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1 Introduction

- 1.1 According to the Environment Agency Water Stressed Areas Classification 2021¹ West Sussex county is situated within an area of serious water stress. Parts of the county lie within Southern Water’s Sussex North Water Resource Zone (SNWRZ), which draws water from abstraction points within the Arun Valley.
- 1.2 Natural England issued a position statement in September 2021² stating that it cannot be concluded that existing abstractions in the SNWRZ are not having an adverse impact on the Arun Valley sites including the Arun Valley Special Area of Conservation (SAC), Special Protection Area (SPA) and RAMSAR site. Therefore, it must be proved that proposed development does not increase this potential impact by increasing demand for water resources.
- 1.3 At present, the only manner in which it can be proved beyond reasonable scientific doubt that proposed development would not exacerbate the impact of the current abstractions, is to show that there is no increase in abstraction within the SNWRZ. Therefore, all proposed development on sites within the SNWRZ must demonstrate “Water Neutrality” i.e. that water demand following development does not exceed the current water use on the site. Water Neutrality could be achieved by reducing the water demand through reduced occupancy and/or floorspace and/or installing water-efficiency measures, or through “offsetting” by reducing water demand elsewhere (for example retro-fitting existing development) within the catchment.
- 1.4 West Sussex County Council may not approve any planning applications that lie within the SNWRZ without the applicant satisfactorily demonstrating that the development will achieve water neutrality. Proposed

¹ <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>

² https://www.westsussex.gov.uk/media/17040/ne_positionstatement.pdf

measures must be quantified and secured by legal agreement or, if considered appropriate, by planning condition before development is allowed to proceed.³

- 1.5 Within the context of the Habitats Regulations, Natural England's position statement and recent case law, it is necessary for West Sussex County Council to consider the conclusions set out in applicants' Water Neutrality Statements (WNS) in order to prepare an Appropriate Assessment (AA) demonstrating that the legislative tests for demonstrating no adverse effect are passed. This means that the WNS must:
- Be based on established scientific methods, with all assumptions clearly evidence, and where uncertainty exists, comply with the precautionary principle which states that the worst possible scenario must be considered; and
 - Provide certainty that the assumptions on which the statement is based, including provision of any mitigation, will be delivered in a timely manner such that at no point in time does the water demand exceed the baseline water demand.
- 1.6 With this in mind, this Technical Note provides a review of the WNS submitted alongside the application for development extending the operation and revising the restoration plan at Rock Common Quarry near Washington (application reference WSCC/028/21).
- 1.7 An initial review, including advice for how to improve the WNS in terms of certainty and precautionality, was issued by Water Environment Limited in January 2023⁴. Following this review, additional evidence including calculations have been compiled by the applicant and a revised WNS has been completed.
- 1.8 The purpose of this Technical Note is to provide an independent review of the revised WNS. The following documents have been reviewed:
- Water Neutrality Statement by H2O Geo version 1.4 dated 6th March 2023 (document reference 220805-20220401P1); and
 - Associated documents submitted with application reference WSCC/028/21 obtained from the West Sussex planning portal.

2 Description of Development

- 2.1 The development is located at Rock Common Quarry, The Hollow, Washington. The application is for:

The continued winning, working and processing of sand from the existing Rock Common Quarry, the importation of inert classified engineering and restoration material, the stockpiling and treating of the imported material, the placement of the imported material within the quarry void and the restoration and landscaping of the quarry

- 2.2 According to the Environmental Statement Non-Technical Summary, the application has two primary components, firstly to extend the existing permission to work the remaining sand reserves within the quarry, and secondly, to alter the existing approved restoration scheme from wet restoration to a dry landform, which is considered to be safer and more sustainable. It is estimated that approximately 150,000 tonnes of sand reserves remains for extraction, with 5,500,000 tonnes of restoration material required. The combined period of extraction and restoration is estimated to be 8 to 10 years.
- 2.3 As a result of the first component of the application, an extension is sought to the timeframe of existing developments in the existing processing area (application reference DC/2151/07(W) – "importation of up to 10,000 tonnes per annum of aggregates to Rock Common Quarry for blending and re-sale" and application reference DC/554/05(W) – "importation of up to 5,000 tonnes per annum of soils and peat to Rock Common Sandpit for blending with indigenous sands and resale as growing medium"). The

³ <https://www.westsussex.gov.uk/planning/water-neutrality/>

⁴ 22180-WRC-TN-02-C01 dated 27/01/2023

application therefore results in the potential for retention of all facilities within the existing “processing area” north-east of The Hollow for the development lifetime. There is currently no indication within the application that the existing processing operations will cease once extraction is completed.

- 2.4 In terms of water resources, the site is currently supplied with water from two sources, water supply from the mains, which is supplied from within the SNWRZ, and from a licenced abstraction amounting to up to 6,000m³/day. The abstraction covers the need to dewater the quarry, and the licence is granted for the purposes of “dewatering and processing”. The dewatering has been taking place since sand extraction commenced in the 1920s. Groundwater is pumped predominantly into the nearby Honeybridge Stream, forming a significant source of flow in this stream, and it is proposed to continue pumping groundwater to protect the stream’s hydro-morphology and ecology. The stream is a tributary of the tidal River Adur.
- 2.5 The currently approved restoration plan could, among other issues, result in the potential for leachate contamination in the groundwater due to the combination of the cessation of pumping allowing local groundwater levels to rise, and the creation of a significant surface water body, in close proximity to local domestic waste landfill sites.
- 2.6 According to the Planning and Environmental Statement Volume 1, the existing development is equipped with administrative offices, workshop, stores and employee welfare facilities located within the “processing area” north-east of The Hollow. There is an office associated with the weighbridge, also in the “processing area”. It is understood that there are existing non-potable water uses on site that are supplied from the abstraction, for example a sand washing plant. As part of the proposed development, a new “restoration material reception area” (RMRA) is proposed which would include new offices and welfare unit, as well as a dedicated wheel-wash and vehicle cleaning facility.

3 Review of Current Water Neutrality Statement

- 3.1 The applicant submitted a WNS undertaken by H2Ogeo dated 16th September 2022 (document reference 20220401P1 version Final v1.0), submitted as part of Terrestria Limited’s response to a WSCC Regulation 25 Further Information request issued on 21st December 2021. This has subsequently been revised to version 1.4 following a previous review⁴ undertaken by Water Environment Limited on behalf of WSCC.
- 3.2 The WNS states that “the areas under consideration [...] do not include the quarry area, as no mains water is consumed in this part of the site”. The WNS discounts processing of sand and recycling from the assessment, indicating that these processes “will continue to use extracted groundwater until completion of the proposed restoration”. The WNS does not cover the quantities required for these processes or indicate whether these would be adequately met within the terms of the existing licence.

Existing (Baseline) Water Use

- 3.3 The WNS indicates that existing mains water facilities were confirmed based on a site visit. Facilities comprise a toilet block (two WCs, two urinals and wash hand basin), a kitchenette sink and an external tap used for drinking and vehicle wash down. The WNS notes that the existing washing plant is supplied from the groundwater abstraction. Existing consumption is calculated using the BREEAM UK New Construction (NC) 2018 WAT 01 calculator using a floor area of 34m² to generate a default occupancy of 3.77. The fittings specified are as follows:
 - WCs at 6 litres/flush;
 - Manually operated urinals specified at 7.5 litres/bowl across two urinal bowls;
 - WHB taps at 12 litres/minute;
 - Kitchenette taps at 12 litres/minute; and

- No dishwasher specified.
- 3.4 For the existing demand calculation, it is necessary, under the precautionary principle, to obtain a minimum estimate of demand. In the absence of evidence demonstrating fitting performances (for example a flow measurement survey), it is typical to assume BREEAM UK NC Baseline performance. The specifications above accord with this, except for the hand basin taps and kitchenette taps which should be 10 litres/minute, although it is noted that Table 41 is referenced later in the document, which refers to BREEAM International NC, which the figures quoted agree with. In general BREEAM UK NC is preferred, particularly when using the NC calculator, as in this case, since it is based on more applicable data and the tables were revised more recently (2018) than in the International code (2016). However, it is acknowledged that in this instance, the fittings are likely to pre-date the 2016 International code, and the differences are minor. Therefore the assumption is acceptably precautionary in this case. Not specifying a dishwasher is precautionary when setting an existing baseline since it estimates dishwashing use as zero. The calculated per person consumption is 37.65 litres/person/day.
- 3.5 The per person water demand has been multiplied by five persons to arrive at a daily consumption of 188 litres/day. Note that the use of five employees is higher than the default occupancy of 3.77 generated by the BREEAM methodology. Although it is acknowledged that the likely staff occupancy on the site in this instance will not be dictated by the size of the office, any increase in the default occupancy should be supported by evidence to provide sufficient certainty in the calculated demand. The WNS includes the Rock Common Organogram organisation chart (Annex D) which shows 5no. machine operators employed on the "east" site. Further employees are indicated, however it is understood that this chart represents the proposed work force and therefore the additional staff are not relevant to the baseline calculation. The use of a full time equivalent staff of 5no, across the water uses indicated in paragraph 3.3 is precautionary in terms of the baseline consumption calculation.
- 3.6 The WNS presents water bills covering the period from 11th March to 23rd November 2022. These period is represented by three estimated readings and one actual reading. Ideally visual readings of the meter would be used, however, estimated readings are typically based on long term average usage and therefore the estimated use is still relevant in the assessment of the baseline water use. In this case, the visual reading on 12th August is the same value as the preceding estimated reading of 23rd May- indicating that water consumption was lower than the anticipated use based on long-term averages in the period prior to the visual reading. At face value, the bills indicate a total use of 13m³ over 257 days, equivalent to an annual consumption of 18m³, or 73 litres/day based on standard working days. However, it is acknowledged that with only a single visual reading, combined with the adjustment to the long-term average use, this is misleading. Consequently, the revised long-term average consumption used in the most recent bill (12th August to 23rd November) would be a more appropriate source of long term trends. This is a total use of 7m³ over 103 days, equivalent to an annual consumption of 25m³, or 98 litres/day. For five employees, this is equivalent to 20 litres/person/day, slightly more than 50% of the calculated theoretical consumption.
- 3.7 As a result of the current use of the site as a quarry, the precise behaviours of the existing employees are not necessarily expected to be consistent with the practices of office based workers in terms of the use of comfort facilities. This is a source of uncertainty, and therefore, under the precautionary principle, the lower water usage rate indicated by the water bills i.e. 98 litres/day should be used to define the baseline water use.

Proposed Water Use

- 3.8 The proposed consumption includes the existing toilet block, reception and workshop kitchen. The new building in the RMRA is assessed based on facilities comprising three dual flush toilets (two male and one female), two urinals and four wash hand basins. The previous calculation allowed for an additional kitchenette sink and dishwasher, which is not included in the revised assessment. The existing facilities will remain, and will be decommissioned only following completion of the restoration. The proposed

consumption is calculated using the BREEAM UK NC 2018 WAT 01 calculator. The fittings specified are as follows:

- WCs at 6 litres/flush;
- Manually operated urinals specified at 7.5 litres/bowl across four urinal bowls;
- WHB taps at 12 litres/minute;
- Kitchenette taps at 12 litres/minute; and
- No dishwasher specified.

3.9 The accompanying text indicates that this calculation is undertaken for demonstration purposes based on fitting of BREEAM Baseline performance fittings. However, as in the existing calculation, the flow rates for the taps exceed the BREEAM UK NC Baseline performance, although performance is consistent with BREEAM International NC performance. In addition, although the accompanying text indicates that dishwasher use has been specified, this is not included in the calculation (this would add around 0.7 litres/person/day). Further, the organogram presented in Annex D indicates there may be a canteen/cleaning staff member, and therefore an allowance for food preparation and kitchen cleaning is required in the calculation (this could add around 9 litres/person/day to the demand calculation), unless it can be demonstrated that this use is not present. Note that it is important to ensure that the estimated occupancy rate in the BREEAM Calculator is correct when fixed uses are accounted for in the calculation, since the per person consumption will be incorrect if the BREEAM default occupancy differs from the actual occupancy rate for the site. Inclusion of the omitted elements could increase the per person calculated demand (at baseline fitting performance) to around 50 litres/person/day.

3.10 According to the organogram presented in Annex D, an additional 15 staff are anticipated, bringing the total site occupancy to 20. The WNS assumes up to three visitors per day each using the equivalent water as one full time employee. Although five visitor spaces are indicated in drawing DRCL/RCRA/WP 02, this allowance is considered to be a sufficiently precautionary assumption, since the anticipated visitor water demand would typically be lower than an employee demand. The per person water demand has been multiplied by 23 persons to arrive at a daily consumption of 900 litres/day. A second calculation is presented using BREEAM performance level 3 standard fittings, as follows:

- WCs effective flush at 4 litres/flush;
- Manually operated urinals specified at 1.5 litres/bowl across four urinal bowls;
- WHB taps at 4.5 litres/minute;
- Kitchenette taps at 5 litres/minute; and
- No dishwasher, canteen or cleaning specified.

3.11 Note that these performances do not agree precisely with BREEAM UK NC Table 8.3, but do agree with level 3 performance fittings from BREEAM International NC. The resulting per person demand is 18.69 litres/person/day (430 litres/day in total), however accounting for dishwashing, canteen and cleaning uses, this could rise to up to 29 litres/person/day depending on the dishwasher specified (667 litres/day). The WNS includes details and the specification for the proposed wheel wash, which is a 100% recovery system, which only requires a water supply for initial filling and topping up. These quantities are not specified in the WNS, however it is understood that the filling and topping up will be supplied from the dewatering abstraction.

3.12 The unmitigated daily water budget presented in the WNS based on BREEAM International NC level 3 fittings, notwithstanding the omissions detailed above, is an increase in potable water demand of 241 litres/day based on the presented figures of 430 litres/day in the proposed case and a theoretical baseline of 188 litres/day (note there is a rounding discrepancy apparent in these numbers, however the

241 litres/day figure is correctly derived from the two input figures). However, the proposed demand could be as high as 667 litres/day, whilst the baseline demand, based on the precautionary assessment taken from water bills, is 98 litres/day. Consequently, the increase in potable water demand could be as much as 569 litres/day.

- 3.13 The WNS confirms that water for other uses will be supplied by the abstraction, however some uses that arise as part of the application are not specifically mentioned, for example any proposed dust suppression system. Such uses should be itemised and quantified to ensure supply from the abstraction is practicable and sufficient resource is available to meet cumulative demand. It is acknowledged that the total available abstraction volume is extremely large, however all demands on the abstraction (including a precautionary estimate of existing uses) should be covered in sufficient detail to demonstrate beyond reasonable doubt that sufficient supply is available from this source.

Mitigation

- 3.14 The WNS indicates that WC and urinal uses will be supplied from the abstracted groundwater to further reduce demand. The WNS provides figures to confirm that there is sufficient water available within the abstracted quantities to meet this demand. This will require retrofitting in the existing toilet block. The calculated demand for WC and urinal use using level 3 fittings is 11.8 litres/person/day, and the maximum saving is therefore 271 litres/day based on the anticipated occupancy. This would result in a total daily demand based on the calculation provided of 159 litres/day, 61 litres/day above the metered existing demand. Corrections to the calculations could increase this to 396 litres/day, 298 litres/day above the metered demand. Further mitigation would therefore be required in both cases.
- 3.15 The WNS also suggests that rainwater collected from the roof of the welfare facilities can be used for landscaping "particularly in the summer months, when watering is increased". It is confirmed that such demand will not be supplied from the mains in the absence of rainwater collection. The simple method is used to determine the total available rainwater volume (19m³/year), and an allowance of 5 litres/day (1.8m³/year) is used to calculate a 35 day storage volume. The figure of 5 litres/day is taken from Building Regs Part G, however this relates to domestic uses and in addition is applied per person. A reliable source to confirm a maximum requirement of 5 litres/day for irrigation should be provided. Typically, WSCC will also require plans and elevations of any proposed rainwater storage tank in order to ensure that the proposals do not breach any other planning requirements.
- 3.16 The WNS is not currently sufficiently robust or precautionary to demonstrate beyond reasonable scientific doubt that the development would be water neutral.

4 General Advice

Source of Water Supply

- 4.1 Water use at the site is currently supplied from two sources; from the mains and from the licenced abstraction. According to the Natural England FAQs, the Position Statement does not apply to existing licenced abstractions, because "they are not using the public water supply abstraction that is contributing to the adverse effect". The Natural England Statement applies only to development that requires a public water supply from Southern Water's SNWRZ, as it is only the Pulborough abstraction that has been identified as a potential contributing factor to declining status at the Arun Valley SAC. Specifically in relation to mineral site pumping, the FAQ states:

Whether an application is included would depend on what water supply is chosen. Only development that uses public water supply from Sussex North water supply zone is included in the Statement. Many of the types of development that use water that the County Council permit do not use public water supply and would therefore not be covered by the Statement.

Consequently, it is reasonable to consider the concept of Water Neutrality at the site solely in terms of the demand on the mains water supply, i.e. any water consuming element of the existing and proposed development that draws water from the mains must be considered in the water budget. Notwithstanding, where compatible with the terms of the abstraction licence, and it can be shown that there is sufficient water available from this source to cover all potential cumulative demands, any use that can instead be supplied by abstracted water can be discounted from the budget.

- 4.2 It remains necessary to show that it is practicable to supply any demands that arise from the proposed development from the abstraction. This may include provision of plans showing proposed external and internal pipework, at a level of detail sufficient to indicate feasibility, and applies to:
- WC and urinal flushing- plans showing location of fittings, proposed supply pipework from abstraction, location and size of any storage tanks, and details of proposed internal pipework separation;
 - Top-up of wheel washing facility – plans showing proposed supply pipework from abstraction as well as the location and size of any storage tanks; and
 - Any other proposed new fixtures, for example dust suppression system, that will take their water supply from the abstraction.
- 4.3 The security of the licenced abstraction as a source of water needs to be taken into account when justifying this position. According to the Adur and Ouse Abstraction Licensing Strategy (ALS), the next Common End Date for the ALS is 31st March 2030, which is before the end of the working and restoration period. However, based on the significant environmental risks of not renewing the abstraction licence, it is considered extremely unlikely that the licence would not be renewed.

Existing Water Demand

- 4.4 The metered existing water demand based on long-term trends is approximately 98 litres/day based on standard working days. This is slightly more than 50% of the theoretical calculated demand. Based on the precautionary principle, and bearing in mind that water usage patterns in this type of development are relatively uncertain, this value should therefore be used to set the baseline (existing) demand, unless sufficient evidence can be provided to show that the metered demand has been underestimated. In this case, the record is short (less than one year), and based largely on estimated readings. There may be legitimate reasons for demand to have been substantially reduced in that timeframe relative to medium term usage rates (e.g. short-term reduction in operation), however an argument, including robust evidence, should be presented to support any claim to increase the baseline demand figure.
- 4.5 The theoretical calculated demand is based on BREEAM International New Construction baseline fittings, rather than BREEAM UK New Construction, which would be consistent with the use of the BREEAM UK WAT 01 calculator. However, the difference is minor and it is likely based on the age of the existing buildings that the fitting performances used remain precautionary.
- 4.6 It may be relevant to consider other uses that draw water from the mains (for example the WNS indicates that there is an external mains tap used for vehicle washing), however it is precautionary to exclude these and they should only be included in the calculation of existing demand if the associated usage rates can be robustly quantified. On the basis that the metered demand is substantially lower than the theoretical demand, additional uses are likely to be minimal, and should in any event not be applied to increase the theoretical calculation unless any revised demand calculated is lower than the metered demand.

Proposed Water Demand

- 4.7 Every potential water consuming activity on the site should be identified, the means of supply clarified, and ideally, anticipated demand should be quantified to demonstrate that the chosen source of water

supply is sufficient to meet demand. All potential mains demand should be quantified as precisely as possible in order to generate a robust calculation of the water budget. Ideally, floor plans of the proposed buildings would be provided to show the locations of water consuming devices and potential water consuming activities, for example the presence or otherwise of a canteen or kitchen area that may require regular cleaning. Examples of relevant proposed water uses associated with the period of the proposed works are:

- Staff comfort use, including WC, basins, showers (if provided), kitchen taps, dishwashing, drinking water etc.;
- Food preparation and kitchen cleaning;
- General cleaning;
- Vehicle and wheel washing including dust and track-out control;
- General dust control;
- All material processing uses, for example sand washing;
- Irrigation of proposed landscaping species (ideally based on a site specific maintenance and watering plan); and
- Any public conveniences proposed as part of the public access provision.

4.8 All of the above activities with the exception of irrigation and public conveniences, will cease once restoration is complete. However, since Water Neutrality is temporally dependent, and in accordance with the precautionary principle, it is necessary to consider as the “proposed case” water demand, the point at which water demands are greatest and therefore the peak demand should be estimated for each use and combined, unless it can be shown that some uses will not occur concurrently. The calculation can, however, be undertaken on an annualised basis.

4.9 Since there are multiple potential water consuming activities on the site, the applicant should provide a plan showing the proposed facilities and an illustrative indication of likely water sources, connections and pipework. This should include all existing and proposed water uses.

4.10 As previously mentioned, there is uncertainty in the behavioural patterns of occupants of this type of development and it may be appropriate to consider calibrating the projected usage rates for operational staff members based on a comparison of the historical metered demand and theoretical calculation of existing demand in order to reduce the estimated demand for these staff members. This is particularly relevant if it is necessary to use the metered demand to set the baseline. Any calibration used should only be applied to operational staff, not to office staff, and it may be necessary to calculate operational and office staff water demands separately to facilitate this. Calibration should be based on robust and reasoned scientific assumptions.

4.11 In a reverse approach to the existing water demand calculation, the calculation of proposed demand should aim to maximise the calculation of demand in accordance with the precautionary principle. Where assumptions are made that reduce the anticipated demand, these should be supported by a robust evidence base, for example details of specific fittings (or a commitment to abide by a certain standard which may be secured by condition or legal agreement). Where rainwater harvesting or greywater recycling is to be implemented,, or where new uses are to be supplied from the existing abstraction, the locations of collection systems, pipework and any tanks should be provided.

5 Specific Recommended Actions

5.1 In accordance with Natural England FAQs, ideally 3 years’ worth of metered water bills should be provided.

- 5.2 Where it is proposed to use the theoretical calculation of existing water use to set the baseline that exceeds the metered water demand, an argument to support the preference for a higher demand should be provided, based on robust reasoning including sufficient evidence to indicate beyond reasonable doubt that the existing demand exceeds the measured demand.
- 5.3 All proposed water uses should be itemised and the source of water indicated and evidenced. Potential sources that are relevant to the application are listed in paragraph 4.7, however the list is not necessarily exhaustive. For clarity, all existing and proposed uses must be set out on a plan, including any proposed connections, storage tanks and pipe networks.
- 5.4 Where it can be conclusively shown (including quantification of total and cumulative demand requirements) that proposed demand will be supplied only from the existing abstraction, this demand can be excluded from the water budget. It may also be possible to exclude uses where it can be demonstrated that there will be no increase in usage rates relative to the existing development, so long as those uses are also excluded from the calculated existing demand.
- 5.5 Calculation of the proposed mains water usage should be based on precautionary assumptions (for example maximum occupancy rates and fitting performances) unless evidence can be provided to demonstrate that a lower figure is acceptable. This may be in the form of example specifications for fittings (or an enforceable commitment to a certain standard), anticipated staffing schedules, landscaping maintenance plans etc.
- 5.6 Any mitigation, for example rainwater harvesting or greywater recycling, or the use of the licenced abstraction to meet certain non-potable or potable demand (subject to the necessary filtration and treatment standard in the case of potable water) should be quantified and evidenced including calculations in accordance with the relevant British Standards. Connections and size and location of tanks should also be provided to WSCC so that they can be considered in the context of other planning requirements.
- 5.7 The final water budget, including existing demand and proposed demand incorporating mitigation, should be presented in the WNS. If it is not possible to cover all anticipated water demands without increasing potable demand from the public water supply, then it will be necessary to provide mitigation in the form of off-site off-setting within the SNWRZ for the proposed development. Any mitigation should be relevant and consistent with the application uses, including an acceptable and comparable calculation methodology to demonstrate sufficient certainty in the benefits identified, should be secured in perpetuity and must be in place before the permission is implemented.

6 Conclusions

- 6.1 The WNS report should be updated in line with the above recommendations and should include all necessary discussion on methodology, assumptions, limitations, sensitivity testing and include all supporting evidence.