

Vale of White Horse District Council - Water Cycle Study

Phase I Study

November 2014

Vale of White Horse District Council
Abbey House
Abbey Close
ABINGDON
Oxfordshire
OX14 3JE



Vale
of White Horse
District Council

JBA Project Manager

Giovanni Sindoni
Crowmarsh Battle Barns
100 Preston Crowmarsh
Wallingford
Oxfordshire
OX10 6SL

Revision History

Revision Ref / Date Issued	Amendments	Issued to
Version 1.0 05/10/2014		Vale of White Horse District Council, Environment Agency, Thames Water
Version 1.1 05/11/2014	Amended following comments from VoWHDC	Vale of White Horse District Council
FINAL Version 1.2 07/11/2014	Amended following comments from VoWHDC, EA and TWUL	Vale of White Horse District Council, Environment Agency, Thames Water

Contract

This report describes work commissioned by Vale of White Horse District Council, by an email dated 30/09/2013. Vale's representative for the contract was Katherine Pearce. Giovanni Sindoni and Paul Eccleston of JBA Consulting carried out this work.

Prepared by Giovanni Sindoni MSc

Senior Analyst

Paul Eccleston BA CertWEM CEnv MCIWEM
C.WEM

Technical Director

Reviewed by Claire Gardner BSc MSc FRGS

Analyst

Alastair Dale BSc PGDip MIAHR

Technical Director

Purpose

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Acknowledgements

JBA Consulting wishes to thank the Vale of White Horse Council, the Environment Agency and Thames Water Utilities Limited for assistance in preparing this report.

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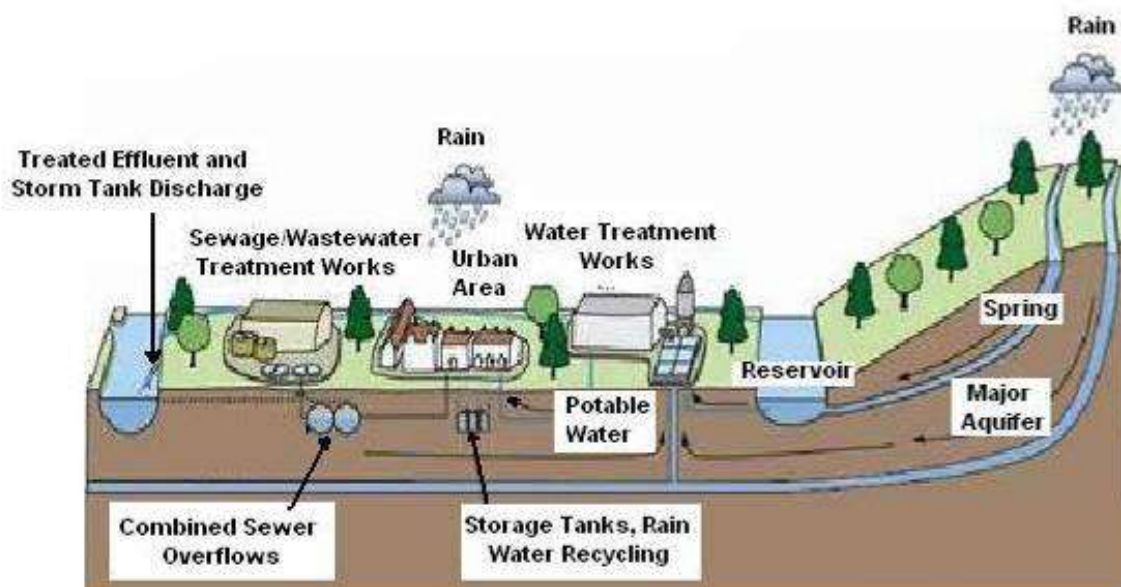
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Executive Summary

In October 2013, JBA Consulting was commissioned to undertake a Phase 1 Water Cycle Study (WCS) for the Vale of White Horse District Council (VoWHDC).

New homes require the provision of clean water, safe disposal of wastewater and protection from flooding. It is possible that allocating large numbers of new homes at some locations may result in the capacity of the existing available infrastructure being exceeded. This situation could potentially lead to service failures to water and wastewater customers, adverse impacts to the environment or high costs for the upgrade of water and wastewater assets being passed on to bill payers. Climate change presents further challenges such as increased intensive rainfall and a higher frequency of drought events that can be expected to put greater pressure on the existing infrastructure. Sustainable planning for water must take this into account. The water cycle can be seen in Figure 1 below, and shows how the natural and man-made processes and systems interact to collect, store or transport water in the environment.

Figure 1: Water cycle study



*Source: Environment Agency – Water Cycle Study Guidance

VoWHDC has identified 21 potential housing allocation sites. These sites and their associated demand for water supply and wastewater services were the key focus of the WCS. Other sites which were under consideration as contingency sites during the period that the WCS was developed were also assessed, but for clarity the main report focusses on the 21 allocations. Information about all sites assessed is included in Appendix A.

The WCS has been carried out in co-operation with the Environment Agency, and Thames Water. The Environment Agency set out a number of key questions to be answered by the WCS. These are tabulated out below with a summary of the study findings:

Question	Conclusion
Water Resources and Water Supply	
Is there capacity in existing licences for development?	There is scope for abstraction from the Cole and the Ock but there is no additional water (surface or groundwater) available for licensing in the majority of the District.
Will existing licences remain valid?	Due to abstraction, several water bodies in the district have fallen below the Ecological Flow Indicator (EFI) which may lead the EA to change or revoke some abstraction licenses. This underlines the need to reduce abstraction by using more efficient management practices.
Can we reduce abstraction by better management practices?	Improving water efficiency is recommended by the Abstraction Licensing Strategies and Thames Waters' Water Resource Management Plan. However, the removal of Code for Sustainable Homes and the proposed amendment to only allow LPAs to impose a lower limit of 110l/person/day in water stressed areas may limit the District's ability to manage water demand through the planning system. Likewise uncertainties over delivery of SuDS may inhibit uptake of measures such as rainwater harvesting.
If new major infrastructure (reservoirs, water treatment works, boreholes) are needed, can they be provided in time, can they be funded, and are they sustainable?	The WCS has highlighted a significant change in the number of housing units currently being considered in the District compared to when Thames Water's Water Resource Management Plan was prepared. Therefore until the WRMP is updated in 2015 there isn't a plan which accommodates all of the predicted growth.
Wastewater Collection and Treatment	
Is there volumetric capacity in existing effluent discharge consent for growth?	This has been assessed at each of the WwTWs planned to receive additional flows. Drayton, Faringdon, Kingston Bagpuize, Oxford and Shrivenham WwTWs are particularly constrained as upgrades would be required by 2021 to enable them to accommodate expected growth without failing their consents.
Will discharge consent be valid to meet future standard (e.g. WFD)?	With the exception of Abingdon WwTW's Lagoon Stream discharge to the River Thames, all of the WwTWs receiving significant additional flows due to growth would require a tightening of their treatment consents to either meet Water Framework Directive Good Status or to prevent a deterioration of greater than 10%. At several WwTWs, the revised consents required would be tighter than could be achieved using the existing treatment processes and therefore may require additional more expensive treatment processes rather than a simple extension of the WwTW.
Will additional discharge be allowed if there is no additional environmental capacity to assimilate it?	EA have confirmed that this question falls beyond the scope of the WCS.
If new major infrastructure (wastewater treatment works, major pumping mains or sewer mains) are needed, can they be provided in time, and can they be funded?	This issue is very specific to individual catchments or locations within catchments. Virtually all of the larger site allocations would require upgrading of existing or new sewerage systems to be provided, therefore phasing within developments and within settlements may need to be considered carefully. The Local Plan Viability Study factors in a cost for accelerating work on capacity upgrades to water and wastewater assets where needed.
Environmental Opportunities	

Question	Conclusion
Are we making the most of our new development?	Currently a number of drivers mitigate against the use of SuDS and Water Sensitive Urban Design (WSUD) within new developments. Principle among these are:
Are there multi-use options that will provide water resources, flood risk management and water quality benefits?	<ul style="list-style-type: none"> • Uncertainties regarding the funding, adoption and maintenance of SuDS. • Proposed changes to the Building Regulations will restrict the ability of LPAs to require water efficient design standards. • A lack of appreciation amongst developers and buyers of the whole-life cost of a house, and a lack of incentivisation to developers to adopt any efficiency measures which may increase the construction costs, even where these may significantly reduce the running costs of that house.

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Abbreviations

ALS	Abstraction Licensing Strategy
AMP	Asset Management Plan
BOD	Biochemical Oxygen Demand
CAMS	Catchment Abstraction Management Strategies
CAPEX.....	Capital Expenditure
CSO	Combined Sewer Overflow
DWF.....	Dry Weather Flow
EA	Environment Agency
EP	Environmental Permit
FE	Final Effluent
FFT	Flow to Full Treatment
FMfSW	Flood Map for Surface Water
FMZ.....	Flow Monitoring Zone
FRA.....	Flood Risk Assessment
FZ.....	Flood Zone
HOF	Hands-Off Flow
LPAs	Local Planning Authorities
MLD	Megalitres per Day
NH ₄	Ammonium
OC.....	Occupancy Rate
OfWAT	Water Services Regulation Authority
OPEX.....	Operational Expenditure
PE	Population Equivalent
PCC	Per Capita Consumption
PPG	Planning Policy Guidance
PR	Price Review or Periodic Review
R/A/G	Red / Amber / Green assessment

RQP	River Quality Planning tool
RSS.....	Regional Spatial Strategy
SA	Sustainability Appraisal
SDS.....	Strategic Direction Statement
SEA.....	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SS	Suspended Solids
TWUL	Thames Water Utilities Limited
SuDS.....	Sustainable Drainage System
VoWHDC	Vale of White Horse District Council
WaSCs.....	Water and Sewerage Companies
WCS.....	Water Cycle Study
WRMP.....	Water Resources Management Plan
WRZ.....	Water Resource Zone
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

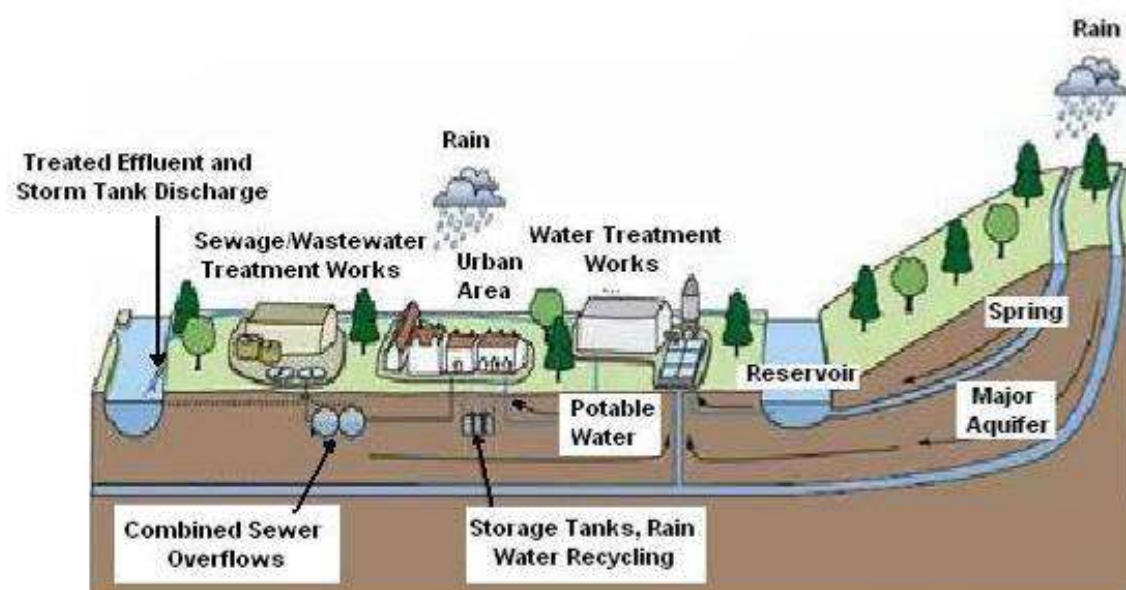
1 Introduction

1.1 Background

In September 2013 JBA Consulting was commissioned to undertake a Phase 1 Water Cycle Study (WCS) for the Vale of White Horse District Council (VoWHDC). New dwellings are planned to be built (or are already consented) throughout the VoWHDC with the main focus for around 70% of planned growth in the South East Vale sub area.

New homes require the provision of clean water, safe disposal of wastewater and protection from flooding. It is possible that allocating large numbers of new homes at some locations may result in the capacity of the existing available infrastructure being exceeded. This situation could potentially lead to service failures to water and wastewater customers, adverse impacts to the environment or high costs for the upgrade of water and wastewater assets being passed on to bill payers. Climate change presents further challenges such as increased intensive rainfall and a higher frequency of drought events that can be expected to put greater pressure on the existing infrastructure. Sustainable planning for water must take this into account. The water cycle can be seen in Figure 1-1 below, and shows how the natural and man-made processes and systems interact to collect, store or transport water in the environment.

Figure 1-1: Water cycle study



*Source: Environment Agency – Water Cycle Study Guidance

This study will assist local authorities to select and develop sustainable development allocations where there is minimal impact on the environment, water quality, water resources, infrastructure and flood risk. This has been achieved by identifying areas where there may be conflict between any proposed development and the requirements of the environment and by recommending potential solutions.

The Water Cycle Study should be treated as a “dynamic document” that is periodically reviewed as further information becomes available. This will provide a better understanding of the impact of the developments on the water supply and wastewater infrastructure and water quality.

1.2 Objectives of the Water Cycle Study

The Vale has put forward their proposed strategic site allocations to meet national policy for housing provision.

The Water Cycle Study is required in order to assess the constraints and requirements that will arise from the proposed growth on the water infrastructure.

The overall objective of the Water Cycle Study is to understand the environmental and physical demands of the development planned and identify opportunities for more sustainable planning

and improvements that may be required so that proposals don't exceed the existing water cycle capacity. This is assessed by considering the following issues:

- Water Supply;
- Wastewater and Treatment;
- Water Quality and the Environment;
- Demand Management; and
- Flood Risk.

This report focuses upon the proposed site allocations provided by the Council. The report outlines the current status of the environment and infrastructure, identifies the possible constraints to the development, the impacts and demands of the development, and gives recommendations as to any improvements or mitigation required including approximate costings.

1.3 Phase 1 Water Cycle Study Scope

The scope of the phase I WCS was defined by the Environment Agency:

We recommend the following issues are scoped into the Phase 1 WCS:

Water Resources and Water Supply

Environmental capacity

- *Is there capacity in existing licenses for development?*
- *Will existing license remain valid?*
- *Can we reduce abstraction by better management practices?*

Infrastructure capacity

- *If new major infrastructure (reservoirs, water treatment works, boreholes) are needed, can they be provided in time, can they be funded, and are they sustainable?*

Wastewater Collection and Treatment

Environmental capacity

- *Is there volumetric capacity in existing effluent discharge consent for growth?*
- *Will discharge consent be valid to meet future standard (e.g. WFD)?*
- *Will additional discharge be allowed if there is no additional environmental capacity to assimilate it?*

Infrastructure capacity

- *If new major infrastructure (wastewater treatment works, major pumping mains or sewer mains) are needed, can they be provided in time, and can they be funded?*

Environmental Opportunities

- *Are we making the most of our new development?*
- *Are there multi-use options that will provide water resources, flood risk management and water quality benefits?*

Examples:

- *Green roofs and permeable road surfaces for new developments*
- *SuDS designed to provide green infrastructure and biodiversity benefits as well as surface water flood risk and water quality management*

1.4 Structure of this report

Table 1-1: Report structure

Question	Method	Link to report section
Water Resources and Water Supply		
Is there capacity in existing licences for development?	Review Water Resource Management Plans (WRMPs) and Catchment Abstraction Management Strategies (CAMS) to identify whether the projected growth accommodates the proposed scale and locations of development.	Water resources assessment
Will existing licences remain valid?	Review WRMP and CAMS	Water resources assessment
Can we reduce abstraction by better management practices?	Review Water Company (WC) proposals for demand management (leakage, metering etc.) Identify opportunities to manage demand on new developments through water efficient fittings, rainwater harvesting and grey water recycling.	Water resources assessment
If new major infrastructure (reservoirs, water treatment works, boreholes) are needed, can they be provided in time, can they be funded, and are they sustainable?	Where available, use WC studies, models etc. to assess infrastructure capacity. Where these are not available, use simple indicators (size of development vs. water resources available) to assess risks.	Water supply infrastructure assessment
Wastewater Collection and Treatment		
Is there volumetric capacity in existing effluent discharge consent for growth?	Assessment will be undertaken at the Wastewater Treatment Works (WwTW) level. Verify that the receiving WwTW has enough headroom to accommodate the extra inflow	Wastewater treatment works flow and quality consent assessment
Will discharge consent be valid to meet future standard (e.g. WFD)?	Asses the water quality status of the receiving water using the data provided by the EA (e.g. WFD GIS layer, existing water quality models) Identify the likelihood of development either inhibiting improvement or downgrading existing good status.	Water quality impact assessment
Will additional discharge be allowed if there is no additional environmental capacity to assimilate it?	The Environment Agency has confirmed that this is a question beyond the scope of this WCS to address.	None
If new major infrastructure (wastewater treatment works, major pumping mains or sewer mains) are needed, can they be provided in time, and can they be funded?	Where available, use WaSC studies, models etc. to assess infrastructure capacity. Where these are not available, use simple indicators (size of development vs. dimensions of receiving sewer, presences of CSOs etc.) to assess risks.	Wastewater treatment works flow and quality consent assessment Wastewater treatment works odour assessment Sewerage system capacity assessment

Question	Method	Link to report section
Environmental Opportunities		
Are we making the most of our new development?	Identify opportunities for improvements to the water environment as part of development e.g. channel and floodplain improvements, de-culverting, rehabilitation of contaminated land. Identify potential for SuDS, green infrastructure and Water Sensitive Urban Design (WSUD)	Opportunities
Are there multi-use options that will provide water resources, flood risk management and water quality benefits?	Provide examples; assess sites for potential (existing green infrastructure, housing density etc.).	Opportunities

Each assessment in this report uses a simple Red / Amber / Green (R/A/G) assessment to identify the degree to which development in a site or settlement may be constrained. An example is shown below from the wastewater treatment works capacity assessment:

Can accommodate the proposed site allocation without upgrades	Can accommodate the proposed site allocation without upgrades but will bring the works close to its current capacity limit	Cannot accommodate all proposed site allocation. Further modelling will be required and subsequent upgrades may be needed.
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1.5 Stakeholders and consultation

It is important that a Water Cycle Study brings together all partners and stakeholders knowledge, understanding and skills to help to understand the environmental and physical constraints to development. The following stakeholders were consulted during this Water Cycle Study and have provided data for use within the study:

- Thames Water Utilities Limited (TWUL)
- Environment Agency (EA)
- Vale of White Horse District Council

1.6 Study Area

The study area is Vale of White Horse District Council area within the county of Oxfordshire. The District covers a largely rural area, with the main towns being Abingdon, Wantage and Faringdon (see Figure 1-2).

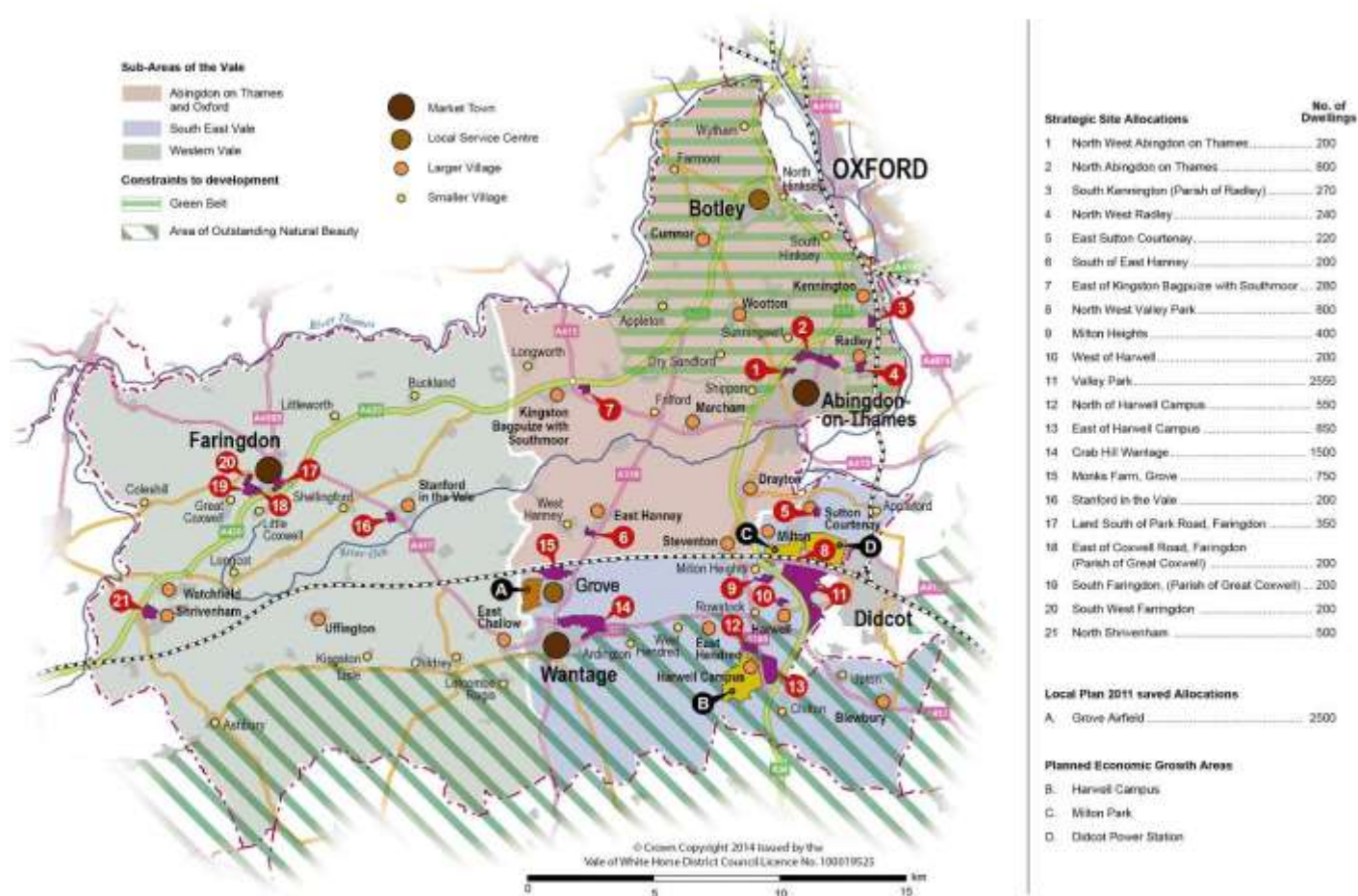


Figure 1-2: VoWHDC study area and location of strategic site allocations.

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