Hampshire Water Transfer and Water Recycling Project

Environmental Statement - Appendix 15.3 Operational noise assessment

VOLUME NUMBER: 6

PLANNING INSPECTORATE NUMBER: WA010002

APPLICATION DOCUMENT REFERENCE: 6.2

APFP REGULATION: 5(2)(a)

May 2026

Version 0

from Southern Water

Contents

Tables

Annexes

1 Introduction

1.1.1 This report provides the operational noise assessment methodology and noise modelling details for the Hampshire Water Transfer and Water Recycling Project (hereafter referred to as the 'Proposed Development'). It outlines operational noise modelling results at the identified noise and vibration sensitive receptors (NVSRs) locations surrounding the Water Recycling Plant (WRP) site, Intermediate Pumping Stations (IPSs), Break Pressure Tanks (BPTs) and Water Supply Works (WSW). The pipeline has been excluded from the operational noise assessment, as it is located underground and would not produce any audible noise during normal operation.

1.1.2 This report is a technical appendix to the Environmental Statement (ES) Chapter 15 Noise and vibration, Volume I (Document reference 6.1, DCO Volume 6).

2 Operational noise assessment method

2.1 Impact on residential receptors

2.1.1 In this assessment, the term residential is applied to permanent dwellings (i.e. houses, apartments). Hotels, hospitals and other buildings where people sleep but are not 'permanent' residents are considered as non-residential receptors.

2.1.2 Operational noise effects on residential NVSRs have been assessed using the guidance set out in British Standard (BS) 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound [1], which is the accepted UK standard for rating and assessing the impact of sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a residential dwelling upon which sound is incident.

2.1.3 The basis of BS 4142 is a comparison between the background sound level in the vicinity of residential locations and the rating level of the noise source under consideration. Terms are italicised as these are quotes from BS 4142. The relevant parameters in this instance are as follows:

1. *Background sound level* – $L_{A90,T}$ – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F (Fast) and quoted to the nearest whole number of decibels.
2. *Specific sound level* – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a reference time interval, T_r (one hour during the daytime hours (07:00 to 23:00 hours) and 15 minutes during night-time hours (23:00 to 07:00 hours)).
3. *Residual sound level*– $L_{Aeq,T}$– the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T.
4. *Rating level* – $L_{Ar,Tr}$ – the *specific sound level* plus any adjustment made for the characteristic features of the noise such as tonality, impulsivity and intermittency.

2.1.4 When comparing the background and the rating sound levels, BS 4142 (section 11 Assessment of the impacts) states that:

1. "*Typically, the greater the difference, the greater the magnitude of the impact.*
2. *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
3. *A difference of around + 5dB is likely to be an indication of an adverse impact, depending on the context.*
4. *The lower the rating level relative to the measured background sound level the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context".*

2.1.5 When assessing the noise from a source, it is necessary to have regard to the acoustic features that may be present in the source noise at the receptor. Section 9.1 of BS 4142 states:

> *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

2.1.6 The assessment of noise is based on the measured background sound levels and predicted rating levels at the receptors in accordance with BS 4142.

2.1.7 The operational sound levels have been predicted at the identified receptors using 3D noise modelling software configured to implement the International Standard (ISO) 9613-2 prediction methodology. The model incorporates proposed buildings and operational noise sources, as well as nearby residential dwellings and other buildings in the study area, intervening ground cover and topographical information.

2.1.8 An indicative list of plant and equipment noise levels has been provided by the project team and compiled based on details of the operational activities provided in ES Chapter 3, Description of the Proposed Development, Volume I (Document reference 6.1, DCO Volume 6). Where details are not known likely worst case assumptions have been made as described in section 3.1.

2.1.9 The magnitude of impact is based on a quantitative assessment of noise impact using BS 4142, as shown in Table 2-1. Separate assessments have been undertaken of day and night-time impacts; the overall magnitude of impact has been based on the likely worst case time period.

Table 2-1 Operational noise magnitude of impact criteria

Rating level $L_{Ar,Tr}$ (dB)	Magnitude of impact
Less than or equal to Measured L_{A90}	Negligible
Measured L_{A90} + up to 5dB	Minor
Measured L_{A90} + more than 5dB to less than 10dB	Moderate
Measured L_{A90} + more than or equal to 10dB	Major

2.1.10 The BS 4142 methodology is interpreted to mean that a difference between the *rating level* and *background sound level* of 5dB equates to the Lowest Observed Adverse Effect Level (LOAEL) and a difference of 10dB equates to the lowest Significant Observed Adverse Effect Level (SOAEL). These terms are adopted from the Noise Policy Statement for England [2], as explained in ES Chapter 15 Noise and vibration, Volume I (Document reference 6.1, DCO Volume 6).

2.1.11 Operational noise effects may be considered significant depending on the margin by which the *rating level* of the specific sound source exceeds the *background sound level* and the context in which the sound occurs. Impacts described as moderate or major magnitude in Table 2-1 may be considered significant, depending on the context.

2.1.12 Of particular relevance to context for this assessment are the absolute sound levels; on this point BS 4142 states that *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."* The standard offers no guidance about what background and rating levels are considered low; however, the 1997 version of the standard stated that background sound levels below around 30dB L_{A90}, and rating levels below around 35dB $L_{Ar,Tr}$, were considered very low and therefore outside the scope of the assessment method. The Association of Noise Consultants produced guidance on the application of BS 4142 (BS 4142:2014+A1:2019 Technical Note, ANC, March 2020 [3]) which states *that "similar values [i.e. background sound levels below around 30dB L_{A90}, and rating levels below around 35dB $L_{Ar,Tr}$] would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate."* Combined, these documents are considered to indicate that, where background sound levels are low, the LOAEL for operational noise is 35dB $L_{Ar,Tr}$.

2.1.13 The World Health Organisation (WHO) Night Noise Guidelines for Europe (NNG) [4] have also been reviewed to establish an alternative LOAEL value for night-time operational noise which could be applied when background sound levels are low. In summary, the NNG found that below the level of 30dB(A) L_{night}, outside (equivalent to a free-field L_{Aeq},23:00 to 07:00) there are no observed effects on sleep. Furthermore, there is no evidence that biological effects observed at levels below 40dB(A) L_{night}, outside are harmful to health. However, the NNG found that *"closer examination of the precise impact will be necessary in the range between 30dB and 55dB as much will depend on the detailed circumstances of each case"* and Table 5.2 of the document states that the threshold for the well-being effect of 'complaints' is 35dB L_{night}, outside. The NNG states *that "for industrial sources there is an almost complete lack of information";* hence, it is not apparent that industrial noise is within the scope of the NNG. Nevertheless, in relation to industrial and commercial noise, the statement regarding complaints in the NNG is considered to indicate a LOAEL of 35dB L_{night}. A noise level specified in terms of the L_{night} parameter is either equal to or below the equivalent level specified using the night-time $L_{Ar,Tr}$ parameter. Hence, to ensure the potential likely worst case impacts are assessed, the LOAEL for operational noise effects on residential NVSRs has been set to 35dB $L_{Ar,Tr}$, where background sound levels are low.

2.1.14 The Winchester City Council (WCC) planning guidance document 'Technical Guidance for Noise' [5] provides guidance in relation to assessment of noise from industrial/commercial sources, stating *"the design objective should be that the development should be designed so as to achieve a rating level of 10dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location. Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, restriction of the hours of operation etc.) and the achievable noise level should be identified."* For IPS in the WCC area, a design objective is therefore set to a rating level of either 10dB below the typical background sound level or 35dB $L_{Ar,Tr}$, whichever is the higher. In other council areas, the design objective is set to rating level equal to the identified LOAEL of 5dB above the background sound level or 35dB $L_{Ar,Tr}$,

whichever is the higher, which is considered a robust interpretation of BS 4142 and the requirements of relevant planning policy.

2.1.15 Of additional relevance to the contextual analysis is the change in ambient sound levels. The Institute of Sustainability and Environmental Professionals (formerly the Institute of Environmental Management and Assessment) Guidelines for Environmental Noise Impact Assessment [6] provide the following discussion of the potential for changes in ambient sound levels to be perceptible; these have been used to assist in the assessment of ambient sound levels as part of the contextual analysis using BS 4142. *"For broad band sounds which are very similar in all but magnitude, a change or difference in noise level of 1dB is just perceptible under laboratory conditions, 3dB is perceptible under most normal conditions, and a 10dB increase generally appears to be twice as loud. These broad principles may not apply where the change in noise level is due to the introduction of a noise with different frequency and/or temporal characteristics compared to sounds making up the existing noise climate. In which case, changes of less than 1dB may be perceptible under some circumstances."*

2.1.16 Emergency power generators would not be used during typical plant operation and would only be used in an emergency scenario during a power cut except for testing which would occur over a short period (several minutes) once a month during daytime periods. Operational noise effects from emergency power generators have therefore been assessed separately, to account for the infrequent nature of their usage. Based on the WHO Guidelines for Community Noise [7], a criterion of 50dB L_{Aeq} has been adopted as the threshold for potentially significant effects for generator noise levels in gardens of residential properties.

2.2 Impact on non-residential receptors

2.2.1 A separate assessment has been undertaken for operational noise effects on non-residential NVSRs. The only identified non-residential NVSRs (see ES Chapter 15 Noise and vibration, Volume I (Document reference 6.1, DCO Volume 6)) with the potential to experience operational noise impacts are those within 500m of the WRP site, IPS-F and IPS-G. These include a care home, offices, external amenity areas and a nursery. Outdoor noise level criteria have been identified as detailed in Table 2-2. In order to calculate the outdoor limit where the receptor is indoors, a 15dB level difference between indoor and outdoor free-field noise levels has been assumed in accordance with the guidance in BS 8233.

Table 2-2 Airborne noise criteria for non-residential receptors

Receptor type	Noise level (dB L_{Aeq} outdoors, free-field)	
	Daytime	Night-time
Care home	50	45
Offices	55	N/A
Children's nursery and external amenity spaces	50	N/A

2.2.2 Where the airborne noise criteria for non-residential receptors are predicted to be exceeded, the following additional factors have been incorporated into the assessment of effect significance:

1. The predicted change in ambient sound levels (where baseline noise levels are known).
    a. The timing of the impact – night-time impacts are more likely to be considered significant than daytime impacts.
    b. The location of the impact at the NVSR – a receptor may contain areas which are more or less sensitive than others, for example in a care home, office spaces or kitchens would be considered less sensitive than bedrooms.
2. The nature, times of use and design of the receptor.
    c. The proportion of the area affected (where a receptor is outdoors).
    d. Design of the receptor affected, for example, construction of the building façade, ventilation strategy, etc.

3 Predictions

3.1 Noise modelling assumptions and methodology

3.1.1 Noise levels associated with the Proposed Development were predicted at the identified NVSR locations using SoundPLAN 9.0 3D modelling software. The software implements accepted national and international acoustic calculation standards.

3.1.2 Operational noise modelling predictions were undertaken in accordance with the methodology provided in ISO 9613-2 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [8].

3.1.3 A three-dimensional model was created using geo-referenced Ordnance Survey mapping data, topographical data of the local area incorporating buildings, plans and elevations of the Proposed Development. The data sources used to develop the three-dimensional model is provided in Table 3-1.

Table 3-1 Data sources

Data	Data Source
Building locations and ground attenuation areas	Ordnance Survey (OS) MasterMap
Area topography	Department for Environment, Food and Rural Affairs (Defra) LiDAR survey data (available at Defra Survey Data Download)

3.1.4 Ground surfaces within the noise model are generally considered soft, such as agricultural and grassland areas. Areas identified in the OS MasterMap as water, rock and man-made surfaces have been assumed to be acoustically reflective (i.e. hard).

3.1.5 The modelling is based on practicable layouts for the WRP site, IPSs and BPTs provided by the engineering team designing the Proposed Development, as shown in the Figures in Annex A.

3.1.6 Two noise impact assessments were undertaken for proposed upgrades to the Otterbourne WSW in 2019 (Capital Maintenance (Phase 2) Project) [9] and 2023 (Phases 2 and 3) [10]. Both assessments were based on a baseline noise level survey undertaken in 2018 and modelling of operational noise emissions. The Phase 2 improvements of the Otterbourne WSW were operational at the time of the baseline surveys undertaken in June to October 2024. The assessment of operational noise impacts from the Invasive Non-Native Species (INNS) Treatment at Otterbourne WSW has therefore used the 2018 survey to determine the baseline, and used the modelling undertaken in 2023 to identify the Otterbourne WSW noise emissions prior to the introduction of the INNS Treatment plant. The use of a 2018 baseline avoids the noise emissions from the Phase 2 improvements from being included in the baseline for this assessment. Likely worst case effects are therefore assessed due to the combined noise from the upgrades to Otterbourne WSW and the INNS treatment plant.

3.1.7 The Phase 3 upgrades introduced three back-up power generators to be used in the event of a mains power outage, as they would only be used in an emergency, their noise emissions have been excluded from this assessment.

3.1.8 The assessment considers the potential likely worst case effects due to operational noise from the INNS Treatment plant at Otterbourne WSW by assuming that a new building will be required and that this will be located at the closest point of the Limits of Deviation to the nearby receptors. Other design options for the INNS Treatment at Otterbourne WSW involve re-use of existing infrastructure, which are anticipated to result in lower noise levels at receptors than the assumption of a proposed new building at a potential worst case location.

3.2 Acoustic model settings

3.2.1 Acoustic modelling for the operation of the Proposed Development has been undertaken using the following model settings:

1. Maximum search radius of 5000m.
2. Maximum number of reflections: 3.
3. Side diffraction enabled.
4. Daytime, evening/weekend and night-time noise predictions carried out at first floor level i.e. 4.5m above ground.
5. Existing building heights set to 6m.

3.3 Operational noise sources

3.3.1 Operational noise sources that were included in the 3D noise model have been separated into those for which sound emissions data are available and those where this is not the case.

3.3.2 Where sound emissions data for sources were not available, an assumption has been made that these sources would emit the maximum sound level possible, whilst avoiding exceedance of the Upper Exposure Action Value of 85dB(A) specified in the Control of Noise at Work Regulations (CoNAWR) 2005 [11], at 1m from the plant. Table 3-2 details where this assumption has been made.

Table 3-2 Operational noise data; items constrained by Control of Noise at Work Regulations 2025 limits, modelled as outdoor sources

Source ID	Location	Description	Spectrum reference
1	Pumping stations (at the WRP site)	All Sources (Pumps)	SNS1
12	WRP site	Standby Generators	SNS3
17	IPS and BPT-E	Standby Generators	SNS3
20	IPS-F	Standby Generators	SNS3
23	IPS-G	Standby Generators	SNS3
26	BPT-K	Standby Generator	SNS3

3.3.3 Sound emissions data internally within buildings were supplied or assumed to be constrained by compliance with the CoNAWR where data were unavailable, as detailed in Table 3-3.

Table 3-3 Operational noise data; building internal sound pressure levels

Source ID	Location	Description	Quantity	Internal reverberant sound pressure level, (dB(A))	Equipment location	Spectrum reference
2	IPS and BPT-E	IPS Building	Combined Plant	84*	In building	SNS7
3	IPS and BPT-E	Compressor Kiosk	Combined Plant	80	In building	SNS4
4	IPS-F	IPS Building	Combined Plant	84*	In building	SNS7
5	IPS-F	Compressor Kiosk	Combined Plant	80	In building	SNS4
6	IPS-G	IPS Building	Combined Plant	84*	In building	SNS7
7	IPS-G	Compressor Kiosk	Combined Plant	80	In building	SNS4
8	WRP site	Osmosis Building	Combined Plant	70	In building	SNS7
9	Otterbourne WSW	INNS Treatment plant	Combined Plant	84*	In building	SNS1

* Assumed constraint to be compliant with the CoNaWR

3.3.4 Sound emissions data available for the proposed external equipment, are detailed in Table 3-4.

Table 3-4 Operational noise data; items with specified levels

Source ID	Location	Description	Quantity	Free field Sound pressure level @ 1m, per item (dB(A))	Spectrum reference
9	WRP site	HVAC unit	4	60	SNS5
10	WRP site	GAC Re-lift pump & Micro filter feed pump	10	70	SNS7
11	WRP site	Lime saturator mixer	4	50	SNS6
13	IPS and BPT-E	BPT Building	1	60	SNS1
14	IPS and BPT-E	HVAC unit	1	50	SNS5
15	IPS and BPT-E	Blower	4	46	SNS4

Source ID	Location	Description	Quantity	Free field Sound pressure level @ 1m, per item (dB(A))	Spectrum reference
16	IPS and BPT-E	Transformer	2	48	SNS2
18	IPS-F	HVAC unit	1	50	SNS5
19	IPS-F	Transformer	2	48	SNS2
21	IPS-G	HVAC unit	1	50	SNS5
22	IPS-G	Transformer	2	48	SNS2
24	BPT-K	BPT	1	60	SNS1
25	BPT-K	Blower	4	46	SNS4

3.3.5 Assumed frequency spectra for the sound sources are detailed in Table 3-5.

Table 3-5 Operational noise source spectra

Spectrum reference	Sound levels (dB) in octave band (Hz)								Data source
	63	125	250	500	1000	2000	4000	8000	
SNS1	109	110	95	100	99	102	101	94	British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on open sites Part 1– Noise' (BS5228-1) [12] Table C4 Row 89 – Water tanker extracting water (vacuum pump)
SNS2	57	52	57	57	48	40	35	28	IEC 60076-10:2016 Power transformers - Part 10: Determination of sound levels [13]
SNS3	108	102	85	82	81	76	73	65	BS5228-1 Table C4 Row 76 – Diesel Generator (6.5 kW Power Rating)
SNS4	98	87	78	73	71	69	72	61	BS5228-1 Table C5 Row 5 – Compressor for hand-held pneumatic breaker
SNS5	62	69	71	65	60	60	57	56	Handbook of Acoustical Measurements and Noise Controls [14]
SNS6	54	55	61	54	51	49	45	42	BS5228-1 Table C4 Row 22 – Large concrete mixer
SNS7	71	64	64	67	63	57	54	49	BS5228-1 Table C5 Row 40 – Electric Water Pump (15kW Power Rating)

3.3.6 In order to calculate the sound emissions from buildings other than the BPT buildings (for BPT buildings external reference noise levels have been provided), the sound pressure level inside each building has been provided as shown in Table 3-3. The frequency spectra of the assumed sound reduction indices of building fabric are presented in Table 3-6. A natural ventilation strategy is proposed for the buildings, but the details have not yet been developed at this stage and have not been included in the model.

Table 3-6 Assumed sound reduction indices of the building envelope (dB)

Building Element	Sound reduction index (R_w) in octave band (Hz)						
	63	125	250	500	1000	2000	4000
Compressor Kiosks (GRP)	7	8	12	17	22	26	29
Osmosis and IPS Buildings (Steel Frame with Cladding)		5	11	26	36	36	
Compressor Kiosks, Osmosis and IPS Buildings (Roller Shutter Doors)				18			

3.4 Mitigation

3.4.1 Revised noise modelling has been undertaken, assuming that the mitigation measures described in this section can be incorporated into the final design. Results of the mitigated noise modelling of the AGP and WRP site are presented in Table 4-3 and for the INNS Treatment at Otterbourne WSW, Table 4-4.

Water Recycling Plant Site

3.4.2 The assessment of operational noise effects described in ES Chapter 15 Noise and vibration, Volume I (Document reference 6.1, DCO Volume 6) identified that, without mitigation, effects are likely significant at receptors provided in Table 4-1 (AGP and WRP site) and Table 4-2 (INNS Treatment at Otterbourne WSW). The operational noise modelling was therefore interrogated, and it was found that the pumping stations plant is the dominant noise source at all receptors. The current design comprises outdoor pumps with an acoustic enclosure. The performance of the enclosure is not specified, and the modelling therefore assumed a worst case scenario in that noise levels at the pumping stations would not exceed the Upper Exposure Action Value of 85dB(A) specified in the CoNAWR 2005 [11].

3.4.3 To reduce residual effects at nearby receptors to no worse than minor i.e. not significant, a reduction of noise emissions of 11dB will be required from the pumping stations equipment. The selection of quieter pumps, improved enclosures or a combination of the two would be sufficient.

Break Pressure Tank and Intermediate Pumping Station E

3.4.4 At the current stage of the design process, it is expected that the building fabric of the BPT/IPS-E building will need to be upgraded to reduce the effect at the likely

worst case residential receptor (R20) to minor. The performance of the IPS facades will need to be approximately 30dB R_w and the roof approximately 32dB R_w.

3.4.5 The internal level of the IPS has been assumed to be 84dB(A). The plant that would be installed within this building has not yet been finalized. The selection of quiet plant leading to a lower sound pressure level within the IPS would allow the acoustic insulation performance of the building fabric to be reduced.

3.4.6 Although the roller shutter door of IPS-E faces towards residential receptor R20, it is not expected to affect the impact magnitude at the receptor. Similarly, the remaining buildings and external AGP at BPT/IPS-E are not significant contributors to the predicted sound levels at R20.

Intermediate Pumping Station F

3.4.7 At the current stage of the design process, it is expected that the building fabric of IPS-F building and associated compressor kiosk will need to be upgraded to reduce the effect at the likely worst case residential receptor (FR2, where 'FR' is a prefix denoting a Future Receptor) to minor. The performance of IPS-F facades will need to be approximately 50dB R_w (the roof, approximately 45dB R_w) and the compressor kiosk facades will need to be 30dB R_w (the roof, approximately 26dB R_w). The roller shutter door of the compressor kiosk will also be required to achieve approximately 21dB R_w This mitigation would achieve a minor impact at FR2 and a negligible impact at R36.

3.4.8 The internal level of IPS-F and compressor kiosk has been assumed to be 84 and 80dB respectively. Final selections of plant that would be installed within these buildings have not yet been finalized. The selection of quieter plant leading to a lower sound pressure level within IPS-F and compressor kiosk would allow the acoustic insulation performance of the building fabric to be relaxed.

3.4.9 In addition to the above, the specific noise level at FR2 with the generators operating is expected to be 56dB L_{Aeq}. Noise emissions from the generators will need to be reduced by 6dB to achieve 50 dB L_{Aeq} at FR2. This could be achieved by selecting quieter generators, improved silencing of the generators or moving the generators position behind the IPS and using the building to block line of sight between the generators and FR2.

3.4.10 The roller shutter door of IPS-F faces away from FR2 and are not expected to significantly impact nearby receptors. Although the transformer and HVAC unit are currently proposed to be between the IPS and kiosk, and FR2 noise levels due to these items are not expected to be significant. In this case it is important to ensure that the IPS-F and compressor kiosk remains as far from the FR2 as possible to reduce noise impacts.

Intermediate Pumping Station G

3.4.11 At the current stage of the design process, it is expected that the building fabric of the IPS-G building will need to be upgraded to reduce the effect at the likely worst case residential receptor R49 to minor. The performance of the IPS-G facades will need to be approximately 50dB R_w (the roof, approximately 45dB R_w). The roller shutter door of IPS-G will also be required to achieve approximately 32dB R_w This mitigation would achieve a minor impact at residential receptors R49 and R51 and a negligible impact at all other nearby receptors listed in Table 4-1.

3.4.12 The internal level of IPS-G has been assumed to be 84dB(A). Final selections of plant that would be installed within this building has not yet been finalized. The selection of quiet plant leading to a lower sound pressure level within IPS-G would allow the acoustic insulation performance of the building fabric to be relaxed.

3.4.13 The remaining buildings and external AGP at IPS-G are not significant contributors to the predicted sound levels at the nearby receptors.

Break Pressure Tank K

3.4.14 At the current stage of the design process, it is expected that the building fabric of the BPT-K building will need to be upgraded to reduce the effect at the likely worst case residential receptor (R114) to minor. Noise emissions from the BPT-K building will need to be reduced by 12dB to achieve this. The internal level within the building could be reduced by the selection of quieter plant, the building fabric upgraded or a combination of both. This mitigation would achieve a negligible impact at all other receptors.

Invasive Non-Native Species Treatment at Otterbourne Water Supply Works

3.4.15 At the current stage of the design process, it is expected that the building fabric of the INNS Treatment plant building will need to be upgraded to reduce the effect at the worst case residential receptor (R156) to minor. The performance of the INNS Treatment plant facades will need to be approximately 33dB R_w (the roof, approximately 28dB R_w). This mitigation would achieve a negligible or minor impact at all other nearby receptors.

4 Results

4.1.1 This section outlines the predicted noise levels at each NVSR. The predicted noise level at each NVSR for the unmitigated noise emissions from the AGP and WRP site with a normal operational *rating level* equal to or over 35dB $L_{Ar,Tr}$ are presented in Table 4-1. The results of the predictions of noise from the INNS Treatment plant and the noise emissions from the Otterbourne WSW site (as predicted) are provided in Table 4-2.

4.1.2 The *rating level* has been calculated by adding a 3dB character correction to the predicted *specific sound level*. All plant except emergency generators are expected to operate continuously; hence, the predicted sound levels in Table 4-1 and Table 4-2 are applicable during all time periods. As discussed in section 2, *rating levels* are only calculated at residential receptors, the assessment criteria for non-residential receptors do not require a character correction to be applied.

Table 4-1 Operational noise levels - unmitigated

Element of Proposed Development	NVSR	Receptor type	Predicted *specific sound level* (dB $L_{Aeq,T}$)	*Rating level* (dB $L_{Ar,T}$)	Predicted *specific sound level* with emergency generators (dB $L_{Aeq,T}$)
WRP site	R1	Residential	58	61	58
	R2	Commercial	58	n/a	58
	R3	Residential	53	56	53
	R4	Residential	51	54	51
	R11	Hotel	53	56	53
	R165	External amenity area	59	n/a	59
	FR1	Residential	57	60	58
BPT/IPS-E	R20	Residential	37	40	38
IPS-F	R36	Care home	32	35	38
	FR2	Residential	49	52	56
IPS-G	R49	Residential	50	53	51
	R50	Children's nursery	39	n/a	44
	R51	Residential	39	42	46
	R52	Residential	41	44	46
	R64	Residential	40	43	42
	R169	Residential	44	47	46
	R172	Residential	36	39	42
	R273	Residential (Caravan)	48	51	50
	R275	Community Centre / Place of Worship	38	n/a	43
BPT-K	R113	Events venue	42	n/a	44

Element of Proposed Development	NVSR	Receptor type	Predicted *specific sound level* (dB $L_{Aeq,T}$)	*Rating level* (dB $L_{Ar,T}$)	Predicted *specific sound level* with emergency generators (dB $L_{Aeq,T}$)
	R114	Residential	43	46	47

Table 4-2 Otterbourne WSW site and INNS Treatment at Otterbourne WSW operational noise levels - unmitigated

NSVR	Receptor type	WSW predicted *specific sound level* (dB $L_{Aeq,T}$)*	INNS predicted *specific sound level* (dB $L_{Aeq,T}$)	*Combined WSW and INNS Level* (dB $L_{Aeq,T}$)	*Combined WSW and INNS rating level* (dB $L_{Ar,T}$)
R153	External amenity area	33	43	43	n/a
R156	Residential	26	37	37	40

*Levels taken from the GTBJV Operational Sound Assessment Phases 2 and 3 report [10]

Table 4-3 Operational noise levels - mitigated

Element of Proposed Development	NVSR	Receptor type	Predicted *specific sound level* (dB $L_{Aeq,T}$)	*Rating level* (dB $L_{Ar,T}$)	Predicted *specific sound level* with emergency generators (dB $L_{Aeq,T}$)
WRP site	R1	Residential	47	50	47
	R2	Commercial	48	n/a	48
	R3	Residential	42	47	43
	R4	Residential	40	45	40
	R11	Hotel	43	48	43
	R165	External amenity area	48	n/a	49
	FR1	Residential	47	50	47
BPT/IPS-E	R20	Residential	32	35	35
IPS-F	R36	Care home	17	20	31

Element of Proposed Development	NVSR	Receptor type	Predicted *specific sound level* (dB $L_{Aeq,T}$)	*Rating level* (dB $L_{Ar,T}$)	Predicted *specific sound level* with emergency generators (dB $L_{Aeq,T}$)
	FR2	Residential	32	35	50
IPS-G	R49	Residential	32	35	41
	R50	Children's nursery	31	n/a	43
	R51	Residential	32	35	45
	R52	Residential	30	33	45
	R64	Residential	24	27	37
	R169	Residential	28	31	40
	R172	Residential	28	31	40
	R273	Residential (Caravan)	31	34	43
	R275	Place of Worship	30	n/a	41
BPT-K	R113	Events venue	31	n/a	40
	R114	Residential	32	35	45

Table 4-4 Otterbourne WSW site and INNS Treatment at Otterbourne WSW operational noise levels - mitigated

NSVR	Receptor type	WSW predicted *specific sound level* (dB $L_{Aeq,T}$)*	INNS predicted *specific sound level* (dB $L_{Aeq,T}$)	*Combined WSW and INNS Level* (dB $L_{Aeq,T}$)	*Combined WSW and INNS rating level* (dB $L_{Ar,T}$)
R153	External amenity area	33	36	38	n/a
R156	Residential	26	31	32	35

*Levels taken from the GTBJV Operational Sound Assessment Phases 2 and 3 report [10]

References

[1] British Standards Institution, British Standard 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound, London: BSI, 2019.

[2] Department for Environment, Food and Rural Affairs, "Noise policy statement for England," 15 March 2010. [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf.

[3] Association of Noise Consultants Working Group, "BS 4142:2014+A1:2019 Technical Note," March 2020. [Online]. Available: https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/07/ANC-BS-4142-Guide-March-2020.pdf.

[4] World Health Organisation, *Night Noise Guidelines for Europe,* Copenhagen: WHO, 2009.

[5] Winchester City Council, "Technical Guidance for Noise," 2022. [Online]. Available: https://www.winchester.gov.uk/planning/other-guidance/technical-guidance-for-noise.

[6] Institute of Sustainability and Environmental Professionals, *Guidelines for Environmental Noise Impact Assessment, Institute of Sustainability and Environmental Professionals,* ISEP, 2014.

[7] World Health Organisation, *Guidelines for Community Noise,* London: WHO, 1999.

[8] International Organization for Standardization, *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation,* London: ISO, 1996.

[9] Southdowns Environmental Consultants, "Southern Water Services Ltd Otterbourne Water Supply Works Capital Maintenance (Phase 2) Project Baseline Noise and Vibration Survey Report," Lewes, 2019.

[10] Southdowns Environmental Consultants, "GTBJV Operational Sound Assessment Phases 2 and 3," Lewes, 2023.

[11] UK Parliament, "The Control of Noise at Work Regulations 2005," HMSO, London, 2005.

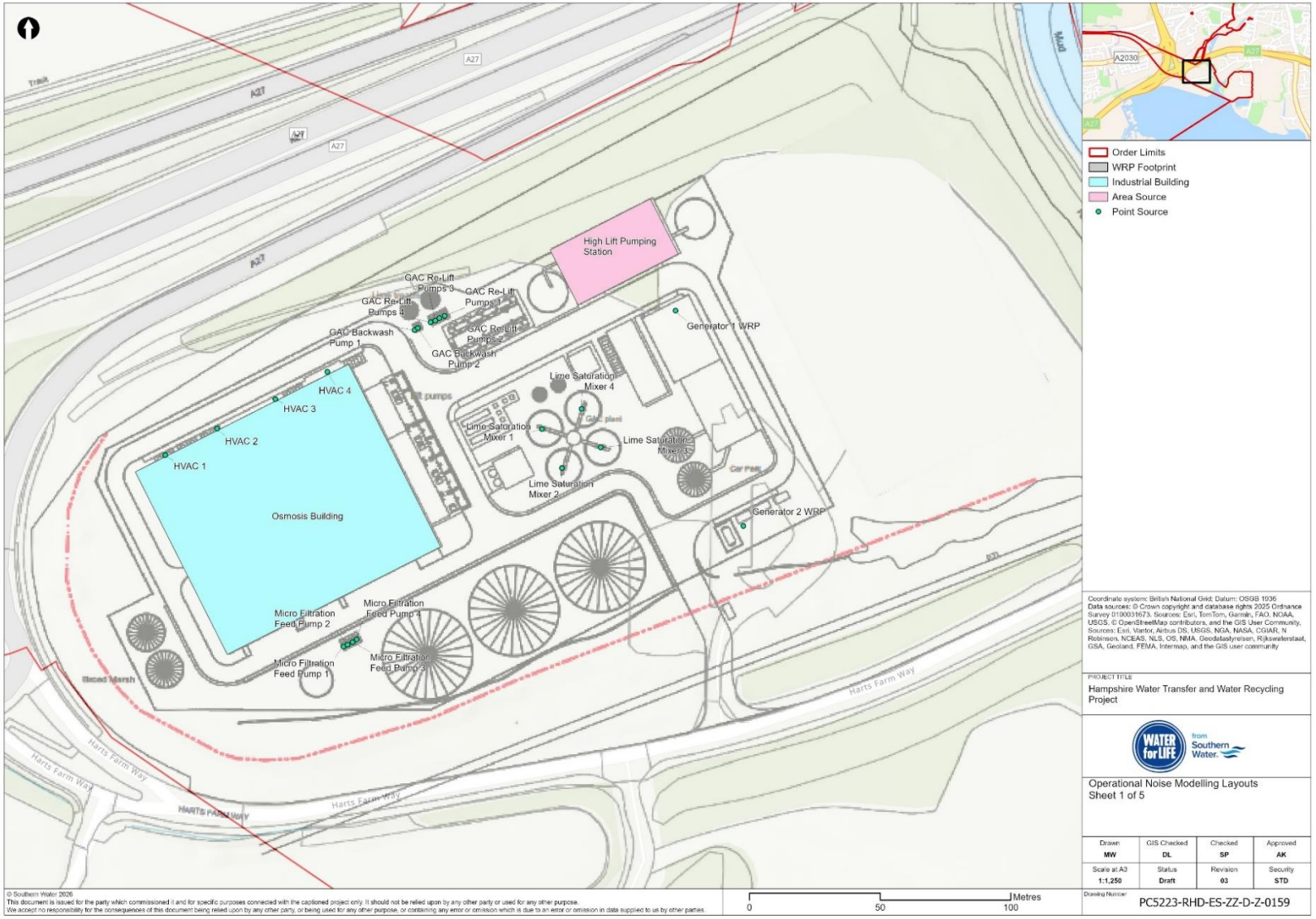
[12] British Standards Institution, British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise, London: BSI, 2014.

[13] International Electrotechnical Commission, Power transformers – Part 10: Determination of sound levels, Geneva: International Electrotechnical Commission, 2016.

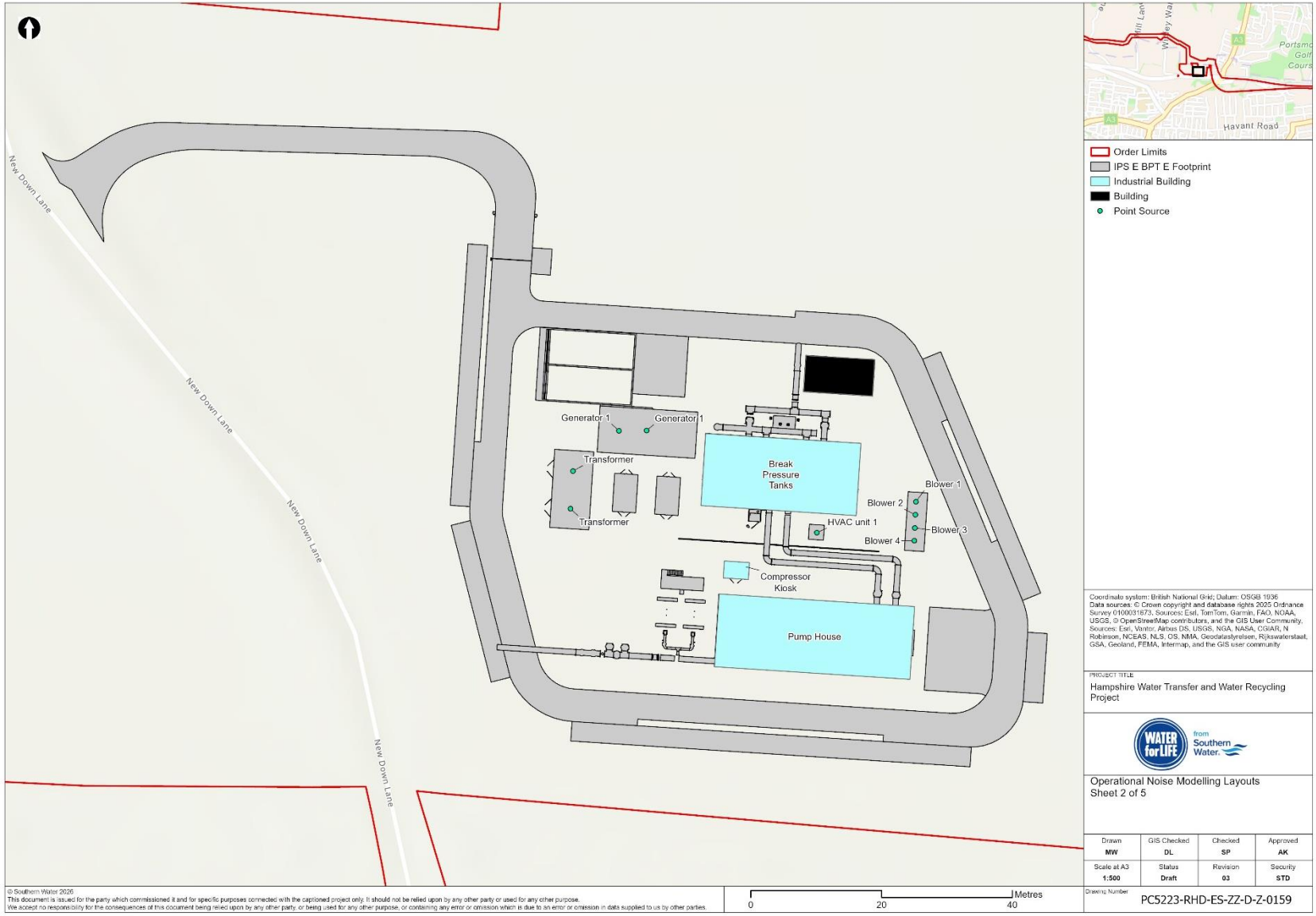
[14] C. M. Harris, Handbook of Acoustical Measurements and Noise Controls, New York: McGraw-Hill, 1991.

Annex A Figures

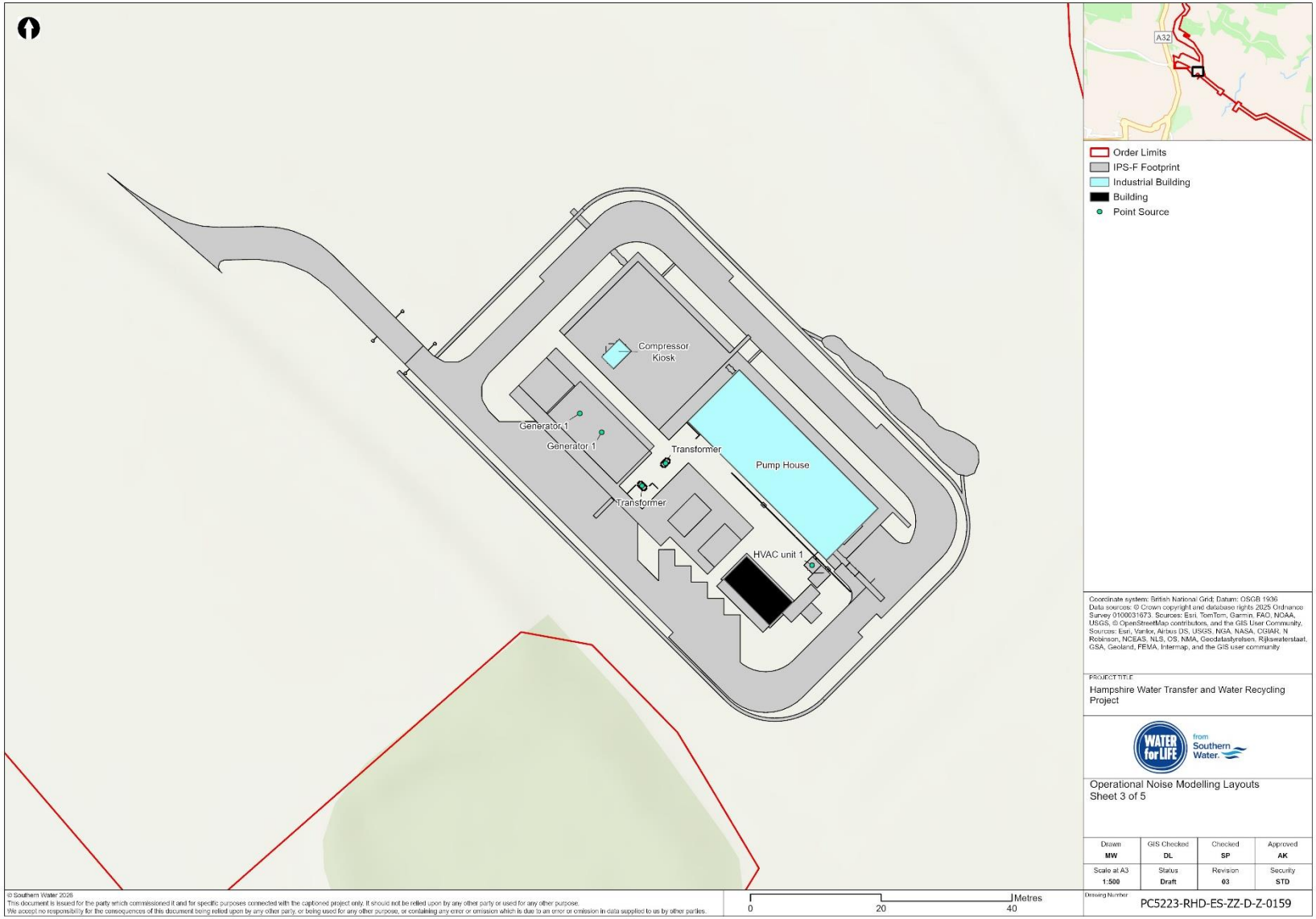
Graphic A-1 Operational Noise Modelling Layout, WRP



Graphic A-2 Operational Noise Modelling Layout, BPT & IPS-E

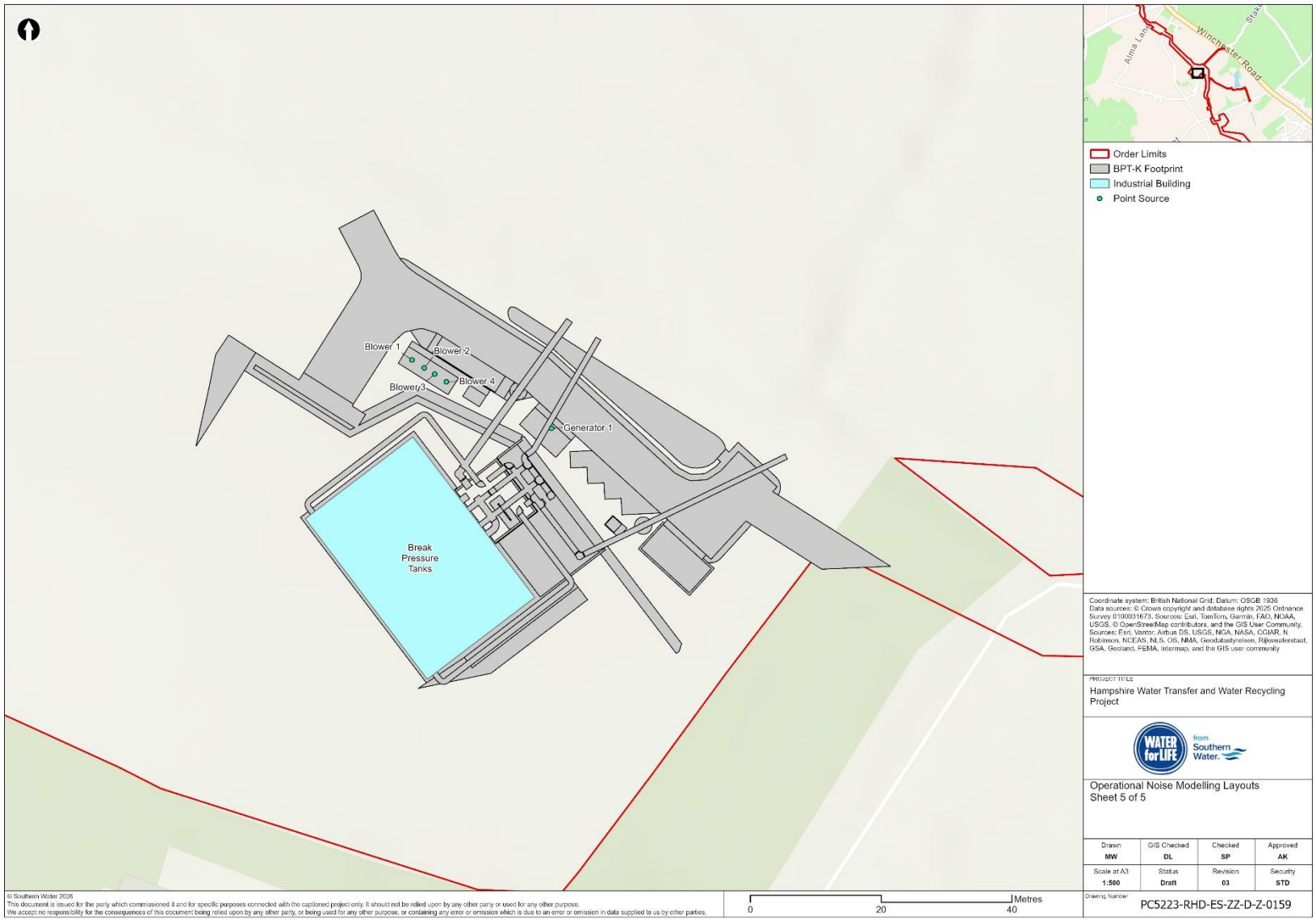


Graphic A-3 Operational Noise Modelling Layout, IPS-F



Graphic A-4 Operational Noise Modelling Layout, IPS-G

Graphic A-5 Operational Noise Modelling Layout, BPT-K




WATER
for LIFE®
from
Southern
Water®