



**Water Neutrality Assessment for Proposed
Development at Crouchlands Farm, West Sussex
RH14 0LE**

March 2022

Project No. 3177

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Issue History

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| - | 01-09-2021 | Preliminary | |
| A | 06-01-2022 | Updated to suit comments | |
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| C | 28-03-2022 | Updated to suit comments | |

1. INTRODUCTION

- 1.1. WARD Associates Consulting Engineers Limited have been commissioned by DLBP Ltd, on behalf of Artemis Land and Agriculture Ltd (the landowner), to prepare a water neutrality report to support the planning application for the proposed development of the Whole Farm Plan at Crouchlands Farm, Rickman's Lane, Plaistow, West Sussex RH14 0LE. The project will aim at developing sustainable rural/commercial business enterprises to improve the local community and create job opportunities. The Whole Farm Plan consists of the farm hub, equestrian centre, rural enterprise centre, glamping site, food and retail centre and agricultural areas for continued farming activities (see Appendix A)
- 1.2. The report focuses on water neutrality and provides strategies to achieve this goal. It is based on the principles in "Water Neutrality Study – JBA Consulting (July 2021)" and documents released by the Environment Agency.
- 1.3. The assessment will draw a comparison between estimated existing and proposed water demand to prove no increase in overall water abstraction from Hardham Treatment Works as a result of the proposed development.
- 1.4. No other third party may rely upon or reproduce the contents of this report without the written approval of WARD Associates (Consulting Engineers) Ltd. If any unauthorised third party comes into the possession of this report, they rely on it entirely at their own risk and WARD do not owe them any Duty of Care or Skill.

2. EXISTING SITE

2.1. Crouchlands Farm is within the ownership of Artemis and is approximately 194 ha in size. It comprises agricultural buildings with associated hard standing, open fields in agricultural use as improved pasture fields (grazed and / or used for silage production), and areas of woodland. The Farm also comprises a residential dwelling towards the north of the site, Hardnip's Barn, that is currently vacant and in need of significant improvement to raise it to a habitable standard. The 'Whole Farm Plan' application boundary is approximately 51 hectares.

Background and history

2.2. Crouchlands Farm supported a dairy herd and produced biogas until 2017, when the herd was sold and the decommissioning process of the biogas plant (Anaerobic Digester facility ("AD facility")) began, following an enforcement notice being served by Chichester District Council. Most of the farm comprises improved pasture fields, which have been grazed and/or used for silage production.

The management of the AD facility required the disposal of a waste product known as digestate, which was spread across these fields as liquid fertiliser. Digestate is a nutrient rich material, a by-product from the use of slurry in the production of biogas. The farm buildings that supported the dairy herd are situated in the northern half of the farm, accessed via Rickman's Lane.

Prior to the enforcement notice being served, it is understood that the farm was subject to poor management, resulting in incidences of pollution and the establishment of a large lagoon without planning permission. The new owners, Artemis Land and Agriculture Ltd, have now spent two years remediating damage to the farm from this poor practice, and the Proposed Development aims to establish measures to help improve the biodiversity value of the farm and thus help to offset the effects of the historic damage.

Crouchlands Farm site was put into Receivership in 2017, following the failure of two businesses operating on the site called Crouchland Farm Limited and Crouchland Biogas Limited, both of which were in Administration until 10 January 2019. West Sussex Agri Limited was the senior creditor in the Receivership and the Administrations. Artemis Land & Agriculture, owned by West Sussex Agri Limited, purchased the site, excluding the area known as Lagoon 3, from the Receiver in 2019.

Artemis' purpose in purchasing Crouchlands is to bring forward plans for the long-term development and operation of rurally orientated and environmentally

sustainable business enterprises which will improve the use of the site, support the local community, and provide sound employment opportunities.

The plans are being developed in discussion with the Coast to Capital Local Enterprise Partnership, in the context of the Gatwick 360 Strategic Economic Plan and the emerging Local Industrial Strategy. The opportunities for the provision of land-based education and woodland enterprises are being discussed with Brinsbury College, part of the Chichester College Group.

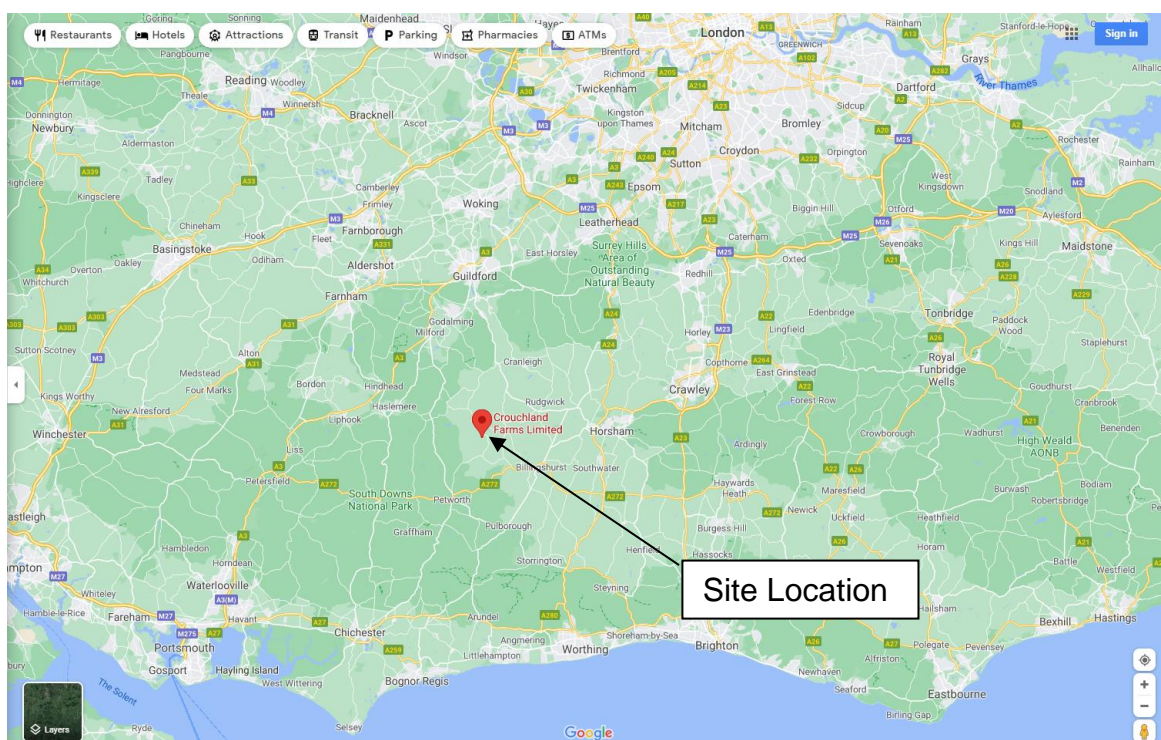


Figure 1 – Site Location plan

2.3. The application site comprises the existing access point from Rickman’s Lane, the existing farm buildings (comprising the large cattle shed and workshop, existing barns and the portakabins currently accommodating Artemis’s office and welfare facilities), Hardnip’s Barn to the west and the existing fields to the south and west of the existing farm buildings. The southern field also includes an existing agricultural building.

The application site encompasses areas of woodland including Hardnip’s Copse (immediately west of the existing farm buildings) and Lime Kiln Wood (to the north west of the application site). The area known as ‘Lagoon 2’, which is currently undergoing restoration, is also included to the far west of the application boundary.

- 2.4. Topographically the site slopes from the South West to North East, from the highest point of approximately 61.50m AOD in the South West corner to the lowest of 35.00m AOD in the North East corner. A copy of the existing topographical survey is attached in Appendix A.

3. PROPOSED DEVELOPMENT

3.1. The development proposal comprises diversification of the farm to provide a Rural Food and Retail Centre, Rural Enterprise Centre, equestrian centre, a glamping facility, and at its hub, the retention of the existing operational farm. The description of development is as follows:

The regeneration of Crouchlands Farm, comprising demolition of selected buildings, extension, refurbishment and remodelling of selected buildings and the erection of new buildings to provide up to a total of 17,169 m² (including retained / refurbished existing buildings) comprising the existing farm hub (sui generis), a rural enterprise centre (Use Classes E, C1 and F1), a rural food and retail centre (Use Class E), an equestrian centre (Use Class F2) and a glamping site (sui generis); Refer to Appendix A for proposed site plans, drawings 463-PA-05 G.

| Schedule of Accommodation | | |
|------------------------------|------------------------------------|--------------------------------------|
| Element | Use | Maximum Floorspace (m ²) |
| Farm Hub | Sui generis | 2000 |
| Rural Enterprise Centre | E (Office and Light Industrial) | 3175 |
| | C1 (Staff / Student Accommodation) | 230 |
| | F1 (Education and Training) | 650 |
| Rural Food and Retail Centre | E (Retail and Cafe) | 1607 |
| | F1 (Education and Training) | 315 |
| Equestrian Centre | F2 (Assembly and Leisure) | 7788 |
| | C1 (Staff / Student Accommodation) | 320 |
| Glamping and Hardnips Barn | Sui generis (Glamping) | 824 |
| | E (Restaurant / Bar) | 260 |
| Total | | 17169 |

Table 3.1 – Schedule of accommodation

3.2. The Whole Farm Plan seeks to remediate and regenerate Crouchlands Farm by proposing high welfare, low impact and low intensity farming activity, mixed use rural diversification development, rural food and retail opportunities, AgriTech facilities, and the development of a range of premium leisure uses. These are to be taken forward via the five elements of the Whole Farm Plan, which are all intrinsically linked to one another and are as follows:

- farm hub - a small scale, high welfare, low impact, low intensity livestock operation at the north of the existing farm site, supported by approximately 2,000 m² of refurbished agricultural buildings for over-wintering of livestock;
- Rural Enterprise and Education Centre - the refurbished farm buildings to the south of the existing farm site would provide a range of commercial and education uses. This includes approximately 3,825 m² use classes E and F1 together with the provision of approximately 230 m² of live-work accommodation for students or staff who are staying at the site (use class C1);
- Rural Food and Retail Centre - this new building, to the south of the access road, would provide up to 1,922m² of retail space (use class E and F1), including the development of a farm shop, café and cookery school with an associated kitchen garden;
- Equestrian Centre - this new leisure facility, also to the south of the main access road, would provide 40 livery boxes, indoor and outdoor arenas, a hay barn, circular horse walk, enclosed paddocks, a riding school and a club house covering approximately 7,788 m² (use class F2). There will be live-work accommodation for staff who are staying at the site for health and safety purposes (use class C1);
- Hardnip's Barn and glamping - this area would provide luxury and comfortable cabins in a serviced glamping site covering approximately 1,084 m² (use classes sui generis and E). Hardnip's Barn will also provide a restaurant space for glamping guests to relax, and will also host workshops and events such as weddings.

4. BACKGROUND AND RATIONAL FOR REPORT

4.1. Natural England is concerned that existing water abstraction in the Sussex North Water Resource Zone, which supplies part of the north of the district, is having an impact on protected sites in the Arun Valley. The increasing demand for water is thought to be harming internationally protected species, with the potential threat of extinction for some of these species. In response to this, Natural England has advised that new developments within this zone must not add to this impact.

4.2. Map Showing area of Chichester District within the Sussex North Water supply Zone which the Crouchlands Farm lies within.

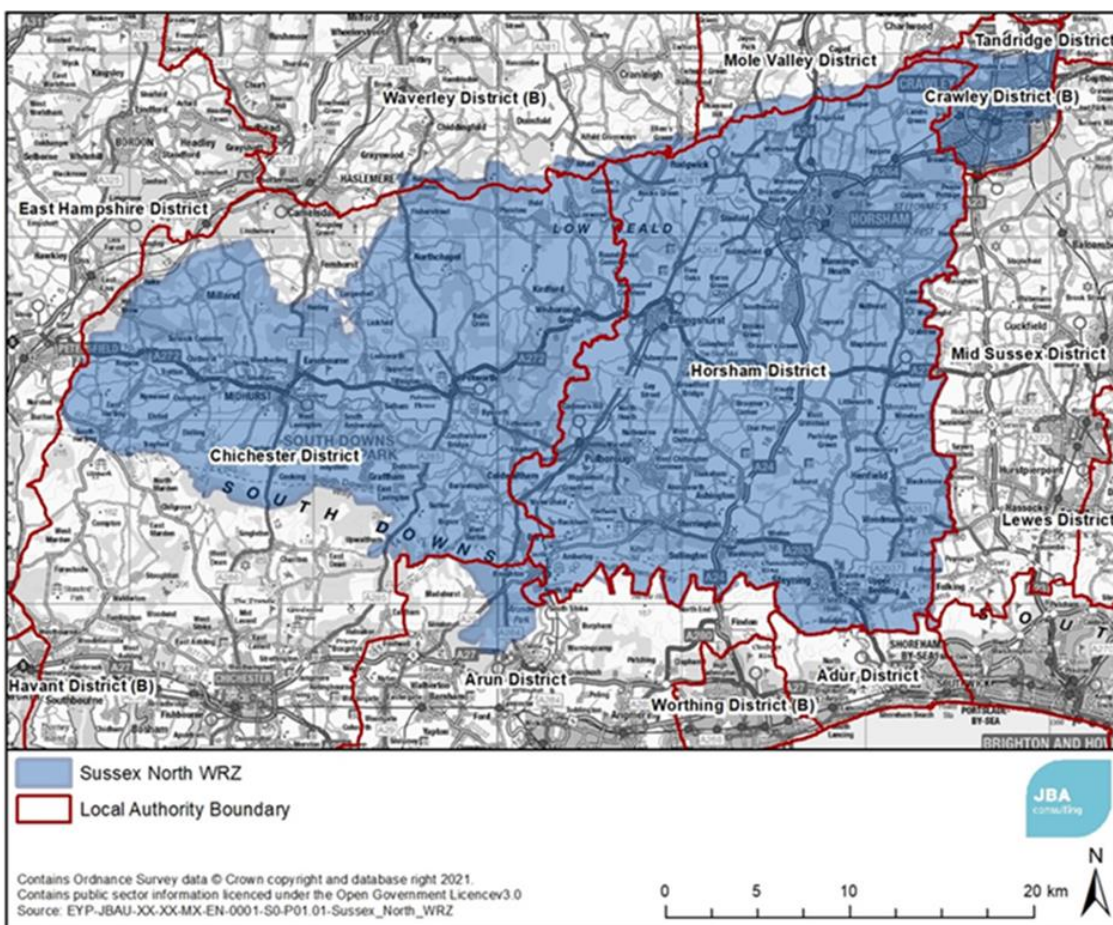


Figure 2 – Sussex North Water supply Zone

4.3. Abstraction is the permanent or temporary removal of water from a river, lake, reservoir, canal, estuary or groundwater. It changes the natural flow pattern and the amount of water in the environment. This can reduce the amount of habitat, prevent natural movement of species and concentrate pollution in the water environment. Abstracted water is used by everyone in their day to day lives for:

drinking water; cleaning; irrigating crops; supporting industry; producing food; generating power; and, for use in households and many other goods and services.

4.4. Natural England has raised concern that further water extraction in the affected area may be having an adverse impact on protected sites in the Arun Valley. It has advised that any development must be 'water neutral' if it is to proceed. This means that new development should not increase the rate of water abstraction from the current water supply site above existing levels.

4.5. This report follows the guidance provided in Natural England's Position Statement for Applications within the Sussex North Water Supply Zone (September 2021) and the Arun Valley and Water Neutrality – frequently asked questions (FAQs) - Developers – December 2021. Both of these documents are contained within Appendix D for reference.

5. METHODOLOGY

- 5.1. The water demand for the Whole Farm Plan is considered independently from any future development.
- 5.2. A comparison of the existing water demand with the proposed water demand has been undertaken with measures proposed to achieve water neutrality.
- 5.3. Daily water demand for various livestock relies upon normal values recommended by the Department of Agriculture, Environment and Rural Affairs (DAERA) and NOT the optimum values mentioned in "Optimum Use of Water for Industry and Agriculture Dependent on Direct Abstraction" (see table 4.1). Since the number of livestock is ever-changing, for each category the maximum value of that reflects the farm capacity has been considered in existing demand.

| Cattle | Amount of water (litres/day) |
|-------------------|-------------------------------------|
| Cow with calf | 50 |
| Dairy cow in milk | 68 - 155 |
| Yearling | 24 -36 |
| 2 year old | 36 - 50 |

| Pigs | Amount of water (litres/day) |
|----------------------|-------------------------------------|
| Lactating sow | 18 - 23 |
| Gestating sow / boar | 13 - 18 |
| Fattening pig | 3 - 10 |
| Weaner | 1 - 3 |

| Poultry (per 1000) | Amount of water (litres/day) |
|---------------------------|-------------------------------------|
| Broilers (1-4 weeks) | 50 - 250 |
| Broilers (5-8 weeks) | 345 - 470 |
| Laying fowl | 180 - 320 |
| Pullets | 30 - 180 |

| Sheep | Amount of water (litres/day) |
|--------------------|-------------------------------------|
| Ewe with lamb | 9 - 10.5 |
| Pregnant ewe / ram | 4 - 6.5 |

Table 4.1 – Drinking water requirements for livestock

- 5.4. The water demand for the Whole Farm Plan has been considered for, with and without optimisation scenarios which are based on number of employees/visitors and users.
- 5.5. The British Water code of practice, Flows and Loads 4 has been used to determine the water usage for each element of the Whole Farm Plan. A copy of the table is shown in Figure 3.



BRITISH WATER
expertise worldwide

Table of Loadings for Sewage Treatment Systems

| Per person / activity / day (unless otherwise specified) | FLOW | BOD | Ammonia as N |
|---|----------|---------|---------------------|
| (Grams) | (Litres) | (Grams) | |
| DOMESTIC DWELLINGS | | | |
| Standard residential | 150 | 60 | 8 |
| Mobile home type caravans with full services | 150 | 60 | 8 |
| INDUSTRIAL | | | |
| Office / Factory without canteen | 50 | 25 | 5 |
| Office / Factory with canteen | 100 | 38 | 5 |
| Open industrial site, e.g. construction, quarry, without canteen | 60 | 25 | 5 |
| *Full-time Day Staff | 90 | 38 | 5 |
| *Part-time Staff (4 hr shift) | 45 | 25 | 3 |
| SCHOOLS | | | |
| Non-residential with canteen cooking on site | 90 | 38 | 5 |
| Non-residential without a canteen | 50 | 25 | 5 |
| Boarding school (i) residents | 175 | 60 | 8 |
| (ii) day staff (inc. mid-day meal) | 90 | 38 | 5 |
| HOTELS, PUBS & CLUBS | | | |
| Hotel Guests (Prestige hotels) | 300 | 105 | 12 |
| Hotel Guests (3 rd & 4 th hotels) | 250 | 94 | 10 |
| Guests (Bedroom only – no meals) | 80 | 50 | 6 |
| Residential Training/Conference Guest (inclusive all meals) | 350 | 150 | 15 |
| Non residential Conference Guest | 60 | 25 | 2.5 |
| Drinkers | 12 | 15 | 5 |
| Holiday camp chalet resident | 227 | 94 | 10 |
| Resident Staff | 180 | 75 | 10 |
| Restaurants - Full Meals - luxury catering | 30 | 38 | 4 |
| - pre-prepared catering | 25 | 30 | 2.5 |
| - Snack Bars & bar meals | 15 | 19 | 2.5 |
| - Function Rooms including buffets | 15 | 19 | 2.5 |
| - Fast Food i.e. (roadside restaurants) | 12 | 12 | 2.5 |
| - Fast Food Meal (burger chain and similar) | 12 | 15 | 4 |
| Students (Accommodation only) | 100 | 60 | 8 |
| AMENITY SITES | | | |
| Toilet Blocks (per use) | 10 | 12 | 2.5 |
| Toilet (WC) (per use) | 10 | 12 | 2.5 |
| Toilet (Urinal) (per use) | 5 | 12 | 2.5 |
| Toilet Blocks in long stay car parks/lorry parks (per use) | 10 | 19 | 4 |
| Shower (per use) | 40 | 19 | 2 |
| Golf Club | 20 | 19 | 5 |
| Local community sports club, e.g. squash, rugby & football | 40 | 25 | 6 |
| Swimming (where a separate pool exists without an associated sports centre) | 10 | 12 | 2.5 |
| Health Club/Sports Centre | 50 | 19 | 4 |
| Tent sites | 75 | 44 | 8 |
| Caravan Sites - (i) Touring not serviced | 100 | 44 | 8 |
| (ii) Static not serviced | 100 | 44 | 8 |
| (iii) Static fully serviced | 150 | 60 | 8 |
| HOSPITALS & RESIDENTIAL CARE HOMES | | | |
| Residential old people / nursing | 350 | 110 | 13 |
| Small hospitals | 450 | 140 | Assess |
| Large hospitals | | | Assess individually |

*Staff figures also apply to other applications

Figure 3 – British Water – Flow and Loads Table

5.6. Two water demand scenarios have been considered within the calculations of proposed demand. The first is with no optimisation and the second is in line with BREEAM recommendations achieving a 40% reduction. The solutions for achieving a 40% reduction in water demand is discussed later in this report.

6. EXISTING WATER DEMAND

- 6.1. The farm is currently used for livestock farming with a mix of Cows, Pigs and Sheep. There are also 2 mobile homes on site used by the farm staff.
- 6.2. As noted in section 5 the livestock daily water demand values as provided by Department of Agriculture, Environment and Rural Affairs (DAERA).
- 6.3. It is noted the number of livestock is ever-changing, the existing demand is based on the projected figures for 2022.
- 6.4. In Appendix B the total existing demand for the farm livestock is calculated as 4649.4 m³/annum.
- 6.5. The water demand usage for the existing farm including mobile home has been calculated as 547.5m³/annum. This is based on a water demand use of 150l/p/d from the British Water Flows and Loads as shown in figure 3.
- 6.6. This results in a total water demand for the existing site of 5196.9 m³/annum.
- 6.7. It is noted that the existing farm has capacity to serve additional livestock. It has been advised that the farm could accommodate:
 - 180 Cattle – advised by existing owner
 - 112 Pigs
 - 1482 Sheep – Based on 6 sheep per acre over 100 Ha site area.
- 6.8. As shown in Appendix B if the above livestock figures are used the existing water usage would be 8219m³ / annum.

7. PROPOSED WATER DEMAND

7.1. The proposed water demand for the development has been calculated by considering the anticipated users and staff for each element of the development. The staffing and user numbers are based on the anticipated use and reflect the vales used in the Transport Assessment.

7.2. The British Water code of practice, Flows and Loads 4 has been used to determine the water usage for each element of the Whole Farm Plan. A copy of the table is shown in Figure 3.

| Whole Farm Plan | | | | | | | | |
|-------------------------------------|-------------|-----------|---|----------------------------|-----------------------|---|--|--|
| Development | Use Class | Area (m2) | Average no. of visitors / occupants per day * | Average no. of employees * | Total number of users | British Water code of practice lit/p/d *4 | Building Regs. standard annual demand (m3) - No optimisation | Achievable annual demand based on 40% reduction in line with via BREEAM Standards (m3) |
| Equestrian Centre | F2 | 8108 | 10 | 20 | 30 | 40 | 438.0 | 262.8 |
| | E | 1607 | 202 | 30 | 232 | 30 | 2542.0 | 1525.2 |
| Rural Food & Retail | F1 | 315 | 0 | 5 | 5 | 15 | 27.4 | 16.4 |
| | Sui Generis | 824 | 36 | 5 | 41 | 100 | 1496.5 | 897.9 |
| Glamping and Hardnips Barn | E | 260 | 0 | 6 | 6 | 100 | 219.0 | 131.4 |
| | E | 3175 | 86 | 64 | 150 | 50 | 2737.5 | 1642.5 |
| Rural Enterprise & education Centre | C1 | 230 | 0 | 2 | 2 | 175 | 127.8 | 76.7 |
| | F1 | 650 | 0 | 5 | 5 | 90 | 164.3 | 98.6 |
| Farm Hub | Sui Generis | 2000 | 0 | 4 | 4 | 100 | 146.0 | 87.6 |
| Total = | | | | | | | 7898.3 | 4739.0 |

Figure 4 – Extract from Proposed Water demand Calculations

7.3. A copy calculations for the water demand for the whole farm plan development area is contained in Appendix C. The total demand for the whole farm plan excluding livestock demand and no betterment is 7898.3m³/annum.

7.4. The remainder of the farm will be used for livestock farming with a mix of Cows, Pigs and Sheep similar to existing.

7.5. As noted in section 5 the livestock daily water demand values as provided by Department of Agriculture, Environment and Rural Affair (DAERA).

7.6. The number of livestock is ever-changing, the proposed demand is based on the projected figures for 2022.

7.7. In Appendix C the demand from livestock is calculated as 4649.4 m³/annum.

7.8. A range of scenarios have then been considered to determine options for achieving Water Neutrality on the development against the existing water usage on the site.

These are summarised below:

| Water Demand Summary | Total m3/annum | Amount to Offset |
|--|----------------|------------------|
| Existing water demand | 5196.9 | n/a |
| Proposed water demand from WFP + Livestock with no optimisation | 12547.7 | 7350.84 |
| Proposed water demand from WFP with 40% reduction in line with BREEAM + Livestock | 9388.4 | 4191.50 |
| Proposed water demand from WFP with 40% reduction in line with BREEAM + Livestock served by rainwater harvesting | 4739.0 | -457.87 |

Figure 5 – Water Demand Summary

7.9. As can be seen in figure 5 if no water saving measures are implemented then the proposed development will result in a 7350.8 m3 / annum increase in water demand on the site.

7.10. It is first proposed to reduce the water usage from the Whole Farm Plan by 40% in line with BREEAM standards. This will be achieved by a combination of:

- Rainwater harvesting – Harvesting rainwater for toilet flushing and garden use
- Smart metering – Allows users to automatically track the amount of water they use giving greater visibility and control over water usage
- Leakage detection/reduction – Identifying leak and undertaking repairs to minimise water wastage
- Use of water efficient fittings – Selection of appropriate Toilets, Urinals, Taps, Showers, Baths, Dishwashers and Washing Machines can achieve significant water usage savings
- Use of water butts in gardens - Harvesting rainwater for garden use
- Water saving culture – Educating users on water usage to enable them to make informed decisions on how they use water

- 7.11. The use of the above tools has been proven as effective in reducing water usage by 40% of British Water Code for Practice values.
- 7.12. By implementing these measures this will reduce the increase in water demand for the development from 7350.8 m³ / annum to 4191.5 m³ / annum.
- 7.13. It is also proposed to utilise rainwater harvesting to serve the livestock demand. Given the annual rainfall for the site of 808mm / annum the area of rainwater harvesting required to serve the livestock would be circa 5754m². This could be provided by ponds and lakes located around the site to suit the site topography.
- 7.14. If both the 40% reduction in water usage for the whole Farm Plan and the use of rainwater harvesting is implemented for the Livestock demand this would result in a reduction of 457.9 m³ / annum in water demand on the site compared to existing.
- 7.15. These methods are relatively simply to implement to achieve Water neutrality on the site. These options are all based on the existing water demand on the site. As noted above the current livestock is not at full capacity.

8. RECOMMENDATIONS & CONCLUSIONS

- 8.1. As detailed above, by implementing some relatively simple measures the proposed development will be able to achieve a reduction in water demand. This is based on the current water demand for the site given the current livestock numbers. It is noted the existing farm has capacity to accommodate additional livestock which could increase the existing demand further.
- 8.2. The proposed development would result in a 7350.8m³ / annum increase in water demand on the site if no water usage reduction measures were implemented.
- 8.3. It is proposed to reduce the water usage from the Whole Farm Plan by 40%. The original water demand usage is based on the British Water code of practice. There are several options for reducing water demand and the more that are utilised the larger the achievable reduction.
- 8.4. BREEAM sets out credits for the Wat 01 category based on water usage reduction below the baseline figure. As can be seen from table 1 the achievement of a 40% reduction is an average reduction would achieve 3 out of 5 possible credits.

| % improvement | No. of BREEAM credits |
|---------------|----------------------------------|
| 12.5 | 1 |
| 25 | 2 |
| 40 | 3 |
| 50 | 4 |
| 55 | 5 |
| 65 | Exemplary performance (1 credit) |

Table 1 – BREEAM Wat 01 Credits

- 8.5. The requirements to achieve a 40% reduction is detailed within the BREEAM standards. The selection of appropriate water efficient products as shown below can be used to achieve the proposed 40% reduction.

| Component | Performance Levels (quoted numbers are minimum performance required to achieve the level) | | | | | | Unit |
|----------------------|---|-----|------|------|------|------|---------------------------------|
| | Base | 1 | 2 | 3 | 4 | 5 | |
| WC | 6 | 5 | 4.5 | 4 | 3.75 | 3 | Effective flush volume (litres) |
| Wash hand basin taps | 12 | 9 | 7.50 | 4.50 | 3.75 | 3 | litres/min |
| Showers | 14 | 10 | 8 | 6 | 4 | 3.50 | litres/min |
| Baths | 200 | 180 | 160 | 140 | 120 | 100 | litres |

| Component | Performance Levels (quoted numbers are minimum performance required to achieve the level) | | | | | | Unit |
|--|---|----|------|------|------|------|---|
| | Base | 1 | 2 | 3 | 4 | 5 | |
| Urinal (2 or more urinals) | 7.50 | 6 | 3 | 1.50 | 0.75 | 0 | litres/bowl/hour |
| Urinal (1 urinal only) | 10 | 8 | 4 | 2 | 1 | 0 | litres/bowl/hour |
| Greywater/ rainwater system | 0 | 0 | 0 | 25 | 50 | 75 | % of WC/urinal flushing demand met using recycled non-potable water |
| Kitchen tap: kitchenette | 12 | 10 | 7.50 | 5 | 5 | 5 | litres/min |
| Kitchen taps: restaurant (pre-rinse nozzles only) | 10.30 | 9 | 8.30 | 7.30 | 6.30 | 6 | litres/min |
| Domestic sized dishwashers | 17 | 13 | 13 | 12 | 11 | 10 | litres/cycle |
| Domestic sized washing machines | 90 | 60 | 50 | 40 | 35 | 30 | litres/use |
| Waste disposal unit | 17 | 17 | 0 | 0 | 0 | 0 | litres/min |
| Commercial sized dishwashers | 8 | 7 | 6 | 5 | 4 | 3 | litres/rack |
| Commercial/ industrial sized washing machines | 14 | 12 | 10 | 7.50 | 5 | 4.50 | litres/kg |

Figure 6 – BREEAM Table 43 Water efficient consumption levels by component type

- 8.6. As noted in figure 6 a minimum of 25% of WC/urinal flushing demand will be met using recycled non-potable water.
- 8.7. It is also proposed to utilise rainwater harvesting for garden use were possible.
- 8.8. It has been proven further reductions in water usage can be achieved by Smart metering, Leakage detection and employing a water saving culture.
- 8.9. The use of the above tools has been proven as effective in reducing water usage by 40% of British Water Code for Practice values.
- 8.10. By implementing these measures this will reduce the increase in water demand for the development from 7350.8 m³ / annum to 4191.5 m³ / annum.
- 8.11. It is proposed to utilise rainwater harvesting to serve the livestock demand. Given the annual rainfall for the site of 808mm / annum the area of rainwater harvesting required to serve the livestock would be circa 5754m². This could be provided by ponds and lakes located around the site to suit the site topography.

- 8.12. These ponds and lakes will not only provide a benefit in terms reduction in water demand but will also bring ecological benefits to the site promoting diverse wildlife growth.
- 8.13. If both the 40% reduction in water usage for the whole Farm Plan and the use of rainwater harvesting is implemented for the Livestock demand this would result in an overall decrease in water demand for the site of 457.9 m³ / annum compared to existing.
- 8.14. These options are all based on the existing water demand on the site. As noted above the current livestock is not at full capacity and existing demand could be higher if the farm was utilised to full capacity.

9. REFERENCES

1. *Optimum Use of Water for Industry and Agriculture Dependent on Direct Abstraction - WS Atkins Ltd & Cranfield University R&D Technical Report W157*
2. *Water Neutrality Study: Part A – Individual Local Authority Areas – JBA Consulting*
3. *Agriculture ready reckoner to help calculate water usage on farms*
4. *British Water Code of Practice – Flows and Loads 2 – Sizing criteria, treatment capacity for small wastewater treatment systems (package plants)*
5. *Crouchland Farm EIA Screening Report (PB9500-RHD-ZZ-XX-RP-Z-0001) – Royal HaskoningDHV Ltd*
6. <https://www.daera-ni.gov.uk/articles/water-advice-livestock-farmers>
7. https://www.breeam.com/ndrefurb2014manual/content/08_water/wat01_rfrb.htm

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