

Havant Thicket Reservoir

Noise and Vibration Impact Assessment

Main Reservoir Works

05/02/2024 | Rev P05

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Revision history

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P02	18/08/2023	Updated calculations for extended working hours	TB	AH	EM	GL
P03	16/10/2023	Addressed PW comments.	NH	TB	TB	GL
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P05	05/02/2024	Updates to construction phasing for main embankment works	BC	NH	EM	GL

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1.0 Introduction

This Noise & Vibration Impact Assessment (NVIA) has been prepared in support of the Main Reservoir Works (MRW) phase for the proposed Havant Thicket Reservoir project (herein referred to as the Scheme). This NVIA sets out an assessment of potential noise and vibration impacts during the construction phase of the Scheme.

This document outlines an assessment of potential noise and vibration effects at Havant Thicket Reservoir during the MRW. If not adequately controlled, noise and vibration from the works may affect local amenity. This could have a detrimental effect on people's health including the workforce and the local community.

The works currently within the MRW scope are planned to start in Q1 2024 and be completed by Q3 2029. The works currently within the MRW scope are summarised below:

- Construction of the Northern Access Route (NAR) (part of phase 1 works) – initially for use by construction traffic and then for use by visiting traffic when the reservoir is operational;
- Establishment of site compounds (part of the enabling works) - stripping of topsoil and excavating sub-soil. Below ground ducts for services and drainage. Hard surfacing provided for the main compound car park, access roads and unloading areas, temporary residential caravans for construction workers;
- Construction of temporary drainage system, access track & haul roads (part of enabling works) - stripping of topsoil and subsoil, excavation of temporary drainage ditches, creation of on-site lagoon, settlement ponds and diversion of existing watercourses;
- Construction of the reservoir earth embankment - borrow pit excavation, materials haulage, placement and compaction of clay, etc;
- Construction of the reservoir culvert – deliveries of concrete by drum mixer lorries. Reinforced concrete structures cast on-site using formwork;
- Construction of wetlands earth embankments and control structures - stripping of topsoil and subsoil, excavation of clay from borrow pits, materials haulage, clay compaction using vibrating rollers. Installation of control structures within the embankment to maintain the required water levels;
- Construction of the valve tower - deliveries of concrete by drum mixer lorries. Reinforced concrete structures cast on-site using formwork;
- Construction of the Southern Access Road – stripping of ground to formation level, placing and compaction of sub-base and drainage, final surface dressing;
- Construction of the control house - deliveries of concrete by drum mixer lorries. Reinforced concrete structures cast on-site using formwork. Installation of ground structures and pipework;
- Construction of the spillway - deliveries of concrete by drum mixer lorries. Reinforced concrete structures cast on-site using formwork;
- Hard and soft landscaping - soft landscaping and aftercare. Hard landscaping comprising fencing, walling and the Avenue staircase;
- Raising of FE CAT A Track & installation of new culverts – installation of silt control measures downstream of the work site. Installation of new watercourse pipes and new headwalls. Raising of track level using site won material from borrow pits;
- Installation of Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) and associated fit out of culvert - draw off, filling pipework and installation of associated systems within the embankment culvert and tower. Installation of security fencing, gates, doors and barriers on control structures.

The document presents calculated noise levels using a number of different construction scenarios which would occur during the construction phase. The Detailed Phasing Plan (doc no. HTR-FUW-RZ-RE-DP-W-507) and the Construction Method Statement (doc no. HTR-FUW-RZ-RE-MS-W-505) outlining the construction phasing and the programme to construct the MRW.

This NVIA is presented to demonstrate compliance with the noise & vibration levels predicted in the ES. The noise management and monitoring procedures are described in the Noise & Vibration Management Plan (doc no. HTR-FUW-P2-RE-RM-W-017) submitted to discharge planning condition 9 for the Scheme.

2.0 Legislation, guidance and planning conditions

2.1 Legislation

The Control of Pollution Act 1974 (CoPA) provides the LPAs with a mechanism outside of the planning process to control construction noise and vibration. Section 60 of CoPA provides powers to Local Authority Officers to serve an abatement notice in respect of noise and/or vibration nuisance from construction works until specific reduction measures have been adopted.

Section 61 provides a method by which a contractor can apply for 'prior consent' for construction activities before commencement of works. The 'prior consent' is agreed between the Local Authority and the contractor and may contain a range of agreed working conditions, noise and/or vibration limits and control measures. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the site is compliant with the requirements of the Section 61 consent.

Section 72 of CoPA defines Best Practicable Means (BPM), which essentially refers to the selection of the quietest techniques and equipment, in addition to considering factors such as timing, duration, location and opportunities for mitigation, to ensure that impacts are controlled as far as reasonably practicable. Demonstrating the use of BPM is an accepted defence against a Section 60 notice. Under section 71 of CoPA, the noise and vibration control measures in British Standard 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' Part 1: Noise and Part 2: Vibration have been adopted as codes of practice which constitute BPM.

2.2 Guidance

BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' – Part 1: Noise and Part 2: Vibration provide recommendations for basic methods of noise and vibration control relating to construction and open sites. They also provide guidance on methods of predicting and measuring noise and vibration, and assessing impacts on those exposed.

2.3 Planning requirements

Havant Borough Council and East Hampshire District Council, as Local Planning Authorities, granted Planning Permission in October 2021 for the Scheme in accordance with the Town and Country Planning Act 1990 (as amended) and subject to compliance with several conditions, including:

Planning condition 8 Hours of working

No construction on the reservoir site shall take place outside the hours of 07:30-18:00 Monday to Friday, 07:30-13:00 on Saturday and no Sunday working, with the exception of specific works that

shall have been agreed in writing with the Local Planning Authority in advance and shall include details of the task, the date and duration of works. No works shall take place on Bank or Public Holidays.

Reason: In the interests of the amenities of local residents.

Planning condition 9 Construction noise and vibration

No phase of the development approved under Condition 4 shall commence until a construction noise and vibration management plan, including a targeted scheme wide construction noise and vibration monitoring and reporting programme, has been submitted to, and approved in writing by, the Local Planning Authority. The development shall be carried out in accordance with the approved details.

Reason: To ensure that construction noise and vibration is managed effectively so that levels do not regularly exceed the threshold for significant impacts.

Planning condition 10 Construction noise and vibration

No phase of the development approved under Condition 4 shall commence until a revised and updated assessment of potential noise and vibration arising during construction shall be prepared in accordance with BS 5228-1:2009+A1:2014. The assessments shall include likely eligibility for noise insulation or temporary re housing and shall be submitted to and approved in writing by the Local Planning Authority and construction carried out in accordance with the agreed recommendations.

Planning condition 11 Construction noise and vibration

Subject to Condition 10 [ABOVE], no night time working shall take place, unless otherwise in accordance with a scheme submitted to and approved in writing by the Local Planning Authority. Night-time works to be carried out strictly in accordance with the approved scheme.

Reason: To minimise potential noise impacts on nearby sensitive receptors.

(Havant BC permission ref APP/20/00990 and East Hampshire District Council permission ref 51680/001)

3.0 Impact assessment methodology

3.1 Noise thresholds

Chapter 12 Noise and Vibration of the Havant Thicket Reservoir Project Environmental Statement (ES) used BS 5228-1 to assess the potential noise impacts of the Scheme. This identified the thresholds for potential impacts presented in Table 1 below.

Table 1 Construction noise threshold levels

Period	Construction noise threshold level L_{Aeq} (dB)	Duration of works for potential impacts
Monday to Friday 07:00 to 19.00 Saturday 07:00 to 13:00	65	40 days in a 6 month period or 10 days in a 15 day period
Monday to Friday 19:00 to 23.00 Saturday 13:00 to 23:00 Sundays 07:00 to 23:00	55	
Night-time 23:00 to 07:00	45*	
* To ensure potential worst-case impacts are captured and mitigated appropriately, the project has elected to use a lower (i.e., more conservative) night-time threshold value of 45 dB L_{Aeq} , rather than the category B limit of 50 dB L_{Aeq} determined in the ES.		

Night-time works are not proposed, however there is potential for some plant to be required at night (as identified in Section 6.0 of this NVIA).

The central mechanism for controlling construction noise and vibration under CoPA 1974 relies on the demonstration that Best Practicable Means (BPM) is being employed at all times to minimise noise and vibration. Where noise limits (such as those in Table 1) are applied, it can allow for works to be planned to generate noise levels up to those limits, which may not be in accordance with BPM. As such, the imposition of limits introduces legal uncertainty and is considered incompatible with BPM. Furthermore, planning works to meet limits does not allow for flexibility in working which may be advantageous to nearby occupants of nearby sensitive properties. For example, generating high noise levels but for only short periods of time with some periods of respite might be considered BPM and may reduce overall disturbance to neighbouring occupants. These periods of respite might not be available if hard limits are imposed.

3.2 Noise level predictions

To predict noise levels due to the Scheme, the assessment uses the SoundPLAN (version 8.2) noise modelling software. This software implements the sound propagation calculation methodology set out in BS5228-1:2009+A1:2014:Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Specific input data are provided in Appendix 2.

Calculations have been undertaken to determine the noise impacts at various receptor locations within each receptor group as defined in the table in Section 4 and Appendix 1 – Receptor Locations.

Works have been split into various scenarios; scenarios were selected to cover the various and often overlapping works, and are chosen such that plant details, locations and earthwork topography is approximately constant within each scenario.

Plant has been allocated accordingly in the numbers and areas appropriate to each scenario. The scenarios also incorporate various topographical layouts; as the works progress the embankments increase in height and borrow pits become deeper.

Modelling scenarios have been determined to identify the likely average construction noise levels at receptors over a worst-case month, in accordance with the methodology specified in Annex E Section 3.3 of BS5228-1.

Further details of the modelling and grid noise maps are presented in **Appendix 2** to demonstrate that the worst-case receptor locations have been selected for each scenario.

If a significant change occurs to the proposed construction locations and/or plant, such that it is conceivable that noise criteria set out in **Section 3.1** of this document will be breached, then an acoustics consultant will be engaged to assess the likelihood of noise nuisance and advise on appropriate control measures, in consultation with the local authority.

3.3 Vibration

Chapter 12 Noise and Vibration of the Havant Thicket Reservoir Project ES assessed likely vibration from vibratory rollers during earth compaction works, as this operation is the most likely to produce ground-borne vibration. The ES Chapter included the following vibration criterion “As these works are transient and will not be taking place in close proximity to receptors for extended periods of

time, it is considered that PPV levels up to 3 mm/s would be acceptable provided residents are given advance notice of the works, and the assessment has used a threshold where there is a 33.3% probability that this level may be exceeded.”

In relation to vibration impacts, para. 12.91 of the ES Chapter concluded that “from the main reservoir site, vibrations would not be significant at sensitive receptors, as no works are proposed within 20 m of these receptors.” The toe of the embankment will be 60m from receptors on Swanmore Road at its closest point.

Havant Borough Council (HBC) and East Hampshire District Council (EHDC) have been consulted and agreed that, based on the above, vibration impacts from the Scheme will be not significant. Hence, vibration is not considered further in this NVIA.

4.0 Baseline and most potentially affected receptor sites

The Scheme is in a largely rural location, bordering onto lightly trafficked suburban areas in Havant and the village of Rowlands Castle. The A3(M) is a minimum of around 430m to the west of the Scheme boundary. Baseline noise measurements were undertaken in 2008 and were reported in Chapter 12 Noise and Vibration of the Havant Thicket Reservoir Project ES, for further information on the baseline conditions, reference should be made to this ES Chapter.

The receptor sites for potential noise effects are summarised in Table 2 and shown in the plan in Appendix 1.

Table 2 – Noise receptors

Primary potential receptor	Receptor sites	Location of works	Works activity	Local authority
RS1	Residential properties facing Swanmore Road, incl upper floors overlooking site. c60m W of embankment toe, 75m W of embankment crest	Main embankment, western arm near Swanmore Road	Transport of materials, placing and compacting	Havant Borough
RS2	Residential properties W of junction, incl upper floors overlooking site. c140m E of embankment toe, 160m E of embankment crest	Main embankment, eastern arm nearest to B2149 Redhill Road junction	Transport of materials, placing and compacting	East Hampshire District
RS3	Residential properties on Winterslow Drive, incl upper floors overlooking site. c250m S of Control House (nearest approach to nearest property)	Culvert (S edge of embankment)	Culvert and Control House works	Havant Borough
RS3	Residential properties on Winterslow Drive, incl upper floors overlooking site. c500m S of Valve shaft (nearest property)	Towards SW corner of new reservoir	Valve shaft	Havant Borough

RS3	Residential properties on Winterslow Drive, incl upper floors overlooking site. c250m S of Spillway (nearest approach to nearest property)	Spillway (S edge of embankment)	Excavation and installation of spillway pipe	Havant Borough
RS3	Residential properties on Winterslow Drive, incl upper floors overlooking site. c150m S of embankment toe, 300m S of embankment crest (nearest property)	Main embankment, southern section nearest to northern edge of Winterslow Drive	Transport of materials, placing and compacting	Havant Borough

5.0 Identification of potential activities causing noise disturbance

5.1 Predicted daytime noise levels at receptors

A table of predicted daytime construction noise levels at all identified sensitive receptors is provided in **Appendix 2. Table 3** summarises the highest average noise level within each receptor group for the daytime noise predictions. The predictions include the implementation of the measures adopted to implement best practicable means, as defined in Section 4.0 of the Noise and Vibration Management Plan (doc no. HTR-FUW-P2-RE-RM-W-017).

Table 3 – Predicted daytime construction noise levels -Summary of the highest average noise level for each receptor group

Scenario Number	Worst-case Predicted Daytime noise level $L_{Aeq,12h}$ (dB)		
	RS1	RS2	RS3
1	51	51	47
2	52	52	48
3	55	53	51
4	63	64	57
5	57	55	48
6	65	57	53
7	64	57	53
8	59	57	52
9	62	56	53
10	59	57	54
11	59	57	54
12	59	57	54
13	61	57	57

Scenario Number	Worst-case Predicted Daytime noise level $L_{Aeq,12h}$ (dB)		
	RS1	RS2	RS3
14	58	48	42

These results show that, in all cases, the agreed daytime noise criterion of 65 dB $L_{Aeq,12h}$ is not predicted to be exceeded.

5.2 Predicted night-time noise levels at receptors

The highest predicted night-time noise level is 34 dB L_{Aeq} at the worst-affected receptor group (RS1), this is below the proposed criterion of 45 dB L_{Aeq} . There are no construction works proposed to be undertaken during night-time.

6.0 Working hours

6.1 Core hours

In accordance with planning condition 8 (Hours of working) the core working hours for the main works construction activities are:

07.30– 18.00 hours (Monday to Friday), 08.00– 13.00 (Saturday).

6.2 Extended working hours

Condition 8 allows for works to be undertaken outside of these hours subject to local authority approval.

Future Water have agreed with East Hampshire District Council and Havant Council that the following activities will be undertaken over extended works hours:

Table 4 – Activities potentially undertaken over extended hours

Activity	Working hours	Timeline
Earthworks embankment and wetlands	07.00 – 19.00 hours (Monday to Friday), 07.30– 13.00 (Saturday).	1 March 2024 – 30th September 2026

These times fall within the definition of daytime in BS5228-1 (Table E.1), as applicable to the assessment of potential construction noise impact.

Any requirement for working outside these hours will be agreed in advance with the LPA.

6.3 Out of hours running of plant

In certain cases, specific items of plant may be required to be left running overnight or over weekends, outside of usual site working hours. Examples of such cases include pumps being kept on overnight or on weekends whereby an agreed rate of pumping at the borrow pits continues throughout, and generators at the satellite compound working overnight or through weekends on particularly wet days to enable drying rooms to dry PPE, or to power security huts.

These are exceptional circumstances, as in most cases plant should not be left running overnight or over weekends due to the negative environmental impacts possible as a result.

Wherever feasible, items of plant selected for such out of hours tasks should have minimal noise and vibration impacts on the environment (e.g., selection of a super-silent pump). Sound pressure levels of plant can be seen in **Appendix 2**.

On this project, it may be essential under exceptional circumstances for the following Plant to be left running Out of Hours:

Table 5 – Out of hours plant

Plant Name	Reason for Out of Hours Running of Plant	Location of Plant on Site	Sensitive Receptors and their Distance from Out of Hours Running Plant	Noise or Vibration Mitigation Measures in Place
<i>Water Pump</i>	<i>Dewatering borrow pits and surface water management</i>	<i>Adjacent to borrow pits</i>	<i>Houses on Swanmore Road located min. 170m from overnight pumping operation</i>	<i>Super silent pump; earth bund / acoustic sound barriers if needed. Manage pumping to minimise out of hours requirement</i>
<i>Generator</i>	<i>Power for site accommodation and security</i>	<i>Satellite compound</i>	<i>Remote from residential property (750m N of Winterslow Drive, 850m E of Swanmore Road, 1km W of B2149)</i>	<i>Hybrid system – maximise use of battery power at night. Locate generator within compound so cabins provide screening</i>

7.0 Conclusion

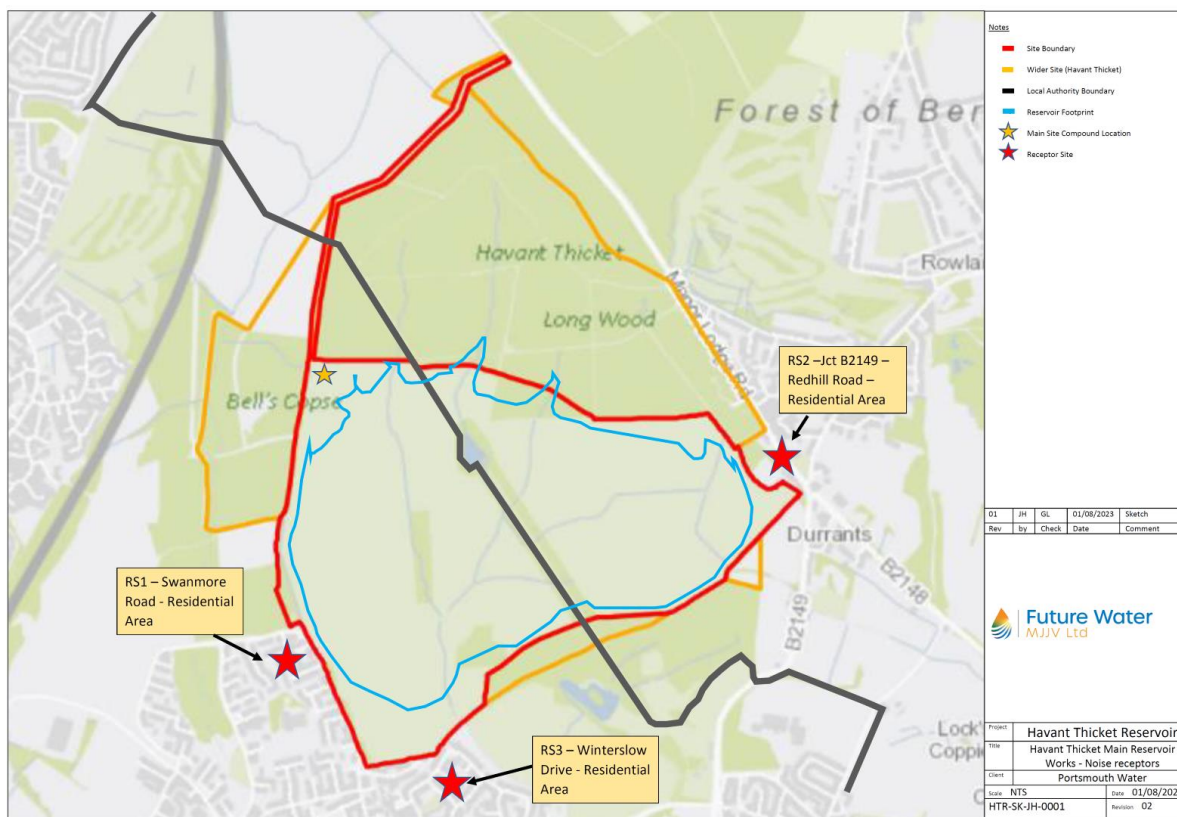
This Noise & Vibration Impact Assessment has been prepared in support of the Main Reservoir Works (MRW) phase for the proposed Havant Thicket Reservoir project.

Potential noise and vibration impacts during the construction phase of the Scheme have been calculated and assessed in order to discharge Condition 10, as set out in Section 2.3.

These results show that, in all cases, the agreed noise criteria of 65 dB $L_{Aeq,12h}$ (daytime) and 45 dB L_{Aeq} (night-time) are not predicted to be exceeded. Additionally, vibration impacts are determined to not be significant at sensitive receptors.

Appendices

APPENDIX 1 – PLAN OF SENSITIVE NOISE RECEPTORS



APPENDIX 2 – NOISE & VIBRATION IMPACT ASSESSMENT DETAILS

PLANT EQUIPMENT SOUND POWER LEVELS

Plant Description	Sound Power Level (dB(A))	Reference	Equipment ID
<i>Volvo AD40 Articulated Dump Truck</i>	<i>112</i>	<i>Manufacturer data sheet</i>	<i>P1</i>
<i>Komatsu D71/D65 Bulldozer</i>	<i>108</i>	<i>Manufacturer data sheet</i>	<i>P2</i>
<i>Volvo SD135 Roller</i>	<i>105</i>	<i>Manufacturer data sheet</i>	<i>P3</i>
<i>Komatsu PC490 Excavator</i>	<i>107</i>	<i>Manufacturer data sheet</i>	<i>P4</i>
<i>Komatsu PC210 Excavator</i>	<i>100</i>	<i>Manufacturer data sheet</i>	<i>P5</i>
<i>Kobelco CK1100G Crane</i>	<i>101</i>	<i>Manufacturer data sheet</i>	<i>P6</i>
<i>Seumitomo SC-700-5 Crawler Crane</i>	<i>103</i>	<i>BS5228 Table 4 Line 52</i>	<i>P7</i>
<i>Hitachi 225 Excavator</i>	<i>101</i>	<i>Manufacturer data sheet</i>	<i>P8</i>
<i>Putmeister 36m boom Static Concrete Pump</i>	<i>106</i>	<i>BS5228 Table 3 Line 25</i>	<i>P9</i>
<i>JCB 540 All Terrain Tele Handler</i>	<i>107</i>	<i>BS5228 Table 4 Line 54</i>	<i>P10</i>
<i>Schwing 42m Boom Mobile Concrete Pump</i>	<i>106</i>	<i>BS5228 Table 3 Line 25</i>	<i>P11</i>
<i>Concrete Delivery Trucks</i>	<i>108</i>	<i>BS5228 Table 4 Line 20</i>	<i>P12</i>
<i>Delivery Vehicles</i>	<i>111</i>	<i>BS5228 Table 11 Line 4</i>	<i>P13</i>
<i>Super silent pump</i>	<i>90</i>	<i>Manufacturer data sheet</i>	<i>P14</i>
<i>Generator</i>	<i>86</i>	<i>Manufacturer data sheet</i>	<i>P15</i>

SCENARIOS MODELED

Scenario Number	Operations Undertaken in Period	Number of each plant type												
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
1a	Haul Route Maintenance, Clay Compaction Trial, Temporary Water Management Works (east)	3	2	3	0	4	0	0	0	0	0	0	0	20
1b	Haul Route Maintenance, Clay Compaction Trial, Temporary Water Management Works (west)	3	2	3	0	4	0	0	0	0	0	0	0	20
2a	Haul Route Maintenance, Satellite Compound establishment, Temporary Water Management Works (east)	3	2	1	0	4	0	0	0	0	0	0	0	40
2b	Haul Route Maintenance, Satellite Compound establishment, Temporary Water Management Works (west)	3	2	1	0	4	0	0	0	0	0	0	0	40
3	Haul Route Maintenance, Wetlands Embankment works, Borrow Pit Excavations	13	6	8	5	1	0	0	0	0	0	0	0	40
4	Haul Route Maintenance, Wetlands Embankment works, Borrow Pit Excavations, Culvert Excavation & Preparation Works, Wetlands & Flow Structures	16	6	8	5	1	0	1	1	1	1	1	1	40
5	Haul Route Maintenance, Culvert and Valve shaft works, Borrow Pit Excavations, Wetlands & Flow Structures	7	3	2	2	1	0	2	2	2	2	2	2	40
6	Haul Route Maintenance, Main Embankment CH0 to CH900, Culvert and Valve shaft worksWetlands & Flow Structures Bognor Sands Cut-off works, Borrow Pit Excavations, Embankment 1 st Lift 29.75m AODControl House works	15	7	10	6	1	0	3	3	3	3	3	3	40
7	Haul Route Maintenance, Borrow Pit Excavations, Main Embankment CH0 to CH900, Culvert and Valve shaft works,	14	6	8	5	1	0	3	3	3	3	3	3	40

Scenario Number	Operations Undertaken in Period	Number of each plant type												
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
	<i>Wetlands & Flow Structures, Embankment 1st Lift 29.75m AOD, Shear Additional Volume – Period 1, Control House works</i>													
8	<i>Haul Route Maintenance, Borrow Pit Excavations, Additional Embankment Realignment works, Control House works</i>	13	6	8	5	1	0	1	1	1	1	1	1	10
9	<i>Haul Route Maintenance, Embankment 2nd Lift 36.50m AOD, Borrow Pit Excavations Control House works</i>	13	6	8	5	1	0	1	1	1	1	1	1	10
10	<i>Haul Route Maintenance, Borrow Pit Excavations, Shear Additional Volume – Period 2</i>	13	6	8	5	1	0	0	0	0	0	0	0	10
11	<i>Haul Route Maintenance, Borrow Pit Excavations, Embankment 3rd Lift 36.50m AOD</i>	13	6	8	5	1	0	0	0	0	0	0	0	10
12	<i>Haul Route Maintenance, Borrow Pit Excavations, Embankment 4th Lift 40.50m AOD</i>	14	6	8	5	1	0	0	0	0	0	0	0	10
13	<i>Haul Route Maintenance, Borrow Pit Excavations, Embankment 4th Lift 40.50m AOD, Harwich Cut-off works, Spillway - Emergency Discharge Structure</i>	14	7	8	5	1	0	1	1	1	1	1	1	10
14	<i>Haul Route Maintenance and Spillway - Emergency Discharge Structure</i>	2	2	0	0	1	0	1	1	1	1	1	1	10
15	<i>Night-time impacts from super silent pumps and generator</i>	6 x P14 and 1 x P15												

Note: Scenarios 1a and 2a include temporary water management works focused on the west most quarter of the works area and Scenarios 1b and 2b include these works in the east most quarter of the works area, P13 numbers denote the number of deliveries per day (vehicle trips = deliveries x2).

RECEPTOR LOCATIONS WITHIN EACH RECEPTOR GROUP

Receptor Group Number	Address	Number of Floors
RS1	2 Abbas Green, Havant, PO9 4EP 1	4
	1 Stratfield Gardens, Havant, PO9 4LS	2
	45-59 Swanmore Road, Havant, PO9 4EU	4
	63-77 Swanmore Road, Havant, PO9 4EU	4
	101 Swanmore Road, Havant, PO9 4EU	3
RS2	Cypress Gate, Manor Lodge Road, Rowland's Castle, PO9 6BA	1
	1, Durrants Road, Rowland's Castle, PO9 6BE	2
	50A, Durrants Road, Rowland's Castle, PO9 6BG	2
	The Former Rectory, 74, Manor Lodge Road, Rowland's Castle, PO9 6BA	2
	Havant Academy, 57 Stanstead Crescent, Havant, PO9 5JD	3
	Mulberry Cottage, 2, Manor Lodge Road, Rowland's Castle, PO9 6BA	2
	19 Nuthatch Close, Rowlands Castle, PO6 6HW	2
RS3	35, Well Meadow, Havant, PO9 4LW	2
	44, Well Meadow, Havant, PO9 4LW	2
	93, Winterslow Drive, Havant, PO9 5DZ	2

MODELLING DATA SOURCES

Parameter	Source	Details
Horizontal distances around site	Ordnance Survey	Ordnance Survey open-source mapping
Ground levels	LIDAR data from environment.data.gov.uk Future Water MMJV Ltd	LIDAR data at 2m resolution DTM
Building heights	Observations and satellite imagery	11m height for four storey, 9m height for 3 storey and 6m height for two storey buildings
Works Areas	Future Water MMJV Ltd	Manually marked-up PDFs
Plant Source Noise Levels	Manufacturer Data Sheets	Manufacturer Data Sheets

ADDITIONAL MODELLING SETTINGS AND PARAMETERS

Parameter	Comment/detail
Maximum search radius	5000m
Maximum number of reflections	3
Side diffraction	enabled
Ground absorption	G=1 (representing soft ground).
Calculation heights for point receivers	ground floor - 1.5m first floor - 4m second floor – 6.5m third floor – 9m
Grid noise map grid spacing	25m
Grid calculation height	1.5m

CALCULATED NOISE LEVELS AT RECEPTORS

The following table provided predicted noise levels at all identified receptors, for each modelling scenario. The predictions include the implementation of Best Practicable Means to minimise construction noise emissions, as identified in the Noise and Vibration Management Plan (document no. HTR-FUW-P2-RE-RM-W-017). All predicted noise levels are within the adopted threshold for the onset of impacts (65 dB L_{Aeq}).

Receptor	Worst Case Daytime noise level $L_{Aeq,12h}$ (dB)															
	1A	1B	2A	2B	3	4	5	6	7	8	9	10	11	12	13	14
RS1 - Swanmore Road Residential																
101, Swanmore Road, Havant, PO9 4EU East Façade, Ground Floor	50	48	50	47	53	61	55	63	62	57	60	57	57	57	56	45
101, Swanmore Road, Havant, PO9 4EU East Façade, 1st Floor	50	48	50	48	54	61	55	64	63	58	61	58	58	58	58	49
101, Swanmore Road, Havant, PO9 4EU East Façade, 2nd Floor	51	48	51	48	54	62	56	64	63	58	62	58	58	58	59	53
101, Swanmore Road, Havant, PO9 4EU North Façade, Ground Floor	50	48	49	47	53	60	54	63	61	56	59	57	57	57	56	41
101, Swanmore Road, Havant, PO9 4EU North Façade, 1st Floor	50	48	50	47	53	61	54	63	62	57	60	57	57	57	57	42
101, Swanmore Road, Havant, PO9 4EU North Façade, 2nd Floor	50	48	50	48	54	61	55	63	62	57	61	58	58	58	57	43
45-59 Swanmore Road, Ground Floor	49	46	49	46	53	61	54	62	61	57	60	57	57	57	62	60
45-59 Swanmore Road, 1st Floor	49	47	49	47	53	61	55	63	61	58	61	57	57	57	63	62
45-59 Swanmore Road, 2nd Floor	50	47	50	48	54	62	55	63	62	58	61	58	58	58	63	62
45-59 Swanmore Road, 3rd Floor	50	48	50	48	55	63	56	63	62	59	61	59	59	59	64	62

Receptor	Worst Case Daytime noise level $L_{Aeq,12h}$ (dB)															
	1A	1B	2A	2B	3	4	5	6	7	8	9	10	11	12	13	14
63-77 Swanmore Road, Ground Floor	50	47	50	47	53	61	55	63	62	58	61	57	57	57	60	57
63-77 Swanmore Road, 1st Floor	51	48	51	48	54	62	55	64	62	58	61	58	58	58	60	57
63-77 Swanmore Road, 2nd Floor	51	48	51	49	55	62	56	64	63	59	62	59	59	59	61	57
63-77 Swanmore Road, 3rd Floor	52	49	52	49	55	63	57	65	64	59	62	59	59	59	61	58
2, Abbas Green, Havant, PO9 4EP, Ground Floor	45	44	42	38	47	51	48	57	55	50	53	51	51	51	54	51
2, Abbas Green, Havant, PO9 4EP, 1st Floor	46	44	43	39	49	52	49	58	55	51	54	52	52	52	54	51
2, Abbas Green, Havant, PO9 4EP, 2nd Floor	47	45	44	40	50	52	49	58	56	51	55	52	52	52	55	52
2, Abbas Green, Havant, PO9 4EP, 3rd Floor	47	46	45	43	52	56	51	59	57	53	56	54	54	54	56	53
1, Stratfield Gardens, Havant, PO9 4LS, Ground Floor	45	44	46	45	51	60	52	57	56	56	57	56	56	56	58	55
1, Stratfield Gardens, Havant, PO9 4LS, 1st Floor	46	44	47	45	51	60	53	58	56	56	57	56	56	56	59	55
RS2 - Waterslow Drive Residential																
35, Well Meadow, Havant, PO9 4LW, Ground Floor	46	43	48	47	52	63	54	56	56	57	56	57	57	57	56	40
35, Well Meadow, Havant, PO9 4LW, 1st Floor	47	43	49	48	53	64	55	57	57	57	56	57	57	57	57	43
44 Well Meadow (N), 1st Floor	46	43	48	45	51	61	53	56	56	56	56	57	57	57	57	48
44 Well Meadow (S), Ground Floor	42	41	44	43	49	58	50	51	52	53	52	53	53	53	51	39
44 Well Meadow (S), 1st Floor	46	43	48	46	51	62	54	56	56	56	56	57	57	57	57	45

Receptor	Worst Case Daytime noise level $L_{Aeq,12h}$ (dB)															
	1A	1B	2A	2B	3	4	5	6	7	8	9	10	11	12	13	14
93, Winterslow Drive, Havant, PO9 5DZ, Ground Floor	51	43	52	45	50	62	54	57	57	57	56	56	56	56	56	47
93, Winterslow Drive, Havant, PO9 5DZ, 1st Floor	51	43	52	46	50	62	55	57	57	57	56	56	56	56	56	47
RS3 - Redhill Road Residential																
19 Nuthatch Close, Ground Floor	40	46	41	46	51	55	46	52	51	51	52	53	53	53	55	38
19 Nuthatch Close, 1st Floor	41	47	41	47	51	56	47	52	52	51	53	54	54	54	56	38
1, Durrants Road, Rowland's Castle, PO9 6BE, Ground Floor	37	44	38	44	48	53	44	49	49	48	53	53	53	53	55	36
1, Durrants Road, Rowland's Castle, PO9 6BE, 1st Floor	38	44	39	44	49	53	44	50	50	49	53	54	54	54	55	36
50A, Durrants Road, Rowland's Castle, PO9 6BG, Ground Floor	37	41	39	42	47	53	44	49	49	49	52	52	52	52	53	36
50A, Durrants Road, Rowland's Castle, PO9 6BG, 1st Floor	37	42	39	42	48	53	45	49	49	49	52	53	53	53	54	37
Cypress Gate, Manor Lodge Road, ROWLAND'S CASTLE, PO9 6BA, Ground Floor	39	47	40	48	51	55	46	52	51	51	52	52	52	52	57	37
Havant Academy, Ground Floor	40	42	41	42	50	55	46	51	50	50	52	52	52	52	53	38
Havant Academy, 1st Floor	41	43	42	43	51	56	47	52	52	51	53	53	53	53	55	40
Havant Academy, 2nd Floor	42	43	43	44	51	57	48	53	53	52	53	53	53	53	54	42
Mulberry Cottage, 2, Manor Lodge Road, Rowland's Castle, PO9 6BA, Ground Floor	37	43	39	44	51	54	44	50	49	49	51	51	51	51	53	37
Mulberry Cottage, 2, Manor Lodge Road, Rowland's Castle, PO9 6BA, 1st Floor	38	43	39	44	51	54	45	50	50	49	51	51	51	51	53	38

Receptor	Worst Case Daytime noise level $L_{Aeq,12h}$ (dB)															
	1A	1B	2A	2B	3	4	5	6	7	8	9	10	11	12	13	14
<i>The Former Rectory, 74, Manor Lodge Road, Rowland's Castle, PO9 6BA, Ground Floor</i>	39	47	40	47	50	54	45	51	51	50	53	54	54	54	57	37
<i>The Former Rectory, 74, Manor Lodge Road, Rowland's Castle, PO9 6BA, 1st Floor</i>	39	47	40	47	51	55	46	52	51	51	54	54	54	54	57	38

Highlighted entries show highest noise levels within each receptor group, for each modelling scenario

Grid noise maps

