The Housing and Regeneration Agency

Homes England

West of Ifield, Crawley
Water Neutrality Statement

WOI-HPA-DOC-WNS-01
Version 1 - Planning submission

July 2025

Homes England

West of Ifield

Water Neutrality Statement

Document no. WOI-HPA-DOC-WNS-01
July 2025

Confidential

Type of document (version) Confidential

Project no. 70114554

Document no. WOI-HPA-DOC-WNS-01

Date: July 2025

WSP

7 Lochside View
Edinburgh Park
Edinburgh, Midlothian
EH12 9DH

Phone: +44 131 344 2300

WSP.com

Quality control

Issue/revision	First issue	Revision 1	Revision 2	Revision 3	Revision 4
Remarks		Address comments from Homes England, include phasing strategy	Alignment with Masterplan	Address comments from Womble Bond Dickinson (UK) LLP	Additional scenarios
Date	10.01.2024	04.07.2024	18.06.2025	04.07.2025	11.07.2025
Prepared by	Toby Hargrove	Toby Hargrove Marie Raffin	Lina Nieto Marie Raffin	Marie Raffin	Marie Raffin per
Signature					James.Ellaway@wsp.com Digitally signed by James.Ellaway@wsp.com DN: cn=James.Ellaway@wsp.com Date: 2025.07.11 16:31:11 +01'00'
Checked by	Marie Raffin	Marie Raffin	Marie Raffin	James Ellaway	James Ellaway
Signature					James.Ellaway@wsp.com Digitally signed by James.Ellaway@wsp.com DN: cn=James.Ellaway@wsp.com Date: 2025.07.11 16:30:37 +01'00'
Authorised by	James Ellaway	James Ellaway	James Ellaway	James Ellaway	James Ellaway
Signature					James.Ellaway@wsp.com Digitally signed by James.Ellaway@wsp.com DN: cn=James.Ellaway@wsp.com Date: 2025.07.11 16:30:22 +01'00'
Project number	70114554	70114554	70114554	70114554	70114554
Report number	WOI-HPA-DOC-WNS-01	WOI-HPA-DOC-WNS-01	WOI-HPA-DOC-WNS-01	WOI-HPA-DOC-WNS-01	WOI-HPA-DOC-WNS-01
File reference	Version 1.0	Version 2.0	Version 3.0	Version 4.0	Version 5.0

Contents

Tables

Figures

Appendices

Ifield Golf and Country Club Water Bills

Appendix E

Groundwater Hydrogeological Risk Assessments

Appendix F

Pumping Tests - Factual Report

Appendix G

Private Water Supply – Rainwater Harvesting Storage Tanks

Appendix H

Illustrative Landscape Masterplan

Executive summary

Homes England is submitting a hybrid planning application for a new mixed-use development on land west of Ifield, within Horsham District Council's administrative area. The proposed development comprises up to 3,000 residential units, commercial and industrial premises, community and educational facilities, a hotel, gypsy and traveller pitches, and extensive public open space. The development will be delivered in five distinct phases between 2027 and 2041.

In accordance with Natural England's 2021 position statement and Horsham District Council's planning requirements, this Water Neutrality Statement (WNS) demonstrates how the proposed development will achieve water neutrality within the Sussex North Water Resource Zone (WRZ). The strategy is based on a combination of demand reduction, water reuse, and offsetting measures.

The key components of the water neutrality strategy include:

- **Demand Reduction**: All residential units will be designed to achieve a maximum per capita consumption (PCC) of 85 litres per person per day, in line with the Natural England-endorsed mitigation strategy. Non-residential buildings will be designed to achieve three BREEAM WAT01 credits, targeting a 40% reduction in water use. The total demand for the development is calculated as 710,328 litres per day.
- **Water Reuse**: Rainwater harvesting systems will be implemented to meet irrigation needs for allotments and landscaped podiums.
- **Offsetting**: The remaining demand of 706,650 litres per day will be offset through:
  - Ceasing existing water use at the Ifield Golf and Country Club (10,420 litres per day).
  - An allocation of Sussex North Offsetting Water Scheme (SNOWS) credits equivalent to 1,600 residential units, representing 304,640 litres/day.
  - The remaining demand of 395,268 litres per day will be met through a private water supply system blending groundwater from the Upper Tunbridge Wells Sand Formation with harvested rainwater and treating it to potable standards.

This phased and resilient approach ensures that the development aligns with Horsham District Council's water neutrality requirements and supports sustainable growth while protecting the region's water resources.

Resilience will be provided by:

- The ability to expand the rainwater harvesting collection system to include commercial buildings (for excess rainwater that isn't required for their BREEAM WAT01 compliance) and/or
- The drilling of additional boreholes to increase the volume of groundwater abstraction and/or

- The purchase of additional SNOWS credits (if available).

The Water Neutrality Strategy will offset the entire demand from the Proposed Development. **As the Proposed Development will not increase water abstraction from the Sussex North WRZ, it will achieve water neutrality.**

Contact name James Ellaway

Contact details 07913 413 093 | james.ellaway@wsp.com

1 Introduction

Homes England is proposing a new mixed-use development on land in Horsham District Council to the west of Ifield.

In 2021, Natural England published a position statement[1] advising local authorities that any new development to be granted planning permission within the Sussex North Water Resources Zone (WRZ) should be water neutral. This position statement affects Horsham District Council as well as Crawley Borough Council, Chichester District Council, South Down National Park, and West Sussex County Council.

Consequently, Horsham District Council requires that a water neutrality statement is submitted as part of the planning application for any development that will lead to a material increase in water demand.

The purpose of this document is to demonstrate that water neutrality requirements can be met to mitigate the water demand of the proposed development through the use of various water efficiency, water reuse, alternative supply and offsetting interventions.

The document outlines the overarching principles that underpin the water neutrality strategy, alongside their application through the different phases of the development.

The water neutrality statement outlines the calculated water consumption rates and volumes for the proposed development along with demand reduction measures. It is expected that implementation of this strategy will form the basis of a condition on the grant of planning permission for the hybrid planning application (HPA).

[1] Natural England's Position Statement for Applications within the Sussex North Water Supply Zone, September 2021 – Interim Approach (accessed August 2023) (https://www.southdowns.gov.uk/wp-content/uploads/2021/10/NE_Position_statement_Water_Neutrality_Sept.21-Final.pdf)

2 Background

Homes England is proposing a hybrid planning application (part outline and part full planning application) for a phased, mixed-use development comprising:

- A full element covering enabling infrastructure including the Crawley Western Multi-Modal Corridor (Phase 1, including access from Charlwood Road and crossing points) and access infrastructure to enable servicing and delivery of secondary school site and future development, including access to Rusper Road, supported by associated infrastructure, utilities and works, alongside
- An outline element (with all matters reserved) including up to 3,000 residential homes (Class C2 and C3), commercial, business and service (Class E), general industrial (Class B2), storage or distribution (Class B8), hotel (Class C1), community and education facilities (Use Classes F1 and F2), gypsy and traveller pitches (sui generis), public open space with sports pitches, recreation, play and ancillary facilities, landscaping, water abstraction boreholes and associated infrastructure, utilities and works, including pedestrian and cycle routes and enabling demolition.

The hybrid planning application is for a phased development intended to be capable of coming forward in distinct and separable phases and/or plots in a severable way. The application is accompanied by an Environmental Statement. The information in the Environmental Statement has been compiled on the basis that the ‘utilities and works’ for which outline planning permission is sought has ensured that reasonable worse case assessments have been undertaken by assuming allowances for key infrastructure and utilities, notably to achieve water neutrality including water treatment works and abstraction boreholes.

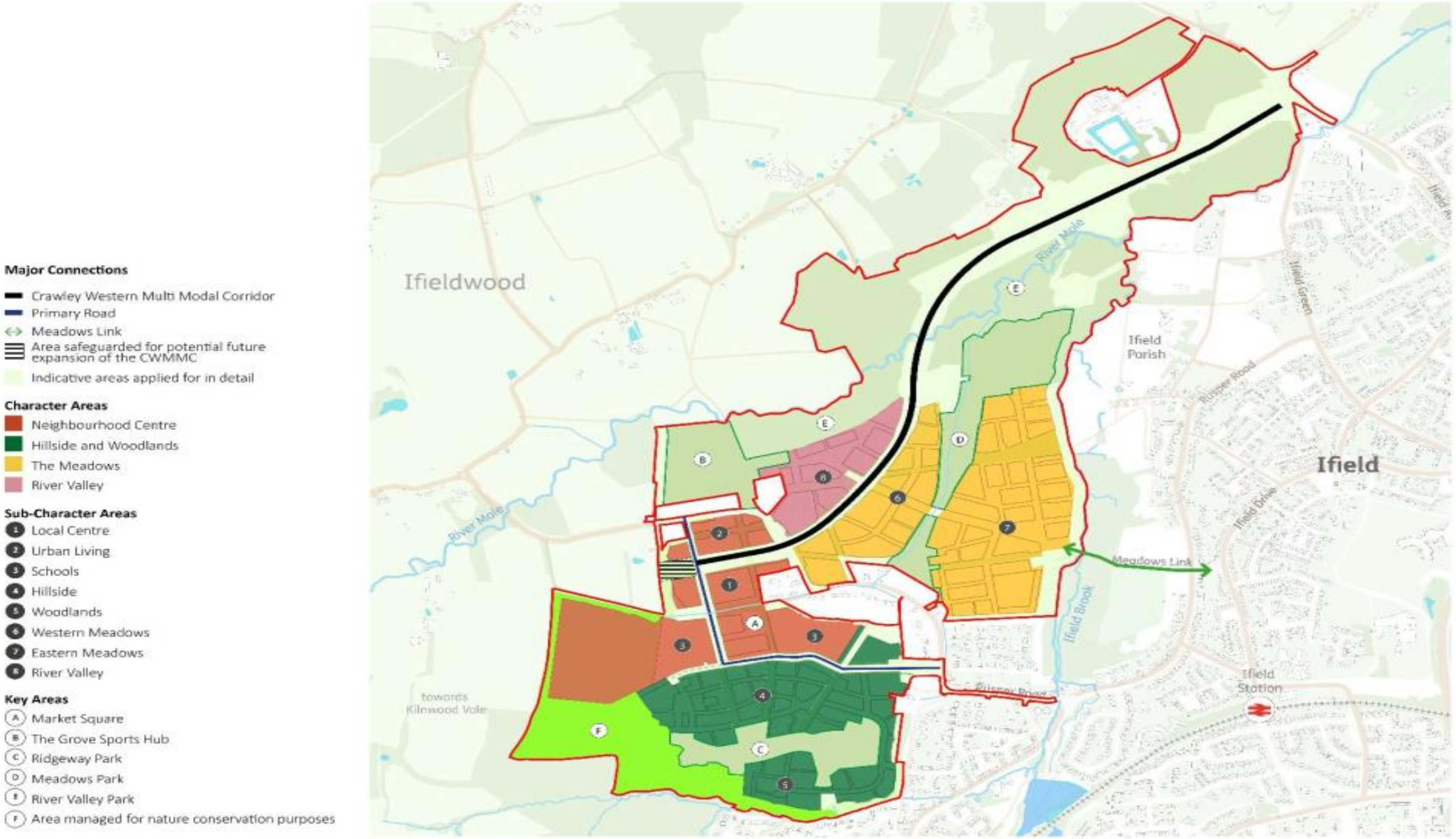
2.1 Site location and layout

The West of Ifield site (‘the Site’) falls entirely within the administrative area of Horsham District Council (HDC) although it immediately abuts the Crawley Borough Council (CBC) boundary. The Site is located south of Charlwood Road, beyond which lies Gatwick Airport. The Site lies to the north of the Arun Valley railway line and adjoins the existing neighbourhoods of Ifield and Langley Green in Crawley. To the east, the Site is bounded by trees and Ifield Village. Ifield West and ancient woodland are to the south and ancient woodland to the west.

The Site is predominantly occupied by a mixture of arable and pastoral fields and includes the Ifield Golf Course and Country Club (hereafter referred to as the ‘golf course’) in the south. The River Mole is present across the northern part of the site and flows from south-west to north-east. The proposed development is split into four character areas (Figure 2-1):

- The Hillside and Woodlands,
- The Neighbourhood Centre,
- The River Valley,
- The Meadows.

Figure 2-1 - Site overview, including Character Areas



2.2 Development delivery - phasing approach

The proposed development will be delivered through five phases[2] over 14 years (2027 to 2041):

- Phase 1: Delivery of an 8 form-entry secondary school within the Neighbourhood Centre character area.
- Phase 2: Delivery of 1,249 residential units throughout three of the four character areas, and all non-residential units and the 3 form-entry primary school within the Neighbourhood Centre.
- Phase 3: Delivery of 713 residential units throughout three of the four character areas and circa 80% of The River Valley's non-residential units (as land take).
- Phase 4: Delivery of 764 residential units throughout two of the four character areas and the remaining 20% of The River Valley's non-residential units (as land take).
- Phase 5: Delivery of 274 residential units in The Meadows.

The Hillside and Woodlands and The Meadows character areas will consist solely of residential developments. The Neighbourhood Centre and River Valley character areas will include both residential and non-residential units. Residential phasing details are summarised in section 2.3 and section 2.4 for the non-residential units.

2.3 Residential units

Homes

The development will comprise 3,000[3] residential units with a mix of 1-bedroom to 2-bedroom apartments and 2-bedroom to 4-bedroom houses. The split for each type of unit through the development is provided in Table 2-1. The number of residential units per character area and per phase is provided in Table 2-2.

The average occupancy rate of the development is aligned with the HDC-specific Section 106 calculator at approximately 2.24[4] people per residential unit, resulting in a total population of 6,725[3] inhabitants. The calculated population split and average occupancy rates per character area are summarised in Table 2-3.

---

[2] Homes England (2024), West of Ifield, Crawley – Phasing Strategy (Draft)
[3] Prior + Partners (January 2025) - West of Ifield: Submission Information and Agreed Terms
[4] The average occupancy is calculated as 2.2416667 people per dwelling across the site based on a population of 6,725 and a total of 3,000 homes.

Table 2-1 – Residential accommodation breakdown across development

Unit Type	Abbreviation	No. of units	Percentage of Total Provision
1- bedroom Apartment	A1	450	15%
2- bedroom Apartment	A2	607	20%
2- bedroom House	H2	279	9%
3- bedroom House	H3	1,071	36%
4- bedroom House	H4	593	20%
Total	-	3,000	100%

Table 2-2 - Number of residential units per character area (per phase)

Character Area	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Overall Total
Hillside & Woodlands	-	387	311	-	-	698
Neighbourhood Centre	-	534	-	154	-	688
The Meadows	-	328	304	352	274	1,258
River Valley	-	-	98	258	-	356
Total	-	1,249	713	764	274	3,000*

*Residential numbers rounded to add to 3,000

Table 2-3 – Population estimation per phase (based on 2.24 occupancy rate)*

Phase	Neighbourhood Centre	Hillside and Woodland	The Meadows	River Valley	Total
Phase 2	1197	868	733	-	2,800
Phase 3	-	697	681	220	1,598
Phase 4	345	-	789	578	1,712
Phase 5	-	-	614	-	614
Total	1,542	1,565	2,818	798	6,725

* Occupancy numbers rounded to add to 6,725 in alignment with the HDC-specific Section 106 calculator

Gypsy and traveller pitches

The site also provides 15 Gypsy and Traveller pitches. The 2023 Gypsy and Traveller Accommodation Assessment (GTAA)[5] does not specify an exact average household size. However, it identified concealed or doubled-up households indicating that some families are living in overcrowded conditions. Other local authorities such as North Somerset Council's Gypsy and Traveller Site Allocation Development Plan (2009)[6] used a 3.9 average occupancy rate.

An occupancy rate per pitch of 3.9 was used in this water neutrality study, resulting in a total population of 59 people. The pitches are at the Meadows and will be delivered as part of Phase 3.

Hotel

Hotels facilities will provide up to 80 beds, resulting in a total maximum population of 160 people. The hotel facilities will be located in the Neighbourhood Centre and will be delivered as part of Phase 2. The water demand from guests and employees is included as part of the commercial water demand.

Summary

Based on the above, the water neutrality strategy provides water allowance for a total residential population of 6,784.

2.4 Non-residential units

Schools

The proposed development will deliver a 6-8 form-entry secondary school (to be completed in Phase 1) and a 3 form-entry primary school (to be completed in Phase 2). Table 2-4 presents the number of pupils and the number of teachers and staff expected to be in each school. The number of pupils is based on the maximum class size of schools within the UK[7]of 30 pupils per class. It is assumed that there will be three classes in each of the seven primary school years and eight classes in each of the five secondary school years. The number of teachers and staff for the two schools was calculated as 245 as part of the West of Ifield Employment and Economic Development Strategy (WOI-HPA-DOC-EDS01). This number was proportionally split between the two schools.

[5] Horsham District Council Gypsy and Traveller Accommodation Assessment (GTAA) Final Report (2023). Accessed online: https://www.horsham.gov.uk/__data/assets/pdf_file/0015/131604/Horsham-GTAA-November-2023.pdf
[6] North Somerset Council. Gypsy and Traveller Site Allocation Development Plan document (2009)
[7] Explore Education Statistics, June 2023. School workforce in England (accessed December 2023) (https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england)

The Department for Education is the developer for the 6-8 form-entry secondary school and as part of its planning application will provide a water neutrality statement for this site. However, as the worst-case scenario, this demand is also included in this water neutrality strategy.

Table 2-4 – Number of pupils, teachers and staffs in each school

School	Calculated number of pupils	Calculated number of teachers and staff
3 FE Primary school	630	85
6-8 FE Secondary school	1,200	160
Total	1,830	245

Commercial premises

Alongside residential units, commercial premises will be delivered within the Neighbourhood Centre and the River Valley character areas. Table 2-5 summarises the number and type of jobs created as well as the gross external area of each commercial use class within each of the character areas in line with the West of Ifield Employment and Economic Development Strategy (WOI-HPA-DOC-EDS01). It is noted that two options pertaining to the mix of use classes are included for the River Valley character area.

Table 2-5 – Commercial use classes, job numbers & gross external area

Character area	Use Class	Sub Class	Job Number	Gross External Area (m^2)
Neighbourhood Centre	Commercial (including retail, business uses, F&B etc)	Including E(a), E(b), E(c)	149	3,300
	Food store	E(a)	84	1,900
	Creche	E(f)	28	1,100
	Leisure Centre	E(d)	48	3,400
	Health Centre	E(e)	39	1,528
	Innovation / Enterprise	E(c), E(g) (i) & (ii)	188	4,900
	Community	F2	8	634
	Hotel (80 bed, Mid-Range)	C1	27	4,400
	Total		571	21,162
River Valley	Option 1			

Character area	Use Class	Sub Class	Job Number	Gross External Area (m^2)
	General Business	E(g) (i), (ii) & (iii)	308	14,008
	General Industrial	B2	126	5,200
	Storage & Distribution	B8	103	7,200
	Total		537	26,408
	Option 2			
	Assume all General Business	E(g) (i), (ii) & (iii)	580	26,408
Overall Total (River Valley Option 1)			1,108	47,570
Overall Total (River Valley Option 2)			1,151*	47,570

*Discrepancy due to rounding.

Working from home

The water neutrality strategy does not account for jobs associated with working from home; the water demand is assumed to be included within the residential allowance of 110 litres per person per day.

Construction jobs

During the construction phase, it is estimated that on average 50 people will work on the construction site. Water demand from workers is included in the construction water demand.

2.5 Landscape and open space

Landscape and open spaces are included in the delivery of the development, part of which will require irrigation either temporarily during establishment or permanently. Irrigation associated with trees, plants and grass establishment is included in the construction water demand.

The water neutrality strategy thus accounts for permanent irrigation only, which is limited to the water demand from the allotment (1.3 hectare) and the Neighbourhood Centre's landscaped podium above the supermarket (0.19 hectare).

3 Baseline calculations

The Site currently consists of a mixture of arable and pastoral fields and includes the golf course and associated buildings in its far southern portion. Part of the site includes a former garden nursery with significant hard standing.

Homes England is the landowner of Ifield Brook Meadows, a number of agricultural and residential buildings at Ifield Court Farm and No. 1 Old Pound Cottages. These are outside of the planning application boundary.

There are 3 no. existing residential flats within the Ifield Golf Club main building (the club house) which will be demolished. Dormy House which borders the golf club is outside the ownership of Homes England, and not part of the planning application boundary.

Located on the southern part of the Site, the Ifield Golf and Country Club will cease operation as the Hillside and Woodlands character area develops. Water bills were obtained from the golf course, from which three actual (rather than estimated) readings were available for each of the two metering points (Appendix D). Based on those readings, the golf course is using on average 10.42 m^3/day.

No actual metering data were available for the Ifield Court Farm and the former nursery. Consequently, their respective water usage was not included in the water neutrality strategy.

4 Proposed development water demand (without mitigation)

4.1 Residential units

Horsham District Planning Framework (2015–2031)[8] requires all new residential developments to meet a water efficiency standard of 110 litres per person per day. Based on this requirement, the baseline residential water demand is calculated at 746,240 litres per day:

- Homes: 739,750 litres per day
- Gypsy and Traveller pitches: 6,490 litres per day
- Hotel: See commercial water demand

4.2 Non-residential units

For commercial properties, the 2015 Framework does not specify a minimum water use requirement. However, it does emphasise the importance of sustainable building practices, which implies alignment with recognised standards such as BREEAM.

The baseline water demand for each use class and sub-class was calculated using the following tool and guidance:

- BREEAM 2018 (v6) Wat 01 calculator (referred as “BREEAM WAT 01 calculator” thereafter).
- BS 8542:2011 – Calculating domestic water consumption in non-domestic buildings – Code of practice (referred as “BS 8542:2011” thereafter).
- Public health and plumbing engineering CIBSE Guide Part G 3rd edition (reprinted July 2017) (amended November 2017) (amended February 2019) (with corrections - 12 February 2019) (including corrigenda - December 2020) (referred as “CIBSE Guide Part G” thereafter).
- Health Technical Memorandum 07-04: Water management and water efficiency – best practice advice for the healthcare sector.

BREEAM Wat 01 calculators are provided in Appendix C.

All water demand values have been annualised.

[8] Horsham District Planning Framework (2015). https://www.horsham.gov.uk/__data/assets/pdf_file/0016/60190/Horsham-District-Planning-Framework-November-2015.pdf

School

The baseline water demand (Table 4-1) for the primary and secondary schools was calculated using the BREEAM WAT 01 calculator (Performance level – Base). It is assumed that the school will operate 195 days per year as per the default value in the BREEAM WAT 01 calculator and is expressed as an annualised value.

Table 4-1 - School annualised baseline water demand

School	Occupancy (person)	Litres/person/day	Total daily demand (litres per day)
3 FE Primary school	715	20.07	7,666
6-8 FE Secondary school	1,360	25.29	18,375

Commercial premises

Basis of calculations

A precautionary approach was taken to estimate water demand. This includes the use of the gross external area (rather than the net internal floor area). To provide a conservative assessment, occupancy of facilities was calculated using the highest occupancy rate per square meter, and the highest water demand per person was used for each type of facility.

BREEAM Wat01 calculator

The BREEAM Wat01 calculator (Performance level – Base) was used to estimate the water demand (litres per person per day) for the following use classes:

- Commercial (including retail, business uses, F&B etc): Building type use – Retail – Shopping centre/complex.
- Food Store: Building type use: Retail – Supermarket.
- Creche: Building type use – Education - pre-school or primary school (see assumption for occupancy below).
- Leisure Centre: Building type use – Office (for staff water demand only). For water demand and occupancy for the visitors see assumption below).
- Innovation: Building type use – Office.
- Community: Building type use – Office (for staff water demand only). For water demand and occupancy for the visitors see assumption below).
- General Business: Building type use – Office.
- General Industrial: Building type use – Industrial - typical business hours of operation.
- Storage and distribution: Building type use – Industrial - typical business hours of operation.

Creche (E(f)) – Assumption

The West of Ifield Employment and Economic Development Strategy (WOI-HPA-DOC-EDS01) has assessed that 28 jobs will be created for the operation of the creche.

It is assumed that the creche will be open 50 weeks per year, 5 days a week and 10 hours a day. Accounting for the 8 bank holidays, the annual number of operating hours is 2,420. It is also assumed that each employee will be working 223 days per year for 40 hours a week (1,784 hours per year). Consequently, the number of employees at any time working is 20.

Based on childcare ratio requirements and assuming two classes by group age, the number of children was calculated at 116.

Leisure Centre (E(d)) - Assumption

The illustrative masterplan includes the delivery of a 3,400m^2 leisure centre, providing employment for 48 people. As part of the BREEAM WAT 01 calculation, 400m^2 were attributed to offices for staff. The remaining area of the leisure centre (3,000m^2) is likely to include a combination of dry sports hall, fitness studio and suite, gym and swimming pool. For this water neutrality strategy, we have applied the maximum leisure centre occupancy density of 0.170 people per m^2 specified in BREEAM guidance[9]. This provides a daily occupancy of 510 people visiting the site, with an estimated water demand of 35 litres per visitor per day (CIBSE Guide Part G).

Health Centre (E(e)) – Assumption

The illustrative masterplan includes the delivery of a 1,528m^2 health centre. It is assumed that it will be a multi-service facility. As per the health technical memorandum 07-04, the average water demand for such facilities is 1.702m^3/m^2/year.

Community (F2) – Assumption

The illustrative masterplan includes the delivery of a 634m^2 community facility (halls or meeting places). As part of the BREEAM WAT 01 calculation, 72m^2 were attributed to offices for staff. This water neutrality strategy is based on an occupancy rate of 0.169 people per m^2,[9], resulting in an occupancy of 95 people.

It is assumed that the community hall does not provide catering facilities. Each visitor will stay on average 3 hour, allowing up to two group of 95 people to visit the facilities, totalling 190 people. We have assumed that the water demand will be limited to the use of the rest room facilities.

The water demand per person visiting the facilities is calculated using the method described in BS 8542:2011[10] and summarised in Table 4-2.

[9] BRE Global Ltd (2023), BREEAM UK New Construction Version 6.1, Technical Manual – SD5079
[10] British Standards (2011), BS 8542:2011 – Calculating domestic water consumption in non-domestic buildings – Code of practice, ISBN 978 0 580 71075 9

Table 4-2 – Community facility – visitor water demand

Terminal fitting type	Flow rate	Use factor - frequency of use	Use factor – intensity of use	Litre/person/day
WC	6 litre/flush	1	1	6
Wash basin	10 litre/min	1	0.25	2.5
Total				**8.5**

<u>Hotel (C1)</u>

The illustrative masterplan includes the delivery of an 80-bed hotel. The water demand is estimated at 200 litres per bedroom (CIBSE Guide Part G). As part of the water neutrality strategy, we have assumed 100% occupancy (with two bedspaces per bedroom).

Commercial premises water demand summary

Based on the assumption above, the daily consumption for each use class was calculated and summarised in Table 4-3.

The total water consumption from the commercial premises is calculated to be up to 191,701 litres per day.

Table 4-3 – Annualised daily water demand per use class (*Default visitor numbers from BREEAM WAT01 calculator)

Character area	Use Class	Job number	Visitors	Litre/ person/ day	Annual days	Daily demand (l/day)
Neighbourhood Centre TOTAL: 172,306 litres/ day	Commercial	149	9,310*	6.80	362	63,793
	Food store	84	7,578*	6.67	362	50,685
	Creche	28	116	33.09	253	3,303
	Leisure Centre	48	578	Staff: 47.96 Visitor: 35	364	22,470
	Health Centre	39	N/A	1,528m² x 1.702 m³/m²/year	N/A	7,125
	Innovation / Enterprise	188	0	47.96	253	6,250
	Community	8	190	Staff: 47.96 Visitor: 8.5	253	1,385
	Hotel (80 bed, Mid-Range)	27	160	Staff: 47.96 Guests: 200l/room	365	17,295
River Valley TOTAL: Option 1: 19,395 litres/ day Option 2: 19,281 litres/ day	Option 1					
	General Business	308	0	47.96	253	10,239
	General Industrial	126	0	56.78	253	4,959
	Storage & Distribution	103	0	58.78	253	4,197
	Option 2					
	General Business	580	0	47.96	253	19,281

4.3 Landscape and open spaces

Allotments

A survey carried out by The National Allotment Society in 2019 found that the water demand from allotments is on average 21 litres per square metre per year[11]. The area allocated in the illustrative masterplan for allotments being 1.3 hectare, the baseline water demand is 748 litres per day.

Landscaped podium

The CIBSE Guide Part G provides irrigation water demands for grass (3 to 5 mm per day), shrubs (4 to 6 mm per day) and trees (20 to 50 litres per day). To assess the requirement for a water supply, daily average rainfall data over the last 20 years (2004-2024) were obtained for the nearest rainfall station, Pease Cottage, through the DEFRA Hydrology Data Explorer[12]. The rainfall data have been used to identify the shortfall (to 5mm) that must be met from irrigation of the podium (1,900m^2) during the growing season of April to September as summarised in Table 4-4.

Table 4-4 – Irrigation water demand

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigation water demand (mm/day)	0	0	0	5	5	5	5	5	5	0	0	0
Average rainfall (mm/day)	2.9	2.4	2.0	1.7	1.9	1.8	1.9	2.2	2.1	3.5	3.4	3.3
Water supply required (mm/day)	0.0	0.0	0.0	3.3	3.1	3.2	3.1	2.8	2.9	0.0	0.0	0.0
Water supply required (m^3/day)	0.0	0.0	0.0	6.4	5.9	6.2	5.9	5.3	5.5	0.0	0.0	0.0

The annualised daily water demand for irrigation of the landscaped podium is 2,930 litres per day.

4.4 Construction

During the construction phase, numerous on-site activities require access to a water source, such as, but not exclusive of:

---

[11] The National Allotment Society, New allotment site design for sustainable rainwater collection, storage and distribution, Last accessed June 2025 (https://thenas.org.uk/uploads/Members%20Area%20Leaflets/New%20allotment%20site%20design%20A5.pdf)
[12] DEFRA, Hydrology Data Explorer, Hydrology Data Explorer - Pease Pottage (Last accessed June 2025)

- Welfare facilities.
- Cleaning – Tools and machinery.
- Dust suppression.
- Piling and drilling.
- Wet trade – Brick laying, screed, concrete production, rendering and plastering, etc.
- Landscaping.

To estimate water demand associated with construction activities, the water neutrality strategy adopts a water demand value of 120 m^3 per £1million of contractor outputs as per the findings presented in the 2014 report from the Green Construction Board[13].

Based on the above, the average water demand over the period of construction (14 years) is 16,222 litres per day.

4.5 Summary

The baseline water demand of the proposed development is calculated to be up to 967,661 litres per day as detailed in Table 4-5.

In addition, the water demand of the proposed development will be increased by 16,222 litres per day for the first 14 years due to construction activities.

[13] The Green Construction Board (2014), Water: 2008-2013 Five years of focus on water – Summary of achievement, Last accessed June 2024: https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2023/08/GCB-GIG-Water-5-year-progress-report-Final-Summary.pdf

Table 4-5 - Annualised baseline water demand

Use Class	Annualised total daily demand (litres per day)
Residential	739,750
Gypsy and Traveller pitches	6,490
Primary school	7,666
Secondary school	18,375
Neighbourhood Centre	172,306
River Valley – Option 1	19,395
River Valley – Option 2	19,281
Allotments	748
Landscaping	2,930
Total (River Valley Option 1)	967,661*
Total (River Valley Option 2)	967,546*

* Rounding

5 Water Reduction Measures

The approach to water neutrality follows the requirements set out in Natural England's position statement published in September 2021[1].

5.1 Minimising potable water use

Specification for an 85 litres per person per day per capita consumption for residential units

In 2022[14], a Water Neutrality Strategy was commissioned by the Local Planning Authorities affected by Natural England's position statement. Part C of the strategy was endorsed by Natural England[15] in November 2022 and recommends, in alignment with Natural England's position statement, that all new housing developments in the Sussex North WRZ should achieve a water usage of 85 litres per person per day. This has been adopted in this water neutrality strategy, with residential units on the development being designed to achieve a maximum per capita consumption of 85 litres per person per day. An example of how this target can be achieved through water efficient fittings is provided in Table A-1 (Appendix A). This demonstrates that a per capita consumption of 84.8 litres per day per person can be achieved for dwellings using the Building Regulations (2010) Part G water efficiency calculator.

In conjunction with the water efficient fittings, it is recommended that pressure independent flow control devices are plumbed into the cold-water feed into each residential unit. This will reduce the risk of any deterioration in per capita consumption that might be caused by the replacement of water efficient fixtures and fittings over the life of the development.

For the purposes of this Water Neutrality Statement, the PCC adopted is 85 litres per person per day, which results in a baseline residential water demand of 571,625 litres per day. This signifies a reduction of 25 litres per person per day.

Including the Gypsy and Traveller pitches, the water demand would increase by 5,015 litres per day resulting in 576,640 litres per day for the residential water demand.

[14] Sussex North Water Neutrality Study: Part A to C (Accessed August 2023) (https://crawley.gov.uk/planning/planning-applications/you-apply/water-neutrality-crawley)
[15] Natural England's endorsement of Sussex North Water Neutrality Study: Part C – Mitigation Strategy, Final Report, 23 November 2022 (Accessed August 2023) (https://crawley.gov.uk/sites/default/files/2022-11/Natural%20England%27s%20endorsement%20of%20Sussex%20North%20Mitigation%20Strategy.pdf)

Commercial and educational premises – Option 1 – Specification for achieving 3 BREEAM credits or equivalent for commercial and educational premises

Part C of the Sussex North water neutrality strategy recommends that "non-household development should achieve a score of three credits within the water (Wat01 Water consumption) issue category for the BREEAM New Construction Standard"[16]. It is proposed that the design of the commercial premises and schools delivered as part of the proposed development aligns with the BREEAM credits scheme, with a requirement to achieve three credits. This will reduce the total commercial water demand by 40%[17] (Table 5-1).

Table 5-1 – Number of BREEAM credits and associated water consumption reduction (not including fixed use)

No. of BREEAM Credits	% Water Consumption Reduction
1	12.5
2	25
3	40
4	50
5	55
1 'Exemplary' Performance Credit	65

Maximum water consumption limits for each water fixture to achieve three BREEAM credits are highlighted in Table 5-2[18]. There is a requirement for 25% of the WC or urinal flushing demand to be met using recycled non-potable water as part of the BREEAM accreditation. When the three credits (40% reduction) are achieved through water efficiency only, rainwater harvesting and greywater recycling were not included as part of the water neutrality strategy.

Developers will be required to provide a completed copy of the BREEAM WAT 01 calculator and supporting evidence at each interim design stage to ensure that this design standard is achieved.

[16] JBA Consulting. 2022. Sussex North Water Neutrality Study: Part C – Mitigation Strategy Final Report (accessed December 2023). (https://crawley.gov.uk/sites/default/files/2022-12/Part%20C%20-%20water%20neutrality%20assessment.pdf)
[17] Engineering Services Consultancy Ltd. 2023. Technical Note: Water Management (accessed December 2023) (https://docs.planning.org.uk/20230927/145/S1CB9YQCLDK00/it5jcjsv97x3nc41.pdf)
[18] BREEAM (2023), BREEAM UK New Construction (Version 6.1), Technical Manual – SD5079

Table 5-2 – Maximum water consumption levels by component type to achieve three BREEAM credits.

Component	Value	Unit
WC	3.75	Effective flush volume (litres)
Wash-hand basin taps	5	Litres/min
Showers	6	Litres/min
Bath	140	Litres
Urinal(s)	1.5	Litres/bowl/hour
Greywater and rainwater system	25%	% of WC or urinal flushing demand met using recycled non-potable water
Kitchen tap: kitchenette	6	Litres/min
Kitchen taps: restaurant (pre-rinse nozzles only)	7.30	Litres/min
Domestic sized dishwashers	12	Litres/cycle
Domestic sized washing machine	40	Litres/use
Waste disposal unit	0	Litres/min
Commercial sized dishwashers	5	Litres/rack
Commercial or industrial sized washing machine	7.50	Litres/kg

Basis of calculation

When possible, the BREEAM WAT01 calculator was used (Appendix C). These are to provide examples only. As a precautionary approach, when a reduction higher than 40% was achieved in the calculator, the reduced fixed use water demand was increased such that only 40% is achieved. Precautionary values were used.

For those use classes where the calculator does not yield a per capita consumption, the assumptions and calculations are provided below.

<u>School</u>

The reduced water demand (Table 5-3) for the primary and secondary schools was calculated using the BREEAM WAT 01 calculator (Performance level – 3). The 40% reduction was achieved without the use of recycled water for toilet flushing.

Table 5-3 - School water demand achieving 3 BREEAM credits

School	Occupancy (person)	Litres/person/day (As per WAT01)	Litres/person/day (Precautionary)	Total daily demand (litres per day)
3 FE Primary school	715	12.45	12.83	4,902
6-8 FE Secondary school	1,360	15.22	16.01	11,632

Commercial premises

The following assumptions were made to estimate the reduced water demand of the commercial premises in each of the character areas:

- Neighbourhood Centre character area:
  - Commercial and food store premises – the efficiency for toilet flushing was increased to those of BREEAM level 4 (3.5 litres per flush), instead of reducing demand through the use of recycled water (rainwater harvesting or greywater recycling).
  - Creche – 31% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
  - Leisure Centre – it is assumed that the water demand from the visitors will be reduced by 40% to 21 litres per person per day. It is estimated that this value is in line with best practice and achievable through further water efficiency and localised recycling of rainwater harvesting and greywater recycling[19].
  - Health Centre – it is assumed that only the water demand associated with the staff can be reduced. The BREAAM WAT01 calculator estimates the baseline water demand for staff at 47.96 litres per person per day (1,870 litres per day) and a 40% reduction would reduce that to 29.43lpd. This has been applied to employee numbers based on 253 days per day and annualised. The baseline water demand for the premises (including visitors) was calculated at 7,125 litres per day. It is therefore calculated that 5,255 litres per day are for visitors and this is considered to be a fixed use.
  - Community – as per the baseline, the water demand per person visiting the facilities is calculated using the method described in BS 8542:2011[20] and summarised in Table

[19] Thames Water (2025), Business Water saving calculator, https://www.thameswater.co.uk/wholesale/non-household-customers/business-water-saving-calculator (Last accessed: May 2025) - The Thames Water's lowest value for the typical water demand range for leisure centre is: 0.022 m^3/visitor/year

[20] British Standards (2011), BS 8542:2011 – Calculating domestic water consumption in non-domestic buildings – Code of practice, ISBN 978 0 580 71075 9

5-4. As a precautionary approach, a value equal to 60% of the baseline water demand is used (5.1 litres per visitors)

Table 5-4 – Community facility – visitor water demand

Terminal fitting type	Flow rate	Use factor - frequency of use	Use factor – intensity of use	Litres/person/day
WC	3.75 litres/flush	1	1	3.75
Wash basin	5 litres/min	1	0.25	1.25
Total				**5**

  - Hotel – it is assumed that the baseline water demand will be reduced by 40% to 120 litres per bedroom per day (60 litres per guest per day). It is estimated that this value is achievable through further water efficiency and on-premises recycling of rainwater and greywater[21].

- River Valley character area:
  - General Industrial – a minimum of 17% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
  - Storage and distribution – a minimum of 21% of the toilet use is assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.

Based on the assumptions and calculation above, the daily consumption for each of the use classes was calculated and summarised in Table 5-5.

The total water consumption from the commercial premises is calculated to be up to 117,154 litres per day. It is estimated that this will be achieved through a combination of water efficient fittings (see Table 5-2) and on-premises rainwater and/or greywater recycling.

[21] Thames Water (2025), Business Water saving calculator, https://www.thameswater.co.uk/wholesale/non-household-customers/business-water-saving-calculator (Last accessed: May 2025) - Thames Water's lowest value for the typical water demand range for a 3-star hotel with swimming pool is estimated at: 20 m^3/bed space/year – 55 litres per bed space per day.

Table 5-5 – Annualised daily water demand per use class (*Default visitor numbers from BREEAM WAT01 calculator) – 40% reduction (discrepancy in daily demand associated with number rounding of the per capita consumption in the table)

Character area	Use Class	Job number	Visitors	Litre/ person/ day	Annual days	Daily demand (l/day)
Neighbourhood Centre TOTAL: 105,282 litres/ day	Commercial	149	9,310*	4.09	362	38,388
	Food store	84	7,578*	3.97	362	30,168
	Creche	28	116	20.68	253	2,064
	Leisure Centre	48	578	Staff: 29.43 Visitor: 21	364	13,547
	Health Centre	39	N/A	Staff: 29.43	Staff: 253	6,051 (incl. 5,255 fixed use)
	Innovation / Enterprise	188	0	29.43	253	3,835
	Community	8	190	Staff: 29.43 Visitor: 5.1	253	835
	Hotel (80 bed, Mid-Range)	27	160	Staff: 29.43 Guests: 120 l/room	365	10,395
River Valley TOTAL: Option 1: 11,872 litres/ day Option 2: 11,831 litres/ day	Option 1					
	General Business	308	0	29.43	253	6,283
	General Industrial	126	0	34.65	253	3,026
	Storage & Distribution	103	0	35.90	253	2,563
	Option 2					
	General Business	580	0	29.43	253	11,831

Commercial and educational premises – Option 2 – Specification for achieving 5 BREEAM credits plus one exemplary performance credit or equivalent for commercial and educational premises

As part of demonstrating redundancy in the proposed water neutrality strategy, this second option proposes that the design of the commercial premises and schools delivered as part of the proposed development align with the BREEAM credits scheme, with a requirement to achieve five credits plus one Exemplary performance credit. This will reduce the total commercial water demand by 65%[22] (Table 5-1).

Maximum water consumption limits for each water fixture to achieve five BREEAM credits are highlighted in Table 5-6[23]. There is a requirement for 75% of the WC or urinal flushing demand to be met using recycled non-potable water as part of the BREEAM accreditation.

Developers will be required to provide a completed copy of the BREEAM WAT 01 calculator and supporting evidence at each interim design stage to ensure that this design standard is achieved.

Table 5-6 – Maximum water consumption levels by component type to achieve five BREEAM credits.

Component	Value	Unit
WC	3	Effective flush volume (litres)
Wash-hand basin taps	3	Litres/min
Showers	3.5	Litres/min
Bath	100	Litres
Urinal(s)	0	Litres/bowl/hour
Greywater and rainwater system	75%	% of WC or urinal flushing demand met using recycled non-potable water
Kitchen tap: kitchenette	5	Litres/min
Kitchen taps: restaurant (pre-rinse nozzles only)	6	Litres/min
Domestic sized dishwashers	10	Litres/cycle
Domestic sized washing machine	30	Litres/use

[22] Engineering Services Consultancy Ltd. 2023. Technical Note: Water Management (accessed December 2023) (https://docs.planning.org.uk/20230927/145/S1CB9YQCLDK00/it5jcjsv97x3nc41.pdf)
[23] BREEAM (2023), BREEAM UK New Construction (Version 6.1), Technical Manual – SD5079

Waste disposal unit	0	Litres/min
Commercial sized dishwashers	3	Litres/rack
Commercial or industrial sized washing machine	4.50	Litres/kg

Basis of calculation

When possible, the BREEAM WAT01 calculator was used (Appendix C). These are to provide examples only. As a precautionary approach, when a reduction higher than 65% was achieved in the calculator when allowing for 75% of the water demand from toilet flushing, the contribution from rainwater harvesting and/or greywater recycling was reduced such as only a 65% total water demand reduction was used. Precautionary values were used.

For those use classes where the calculator does not yield a per capita consumption, the assumptions and calculations are provided below.

School

The reduced water demand (Table 5-7) for the primary and secondary schools was calculated using the BREEAM WAT 01 calculator (Performance level – 5). The 65% reduction is achieved as followed:

- Primary school - 27% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
- Secondary school - 24% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.

Table 5-7 - School water demand achieving 5 BREEAM credits plus one Exemplary performance credit

School	Occupancy (person)	Litres/person/day (As per WAT01)	Litres/person/day (Precautionary)	Total daily demand (litres per day)
3 FE Primary school	715	12.45	8.31	3,174
6-8 FE Secondary school	1,360	15.22	10.16	7,382

Commercial premises

The following assumptions were made to estimate the reduced water demand of the commercial premises in each of the character areas:

- Neighbourhood Centre character area:

- Commercial units - 31% of the toilet use assumed to be recycled harvested rainwater and greywater; a sole source (either rainwater or greywater) was unable to meet the minimum non-potable water demand.
- Food store - 32% of the toilet use assumed to be recycled harvested rainwater and greywater; a sole source (either rainwater or greywater) was unable to meet the minimum non-potable water demand.
- Creche – 100% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible. It is to be noted that even if maximising the use of recycled water, due to the fixed use water demand, the maximum demand reduction achievable is 64.45%.
- Leisure Centre – 30% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible. It is assumed that the water demand from the visitors will be reduced by 65% to 12.25 litres per person per day. It is estimated that this value is in line with best practice and achievable through further water efficiency and localised recycling of rainwater harvesting and greywater recycling[24].
- Health Centre – As previously, it is assumed that only the water demand associated with the staff can be reduced, with a fixed use previously calculated at 5,255 litres per day. 30 % of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
- Innovation/Enterprise - 30 % of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
- Community – as per the baseline, the water demand per person visiting the facilities is calculated using the method described in BS 8542:2011[25] and summarised in Table 5-8. The rainwater harvesting yield, using the basic approach from BS EN 16941-1:2018, is calculated to an equivalent of 6.86 litres per person per day (including visitor and personnel). There is thus sufficient rainwater available to cover 100% of the water demand from toilet flushing. As a precautionary approach, a value equal to 34% of the baseline water demand is used (2.98 litres per visitors). 30 % of the toilet use (from personnel) assumed to be recycled harvested rainwater. Based on the

[24] Thames Water (2025), Business Water saving calculator, https://www.thameswater.co.uk/wholesale/non-household-customers/business-water-saving-calculator (Last accessed: May 2025) - The Thames Water's lowest value for the typical water demand range for leisure centre is: 0.022 m^3/visitor/year. A 12.25 litres per person per day put the yearly water demand mid range of best water demand range.
[25] British Standards (2011), BS 8542:2011 – Calculating domestic water consumption in non-domestic buildings – Code of practice, ISBN 978 0 580 71075 9

gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.

Table 5-8 – Community facility – visitor water demand

Terminal fitting type	Flow rate	Use factor - frequency of use	Use factor – intensity of use	Litres/person/day
WC	3 litres/flush	1	1	3
Wash basin	3 litres/min	1	0.25	0.75
Total				**3.75**

- Hotel – it is assumed that the baseline water demand will be reduced by 65% to 70 litres per bedroom per day (35 litres per guest per day). It is estimated that this value is achievable through further water efficiency and on-premises recycling of rainwater and greywater[26]. 30 % of the toilet use (from personnel) assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.

- River Valley character area:
  - General Business – a minimum of 30% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
  - General Industrial – a minimum of 77% of the toilet use assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.
  - Storage and distribution – a minimum of 88% of the toilet use is assumed to be recycled harvested rainwater. Based on the gross external area, on-premises rainwater harvesting and recycling is deemed to be feasible.

Based on the assumptions and calculation above, the daily consumption for each of the use classes was calculated and summarised in Table 5-9.

The total water consumption from the commercial premises is calculated to be up to 76,275 litres per day. It is estimated that this will be achieved through a combination of water efficient fittings (see Table 5-6Table 5-2) and on-premises rainwater and/or greywater recycling.

[26] Thames Water (2025), Business Water saving calculator, https://www.thameswater.co.uk/wholesale/non-household-customers/business-water-saving-calculator (Last accessed: May 2025) – The calculated demand from this assumption is within the best range for a 5-start hotel with swimming pool.

Table 5-9 – Annualised daily water demand per use class (*Default visitor numbers from BREEAM WAT01 calculator) – 65% reduction (discrepancy in daily demand associated with number rounding of the per capita consumption in the table)

Character area	Use Class	Job number	Visitors	Litre/ person/ day	Annual days	Daily demand (l/day)
Neighbourhood Centre TOTAL: 69,116 litres/ day	Commercial	149	9,310*	2.39	362	22,421
	Food store	84	7,578*	2.34	362	17,782
	Creche	28	116	13.11	253	1,309
	Leisure Centre	48	578	Staff: 17.75 Visitor: 12.25	364	12,988
	Health Centre	39	N/A	Staff: 17.25	Staff: 253	5,735 (incl. 5,255 fixed use)
	Innovation / Enterprise	188	0	17.25	253	2,313
	Community	8	190	Staff: 17.25 Visitor: 2.98	253	490
	Hotel (80 bed, Mid-Range)	27	160	Staff: 17.25 Guests: 70 l/room	365	6,079
River Valley TOTAL: Option 1: 7,159 litres/ day Option 2: 7,136 litres/ day	Option 1					
	General Business	308	0	17.75	253	3,789
	General Industrial	126	0	20.92	253	1,827
	Storage & Distribution	103	0	21.6	253	1,542
	Option 2					
	General Business	580	0	17.25	253	7,136

Landscape and open spaces

While good irrigation practice should be implemented, it is assumed that water efficiency improvements would be difficult to deliver, although it is recommended that flow regulators should be installed. It is assumed that the water demand remains unchanged at 748 litres per day for allotment irrigation and 2,930 litres per day for the landscaped podium irrigation, totalling 3,678 litres per day.

Construction

While good construction practice should be implemented, it is assumed that water efficiency improvements would be difficult to deliver. It is recommended that a water management plan is developed to minimise water consumption during construction. It is assumed that the water demand remains unchanged at 16,222 litres per day for 14 years.

Summary

Implementing a PCC of 85 litres per person per day for residential dwellings and three BREAAM credits (a 40% reduction) for commercial premises (Option 1), would reduce the water demand for the proposed development from 967,661 litres per day to 713,964 litres per day at full buildout (refer Table 5-10). Option 2 (five BREEAM credits and an exemplary performance certificate), would further reduce the water demand to 667,126 litres per day.

Table 5-10 - Annualised optimised water demand

Use Class	Annualised total daily demand (litres per day) – Option 1	Annualised total daily demand (litres per day) – Option 2
Residential	571,625	571,625
Gypsy and Traveller pitches	5,015	5,015
Primary school	4,902	3,174
Secondary school	11,632	7,382
Neighbourhood Centre	105,282	69,116
River Valley – Option 1	11,872	7,159
River Valley – Option 2	11,831	7,136
Allotments	748	748
Landscaping	2,930	2,930
Total (River Valley Option 1)	714,006*	667,149
Total (River Valley Option 2)	713,965*	667,126

* Rounding

In addition, the water demand of the proposed development will be increased by 16,222 litres per day for the first 14 years due to construction activities.

5.2 Water reuse

Residential units

Not all water used in homes is required to be of potable water quality. This includes water used for toilet flushing, washing machines and any external uses. These uses represent circa 34% (28.5 litres per person per day) of the total water demand in home (see Figure A-1 in Appendix A), which alternatively could be supplied with a non-potable water supply.

An optioneering study was undertaken to determine if a non-potable water supply could be supplied to households to lower the volume of potable water required to be supplied to each household (See Appendix B).

The study concluded that this option was not feasible. In summary, only potable water will be supplied to residential households.

Educational and commercial premises

The use of on-premises rainwater harvesting and/or greywater recycling is feasible and would further reduce the water demand from educational and commercial premises. The water neutrality strategy considers on-premises water reuse as follows:

- Option 1 – only in the case where it is required to achieve the 40% water demand reduction to achieve BREEAM three credits.
- Option 2 – features in all educational and commercial properties.

Landscape and open spaces

Allotment

As part of the water neutrality strategy, it is proposed that a storage tank with a minimum usable volume of 27 cubic meters (equivalent to 35 days storage) is provided to harvest rainwater from the surface water drainage network within the vicinity of the allotment plots.

More details on this storage are provided in Section 6.3.

Landscaped podium

As part of the water neutrality strategy, it is proposed that a storage tank with a minimum usable volume of 103 cubic meters (equivalent to 35 days storage) is provided to harvest rainwater from the surface water drainage network within the vicinity of the landscaped podium.

More details are provided in Section 6.3.

Summary

Water reuse for irrigation would reduce the water demand for the proposed development as follows:

- Option 1: from 714,006 litres per day to 710,328 litres per day.
- Option 2: from 667,149 litres per day to 663,471 litres per day.

The water demand for construction purposes remains at 16,222 litres per day.

6 Water offsetting

6.1 Offsetting through existing demand

Existing water demand from existing land uses on a proposed development site can be offset against the future demand if the existing demand is to be ceased as the development is constructed. The existing demand can be accounted for only if actual meter readings can be provided as evidence.

As detailed in section 3, the average water demand for Ifield Golf and Country Club is 10,420 litres per day.

6.2 Sussex North Offsetting Water Scheme

The Sussex North Offsetting Water Scheme (SNOWS) generates credits that can be bought to offset the water demand of a development within the Sussex North WRZ. It is expected that SNOWS credits will increasingly become available through 2025[27].

For the West of Ifield development, any water demand that cannot be reduced or mitigated will need to be offset through the purchase of the required number of credits from SNOWS.

Under the now withdrawn emerging Horsham Local Plan (and its supporting evidence base) the West of Ifield development was allocated sufficient SNOWS credits for up to 1,600 homes, which is equivalent to an offset of 304,640 litres per day[28]. In line with SNOWS current user guidance, Homes England is unable to apply for these credits until after the outline planning application stage.

The West of Ifield development, at the point of submission, will meet the SNOWS access definition[29], being in accordance with a 'post submission local plan' that has 'informed the preparation of Southern Water's Water Resource Management Plan 2024 calculations of water demand'. The SNOWS project manager has confirmed that the proposed development 'meets the SNOWS access criteria' and 'would be eligible to request *additional* SNOWS capacity.'

The SNOWS scheme is live as of March 2025 and it is the intention that, at a minimum, the number of SNOWS credits required to offset at least 1,600 homes will be secured following submission of the outline planning application. It is considered highly likely that SNOWS credits will be secured as the proposed development not only meets the SNOWS access criteria but would also address four out of the five of the SNOWS credit prioritisation criteria:

---

[27] https://www.horsham.gov.uk/planning/water-neutrality-in-horsham-district/sussex-north-offsetting-water-scheme-snows
[28] Based on an average occupancy of 2.24/dwelling and a per capita consumption of 85 litres per person per day.
[29] https://www.horsham.gov.uk/__data/assets/pdf_file/0017/144620/SNOWS-Applicant-User-Guide-Mar-2025.pdf

Criterion 2: Whether the application is a local authority 'corporate priority', which includes schemes in council plans or those approved by the council's political leadership. These will be given greater weighting.

- The Proposed Development is a strategic, priority, site that was allocated in the emerging Horsham Local Plan.

Criterion 3: The extent to which water efficiency measures have been included in the application to maximise on-site water savings and minimise offsetting requirement. Applications that minimise their on-site water use will be given greater weighting.

- The Proposed Development is highly water efficient. It complies with the minimum residential water consumption threshold of 85 litres per person per day and incorporates rainwater harvesting and reuse that would reduce domestic consumption to 56.3 litres per person per day. The inclusion of high performance BREAAM designs, rainwater harvesting and greywater reuse for the non-household and commercial properties would deliver significant water efficiency reductions.

Criterion 4: (residential applications only): Whether the application is policy compliant in the delivery of affordable housing units. Applications delivering 100% affordable schemes made by registered or approved affordable housing providers will be given greater weighting.

- The Proposed Development is policy compliant for the delivery of affordable housing units.

Criterion 5: (non-residential applications only): Whether the application provides community services or other infrastructure supporting development*. These applications will be given a greater weighting.

- The Proposed Development provides considerable community services and other supporting infrastructure, including primary and secondary schools, leisure, office and commercial components.

Given the strategic importance of the scheme, the eligibility for SNOWS credits to offset 1,600 homes, the eligibility to apply for additional SNOWS credits, and compliance with four of the five SNOWS credit prioritisation criteria, it is highly likely that SNOWS credits for a minimum of 304,640 litres per day will be allocated to the scheme following submission of the outline planning application.

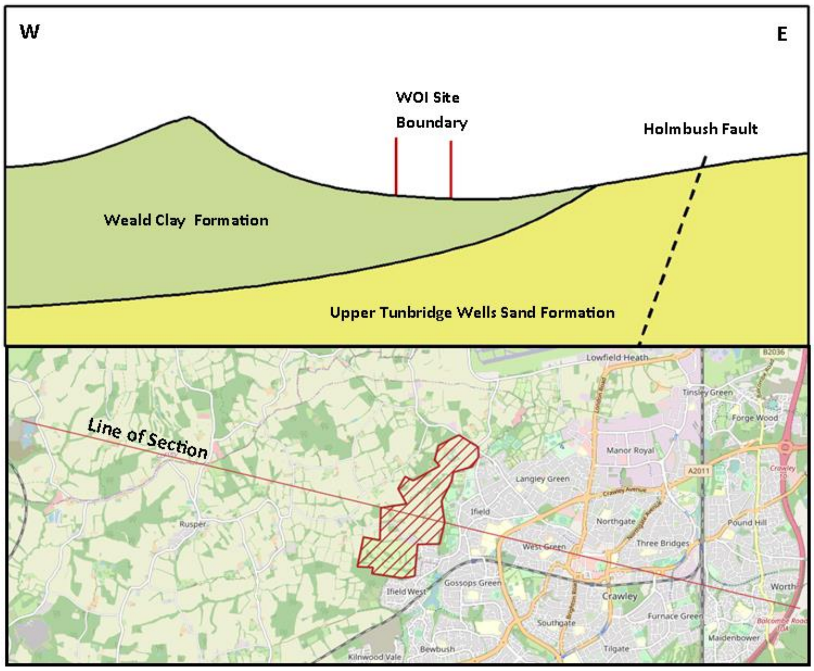
6.3 Alternative water supply

The water neutrality strategy includes the provision of a private water supply, where groundwater will be blended with harvested rainwater before being treated to drinking water quality.

Groundwater

The location of the proposed site means that it is possible to abstract water from an aquifer (the Upper Tunbridge Wells Sand Formation, shown in Figure 6-1) that is hydraulically and hydrologically disconnected from the Sussex North WRZ. Consequently, any water abstracted from on-site borehole(s) and treated will partially or fully reduce the development's potable demand on the Sussex North WRZ.

Figure 6-1 - West of Ifield site location and geology



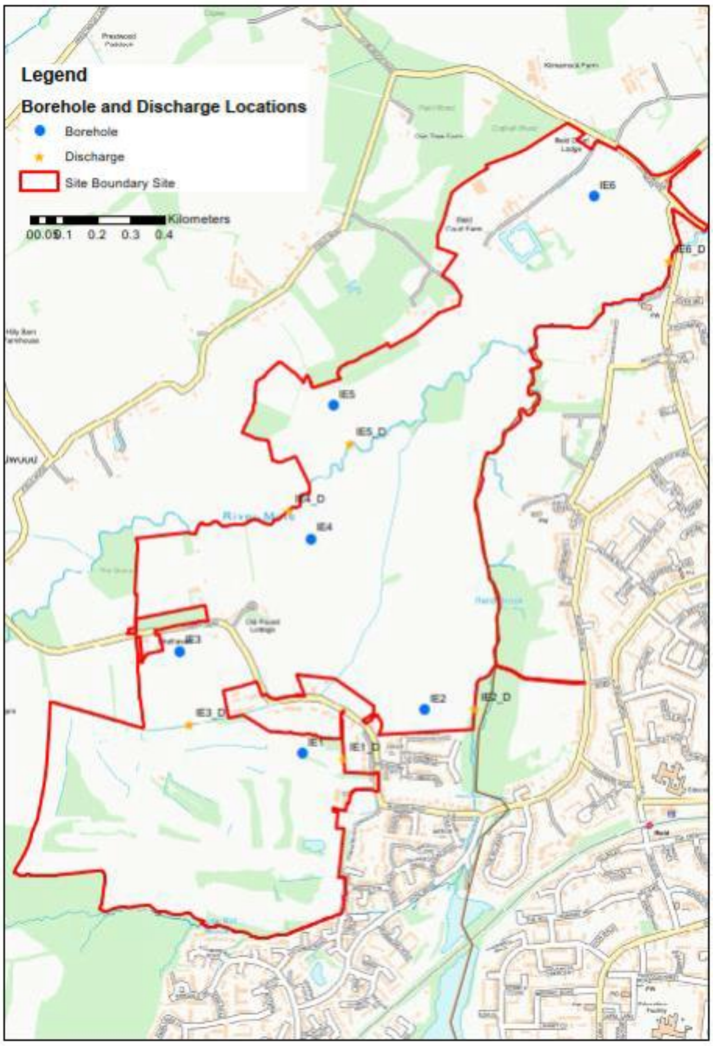
A feasibility study was undertaken to assess the viability of this proposed option, including a desktop review, conceptual hydrogeological site modelling and initial hydrogeological risk assessments (Appendix E). The feasibility study identified that the proposed borehole/s within the Tunbridge Wells Sand Member (UTWSM) at a depth of approximately 200 m has the potential to supply a yield of 500 m^3/day at least initially. Potential borehole locations (six in total) were identified (Figure 6-2).

The development of test boreholes and pump testing was carried out in the winter of 2024 to more accurately estimate the yield and quality of water that may be abstracted from the Upper Tunbridge Wells Sand Formation (Appendix F). As the targeted aquifer is confined, valid pump testing can be undertaken at any time during the year and is not restricted to the summer months.

Two exploratory boreholes (IE2 and IE3 location - Figure 6-2) were drilled at the proposed development site during the 2024/5 programme, within the Weald Clay Formation (WCF) and Tunbridge Wells Sand Formation (TWSF) sequence of geological strata. The boreholes were consented with the Environment Agency for a maximum depth of 210 meters below ground level (mbgl) and the final depths were 202.3 mbgl (borehole IE2) and 210.00 mbgl (borehole

IE3). Water levels within exploratory boreholes IE2 and IE3 were consistent with historical data from existing boreholes in the area.

Figure 6-2 - Potential borehole locations (Pumping tests carried out at IE2 and IE3)



Based on testing during the exploration phase of drilling at the Proposed Development site a conservative approach was used to estimate a yield for one production borehole. Based on limited testing undertaken on the Upper Tunbridge Wells Sand Member aquifer, the aquifer is considered to be capable of supplying 0.9 l/s (77.8 m^3/day) with a drawdown of approximately 20 m. These yield values are in line with literature estimated yields for the Upper Tunbridge Wells Sand Member aquifer. By increasing drawdown and increasing the diameter of a future production borehole, **a yield of 125 m^3/day for one production borehole** is conservatively indicated. On this basis it can be confirmed that multiple production boreholes at the site can meet the required demand for groundwater. Given the nature of the hydrogeology of the aquifer even though future production boreholes will have to be spaced, it is likely that they could be located within 100 m of each other with limited interference effects. The Proposed Development site therefore provides sufficient space for the construction of multiple boreholes, if required.

Following future production borehole/s installation, a programme of testing would be undertaken to confirm the long-term sustainable yield from the borehole/s. This will be a conditional requirement relating to any abstraction licensing for production borehole development and operation. The installation of production boreholes would be delivered in a phased manner in line with development scheme water demand requirements and with appropriate siting and testing of production boreholes to deliver long-term supply sustainability.

Existing water quality data indicate that water abstracted from the borehole(s) will require a certain level of treatment to comply with the wholesomeness requirements of the Private Water Supplies (England) Regulations 2016 (as amended).

Early indications from a desktop study of nearby borehole water quality data indicated that the borehole water was likely to contain concentrations of fluoride, boron and sodium that exceed the Drinking Water Inspectorate (DWI) standards. After testing during the 2024/2025 drilling programme there is more certainty regarding the quality of groundwater within the aquifers below the proposed development. There is strong evidence of elevated chloride within the Weald Clay Formation and the Grinstead Clay Member and other mudstones. Within the Upper Tunbridge Wells Sand Member aquifer groundwater, alkalinity appears to be elevated and without treatment may generate a noticeable aesthetic (taste, odour, feel) character to the water that could affect water wholesomeness and scaling issues. Groundwater abstracted from the aquifer/s is likely to require treatment to reduce the fluoride levels to below the required prescribed concentration or value. Boron levels may also be elevated within the deeper Lower Tunbridge Wells Sand Member aquifer, but below the drinking water prescribed concentration or value within the Upper Tunbridge Wells Sand Member. Treatment for elevated sodium may also be required as elevated levels may impose noticeable aesthetic (taste, odour, feel) character to the water that affect water wholesomeness. In addition, there is an indication that ammonia concentrations may be elevated over the drinking water standards prescribed concentration value, leading to taste and odour impacts and this would also require treatment.

The pumping test indicates that the Upper Tunbridge Wells Sand Member should be targeted with the requirement to treat the abstracted groundwater for alkalinity, sodium, fluoride and possibly boron and ammonia.

Rainwater harvesting

There is an opportunity to harvest rainwater as an alternative source to potable water supply. The rainwater yield was calculated as per the methodology provided in British Standard BS EN 16941-1:2024, as summarised below:

- Horizontal collection area: As a precautionary approach, only rainwater harvested from residential properties was considered. This allows the scheme to expand to include commercial properties in future stages of the design. The total residential collection area is calculated to be 216,996 m^2 (Table B-2).

- Average annual rainfall: A value of 860 mm was used based on 20 years of data (2004-2024) for the Pease Pottage rain gauge[12].
- Surface yield coefficient: a value of 0.8 is used considering that houses are likely to have pitched rough surface roofs and apartments are likely to have a flat roof without gravel.
- Hydraulic treatment coefficient: a value of 1 is used as the treatment is to occur post-storage.

Based on the above, the residential-only rainwater yield (pre-treatment) was calculated at 409,022 litres per day.

The yield value is conservative. The rainwater storage tank will be able to capture rainwater from the entire site through the surface water drainage network, and so there is an opportunity to also reuse water captured on commercial properties and other impermeable areas. The rainwater harvesting yield for commercial properties was calculated as 89,996 litres per day (Table 6-1). When combined with the rainwater yield from residential dwellings, the total supply would be 498,688 litres per day.

Deducting the water demand per day sustained by harvesting rainwater (which includes irrigation and non-potable water demand from educational and commercial premises), the remaining untapped and untreated harvested rainwater as a potential potable water source is 478,468 litres per day for Scenario 1 and 455,185 litres per day for Scenario 2.

Table 6-1 – Untapped harvested rainwater from commercial units

	Collection Surface Area (m^2)	Rainwater Yield (litres per day)
Residential dwellings	216,996	409,022
Commercial dwellings	47,570	89,966
Total	**264,566**	**498,688**
Water demand sustained through rainwater harvesting for non-potable application		
	Scenario 1	**Scenario 2**
Irrigation	3,678	3,678
Creche*	209	699
Leisure Centre**	8,924	9,483
Hotel**	6,900	11,216
General Industrial*	247	897
Storage & distribution*	262	838
Commercial*	-	8,235

Food store*	-	6,670
Health centre**	-	108
Innovation / Enterprise*	-	521
Community*	-	302
General business*	-	854
Total	**20,220**	**43,501**
Remaining untapped and untreated harvested rainwater for potable application		
Total	**478,468**	**455,185**

* Educational and Commercial rainwater demand calculated using outputs from relevant WAT01 calculator.
** Assumed that any reduction is associated with the implementation of rainwater harvesting (worst-case scenario).

Infrastructure requirements

The infrastructure requirements will depend on whether SNOWS credits are available (quantity) at the time required for the development of each phase. In this water neutrality, we consider two cases:

- SNOWS credits are available (as described previously) – Accounting for the offsetting provided from existing demand and the SNOWS credits, the remaining water demand would be reduced to 395,268 litres per day for Scenario 1 and to 348,411 litres per day for Scenario 2 at full build out.
- SNOWS credits are unavailable - Accounting for the offsetting provided from existing demand, the remaining water demand would be reduced to 699,908 litres per day for Scenario 1 and to 653,051 litres per day for Scenario 2 at full build out.

This would be offset through the provision of a private water supply, generated from the blending of abstracted groundwater and harvested rainwater. A summary of the high-level feasibility study is provided below.

Water quality risks

<u>Groundwater</u>

As detailed above, the borehole water quality risks are alkalinity (taste and feel), sodium, fluoride and possibly boron and ammonia. Elevated particulates were also present, with associated particulate iron. The borehole water quality (for those identified as risks to public health) used to derive the treatment approach as well as minimum requirements are summarised in Table 6-2. It is noted that more water quality data would be required to inform further stages of the water treatment plant design.

Table 6-2 - Borehole water quality and calculated minimum removal requirement

Parameter	Drinking water standards (µg/l)	Concentration observed (µg/l)	Minimum removal required (%)
Sodium (dissolved)	200,000	254,000	21.3
Alkalinity (total as $CaCO_3$)	N/A	593,000	N/A
Fluoride	150	6,470	97.7
Boron	1,000	1,670	40.1
Ammonium (as N)	500	577	13.3

Rainwater harvesting

Harvested rainwater will also contain contaminants, including:

- Faecal pathogens from animals or human.
- Chemical contamination from on-site air pollutants.
- Leaching from roofing, conveyance or storage materials.
- Hydrocarbon, heavy metals and particulate from roads.
- Natural organic matter from green roofs, trees, etc.
- Debris.
- Pathogen proliferation caused by water stagnation.

Risk mitigation approach

The detailed design of each risk mitigation measure will be developed during later design stages based on the conceptual design principles and approach detailed below.

Management of the potable water system

The potable water system will be operated by a suitable operator. Should the management be undertaken by a facility management or private service provider, the design and operation of the potable water system from catchment to customers tap will comply with the Private Water Supplies (England) Regulations 2016 (as amended in 2018). Alternatively, the management of the potable water system could be undertaken by a New Appointment and Variation (NAV). NAVs are limited companies appointed by Ofwat under the Water Industry Act 1991 to provide water and/or wastewater services to an area previously provided by an incumbent company (in this case Southern Water). As part of this appointment, a NAV has the same duties and responsibilities as the previously incumbent water company. As such a NAVs would comply with the Water Supply (Water Quality) Regulations 2016.

Both Regulations specify the requirement to:

- Provide wholesome water for domestic purposes.

- Use suitable products or substances in the preparation and distribution of potable water.
- Carry out a risk assessment and provide sufficient mitigations.
- Implement a monitoring and sampling programme.

Groundwater borehole

To reduce pollution risks to and from the groundwater borehole and consequent risk to the environment and public health, mitigation measures would be implemented. These are detailed in Appendix E, Appendix F and in the Phase 1 Environmental Site Assessment (Ground Conditions) Report.

Good practice techniques and methodologies would be followed during the implementation of shallow workings, excavation and drilling works. Boreholes would be designed to minimise as far as reasonably practical the risk of fluid escaping from the well. The section within the overlying Weald Clay Formation would be cased and sealed to avoid the creation of preferential pathways, minimising any short circuiting of groundwater to the underlying aquifer formation and the risk of chloride rich groundwater in the Weald Clay Formation impacting the underlying aquifer formation. Construction would be supervised by a trained and experienced hydrologist to ensure that the borehole is constructed to design.

The boreholes would be located over 50 m from environmental receptors and 10 m from any surface water features. The borehole would also be located outside any flood risk zones and away from any potential pollution sources.

Finally, a 50 m radius source protection zone (SPZ) would be delimited around the borehole to protect the groundwater from accidental release of contaminants. As far as practicable, any fuels, oils or hazardous materials associated with the construction and operational activities of the development would not be stored within 50 m of any abstraction borehole. The locations of the six potential boreholes are identified in Figure 6-2 and the SPZs are provided in the illustrative landscape masterplan (Appendix H).

Construction pollution mitigation requirements would be outlined in the construction environmental management plan (CEMP). Mitigations required as part of operational activities would be outlined in the relevant reserved matters application for any phase of the Proposed Development which is within 50m of a groundwater abstraction borehole.

Rainwater harvesting

Rainwater will be harvested from the surface water drainage network post pollution control mitigation, reducing total suspended solids, metals and hydrocarbons to achieve environmental requirements.

Water treatment plant

While the use of reverse osmosis (and required pre- and post- treatment) would provide an effective risk mitigation approach for the identified groundwater quality risks, there are currently no DWI Regulation 31-approved reverse osmosis products available. Consequently, the adopted treatment approach is to blend the abstracted water with a source containing low concentrations of the elevated compounds (i.e. rainwater) to reduce the concentrations of sodium, boron and ammonium below DWI standards.

Consequently, a minimum ratio between groundwater and rainwater inflows of 1:1 has been used as a precautionary approach driven by the boron concentration. This allowed to determine the water resource availability for the potable water supply. This is summarised in Table 6-3.

Based on the remaining water quality risks identified for both sources, the following processes were selected as part of the water treatment plant process:

- Blending tank – a one-hour retention time storage tank allowing blending of abstracted groundwater and harvested rainwater.
- pH adjustment – raw water pH is monitored and corrected to enhance the efficiency of the downstream coagulation and flocculation process, minimising coagulant residual.
- Coagulation, flocculation and clarification – an iron or aluminium-based coagulant is dosed into the water at a point of high mixing intensity. Water is then gently mixed to promote the formation of flocs to remove particulate matter, natural organic matter and metals.
- Clarification – flocs are separated from the water by sedimentation.
- Dual media filtration (sand/activated carbon) – the clarified water is then filtered through a dual media filter, removing the remaining solids and colloids that were not settled as well as micropollutants such as hydrocarbons and heavy metals. Through this process a final turbidity after filtration can be reduced to <0.5 NTU (potentially 0.1 NTU). The low turbidity is required to ensure the efficiency of disinfection.
- Activated alumina bed filters (only required if borehole water is uses as a water source) – activated alumina functions as an anion exchanger with a high selectivity for fluoride removal. The activated alumina beds are regenerated using sodium hydroxide.
- Disinfection – the treated water is disinfected with ultraviolet and sodium hypochlorite is dosed to provide a chlorine residual.
- pH control – pH is adjusted as required.
- Treated water blending tank – the treated water is blended with Southern Water potable water as required before being supply via the potable water supply.
- Wastewater management – investigation is ongoing to determine the management options for the wastewater stream. Thames Water is not obliged to accept the discharge into the local sewer. It is assumed that the wastewater will be discharged to the sewer. Alternatively, the sludge generated through the clarification and filtration processes will be stored in a sludge tank before being thickened and tankered off-site. The regenerant solution from the activated alumina bed would be neutralised before being disposed to the sewer.
- Odour management – all processes identified above will be located inside the water treatment plant buildings except for the raw water blending tank and the treated water blending tank, which may be located outside and underground. An odour management

assessment will be carried out at the detailed design stage to assess whether odour management or treatment will be required.

The water treatment plant (referred as WTW) is located in the Neighbourhood Centre character area. The allocated area has a surface of 1,000 m^2 (Appendix G).

As a precautionary approach, we have estimated that the recovery rate of the plant is 75%. Based on this estimation, the maximum water supply was calculated and reported in Table 6-3.

Table 6-3 – Maximum water resource available and water supply available

	Untreated harvested rainwater yield (litre per day)	Abstracted groundwater (litre per day)	Maximum water resource available (litre per day)	Maximum water supply available
Rainwater captured only from residential properties	409,022	Max: 409,022	818,044	613,533
Rainwater captured from residential, educational and commercial properties – Scenario 1	478,468	Max: 478,468	956,936	717,702
Rainwater captured from residential, educational and commercial properties – Scenario 2	455,187	Max: 455,187	910,374	682,780

When comparing the maximum water supply (Table 6-3) and the remaining water demand to offset through the proposed private water supply, the following conclusion can be drawn:

- The water demand from scenarios 1 and 2 could be met by the private water supply only without the requirement for SNOWS credits if accounting for harvested rainwater from residential, educational and commercial properties. Given the current understanding of the groundwater yield, this could be achieved through the implementation of four boreholes.
- SNOWS credits are required to meet the water demand if accounting for harvested rainwater only from residential properties.

Additional resilience could be provided by treating harvested rainwater to potable water standard through a separate, lesser, treatment train[30] than required for treating the abstracted groundwater. A conservative recovery rate for a process treating only rainwater is estimated at 85% (rather than the 75% for the blended groundwater/rainwater treatment process). The higher rainwater recovery rate would therefore generate a water supply between 344,542 litres per day[31] (precautionary approach) to 406,697 litres per day for scenario1 and to 387,503 for scenario 2[32]. Both values exclude (i.e. are independent of) the rainwater collected for the supply of non-potable water to commercial properties as part of their own BREEAM compliance. The latter approach, combining residential and commercial rainwater harvesting, would meet the potable water demand (Scenario 1: 395,268 litres per day; Scenario 2: 348,411litres per day) of the Proposed Development without requiring the use of groundwater, but accounting the availability of SNOWS credits. However, a groundwater supply would provide additional system resilience, particularly during prolonged dry weather.

As option 1 (BREEAM 3 credits) offers the same flexibility as option 2 (BREEAM 5 credits plus 1 credit for Exemplary Performance), option 2 is not included in the assessment below. Through the water neutrality strategy, it is confirmed that a specification for achieving three BREEAM credits (40% reduction) or equivalent for commercial and educational properties is sufficient.

In summary, the water demand from the development once accounting for the offset from existing water demand can be achieved by,

- Scenarios A1 and A2 – a private water supply generated from harvested rainwater from residential properties and abstracted ground water from a borehole, topped-up with Southern Water supply (using SNOWS credit, equivalent to 1,600 residential properties). Given the current understanding of the groundwater and rainwater yield, this could be achieved through the implementation of one (Scenario A1) or more (Scenario A2) boreholes (125,000 litres per day per borehole) and harvested rainwater (277,024 to 402,024 litres per day).
- Scenario B – a private water supply generated from harvested rainwater from residential properties, educational and commercial properties and abstracted ground water from borehole, topped-up with Southern Water supply. Given the current understanding of the groundwater and rainwater yield, this could be achieved through the implementation of four boreholes (125,000 litres per day per borehole – limited to a total volume of 466,605 litres per day) and harvested rainwater (466,605 litres per day).

---

[30] Consisting of coagulation, flocculation and clarification processes followed by sand or membrane filtration, a granular activated carbon process, conditioning and disinfection.
[31] Calculated as the residential rainwater harvesting supply (409,022lpd) minus the demand for irrigation (3,678lpd) with the result multiplied by 0.85.
[32] Calculated as the residential, educational and commercial rainwater harvesting supply (Scenario 1: 478,468 lpd; Scenario 2: 455,886) with the result multiplied by 0.85.

- Scenario C – a private water supply generated from harvested rainwater (465,021 litres per day) from residential properties, educational and commercial properties topped-up with Southern Water supply (SNOWS credits, equivalent to 1,600 residential properties).

The approach described above allows for flexibility and redundancy in the water sources that would mitigate any temporary shortfall in harvested rainwater (for example, during a severe drought) or abstracted groundwater.

The details of the water treatment process will be determined as part of a subsequent, detailed planning application alongside the relevant licences from Thames Water. The realistic worse case likely significant environmental effects of the provision of water treatment works and abstraction boreholes have been assessed as part of the ES for the hybrid planning application.

Rainwater harvesting

The infrastructure requirement for rainwater harvesting has been calculated for Scenario A only. Tanks volumes would require to be increased by 14% for Scenarios B and C.

Horsham District Council requires the provision of 35 days of storage to mitigate against the risk of droughts. The rainwater harvested requirement from the proposed development includes:

- Non-potable water demand from irrigating the allotments and the landscaped podium (3,678 litres per day).
- Source to the water treatment works for generating a private water supply (277,024 to 402,024 litres per day).

Consequently, the provision of a storage capacity of a usable volume of up to 14,200 m^3 is required. Using the detailed approach specified in BS EN 16941-1:2024, the usable volume of rainwater in a storage tank of a capacity of 14,200 m^3 throughout the year was modelled, based on daily rainfall data for five years (2020 to 2024). This show that for the modelled years, insufficient rainwater volume would be available to sustain a 405,701 litres per day demand using a storage of 35 days; to achieve this requirement would need a usable volume of storage tank of 16,431 m^3 (Figure 6-3).

As part of the water neutrality strategy, it is proposed to harvest and store rainwater in eight rainwater storage tanks which will be distributed through the site, in alignment with the phased delivery of the development, the surface water drainage strategy and topography. Where possible, the attenuation tanks and rainwater storage tanks will be combined. When this is not possible, the water will be diverted before entering the attenuation basins and conveyed (either by gravity or pumped) to the rainwater storage tanks. The indicative location of the storage tanks are identified in the plan provided in Appendix G. The indicative size and construction phasing for each tank are detailed in Table 6-4.

Figure 6-3 - Usable volume of rainwater in storage tank (m3) through the year

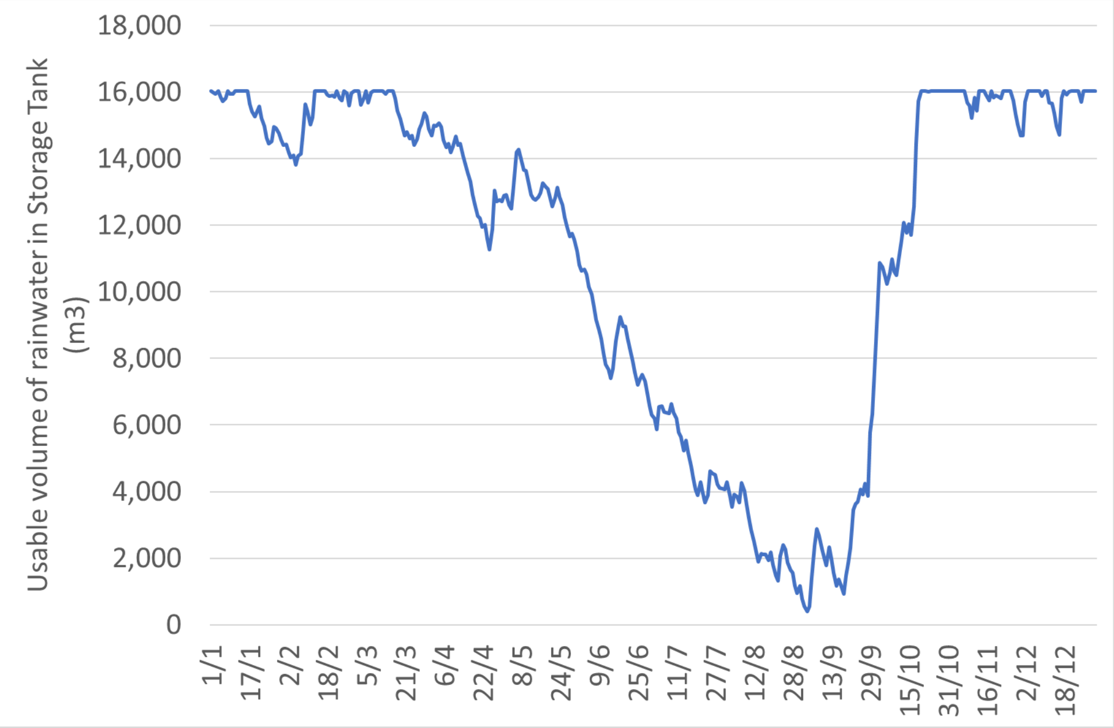


Table 6-4 – Rainwater harvesting tanks

Tank number	Capacity – usable volume (m^3)	Phase of delivery
1	2,219	Phase 1
2	3,671	Phase 2
3	1,792	Phase 2
4	1,950	Phase 3
5	1,704	Phase 3
6	1,666	Phase 3
7	1,929	Phase 4
8	1,501	Phase 5

Noise and vibration considerations

Construction and operation noise and vibration effect are covered in general in the ES Noise Chapter. Specific assessment requires specific construction details and as such this will be covered at RMA stage. Operational noise will also be considered at RMA stage.

It has to be noted that the borehole(s) and water treatment process would be located within buildings, limiting noise impact. Pumps would be designed to limit vibration.

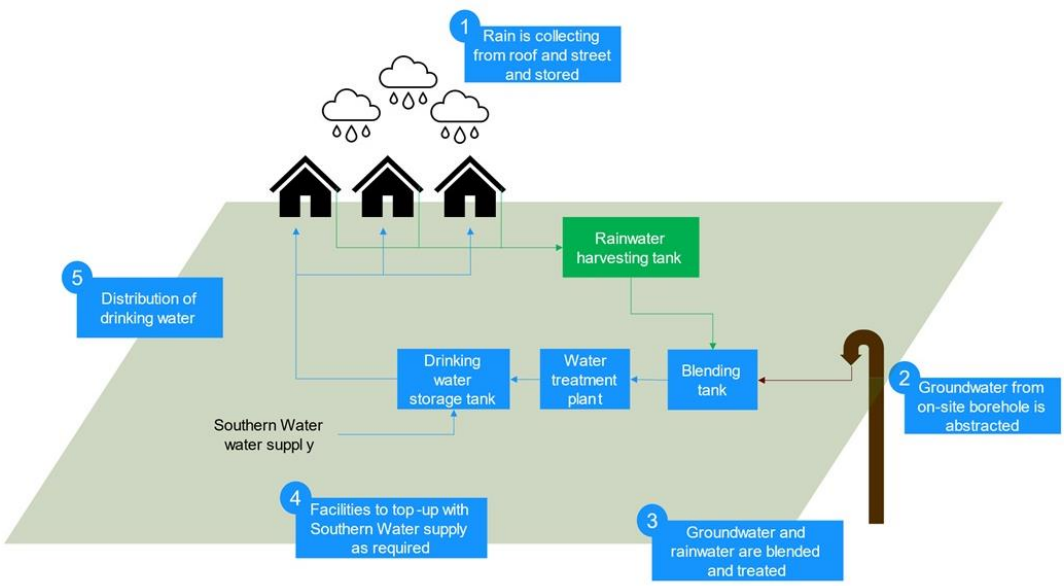
6.4 Summary of offsetting intervention

In addition of the offsetting gained through the ceasing activities at the Ifield Golf and Country Club (10,420 litres per day), water neutrality will be achieved by:

- Scenarios A1 and A2: Offsetting the water demand through the development of a private water supply generated from harvested rainwater from residential properties and abstracted groundwater (395,268 litres per day) supplemented by Southern Water supply (accessed through the acquisition of SNOWS credits – 304,640 litres per day).
- Scenario B: Offsetting the water demand through the development of a private water supply generated from harvested rainwater from residential, commercial and educational properties and abstracted groundwater (699,908 litres per day).
- Scenario C: Offsetting the water demand through the development of a private water supply generated from harvested rainwater from residential, commercial and educational properties (395,268 litres per day) supplemented by Southern Water supply (accessed through the acquisition of SNOWS credits – 304,640 litres per day) with no groundwater abstraction.

Figure 6-4 summarises the offsetting strategy where rainwater is harvested and stored before being blended with groundwater abstracted from the Lower Tunbridge Wells Sand formation aquifer (for Scenarios A and B). The blended sources will be treated via a water treatment plant before being blended with Southern Water (Scenario A and C) mains water and supplied to the development.

Figure 6-4 - Offstetting strategy



7 Development phase and water neutrality

A phased water neutrality approach has been developed to align with the construction phasing of the development. The phased approach considers solely the water demand when the development phases are occupied. Table 7-1 provides example of how the phased approach would work if one or two borehole(s) is/are implemented (Scenarios A1 and A2). Table 7-3 provides an example of how the phased approach would work for Scenario B, and Table 7-4 illustrates Scenario C.

Construction and occupation of phase 1

The average water demand for construction is 16,222 litres per day. It is proposed that the first borehole is fully developed in early stage of the construction of Phase 1. A temporary water treatment plant could be implemented using rainwater from Tank 1 (delivered as part of Phase 1, as part of the Phase 1 drainage strategy) and groundwater. This would supply the water demand for construction of Phase 1 and Phase 2 and the occupation of the secondary school until the full-scale treatment plant is operational.

This would provide an opportunity to obtain further data on the quantity and quality of the two sources that would inform optimisation of the treatment process for the full-scale plant.

Notes for Table 7-1 to Table 7-4:

*Increased by 1 unit to total 3,000.

**Planning application from DoE to provide a water neutrality strategy for this site. See proposal above.

*** First borehole and water treatment plant to be fully operational once phase 2 start to be occupied.

**** Second borehole to be operational and water treatment plant to be fully operational

***** Third borehole to be operational and water treatment plant to be fully operational

****** Fourth borehole to be operational and water treatment plant to be fully operational

Table 7-1 – Phased water neutrality strategy – Example of a phased delivery with one borehole (Scenario A1)

Phase	Character Area	Residential Units	Non-Residential Units	Household Water Demand (m³/day)	Non-Household Water Demand (m³/day)	Cumulative Water Demand (m³/day)	Cumulative Water Demand with Offsetting (m³/day)	Rainwater - Cumulative Treated Volume (m³/day)	Borehole(s) – Cumulative Treated Volume (m³/day)	Southern water mains supply (m³/day)
1	Neighbourhood Centre	0	Secondary School	-	11.6	11.6	11.6	0.0**	0.0	0.0
2	Hillside and Woodland	387	N/A	73.7	-	359.6	349.2	127.6	93.8***	127.8
	Neighbourhood Centre	534	Commercial + Primary School	101.7	110.2					
	The Meadow	327	N/A	62.3	-					
3	Hillside and Woodland	311	N/A	59.3	-	510.0	499.6	200.5	93.8	205.3
	The Meadow	304 + 15 (gypsy pitches)	N/A	62.9	-					
	River Valley	98	80% commercial units	18.7	9.5					
4	River Valley	258	20% commercial units	49.2	2.4	657.9	647.5	278.6	93.8	275.1
	Neighbourhood Centre	154	N/A	29.3	-					
	The Meadow	352	N/A	67.1	-					
5	The Meadow	275*	N/A	52.4	-	710.3	699.9	301.5	93.8	304.6
Total	-	3000	-	576.6	133.7	710.3	699.9	301.5	93.8	304.6

Table 7-2 – Phased water neutrality strategy – Example of a phased delivery with two boreholes (Scenario A2)

Phase	Character Area	Residential Units	Non-Residential Units	Household Water Demand (m³/day)	Non-Household Water Demand (m³/day)	Cumulative Water Demand (m³/day)	Cumulative Water Demand with Offsetting (m³/day)	Rainwater - Cumulative Treated Volume (m³/day)	Borehole(s) – Cumulative Treated Volume (m³/day)	Southern water mains supply (m³/day)
1	Neighbourhood Centre	0	Secondary School	-	11.6	11.6	11.6	0.0**	0.0	0.0
2	Hillside and Woodland	387	N/A	73.7	-	359.6	349.2	127.6	93.8***	127.8
	Neighbourhood Centre	534	Commercial + Primary School	101.7	110.2					
	The Meadow	327	N/A	62.3	-					
3	Hillside and Woodland	311	N/A	59.3	-	510.0	499.6	147.2	147.1****	205.3
	The Meadow	304 + 15 (gypsy pitches)	N/A	62.9	-					
	River Valley	98	80% commercial units	18.7	9.5					
4	River Valley	258	20% commercial units	49.2	2.4	657.9	647.5	186.4	186.0	275.1
	Neighbourhood Centre	154	N/A	29.3	-					
	The Meadow	352	N/A	67.1	-					
5	The Meadow	275*	N/A	52.4	-	710.3	699.9	207.8	187.5	304.6
Total	-	3000	-	576.6	133.7	710.3	699.9	207.8	187.5	304.6

Table 7-3 – Phased water neutrality strategy – Example of a phased delivery for four boreholes without SNOWS credits (Scenario B)

Phase	Character Area	Residential Units	Non-Residential Units	Household Water Demand (m³/day)	Non-Household Water Demand (m³/day)	Cumulative Water Demand (m³/day)	Cumulative Water Demand with Offsetting (m³/day)	Rainwater - Cumulative Treated Volume (m³/day)	Borehole(s) – Cumulative Treated Volume (m³/day)
1	Neighbourhood Centre	0	Secondary School	-	11.6	11.6	11.6	0.0**	0.0
2	Hillside and Woodland	387	N/A	73.7	-	359.6	349.2	174.6	174.6****
	Neighbourhood Centre	534	Commercial + Primary School	101.7	110.2				
	The Meadow	327	N/A	62.3	-				
3	Hillside and Woodland	311	N/A	59.3	-	510.0	499.6	249.8	249.8*****
	The Meadow	304 + 15 (gypsy pitches)	N/A	62.9	-				
	River Valley	98	80% commercial units	18.7	9.5				
4	River Valley	258	20% commercial units	49.2	2.4	657.9	647.5	323.8	323.8
	Neighbourhood Centre	154	N/A	29.3	-				
	The Meadow	352	N/A	67.1	-				
5	The Meadow	275*	N/A	52.4	-	710.3	699.9	350.0	350.0
Total	-	3000	-	576.6	133.7	710.3	699.9	350.0	350.0

Table 7-4 – Phased water neutrality strategy – Example of a phased delivery with water reuse, SNOWS credits and no borehole (Scenario C)

<table>
<tr><th>Phase</th><th>Character Area</th><th>Residential Units</th><th>Non-Residential Units</th><th>Household Water Demand (m³/day)</th><th>Non-Household Water Demand (m³/day)</th><th>Cumulative Water Demand (m³/day)</th><th>Cumulative Water Demand with Offsetting (m³/day)</th><th>Rainwater - Cumulative Treated Volume (m³/day)</th><th>Southern water mains supply (m³/day)</th></tr>
<tr><td>1</td><td>Neighbourhood Centre</td><td>0</td><td>Secondary School</td><td>-</td><td>11.6</td><td>11.6</td><td>11.6</td><td>0.0**</td><td>0.0</td></tr>
<tr><td rowspan="3">2</td><td>Hillside and Woodland</td><td>387</td><td>N/A</td><td>73.7</td><td>-</td><td rowspan="3">359.6</td><td rowspan="3">349.2</td><td rowspan="3">221.4</td><td rowspan="3">127.8</td></tr>
<tr><td>Neighbourhood Centre</td><td>534</td><td>Commercial + Primary School</td><td>101.7</td><td>110.2</td></tr>
<tr><td>The Meadow</td><td>327</td><td>N/A</td><td>62.3</td><td>-</td></tr>
<tr><td rowspan="3">3</td><td>Hillside and Woodland</td><td>311</td><td>N/A</td><td>59.3</td><td>-</td><td rowspan="3">510.0</td><td rowspan="3">499.6</td><td rowspan="3">294.3</td><td rowspan="3">205.3</td></tr>
<tr><td>The Meadow</td><td>304 + 15 (gypsy pitches)</td><td>N/A</td><td>62.9</td><td>-</td></tr>
<tr><td>River Valley</td><td>98</td><td>80% commercial units</td><td>18.7</td><td>9.5</td></tr>
<tr><td rowspan="3">4</td><td>River Valley</td><td>258</td><td>20% commercial units</td><td>49.2</td><td>2.4</td><td rowspan="3">657.9</td><td rowspan="3">647.5</td><td rowspan="3">372.4</td><td rowspan="3">275.1</td></tr>
<tr><td>Neighbourhood Centre</td><td>154</td><td>N/A</td><td>29.3</td><td>-</td></tr>
<tr><td>The Meadow</td><td>352</td><td>N/A</td><td>67.1</td><td>-</td></tr>
<tr><td>5</td><td>The Meadow</td><td>275*</td><td>N/A</td><td>52.4</td><td>-</td><td>710.3</td><td>699.9</td><td>395.3</td><td>304.6</td></tr>
<tr><td>Total</td><td>-</td><td>3000</td><td>-</td><td>576.6</td><td>133.7</td><td>710.3</td><td>699.9</td><td>395.3</td><td>304.6</td></tr>
</table>

8 Conclusion

The proposed development includes 3,000 residential homes (Class C2 and C3), commercial, business and service (Class E), general industrial (Class B2), hotel (Class C1), community and education facilities (Use Classes F1 and F2), gypsy and traveller pitches (Sui Generis), public open space with sports pitches, recreation, play and ancillary facilities, landscaping and associated infrastructure, utilities and works including pedestrian and cycle routes and enabling demolition. The development is to be constructed over five separable phases.

The 3,000 homes in the development are assumed to have an average occupancy rate of 2.24 people per dwelling. The development also includes 15 Gypsy and Traveler pitches for which an assumed occupancy rate of 3.9 people per pitch was used. The residential water demand is proposed to be partially mitigated by achieving a per capita consumption of 85 litres per person per day from a 110 litres per person per day baseline. **The residential water demand has been calculated at 576,640 litres per day**.

The non-residential development includes commercial & education units. These would be designed to achieve BREEAM WAT01 three credits, which will reduce their water demand by 40%. The commercial & educational water demand is **calculated at 133,688 litres per day.**

The water demand associated with irrigation for the allotment plots & landscaping is calculated at 3,678 litres per day. Rainwater storage provision has been included to cover 100% of the irrigation water demand.

The total water demand of the site is 710,328 litres per day.

Existing water usage (**10,420 litres per day)** on the site by Ifield Golf and Country Club would be offset against the development by ceasing club operations.

Homes England will apply for SNOWS credits equivalent to a minimum of 1,600 residential units. The water neutrality strategy makes use of all the allocated SNOWS credits. **This is equivalent to 304,640 litres per day.**

The water neutrality strategy (Scenarios A1 and A2) includes the provision of a private water supply, where groundwater will be blended with harvested rainwater before being treated to drinking water quality. **The private water supply will offset the remaining water demand of 395,268 litres per day.**

System resilience is available by expanding the rainwater harvesting system to commercial properties and/or through the installation of additional boreholes (Scenarios B and C) and/or the purchase of additional SNOWS credits (if available).

The water neutrality strategy has been designed to ensure that the development meets its potable water demands in a sustainable, resilient, and phased manner throughout the construction and occupation period. The approach maximises the use of on-site water resources and aligns with best practice in sustainable development principles and water neutrality.

Appendix A

Residential Units – Supporting Assumptions and Calculations

Per capita consumption – achieving 85 litres per person per day

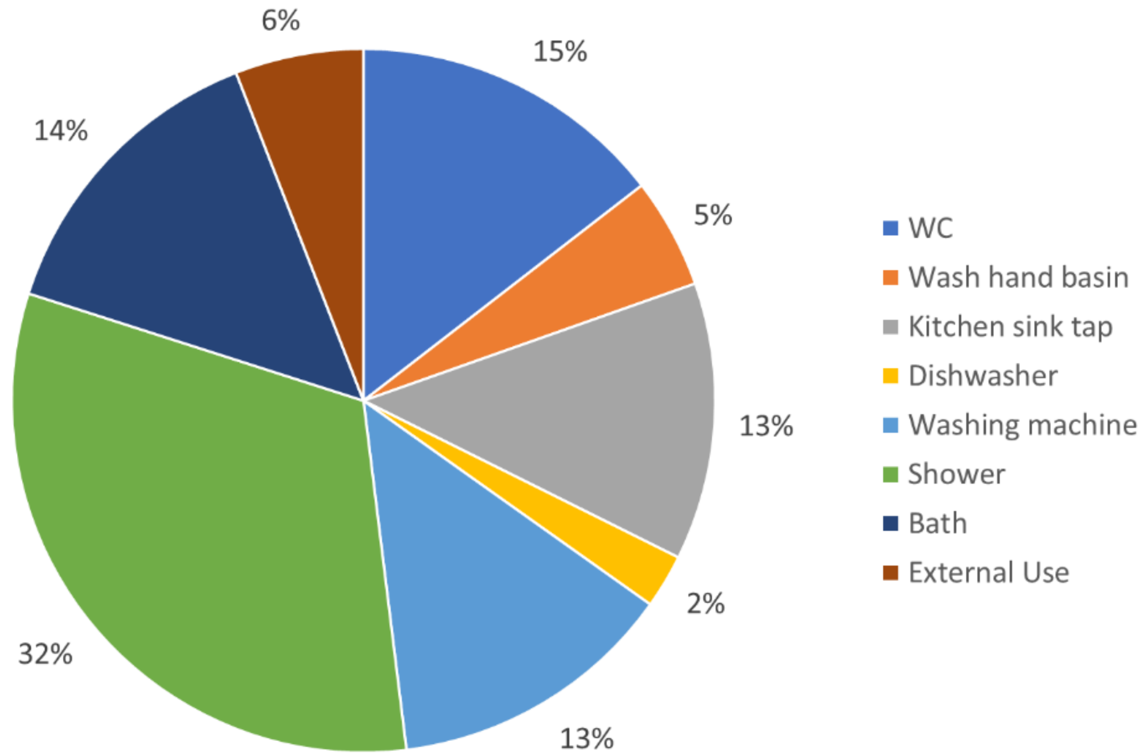
Table A-1 presents an example of how a per capita consumption of 85 litres per person per day can be achieved using the Water efficiency calculator for new dwellings provided in Appendix A of Part G of the Building Regulations 2010. This is for illustration purposes.

Table A-1 – Example – 85 litres per person per day

Installation type	Unit of measure	Capacity/Flow rate* (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day (4) = [(1)x(2)]+(3)
WC (dual flush) – full flush	Volume (L)	4	1.46	-	13.5
WC (dual flush) – half flush	Volume (L)	2.6	2.96	-	
Wash hand basin	Flowrate (L/min)	2	1.58	1.58	4.7
Kitchen sink tap	Flowrate (L/min)	3.5	0.44	10.36	11.9
Dishwasher	L/place setting	0.63	3.6	-	2.3
Washing machine	L/kg	5.86	2.1	-	12.3
Shower	Flowrate (L/min)	6.8	4.37	-	29.7
Bath	Volume (L)	120	0.11	-	13.2
Total Use (sum of column (4)) (5)					87,7
Normalisation factor (6)					0.91
Normalised total water consumption (7) = (5)x(6)					79.8
External Use (8)	l/p/d	5	-	-	5.0
Per capita consumption (9) = (7)+(8)					84.8

*Selected fixtures' flow rates and capacities are based on flow rates and capacities of existing products

Figure A-1 - Contribution of fitting and appliance water consumption towards per capita consumption



Appendix B

Non-Potable Water Supply - Optioneering Study for Residential Units

Appendix B presents a summary of the optioneering study carried out to determine whether a non-potable water supply could be provided to the residential units in the West of Ifield development. As mentioned before, this option was not pursued further but presents a potential alternative to the adopted strategy.

Demand for non-potable water is generated by toilets, washing machines and any external uses, as these do not require the use of potable water. This non-potable demand can be supplied through a variety of approaches including property-level or centralised rainwater harvesting (RWH) and/or greywater recycling (GWR), or blackwater recycling. These options are considered below.

Non-potable water demand

The non-potable water demand is calculated at 28.5 litres per person per day to meet demand from toilet flushing, washing machine and external use. Scaled up the whole development, this is equivalent to 192 cubic metres per day as detailed in Table B-1.

Table B-1 – Non-potable water demand (m^3/day) per phase and per character area

Phase	Neighbourhood Centre	Hillside and Woodland	The Meadows	River Valley	Total
Phase 2	34	25	21		80
Phase 3		20	19	6	46
Phase 4	10		22	16	49
Phase 5			18		18
Total	44	45	80	23	192

Non-potable water source

Rainwater harvesting

Rainwater harvesting (RWH) can be delivered at the property-level, with water collected from the roof and stored on each property, or through a semi or fully centralised system with large storage tanks, treatment plants and a reticulation system for distribution. A semi-centralised system is considered appropriate for the proposed development. This will include rainwater storage tank(s) (in addition to attenuation facilities for stormwater) and treatment plant(s) with a non-potable network serving each of the residential properties.

Rainwater yield (i.e. the amount of rainwater that can be captured, treated and then supplied as a non-potable source) was calculated using the methodology specified in British Standard

BS EN 16941-1:2024[33] (Basic approach) and is summarised in Table B-2. Site wide, when considering residential units only, the normalised rainwater yield equates to 325 cubic metres per day. This source of water supply is thus sufficient to meet non-potable water demand.

Table B-2 – Normalised rainwater yield

Parameter		Value
Calculated collection area per dwelling (m^2)[34]	A1	25
	A2	35
	H2	79
	H3	93
	H4	106
	Total (a)	216,996
Yield coefficient[35] (b) – include Surface yield coefficient (0.8) multiply by hydraulic treatment coefficient (0.9)		0.7
Average rainfall (mm/year)[36] (c)		860
Daily rainwater collection (m^3/day) (d) = [(a)x(b)x(c)]/365		358
Normalisation factor (e)		0.91
Normalised rainwater collection (m^3/day) (f) = (d)x(e)		325

Greywater recycling

Greywater recycling uses water collected from showers, baths, and wash basins from the bathroom only. The greywater yield was calculated using the detailed approach specified in BS EN 16941-

33 British Standard BS EN 8515. 2013. Rainwater harvesting systems – Code of practice (accessed December 2023). The British Standards Institution 2013. ISBN 978 0 580 82813 3.
34 Callister, R. 2023. Minimum Space standards for new homes. Urbanist Architecture (accessed November 2023). (https://urbanistarchitecture.co.uk/minimum-space-standards/#:~:text=The%20best%20practice%20home%20sizes,bedroom%2C%206%2Dperson%20house.)
35 British Standard 8515. 2013. Rainwater harvesting systems – Code of practice (accessed December 2023). The British Standards Institution 2013. ISBN 978 0 580 82813 3.
36 https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcpdj5hby (Accessed November 2023

2:2021 (paragraph 6.2.4)[37]. Note that in this strategy, water from the washing machine is not accounted as a potential source of water for non-potable water supply. The greywater yield is normalised as per the requirements of the Part G water efficiency calculator. The calculated greywater yield is 43.3 litres per person per day, equating to 281 cubic metres per day for the development (Table B-3). This source of water supply is thus sufficient to meet non-potable water demand.

Table B-3 – Normalised greywater yield

Installation type	Unit of measure	Capacity/Flow rate* (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day (4) = [(1)x(2)]+(3)
Wash hand basin	Flowrate (L/min)	2	1.58	1.58	4.7
Shower	Flowrate (L/min)	6.8	4.37	-	29.7
Bath	Volume (L)	120	0.11	-	13.2
Total non-potable water supply (sum of column (4)) (5)					47.6
Normalisation factor (6)					0.91
Normalised total non-potable water supply (7) = (5)x(6)					43.3

Blackwater recycling

Blackwater is defined as domestic wastewater with faecal matter and urine and it is usually conveyed for treatment at sewage treatment works. However, similarly to greywater, blackwater can be treated to a non-potable standard on-site and used to meet demand from for toilet flushing, washing machines and external uses.

Blackwater yield has been estimated to be 90% of the baseline residential water demand in line with the wastewater abatement applied by Thames Water to calculate wastewater charges to domestic customers[38]. Consequently, the calculated blackwater yield is **76.5 litres per person per day** or **514 cubic metre per day** for the development. The treatment requirements for recycling blackwater are considerably greater than for greywater and rainwater, incurring additional costs. The treatment would reduce the calculated yield. It is however estimated that this source of water supply is sufficient to meet non-potable water demand.

[37] British Standard EN 16941-2:2021. On-site non-potable water systems, Part 2: Systems for the use of treated greywater (accessed March 2024). The British Standards Institution 2021.
[38] Thames Water (2024), Reduce your wastewater bill (https://www.thameswater.co.uk/help/account-and-billing/understand-your-bill/reduce-your-wastewater-bill - accessed March 2024)

Source shortlisting

A qualitative multi-criteria decision analysis was carried out using a red, amber, green score to shortlist the best source for a non-potable supply, the results of which are presented in Table B-4. The scores are based on implementing centralised or semi-centralised systems.

Table B-4 – Multi-criteria decision analysis

Source	Total cost	Total Net Benefit	Risk to public health (pre-treatment)	Regulations and standards	Resilience
Rainwater harvesting	G	G	G	G	A
Greywater recycling	A	G	A	G	G
Blackwater recycling	R	A	R	R	G

Cost and benefits

In 2020, on behalf of Waterwise, Ricardo Energy & Environment carried out an independent review of the costs and benefits of rainwater harvesting and greywater recycling options in the UK[39]. In this study, the implementation of rainwater harvesting and greywater recycling systems in new small to large developments were assessed in terms of capital, operating and carbon costs, water cost savings (private net benefits) and societal benefits (flood reduction, reduced demand for additional water infrastructure), assuming a system life span of 20 years. The relevant results of the cost benefit analysis are shown in Table B-5.

The study shows that:

- Rainwater harvesting in residential development has a positive total net benefit whatever the size of the development, although these benefits increase with size.
- Greywater recycling remains attractive for large developments; smaller installations have been shown to not be privately or socially beneficial, unless subsidised.

The cost of blackwater recycling is less reported in the UK context. However, it will be assumed that if implemented, a blackwater treatment plant would treat all wastewater generated by the development and as such, the size of it will be similar to the Old Ford Water Recycling Plant, which provided non-potable water to the Queen Elizabeth Olympic Park in

[39] Ricardo (2020), Independent review of the costs and benefits of rainwater harvesting and greywater recycling options in the UK (https://www.susdrain.org/files/resources/evidence/Ricardo_Independent-review-of-costs-and-benefits-of-RWH-and-GWR-Final-Report.pdf), accessed March 2024

London between 2012 and 2019. Capex of this plant is reported to be £7m. No information on operating costs were found.

Table B-5 – Cost and benefit estimation (reproduced from Ricardo Energy & Environment's study)

Non-potable water source	Yield	Example building types	Costs (CAPEX + OPEX; '000 £)	Total water cost savings ('000 £)	Private net benefits ('000 £)	Societal benefits ('000 £)	Total net benefit ('000 £)
Rainwater	Very Large (>5,000 m^2)	Large scale residential developments (including hybrid developments)	£35 - £60	£70 - £340	-£17 - £280	£30 - £920	£14 - £1,200
Greywater	Significant (>10,000 m^3)	High rise offices or blocks of flat, hotels, multi-purpose developments.	£270	£780	£510	£275	£787

Public health risks

The use of these non-potable water sources will bring a certain risk to public health if misused (e.g. cross-connection with a potable water main, use for a purpose other than the one it is fit for).

Rainwater is the source presenting the lowest risk to public health. Roof-harvested rainwater can be contaminated with microbial contamination from animal faeces, chemicals leaching from roof material or via atmospheric deposition, and solids (e.g. leaves). When selecting rainwater harvesting, it is recommended that rainwater is collected from rooftops. If rainwater is also harvested from surface water run-off, other micropollutants may be present such as heavy metals, hydrocarbons, road salts, pesticide, etc, depending on activities occurring on-site (e.g. industrial park); as such a higher level of treatment will be required.

Greywater quality is highly dependent of the household or non-household activities. Greywater can be contaminated with microbial compounds, cleaning and personal care products, nutrients, oil and grease and suspended solids. Consequently, biological treatment followed by filtration is often used to mitigate those risks before supply.

Blackwater contains the highest concentrations of chemical contaminants, bacteria, and pathogens. Consequently, this source will require the highest level of treatment.

As such, rainwater harvesting should be preferred over the two other sources unless it cannot meet the demand for non-potable application.

Regulations and standards

There is currently no regulation on water reuse in the UK. However, there are British Standards covering the choice, design, maintenance and operation of on-site non-potable water systems, focussing on rainwater harvesting, stormwater harvesting and greywater recycling. There is no guidance with regards to the reuse and recycling of other alternative sources to non-potable supply. These British Standards are:

- BS EN 8595:2013 Code of practice for the selection of water reuse systems.
- BS EN 16941-1:2024 On-site non-potable water systems. Part 1: Systems for the use of rainwater.
- BS EN 8525-1:2010 Greywater systems – Code of practice.
- BS EN 8525-2:2011 Greywater systems – Domestic greywater treatment equipment. Requirements and test methods.
- BS EN 16941-2:2021 On-site non-potable water systems – Systems for the use of treated greywater.

Supply resilience

Rainwater harvesting is dependent on rainfall and as such, while the system may be designed to meet guidance from BS EN 16941-1:2024, the supply may not be available during extreme and severe drought.

Greywater recycling generates enough yield to meet non-potable demand in a residential setting. However, this is not the case in a non-residential setting, where the demand is higher than the supply available. Greywater recycling is more efficient in a mixed-use development.

Blackwater recycling will generate enough yield to meet non-potable water demand, both for the residential and non-residential developments.

Conclusion

Based on the above and for the purpose of this strategy, rainwater harvesting was identified as the best source for a non-potable water supply for the proposed development. This solution provides sufficient yield to meet non-potable demand at the least cost, with the least public health risk. However, in the case of residential houses, a non-potable supply will not be provided.

Appendix C

Non-Residential Units - BREEAM WAT01 Calculator

Appendix D

Ifield Golf and Country Club Water Bills

WSP

Table D-1 - Average Daily Water Use from the Golf and Country Club (Based on Actual Meter Readings)

There are two water meters on for on the grass and one at the back.

Meter 1	**Location: On grass verge between entry and exit roads map**			
Date	Actual meter readings	Number of days covered	Total volume (m^3)	Daily usage (m^3/d)
08/11/2021	13786	109	739	6.78
25/02/2022	14525	67	529	7.90
03/05/2022	15054	Average		7.34
Meter 2	**Location: At back of club house concrete cvrnow read main 97229**			
Date	Actual meter readings	Number of days covered	Total volume (m^3)	Daily usage (m^3/d)
03/10/2018	432	196	1049	5.35
17/04/2019	1481	1045	844	0.81
25/02/2022	2325	Average		3.08
TOTAL				**10.42**

Appendix E

Groundwater Hydrogeological Risk Assessments

Appendix F

Pumping Tests - Factual Report

Appendix G

Private Water Supply – Rainwater Harvesting Storage Tanks

Appendix H

Illustrative Landscape Masterplan

7 Lochside View
Edinburgh Park
Edinburgh, Midlothian
EH12 9DH

wsp.com