Havant Thicket Reservoir – Main Pipeline Works

Noise & Vibration Management Plan

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Havant Thicket Reservoir – Main Pipeline Works

Noise & Vibration Management Plan

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1 Abbreviations and Definitions

BPM	=	Best Practicable Means
Client	=	Portsmouth Water Limited
CMP	=	Communications Management Plan
Contractor	=	Ward and Burke Construction Limited
CoPA	=	The Control of Pollution Act 1974
CSFs	=	Critical Success Factors
EA	=	Environment Agency
HTR MPW	=	Havant Thicket Reservoir Main Pipeline Works
HTR MRW	=	Havant Thicket Reservoir Main Reservoir Works
LPA	=	Local Planning Authority
N&V	=	Noise & Vibration
NR	=	Network Rail
OCI	=	Optimised Contractor Involvement
PAC	=	Powdered Activated Carbon
PW	=	Portsmouth Water Limited
RAMS	=	Risk Assessment / Method Statement
REAC	=	Register of Environmental Actions and Commitments
SAC	=	Maritime Special Area of Conservation
SPA	=	Special Protected Areas
SPZ1	=	Source Protection Zone 1
SWS	=	Southern Water Services
WBCL	=	Ward and Burke Construction Limited
UTX	=	Under Track Crossing

2 Introduction

The objective of the Havant Thicket Reservoir Project is to provide a new resource to supply drinking water in the water-stressed Southeast of England, while maximising the community and environmental benefits of a new raw water reservoir.

Ward and Burke Construction Limited (WBCL) have been appointed by Portsmouth Water Limited (PW) to design, construct, and commission a new pipeline connecting Bedhampton Pumping Station to Havant Thicket Reservoir, including an emergency discharge structure at the Hermitage Stream, culvert upgrades and an Under Track Crossing.

The pipeline corridor extends from the Portsmouth Water pumping station at the Bedhampton works, northwards to the proposed control house within the reservoir site. It passes through the Leigh Park Estate under local roads and open spaces. The corridor also runs north along the Hermitage Stream before turning North-East and broadly following the Riders Lane Stream towards the reservoir site. The Southernmost point of the pipeline is located approximately 1 km north of Chichester Harbour and Langstone Harbour, which are Special Protected Areas (SPA) and part of the Solent Maritime Special Area for Conservation (SAC).

A combination of open cut and micro-tunnelling techniques will be used for the construction of the pipeline. Open cut techniques will take place in two locations: the council playing fields adjacent to Havant Rugby Club; and land in the South-West of Staunton Country Park. Micro-tunnelling will be used for the remainder of the pipeline construction facilitated by eight construction shafts and the emergency discharge chamber.

Three culvert upgrades on Riders Lane Stream will be carried out along Riders Lane Stream to facilitate increased water flows from the reservoir.

2.1 Works Background

Portsmouth Water have outlined seven strategic drivers for this project to ensure continued focus on meeting the Project's objectives. These project drivers are:

- **Quality:** Quality in procurement, design and delivery to deliver an exemplar project to serve Customers in the short, medium and long term,
- **Timeliness:** In service and operating by 2029 to support a major bulk transfer to Southern Water,
- **Innovation:** Develop best practice in the largest new reservoir project in the southeast for decades. Capture learning from companies working in partnership to deliver better value for Customers,
- **Flexibility:** Create a project that offers multiple uses and enables Portsmouth Water to be a strategic water supplier for the South over the medium and long term,
- **Responsibility:** Realise and build upon our health, safety and well-being goals,
- **Connectivity:** Positive connection for all stakeholders – Customers, the local community, regulators, staff, contractors, shareholders, commercial partners, environmental groups and individuals with a passion for the environment, and
- **Environment:** A positive contribution to local and internationally important habitats. Direct support for Government's objective to reduce the damaging abstraction of water from rivers.

2.2 Scope of Document

This Noise & Vibration Management Plan is in support of a planning application for a revised pipeline scheme between the Havant Thicket Reservoir and Bedhampton Springs and pumping station. Following outline approval of a pipeline scheme in October 2021 (Havant Borough Council ref. APP/20/00991), a new pipeline route and design has been identified, which needs a new planning approval. There has also been a change in approach to deliver

additional resilience to the water network, with an additional pipe now being proposed. The new water pipes would be installed inside two adjacent tunnels which would be constructed concurrently to ensure maximum efficiency is achieved with construction programme durations, and subsequent disruption to residents minimised.

This N&V Management Plan outlines the measures to be taken to reduce the generation of noise and vibration during the Main Pipeline Works (MPW) for the Havant Thicket Reservoir (HTR). It is essential to adequately control noise and vibration to reduce the risk to the local environment as well as the local community and amenities.

This plan also outlines a high-level construction programme and associated activities in order to demonstrate overlap of concurrent work, alongside an overview of the scheme areas. The distances between work areas are typically large enough that cumulative effects of noise and vibration will not be observed.

All staff and sub-contractors will be required to follow the measures outlined in this document and these measures will be delivered via site inductions and regular toolbox talks.

3 Legislation

The Control of Pollution Act 1974 (CoPA) provides the Local Planning Authorities 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.

3.1 Planning Requirements

The Register of Environmental Actions and Commitments (REAC) (HTR-WAB-PI-XX-HS-W-0006) is formed from the Environmental Statement which outlines several environmental actions and commitments that must be adhered to during the construction of the pipeline. Table 1 shows the measures to be taken regarding noise and vibration.

Ref	ES ref	Objective	Actions/commitments	Assumptions (on which the action is based)	Achievement criteria and reporting requirements	When P - Pre-construction C - Construction O - Operation A - All	Completion Record
Noise and vibration							
Pipeline NV1	CH12	To limit and control noise emissions during construction to avoid direct and indirect impacts on Community and receptors.	• Works will be carried out in accordance with the Best Practicable Means, as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environment Protection Act 1990, and noise control measures, as suggested by BS 5228 Part 1 • Only plant which complies with the relevant EU/UK noise limits applicable to that equipment or is in no way noisier than would be expected from the noise levels quoted in BS 5228: 2009+A1:2014 Part 1 will be used. This would include all vehicles and mechanical plant used for the purpose of the works to be fitted with effective exhaust silencers and	To minimise the emission of noise from the site	Specification of plant noise level	**P, C**	Initial: Date:

			maintained in good and efficient working order; • All compressors and generators should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools should be fitted with mufflers or suppressers of the type recommended by the manufacturers and should be kept in a good state of repair; • Machines in intermittent use should be shut down in the intervening periods between work, or where this is impracticable, throttled down to a minimum; • Where practicable, plant with directional noise characteristics should be positioned so as to minimise noise at adjacent properties; • The works covered by this application will be planned so as to ensure that as much work as practicable (taking into account the needs to minimise disruption to trains when the pipeline crosses the rail line and ensuring the safety of the public and workforce) takes place during normal daytime working hours; • Ensuring that all staff and operatives are briefed on the requirement to minimise				

			nuisance from site activities, via toolbox talks etc. • Regular plant maintenance; all plant and equipment should be examined daily for defects prior to the start of works and under no circumstances should defective plant be used; • Avoid any reversing on site as far as reasonably practicable – if reversing is required, utilise broadband low impact reversing alarms or banksmen. • Where practicable, use a 'dead rolling' method when vibratory rollers are required for compaction activities or road resurfacing close to properties. • Use vibration-generating equipment at the minimum vibration amplitude.				
Pipeline NV2	CH12	To limit and control noise emissions during construction to avoid direct and indirect impacts on Community and ecological receptors.	• Use of temporary noise screens or partial enclosures around particularly noisy activities, for example pneumatic breakers used in close proximity to dwellings	Current assessment shows potential for significant night time impacts at receptors on Swanmore Road.	Specification of noise barriers and input to CEMP	**P, C**	Initial: Date:
Pipeline NV3	CH12	Avoid night-time impacts	• Avoid night-time works where practicable, particularly in proximity to receptors on Swanmore Road. • Where night-time works cannot be avoided, acoustic screens should be erected to block line-of-sight between the plant and receptor to minimise impacts as far as reasonably practicable.	Current assessment shows potential for significant night time impacts at receptors on Swanmore Road.	Input to CEMP	**P, C**	Initial: Date:

Pipeline NV4	CH12	Reassess Noise and Vibration Impacts	• Reassess noise and vibration impacts if the method of working, plant and programme have been altered.	Current assessment shows potential for significant impacts	New assessment	**P**	Initial: Date:
Pipeline NV5	CH12	Undertake building surveys	• Agree thresholds for vibration levels and durations of works with the local authority and determine if undertaking building surveys before and after works generating vibration in close proximity to sensitive receptors is appropriate	Current assessment shows potential for significant vibration impacts when works are very close to receptors	Ensure works do not cause cosmetic building damage	**P, C**	Initial: Date:
Pipeline NV6	CH12	Noise and vibration monitoring	• Undertake targeted monitoring of noise and vibration levels when works are in close proximity to sensitive receptors. Frequency and locations to be agreed with local authority	Ensure works do not cause significant noise or vibration impacts	Report measured levels to the local authority within an agreed timeframe	**C**	Initial: Date:
Pipeline NV7	CH12	To limit and control noise emissions during construction to avoid direct and indirect impacts on Community and ecological receptors.	• Agree thresholds for noise levels and durations of works with the local authority above which noise insulation or temporary rehousing will be offered to affected residents	Current assessment shows potential for significant impacts at receptors, dependant on duration of works	Input to CEMP	**P**	

Table 1 – Extract from REAC Table in CEMP

4 Noise & Vibration Mitigation Measures

4.1 Noise

The project shall implement mitigation measures to ensure that the noise emitted from all equipment, operations and services used during the project will be practically minimised in line with the recommendations of BS 5228-1 (Code of practice for noise and vibration control on construction and open sites). All vehicles, plant and machinery used on site will be maintained in efficient working order to minimise any potential excess noise produced. Mobile plant is to be sited as far away from sensitive receptors (e.g. residential areas, recreational areas) as reasonably practicable. In general site management will consider the following noise hierarchy:

- Eliminate the source of the noise.
- Substitute for quieter methods of working.
- Isolate source of the noise.
- Engineering controls, i.e. barriers, silencers, insulation.
- Restriction of working hours.

4.1.1 Noise Impact Assessment

A Noise and Vibration (N&V) Impact Assessment has been carried out for the Main Pipeline Works (HTR-ATK-ZZ-ZZ-RP-Z-0112) which includes information relating to the Shaft and tunnelling construction works as well as open cut trench works.

The following tables 2-5 outline the number of receptors affected by construction noise during construction before mitigation measures are applied.

Pipeline Shaft	Duration of Works (days)	Potential Impacts (residential)	Potential Impacts (non-residential)
Shaft 1	213	19	1
Shaft 2	381	21	2
Shaft 3	132	73	0
Shaft 4	429	25	0
ED Shaft	279	45	0
Shaft 5	447	82	1
Shaft 6	185	74	0
Shaft 7	514	58	0
Shaft 8	135	3	0

Table 2 - Sensitive receptors affected by daytime shaft works.

Pipeline Section	Duration of works	Potential Impacts (residential)	Potential Impacts (non-residential)
Shaft 2	14	304	4

Table 3 - Sensitive receptors affected by 24-hour rail crossing.

Pipeline Section	Duration of Works (days)	Potential Impacts (residential)	Potential Impacts (non-residential)
Bedhampton	340	19	1
P2	100	78	2
P9	177	0	0
Reservoir Pipeline Section	312	18	0

Table 4 - Open cut sensitive receptors affected by daytime works.

Pipeline Section	Duration of works	Potential Impacts (residential)	Potential Impacts (non-residential)
Culvert Middle Park Way	74	15	0
Culvert Dunsbury Way	68	65	0
Culvert Purbrook Way	88	46	1

Table 5 - Culvert upgrades sensitive receptors.

Ward and Burke and contractors will adopt mitigation measures supported by the Noise and Vibration Impact Assessment (HTR-ATK-ZZ-ZZ-RP-Z-0112), to mitigate noise effects on sensitive receptors, including but not limited to the following:

- All mobile plant and equipment will be fitted with acoustic panels that will be kept closed whilst running.
- All mobile plant and equipment will be switched off when not in use.
- All equipment will be well maintained, including dampers and silencers.
- Faulty equipment will be removed from use.
- Restrict the number of vehicles allowed on site. HGV movements will be restricted as outlined in the Construction Traffic Management Plan (HTR-WAB-PI-ZZ-PL-W-0003).
- Only plant which complies with the relevant EU/UK noise limits applicable to that equipment or is in no way noisier than would be expected from the noise levels quoted in BS 5228: 2009+A1:2014 Part 1 will be used.
- Using vibration-generating equipment at the minimum vibration amplitude.
- Where practicable, using a ‘dead rolling’ method when vibratory rollers are required for compaction activities, which involves not applying the vibration system on the rolling equipment.
- When sheet piling, noise reduction shrouds will be used, and shorter working durations can be used where required to limit constant impacts, with periods of respite potentially considered BPM to reduce overall disturbance to neighbouring occupants
- Ensuring that all staff and operatives are briefed on the requirement to minimise nuisance from site activities via toolbox talks.

- Polyfan/PCT grinding and cutting discs will be used, where appropriate, that allow up to four times the exposure to both vibration and noise over conventional discs.
- Regular noise surveys will be undertaken throughout the works, during grinding, drilling and other noise generating activities.
- Any equipment/plant that appears to be generating high noise levels will be checked for any potential defaults by a competent plant fitter/mechanic and removed from site if found unsuitable. Alternative plant/equipment will be investigated for suitability to carry out the work if required.
- Compliance with requirements outlined in this document will be checked as part of the weekly environmental inspection and the results recorded. This audit checklist will be available in the site offices and will be reviewed during formal environmental audits.

Works are to be carried out, in accordance with Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environment Protection Act 1990 (Appendix C). These works are to be detailed in site, and task specific, RAMS throughout the project. Typically, works will be carried out during daytime hours for this scheme to prevent any unnecessary disturbance however, tunnelling works for the under-track crossing (UTX) north of Shaft 1 will need to be undertaken 24 hours a day. This is to reduce any potential disturbance that may be caused crossing under the tracks. Other nighttime works may be necessary in some situations, as stopping tunnelling work at the end of the day shift may not be possible due to geological conditions and various unfavourable tunnelling factors. During such scenarios, the tunnelling works would be continued until a favourable situation is encountered to stop the tunnelling works. The impact of these nighttime works would only affect the associated shaft launch location.

4.1.2 Acoustic Screening

To mitigate the effects to sensitive noise receptors along the pipeline route, acoustic screening is to be implemented, where reasonably practical as recommended in the N&V assessment. Table 6 below outlines the areas in which acoustic screens are to be installed.

Pipeline Shaft / Location	Location of temporary noise barriers
Shaft 2	Throughout the worksite periphery at Shaft 2 worksite to minimise both daytime and night-time impacts, shielding Bidbury infant school.
Shaft 3	Towards the north and east of Shaft 3 work site, shielding the properties on Hook's Farm Way and Hook's Lane.
Shaft 4	Towards the South and north of Shaft 4 worksite, shielding the properties along Barncroft Way and St Francis Pl.
Emergency Discharge	Towards the southwest and north of the Shaft ED worksite, shielding the properties on Priorsdean Crescent, Corhampton Crescent and Hermitage Close. During the construction of the spillway, it may not be practical to install noise barriers to the southwest of the Shaft ED worksite. Therefore, during the construction of the spillway, noise should be mitigated using acoustic shrouds to minimise the impact of the construction noise.
Shaft 5	Throughout the worksite periphery at Shaft 5 worksite. If the temporary noise barrier around the entire periphery of the worksite is unpracticable, acoustic shrouds should be deployed around noisy plan

	and construction activity to minimise the impact of the construction noise.
Shaft 6	Throughout the worksite periphery at Shaft 6 worksite. If the temporary noise barrier around the entire periphery of the worksite is unpracticable, acoustic shrouds should be deployed around noisy plan and construction activity to minimise the impact of the construction noise.
Shaft 7	Towards the south and east of the Shaft 7 worksite, shielding the properties on High Lawn Way
Shaft 8	Towards the west and Southwest of the Shaft 8 worksite, shielding the properties on Bondfields Crescent and Bitterne Close.
Bedhampton Pipeline	Due to the moving nature of work, a temporary noise barrier can be deployed, which can be moved around and placed to break the direct line of site between the noise source and sensitive receptors along the properties on Chadswell Meadows and Kings Croft Lane. Alternatively, for the locations where temporary noise barriers cannot be deployed, acoustic shrouds should be deployed around noisy plant and construction activity to minimise the impact of the construction noise.
Section P2	Due to the moving nature of work, a temporary noise barrier can be deployed, which can be moved around and placed to break the direct line of site between the noise source and sensitive receptors along the properties on Chadswell Meadows and Kings Croft Lane. Alternatively, for the locations where temporary noise barriers cannot be deployed, acoustic shrouds should be deployed around noisy plant and construction activity to minimise the impact of the construction noise.
Reservoir Pipeline	Temporary noise barrier (approximately 30m) on the western end of the reservoir pipeline (where the pipeline bends towards the reservoirs, located approximately 50m east of Swanmore road), to shield properties on Swanmore Road between Inkpen Walk and Mewsey Court.
Middle Park Way Culvert	Towards the west of Middle Park Way Culvert worksite, shielding the properties on Bondfields Crescent and Bitterne Close.
Dunsbury Way Culvert	Throughout the worksite periphery at Dunsbury Way Culvert worksite. Alternatively, for the locations where temporary noise barriers cannot be deployed, acoustic shrouds should be deployed around noisy plant and construction activity to minimise the impact of the construction noise.
Purbrook Way Culvert	Throughout the worksite periphery at Purbrook Way Culvert worksite. If temporary noise barrier around the periphery of the worksite is unpracticable, acoustic shrouds should be deployed around noisy plant and construction activity to minimise the impact of the construction noise.

Table 6 - Acoustic screening locations

For maximum effectiveness, barriers will be brought as close as reasonably possible to either the noise source or the receiving positions. In addition, there should be no gaps or openings at joints in the barrier material. All screens need to extend to a height such that the 'line of sight' between noise source and receptor where practicable, or at least a minimum of 2m in height.

Subject to safety considerations, temporary screens will be mobile to facilitate onsite relocation. Where possible, any gaps between the ground and the bottom of the panel will be less than 100 mm.

Acoustics screens are unlikely to sufficiently reduce noise levels during the night-time trenchless works. However, the works are short term, and the implementation of best practicable means will minimise any residual impacts.

Additional noise insulation can potentially be provided where significant effects are predicted, and noise barriers at locations such as Bidbury School are expected to remain in place for the full duration of the project. An overview of the proposed noise mitigation for the full pipeline route, including the daytime and nighttime noise radii, can be seen in Appendix A – Noise Mitigation Layouts.

4.1.3 Post Mitigation Noise Impacts

Works Location	Number of Receptors affected
Shaft 1	2
Shaft 3	14
ED Chamber	5
Shaft 5	22
Shaft 6	11
Shaft 7	6
Section P2	1
Purbrook Way Culvert	1
Dunsbury Way Culvert	6

Table 7 - Post Mitigation Noise Impacts

After the implementation of mitigation measures and best practicable means, it is determined that there may potentially be up to 68 receptors that would experience noise effects from daytime construction. Residual impacts will be managed via effective communication with the residents both prior and during the works. Nighttime works will not be undertaken unless necessary.

For 24-hour construction, it is determined that there may potentially be 11 receptors impacted post mitigation measures however, with reference to table 8, it is not expected that night works will exceed the threshold for a period of 10 or more days of working in any 15 consecutive days so there is no significant nighttime effect expected.

Refer to Appendix A and C for drawings indicating the noise mitigation measures and residual receptors.

4.1.4 Noise Thresholds

The ES Chapter found that "all receptors are considered to be in BS 5228 Part 1 Category A for daytime works and Category C for nighttime works". On this basis, the thresholds for the potential construction noise impacts are defined in Table 8.

Assessment Period	Threshold value (dB) for potential impacts	Duration of works for potential impacts
Monday to Friday 07:00 to 19.00 Saturday 07:00 to 13:00	65	10 days in a 15-day period or 40 days in a 6-month 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	50	

Table 8 - Threshold of potential impacts

Where all reasonable measures cannot reduce levels to below the threshold values, further mitigation could be provided, such as restrictions on working which prevent exceedances of the relevant temporal. Implementing working restrictions to eliminate these exceedances could significantly extend the works duration; thereby increasing the overall disturbance and nuisance of nearby residents. In this scenario, WBCL will seek consent under Section 61 of the Control of Pollution Act at the earliest opportunity to agree the preferred approach to managing these effects. The central mechanism for controlling construction noise and vibration under the Control of Pollution Act (CoPA) 1974 relies on the demonstration that Best Practicable Means (BPM) is being employed at all times to minimise noise effects. It is therefore not considered appropriate to apply the threshold values in Table 8 as hard limits, as this 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.

It is possible that, in exceptional situations, there may be a requirement for work that is significantly above these threshold values. If this is the case, the project team will discuss these with the relevant Environmental Health Officer(s) to agree appropriate mitigation measures.

4.1.5 Noise Monitoring

During the works, noise monitoring will be undertaken at the closest noise sensitive receptor for each site. Results will be compared with the noise level thresholds identified in Section 4.1.4 and any exceedances identified. Monitoring will be carried out daily and records will be kept in the site office to be made available to PW.

Noise monitoring at receptor sites will be undertaken using calibrated equipment at the agreed monitoring points. Survey frequency will be four times within the annual construction period. Each survey will comprise of total of one day of measurements, measurements will be undertaken at the likely worst-affected receptor(s), which will depend on the location and type of the works being undertaken at the time.

Additionally, active monitoring with fixed monitors may be undertaken following a complaint or as required.

4.1.6 Operational Noise

As the pipeline will be underground, it is assumed that there will be no operational noise apart from water discharge on the rare occasion that the emergency discharge is required and from testing and maintenance of associated equipment (further detail regarding the Emergency Discharge structure detailed below).

There is a possibility of noise from plant at the Bedhampton Compound. Upgrades within the Bedhampton Compound include the installation of new equipment, including an emergency generator, powdered activated carbon (PAC) equipment, transformer, and surge vessel (including a compressor kiosk). The transformer and the

surge vessel will continuously operate throughout the year. However, the generator will be used as an emergency power backup and will be operational only when mains power fails or during its maintenance, so is not considered as an operational noise.
The PAC equipment and generator are the significant contributors to noise levels but as these two are not expected to be in use often, the noise impacts are not considered to be significant.

4.1.6.1 Emergency Discharge Structure

As part of required maintenance activities (typically 6-monthly), the emergency drawdown discharge structure will require modulation of the installed actuated valves to ensure good function in an actual emergency event. This is expected to last only a few minutes and is not expected to be noisy. This activity is infrequent and of a short duration, and has not been assessed as causing noise disturbance to the nearby receptors.

In a drawdown event, water will flow down the spillway as designed – there is no methodology to assess water spillage noise, and any assessment would need to be undertaken based on an onsite noise measurement. This is considered to be a rare occurrence and is unlikely to result in any noise impacts. The flow of water can also be considered a 'natural' sound, and any noise generated is likely to be white noise.

4.2 Vibration

Table 9 below outlines the number of sensitive receptors affected by vibration during the pipeline construction.

Works location	Duration of works (days)	Maximum amplitude of vibration		Minimum amplitude of vibration	
		Residential	Non-residential	Residential	Non-residential
Impacts due to earth compaction at tunnel shaft sites					
Shaft 5	10	2	0	0	0
Shaft 6	5	4	0	0	0
Impacts due to road compaction at culvert crossings					
Dunsbury Way	5	5	0	0	0
Impacts due to micro-tunnelling					
Section P1	5	7	1	N/A	N/A
Section P5	5	0	1	N/A	N/A

Table 9 - Sensitive receptors affected by vibration.

The Environmental Statement (ES) (Vol 2 Chapter 12 (Noise and vibration)) for the Scheme assessed main vibration impacts are likely to arise from surface mounted equipment to facilitate tunnelling operations, and compaction resulting from the movement of heavy plant near shaft locations and open cut sections of the pipeline, which involves the use of vibratory rollers.

Vibratory rollers have the potential to cause vibration impacts at 11 residential receptors when used at its maximum amplitude. When the roller is at its minimum amplitude, no potential effects are predicted at sensitive receptors.

Where reasonably practicable, 'dead rolling' methods will be employed when carrying out compaction activities within 20 m of sensitive receptors. This involves using rolling equipment without enabling the vibration setting meaning it will be working at minimum amplitude.

When the vibratory roller must work at maximum amplitude, works will not take place within 4.5m of residential buildings to eliminate the risk of damage. As works are not within 4.5m of residential receptors, no damage to residential receptors is predicted.
Tunnelling operations has the potential to impact 7 residential receptors and 2 non residential receptors. Tunnelling will be carried out at depths greater than 5m at most locations which mitigates the likelihood of any damage being caused to receptors. As tunnelling operations progress relatively quickly, any receptors that may be affected by vibration will only feel short term effects.

4.2.1 Vibration Thresholds

Vibration threshold levels, as per the ES chapter, are provided in Table 10.

Magnitude	Level of Protection	Period
3.0 mm/s PPV	Nuisance grounds	All times

Table 10 – Construction Vibration Threshold Levels

4.2.2 Vibration Monitoring

Vibration monitoring is to be carried out at receptors closer than 5m from the tunnelling works, during the works. Results will be compared with the thresholds. Vibration monitoring at receptor sites will be undertaken using calibrated equipment at the agreed monitoring points. Working Hours Mitigation.

4.3 Working Hours

4.3.1 Core Hours

Construction of the pipeline will be undertaken within the hours agreed between WBCL and the LA, via any section 61 consents that may be required. Working hours will align with the thresholds set out in Table 8 and will not exceed the threshold limits set out in this table. Construction of the Under-track Crossing will be carried out 24 hours a day for the duration of the works to minimise any potential effects on the railway track. In certain circumstances, tunnelling works may be extended past regular hours to avoid unfavourable tunnelling conditions to avoid any potential unforeseen issues or damage to tunnelling equipment.

4.3.2 Out of Hours Plant

In certain cases, specific items of plant may be required to be left running overnight or over weekends, outside of core working hours. Examples of such cases include pumps being kept on overnight or on weekends, and generators 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.
Noise and vibration control measures must be put in place to ensure that nuisance to receptors is minimised. Wherever feasible, items of plant selected for such out of hour's tasks should have minimal noise and vibration impacts on the environment (e.g. selection of a super-silent pump).

Security systems set up at site compounds overnight typically feature remote tannoy or alert systems when disturbed. The volume of these systems will need to be evaluated to ensure residents are not unduly disturbed if triggered by legitimate or false alarms out of hours. The presence of patrolling security guards across the project may negate the requirement for tannoy or alert systems overnight.

5 Communication & Engagement

5.1 Liaison with Local Planning Authority

This N&V Management Plan will be issued to the Local Authority as part of the planning application.

5.2 Liaison with local community

Letter drops providing appropriate information will be prepared and sent to residents/business owners in advance of works. Proactive communications will also be undertaken via Portsmouth Water social media channels (such as Facebook, Twitter etc.)
At least 14 days notice before the commencement of the works. The information provided, within the notification correspondence, will include the following details:

- Type of work to be undertaken;
- Working hours;
- Reason for the works;

An early dialogue will need to be established and maintained with the receptors assessed to experience noise effects following the proposed mitigation measures. Where significant effects are expected, additional measures may be required above the overall noise mitigation measures to alleviate these affects, including flexibility in working. Any potential impact to the works duration/s will need to be communicated to these receptors if additional measures are required to be put in place.

6 Project Phasing

The works areas follow a roughly sequential construction programme built around the works required to tunnel from one shaft location to the next along the full pipeline route, with 2Nr. TBM's expected to be in the ground at any one time until the tunnelling works are complete. Two open cut sections (P2 and P9) of pipeline are the exceptions to this.

Overall noise mitigation is to remain the same for all phases of the project, with mitigation measures such as noise barriers to remain in place at shaft locations and as required elsewhere (e.g at Bidbury School) for the full construction duration. Mitigation measures for the project are one-time activities and will remain the same for all phases, with measures established as part of each construction area site set-up, and prior to any noise or vibration generating activities.

The core project activities can be broken down into the following list, with some activities common to most areas (e.g shaft construction), and some featuring only at every other area (e.g tunnelling works).

- **Launch Shaft**
- **Reception Shaft**
- **Open Cut Pipework**
- **1650 Tunnel**
- **1500 Tunnel**
- **Tunnel Pipework**
- **Shaft Fitout & Backfill**

Key	
Launch Shaft	
Reception Shaft	
Open Cut	
1650 Tunnel	
1500 Tunnel	
Tunnel Pipework	
Shaft Fitout / Backfill	

6.1 High Level Activity Programme

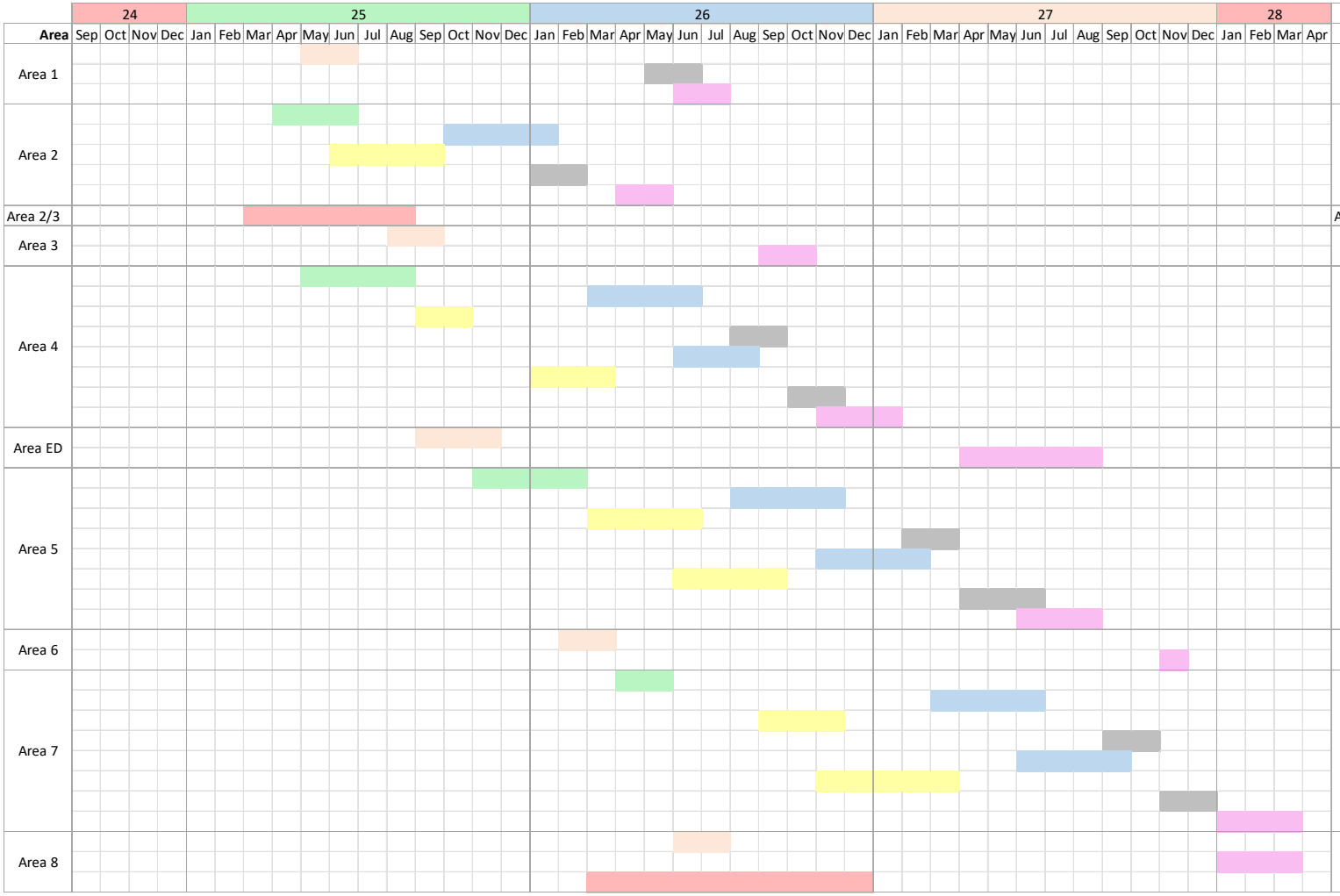
The Gantt chart below shows the high-level construction sequence for the project, leading with the shaft construction works, followed by the tunnelling works, and finishing with the tunnel pipework and shaft fitouts. The open cut section of pipework are somewhat separate from the shaft and tunnelling works, but are slated to take place in the summer months for optimal weather conditions.

The breakdown of activities at each area can be seen in Figure 1, with the large majority of activity taking place at each launch shaft location (namely each tunnel drive and tunnel pipework installation). The location of each area along the pipeline route can also be seen in Appendix B – Key Programme Dates.

The key shown above labels the activity types by colour, and the follow-on of activities progressively from Area 1 through to Area 8 is apparent.

The typical plant and equipment required for each activity is as per the ES Vol 4 - Revised Appendix A12 Noise and Vibration, with noise assessments at each area carried out based on these activities.

High Level Programme Activities



Area	Activity	Start	End
Area 1	Shaft W1	May-25	Jun-25
	P0 Pipework	May-26	Jun-26
	Shaft W1 Fitout / Backfill	Jan-26	May-26
Area 2	Shaft W2	Apr-25	Jun-25
	P1 1500	Oct-25	Jan-26
	P1 1650	Jun-25	Sep-25
	P1 Tunnel Pipework	Jan-26	Feb-26
	Shaft W2 Fitout / Backfill	Mar-26	May-26
Area 2/3	P2 Opencut (W2 to W3)	Mar-25	Aug-25
Area 3	Shaft W3	Aug-25	Sep-25
	Shaft W3 Fitout / Backfill	Sep-26	Oct-26
Area 4	Shaft W4	May-25	Aug-25
	P3 1500	Mar-26	Jun-26
	P3 1650	Sep-25	Oct-25
	P3 Tunnel Pipework	Aug-26	Sep-26
	P4 1500	Jun-26	Aug-26
	P4 1650	Jan-26	Mar-26
	P4 Tunnel Pipework	Oct-26	Nov-26
	Shaft W4 Fitout / Backfill	Nov-26	Jan-27
Area ED	Shaft ED	Sep-25	Nov-25
	Shaft ED Fitout / Backfill	Apr-27	Aug-27
Area 5	Shaft W5	Nov-25	Feb-26
	P5 1500	Aug-26	Nov-26
	P5 1650	Mar-26	Jun-26
	P5 Tunnel Pipework	Feb-27	Mar-27
	P6 1500	Nov-26	Feb-27
	P6 1650	Jun-26	Sep-26
	P6 Tunnel Pipework	Apr-27	Jun-27
	Shaft W5 Fitout / Backfill	Jun-27	Aug-27
Area 6	Shaft W6	Feb-26	Mar-26
	Shaft W6 Fitout / Backfill	Nov-27	Nov-27
Area 7	Shaft W7	Apr-26	May-26
	P7 1500	Mar-27	Jun-27
	P7 1650	Sep-26	Nov-26
	P7 Tunnel Pipework	Sep-27	Oct-27
	P8 1500	Jun-27	Sep-27
	P8 1650	Nov-26	Mar-27
	P8 Tunnel Pipework	Nov-27	Dec-27
	Shaft W7 Fitout / Backfill	Jan-28	Mar-28
Area 8	Shaft W8	Jun-26	Jul-26
	Shaft W8 Fitout / Backfill	Jan-28	Mar-28
	P9 Opencut (W8 to Res)	Mar-26	Dec-26

Figure 1 – High Level Construction Programme

6.2 High Level Area Activity Programme

High Level Area Activity

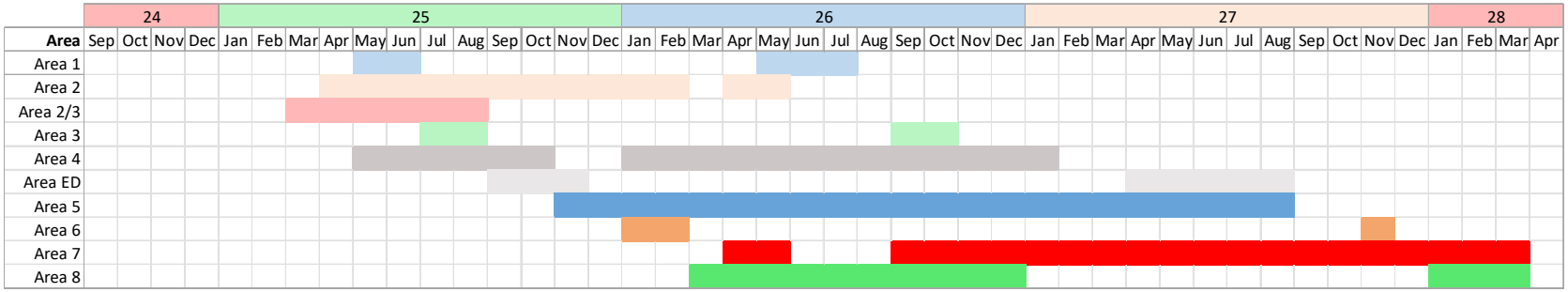


Figure 2 – Area Activity Programme

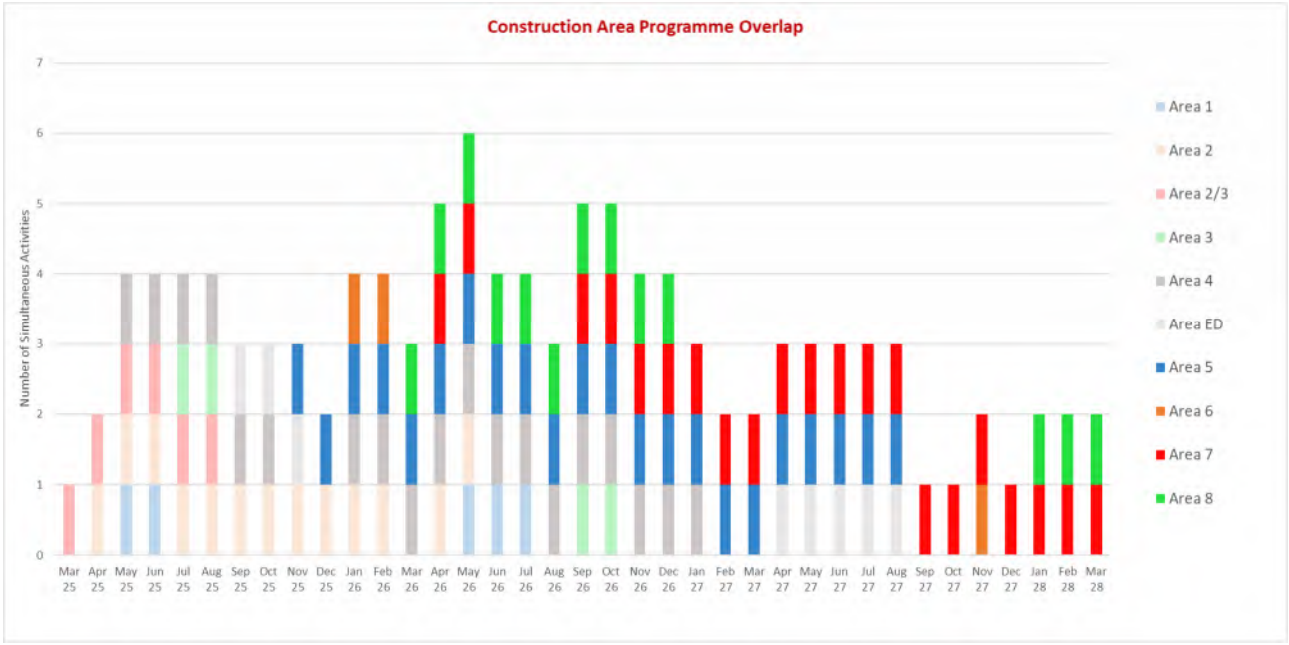


Figure 3 – Stacked Area Activity throughout Project

The previous chart activity breakdown in Figure 1 can be further simplified to show the approximate overlap of *any* works taking place at the designated areas as listed throughout the project, as presented in Figures 2 and 3. The figure/s may appear exaggerated as this shows activities possibly taking place in areas in any given month, and activities may not in fact overlap when more precise dates are used. The sequential nature of the works can again be seen, with activities moving northwards towards the reservoir as sections are completed following completion of tunnelling works in each area, with pipework install and shaft fit-out and backfilling following on. The distribution of activities can be seen to peak in May 2026, but the average number of concurrent activities is conservatively estimated as between 3Nr. and 4Nr. at any given time.

The project is sequential with works at multiple adjacent areas expected to take place, but the typical distance between each construction area is significant and not expected to produce any cumulative effects. The daytime and nighttime noise boundaries and any overlap are shown in Appendix A – Noise Mitigation Layouts. The 2Nr. construction areas closest to one another are Area 4 and Area ED, however the expected programme overlap at these two work areas is not significant, with tunnelling works at Area 4 towards Area 3 taking place as the Area ED shaft is constructed, with little to no overlap elsewhere, as can be seen in Figure 4.

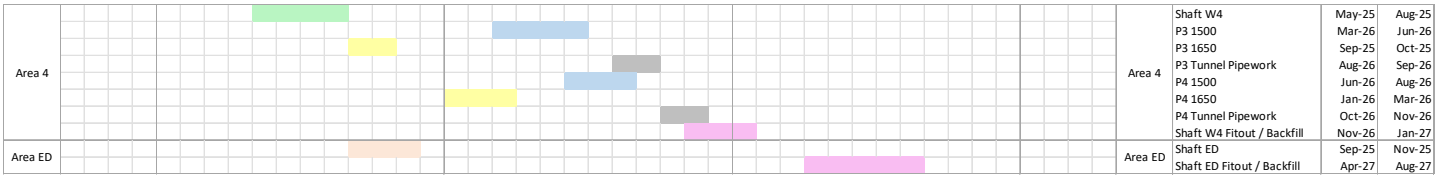


Figure 4 – Area 4 / ED Expected Overlap

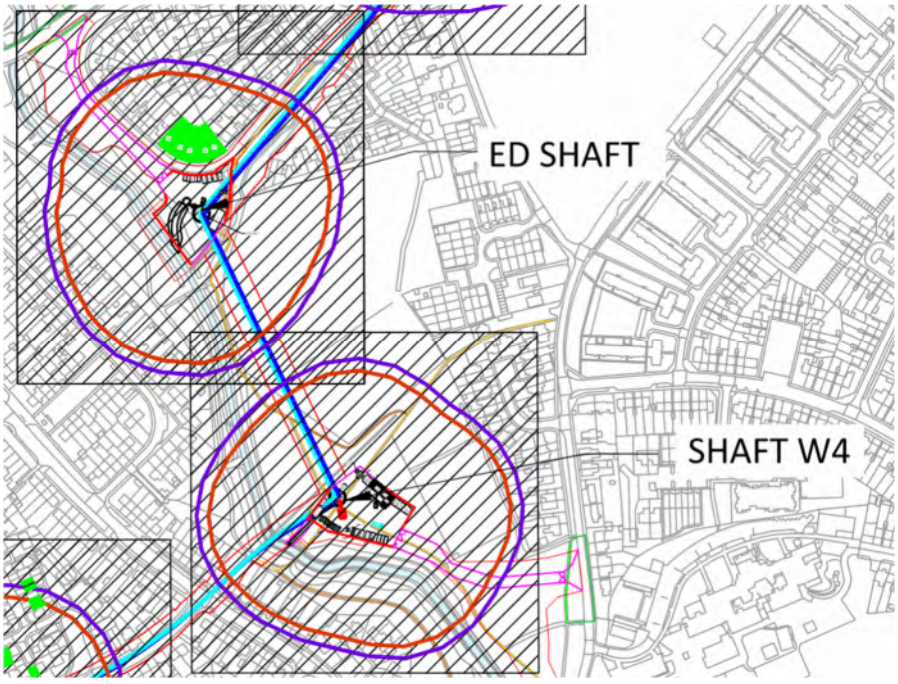
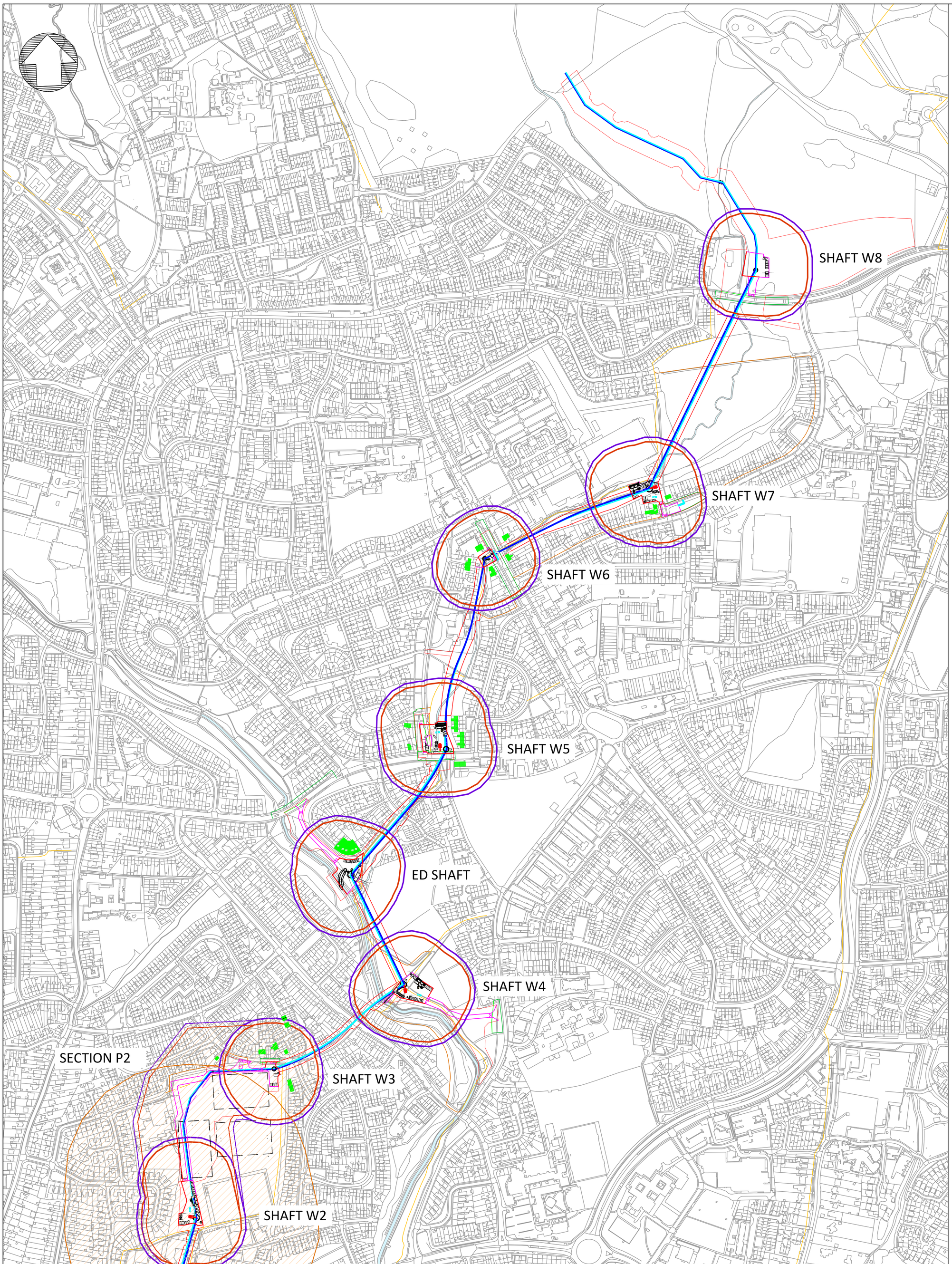


Figure 5 – Noise Mitigation Layout Extract (Area 4 and Area ED)

Appendix A: Noise Mitigation Layouts



NOTES.

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- DAYTIME NOISE RADIUS
- NIGHTTIME NOISE RADIUS
- NIGHTTIME TUNNELLING NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 70 140 210 280 350 m

SCALE 1:3500

Rev	Drn By	Ckd By	Apv By	Description	Date
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	08/10/24

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Drawing Suitability: FOR CONSTRUCTION APPROVAL	Status: S4
Contractors Drawing Number: HTR-WAB-PI-XX-XX-X-XXXX	

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Portsmouth Water

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08/10/24	1:3500	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number: | Rev: P01

Appendix B: Key Programme Dates

Havant Thicket Reservoir Project - *Key Programme Dates*

TUNNEL SECTIONS	Inlet Pipeline (1500ID 1866OD DN1000)	Outlet Pipeline (1650ID 2050OD DN1200)
SECTION P1	424.2 m	425.8 m
SECTION P3	302.9 m	302.5 m
SECTION P4	236.8 m	236.8 m
SECTION P5	307.2 m	306.6 m
SECTION P6	380.0 m	379.8 m
SECTION P7	347.6 m	347.4 m
SECTION P8	471.9 m	471.9 m

OPEN CUT SECTIONS	Inlet Pipeline DN1000	Outlet Pipeline DN1200
SECTION P2	429.2 m	433.0 m
SECTION P9	571.7 m	572.9 m

Route Distances	Total length (m)	Microtunnel (m)	Open Cut (m)	Micro-Tunnelling Nr. of Drives	Nr. of Shafts
Inlet Pipeline	3,471.5	2,470.6	1,000.9	7	
Outlet Pipeline	3,476.7	2,470.8	1,005.9	7	9
Totals	6,948.2	4,941.4	2,006.8	14	

Redline Boundaries: Tunnel Corridors

Redline Boundaries: Surface Works & Tunnel Corridors

Twin Tunnel Section Arrangement Examples

CONTRACTURAL BOUNDARY INTERFACE WITH MRW CONTRACTOR

CONTINUATION OF PIPELINES INTO HAVANT THICKET RESERVOIR SITE

North

SECTION P9 571.7 m 18

Shaft W8 - Reception
7.0 m ID / 8.4 m OD 17

SECTION P8 471.9 m 16

Shaft W7 - Launch
11.0m ID / 13.0m OD 15

SECTION P7 347.6 m 14

Shaft W6 - Reception
6.0m ID / 7.4m OD 13

SECTION P6 380.0 m 12

Shaft W5 - Launch
9.2 m ID / 11.0 m OD 11

SECTION P5 307.2 m 10

Emergency Discharge
Valve Chamber & Spillway into Hermitage Stream 9

Reception Shaft
Emergency Discharge
11.0m ID / 13.0m OD

SECTION P4 236.8 m 8

Shaft W4 - Launch
11.0m ID / 13.0m OD 7

Shaft W3 - Reception
7.0m ID / 8.4 OD 5

SECTION P3 302.9 m 6

SECTION P2 429.2 m 4

Shaft W2 - Launch
11.0m ID / 13.0m OD 3

SECTION P1 424.2 m 2

Shaft W1 - Reception
8.0m ID / 9.4m OD 1

PIPEWORK TO BEDHAMPTON PUMPING STATION SITE

By Others

Bedhampton Station

Middle Park Way, Dunsbury Way, High Lawn Way, Riders Lane, Riders Ln., Purbrook Way, Barncroft Way, Stockheath Ln., New Rd., Bedhampton Rd., West St., Warblington Rd.

PROJECT PROGRAMME

	SECTION / SHAFT ID	KEY DATES
AREA 1	1 SHAFT W1	
AREA 2	2 SECTION P1	
	3 SHAFT W2	
AREA 2/3	4 SECTION P2	
AREA 3	5 SHAFT W3	
AREA 4	6 SECTION P3	
	7 SHAFT W4	
	8 SECTION P4	
AREA ED	9 ED	
AREA 5	10 SECTION P5	
	11 SHAFT W5	
	12 SECTION P6	
AREA 6	13 SHAFT W6	
AREA 7	14 SECTION P7	
	15 SHAFT W7	
	16 SECTION P8	
AREA 8	17 SHAFT W8	
	18 SECTION P9	

Refer to simplified programme

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Appendix C: Noise Mitigation Drawings

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84M DAYTIME NOISE RADIUS

75M NIGHTTIME NOISE RADIUS

5 AND 6 BRUNSWICK GARDENS

6

5

RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

SHAFT W1 8 m ID / 9.4 m OD

SHAFT W1 WORK AREA

MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIER

ST CHAD'S WELL

CHALKWELL MEADOW

PALK ROAD

BELOW GROUND

ABOVE GROUND

HERAS GATE ENTRY

EXISTING UNDERGROUND SUCTION TANK

PIPE STORE

APPROX. EXTENT OF EXISTING SOLAR ARRAY COMPOUND

SOLAR PANELS

ACCESS ROAD TO SHAFT 1

FILL PIPELINE

RETURN PIPELINE

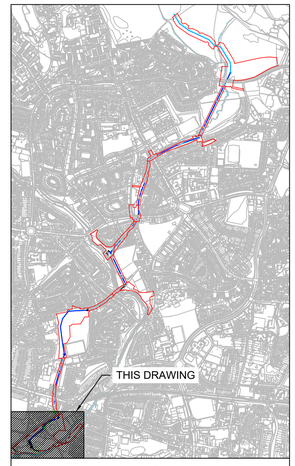
FARLINGTON CONNECTION

MEYRICK ROAD

HERMITAGE STREAM

PORTSMOUTH WATER ACCESS GATE CONTROL

GATE



KEY PLAN

Notes:

- FILL PIPELINE
- RETURN PIPELINE
- FARLINGTON CONNECTION PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- SITE INTERNAL FENCING
- PORTSMOUTH WATER LAND OWNERSHIP
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- EXISTING SOLAR ARRAY
- PEDESTRIAN FOOTPATH
- STONED UP AREAS
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 10 20 30 40 50 m

SCALE 1:500

Rev	Drn By	Ckd By	Apv By	Description	Date
P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL
Status: S4

Contractors Drawing Number: HTR-WAB-PI-W1-DR-W-0014

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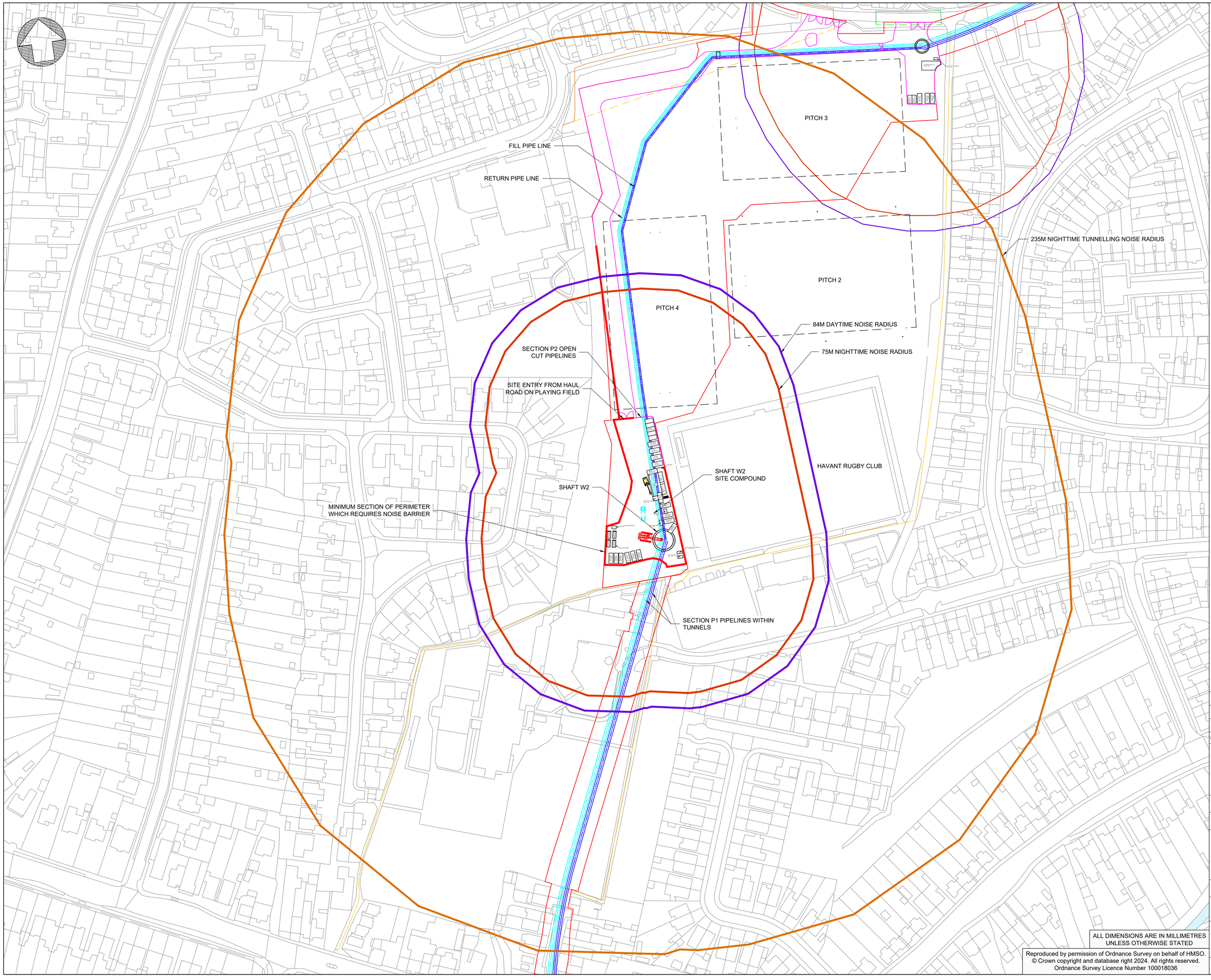
Project Title: HAVANT THICKET RESERVOIR

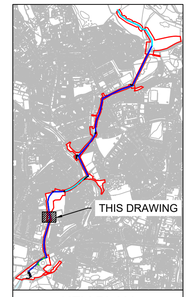
Drawing Title: BEDHAMPTON TO HTR PIPELINE
BEDHAMPTON AND SHAFT W1
SITE LAYOUT- NOISE MITIGATION

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED

Portsmouth Water Drawing Number:

Rev: P02





KEY PLAN

Notes:

1. THE TEMPORARY SITE COMPOUND SHOWN IS FOR CONSTRUCTION OF SHAFT W2 AND SECTION P1 PIPELINES.
2. FOR TEMPORARY SITE AREAS FOR CONSTRUCTION SECTION P2 OPEN CUT PIPELINES SEE HTR-WAB-PI-P2-DR-T-0002.

Notes:

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- RUGBY PITCH BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NIGHTTIME TUNNELLING NOISE RADIUS
- NOISE BARRIER

0 10 20 30 40 50 m

SCALE 1:500

Rev	Drn By	Ckd By	Apv By	Description	Date
P03 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P02 S4	BPa	JT	BP	MODIFIED P2 PIPELINE ROUTE	12/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	05/09/24

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Drawing Suitability: FOR CONSTRUCTION APPORVAL
Status: S4

Contractors Drawing Number: HTR-WAB-PI-W2-DR-W-0005

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Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W2 SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number:
Rev: P03

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BOUNDARY OF HAUL ROAD FOR ACCESS TO SHAFT W2 DURING SHAFT AND TUNNEL WORKS (SEE HTR-WAB-PI-W2-DR-T-0001)

53-HOOK'S FARM

53

PLAY AREA

ST.THOMAS MORE'S CATHOLIC PRIMARY SCHOOL

ACCESS TO HAUL ROAD FOR SHAFT W2 SITE DURING SHAFT AND TUNNEL WORKS (SEE HTR-WAB-PI-W2-DR-T-0001)

P2 AIR VALVE CHAMBERS

HOOK'S FARM WAY

MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIER

94.000 m

85.000 m

PITCH 3

SHAFT W3
SEE HTR-WAB-PI-W3-DR-T-0002

PROTECTIVE MATTING TO BE USED OVER ROOT PROTECTION ZONE

PITCH 4

PITCH 2

PITCH FLOOD LIGHTS

85M NIGHTTIME NOISE RADIUS

94 M DAYTIME NOISE RADIUS

85.000 m

94.000 m

HAVANT RUGBY CLUB

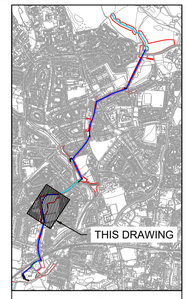
SHAFT W2
SEE HTR-WAB-PI-W2-DR-T-0002

BEAUFORT ROAD

HOOK'S LANE

WOODGREEN AVENUE

FRASER ROAD



KEY PLAN

Notes:

1. THE TEMPORARY SITE AREAS SHOWN ARE ONLY FOR OPEN CUT CONSTRUCTION OF SECTION P2 PIPELINES.
2. FOR TEMPORARY SITE COMPOUNDS AT SHAFTS W2 AND W3 FOR CONSTRUCTION OF SECTIONS P1 AND P3 SEE HTR-WAB-PI-W1-DR-T-0001 AND HTR-WAB-PI-W1-DR-T-0003 RESPECTIVELY.
3. ST THOMS MOORE SCHOOL IS NOT A RECEPTOR WITH SIGNIFICANT IMPACT AS THE OPENCUT WORKS WILL BE UNDERTAKEN DURING THE SCHOOL SUMMER HOLIDAYS.

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- TEMPORARY HERAS FENCING
- OPEN CUT TRENCH AREA
- HAUL ROAD
- REDLINE BOUNDARY
- RUGBY PITCH BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- ROOT PROTECTION MATTING
- DAYTIME NOISE RADIUS
- NIGHTTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 16 32 48 64 80 m

SCALE 1:800

Rev	Drn By	Ckd By	Apv By	Description	Date
P03 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P02 S4	BPa	JT	BP	MODIFIED P2 PIPELINE ROUTE	12/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	04/09/24

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Drawing Suitability: FOR CONSTRUCTION APPROVAL
Status: S4

Contractors Drawing Number: HTR-WAB-PI-P2-DR-W-0003

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REGISTERED IN ENGLAND No. 2536455

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Date:	Scale:	Sheet:	Sheet Size:
30/09/2024	S4	01 of 01	A1

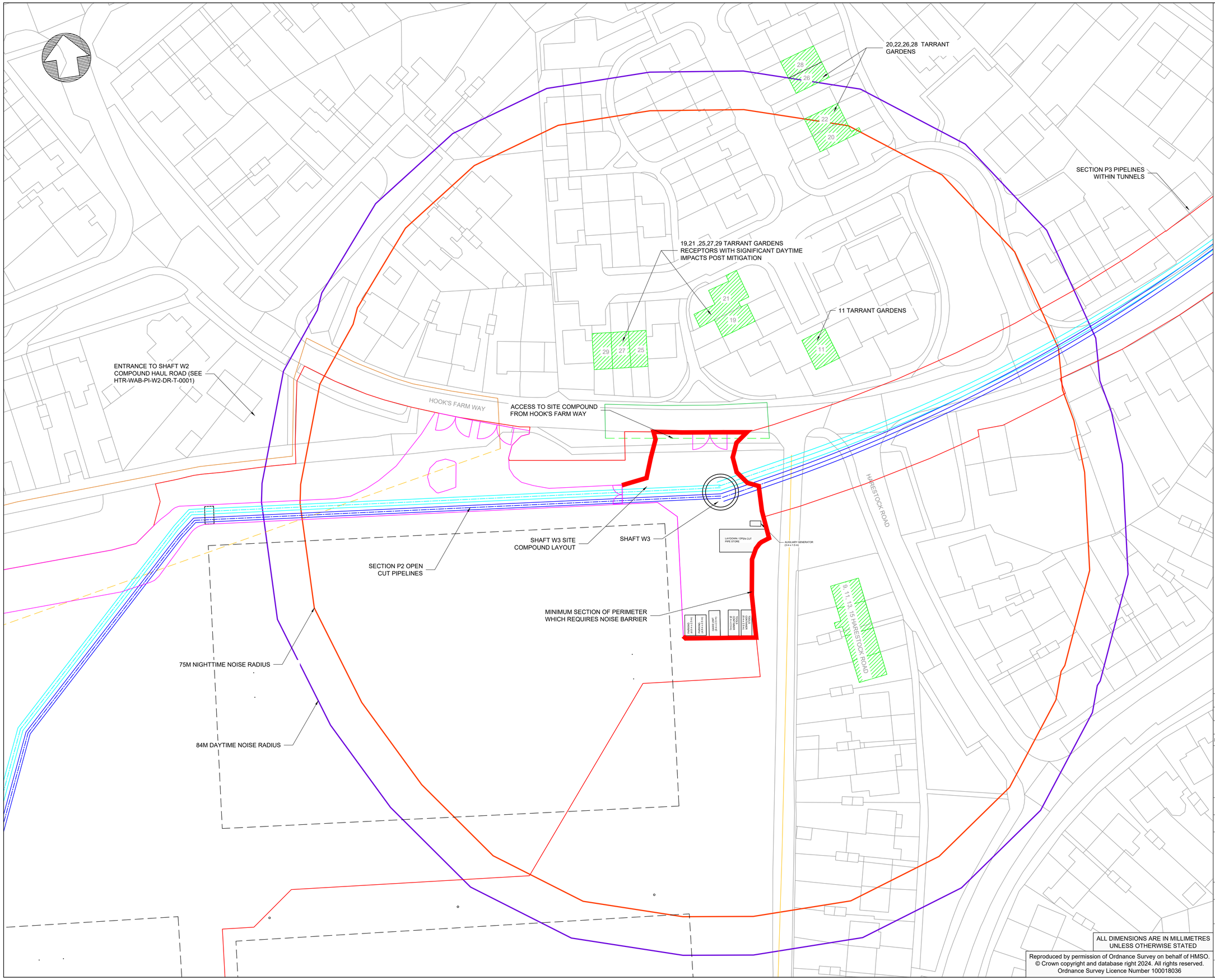
Project Title: HAVANT THICKET RESERVOIR

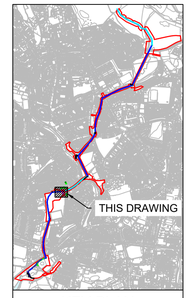
Drawing Title: BEDHAMPTON TO HTR PIPELINE SECTION P2 NOISE MITIGATION LAYOUT

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Portsmouth Water Drawing Number:

Rev: P03





KEY PLAN

Notes:

1. THE TEMPORARY SITE COMPOUND SHOWN IS FOR CONSTRUCTION OF SHAFT W3 AND SECTION P3 PIPELINES.
2. FOR TEMPORARY SITE AREAS FOR CONSTRUCTION SECTION P2 OPEN CUT PIPELINES SEE HTR-WAB-PI-P2-DR-T-0002.
3. TEMPORARY NETTING TO BE INSTALLED ALONG COMPOUND BOUNDARY FACING PITCH 3 TO PREVENT BALLS ENTERING COMPOUND, AS REQUIRED.

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- RUGBY PITCH BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- REQUIRES NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 8 16 24 32 40 m

SCALE 1:400

Rev	Drn By	Ckd By	Apv By	Description	Date
P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL	Status: S4
Contractors Drawing Number: HTR-WAB-PI-W3-DR-W-0003	

Telephone: Havant (023) 9249 9888
Fax: Havant (023) 9245 3632
Website: www.portsmouthwater.co.uk
Registered Office: PO Box 8 West Street
Havant Hampshire PO9 1LG
REGISTERED IN ENGLAND No. 2536455

Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
30/09/24	1:400	01 of 01	A1

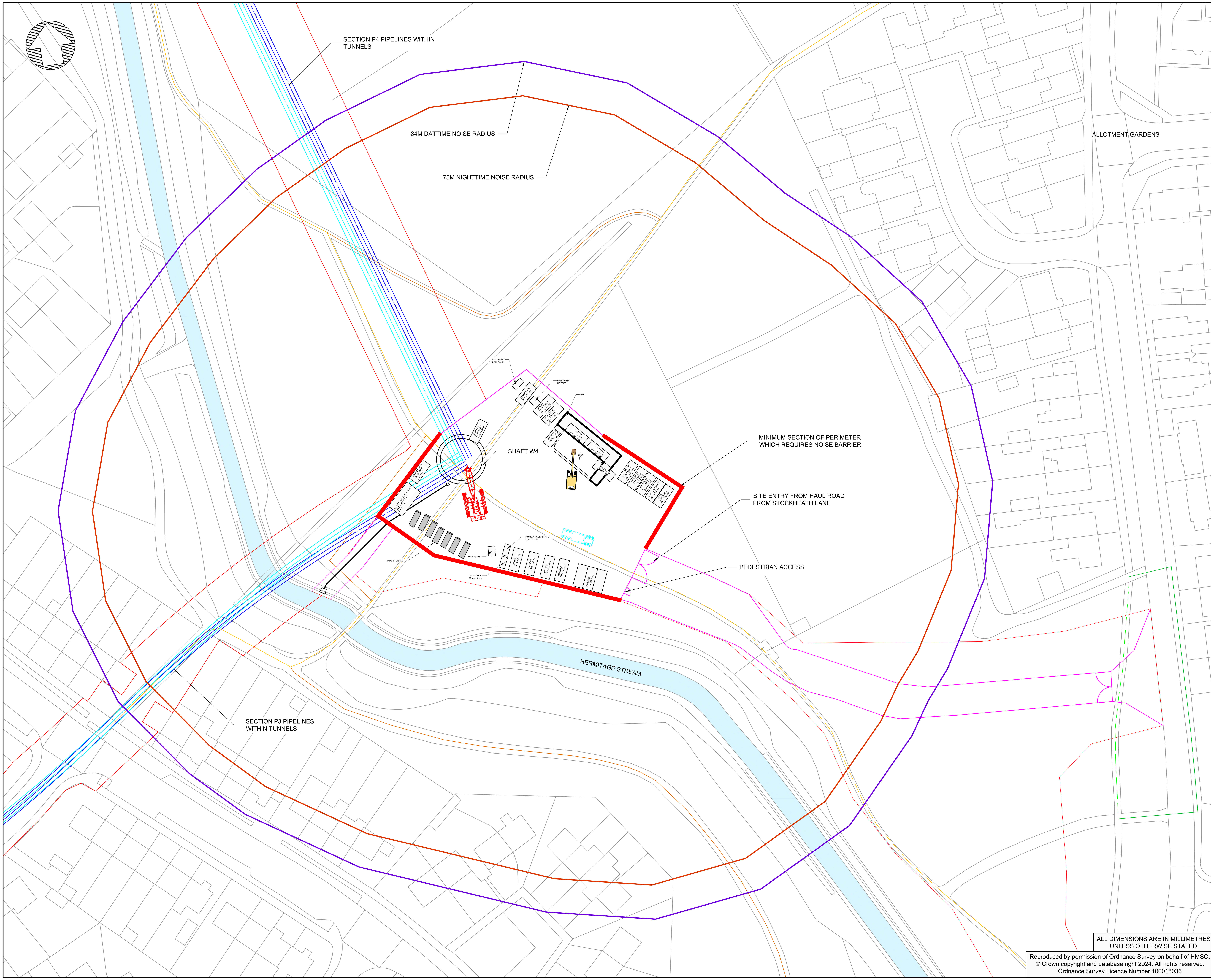
Project Title: HAVANT THICKET RESERVOIR

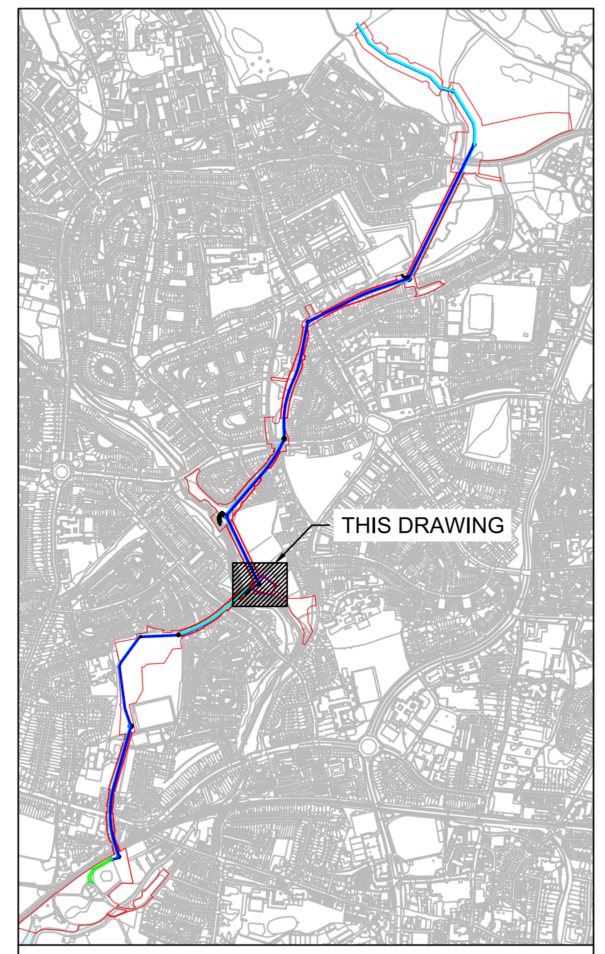
Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W3 SITE LAYOUT- NOISE NOISE MITIGATION

Portsmouth Water Drawing Number: | Rev: P02

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KEY PLAN

Notes:

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- ROOT PROTECTION MATTING
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER

0 9 18 27 36 45 m

SCALE 1:450

Rev	Drn By	Ckd By	Apv By	Description	Date
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/024

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL

Status: S4

Contractors Drawing Number: HTR-WAB-PI-W4-DR-W-0003

Telephone: Havant (023) 9249 9888
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Website: www.portsmouthwater.co.uk
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Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
12/09/24	1:450	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title:
BEDHAMPTON TO HTR PIPELINE
SHAFT W4
SITE LAYOUT- NOISE MITIGATION

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Portsmouth Water Drawing Number:

Rev: P01

84M DAYTIME NOISE RADIUS

75M NIGHT TIME NOISE RADIUS

SECTION P6 PIPELINES WITHIN TUNNELS

RIDERS LANE CLOSURE TO ALLOW CONSTRUCTION TRAFFIC INTO AND OUT OF SITE

RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

1, 3 EVERSLEY CRESCENT

RIDERS LANE

TEMPORARY BRIDGE OVER RIDERS LANE STREAM

1, 3, 5, 7, 9, 11, 13, 15 ELLISFIELD ROAD

MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIERS

SHAFT W5

36 PURBROOK WAY

SITE EXIT/ENTRANCE ONTO PURBROOK WAY

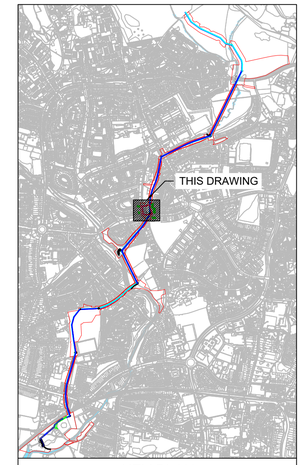
EXISTING CULVERT

PURBROOK WAY

PURBROOK WAY CULVERT UPGRADE WORK. SEE HTR-WAB-PI-W5-DR-T-0003

181-191 PURBROOK WAY

SECTION P5 PIPELINES WITHIN TUNNELS



KEY PLAN

Notes:

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- CULVERT UPGRADE WORKS
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 9 18 27 36 45 m

SCALE 1:450

Rev	Dm By	Ckd By	Apv By	Description	Date
P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL	Status: S4
Contractors Drawing Number: HTR-WAB-PI-W5-DR-W-0004	

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Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
30/09/24	1:450	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W5 SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number: | Rev: P02

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84M DAYTIME NOISE RADIUS

75M NIGHTTIME NOISE RADIUS

RIDERS LANE

SITE ENTRY VIA PULL IN
OFF RIDERS LANE

TEMPORARY BRIDGE OVER
RIDERS LANE STREAM

LAYDOWN

OASIS UNIT
(6 m x 2.5 m)

GENERATOR
(6 m x 2.5 m)

TOOLS
CONTAINER
(6 m x 2.5 m)

TOOLS
CONTAINER
(6 m x 2.5 m)

MUCK BAY

ELLISFIELD ROAD

MINIMUM SECTION OF PERIMETER
WHICH REQUIRES NOISE BARRIER

EXISTING CULVERT

WORKING AREA FOR OPEN CUT
CULVERT INSTALLATION

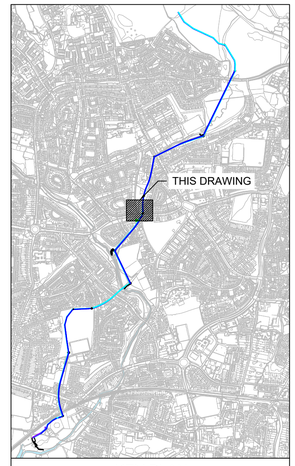
PURBROOK WAY

PURBROOK WAY CULVERT UPGRADE
WORK. SEE HTR-WAB-PI-W5-DR-T-0003

193 -PURBROOK WAY

193

RECEPTORS WITH SIGNIFICANT DAYTIME
IMPACTS POST MITIGATION



KEY PLAN

Notes:

- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- CULVERT UPGRADE WORKS
- ROOT PROTECTION MATTING
- PROTECTIVE FENCING
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 8 16 24 32 40 m

SCALE 1:400

Rev	Drn By	Ckd By	Apv By	Description	Date
P01 S4	BPa	BP	BC	FIRST ISSUE	12/09/24

WARD & BURKE

Drawing Suitability:	Status:
FOR CONSTRUCTION APPROVAL	S4

Contractors Drawing Number:
HTR-WAB-PI-W5-DR-W-0005

Telephone: Havant (023) 9249 9888
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REGISTERED IN ENGLAND No. 2536455

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Date:	Scale:	Sheet:	Sheet Size:
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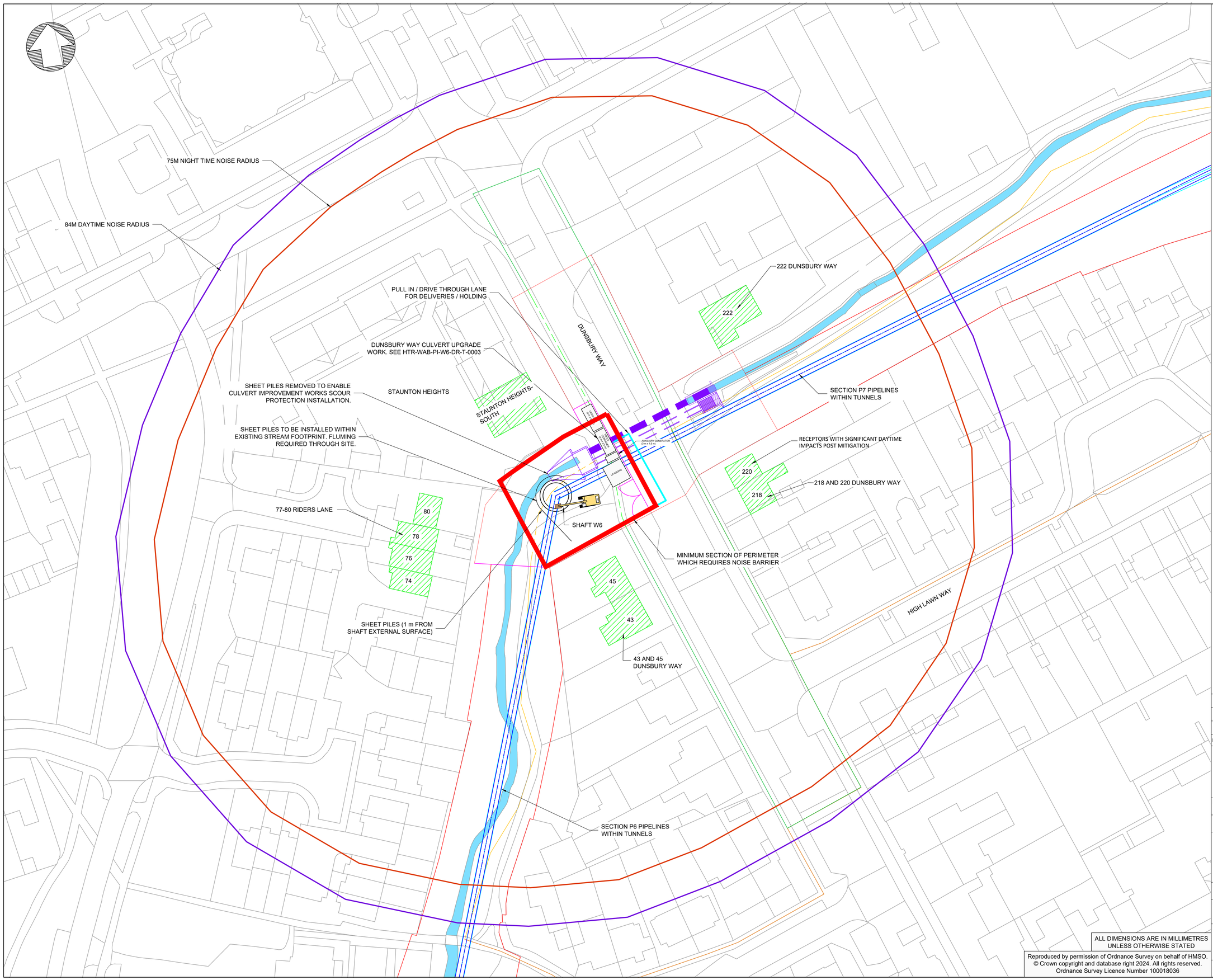
Project Title:
HAVANT THICKET RESERVOIR

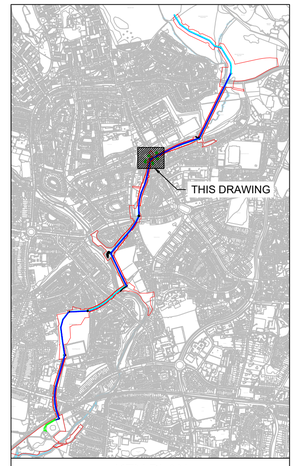
Drawing Title:
BEDHAMPTON TO HTR PIPELINE
PURBROOK WAY CULVERT UPGRADE
SITE LAYOUT-NOISE MITIGATION

Portsmouth Water Drawing Number: P01

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KEY PLAN

Notes:

1. THE PUBLIC RIGHT OF WAY AND FOOTPATH CLOSURES AND DIVERSIONS ARE FOR THE SHAFT, TUNNEL AND PIPE INSTALLATION WORKS. ADDITIONAL AND/OR MODIFIED CLOSURES FOR THE CULVERT UPGRADE WORKS ARE NOT SHOWN.

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- VEHICLE PULL IN BAY
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- CULVERT UPGRADE WORKS
- DAYTIME NOISE RADIUS
- NIGHTTIME NOISE RADIUS
- NOISE BARRIER
- PROTECTIVE FENCING
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 8 16 24 32 40 m

SCALE 1:400

Rev	Drn By	Ckd By	Apv By	Description	Date
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL	Status: S4
Contractors Drawing Number: HTR-WAB-PI-W6-DR-W-0004	

Telephone: Havant (023) 9249 9888
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Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
12/09/24	1:400	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W6 SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number: | Rev: P01

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84M DAYTIME NOISE RADIUS

75M NIGHTTIME NOISE RADIUS

STAUNTON HEIGHTS

DUNSBURY WAY

222, DUNSBURY WAY

222

EXISTING CULVERT

RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

THREE FLATS STAUNTON HEIGHTS

DUNSBURY WAY CULVERT UPGRADE WORK. SEE HTR-WAB-PI-W6-DR-T-0003

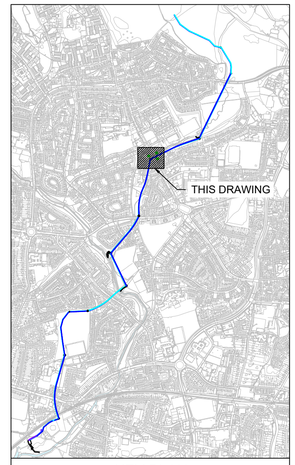
MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIER

220

218

218 , 220 DUNSBURY WAY RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

WORKING AREA FOR OPEN CUT CULVERT INSTALLATION IN SECTIONS UNDER LANE CLOSURES



KEY PLAN

Notes:

- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- CULVERT UPGRADE WORKS
- PROTECTIVE FENCING
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 4 8 12 16 20 m

SCALE 1:200

Rev	Drn By	Ckd By	Apv By	Description	Date
P01 S4	BPa	BP	BC	FIRST ISSUE	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL

Status: S4

Contractors Drawing Number: HTR-WAB-PI-W6-DR-W-0005

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Havant Hampshire PO9 1LG
REGISTERED IN ENGLAND No. 2536455

Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
12/09/24	1:400	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE DUNSBURY WAY CULVERT SITE LAYOUT -NOISE MITIGATION

Portsmouth Water Drawing Number:

Rev: P01

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75M NIGHTTIME NOISE RADIUS

84 M DAYTIME NOISE RADIUS

SECTION P8 PIPELINES WITHIN TUNNELS

TANK (EXISTING)

HEADWALL FOR PERMANENT WASHOUT INTO RIDERS LANE STREAM

MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIER

85,87 HIGH LAWN WAY

TURNING AREA FOR VEHICLES ACCESSING PROPERTIES OFF HIGH LAWN WAY

HIGH LAWN WAY

SHAFT W7

SECTION P7 PIPELINES WITHIN TUNNELS

73, 75, 77, 79, 81, 83 HIGH LAWN WAY

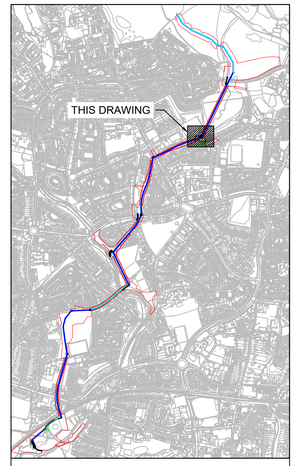
SITE ENTRANCE

RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

HIGH LAWN WAY

CONSTRUCTION VEHICLE TURNING AREA

ACCESS TO SITE AND TURNING AREA FROM HIGH LAWN WAY



KEY PLAN

Notes:

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- PUBLIC TEMPORARY VEHICLE TURNING AREA
- PUBLIC RIGHT OF WAY
- PUBLIC RIGHT OF WAY CLOSURE
- PROPOSED PUBLIC RIGHT OF WAY DIVERSION
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- DAYTIME NOISE RADIUS
- NIGHTTIME NOISE RADIUS
- NOISE BARRIER
- RECEPTORS WITH SIGNIFICANT DAYTIME IMPACTS POST MITIGATION

0 8 16 24 32 40 m

SCALE 1:400

Rev	Drn By	Ckd By	Apv By	Description	Date
P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL
Status: S4

Contractors Drawing Number: HTR-WAB-PI-W7-DR-W-0003

Telephone: Havant (023) 9249 9888
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Website: www.portsmouthwater.co.uk
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Date:	Scale:	Sheet:	Sheet Size:
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Project Title: HAVANT THICKET RESERVOIR

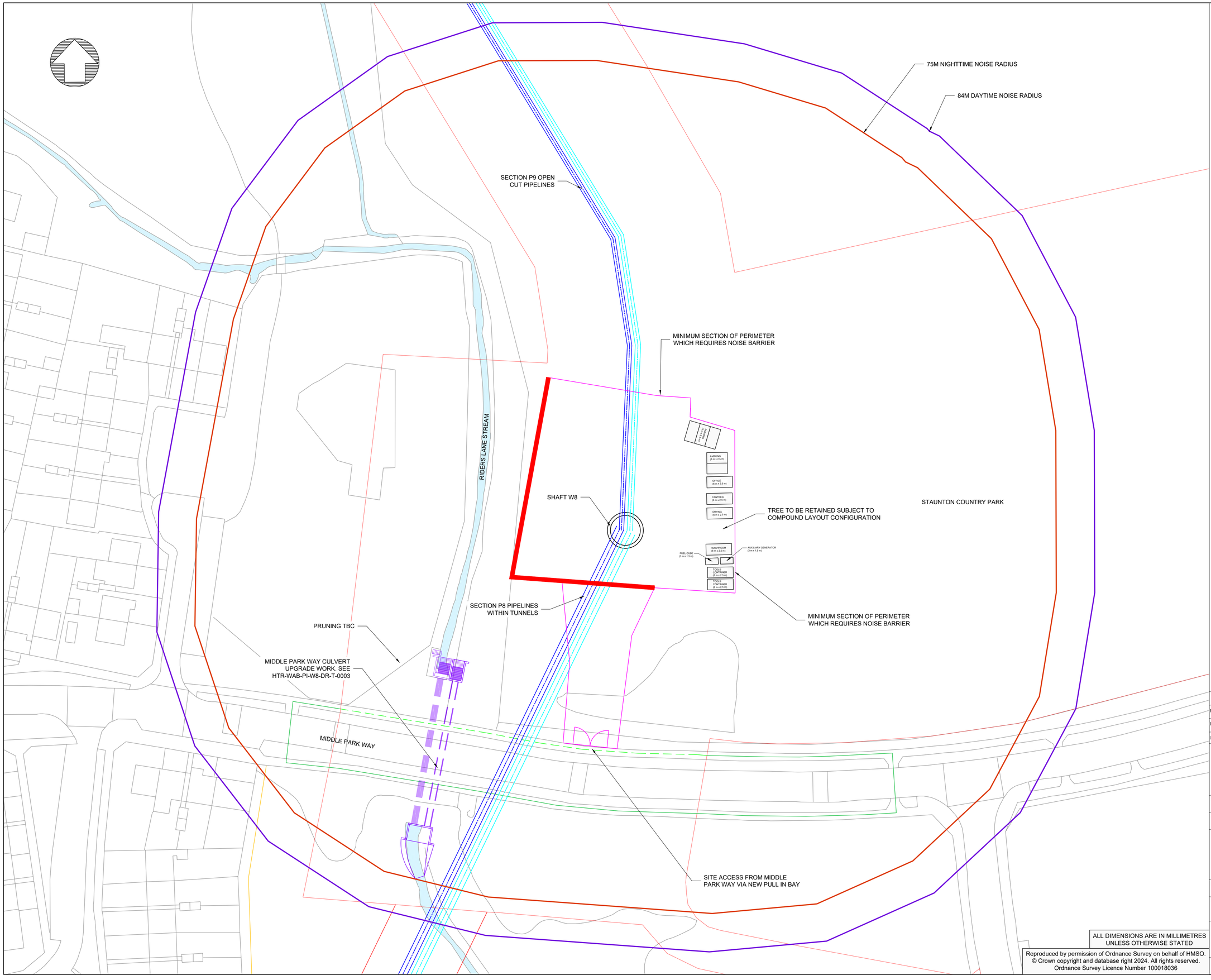
Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W7 SITE LAYOUT - NOISE MITIGATION

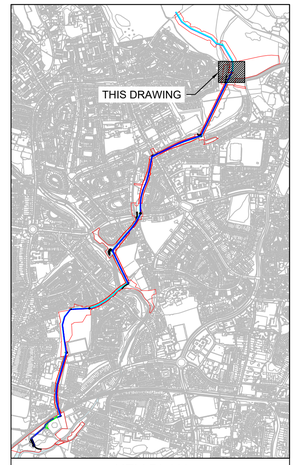
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KEY PLAN

Notes:

1. THE PUBLIC RIGHT OF WAY AND FOOTPATH CLOSURES AND DIVERSIONS ARE FOR THE SHAFT, TUNNEL AND PIPE INSTALLATION WORKS. ADDITIONAL AND/OR MODIFIED CLOSURES FOR THE CULVERT UPGRADE WORKS ARE NOT SHOWN.
2. THE TEMPORARY SITE COMPOUND SHOWN IS FOR CONSTRUCTION OF SHAFT W8 AND SECTION P8 PIPELINES.
3. FOR TEMPORARY SITE AREAS FOR CONSTRUCTION SECTION P9 OPEN CUT PIPELINES SEE HTR-WAB-PI-P9-DR-T-0002.

- FILL PIPELINE
- RETURN PIPELINE
- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- FOOTPATH CLOSURE
- PROPOSED FOOTPATH DIVERSION
- CULVERT UPGRADE WORKS
- DAYTIME NOISE RADIUS
- NIGHTTIME NOISE RADIUS
- NOISE BARRIER

0 8 16 24 32 40 m

SCALE 1:400

Rev	Drn By	Ckd By	Apv By	Description	Date
P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	INCLUSION OF NOISE BOUNDARIES	12/09/24

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL
Status: S4

Contractors Drawing Number: HTR-WAB-PI-W8-DR-W-0004

Telephone: Havant (023) 9249 9888
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30/09/24	1:400	01 of 01	A1

Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE SHAFT W8 SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number:
Rev: P02

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84M DAYTIME NOISE RADIUS

75M NIGHTTIME RADIUS

SHAFT W8

STAUNTON COUNTRY PARK

RIDERS LANE STREAM

LAYDOWN

COOLING TOWER (DIA 17.5m)

COOLING TOWER (DIA 14.5m)

GAS ENG (W17.5 H)

GENERATOR (W 4.5 H 2.5)

AIR ICON

MINIMUM SECTION OF PERIMETER WHICH REQUIRES NOISE BARRIER

MIDDLE PARK WAY CULVERT UPGRADE WORK. SEE HTR-WAB-PI-W8-DR-T-0003

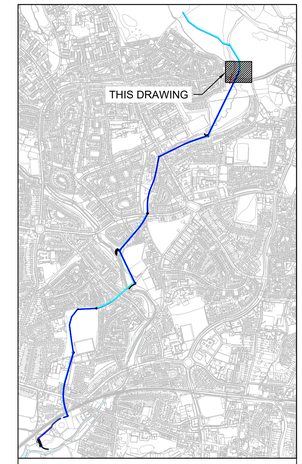
EXISTING CULVERT

MIDDLE PARK WAY

SITE ACCESS ROAD

SITE ACCESS FROM MIDDLE PARK WAY VIA NEW PULL IN BAY

ACCESS TO SOUTHERN COMPOUND FROM HIGH LAWN WAY



KEY PLAN

Notes:

- CONSTRUCTION SITE HOARDING
- REDLINE BOUNDARY
- CULVERT UPGRADE WORKS
- NIGHTTIME NOISE RADIUS
- DAYTIME NOISE RADIUS
- NOISE BARRIER

0 4 8 12 16 20 m

SCALE 1:200

P02 S4	BPa	BP	BC	INCORPORATING COMMENTS	30/09/24
P01 S4	BPa	BP	BC	FIRST ISSUE	12/09/24
Rev	Drn By	Ckd By	Apv By	Description	Date

WARD & BURKE

Drawing Suitability: FOR CONSTRUCTION APPROVAL

Status: S4

Contractors Drawing Number: HTR-WAB-PI-W8-DR-W-0005

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Portsmouth Water

Date:	Scale:	Sheet:	Sheet Size:
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Project Title: HAVANT THICKET RESERVOIR

Drawing Title: BEDHAMPTON TO HTR PIPELINE MIDDLE PARK WAY CULVERT UPGRADE SITE LAYOUT - NOISE MITIGATION

Portsmouth Water Drawing Number:

Rev: P02

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