B. Development Proposals

SCOTT BROWNRIGG

Key: -

- Land required for infrastructure (including green infrastructure)
- Residential Class C3
- Commercial Class B1/B2/B8
- Commercial Class B1
- Local centre Class A1-A5 / D1 and C3 use
- Heritage Class D1
- New Primary School Class D1
- Institutional Residential Class C1
- Hotel/Care home facility Class C1/C2

Development Uses Parameter Plan

Upper Heyford

31 August 2010 14272 • 01 - DW - 411 - 023 D

0 50 100 150 200 250m SCALE 1 : 2500 @ A1

N

SCOTT BROWNRIGG

Application Boundary

Open Space

Natural Open Space

Sports ground

Green Routes (see DAS)

Structure Planting (see DAS)

Surface Water Attenuation Feature (precise number, location and dimension to be determined)

Green Infrastructure Parameter Plan

Upper Heyford

02 September 2010 14272 • 01 - DW - 411 - 029 C

0 50 100 150 200 250m SCALE 1 : 2500 @ A1

N

C. Correspondence

Tarran, Sophie G

From: Thames West, Customer Contact [thwest@environment-agency.gov.uk]
Sent: 13 May 2010 14:41
To: Tarran, Sophie G
Subject: RE: WIR33071: Upper Heyford Airport Flood Risk Enquiry Letter
Attachments: 33071 flood map.pdf; 33071 receipt.pdf; 33071 watercourse map2.pdf; 33071 watercourse map1.pdf; UpperHeyford PS.xls; EA Standard Notice (Commercial).pdf

Dear Ms Tarran

WIR33071: Upper Heyford Airport Flood Risk Enquiry Letter

Thank you for your data request and payment.

Please now find attached:

Flood Zones Map – confirming that the site lies within flood zone 1, the area with a chance of flooding of less than 1 in 1000 in any year.

Watercourse maps – showing the location of secondary and tertiary watercourses on or near the site. Please note that the closest Main River is the River Cherwell, approximately 1 kilometre west of the site.

History of flooding: the above site is not within the Environment Agency's records of historic flood event from rivers, the sea or groundwater. However, please note that this does not necessarily mean that flooding has not occurred here in the past, as our records are not comprehensive. We would therefore advise that you make further enquiries locally with specific reference to flooding at this location.

Groundwater Information
This is based on a 1km search radius at OX25 5TD (NGR 451202, 225749). Our Groundwater team have included background and any additional information that may be useful:

- **Geology**
  The solid geology beneath the site is the Great Oolite group. This rock formation is classed as a Principal Aquifer. There are no drift deposits within the search radius.

- **Protected Rights and Source Protection Zones**
  There are no groundwater abstractions (licensed or deregulated) or private water supplies within the 1km search radius. There are no Source Protection Zones within the area.

- **Groundwater Levels**
  Groundwater levels at the site are approximately 103.9mAOD - this is a rest water level associated with the drilling of BH SP52/041B which is approximately 700m east from the NGR reference given above. There is an EA closed groundwater monitoring point approximately 1.2km west of the site. I have attached the groundwater level information. Please note that the groundwater levels are only an indication of levels at the site. The elevation of the monitoring BH 10 metres lower than the site.

- **Groundwater Flooding**
  There are no historical flooding events within a 1km radius of the site. Approximately 3.8km west of the site we have a record of a cellar flooded in mid January 2001.Please note that we only hold data on groundwater flooding events from 2000 onwards. There may have been previous groundwater events prior to this date that we do not have records for. We hold groundwater emergence maps (GEM) that show where during exceptionally wet winters, groundwater levels may be close to or at surface. There are no areas of GEM within the search radius.

A VAT receipt and our standard notice for the supply of Environment Agency information are also attached for your reference.

I trust this now completes your enquiry, please don't hesitate to contact us again if we can be of any more assistance.

Regards
Nicola

Nicola Cook
External Relations Officer
Direct Dial: 01491 828 352

External Relations
Planning and Corporate Services
Environment Agency
Thames Region, West Area
Red Kite House, Howbery Park, Wallingford, OX10 8BD

Please be aware that the Environment Agency has updated the way it responds to requests for flood risk information, including Flood Risk/Consequence Assessments (FRA/FCA).

If you are conducting a Flood Risk/Consequence Assessments (FRA/FCA) please check the "New Flood Risk Standing Advice for England – PPS25 National Version 2.0" web pages for the FRA/FCA 'product' you require.

The FRA/FCA 'product' can then be ordered from the External Relations team by emailing us at thwest@environment-agency.gov.uk

---

From: Thames West, Customer Contact
Sent: 06 May 2010 15:43
To: 'Tarran, Sophie G'
Subject: WIR33071: Upper Heyford Airport Flood Risk Enquiry Letter

Dear Ms Tarran

WIR33071: Upper Heyford Airport Flood Risk Enquiry Letter

Thank you for your enquiry (WIR33071). Before we can supply you with information, we require payment. Our charges were revised from 1 July 2009 and those requests including licensing your use of information are calculated as follows:

i) the time spent by our staff in providing you with the information requested, current rates being £25.00 per hour. These charges are not subject to VAT.
ii) a standard charge of £10 for the extra permission to use our information commercially. VAT is applicable to this charge. VAT has reverted to 17.5% from 1 January 2010.

The information you have requested will cost **£41.75** to supply. This charge has been determined as follows:-

Hour(s) of staff time at £25.00 per hour	£25.00
Payment processing cost	£5.00
Commercial re-use charge	£10.00
VAT	£1.75
Total cost	**£41.75**

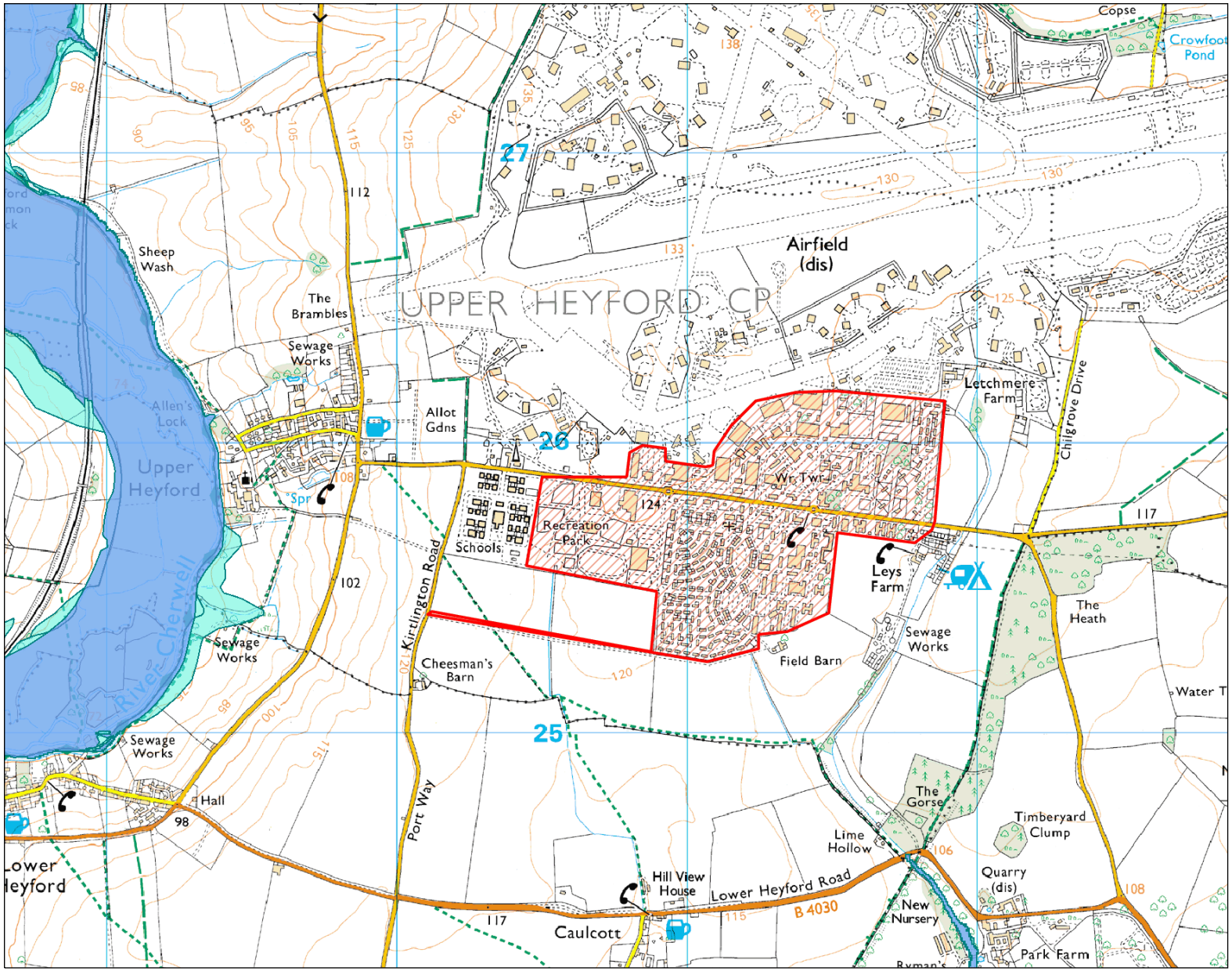
VAT Registration Number: GB 662 4901 34

If you wish to make payment over the phone please quote reference WIR33071. Please note that for security reasons we ask only the Cardholder call for telephone payment. Representatives calling on behalf of the Cardholder will be denied the option of telephone payment. Please call our External Relations Team on **01491 828352** for telephone payment.

However, if you wish to pay by cheque, the processing cost will be £25.00, making the total cost £61.75. Please make your cheque payable to the Environment Agency and send it to this office at the address below. We will process your request when we receive your payment.

Please let us know if you require a VAT receipt.

WIR33071 Flood Map centred on Upper Heyford site created 13 May 2010



Scale 1:20,410

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- Flood Map - Defences
- Areas Benefiting from Flood Defences
- Flood Map - Flood Storage Areas
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2

Flood Map Areas (assuming no defences)

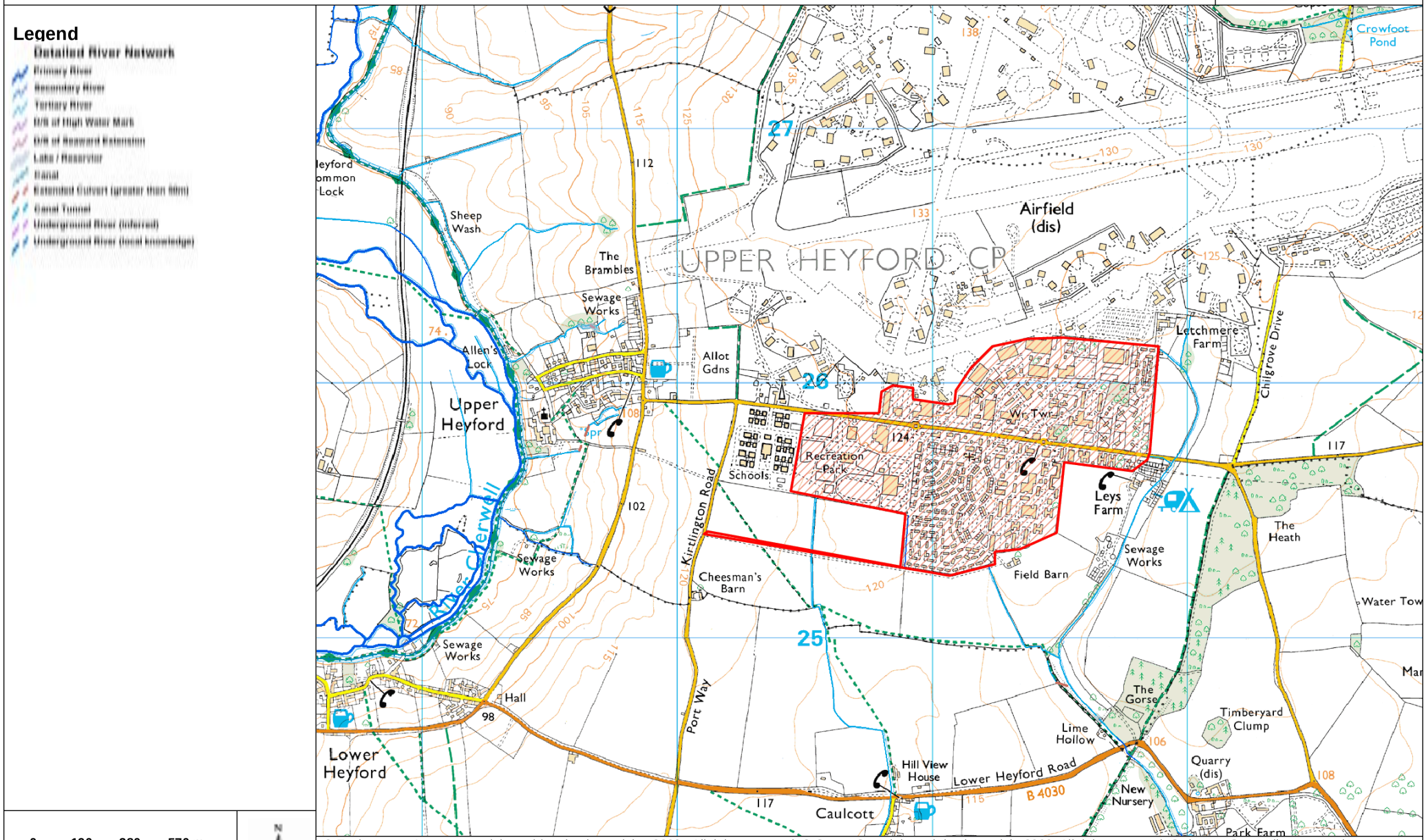
Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

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

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

WIR33071 Watercourses near Upper Heyford site created 13 May 2010

Environment Agency

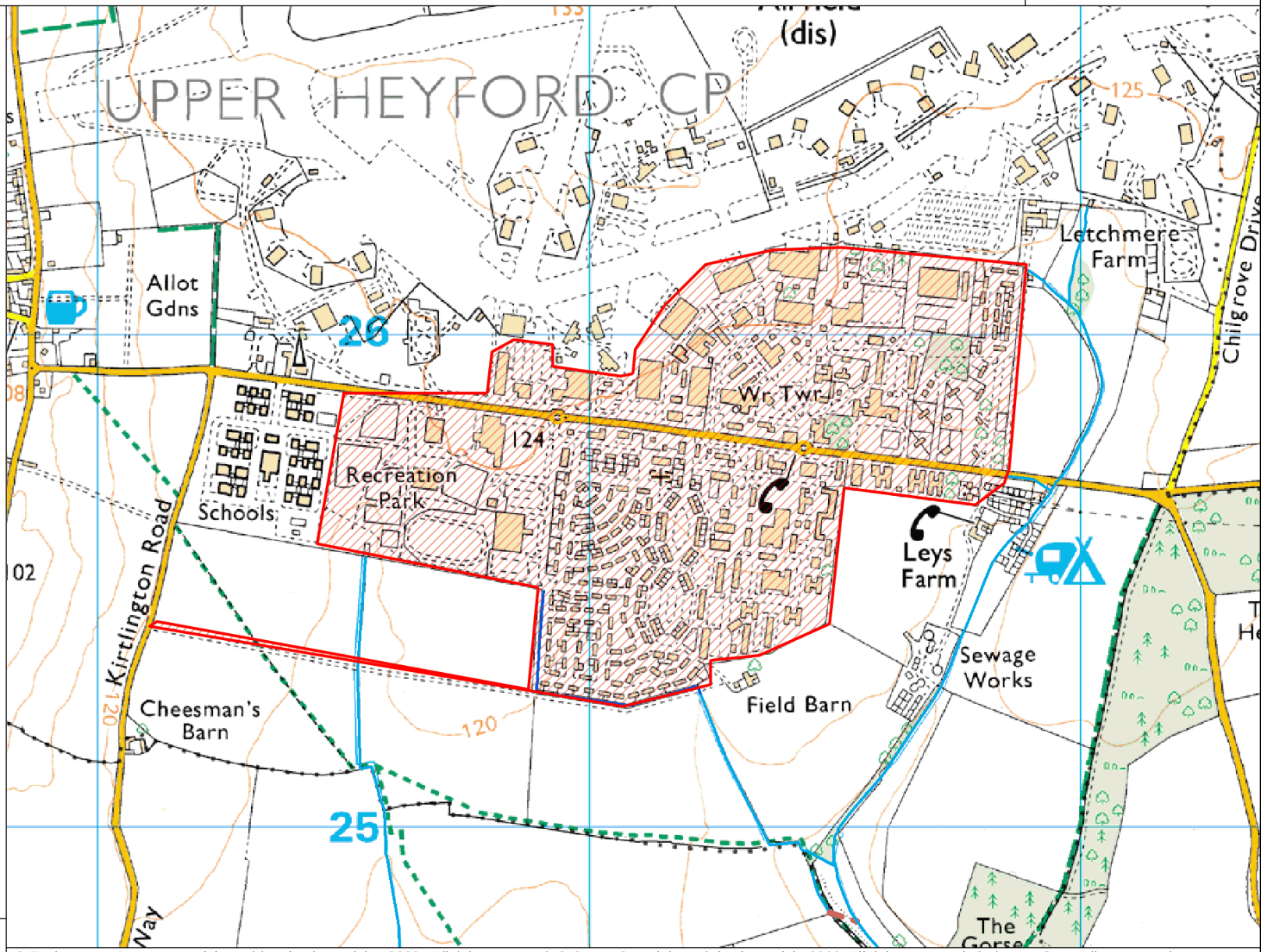


WIR33071 Watercourses near Upper Heyford site created 13 May 2010

Environment Agency

Legend

- Detailed River Network
- Primary River
- Secondary River
- Tertiary River
- MHWM of High Water Mark
- MHWM of Seaward Extension
- Lake / Reservoir
- Canal
- Extended Culvert (greater than 60m)
- Canal Tunnel
- Underground River (inferred)
- Underground River (local knowledge)



0 110 220 330 m.

N W E S

Ms Sophie Tarran
Waterman Transport & Development Ltd
Pickfords Wharf
Clink Street
London
SE1 9DG

Our ref: WA/2010/108040/01-L01
Your ref: 11234 WTD

Date: 24 May 2010

Dear Ms Tarran

PROPOSED RESIDENTIAL LED MIXED USE SCHEME.
UPPER HEYFORD AIRPORT, UPPER HEYFORD, OX25 5TD. (CHERWELL).

Thank you for your email dated 05 May 2010 regarding the above site.

Your email includes:

- a pre-application enquiry form
- a letter dated 30 April 2010 from Waterman
- a plan showing the site boundary

We have read the letter dated 30 April 2010 regarding flood risk and have the following comments to make:

1. We confirm that the entire site lies within Flood Zone 1, but a Flood Risk Assessment (FRA) will be required due to the size of the site. FRAs are required for sites greater than 1 hectare in size in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25).
2. There are no main rivers on the site. We do not have comprehensive records of ordinary watercourses (all watercourses not classified as main rivers). The Local Planning Authority are likely to have more detailed records of the locations of ordinary watercourses and culverted sections, but they are not necessarily recorded anywhere. The term watercourse includes all open, bridged, culverted or piped rivers, streams, ditches, drains, cuts, dykes, sluices and passages through which water flows. It is the responsibility of the applicant to identify all watercourses as part of the baseline assessment of the onsite drainage characteristics, in the PPS 25 compliant FRA.
3. As a minimum, it must be demonstrated in the FRA that existing surface water

Cont/d..

discharge rates will not be exceeded across a range of storm events up to and including the 1 in 100 year storm event with an allowance for climate change. The FRA should include a calculation of existing runoff rates and as well as greenfield rates for the site. The proposed discharge rates should be as close to the greenfield rates as possible, to ensure that the development offers a significant reduction in flood risk, in accordance with the guidance of PPS 25. The suggested methods for calculating runoff from hardstanding and greenfield areas are acceptable. Any surface water drainage scheme should utilise sustainable drainage techniques, offering ecological, water quality and amenity benefits wherever possible, in accordance with the *SUDS Management Train* (Ciria C609) and the *SUDS Manual* (Ciria C697). To summarise, the surface water scheme should clearly show that:

· peak discharge rates from the site will be reduced as a result of the proposed development, across a range of storm events, up to and including the 1 in 100 year storm with a suitable allowance for climate change (the design storm event)
· discharge volumes from the site will not increase as a result of the proposed development, across a range of storm events, up to and including the design storm event
· the site will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event can be safely contained on site;
· the likely flood flow routes and the impact of a storm that exceeds the capacity of the system has been considered.
· the future management and/or adoption of the system has been fully explored.

Any works that will impede the flows of an ordinary watercourse, such as culverting, requires the prior written approval of the local authority under the Public Health Act 1936, and the prior written consent of the Environment Agency under the terms of the Land Drainage Act 1991/Water resources Act1991. The Environment Agency seeks to avoid culverting, and its consent for such works will normally be withheld.

Please have regard to policy NRM4 (Sustainable flood risk management) of the South East Plan dated May 2009.

Yours sincerely

Ms Michelle Kidd
Planning Liaison Officer

Direct dial 01491 828455
Direct fax 01491 834703
Direct e-mail michelle.kidd@environment-agency.gov.uk

End

MEETING NOTES

Project: Upper Heyford

Subject: Environment Agency Meeting

Date: 19 July 2010

Present: Michelle Kidd (MK), Environment Agency
Ian Norriss (IN), Environment Agency
Gavin Angell (GA), Dorchester Holdings
Bruce Calton (BC), Scott Brownrigg
Brendan McCarthy (BM), Waterman
Sophie Tarran (ST), Waterman

ITEM	MATTERS ARISING	ACTION
1.0	**Introduction**	
1.1	BM thanked everyone for attending and tabled the agenda for the meeting. All parties were introduced.	
2.0	**Masterplan and Planning Background**	
2.1	GA stated that the previous scheme was consented in January 2010, and that the new Masterplan built on the parameters of this scheme.	
2.2	BC described the development of the new Masterplan, noting the sustainable approach which retained the existing housing stock, and the requirement from the Council to retain the Parade Ground, some existing buildings and the open space throughout the Site.	
2.3	BC explained that the retention of the existing housing, which is of low density, means that the remainder of the Site needs to be developed more densely to provide the number of dwellings consented by the previous planning application. This has led to certain areas of the Site becoming spatially constrained, with amenity space, protection of ecology and drainage requirements all needing to be incorporated into the Masterplan.	
3.0	**Flood Risk to the Site**	
3.1	ST noted that the site was at a low risk of flooding from all sources. This was due in part to the topography of the Site, being located on a plateau and therefore above any watercourse. Furthermore, consultation with the Council and the Environment Agency (EA) had not noted any historical flooding in the vicinity as a direct result of the Site, and no on-site flooding had been reported.	
3.2	Due to the low risk of flooding at the Site, ST noted that the primary focus of the Flood Risk Assessment (FRA) would be the management of surface water runoff resultant from the Site.	

3.3	IN recalled that in the previous assessment undertaken at the Site, it was noted that local residents had reported flooding which was potentially due to runoff from the Site. No knowledge of this incident had been reported to Waterman and ST requested a copy of this information. **Action: IN to circulate reports of historic flooding to BM and ST**	**Environment Agency**
4.0	**Surface Water Drainage Strategy**	
4.1	Further to circulation of the indicative drainage strategy (16th July) ST outlined the main aspects of the proposed strategy. This strategy would focus on source control methods of attenuation, restricting flows to the existing rate allowing for 30% climate change. The rate of discharge was calculated through the Modified Rational Method and IH124, which was agreed in previous correspondence with the EA.	
4.2	IN noted that although this was acceptable in principle, as it met the minimum requirements of PPS25, the restriction in discharge was less than that accepted in the previous application and he would like to see some degree of betterment over the existing situation. **Action: Waterman to investigate whether an increase in storage could be accommodated within the scheme. Waterman to take into consideration IN's reference to historic flooding.**	**Waterman**
4.3	ST stated that the current scheme was precautionary and presumed no infiltration. IN agreed that infiltration would go towards betterment as the volume of surface water runoff would be decreased, not simply the peak discharge rate. IN confirmed that if infiltration measures were utilised, soakage tests would be required. If existing soakaways were located IN confirmed that indicative soakage rates obtained from these features could be utilised for planning purposes.	
4.4	IN confirmed that the SuDS techniques incorporated within the indicative drainage strategy were acceptable due to the existing urban nature of the Site. IN welcomed the inclusion of ponds as this provides betterment in terms of ecology over the existing situation.	
4.5	MK asked whether water butts were going to be considered for inclusion within the scheme. BC and GA confirmed that these would be incorporated within the new housing stock to satisfy Code for Sustainable Homes, and could potentially be retrofitted on the existing houses. BC stated that rainwater harvesting would also be considered for the school; however GA confirmed that this would be a detail for Oxfordshire County Council to agree at the design stage, as the developer would not have control over this area of the development. IN clarified that the volumes collected through rainwater harvesting could not be quantified as additional attenuation storage.	

4.6	MK asked whether we would be submitting the FRA and drainage strategy to the EA prior to planning submission. BM stated that he hoped to submit these documents, but that if timescales proved that this was unachievable, Waterman would re-consult regarding the surface water drainage strategy to agree this aspect of the proposals.	
4.7	BM queried whether the EA would accept additional attenuation in the balancing pond downstream of the Site if its capacity was increased. IN stated that the capacity of the pond to deal with the existing flows would need to be confirmed before he would consider this, but that this feature would provide water quality benefits and could be considered as an element of the SuDS treatment train for the drainage system.	
4.8	BM questioned how best to produce the drainage schematic for outline planning purposes, while ensuring that information was sufficient for the EA to accept the development proposals. IN and BM agreed that it would be acceptable to show the proposed discharge rates and attenuation volumes for each catchment across the Site included within the Parameter Plans. IN stated that he would like to visually see the placement of above ground pond features within the submitted plans, but that there could be flexibility regarding the placement of below ground attenuation and that it would be acceptable to show broad areas where permeable paving and underground tanks were proposed.	

Outcome

1. Further investigations to be undertaken of the potential to increase the volume of storage, on receipt of further information from the EA.

Tarran, Sophie G

From: Tarran, Sophie G
Sent: 04 August 2010 14:47
To: 'Ian.Norriss@environment-agency.gov.uk'
Subject: FW: C11234 100802 STIN surface water attenuation proposals
Attachments: Figure 1.2 Site Boundary Plan.pdf; Indicative Surface Water Strategy 2.pdf

Good afternoon Ian,

Further to our verbal conversation, please could you confirm that you are happy with the intended surface water strategy as it stands, on submission of the additional information as set out below.

I will ensure that these proposals are acceptable to the team within the additional meeting scheduled for Tuesday, and leading on from this hope to issue a copy of the FRA after receiving sign off from the client prior to planning submission if timescales allow.

If you have any questions in the interim please feel free to get in contact.

Kind Regards,

Sophie

From: Tarran, Sophie G
Sent: 02 August 2010 17:44
To: 'Ian.Norriss@environment-agency.gov.uk'
Subject: C11234 100802 STIN surface water attenuation proposals

Good afternoon Ian,

Many thanks for sending through the additional information. I have had chance this afternoon to assess this and taken new information into consideration while reassessing the proposed surface water strategy.

Flooding in Caulcott associated with Gallos Brook, Letter from James Macnamara
Regarding this location, please note that the Site boundary is such (as seen in attached Figure 1.2) that the proposed development will not drain through this section of the watercourse. Therefore, the development would not affect surface water runoff in this location and there is no scope to provide attenuation in relation to this.

Anecdotal evidence reported by Environment Agency staff member
This report of flooding is unsubstantiated. However, to provide a level of betterment it is proposed to limit the rate of discharge over the existing situation within this stretch of watercourse and provide a greater extent of attenuation where appropriate.

Surface water drainage proposal
The catchment areas draining into this section of watercourse are namely Areas 3 and 4. It is proposed to limit surface water entering this section of watercourse (i.e. from Catchments 3 and 4) by an additional 10% over the existing situation, while accounting for the affects of climate change.

Area 3 (delineated in black) is a constrained central area of the Site which has many functions to perform. It would therefore not be appropriate to provide additional storage in this location. As there is no scope within Area 3 it is proposed to offset the allowable rate of discharge within Area 4. This would require discharge from Area 4 to be

restricted to 82 l/s and necessitate an additional storage volume of approximately 166m3 (please see attached sketch).

As discussed within our meeting the Site is greatly constrained with regard to space, and available above ground locations have been maximised where possible, taking into consideration all other aspects required of the scheme. It is therefore proposed to accommodate this additional volume within a sub-surface attenuation tank, located to the south of proposed pond 4a. This will ensure that the required area of play can still be incorporated at ground level.

These measures would ensure that discharge in the section of watercourse flowing past the caravan site is restricted and would aid in alleviating any issues as suggested by anecdotal evidence.

If you would like to discuss this matter further please do not hesitate to get in contact. As previously mentioned I have a team meeting tomorrow afternoon, and if we could reach agreement of the intended strategy before this time it would be greatly appreciated.

Kind Regards,

Sophie

From: Norriss, Ian [mailto:Ian.Norriss@environment-agency.gov.uk]
Sent: 02 August 2010 14:30
To: Tarran, Sophie G
Subject: RE: C11234 100802 STIN upper heyford surface water attenuation

Hi Sophie

I've attached the letter from James Macnamara, District Councillor of Astons and Heyfords Ward, dated 19th August 2008. I draw your attention to the bottom of the fifth page for his comments on flooding in Caulcott.

I have also attached a plan which identifies Caulcott and the caravan park at which my colleague has suggested there has been historic flooding.

The Heyford Hill site includes large areas of impermeable surfaces and is upstream of both Caulcott and the caravan park, on different tributaries of the Gallos Brook. With the anecdotal historic flooding in mind, I think it is reasonable to expect a reduction in surface water discharge rates from the baseline.

I look forward to receiving further details of the scheme. Any questions please don't hesitate to get in contact.

Kind Regards

Ian Norriss

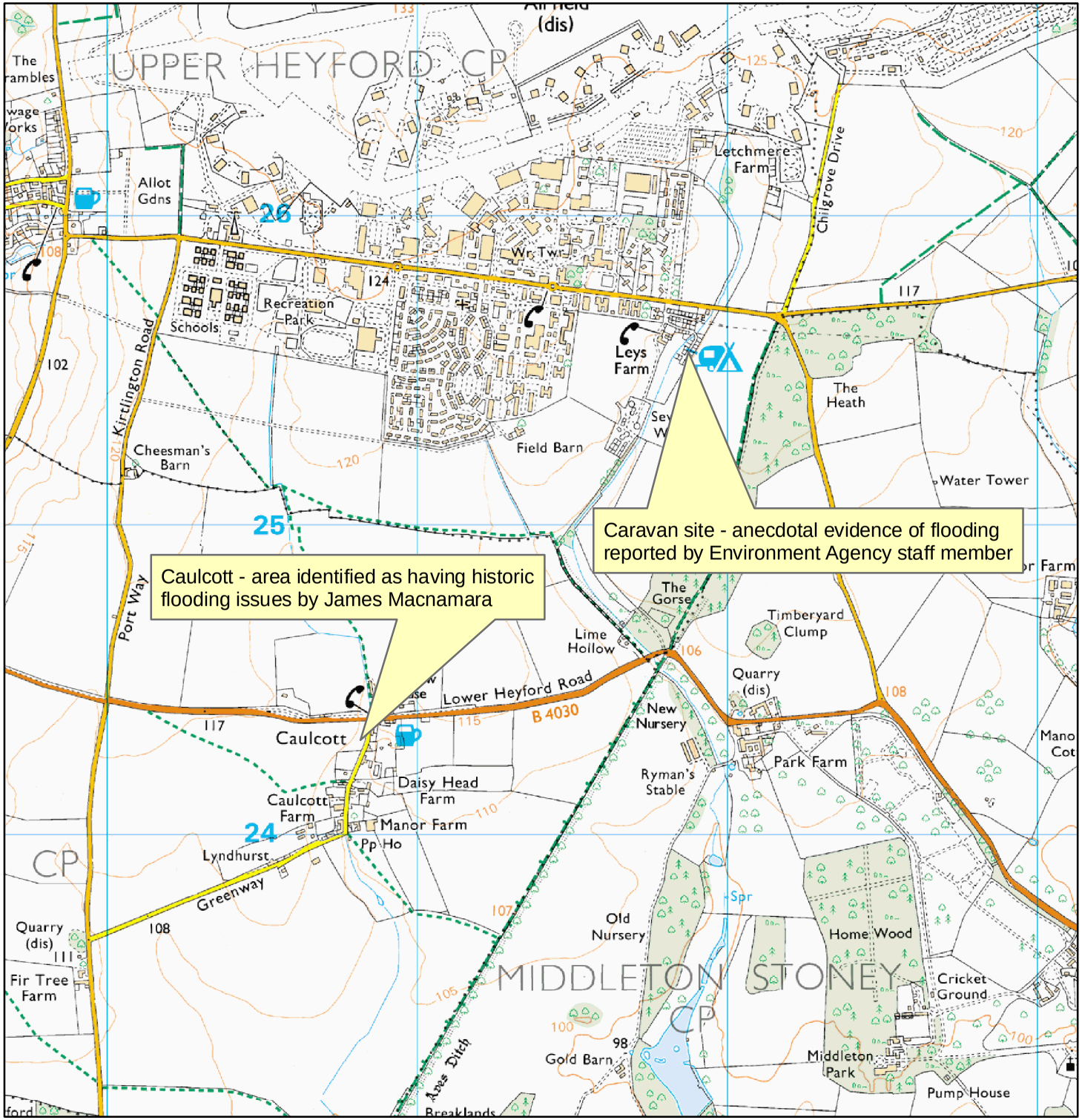
Development and Flood Risk Engineer

Environment Agency

Internal tel: 7 25 8309

External tel: 01491 828309

Please be aware that the Environment Agency is updating the way it responds to requests for flood risk information, including Flood Risk/Consequence Assessments (FRA/FCA), from 3rd August 2009.



Areas believed to have suffered from flooding downstream of Heyford Park

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0 290 580 1,160 Meters

northwestern group of HAS's (3052-5) should be enacted as these both overdominate the houses at Aston View (in Somerton parish) and, if used for employment, could damage their amenity through noise and industrial activity. Given the total numbers of HAS's and EH's concurrence with the RCPB, preserving this small and unimportant group has no conservation value.

In general, it would be good to see minor structures which do not contribute to the perceived historic value of the Base removed. A particular (though invisible) concern is with the capacity for further pollution from the POL system, if not removed.

Employment uses on the flying field (mainly in the HAS's) need to respect EH's intentions to preserve the Cold War ambience, since this is the sole justification for preserving these intrusive structures. It seems completely illogical to preserve them to memorialise the Cold War and then turn them into a haphazard industrial estate which looks nothing like a Cold War air base. I cannot think of any grounds on which industrial development would have been permitted on this site if the air base had not been here, so employment uses should only be allowed if they do not impinge at all on this primary purpose.

This implies tight restrictions on vehicle movements and parking, external storage, lighting, signage, external decoration and security measures. Benign uses which seem particularly appropriate are data storage and library stacks, which can be installed and dismantled without touching the HAS's, inside or out, and fireworks storage in the Bomb Stores. Since I carry no torch for the Cold War heritage cause, I would be happy to see the use of the QRA, where the retention of the fence is important to EH, for secure storage.

Employment uses in the technical area: a hotel and conference facility seem inappropriate to the size of settlement and will generate additional traffic. Given the existence of such facilities within a narrow radius at Hopcrofts Holt, Middle Aston, Middleton Stoney and Weston on the Green, this may be damaging to existing local employment. Planning permission already exists for such a facility at a sustainable location on the south edge of Bicester.

Employment numbers should be limited to those sustainable from the agreed housing totals, in the interests of sustainability and the amenity of surrounding villages, and not derived from maximising usage of existing buildings. Population should determine employment and not vice versa, in accordance with the RCPB methodology. A permanent cap on numbers would also serve to limit unplanned future growth without completely removing flexibility between buildings and use classes.

Water, finally, raises two issues:

- **Supply**: prior to the last two wet summers, surrounding villages have experienced issues with water supply and need assurance that the additional demands of both residential and business uses have been taken care of before they are occupied.
- **Run-off:** the Gallos Brook through Caulcott has caused flooding at the lower end of the village. Residents need assurance that run-off from the development will not exacerbate this.

Tarran, Sophie G

From: Norriss, Ian [Ian.Norriss@environment-agency.gov.uk]
Sent: 04 October 2010 13:32
To: Tarran, Sophie G
Subject: RE: C11234 100921 STIN confirmation prior to submission

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Sophie

Sorry for the delay in my response. I have been away.

All formal site specific comments from me should really go out through our planning liaison team to ensure constitency.

I can say that as a good practice measure we would like to see attenuation devices retrofitted in areas of the development site to only be refurbished (to achieve a betterment), but we will not require this on this development site.

Kind Regards

Ian Norriss

Development and Flood Risk Engineer

Environment Agency

Internal tel: 7 25 8309

External tel: 01491 828309

From: Tarran, Sophie G [mailto:s.g.tarran@waterman-group.co.uk]
Sent: 21 September 2010 16:59
To: Norriss, Ian
Subject: C11234 100921 STIN confirmation prior to submission

Good afternoon Ian.

The FRA is being issued to the client for sign off before being submitted for planning. To tie up loose ends I wanted to include our verbal agreement that the drainage strategy only needs to attenuate flows from developed areas of the Site.

As previously agreed, areas which are only intended to be refurbished (i.e. no changes in hard/soft landscaping, facade alterations such as new windows and repainting) would not need to be attenuated as the infrastructure would remain as existing.

If you could respond confirming this in writing it would be greatly appreciated.

Many thanks.

Kind Regards,

Sophie

Sophie Tarran
Waterman Transport & Development Ltd

Pickfords Wharf
Clink Street
London
SE1 9DG
t +44 20 7928 7888
f +44 20 7902 0992
www.watermangroup.com


Please consider the environment before printing this e-mail. Thank you

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D. Surface Water Management Calculations

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	1 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 1**

Calculations Title **Surface Water Management - Summary Sheet**

LOCATION	CALCULATIONS				OPTIONS
	Surface water at the Site will be managed in accordance with PPS25 requirements, i.e. surface water discharge restricted to the existing rate plus 30% clmate change.				
	Existing surface water discharge regime:				
		Area (ha)	Calculation method	Discharge Rate	
	Hard landscaped	6.34	Wallingford (Page 2)	715.3 l/s	
	Soft landscaped	4.23	IoH 124 (Page 3)	45.3 l/s	
	Maximum allowable discharge rate for 1 in 100 year storm =			**760.6 l/s**	
	Proposed surface water discharge regime:				
	Proposed hard landscaped area	6.34 ha		6.34 ha	
	Proposed soft landscaped area	4.23 ha			
	Contributing soft landscaping (10%)*	0.423 ha		0.423 ha	
	Total Area contributing to discharge =			**6.763 ha**	
	(hard landscaping + contributing soft landscaping)				
	* = Typical contributing discharge from soft landscaping is approximately 10% of the equivalent area of hard landscaping.				
	Intial attenuation estimate				
	An initial estimate of the volume of surface water attenuation has been undertaken, using WinDes Quick Storage Estimate software application. A summary of these calculations are provided on Page 4.				
	The preliminary estimate of surface water attenuation is :			**1649 m^3**	
	Based on an allowable discharge of :	760 l/s			
	A hard landscaped area of:	6.763 ha			

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	2 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 1**

Calculations Title **Surface Water Management - Modified Rational Method**

LOCATION	CALCULATIONS	OPTIONS
	Calculations based on: Design and Analysis of urban storm drainage. The Wallingford Procedure, Volume 1 Principles methods and practice.	
	User Input Data	
	Exisiting hard landscaped area = 6 ha	
	SAAR (From FEH / Windes) = 691	
	M5_60 (From Windes) = 20	
	Ratio R (From Windes) = 0.405	
	PIMP (% impervious) = 100.0%	
	Soil Type = 0.40	
	Very Low Runoff (well drained sandy, loamy or earthy peat soils) = 0.15	
	Low Runoff (Very permeable soils (e.g. gravel, sand) = 0.30	
	Moderate (Very fine sands, silts and sedimentary clays) = 0.40	
	High Runoff (Clayey or loamy soils) = 0.45	
	Very High Runoff (Soils of the wet uplands) = 0.50	
Fig. 9.7	UCWI (From Figure 9.7 of Wallingford Method) = 65	
Fig 6.3a/b	Z1 (From Figure 6.3a or 6.3b) = 1.00	
Tab 6.2/6.3	Z2 (From Table 6.2 & Table 6.3) = 2.02	
Eqn. 13	Qp (peak discharge) = 2.78 Cv CR i A	
	Where: Qp (Peak Discharge) i = rainfall intensity A = Total Area	
	Calculating Rainfall Intensity (i)	
Eqn 6.4	MT-D =Z1 x Z2 x (M5-60min)	
	M5_60 20 Z1 1.00 Z2 2.02	
	Thus M100_60 is: 40.4 mm	
Eqn 7.20	Cv = PR/100	
Eqn 7.3	PR = (0.829 PIMP) + (25.0 SOIL) + (0.078 UCWI) - 20.7	
	PIMP (Percentage of catchment which is impervious) 100.0 %	
Page 52	Note: PIMP can not be less than 40% 40.0 %	
	Thus value of PIMP to be used 100.0 %	
	Soil: 0.40 UCWI: 65	
	PR = 77.27	
	Thus Cv = 0.77	
Sec 7.10	CR (Recommended for simulation and design) 1.3	
	Qp for 1 in 100 year 60 minute duration = 715.3 l/s or 112.8 l/s/ha	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	3 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

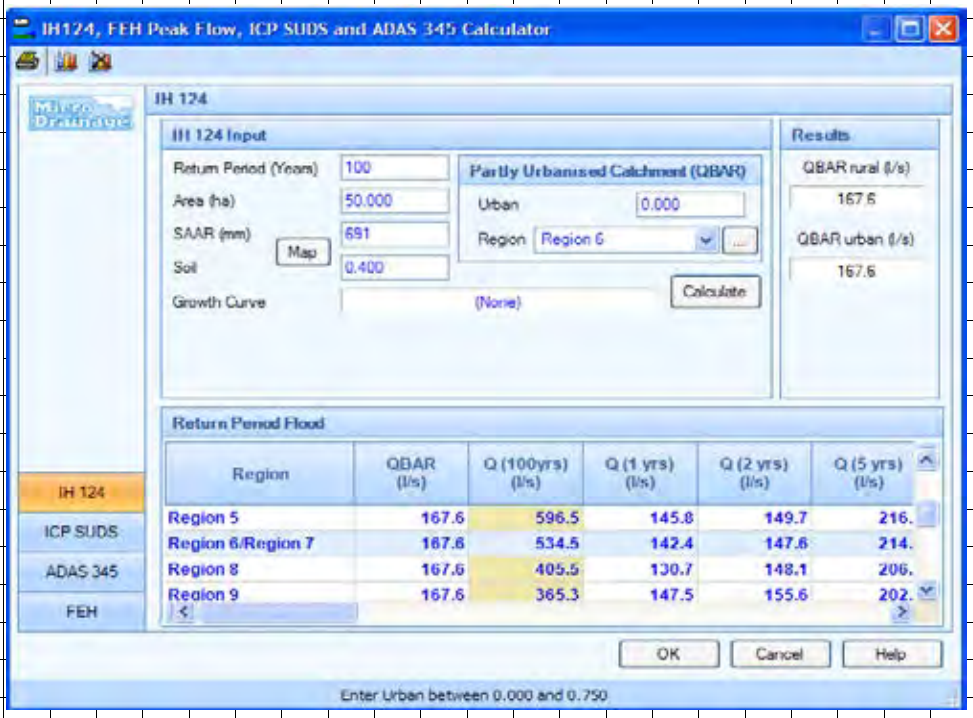
Project Title **Upper Heyford, Catchment Area 1**

Calculations Title **Surface Water Management - IoH 124**

LOCATION	CALCULATIONS	OPTIONS

In order to calculate the rate of surface water discharge from the permeable portion of the Site, the Windes Microdrainage version W.12.4 Source Control module has been utilised. Rural runoff has been calculated using the IoH 124 Methodology, the input and output data for which are shown below;

An area of 50ha has been used in the calculations as this is the smallest catchment area which the IoH 124 method can calculate. The 50ha output is then prorated as set out in IoH 124.



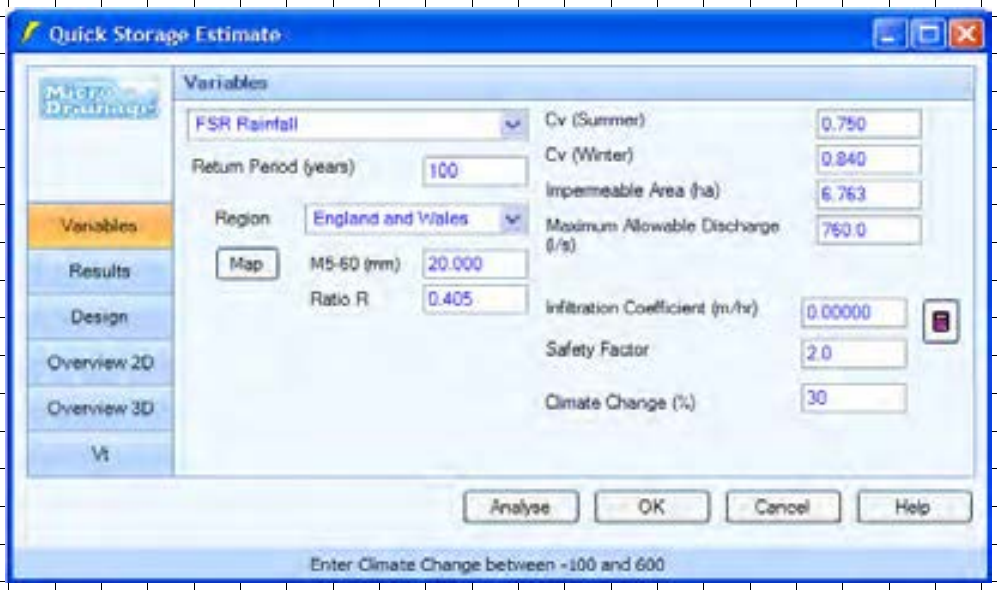
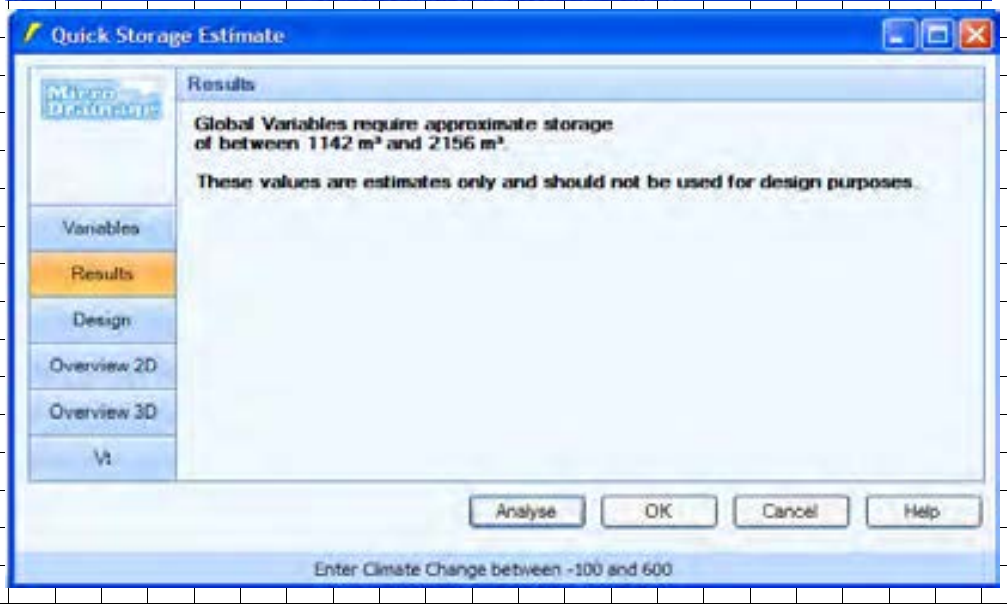
Qbar (1 in 2.333)	167.6	l/s/50ha	3.4	l/s/ha					
1 in 100	534.5	l/s/50ha	10.7	l/s/ha		or	**45.3**	**l/s**	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	4 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 1**

Calculations Title **Preliminary surface water attenuation volume.**

LOCATION	CALCULATIONS	OPTIONS
	In order to calculate the volume of surface water attenuation required for the Site, Windes Microdrainage version W.12.4, Source Control module, Quick Storage Estimate has been used. The input and output data for which are shown below;	
Input:		
Output:		
	As Windes Quick Storage Estimate provides a range of attenuation volumes it is considered that an average value of the range is suitable for preliminary design sizing.	
	Minimum: 1,142 m^3	
	Maximum: 2,156 m^3 Preliminary Estimate: **1649** m^3	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	1 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 2**

Calculations Title **Surface Water Management - Summary Sheet**

LOCATION	CALCULATIONS	OPTIONS
	Surface water at the Site will be managed in accordance with PPS25 requirements, i.e. surface water discharge restricted to the existing rate plus 30% climate change.	
	Existing surface water discharge regime:	

	Area (ha)	Calculation method	Discharge Rate
Hard landscaped	9.11	Wallingford (Page 2)	1027.8 l/s
Soft landscaped	3.91	IoH 124 (Page 3)	41.8 l/s

Maximum allowable discharge rate for 1 in 100 year storm = **1069.6 l/s**

Proposed surface water discharge regime (60/40 instead of 70/30):

Proposed hard landscaped area	7.81 ha	7.81 ha	
Proposed soft landscaped area	5.21 ha		
Contributing soft landscaping (10%)*	0.521 ha	0.521 ha	
Total Area contributing to discharge = (hard landscaping + contributing soft landscaping)		**8.331 ha**	

* = Typical contributing discharge from soft landscaping is approximately 10% of the equivalent area of hard landscaping.

Intial attenuation estimate

An initial estimate of the volume of surface water attenuation has been undertaken, using WinDes Quick Storage Estimate software application. A summary of these calculations are provided on Page 4.

The preliminary estimate of surface water attenuation is : **1893 m^3**

Based on an allowable discharge of :	1069	l/s
A hard landscaped area of:	8.331	ha

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	2 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 2**

Calculations Title **Surface Water Management - Modified Rational Method**

LOCATION	CALCULATIONS	OPTIONS
	Calculations based on: Design and Analysis of urban storm drainage. The Wallingford Procedure, Volume 1 Principles methods and practice.	
	User Input Data	
	Exisiting hard landscaped area = 9 ha	
	SAAR (From FEH / Windes) = 691	
	M5_60 (From Windes) = 20	
	Ratio R (From Windes) = 0.405	
	PIMP (% impervious) = 100.0%	
	Soil Type = 0.40	
	Very Low Runoff (well drained sandy, loamy or earthy peat soils) = 0.15	
	Low Runoff (Very permeable soils (e.g. gravel, sand) = 0.30	
	Moderate (Very fine sands, silts and sedimentary clays) = 0.40	
	High Runoff (Clayey or loamy soils) = 0.45	
	Very High Runoff (Soils of the wet uplands) = 0.50	
Fig. 9.7	UCWI (From Figure 9.7 of Wallingford Method) = 65	
Fig 6.3a/b	Z1 (From Figure 6.3a or 6.3b) = 1.00	
Tab 6.2/6.3	Z2 (From Table 6.2 & Table 6.3) = 2.02	
Eqn. 13	Qp (peak discharge) = 2.78 Cv CR i A	
	Where: Qp (Peak Discharge) i = rainfall intensity A = Total Area	
	Calculating Rainfall Intensity (i)	
Eqn 6.4	MT-D =Z1 x Z2 x (M5-60min)	
	M5_60 20 Z1 1.00 Z2 2.02	
	Thus M100_60 is: 40.4 mm	
Eqn 7.20	Cv = PR/100	
Eqn 7.3	PR = (0.829 PIMP) + (25.0 SOIL) + (0.078 UCWI) - 20.7	
	PIMP (Percentage of catchment which is impervious) 100.0 %	
Page 52	Note: PIMP can not be less than 40% 40.0 %	
	Thus value of PIMP to be used 100.0 %	
	Soil: 0.40 UCWI: 65	
	PR = 77.27	
	Thus Cv = 0.77	
Sec 7.10	CR (Recommended for simulation and design) 1.3	
	Qp for 1 in 100 year 60 minute duration = 1,027.8 l/s or 112.8 l/s/ha	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	3 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

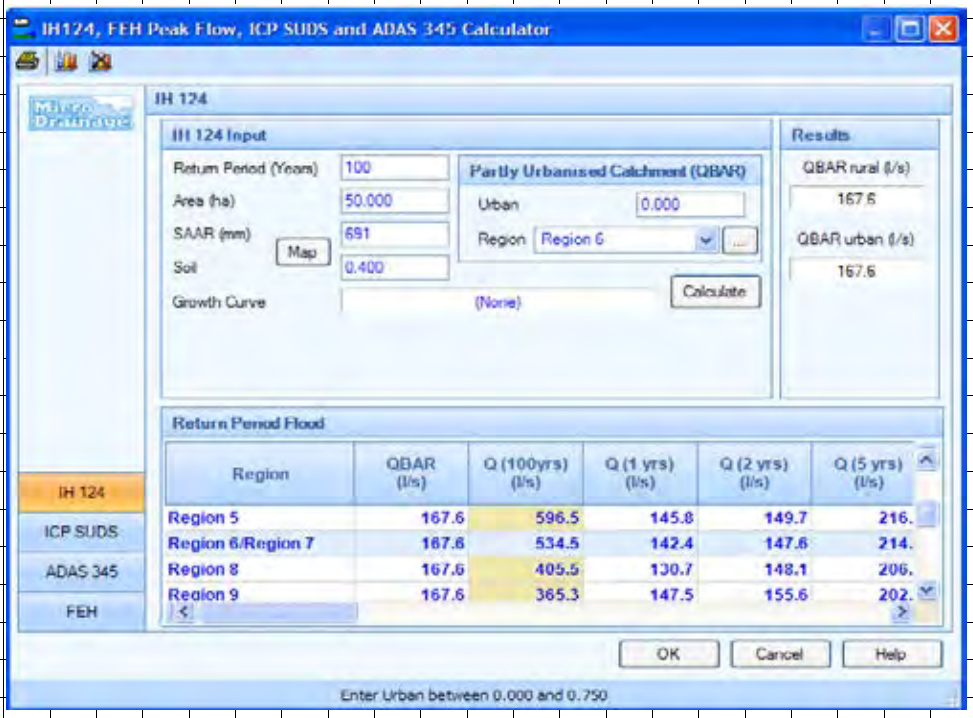
Project Title **Upper Heyford, Catchment Area 2**

Calculations Title **Surface Water Management - IoH 124**

LOCATION	CALCULATIONS	OPTIONS

In order to calculate the rate of surface water discharge from the permeable portion of the Site, the Windes Microdrainage version W.12.4 Source Control module has been utilised. Rural runoff has been calculated using the IoH 124 Methodology, the input and output data for which are shown below;

An area of 50ha has been used in the calculations as this is the smallest catchment area which the IoH 124 method can calculate. The 50ha output is then prorated as set out in IoH 124.



Qbar (1 in 2.333)	167.6	l/s/50ha	3.4	l/s/ha							
1 in 100	534.5	l/s/50ha	10.7	l/s/ha		or	**41.8**	**l/s**			

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	4 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

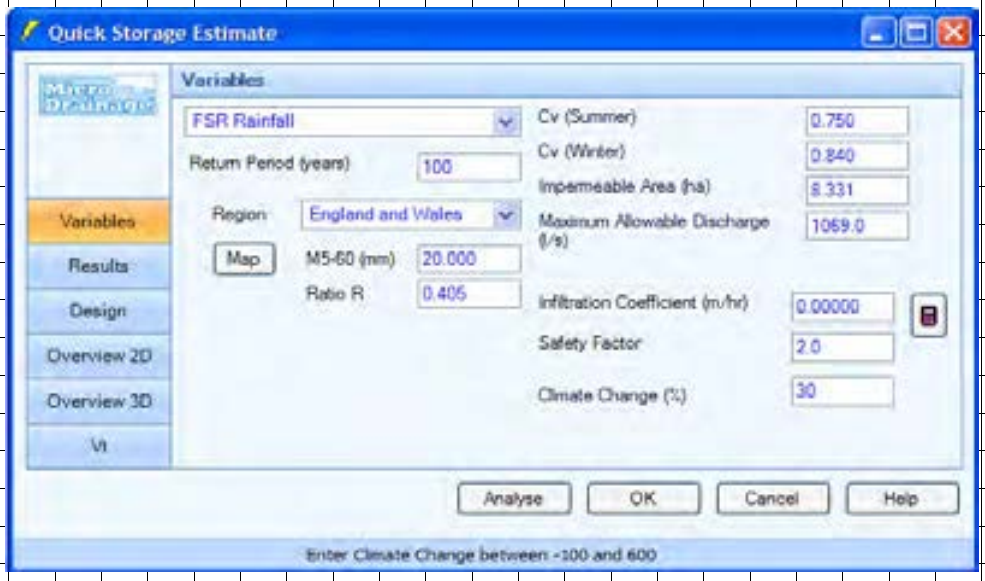
Project Title **Upper Heyford, Catchment Area 2**

Calculations Title **Preliminary surface water attenuation volume.**

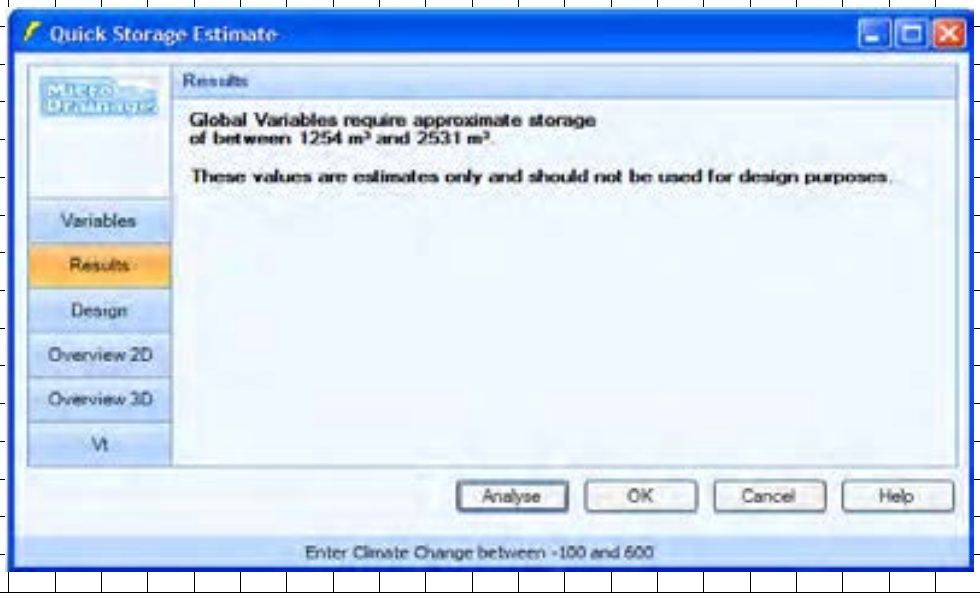
LOCATION	CALCULATIONS	OPTIONS

In order to calculate the volume of surface water attenuation required for the Site, Windes Microdrainage version W.12.4, Source Control module, Quick Storage Estimate has been used. The input and output data for which are shown below;

Input:



Output:



As Windes Quick Storage Estimate provides a range of attenuation volumes it is considered that an average value of the range is suitable for preliminary design sizing.

Minimum:	1,254	m^3			
Maximum:	2,531	m^3	Preliminary Estimate:	**1893**	**m^3**

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	1 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 3**

Calculations Title **Surface Water Management - Summary Sheet**

LOCATION	CALCULATIONS	OPTIONS
	Surface water at the Site will be managed in accordance with PPS25 requirements, i.e. surface water discharge restricted to the existing rate plus 30% climate change.	
	Existing surface water discharge regime:	

	Area (ha)	Calculation method	Discharge Rate
Hard landscaped	7.81	Wallingford (Page 2)	881.2 l/s
Soft landscaped	3.35	IoH 124 (Page 3)	35.9 l/s

Maximum allowable discharge rate for 1 in 100 year storm = **917.1 l/s**

Proposed surface water discharge regime:

Proposed hard landscaped area	7.81 ha	7.81 ha
Proposed soft landscaped area	3.35 ha	
Contributing soft landscaping (10%)*	0.335 ha	0.335 ha

Total Area contributing to discharge = **8.145 ha**

(hard landscaping + contributing soft landscaping)

* = Typical contributing discharge from soft landscaping is approximately 10% of the equivalent area of hard landscaping.

Intial attenuation estimate

An initial estimate of the volume of surface water attenuation has been undertaken, using WinDes Quick Storage Estimate software application. A summary of these calculations are provided on Page 4.

The preliminary estimate of surface water attenuation is : **1986 m^3**

Based on an allowable discharge of :	917	l/s
A hard landscaped area of:	8.15	ha

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	2 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 3**

Calculations Title **Surface Water Management - Modified Rational Method**

LOCATION	CALCULATIONS	OPTIONS
	Calculations based on: Design and Analysis of urban storm drainage. The Wallingford Procedure, Volume 1 Principles methods and practice.	
	User Input Data	
	Exisiting hard landscaped area = 7.81 ha	
	SAAR (From FEH / Windes) = 691	
	M5_60 (From Windes) = 20	
	Ratio R (From Windes) = 0.405	
	PIMP (% impervious) = 100.0%	
	Soil Type = 0.40	
	Very Low Runoff (well drained sandy, loamy or earthy peat soils) = 0.15	
	Low Runoff (Very permeable soils (e.g. gravel, sand) = 0.30	
	Moderate (Very fine sands, silts and sedimentary clays) = 0.40	
	High Runoff (Clayey or loamy soils) = 0.45	
	Very High Runoff (Soils of the wet uplands) = 0.50	
Fig. 9.7	UCWI (From Figure 9.7 of Wallingford Method) = 65	
Fig 6.3a/b	Z1 (From Figure 6.3a or 6.3b) = 1.00	
Tab 6.2/6.3	Z2 (From Table 6.2 & Table 6.3) = 2.02	
Eqn. 13	Qp (peak discharge) = 2.78 Cv CR i A	
	Where: Qp (Peak Discharge) i = rainfall intensity A = Total Area	
	Calculating Rainfall Intensity (i)	
Eqn 6.4	MT-D =Z1 x Z2 x (M5-60min)	
	M5_60 20 Z1 1.00 Z2 2.02	
	Thus M100_60 is: 40.4 mm	
Eqn 7.20	Cv = PR/100	
Eqn 7.3	PR = (0.829 PIMP) + (25.0 SOIL) + (0.078 UCWI) - 20.7	
	PIMP (Percentage of catchment which is impervious) 100.0 %	
Page 52	Note: PIMP can not be less than 40% 40.0 %	
	Thus value of PIMP to be used 100.0 %	
	Soil: 0.40 UCWI: 65	
	PR = 77.27	
	Thus Cv = 0.77	
Sec 7.10	CR (Recommended for simulation and design) = 1.3	
	Qp for 1 in 100 year 60 minute duration = 881.2 l/s or 112.8 l/s/ha	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	3 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

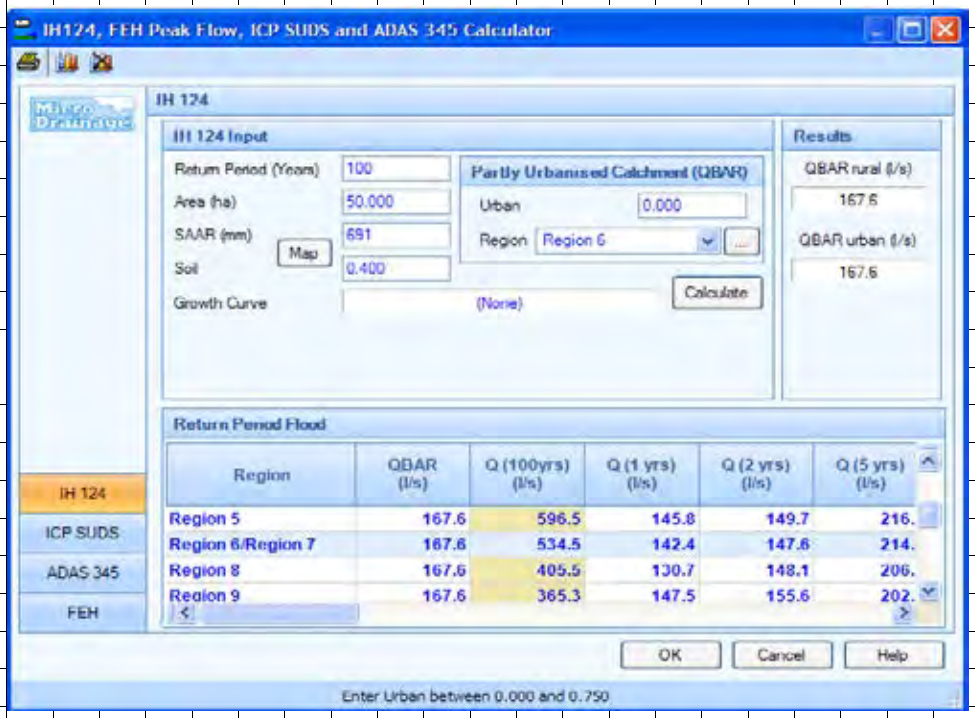
Project Title **Upper Heyford, Catchment Area 3**

Calculations Title **Surface Water Management - IoH 124**

LOCATION	CALCULATIONS	OPTIONS

In order to calculate the rate of surface water discharge from the permeable portion of the Site, the Windes Microdrainage version W.12.4 Source Control module has been utilised. Rural runoff has been calculated using the IoH 124 Methodology, the input and output data for which are shown below;

An area of 50ha has been used in the calculations as this is the smallest catchment area which the IoH 124 method can calculate. The 50ha output is then prorated as set out in IoH 124.



Qbar (1 in 2.333)	167.6	l/s/50ha	3.4	l/s/ha							
1 in 100	534.5	l/s/50ha	10.7	l/s/ha		or	**35.9**	**l/s**			

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	4 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

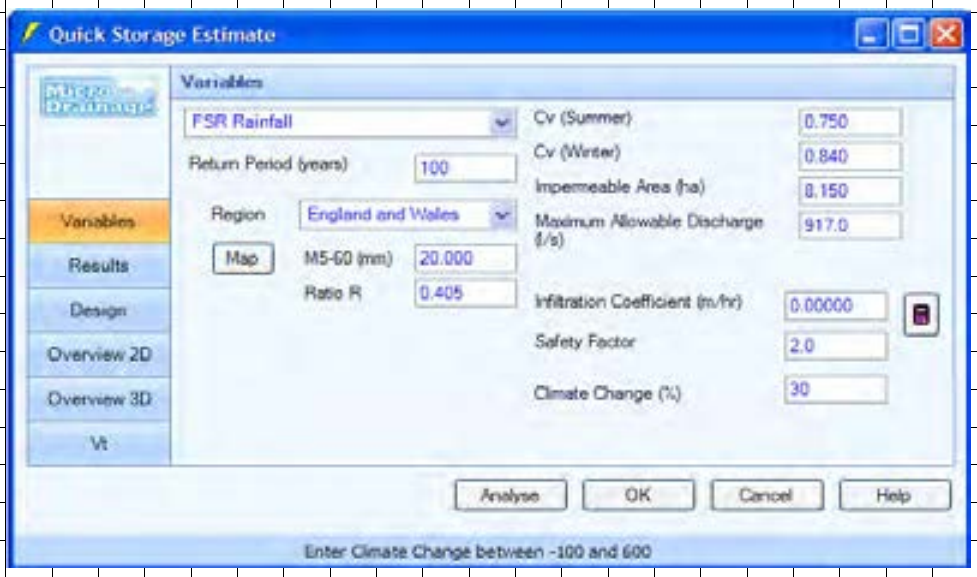
Project Title **Upper Heyford, Catchment Area 3**

Calculations Title **Preliminary surface water attenuation volume.**

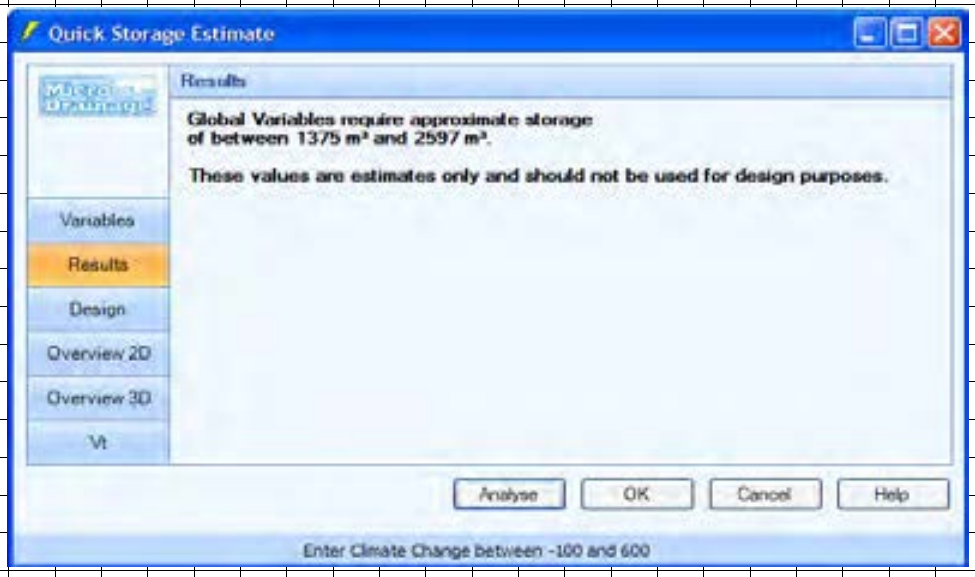
LOCATION	CALCULATIONS	OPTIONS

In order to calculate the volume of surface water attenuation required for the Site, Windes Microdrainage version W.12.4, Source Control module, Quick Storage Estimate has been used. The input and output data for which are shown below;

Input:



Output:



As Windes Quick Storage Estimate provides a range of attenuation volumes it is considered that an average value of the range is suitable for preliminary design sizing.

Minimum:	1,375	m^3		
Maximum:	2,597	m^3	Preliminary Estimate:	**1986** **m^3**

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	1 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 4**

Calculations Title **Surface Water Management - Summary Sheet**

LOCATION	CALCULATIONS				OPTIONS
	Surface water at the Site will be managed in accordance with PPS25 requirements, i.e. surface water discharge restricted to the existing rate plus 30% clmate change. Further restriction to reduce flows into the eastern watercourse by 10% over the existing situation.				
	Existing surface water discharge regime:				
		Area (ha)	Calculation method	Discharge Rate	
	Hard landscaped	1.65	Wallingford (Page 2)	186.2 l/s	
	Soft landscaped	0.71	IoH 124 (Page 3)	7.6 l/s	
	Maximum allowable discharge rate for 1 in 100 year storm =			193.8 l/s	
	Proposed surface water discharge regime (60/40 instead of 70/30):				
	Proposed hard landscaped area	1.42 ha		1.42 ha	
	Proposed soft landscaped area	0.94 ha			
	Contributing soft landscaping (10%)*	0.094 ha		0.094 ha	
	Total Area contributing to discharge =			**1.514 ha**	
	(hard landscaping + contributing soft landscaping)				
	* = Typical contributing discharge from soft landscaping is approximately 10% of the equivalent area of hard landscaping.				
	The Environment Agency require a 10% reduction in discharge to the eastern watercourse, namely Catchment Areas 3 and 4, to reduce flood risk downstream.				
	Area 3: allowable discharge 917.1 l/s, 10% =			91.71 l/s	
	Area 4: allowable discharge 193.8 l/s, 10% =			19.38 l/s	
	Total reduction in allowable discharge =			111.09 l/s	
	Discharge from Area 3 to remain as existing, required reduction to be offset in Area 4				
	Allowable discharge (193.8 - 111.09) =			**82.7 l/s**	
	Intial attenuation estimate				
	An initial estimate of the volume of surface water attenuation has been undertaken, using WinDes Quick Storage Estimate software application. A summary of these calculations are provided on Page 4.				
	The preliminary estimate of surface water attenuation is :			**511 m^3**	
	Based on an allowable discharge of :	82 l/s			
	A hard landscaped area of:	1.514 ha			

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	2 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 4**

Calculations Title **Surface Water Management - Modified Rational Method**

LOCATION	CALCULATIONS	OPTIONS
	Calculations based on: Design and Analysis of urban storm drainage. The Wallingford Procedure, Volume 1 Principles methods and practice.	
	User Input Data	
	Exisiting hard landscaped area = 2 ha	
	SAAR (From FEH / Windes) = 691	
	M5_60 (From Windes) = 20	
	Ratio R (From Windes) = 0.405	
	PIMP (% impervious) = 100.0%	
	Soil Type = 0.40	
	Very Low Runoff (well drained sandy, loamy or earthy peat soils) = 0.15	
	Low Runoff (Very permeable soils (e.g. gravel, sand) = 0.30	
	Moderate (Very fine sands, silts and sedimentary clays) = 0.40	
	High Runoff (Clayey or loamy soils) = 0.45	
	Very High Runoff (Soils of the wet uplands) = 0.50	
Fig. 9.7	UCWI (From Figure 9.7 of Wallingford Method) = 65	
Fig 6.3a/b	Z1 (From Figure 6.3a or 6.3b) = 1.00	
Tab 6.2/6.3	Z2 (From Table 6.2 & Table 6.3) = 2.02	
Eqn. 13	Qp (peak discharge) = 2.78 Cv CR i A	
	Where: Qp (Peak Discharge) i = rainfall intensity A = Total Area	
	Calculating Rainfall Intensity (i)	
Eqn 6.4	MT-D =Z1 x Z2 x (M5-60min)	
	M5_60 20 Z1 1.00 Z2 2.02	
	Thus M100_60 is: 40.4 mm	
Eqn 7.20	Cv = PR/100	
Eqn 7.3	PR = (0.829 PIMP) + (25.0 SOIL) + (0.078 UCWI) - 20.7	
	PIMP (Percentage of catchment which is impervious) 100.0 %	
Page 52	Note: PIMP can not be less than 40% 40.0 %	
	Thus value of PIMP to be used 100.0 %	
	Soil: 0.40 UCWI: 65	
	PR = 77.27	
	Thus Cv = 0.77	
Sec 7.10	CR (Recommended for simulation and design) 1.3	
	Qp for 1 in 100 year 60 minute duration = 186.2 l/s or 112.8 l/s/ha	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	3 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

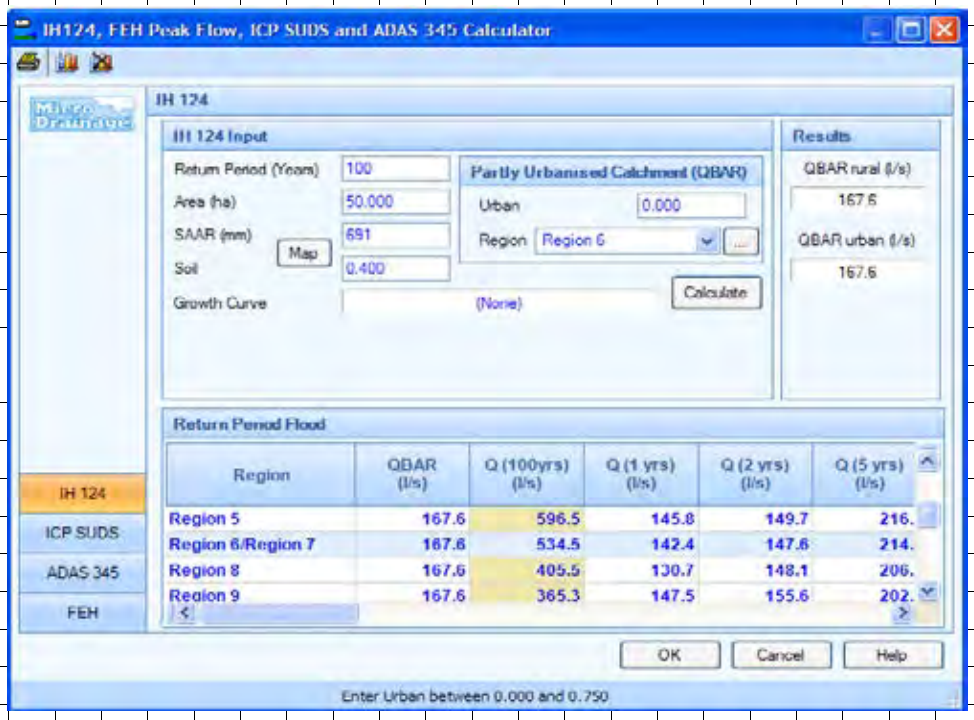
Project Title **Upper Heyford, Catchment Area 4**

Calculations Title **Surface Water Management - IoH 124**

LOCATION	CALCULATIONS	OPTIONS

In order to calculate the rate of surface water discharge from the permeable portion of the Site, the Windes Microdrainage version W.12.4 Source Control module has been utilised. Rural runoff has been calculated using the IoH 124 Methodology, the input and output data for which are shown below;

An area of 50ha has been used in the calculations as this is the smallest catchment area which the IoH 124 method can calculate. The 50ha output is then prorated as set out in IoH 124.



Qbar (1 in 2.333)	167.6	l/s/50ha	3.4	l/s/ha					
1 in 100	534.5	l/s/50ha	10.7	l/s/ha		or	**7.6**	**l/s**	

CALCULATIONS

Company:	WTDL	Office:	London
Sheet No:	4 of 4	Project No:	C11234
By	S. Tarran	Date	20.09.10
Checked:	S.Brown	Date	20.09.10

Project Title **Upper Heyford, Catchment Area 4**

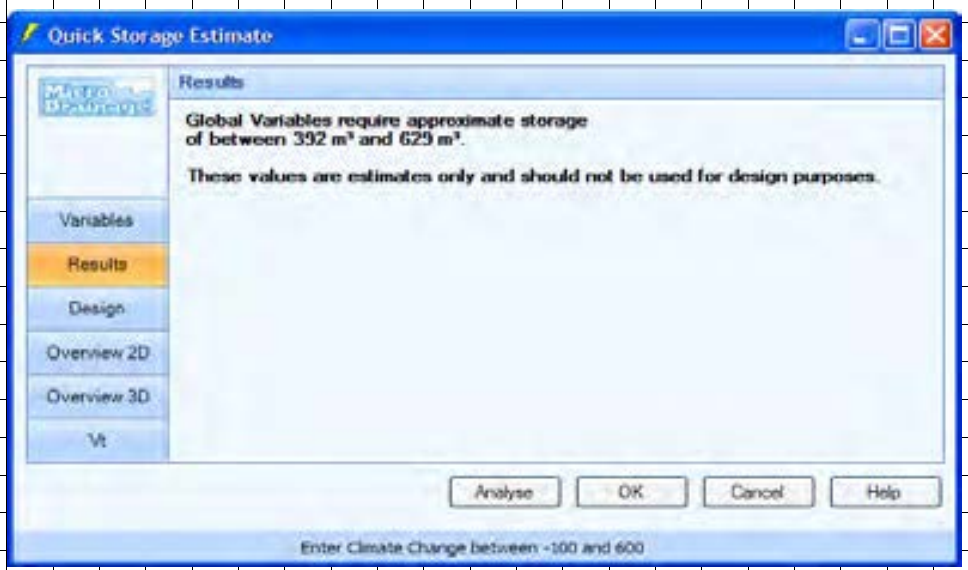
Calculations Title **Preliminary surface water attenuation volume.**

LOCATION	CALCULATIONS	OPTIONS

In order to calculate the volume of surface water attenuation required for the Site, Windes Microdrainage version W.12.4, Source Control module, Quick Storage Estimate has been used. The input and output data for which are shown below;

Input:

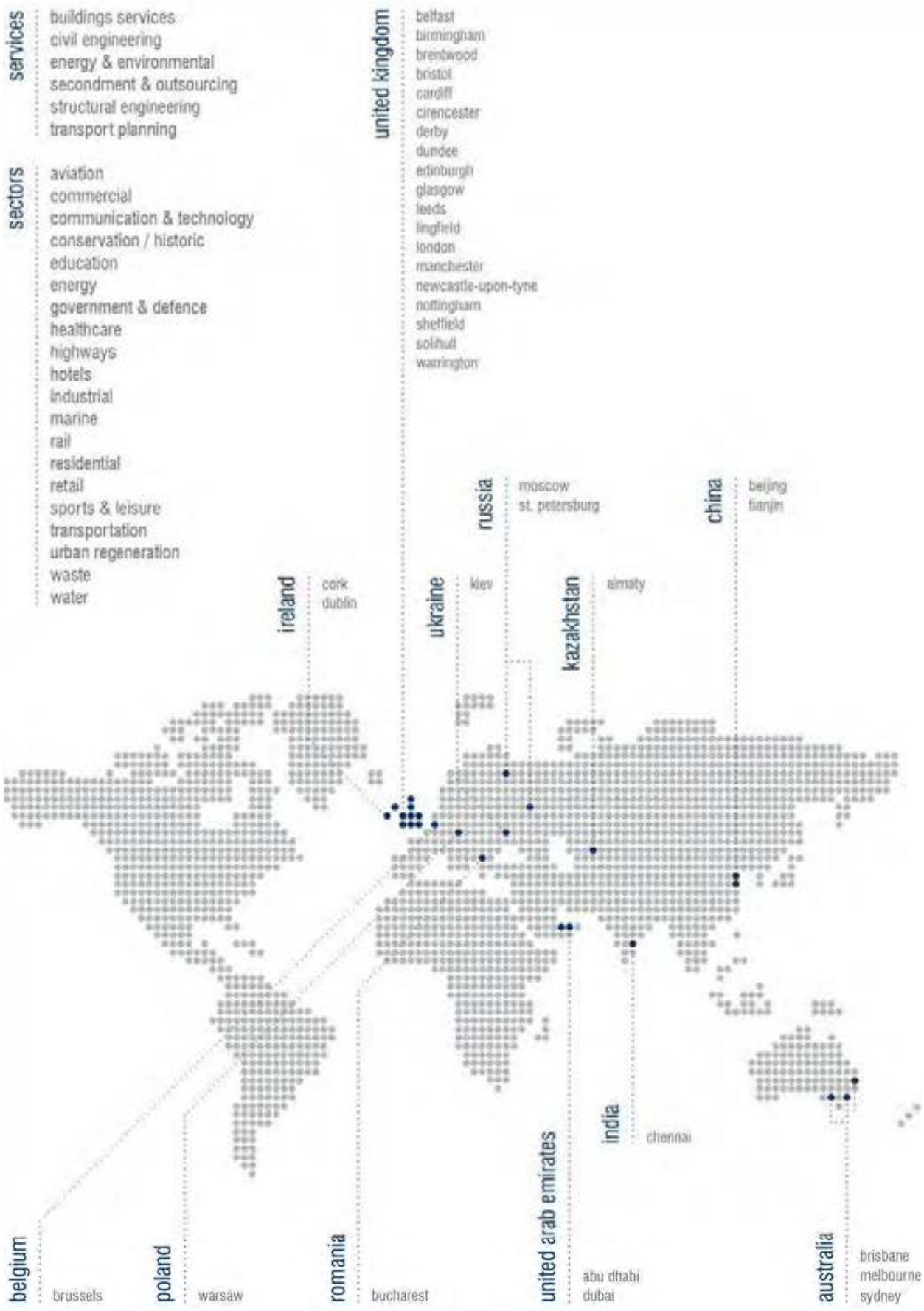
Output:



As Windes Quick Storage Estimate provides a range of attenuation volumes it is considered that an average value of the range is suitable for preliminary design sizing.

Minimum:	392	m^3			
Maximum:	629	m^3	Preliminary Estimate:	**511**	**m^3**

Waterman


services
buildings services
civil engineering
energy & environmental
secondment & outsourcing
structural engineering
transport planning
sectors
aviation
commercial
communication & technology
conservation / historic
education
energy
government & defence
healthcare
highways
hotels
industrial
marine
rail
residential
retail
sports & leisure
transportation
urban regeneration
waste
water
united kingdom
belfast
birmingham
brentwood
bristol
cardiff
cirencester
derby
dundee
edinburgh
glasgow
leeds
lingfield
london
manchester
newcastle-upon-tyne
nottingham
sheffield
solihull
warrington
russia
moscow
st. petersburg
china
beijing
tianjin
ireland
cork
dublin
ukraine
kiev
kazakhstan
almaty
india
chennai
united arab emirates
abu dhabi
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