



Vale of White Horse – Water Cycle Study Stage 1

Technical Statement

1. Introduction

1.1 Background

The Vale of White Horse District Council are currently progressing the Local Plan 2031: Part 2 (LPP2) with submission to the Secretary of State timetabled for February 2018. The LPP2 will include.

- policies and locations for new housing to meet the Vale's proportion of Oxford's housing need, which cannot be met within the City boundaries, as agreed by the Oxford Growth Board
- policies for the part of Didcot Garden Town that lies within the Vale of White Horse District
- detailed development management policies to complement the strategic policies set out in the Part 1 plan and replace the remaining saved policies of the Local Plan 2011, where appropriate, and
- additional development site allocations to address the agreed quantum of Oxford's unmet housing need to be addressed within the Vale and to support the achievement of sustainable development. The Vale of White Horse District Council Local Plan 2031: Part 1 (LPP1) was adopted on 14th of December 2016. The LPP1 sets the strategic policies and identifies strategic sites for housing, employment and supporting infrastructure required in the district up to 2031.

To support the LPP1, a Water Cycle Study (WCS) was completed in September 2015¹ and a Statement of Common Ground with Thames Water and the Environment Agency was signed on the 18th of September 2015². An additional WCS is required to support the second part of the Local Plan (LPP2).

This technical note covers interim outputs in relation to the Vale of White Horse District Council's LPP2 initial site options and allocations, following the format used in the 2015 WCS. Interim findings have been used to inform the consultation document prior to the development of a full WCS report

The WCS report will be prepared and finalised alongside the preparation of the Pre-Submission Document.

1.2 WCS Objectives

The purpose of a WCS is to form part of the evidence base for a local authorities Local Plan preparation, and will specifically ensure that future development does not have a damaging effect on the water environment across the study area. The WCS will also help to guide future development in terms of the most appropriate locations and appropriate timescales (with respect to water infrastructure and the water environment).

The WCS will assess planned future development throughout the Vale of White Horse District (study area) with regards to water supply capacity, wastewater capacity and environmental capacity. Any water quality issues and associated water infrastructure upgrades that may be required and potential constraints have subsequently been identified and reported. The WCS then provides information at a level suitable to demonstrate that there are workable solutions to key constraints to deliver future development for all development sites (committed and allocations), including

¹ Water Cycle Study Final Report September 2015 written by JBA Consulting

² Vale of White Horse Local Plan 2031 Part 1 Examination Statement of Common Ground between Vale of White Horse District Council; Environment Agency; and Thames Water, September 2015.

http://www.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=555463412&CODE=F05ED913BBC072A32CC57D9367844D28

recommendations on the policy required to deliver it.

1.3 Objectives

The key objective of the WCS technical note is to provide an interim position on key technical water cycle issues prior to development of the full WCS, including:

- Interim reporting of flow capacity assessment using proposed housing figures, using the data and conclusions contained within the 2015 WCS. Where a Wastewater Treatment Works (WwTW) requires standards beyond the limits of convention treatment this has been highlighted.
- Review the revised development growth figures (LPP2 and LPP1 which includes the Vale of White Horse's apportionment of Oxford City's unmet housing need) against available water planned by Thames Water and whether the current Water Resource Management Plan adequately caters for the proposed growth.
- Carry out a high level site assessment, covering wastewater network and water supply network constraints with information provided by Thames Water.

The full WCS will include:

- the total proposed number of dwellings which will need to be catered for in terms of water supply and wastewater treatment.
- An assessment of the current wastewater treatment facilities in regards to both capacity and compliance with legislation and environmental permits.
- Water resource planning targets, as well as current and proposed water efficient measures.
- An assessment of each site by identifying local receptors such as watercourses, outlining current and future flood risks (inclusive of surface water and groundwater flood risks) and assessing the current wastewater network.
- Recommendations in regards to wastewater, water supply, surface water management and flood risk, ecology and stakeholder liaison.

2. Wastewater Strategy

2.1 WwTW flow capacity assessment

All WwTWs are issued with a permit to discharge by the Environment Agency, which sets out conditions on the maximum volume of treated flow that it can discharge and also limits on the quality of the treated flow. These limits are set in order to protect the water quality and ecology of the receiving waterbody. They also dictate how much flow can be received by each WwTW, as well as the type of treatment processes to be used at the WwTWs.

The volume element of the discharge permit determines the maximum number of properties that can be connected to a WwTW catchment. When discharge permits are issued for the first time, they are generally set with a volume 'freeboard', which acknowledges that allowance needs to be made for additional connections. This allowance is termed 'permitted headroom'. The quality conditions applied to the discharge permit are derived to ensure that the water quality of the receiving waterbody is not adversely affected, even when the maximum amount of flow is discharged. For the purposes of this Stage 1 review, a simplified assumption is applied that the permitted headroom is usable and would not affect downstream water quality. This headroom therefore determines how many properties can be connected to the WwTW before a new discharge permit would need to be issued (and hence how many properties can connect without significant changes to the treatment infrastructure). An initial analysis of projected growth against the headroom at WwTWs in VOWH is included in Table 2-1 below.

When a new discharge permit is required, an assessment needs to be undertaken to determine what new quality conditions would need to be applied to the discharge. If the quality conditions remained unchanged, the increase in flow would result in an increase in total load of some substances being discharged to the receiving waterbody. This may have the effect of deteriorating water quality and hence in most cases, an increase in permitted discharge flow results in more stringent (or tighter) conditions on the quality of the discharge. The requirement to treat to a higher level may result in an increase in the intensity of treatment processes at the WwTWs which may also require improvements or upgrades to be made to the WwTW to allow the new conditions to be met.

In some cases, it may be possible that the quality conditions required to protect water quality and ecology are beyond

that which can be achieved with conventional treatment processes and as a result, this WCS assumes that a new solution would be required in this situation to allow growth to proceed.

Table 2-1

WwTW	Current DWF consent m ³ /d	Measured Flow m ³ /d	Current DWF capacity m ³ /d	Dwelling capacity (approx.)	Phase 1 growth (LPP1)	Phase 2 growth (to 2031) (LPP2)	Total New Growth (LPP1 + LPP2)	Capacity post growth (LPP1 and LPP2 growth) m ³ /d ³	Dwelling capacity
Abingdon STW (lagoon & new outfall)	12859	10939	1,920	7,300	1,032	6,500	7,532	-57	-200
Appleton STW	2559	987	1,572	6,000	438	2,550	2,988	788	3,000
Didcot STW	11476	9390	2,086	7,950	5,115	6,360	11,475	-926	-3,500
Drayton STW	1672	1198	474	1,800	730	2,580	3,310	-395	-1,500
Faringdon STW	2812	1548	1,264	4,800	679	0	679	1,086	4,100
Kingston Bagpuize STW	633	626	7	<50	679	3,700	4,379	-1,142	-4,350
Oxford STW	50985	53618	-2,633	-10,030	1,164	860	2,024	-3,164	-12,050
Shrivenham STW	2842	1220	1,622	6,200	904	300	1,204	1,306	5,000
Stanford in the Vale STW	650	339	311	1,200	355	0	355	218	850
Wantage STW	6250	4891	1,359	5,200	5,038	4,575	9,613	-1,164	-4,400

2.2 Key issues

2.2.1 Exceeding volumetric consents

It was identified in the previous WCS (JBA , 2015) that LPP1 growth would lead to a requirement for upgrades at the following works based on a combined analysis of volumetric flow and quality consent conditions carried out by TWUL:

- Didcot;
- Drayton;
- Faringdon;
- Kingston Bagpuize;
- Oxford; and,
- Shrivenham.

The additional growth from LPP2 will compound these identified issues and must be factored into consideration for upgrades to WwTWs in the District. The analysis of volumetric flow carried out for the combined growth of LPP1 and LPP2, summarised in

Table 2-1 indicates that the following WwTWs would also exceed their consented DWF after growth:

- Abingdon; and
- Wantage.

The previous WCS (JBA , 2015) also highlighted that LPP1 growth would bring a number of works close to their current capacity limit based on a combined analysis of volumetric flow and quality consent conditions carried out by TWUL:

- Abingdon (BOD consent);

³ Further upgrades by Thames Water may be needed to meet a new consent

- Appleton (BOD consent); and,
- Wantage (Suspended Solids and Ammonia).

A more detailed assessment will therefore be required to establish whether the flow can be accommodated with upgrades to capacity and a tightening of consents within the limits of conventional treatment at these WwTWs.

3. Water Supply and demand Strategy

Water companies have historically undertaken medium to long term planning of water resources in order to demonstrate that there is a long-term plan for delivering sustainable water supply within its operational area to meet existing and future demand.

Water Resource Management Plans are a key document for a WCS as they set out how demand for water from growth within a water company's supply area can be met, taking into account the need for the environment to be protected. As part of the statutory approval process, the plans must be approved by both the Environment Agency and Natural England (as well as other regulators) and hence the outcomes of the plans can be used directly to inform whether growth levels being assessed within a WCS can be supplied with a sustainable source of water supply.

Water companies manage available water resources within key zones, called Water Resource Zones (WRZ). These zones share the same raw resources for supply and are interconnected by supply pipes, treatment works and pumping stations. As such the customers within these zones share the same available 'surplus of supply' of water when there is more available water than demand; but also share the same risk of supply when demand for water is greater than the available supply (i.e. deficit of supply). Water companies undertake resource modelling to calculate if there is likely to be a surplus of available water or a deficit in each WRZ by 2040, once additional demand from growth and other factors such as climate change are taken into account.

As discussed in the previous WCS (JBA, 2015), the most recent, Thames Water (TWUL) Water Resource Management Plan (WRMP) has been reviewed and used to inform this Technical Note. The WRMP was published prior to the publication of the Oxfordshire Strategic Housing Market Assessment (SHMA). The councils involved (including VOWH) indicated housing growth may be 65% greater than the numbers which informed the WRMP14. This prompted TWUL and the Environment Agency to produce a 'Statement of Common Ground' in 2015 in which it was established that:

- Thames Water can maintain security of supply in the SWOX Water Resource Zone in the 5 years to 2020
- Further short term mitigation measures have been identified which could be introduced with a short lead time to provide additional supply to 2020 if needed.
- TWUL have a statutory obligation to review performance on an annual basis, during which they will formally review population and housing growth against forecasts and identify any measures needed
- TWUL will publish their next draft WRMP covering 2020 – 2045 in Spring 2018 which will fully incorporate the increased population and property growth forecasts in close liaison with Local Authorities

It is assumed that additional growth put forward for LPP2 (which includes the Vale of White Horse's apportionment of Oxford's unmet need) is part of the need identified within the SHMA and is therefore already incorporated within the Water Resources Statement of Common Ground. On this basis, the conclusions and recommended actions on water availability within the 2015 WCS remain unchanged. In terms of water supply infrastructure for the update LPP2 sites, this should be subject to a more detailed review by TWUL in the next stage of work.

4. Site assessments: Constraints

A high level assessment of constraints to development at the shortlisted LPP2 sites is included below in Table 4-1, which includes wastewater network constraints identified by TWUL, flood risk and high level restrictions to infiltration SuDS.

A Red, Amber Green assessment has been used to show the scale of the issue/ concern within the wastewater network catchment and the level of TWUL infrastructure upgrades that might be required to serve proposed growth. The definitions of each colour are shown below:

- Red – The wastewater infrastructure in this area is highly unlikely to be able to support the demand anticipated from this development. Infrastructure and/or treatment upgrades will be required to serve proposed growth.
- Amber – Infrastructure and/or treatment upgrades may be required to serve proposed growth.

- Green – No infrastructure or treatment upgrades needed

Table 4-1 Site constraints assessment for LPP2 sites

AECOM ID	Ref ID	SLAA Ref	Location	Maximum Dwellings Considered	Site Area (sq km)	% of site at high risk of surface water flooding	% of site at medium risk of surface water flooding	% of site within FZ 2	% of site within FZ 3	% of site within FZ 3b	Potential receiving watercourse for surface water	Aquifer Designation	SPZ	Groundwater Protection	Known Wastewater Network Constraints – Information provided by Thames Water	WwTW Catchment
VoWH_1	HASC_A		Harwell Campus	850	34.45	N/A	0.05%	N/A	N/A	N/A	No watercourse nearby	Superficial - Secondary undifferentiated ; Bedrock - Secondary undifferentiated	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Didcot
VoWH_2	EACH_A		West of Wantage	1500	87.84	0.38%	0.82%	7.43%	5.67%	5.67%	Woodhill Brook	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	The system may/may not need reinforcement, Impact study would be required to assess each development.	Wantage
VoWH_3	GROV_A		North West of Grove	700	28.35	0.72%	1.40%	N/A	N/A	N/A	Woodhill Brook	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Wantage
VoWH_4	GROV_B		East of Grove	1500	92.85	0.05%	0.45%	0.21%	N/A	N/A	Pill Ditch	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A		Wantage
VoWH_5	HARW_A		West of Harwell Village	750	30.19	0.51%	0.80%	N/A	N/A	N/A	Unnamed watercourse	Superficial - Secondary undifferentiated ; Bedrock - Principal	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Didcot
VoWH_6	SUCT_A		South East of Sutton Courtenay	440	17.75	0.20%	0.92%	N/A	N/A	N/A	Moor Ditch	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Drayton
VoWH_7	ROWS_A		Rowstock	1500	85.61	0.32%	0.58%	N/A	N/A	N/A	No watercourse nearby	Superficial - Secondary undifferentiated ; Bedrock - Principal	N/A	N/A		Didcot
VoWH_8	MIHE_A		Milton Heights	1500	77.44	0.41%	0.63%	N/A	N/A	N/A	No watercourse nearby	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Didcot
VoWH_9	APPF_A	Oxford City's Unmet Housing Need	Appleford	1500	69.49	0.98%	1.84%	3.19%	1.16%	0.51%	Unnamed watercourse	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Didcot
VoWH_10	ABIG_A	Oxford City's Unmet Housing Need	North Abingdon	1500	82.27	0.80%	1.41%	N/A	N/A	N/A	Unnamed watercourse	Superficial - Secondary A; Bedrock - Unproductive	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Abingdon
VoWH_11	ABIG_B	Oxford City's Unmet Housing Need	South Abingdon	1500	61.35	3.06%	3.89%	2.45%	0.00%	N/A	River Thames	Superficial - Secondary A; Bedrock - Unproductive	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Abingdon

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VoWH_12	DRAY_A	Oxford City's Unmet Housing Need	North East of Drayton	1050	43.83	0.03%	0.13%	0.44%	N/A	N/A	Unnamed watercourse	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Drayton
VoWH_13	DRAY_B	Oxford City's Unmet Housing Need	West of Drayton	850	34.27	0.00%	0.62%	N/A	N/A	N/A	No watercourse nearby	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Drayton
VoWH_14	DRAY_C	Oxford City's Unmet Housing Need	South of Drayton	240	9.6	N/A	0.01%	N/A	N/A	N/A	Mill Brook	Superficial - Secondary A; Bedrock - Principal	N/A	N/A		Drayton
VoWH_15	BOTL_A	Oxford City's Unmet Housing Need	South West of Botley	1350	53.95	0.05%	0.51%	N/A	N/A	N/A	No watercourse nearby	Superficial - None ; Bedrock - Secondary A	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Appleton
VoWH_16	CUMN_A	Oxford City's Unmet Housing Need	South of Cumnor	200	8	1.55%	5.41%	N/A	N/A	N/A	Unnamed watercourse	Superficial - None ; Bedrock - Secondary A	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Appleton
VoWH_17	RADL_A	Oxford City's Unmet Housing Need	North of Radley	620	24.94	0.16%	1.68%	N/A	N/A	N/A	River Thames	Superficial - Secondary A; Bedrock - Unproductive	N/A	N/A	The system may/may not need reinforcement, Impact study would be required to assess each development.	Oxford
VoWH_18	RADL_B	Oxford City's Unmet Housing Need	South of Radley	240	9.82	0.30%	0.93%	N/A	N/A	N/A	River Thames	Superficial - Secondary undifferentiated ; Bedrock - Unproductive	N/A	N/A	The system may/may not need reinforcement, Impact study would be required to assess each development.	Oxford
VoWH_19	WOOT_A	Oxford City's Unmet Housing Need	South of Wootton	800	32.19	0.13%	0.31%	N/A	N/A	N/A	No watercourse nearby	Superficial - None ; Bedrock - Secondary A	N/A	N/A	The system may/may not need reinforcement, Impact study would be required to assess each development.	Abingdon
VoWH_20	WOOT_B	Oxford City's Unmet Housing Need	East of Wootton	410	16.71	0.02%	0.25%	N/A	N/A	N/A	Unnamed watercourse	Superficial - None ; Bedrock - Secondary A	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Abingdon
VoWH_21	WOOT_C	Oxford City's Unmet Housing Need	North of Wootton	790	31.6	0.11%	1.52%	N/A	N/A	N/A	No watercourse nearby	Superficial - None ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Abingdon
VoWH_22	SHIP_A	Oxford City's Unmet Housing Need	Dalton Barracks (Shippon)	1500	288.67	0.24%	0.71%	0.11%	0.09%	0.09%	Gozzard's Ford	Superficial - None ; Bedrock - Secondary A	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Abingdon
VoWH_23	EHAN_A	Oxford City's Unmet Housing Need	East of East Hanney	375	15.03	0.13%	0.71%	0.03%	N/A	N/A	Unnamed watercourse	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Wantage

AECOM ID	Ref ID	SLAA Ref	Location	Maximum Dwellings Considered	Site Area (sq km)	% of site at high risk of surface water flooding	% of site at medium risk of surface water flooding	% of site within FZ 2	% of site within FZ 3	% of site within FZ 3b	Potential receiving watercourse for surface water	Aquifer Designation	SPZ	Groundwater Protection	Known Wastewater Network Constraints – Information provided by Thames Water	WwTW Catchment
VoWH_24	EHAN_B	Oxford City's Unmet Housing Need	South of East Hanney	500	20.2	N/A	0.23%	1.11%	1.09%	1.09%	Letcombe Brook	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Wantage
VoWH_25	MRCM_A	Oxford City's Unmet Housing Need	North of Marcham	1000	43.08	0.05%	0.29%	0.04%	N/A	N/A	Unnamed watercourse	Superficial - None ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Appleton
VoWH_26	STEV_A	Oxford City's Unmet Housing Need	North of Steventon	260	10.46	N/A	N/A	N/A	N/A	N/A	Unnamed watercourse	Superficial - Secondary A; Bedrock - Principal	N/A	N/A	At this stage, developments need to be assessed individually to make sure there is no detriment in the existing levels of service.	Didcot
VoWH_27	KBAG_A	Oxford City's Unmet Housing Need	East of Kingston Bagpuize	860	34.73	0.06%	0.19%	N/A	N/A	N/A	Unnamed watercourse	Superficial - None ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Kingston Bagpuize
VoWH_28	KBAG_B	Oxford City's Unmet Housing Need	South of Kingston Bagpuize	620	25.14	0.31%	1.78%	N/A	N/A	N/A	Unnamed watercourse	Superficial - None ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Kingston Bagpuize
VoWH_29	KBAG_C	Oxford City's Unmet Housing Need	West of Kingston Bagpuize	720	28.81	0.33%	0.84%	N/A	N/A	N/A	Unnamed watercourse	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Kingston Bagpuize
VoWH_30	FYFL_A	Oxford City's Unmet Housing Need	Fyfield	1500	381.02	3.38%	6.14%	N/A	N/A	N/A	Unnamed watercourse	Superficial - Secondary A ; Bedrock - Secondary A	N/A	N/A	The system is above capacity, can't cope with the new flows and Reinforcement in the sewers would be required.	Kingston Bagpuize
			Shrivenham	150	No Site Area Provided											Shrivenham
			Watchfield	150	No Site Area Provided											Shrivenham

5. Preferred Options

Table 5-1 sets out the Vale of White Horse District Councils preferred site options for LPP2.

Table 5-1 Preferred site options

Site Name	Planned Number of Dwellings
Dalton Barracks	1,200 dwellings (+ 1,000 more dwellings beyond the plan period)
East of Kingston Bagpuize	600 dwellings
North East of Marcham	400 dwellings
South East of Marcham (Smaller Site and has not been tested at this stage)	120 dwellings
North of East Hanney (Smaller Site and has not been tested at this stage)	80 dwellings
North East of East Hanney (Smaller Site and has not been tested at this stage)	50 dwellings
Harwell Campus	1,000 dwellings
North West of Grove	300 dwellings
West of Harwell	100 dwellings

6. Next steps for the study

The next part of the study will build on the work undertaken in Stage 1 and will produce a full WCS report and will act as the updated evidence base. This will include:

- Full reporting on all growth numbers (LLP1 and LLP2) that have been assessed.
- Full reporting on the changes to wastewater treatment work capacity, WFD and water environment baseline and the environmental capacity calculations.
- Details of any wastewater treatment options needed to manage situations where existing discharges need to be treated beyond the limits of conventional treatment.
- Reporting of the WRMP with respect to available water supply.
- A review of updated Catchment Abstraction Management Strategies (CAMS) to determine capacity for localised abstraction to support development.
- A water neutrality feasibility assessment, including pathway for implementing a neutrality initiative.
- Local Plan policy recommendations, phasing implications and developer guidance.