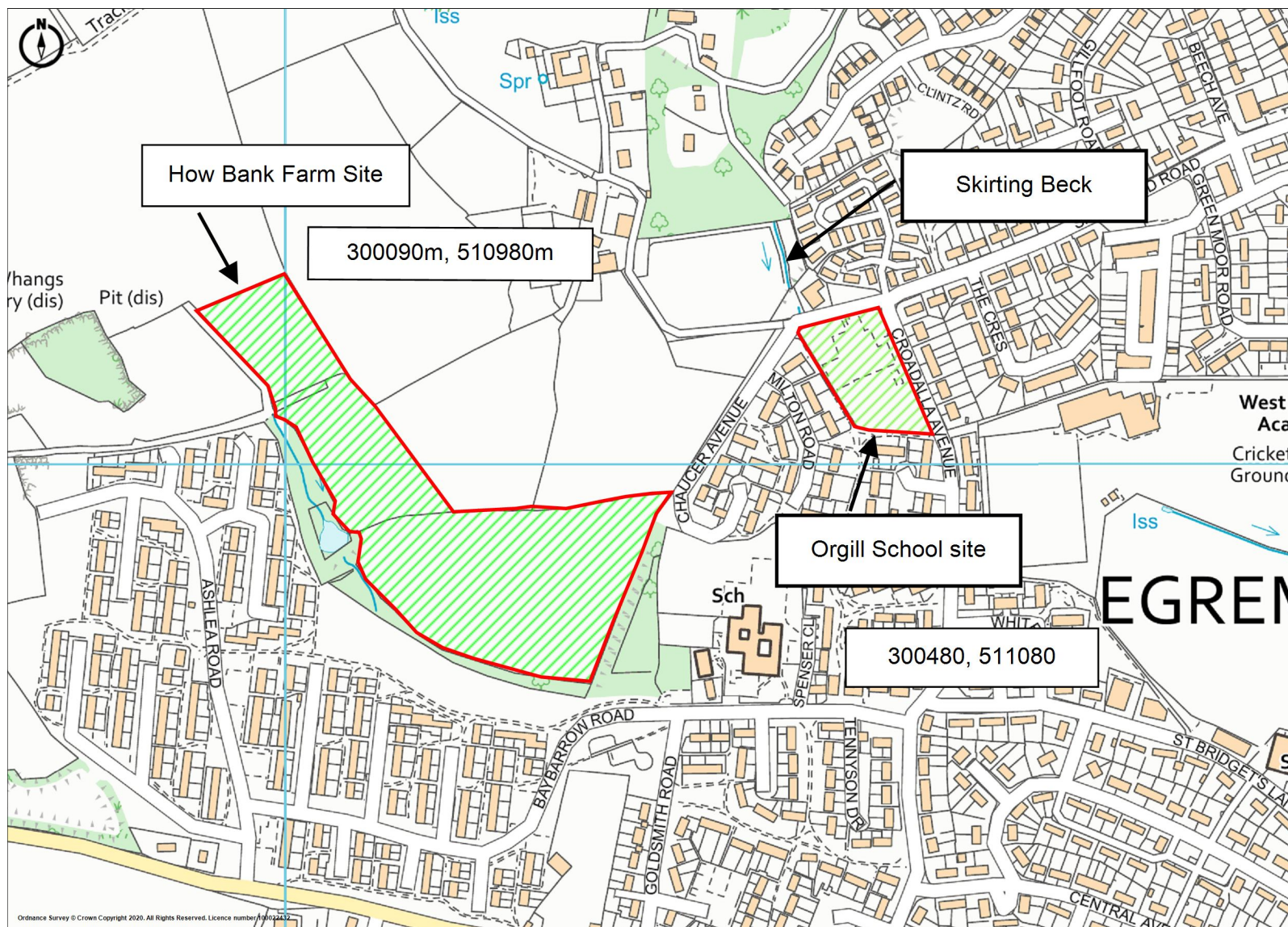
- 10.1.8. Ground conditions are unlikely to be suitable for infiltration drainage and therefore surface water would have to be discharged to the Skirting Beck culvert at a controlled rate to be agreed with the LLFA and the Environment Agency.
- 10.1.9. The development will have no effect on fluvial flood risk and will not increase off-site flood risks provided the recommendations for surface water management are implemented.

10.2 Recommendations

- 10.2.1. The recommended flood risk management precautions in section 9 of this report should be implemented in the design and construction of the development.
- 10.2.2. It is recommended that a detailed drainage design, based on the Drainage Strategy, is prepared and submitted to Copeland District Council and United Utilities for approval, prior to construction.

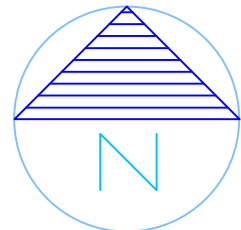
11.0 REFERENCES

1. National Planning Policy Framework. Department for Communities and Local Government. February 2019.
2. Copeland District Council Local Plan 2013 – 2028, adopted 5th December 2013.
3. Copeland District Council SFRA, October 2021.
4. Planning Practice Guidance: Flood Risk and Coastal Change. Updated 15th April 2015. Department for Communities and Local Government.
5. Environment Agency Standing Advice to local planning authorities, 8th February 2022.
6. Skirting Beck and Whangs Beck Flood Risk Assessment version S2, VBA Joint Venture Limited, 31st January 2019.
7. Flood risk assessments: climate change allowances. Environment Agency, 19th February 2016, updated 27th May 2022.
8. Sustainable Drainage Systems. Non-statutory technical standards for sustainable drainage systems. DEFRA March 2015.



APPENDIX A

Topographical survey plan



SURVEY STATIONS				
Name	Easting	Northing	Height	Remark
S1	300459.995	511029.896	57.007	
S2	300470.982	511018.751	53.803	
S3	300457.655	511046.177	54.219	
S4	300414.541	511111.327	56.793	
S5	300500.356	511130.554	56.249	
S6	300509.613	511082.482	55.158	
S7	300531.655	511020.423	52.728	
S8	300504.388	511022.792	52.988	

Survey Features	
	Bin of Batter
	Top of Batter
	Fence (General)
	Fence (Pallade)
	Fence (Metal)
	Fence (Close Board)
	Hedge/line
	Wall
	Building (Structure)
	Road (Channel)
	Track
	Karling
	Footpath
	Tree / Vegetation Canopy
	Edge of Stone
	Concrete
	Tarmac / Asphalt
	Drop Karling
	Centeline
	Verge
	Edging Kerbs
	Watercourse / Ditch
	Contour (Major)
	Contour (Minor)
	Overhead Electricity Cable
	Overhead Telecom Cable

Underground Utility Mapping	
	Underground Electricity Utility
	Underground Gas Utility
	Underground Water Utility
	Underground BT Utility
	Underground Telecom Utility
	Unknown route obtained with GPR
	Unknown Utility
	Storm Water
	Foul Water
	Combined Sewer

	EOT
	Loss of GPR Reflection
	Loss/End of Signal
Site Grid	
OS National Grid (OSTN15 Transformation)	
Scale Factor removed so as true dimensions can be used on site for future work.	
Site Datum	
OS National Geoid Model (OSGM15) to obtain local area corrections.	
DO NOT SCALE FROM DRAWING	
DIMENSIONS TO BE TAKEN ON SITE	



Former
Orgill School
Egremont

JOB TITLE

Gleeson Homes

CLIENT

Topographical
Survey

DRAWING TITLE

1:250 @ A1

SCALE

J D Gibson

DRAWN

11/05/2020

DATE

J D Gibson

APPROVED

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REV	AMENDMENT	DRAWN	CHECKED
PROJECT No.		GH/FOS/TS01	REV

APPENDIX B

Planning Layout drawing

Drawing No: MGL/PL/111 revision F dated 4th September 2022 by
Twenty 10 Design and Planning

FORMER ORGILL INFANTS SCHOOL, EGREMONT



KEY

- 1.8m HIGH TIMBER SCREEN FENCE TO SEPARATE DETAIL
- 1.8m HIGH TIMBER SCREEN DIVISIONAL FENCE TO SEPARATE DETAIL
- 1.8m HIGH SCREEN WALL TO SEPARATE DETAIL
- EXISTING TREES TO BE REMOVED
- SHARED DRIVE
- AS AND 'OPP' HANDINGS OF HOUSE TYPES
- DENOTES BIN COLLECTION POINTS

SCHEDULE OF ACCOMMODATION - FORMER ORGILL INFANTS SCHOOL

TYPE	NAME	DESCRIPTION	SQ. FT.	No.
254	Moy	2 bed bungalow	656	4
201	Cork	2 bed semi-det.	651	10
301	Tyrone	3 bed semi-det.	759	16
303	Wicklow	3 bed semi-det.	772	6
340	Keady	3 bed semi-det.	839	6
304	Killenny	3 bed detached	772	7
354	Strade	3 bed detached	904	10
359	Clifden	3 bed detached	984	9
401	Longford	4 bed detached	1066	4
403	Carlow	4 bed detached	1048	2
435	Dublin	4 bed detached	1272	16
TOTAL			80,140 SQ. FT.	90No.

SCHEDULE OF ACCOMMODATION - FORMER ORGILL INFANTS SCHOOL

TYPE	NAME	DESCRIPTION	SQ. FT.	No.
254	Moy	2 bed bungalow	656	1
201	Cork	2 bed semi-det.	651	1
301	Tyrone	3 bed semi-det.	759	5
302	Galway	3 bed semi-det.	788	2
354	Strade	3 bed detached	904	3
359	Clifden	3 bed detached	984	1
401	Longford	4 bed detached	1066	1
435	Dublin	4 bed detached	1221	1
TOTAL			12,661 SQ. FT.	13No.

HOW BANK FARM, EGREMONT

gleeson

GLEESON HOMES & REGENERATION

PLANNING LAYOUT

FORMER ORGILL INFANTS SCHOOL, EGREMONT

SCALE: 1:1000 DATE: 10.03.23 DRAWING NO: M/JG/PL-111

20210 design

APPENDIX C

Flood Map for Planning

Flood map for planning

Your reference
19/013

Location (easting/northing)
300480/511080

Created
7 Oct 2022 11:17

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)

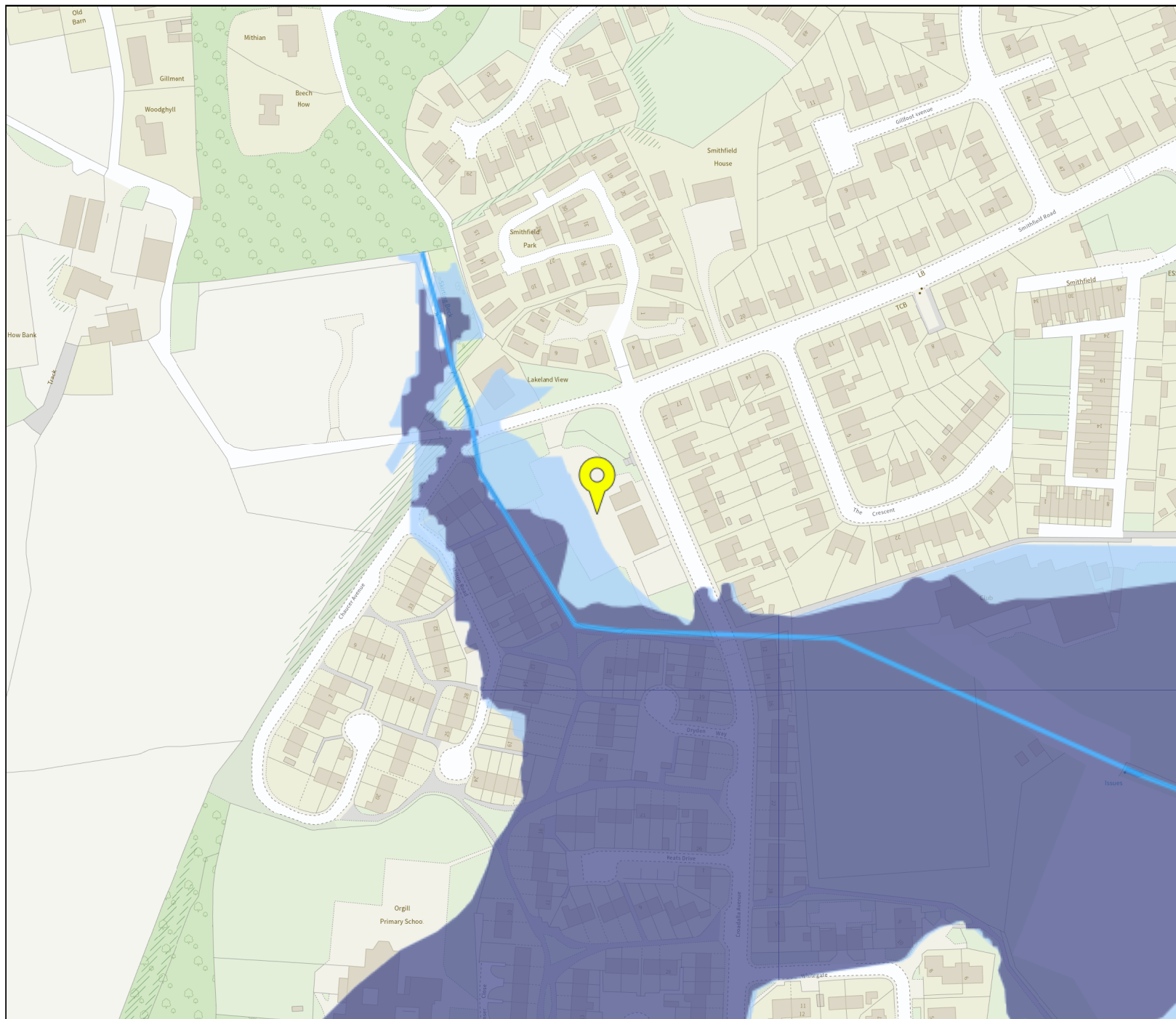
Notes

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
19/013

Location (easting/northing)
300480/511080

Scale
1:2500

Created
7 Oct 2022 11:17

-  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

APPENDIX D

Predicted flood levels provided by the Environment Agency

John O'Connor

From: Stanger, Graham [graham.stanger@environment-agency.gov.uk]
Sent: 22 October 2019 08:22
To: John O'Connor
Cc: Hall, Chris; Scopes, David S; Tom Lawrenson
Subject: FW: Skirting Beck - Information as requested

Hi John,

Please see info below . I am out of the office shortly and will have limited access to my emails, if you need mor model information please contact Chris Hall / David Scopes our design team who will be able to assist with model information.

Regards

Graham Stanger – Project Manager
Programme & Contract Management (PCM)
part of Operations Assets & Programme Management

Environment Agency

✉ Richard Fairclough House, Knutsford Road, Latchford, Warrington WA4 1HT
Mobile: 07771 51 3115

📧 graham.stanger@environment-agency.gov.uk

🌳 Please consider the environment before printing this email

From: Hall, Chris [mailto:Chris.Hall2@atkinsglobal.com]
Sent: 21 October 2019 17:05
To: Stanger, Graham <graham.stanger@environment-agency.gov.uk>
Cc: Scopes, David S <David.Scopes@atkinsglobal.com>
Subject: Skirting Beck - Information as requested

Hi Graham,

As requested, the planning application reference is 4/19/2044/0F1

I have included information below, showing overtopping events at the various reservoirs.

	Event	Overtopping Volume (m3)	Peak Overtopping Flow (m3/s)	Peak Level (mAOD)	Notes
How Bank	Q5+CC			65.56	No overtopping for during Q100+CC and below
67.65	Q10+CC			65.62	
	Q20+CC			65.68	
	Q30+CC			65.96	
	Q50+CC			66.65	
	Q75+CC			67.12	
	Q100+CC			67.48	
Whangs Upper	Q5+CC			77.23	
78	Q10+CC			77.97	
	Q20+CC	2621	0.7	78.07	Overtopping flow into Whangs Lower
	Q30+CC	4284	0.92	78.08	
	Q50+CC	6700	1.2	78.09	
	Q75+CC	8400	1.35	78.12	
	Q100+CC	9900	1.44	78.12	
Whangs Lower	Q5+CC	-		65.8	
69.8	Q10+CC	-		66.23	
	Q20+CC	-		68.79	
	Q30+CC	-		69.67	
	Q50+CC	2,300	0.8	69.87	Overtopping flow down Baybarrow road, through school and eventually into WLA
	Q75+CC	4,300	1.1	69.89	
	Q100+CC	5,900	1.3	69.9	
WLA	Q5+CC			48.87	

49.7	Q10+CC			49.1	
	Q20+CC			49.31	
	Q30+CC			49.41	
	Q50+CC	-		49.59	
	Q75+CC	700	0.6	49.72	
	Q100+CC	6,000	1.3	49.73	

Please let me know if you require anything further.

Chris Hall
Graduate Civil Engineer, Infrastructure
UK & Europe
Engineering, Design and Project Management

01925 238905

Chadwick House, Birchwood Park, Warrington, Cheshire WA3 6AE

Company

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APPENDIX E

Surface Water Flood Maps

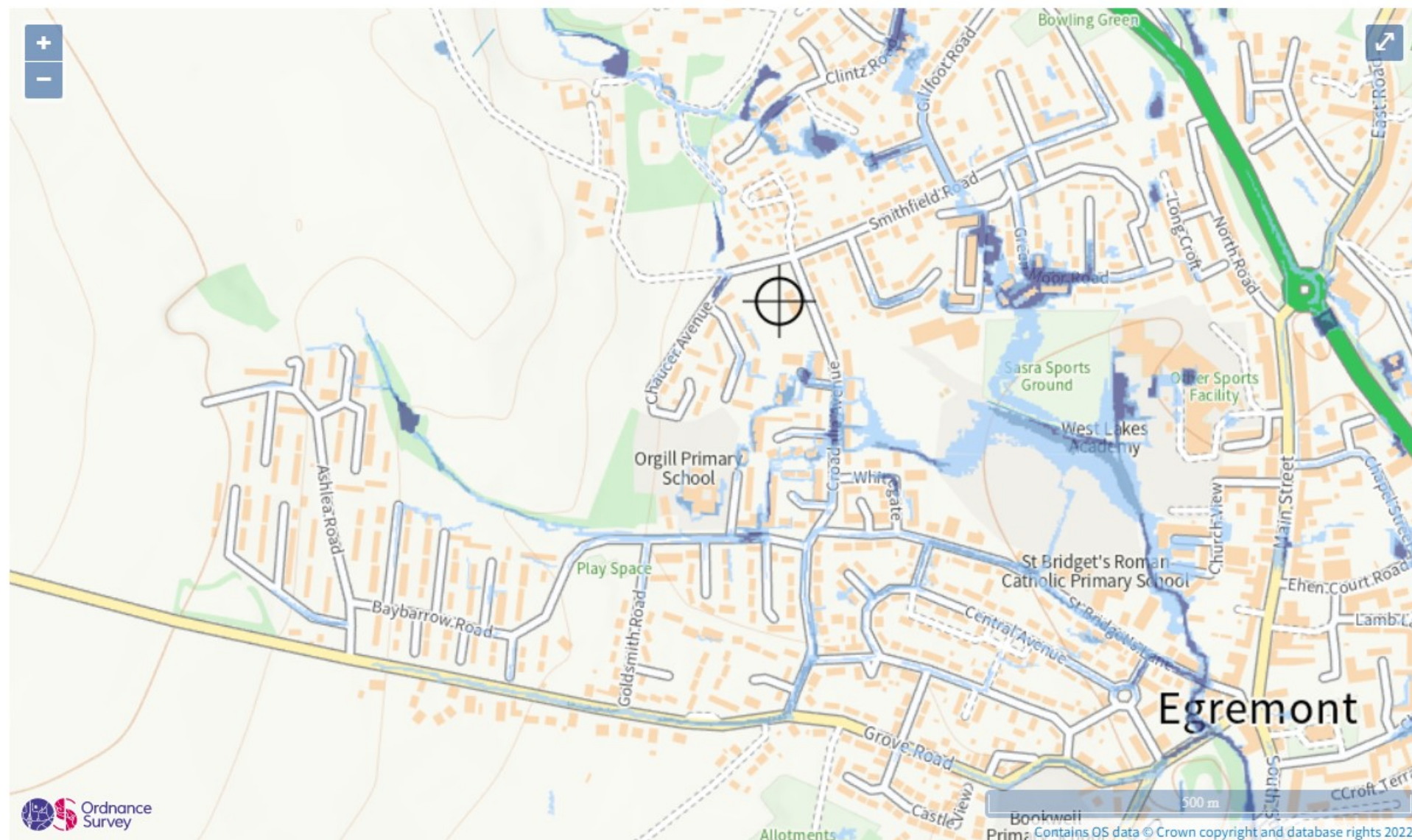
Flood risk

Location

Extent of flooding



Enter a place or postcode



Extent of flooding from surface water

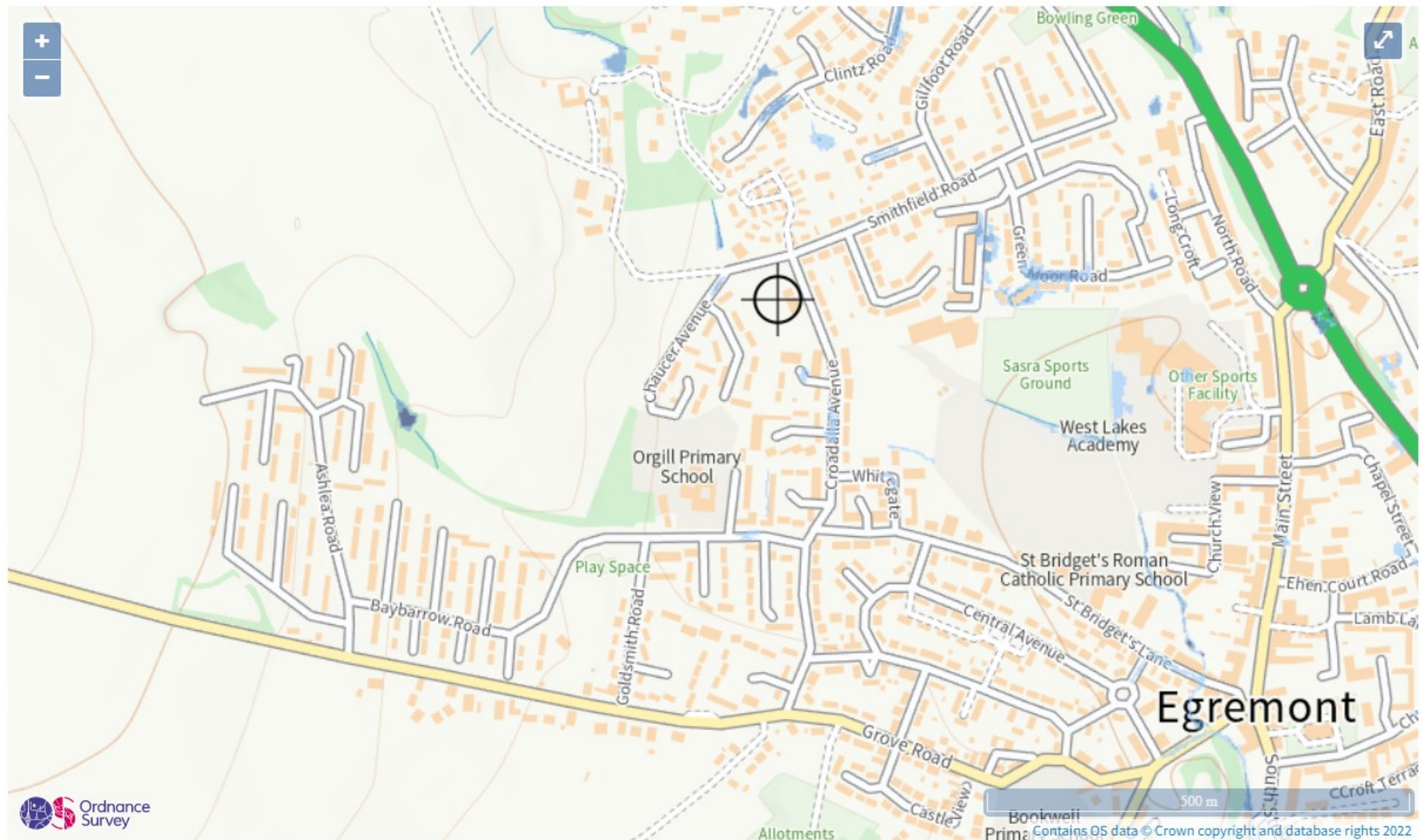
● [High](#) ● [Medium](#) ● [Low](#) ○ [Very low](#) ⊕ Location you selected

Flood risk

High risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

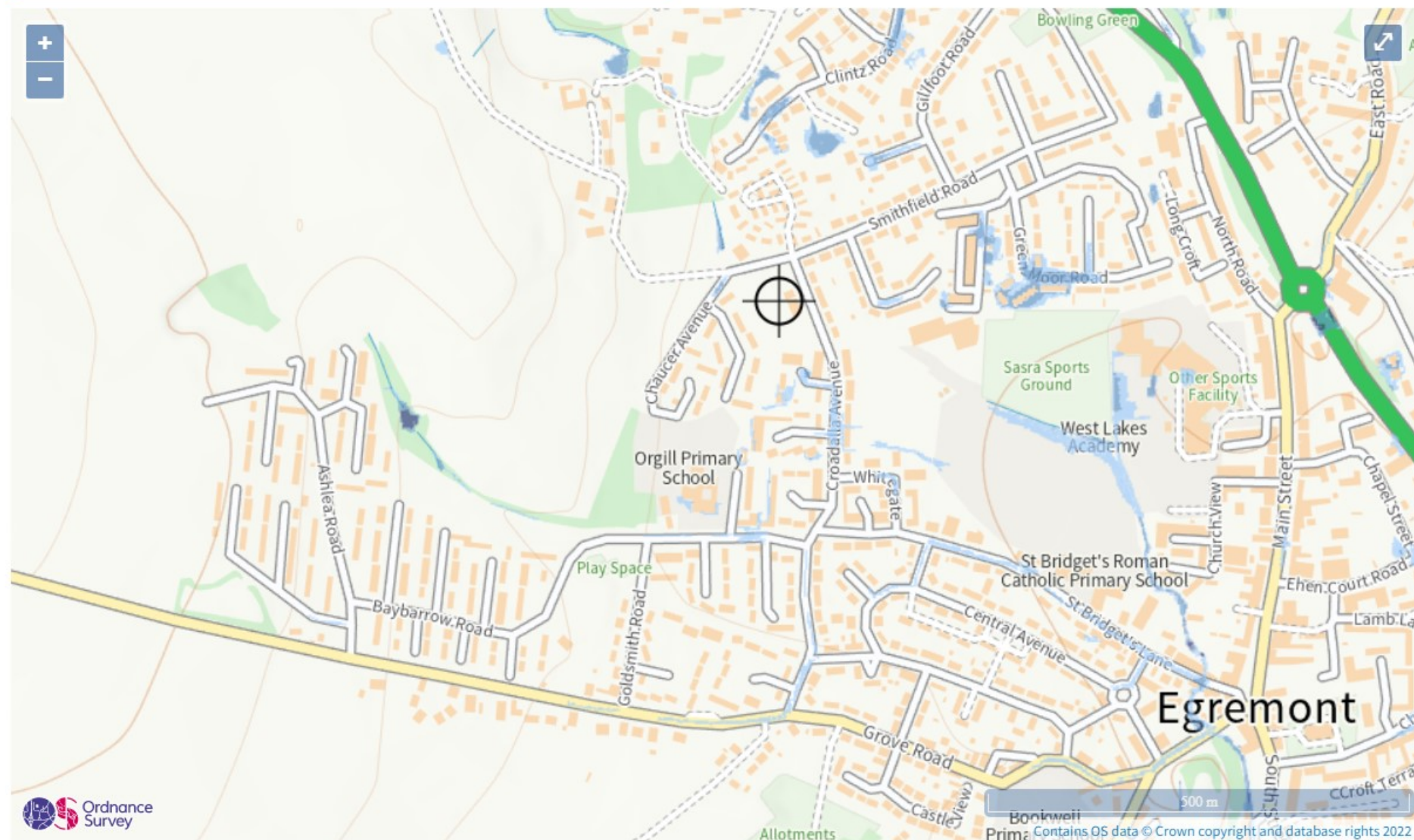
Over 900mm 300 to 900mm Below 300mm Location you selected

Flood risk

Medium risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm Location you selected

Flood risk

Low risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm Location you selected

APPENDIX F

Reservoirs Flood Map

Flood risk

Location

Extent of flooding

Enter a place or postcode



Maximum extent of flooding from reservoirs:

● when river levels are normal ● when there is also flooding from rivers ⊕ Location you selected

APPENDIX G

ReFH 2 estimates of peak surface water runoff rates and volumes

REFH2 estimates of surface water runoff rates and volumes

10th October 2022

Return period (yrs)	Urbanised peak flow (l/s)	Urbanised direct runoff (m ³)	As-rural peak flow (l/s)	As-rural direct runoff (m3)	Peak flow increase %	Runoff increase %
1	6.42	37.96	1.24	7.34	416.0%	417.4%
2	7.22	42.81	1.40	8.40	414.0%	409.4%
5	9.93	59.22	1.98	12.23	401.3%	384.4%
10	11.91	71.26	2.43	15.23	389.5%	368.0%
30	15.42	92.66	3.30	20.96	367.6%	342.1%
50	17.36	104.51	3.81	24.34	355.8%	329.3%
75	19.07	115.06	4.28	27.48	345.6%	318.8%
100	20.41	123.26	4.66	29.99	337.9%	311.0%
200	24.08	145.95	5.77	37.28	317.6%	291.5%
1000	34.39	210.26	9.29	60.46	270.4%	247.8%
				Average:	355.5%	333.6%
30_45% CCA	22.62	136.92	5.32	34.32		
100_50% CCA	31.16	189.98	8.12	52.77		

Effect of CCA on 1% AEP event

	Peak flow rural increase	Runoff volume rural increase	Peak flow post development increase	Runoff volume post development increase
30_45% CCA	61.2%	63.7%	46.7%	47.8%
100_50% CCA	74.2%	76.0%	52.7%	54.1%

APPENDIX H

UK SuDS estimate of attenuation storage

[Print](#)[Close Report](#)

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by: John O'Connor

Site name: Orgill School Site, Egremont

Site location: CA22 2HD

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude: 54.48527° N

Longitude: 3.53779° W

Reference: 3731853543

Date: Oct 09 2022 14:53

Site characteristics

Total site area (ha): 0.45

Significant public open space (ha): 0

Area positively drained (ha): 0.45

Impermeable area (ha): 0.225

Percentage of drained area that is impermeable (%): 50

Impervious area drained via infiltration (ha): 0

Return period for infiltration system design (year): 10

Impervious area drained to rainwater harvesting (ha): 0

Return period for rainwater harvesting system (year): 10

Compliance factor for rainwater harvesting system (%): 66

Net site area for storage volume design (ha): 0.45

Net impermeable area for storage volume design (ha): 0.26

Pervious area contribution to runoff (%): 30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor: 1.4

Urban creep allowance factor: 1.1

Volume control approach: Use long term storage

Interception rainfall depth (mm): 5

Minimum flow rate (l/s): 2

Methodology

esti: IH124

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	70
Rainfall 100 yrs 12 hrs:	--	84
FEH / FSR conversion factor:	1	1
SAAR (mm):	1169	1169
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	3.96	3.96
Q_{BAR} for net site area (l/s):	3.96	3.96

Site discharge rates	Default	Edited
1 in 1 year (l/s):	3.4	3.4
1 in 30 years (l/s):	6.7	6.7
1 in 100 year (l/s):	8.2	8.2

Estimated storage volumes	Default	Edited
Attenuation storage 1/100 years (m³):	154	154
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	154	154

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

End of Report