



Havant Thicket Main Pipeline Works

Non-Material Amendment Technical Note

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Suitable for Approval

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Issue and Revision Record

Havant Thicket Main Pipework Works

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Abbreviations

ABBREVIATION	MEANING
ATK	AtkinsRéalis
HTR	Havant Thicket Reservoir
WAB	Ward & Burke Construction Limited
POR	Portsmouth Water Limited
PS	Pumping Station
MPW	Main Pipework Works
DN	Nominal Diameter
DI	Ductile Iron
RC	Reinforced Concrete
CPP	Concrete Pressure Pipe
ED	Emergency Discharge
W6	Shaft W6 (Worksite 6)
GI	Ground Investigation
GL	Ground Level
CO ₂ e	Carbon Dioxide Equivalent
TCO ₂ e	Tonnes of Carbon Dioxide Equivalent
m	Metres
m ³	Cubic metres

1 Introduction

1.1 Project Background

The Havant Thicket Reservoir (HTR) project comprises the construction of a new raw water storage reservoir north of Havant, Hampshire. The project aims 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 reservoir. Ward and Burke Construction Limited (WAB) have been appointed by Portsmouth Water Limited (POR) to design, construct, and commission a new pipeline connection between Bedhampton Pumping Station (PS) and the new reservoir – referred to as the HTR main pipelines.

The HTR main pipelines works (the scheme) comprise:

1. A DN1000 pumped main for conveying spring-water between Bedhampton PS and the HTR – referred to as the fill pipeline.
2. A DN1200 gravity main for conveying reservoir water from the HTR back to Bedhampton PS – referred to as the return pipeline.
3. An emergency discharge structure approximately halfway along the pipeline routes, to enable discharge of reservoir water into Hermitage stream in an emergency drawdown scenario.
4. Culvert upgrade works along Rider's Lane stream, to increase stream capacity to handle emergency discharge flows from the reservoir in an emergency drawdown scenario.

The fill and return pipelines are to be constructed primarily using pipe jacked tunnels through Havant. Ten shafts are used to facilitate construction of the pipelines and, in specific cases, house permanent infrastructure. The fill and return pipelines run approximately parallel for the whole pipeline route, with each comprising seven pipe jacked tunnel drives and two open cut sections. The planning application for the scheme was submitted on 4 June 2024 and subsequently approved by Havant Borough Council on 22 September 2025 (ref: APP/24/00405).

1.2 Document scope

As the detailed design of the scheme for construction has progressed, several opportunities have been taken to improve the efficiency of the scheme, both to construct and to operate. In addition, further ground investigation works undertaken have identified geotechnical risks which will also require some design changes. This document sets out the proposed changes to the scheme since the planning application (APP/24/00405) was approved along with an assessment of the environmental implications to support a request for a non-material amendment to the planning permission to encompass these changes. It should be read in conjunction with the Atkins Assessment, Appendix A:.

Following pre-app advice from the LPA (including consultation feedback from the HBC EHO), an additional piling assessment has been carried out to evaluate the impacts of the proposed changes to piling from the consented scheme in further detail. This document is included as Appendix B:.

1.3 Summary of changes

The proposed changes to the scheme, and reasons for them, are summarised in Table 1. Further detailed descriptions of each change is provided in the following sections.

Table 1: Summary of changes to the scheme, the reasons for them, and the high-level planning impacts.

No.	Change description	Reason for change	High level planning impact
1	Change from Ductile Iron Pipelines within tunnels to integrated concrete pressure pipe.	A more efficient pipeline construction method has been identified which will reduce the embodied carbon of the scheme, as well as reducing the number of traffic movements to and from construction sites.	<ul style="list-style-type: none"> Reduced scheme embodied carbon Reduced traffic movements across the scheme.
2	Change of Emergency discharge shaft construction method and temporary works.	Additional ground investigation works identified artesian groundwater in a layer beneath the emergency discharge shaft. This has now been accounted for in design, which has increased the amount of concrete required at the shaft location to resist floatation. Additional piling works are required to facilitate the construction.	<ul style="list-style-type: none"> Increased construction activities at the shaft location. Increased embodied carbon of the emergency discharge structure. Increased construction programme at the emergency discharge site. Increased traffic movements at the emergency discharge site. Increased silent piling at the emergency discharge site.
3	Change of Shaft W6 construction method.	Due to the constrained footprint of the Shaft W6 site location, the construction method of Shaft W6 has been changed from a reinforced concrete	<ul style="list-style-type: none"> Increased use of silent piling methods at Shaft W6. Reduced concrete volume at Shaft W6 location.

1.4 Referenced documents

- Proposed non-material amendment following approval Havant Thicket pipeline dual pipeline application APP/24/00405, ref 100103591, Revision 1.0 dated 21/05/2026.

2 Ductile Iron pipelines to concrete pressure pipe

2.1 Description

The approved tunnelling solution for the Havant Thicket Main Pipeline involved installing ductile iron (DI) pipework inside a reinforced concrete (RC) jacking tunnel, delivered as a 'two pass' - construction method, as shown in Figure 1 (a). First, a structural RC tunnel was constructed using pipejacking, and once the tunnel drive was completed, the DI carrier pipe was installed within it. This approach required internal supports (called pipe spiders) to position and align the DI pipe inside the tunnel, as well as jointing operations of the DI pipework in a confined, underground environment. The RC tunnel carried all external ground and traffic loads, while the DI pipe inside carried the internal water pressure. Although effective and commonly used, this system introduced additional complexity, risk, embodied carbon, and construction cost due to the duplicated structural and hydraulic systems needed to achieve the final pipeline function.

In contrast, the revised approach uses a 'single pass' - Concrete Pressure Pipe (CPP), in which the pipeline itself is jacked into place and simultaneously fulfils both the structural and hydraulic roles, as shown in Figure 1 (b). The CPP incorporates a continuous welded steel pressure liner, surrounded by a thick reinforced concrete wall capable of taking all external ground loads and jacking forces during installation. Each joint includes a steel-to-steel weld for pressure continuity, supplemented by gaskets providing a watertight seal during construction. Because the CPP acts directly as the permanent pressure pipeline, the need for a secondary DI pipe installation within a tunnel is eliminated entirely and the system is more efficient.

The key differences between the two systems lie in the pipe construction and the division of responsibilities between components. In the approved method, the RC tunnel provided the structural capacity while the DI pipe took the internal pressure load, whereas in the CPP method, the embedded steel liner and the reinforced concrete outer wall work together to resist both internal and external loads within a single pipe unit. This integrated design also improves durability, design life, and long-term operational resilience. Furthermore, the CPP pipeline reduces construction risks on the project by allowing an increased separation between the two tunnels and a more robust tunnel pipeline.

Overall, the adoption of the CPP system provides a more efficient, cost effective, lower embodied carbon, and resilient solution by combining structural tunnel and pressure pipeline functions into a single engineered product. This removes the complexities inherent in the earlier two pass method, offering tangible benefits to construction sequencing, safety, quality control, and long-term asset performance. All tunnelled sections of the Havant Thicket Pipeline route (P1, P3, P4, P5, P6, P7, and P8) have been changed to use the new CPP method of construction. This design change does not result in any above ground changes to the final scheme, as it only affects the buried pipework.

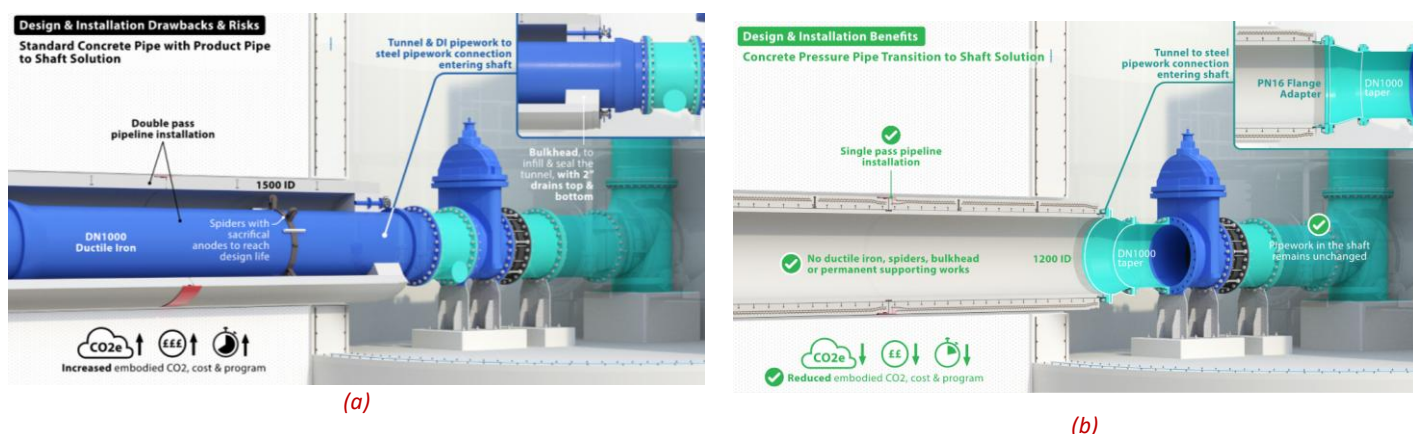


Figure 1: Tunnel arrangement at shaft interfaces for the fill pipeline: (a) approved scheme, (b) new concrete pressure pipe.

2.2 Change assessment

The key benefits of the change from the approved to new construction method are summarised in Table 2. From the table it is evident that the reduction in excavated volume (and therefore number of “muck away” traffic movements), embodied carbon, and number of deliveries to the pipeline are all significantly reduced. As these changes affect all tunnelled sections of the pipeline route (4938 m of the 6932 m total, 71%) the reductions detailed below provide a significant benefit to reducing the overall impact of the scheme, both during construction and following completion. Further detailed analysis of the changes specific to the different planning requirements is provided in Appendix A:.

Table 2: Comparison of key metrics of the approved and new construction methods for the pipeline.

Metric	Fill pipeline		Return pipeline		Cumulative change (%)	Total change along route
	Approved scheme	New scheme	Approved scheme	New scheme		
Excavated volume (m3 per m)	2.73	2.24	3.30	2.24	- 26	- 7655 m ³
Embodied Carbon (TCO2e per m)	1.19	1.1	1.62	1.1	- 19	- 3010 TCO2e
Pipeline deliveries (trips per km) ^[1]	169	125	170	125	- 26	- 440 trips

Notes:

[1] Pipeline deliveries are calculated per pair of tunnels at each launch shaft location (i.e. for the fill and return tunnel) as there are efficiencies on site due to two tunnels being constructed simultaneously. 50% of the deliveries are attributed to each tunnel in the above table to provide an overall comparison.

3 Change in Emergency Discharge (ED) shaft construction

3.1 Description

Further ground investigation works undertaken after the planning application was submitted identified two geotechnical risks which required mitigation through updates to the design. These were:

- 1) Calcareous rock deposits along the alignment in the P4 and P5, as well as in the vicinity of the emergency discharge shaft.
- 2) Artesian groundwater (i.e. groundwater with a head level above ground level) beneath the clay layer at the emergency discharge shaft and tunnel in alignments P4 and P5.

The calcareous rock deposits have been identified at the interface between the overlaying clay and silty-sandy layer which contains the artesian groundwater pressures. The rock is variable, but in places consists of a coherent layer of hard rock up to approximately 1 m thick. The silty-sandy layer beneath the groundwater is confined by the clay above and is at a pressure equivalent to a level up to 3 m above the ground level in the worst location. Tunnelling through the strata with artesian ground water, or installing shafts into it, introduces a risk of “frac out” (where water and the tunnel slurry may make its way to the surface). Additionally, the increased uplift force generated by these greater water pressures acting on the shaft base requires additional mass within the structure to ensure shaft uplift does not occur.

To mitigate against these risks, a dewatering scheme has been introduced at shafts 4 and the emergency discharge site to reduce the ground water pressure during construction and allow the operations to be conducted without the risk of frac out at these locations. Additionally, the design of the shafts at the emergency discharge site has been changed to provide additional mass to resist the uplift forces in the permanent state.

To achieve this at the emergency discharge site, the tunnel alignment depths have been reduced, to ensure the shaft and tunnels are not within the artesian layer. Additional piling has also been introduced to allow for safe construction of a larger slab around the shafts to resist uplift caused by the increased water pressure. Furthermore, the thickness of the shaft bases has been increased to provide additional mass within the shaft and provide a stronger base, which can resist the increased loading. These changes are shown in Figure 2. Figure 3 shows a plan view of the piled arrangement around the emergency discharge site shafts. The arrangement has been designed so that it can be installed using silent piling methods.

In addition to the above changes, the ground level strategy has been changed slightly so that the whole site is now level after reinstatement (instead of having a rise in it at the discharge shaft). This change reduces the need to import fill and simplifies site access requirements, thereby removing health and safety risks during site operation.

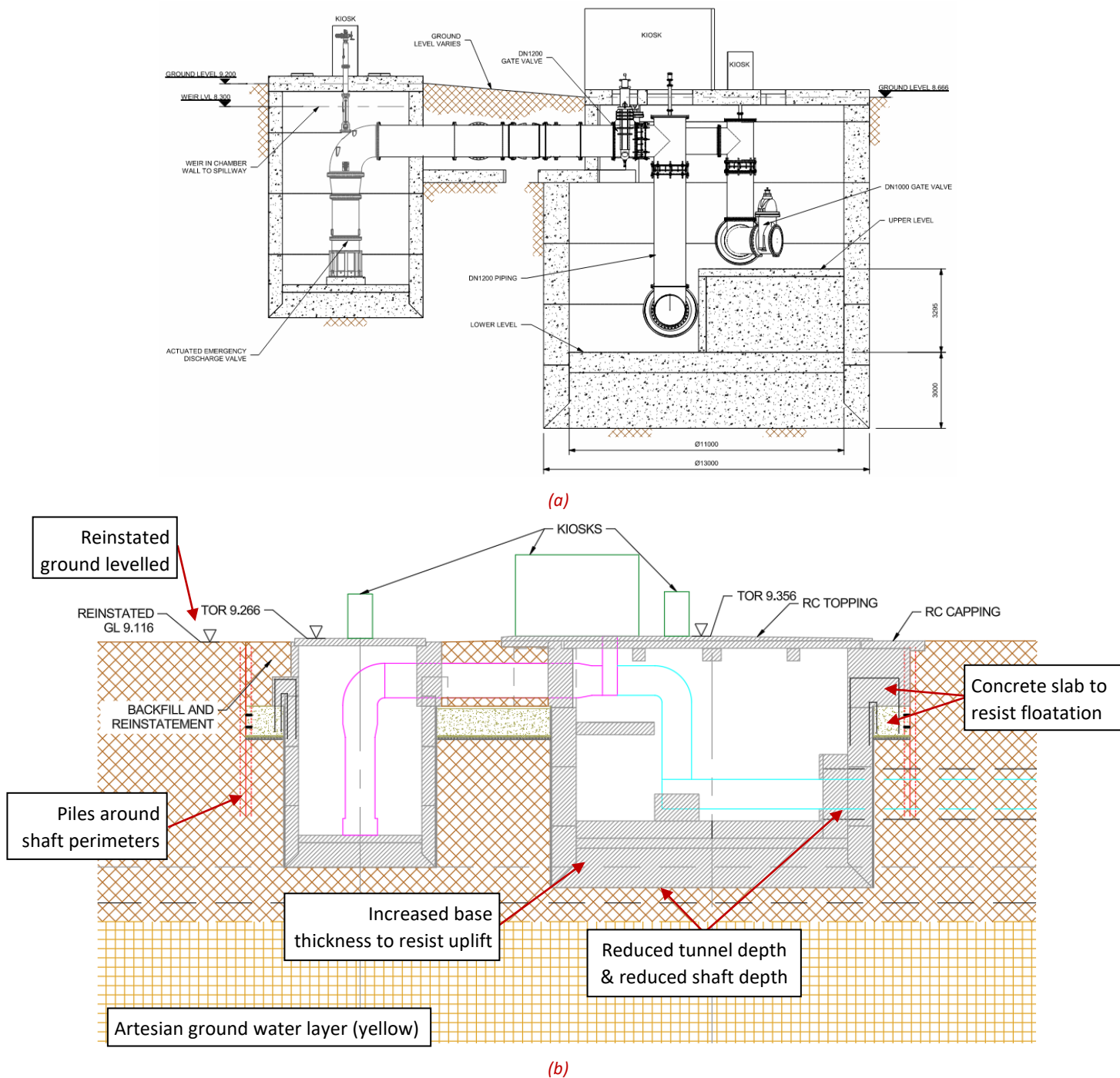


Figure 2: Plan view showing the permanent structure at the emergency discharge site, (a) approved scheme (extract from HTR-WAB-PI-ED-DR-T-0004 A4.P04), (b) updated scheme accommodating the increased water pressures with key changes highlighted.

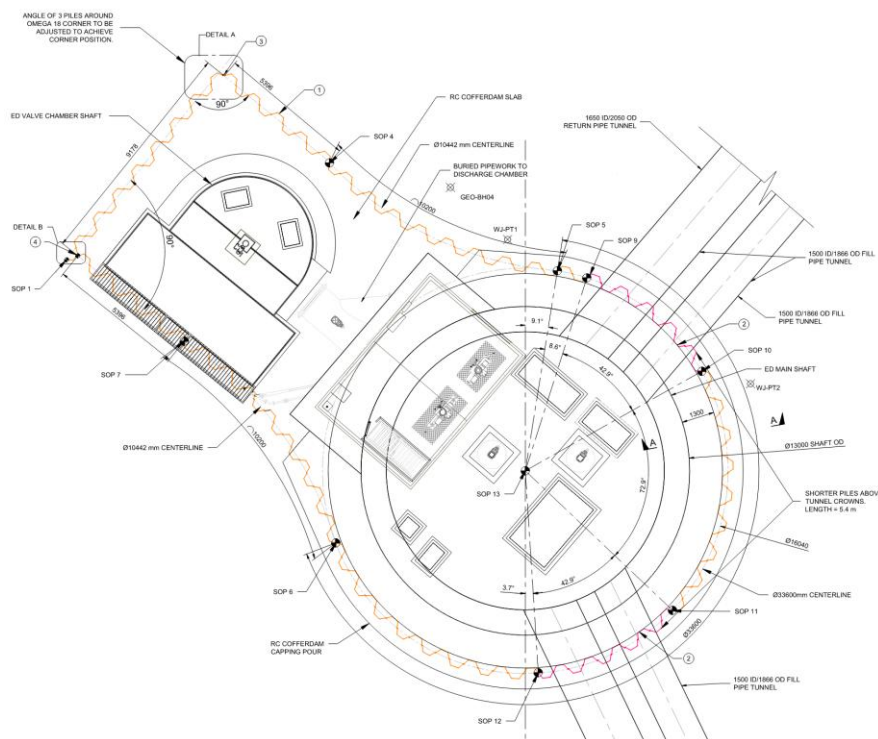


Figure 3: Plan view showing proposed piling arrangement (orange and red lines) around emergency discharge shafts. Angle of curved section has been designed to allow installation using silent piling methods.

3.2 Change assessment

The changes described above do not result in any above ground changes to the approved design, with the exception of levelling the ground at the site location so that the structures at a more uniform level. The changes described above result in an overall increase in the volume of excavated material to be removed from the emergency discharge site and the volume of concrete to be imported. The additional activity of pile installation at the site is also required. Table 3 provides a summary of the changes and shows the minor increases in excavated volume and concrete volume associated with the new arrangement. The 70 m of additional piling is also highlighted; however, it should be noted that this will be installed using silent piling methods. The 8% increase in concrete volume equates to an approximate additional embodied carbon of 25 T and the additional piling works contribute a further 67 T CO₂e.

Table 3: Emergency discharge site changes in key metrics between approved and new arrangement

Metric	Approved arrangement	New arrangement	Change (%)
Excavated volume (m3)	1270	1365	+8
Concrete volume (m3)	1970	2120	+ 8
Sheet pile length (m)	0	70	-

4 Change in Shaft W6 construction

4.1 Description

The Shaft W6 construction site is the most physically constrained site along the pipeline route. Riders Lane stream to the north and west of the site location, Dunsbury Way to the east, and houses to the south limit the available site footprint and introduce constraints on the location of the shaft footprint to avoid blocking the stream. These constraints, coupled with the changes in tunnel alignment discussed in Section 3, mean that a circular caisson shaft construction is no longer suitable for the construction of shaft 6. Instead Shaft W6 will need to be constructed using a cofferdam with a reinforced concrete base, as shown in Figure 4.

The figure shows that the revised cofferdam arrangement does not provide any greater blockage to the stream than the approved proposal and does not significantly change the footprint of the shaft. Instead, the change has been made to “square off” the circular shaft, to provide increased internal working room for tunnelling and pipework operations within the shaft. Figure 5 shows a comparative section through the shafts, which highlights that the depth (and therefore volume of excavated material) has also been reduced by the proposed change, as well as the reduced volume of concrete required in the cofferdam arrangement.

The proposed changes do not result in any permanent ground level changes at the Shaft W6 site.

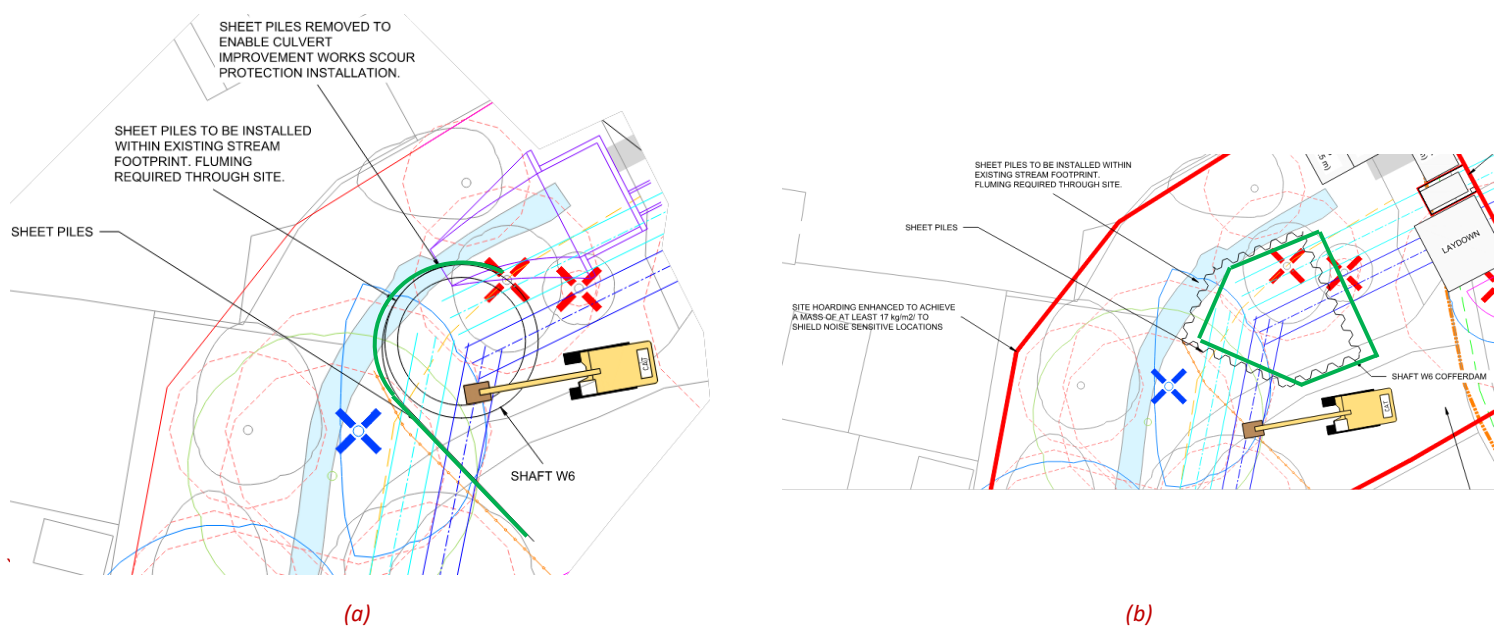
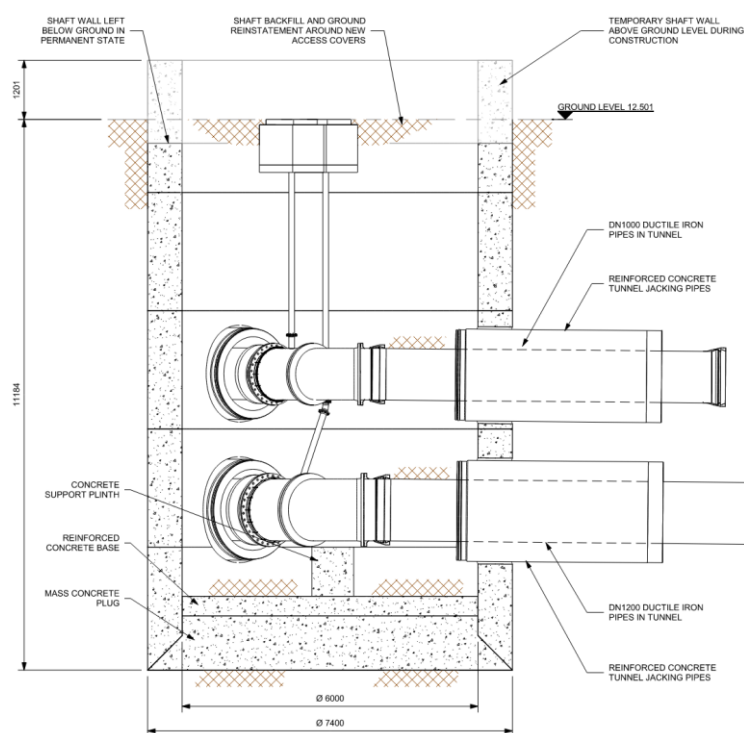
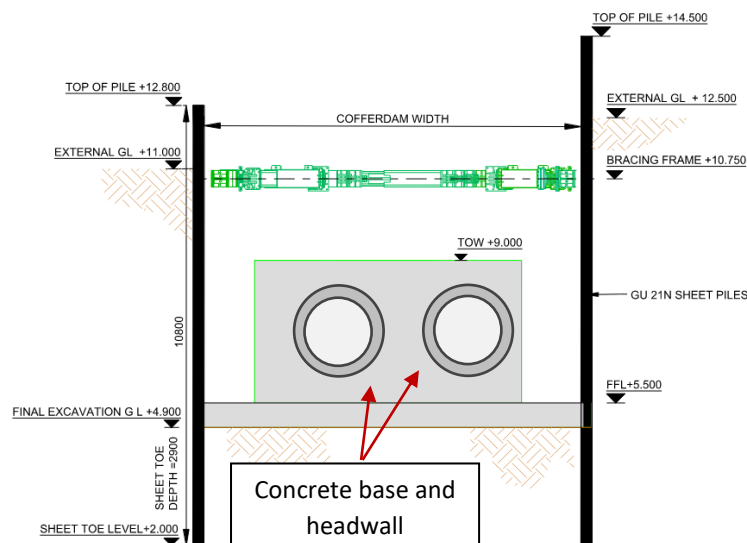


Figure 4: Plan view showing the buried structures at shaft W6 with piles highlighted in green: (a) approved scheme (extract from HTR-WAB-PI-W6-DR-T-0001 A4.P04), (b) updated scheme cofferdam.



(a)



(b)

Figure 5: Section view showing the buried permanent structure at Shaft W6: (a) approved scheme (extract from HTR-WAB-PI-W6-DR-T-0002 A4.P04), (b) updated scheme. Note that the scales on the section views are different.

4.2 Change assessment

As discussed in Section 4.1, the change in construction method means a reduction of the reinforced concrete from the shaft but results in an increase in the length of pile wall to be installed and a minor increase in the volume of excavated material. These changes are summarised in Table 4. The increase in sheet pile length created by the straighter alignment of the piles allows more of the piling to be completed using silent piling methods, whereas 50% of the approved scheme was required to be installed using vibratory methods due to the curved nature of the sheet pile wall. The reduction in concrete volume equates to an approximate 34 T CO₂e reduction in embodied carbon at the Shaft W6 site, whereas the increase in sheet pile length causes a 16 T increase in CO₂e at the site.

Table 4: Shaft 6 changes in key metrics between approved and new arrangement

Metric	Approved arrangement	New arrangement	Change (%)
Excavated volume (m ³)	480	520	+ 8
Concrete volume (m ³)	225	95	- 58
Sheet pile length (m)	23	34	+ 48

5 Cumulative changes summary

The proposed changes to the scheme since the planning application was approved have been summarised in Sections 2 to 4 of this note. The change from the conventional tunnel pipe with a ductile iron pipeline to the ‘single-pass’ reinforced concrete pressure pipe results in significant reductions in excavated volume (7654 m³) and embodied carbon (3012 TCO₂e) along the pipeline route, which offsets the minor increases generated by the changes at the ED and shaft 6 sites. Additionally, the reduction in the number of delivery trips (440) due to this change offset any minor changes from the other changes along the route. Overall, the cumulative impacts of these changes shown in Table 5 are positive when compared to the approved scheme and therefore the changes constitute a non-material amendment to the approved scheme planning application.

Table 5: Cumulative changes in key metrics considering changes described in this technical note.

Change in Metric	CPP (Section 2)	ED (Section 3)	W6 (Section 4)	Cumulative Change
Excavated volume (m ³)	- 7650	+ 150	+ 40	- 7460
Concrete volume (m ³)	+ 260	+ 95	- 130	+ 225
Embodied Carbon (TCO ₂ e)	- 3010	+ 90	- 20	- 2940
Perimeter sheet pile length (m)	N/A	+ 70	+ 10	+ 80
Deliveries (Trips)	- 440	+ 30	-15	-425

The additional piling review (detailed within Appendix B: Sweco Piling Assessment) carried out in association with the proposed piling changes finds that noise and vibration emissions, and the associated impacts, are expected to be lower than those currently predicted under the consented piling strategies.

Appendix A: Atkins Assessment

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Havant Thicket Reservoir Project

SUBJECT	YOUR REFERENCE	DATE
Proposed non-material amendment following approval Havant Thicket pipeline dual pipeline application APP/24/00405.	100103591	21 May 2026

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	First draft	KHL	LO	JF	JF	21/5/26

Client signoff

Client	Portsmouth Water				
Project	Havant Thicket Reservoir Project Dual Pipeline			Project No.	100103591
Client signature / date					

HAVANT THICKET RESERVOIR PROJECT

PROPOSED NON-MATERIAL AMENDMENT FOLLOWING APPROVAL HAVANT THICKET PIPELINE DUAL PIPELINE APPLICATION APP/24/00405.

Following the granting of planning permission for the Dual Pipeline Scheme in September 2025, Ward and Burke (WAB) has reviewed alternative construction techniques for the Dual Pipeline from a “traditional” tunnelled pipeline arrangement (ductile iron within a concrete tunnel) to a concrete pressure pipe (CPP), as well as changes to shaft 6 construction method and Emergency Discharge (ED) shaft construction method and temporary works.

This technical note considers the proposed change and its conformity with the planning permission and the approved Environmental Statement and considers whether the changes to the pipeline are likely to give rise to any new or materially different effects to those identified in the Revised ES 2024.

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1. Description of proposed changes

The proposed changes to the scheme, and rationale behind the changes, are summarised in Table 1. Further detailed descriptions of each change will be provided in the following sections.

Table 1: Summary of changes to the scheme, the reasons for them, and the high-level planning impacts.

No.	Change description	Reason for change	High level planning impact
1	Change from Ductile Iron Pipelines within tunnels to integrated Concrete Pressure Pipe (CPP).	A more efficient pipeline construction method has been identified which will reduce the embodied carbon of the scheme, as well as reducing the number of traffic movements to and from construction sites.	<ul style="list-style-type: none">▪ Reduced scheme embodied carbon▪ Reduced traffic movements across the scheme.
2	Change of Emergency discharge shaft construction method and temporary works.	<p>Additional ground investigation works identified artesian groundwater in a layer beneath the emergency discharge shaft. This has now been accounted for in design, which has increased the amount of concrete required at the shaft location to resist floatation.</p> <p>Additional piling works are required to facilitate the construction.</p>	<ul style="list-style-type: none">▪ Increased construction activities at the shaft location.▪ Increased embodied carbon of the emergency discharge structure.▪ Increased construction programme at the emergency discharge site.▪ Increased traffic movements at the emergency discharge site.▪ Increased silent piling at the emergency discharge site.
3	Change of shaft 6 construction method from a reinforced concrete to a cofferdam with a reinforced concrete base.	Due to the constrained footprint of the shaft 6 site location, the construction method of shaft 6 has been changed from a reinforced concrete to a cofferdam with a reinforced concrete base.	<ul style="list-style-type: none">▪ Increased use of silent piling methods at shaft 6.▪ Reduced concrete volume at shaft 6 location.

1.1 Concrete Pressure Pipe

The changes to the pipeline are to transition from a “traditional” tunnelled pipeline arrangement (ductile iron within a concrete tunnel) to concrete pressure pipe (CPP).

The changes to the pipeline mean switching from a traditional way of building it (where a metal pipe is placed inside a concrete tunnel) to using a new type of concrete pipe. Installing these new pipes is simpler and quicker than the old method. The new design also gets rid of the need for extra parts called ‘spiders’ that were used to keep the pipe in the middle and protect it. With the new pipes, everything fits together more closely, so there are no empty spaces between the pipe and the tunnel wall.

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Most of the work to make the new concrete pipes is done in the factory, which means there's less work needed at the construction site. This makes the whole process quicker and easier. The new pipes also last much longer - up to 120 years. Because the installation is more efficient, the pipes are smaller on the outside and can be placed further apart from each other. This helps lower the chance of problems when putting the pipes in the ground.

The new concrete pipes are put in place using the same method as the previously approved pipes. These pipes have special joints with rubber seals to keep water and soil from getting inside while the tunnel is being built. Once the tunnel is finished, the outside of each pipe is sealed and the metal parts are welded together. This makes the whole pipeline strong and able to safely handle the water pressure inside.

A summary is provided below to identify what the changes are between the approved traditional tunnelled arrangement and the proposed CPP.

Table 2 - Key differences between approved pipeline and CPP

	Approved traditional pipeline	Proposed Concrete Pressure Pipe (CPP)
1. Structural Configuration	<ul style="list-style-type: none">▪ Ductile iron pipe is installed inside a concrete tunnel or casing.▪ The tunnel provides external protection and structural support, while the ductile iron pipe carries the pressure load.▪ Two separate components: tunnel (civil structure) + pipe (pressure carrier).	<ul style="list-style-type: none">▪ The pipe itself is a composite structure designed to carry internal pressure and external loads.▪ No separate tunnel required; CPP acts as both pressure pipe and structural element.▪ Typically, steel cylinder embedded in concrete with steel reinforcement.
2. Installation	<ul style="list-style-type: none">▪ Excavation for tunnel construction, then installation of ductile iron pipe inside.▪ More complex and time-consuming due to two-step process.▪ Alignment and jointing inside tunnel can be challenging.	<ul style="list-style-type: none">▪ Installed directly in tunnel bore without secondary casing.▪ Faster installation and fewer components.▪ Joints are designed for pressure and structural continuity.
3. Load Handling	<ul style="list-style-type: none">▪ Tunnel handles external loads (soil, traffic), ductile iron handles internal pressure.▪ Separation of roles means redundancy but higher cost.	<ul style="list-style-type: none">▪ Integrated design handles both internal pressure and external loads.▪ Reinforced concrete and steel cylinder share load responsibilities.
4. Cost & Complexity	<ul style="list-style-type: none">▪ Higher cost due to dual construction (tunnel + pipe).▪ More labour and time intensive.	<ul style="list-style-type: none">▪ Lower overall cost.▪ Simplified design and fewer components.

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A comparison table is provided below on the size and level of excavation required on the approved and proposed pipeline.

Table 3 – Summary of Changes

	Approved diameter size	Proposed diameter size	Overall reduction in diameter size	Approved level of excavation	Proposed level of excavation	Overall reduction in excavation
Fill pipe	1.866m	1.690m	0.176m	2.7m ³ /m	2.2m ³ /m	0.5m³/m
Return Pipe	2.050m	1.690m	0.36m	3.3 m ³ /m	2.2 m ³ /m	1.1m³/m

The proposed changes result in a reduction in size of the pipeline, which results in reduced levels of excavation for both pipelines.

There are no other changes to the approved scheme, the following elements remain as approved:

- Shaft sizes, layouts, depths.
- Programme of works.
- Tunnel alignments.
- Site layouts.
- Shaft pipework.
- Open cut pipework.

1.2 Emergency Discharge Shaft Construction

Further ground investigation works undertaken after the planning application was submitted identified two geotechnical risks which required mitigation through updates to the design, including:

- Calcareous rock deposits along the alignment in the P4 and P5 section of the approved pipeline alignment, as well as in the vicinity of the emergency discharge shaft; and
- Artesian groundwater (i.e. groundwater with a head level above ground level) beneath the clay layer at the emergency discharge shaft and tunnel in alignments P4 and P5.

To mitigate these risks, a dewatering scheme has been introduced at the emergency discharge site to reduce the ground water pressure during construction and allow the operations to be conducted without the risk of frac-out – which is the unintentional return of drilling fluids to the surface – at these locations. Additionally, the design of the shafts at the emergency discharge site has been changed to provide additional mass to resist the uplift forces in the permanent state.

To achieve this at the emergency discharge site, the tunnel alignment depths have been reduced, to ensure the shaft and tunnels are not within the artesian layer. Additional piling has also been introduced to allow for

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safe construction of a larger slab around the shafts to resist uplift caused by the increased water pressure. Furthermore, the thicknesses of the shaft bases have been increased to provide additional mass within the shaft and provide a stronger base, which can resist the increased loading. These changes are shown below in Figure 1 and Figure 2. Figure 3 shows a plan view of the pile arrangement around the emergency discharge site shafts. The arrangement has been designed so that it can be installed using silent piling methods.

In addition to the above changes, the ground level strategy has been changed slightly so that the whole site is now level after reinstatement (instead of having a rise at the discharge shaft). This change reduces the need to import fill and simplifies site access requirements, thereby removing health and safety risks during site operation.

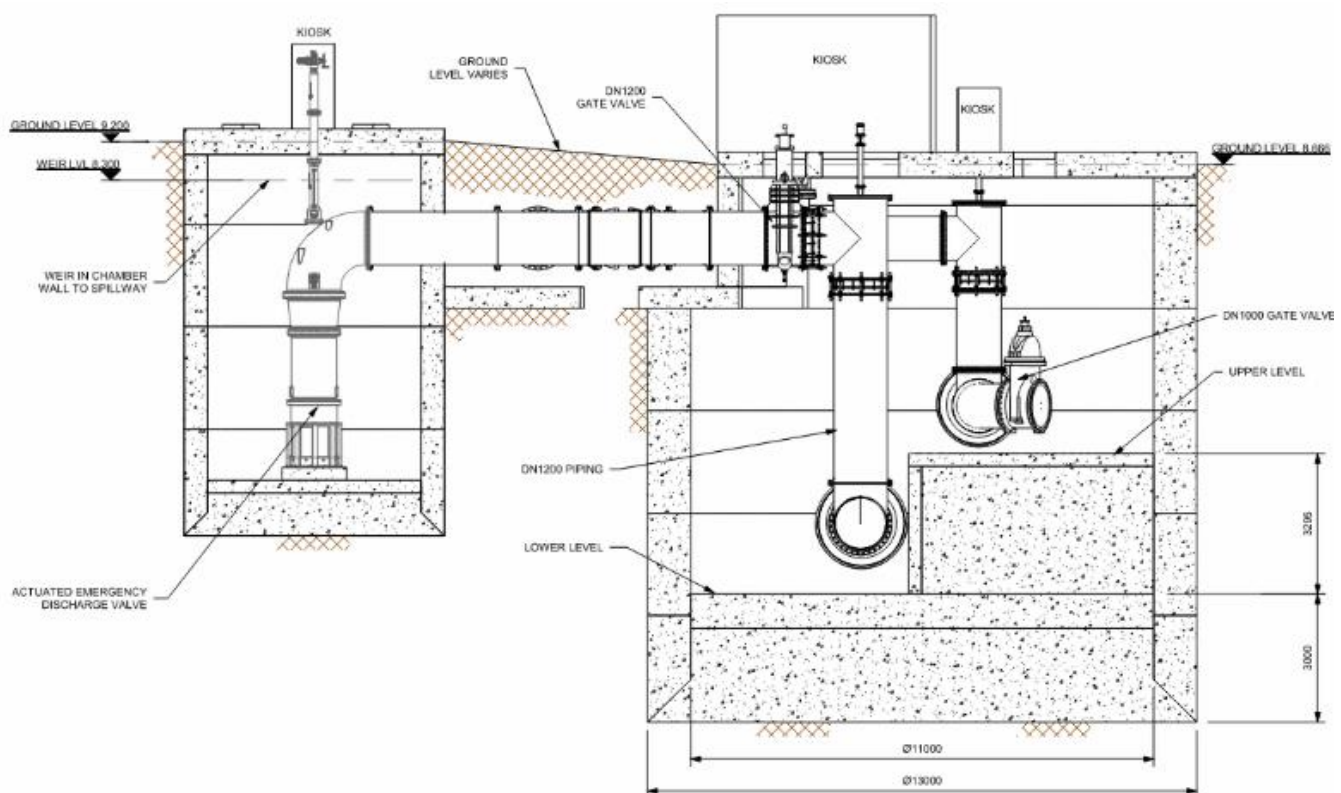


Figure 1 - Approved scheme (extract from HTR-WAB-PI-ED-DR-T-0004 A4.P04)

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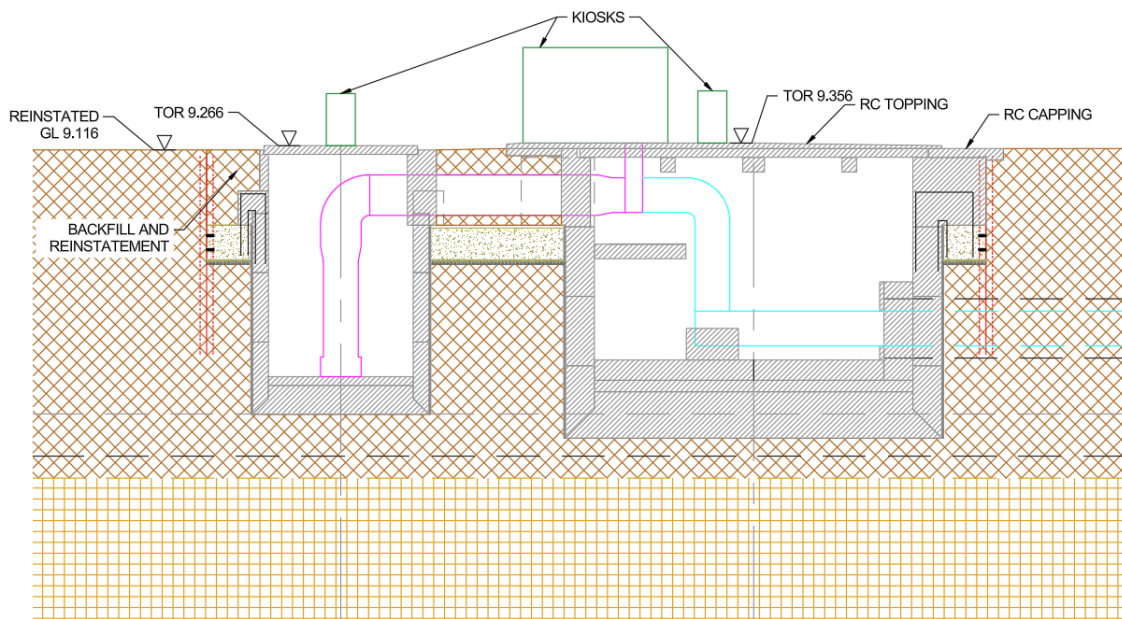


Figure 2 – Proposed scheme accommodating the increased water pressures with key changes highlighted.

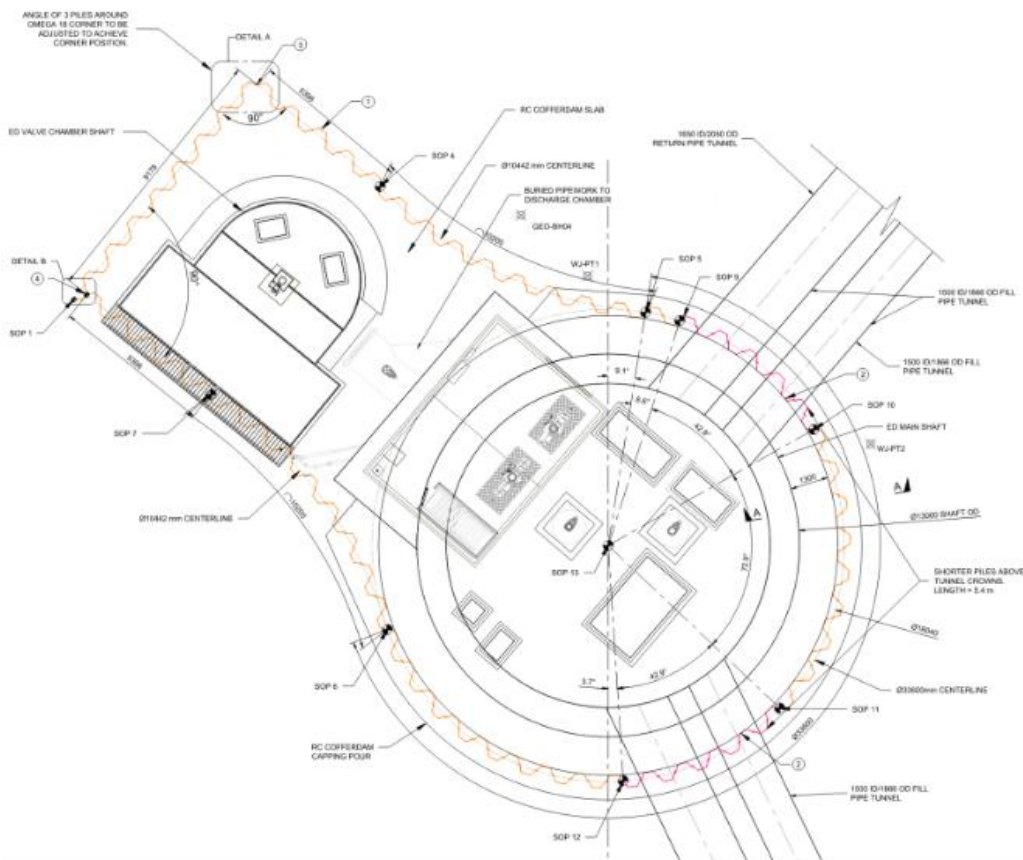


Figure 3 - Plan view showing proposed piling arrangement (orange and red lines) around emergency discharge shafts (*Angle of curved section designed to allow installation using silent piling*).

TECHNICAL NOTE

The proposed changes will not result in any above ground changes to the approved design, except for minimal levelling the ground at the site location so that the structures at a more uniform level. The changes described above result in an overall increase in the volume of excavated material to be removed from the emergency discharge site and the volume of concrete to be imported.

Table 4 provides a summary of the changes and identifies that there will be minor increases in excavated volume and concrete volume associated with the new arrangement. The works will be installed using silent piling methods.

Table 4: Emergency discharge site changes in key metrics between approved and new arrangement

Metric	Approved scheme	Proposed scheme	Change (%)
Excavated volume (m3)	1270	1365	+8
Concrete volume (m3)	1970	2120	+ 8
Sheet pile length (m)	0	70	-

1.3 Shaft 6 Construction

The shaft 6 construction site is the most physically constrained site along the pipeline route. Riders Lane stream to the north and west of the site location, Dunsbury Way to the east, and houses to the south limit the available site footprint and introduce constraints on the location of the shaft footprint to avoid blocking the stream.

These constraints, coupled with the changes in tunnel alignment discussed above on the Emergency Discharge structure, mean that a circular caisson shaft construction is no longer suitable for the construction of shaft 6. Therefore, it is proposed that shaft 6 will need to be constructed using a cofferdam with a reinforced concrete base, as shown below in

Figure 5.

TECHNICAL NOTE

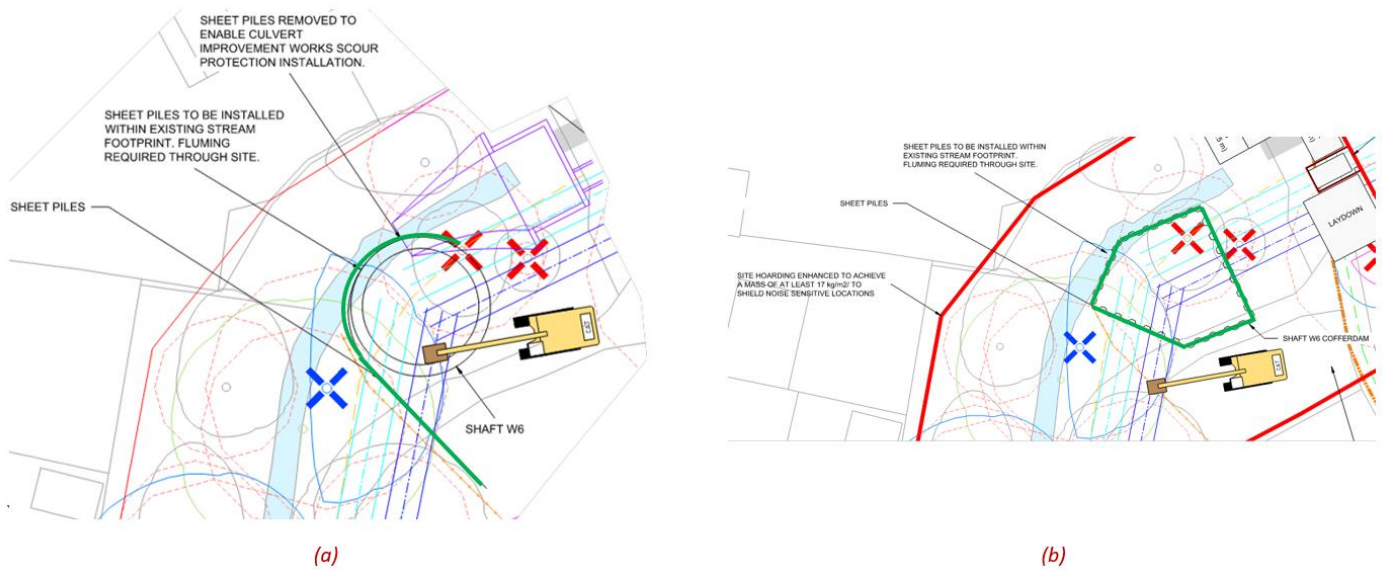


Figure 4 - Plan view showing the buried structures at shaft W6 with piles highlighted in green: (a) approved scheme (extract from HTR-WAB-PI-W6-DR-T-0001 A4.P04), (b) updated scheme cofferdam.

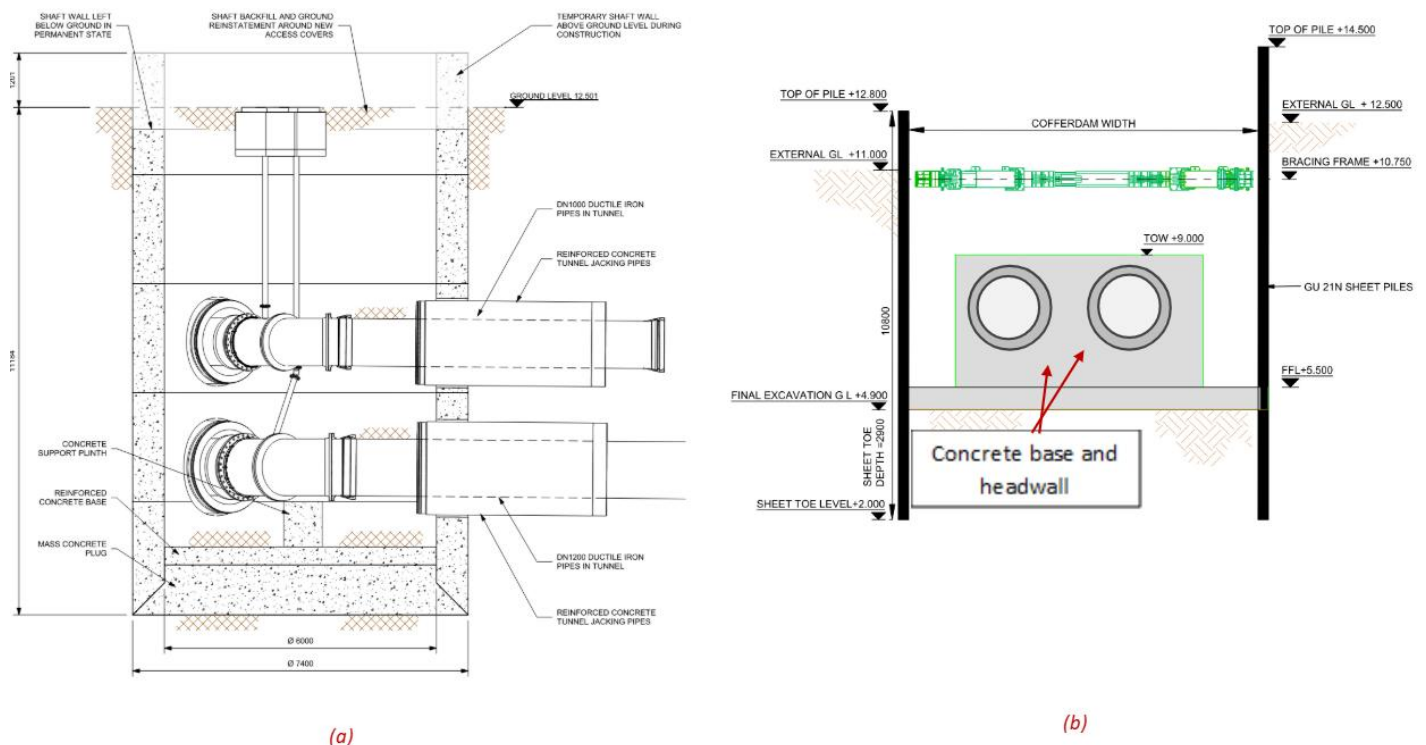


Figure 5 - Section view showing the buried permanent structure at shaft W6: (a) approved scheme (extract from HTR-WAB-PI-W6-DR-T-0002 A4.P04), (b) updated scheme. Note that the scales on the section views are different.

TECHNICAL NOTE

The change in construction method at shaft 6 means a reduction of reinforced concrete, however it does result in a slight increase in the length of pile wall to be installed and a minor increase in the volume of excavated material. These changes are summarised in Table 5. The increase in sheet pile length created by the straighter alignment of the piles allows more of the piling to be completed using silent piling methods, whereas 50% of the approved scheme was required to be installed using vibratory methods due to the curved nature of the sheet pile wall. The reduction in concrete volume equates to an approximate 34 T CO2e reduction in embodied carbon at the shaft 6 site, whereas the increase in sheet pile length causes a 16 T increase in CO2e at the site.

Table 5: Shaft 6 changes in key metrics between approved and new arrangement

Metric	Approved scheme	Proposed scheme	Change (%)
Excavated volume (m3)	480	520	+ 8
Concrete volume (m3)	225	95	- 58
Sheet pile length (m)	23	34	+ 48

1.4 Cumulative changes summary

The proposed changes to the scheme since the planning application was approved have been summarised. The change from the conventional tunnel pipe with a ductile iron pipeline to the single-pass reinforced concrete pressure pipe results in significant reductions in excavated volume (7654 m3) and embodied carbon (3012 TCO2e) along the pipeline route, which offsets the minor increases generated by the changes at the Emergency Discharge and shaft 6 sites. Additionally, the reduction in the number of delivery trips (440) due to this change offset any minor changes from the other changes along the route. Overall, the cumulative impacts of these changes are shown in Table below.

Table 6 - Cumulative changes in key metrics considering changes described in this technical note.

Change in Metric	CPP (Section 1.1)	ED (Section 1.2)	W6 (Section1.3)	Cumulative Change
Excavated volume (m3)	- 7650	+ 150	+ 40	- 7460
Concrete volume (m3)	+ 260	+ 95	- 130	+ 225
Embodied Carbon (TCO2e)	- 3010	+ 90	- 20	- 2940

TECHNICAL NOTE

Perimeter sheet pile length (m)	N/A	+ 70	+ 10	+ 80
Deliveries (Trips)	- 440	+ 30	-15	-425

2. Environmental Appraisal

A high-level environmental appraisal has been undertaken of the proposed changes. The Environmental Statement (ES) submitted in 2020 for both the hybrid reservoir permission and the outline pipeline planning application assessed the potential for significant effects arising from the Scheme with respect to: air quality, historic environment, biodiversity, ground conditions, landscape and visual, noise and vibration, traffic and transport, material resources and waste, water (flows, quality and groundwater) climate, climate change vulnerability, population and human health, cumulative effects and vulnerability to major accidents and disasters.

The Revised ES 2024 described the proposed changes to the Scheme as part of the hybrid Dual Pipeline planning application 2024 and presented an assessment of any new or different significant effects that could result from these changes. It confirmed that the impacts of the new pipeline scheme, including the cumulative impact from the reservoir S73 planning application, are comparable to the approved pipeline scheme with no likely permanent significant adverse effects predicted. However, four new temporary significant adverse effects were identified relating to noise, dust and visual impacts and loss of open space during construction – these effects are considered to be minimised with the proposed mitigation measures.

The proposed changes outlined above have been reviewed to determine whether they are likely to give rise to any new or materially different environmental effects.

The outcome of the environmental appraisal is presented in Table 7 below.

Table 7 – Environmental Topics reviewed for Non-Material amendment of APP/24/00405 Dual Pipeline planning application

ES Topic	Environmental Appraisal Summary
Air quality	<p>Conclusion from approved Revised ES 2024</p> <p>With appropriate mitigation measures in place, any adverse impacts resulting from the construction works would be minimised such that there would not be any residual significant effect on receptors. Mitigation measures to control dust are included in the Record of Environmental Actions and Commitment (REAC) in the Outline Environmental Management Plan (OEMP) in Appendix A2.1 of the Environmental Statement Volume 4. Any effect on air quality from construction traffic would be temporary, and would not be significant.</p> <p>There would be no adverse significant effects on receptors with the implementation of suitable mitigation measures during the construction and operation of the reservoir and pipeline.</p>

TECHNICAL NOTE

	Assessment of proposed changes <p>The proposals would require similar traffic movements to the approved, no significant additional effects.</p>
Historic Environment	Conclusion from approved Revised ES 2024 <p>There would be no adverse effects on heritage assets with the implementation of suitable mitigation measures during the construction and operation of the pipeline.</p> Assessment of proposed changes <p>No additional impacts as the changes are all underground.</p>
Biodiversity	Conclusion from approved Revised ES 2024 <p>There would be no adverse effects on receptors with the implementation of suitable mitigation measures during the construction and operation of pipeline.</p> Assessment of proposed changes <p><i>Concrete Pressure Pipe</i> No additional impacts as the changes are underground.</p> <p><i>Shaft 6</i> The Arboricultural Impact Assessment and tree protection plan submitted as part of the ES, captured all trees within the redline around shaft 6, meaning no additional tree survey would be required. A Category A tree was identified for coppicing (felling to ground level and retaining its stump to enable regeneration), this will still require coppicing. The stump will still be retained as part of the works, enabling it to regenerate as a multi-stem tree.</p> <p><i>Emergency Discharge Site</i> No additional impacts at this site.</p>
Ground Conditions	Conclusion from approved Revised ES 2024 <p>There would be no adverse effects that would be significant on receptors with the implementation of suitable mitigation measures during the construction and operation of the reservoir and pipeline.</p> Assessment of proposed changes <p>No additional impacts as the pipeline is in the same location.</p>
Landscape and Visual	Conclusion from approved Revised ES 2024 <p>During construction there would be some effects on landscape character and views from residential properties, from roads, from public rights of way and public open space close to the pipeline corridor. The majority of these effects are considered 'not significant', affecting only a very localised area and being temporary in nature. However, there would be short term significant effects on users of three public rights of way and Riders Lane Stream open space.</p> <p>During operation there would be very little trace of construction works and any effects remaining would reduce and not be significant once the Site is restored and planting established.</p> Assessment of proposed changes <p><i>Concrete Pressure Pipe</i></p>

TECHNICAL NOTE

No additional impacts as the changes are underground.

Emergency Discharge Site

No changes are required to the landscape reinstatement design.

Shaft 6

No changes or additional impact arise, as the changes are underground.

Cumulative Impacts

The proposed changes are not expected to result in any new significant effects on landscape, as all the changes are underground and there will be no changes to the landscape reinstatement plans.

Noise and Vibration

Conclusion from approved Revised ES 2024

During construction there would be short-term significant adverse noise effects on 69 receptors located adjacent to the pipeline shafts. Operation of plant within the Bedhampton compound is expected to have below adverse impact and is not considered to cause significant effects.

During operation there would be no adverse effects on receptors.

Assessment of proposed changes

Concrete Pressure Pipe

No additional impacts as the changes are underground. The CPP is installed in a similar way to the approved conventional jacking pipes, which will use the same machinery.

Emergency Discharge

A dewatering scheme has been introduced; however, this will only add one noise source. The pump itself is submerged and is not a significant contributor to noise. The only audible item is a 40 kVA sound-proofed generator with a noise emission level of 61 dB(A) at 7 m. This level is more than 10 dB below the established overall Activity Noise Level for the Emergency Discharge (ED) Chamber and will therefore make a negligible change to the construction noise and vibration.

The tunnel alignment depth at the ED Shaft has been reduced by approximately 1m, from around 6m to approximately 5m. This change is considered negligible in terms of its effect on vibration levels arising from Tunnel Boring Machine construction at the nearest sensitive receptors.

The revised ED Shaft design allows installation using silent piling techniques. The additional silent piling works (hydraulic jacking) would generate noise levels no more than 10 dB below the overall Activity Noise Level for the ED Chamber and, as such, would not result in any increase in construction noise or vibration.

While there is a minor increase in the total number of delivery vehicle trips, no significant change in the daily construction traffic noise level is anticipated.

Shaft 6

There is a small increase in the length of the pile wall; however, the revised design enables a greater proportion of the works to be carried out using silent piling techniques. As silent piling (hydraulic jacking) is more than 10 dB quieter than vibratory piling, this change will not result in an increase in construction noise or vibration levels.

There is also a small reduction in the total number of delivery vehicle trips. As a result, no significant change in daily construction traffic noise levels is expected.

Cumulative Impacts

The proposed changes are not expected to result in any new significant effects on noise and vibration. While there is a minor increase in the total number of delivery vehicle trips, no significant change in daily construction traffic noise level is anticipated. The revised ED Shaft design allows installation using silent piling techniques. The additional silent piling works (hydraulic jacking) would generate noise levels no more than 10 dB below the overall Activity Noise Level for the ED Chamber and, as such, would not result in any increase in construction noise or vibration. Therefore, it is considered that all changes would fall within the ES parameters set out in the approved application.

Traffic and Transport

Conclusion from approved Revised ES 2024

The review of potential effects indicates that during construction of the reservoir site and access roads, and pipeline in combination, there would be adverse effects on some road links, due to either the increase in Heavy Goods Vehicles traffic (in the case of the reservoir site and access roads) or temporary closures of highway or public right of way (in the case of the reservoir site and access roads, and pipeline). However, these effects would be minor in nature and not significant, and for a temporary period only. The requirements in the REAC in the OEMP in Appendix A2.1 of the Environmental Statement Volume 4 will seek to minimise the effects of construction traffic as far as is reasonably practical.

Assessment of proposed changes

In traffic and transport terms, the potential impacts and significant effects of the scheme were related to the construction of the pipeline. The approved ES considered the impacts of construction traffic volumes, construction vehicle type and the impact of road / Public Right of Way closures relating to traffic management and work area compounds.

Concrete Pressure Pipe

The proposed design change will not require the use of different sized vehicles compared to those that were assessed as part of the approved ES. Therefore, the required traffic management and work area layouts (including access points) will remain consistent with the approved parameters.

As outlined in Table 6, above, the key benefits of the change from the approved to new construction method are the reduction in excavated volume (and therefore number of “muck away” traffic movements), embodied carbon, resulting in the reduction in the number of deliveries by 440 trips. Pipeline deliveries are calculated per pair of tunnels at each launch shaft location (i.e. for the fill and return tunnel) as there are efficiencies on site due to two tunnels being constructed simultaneously. These reductions in traffic movement provide a substantial benefit to reducing the overall impact of the scheme, both during construction and following completion of the development and complies with the measures set out within the approved Framework Construction Management Plan.

The design change is not expected to result in any new significant effects in traffic and transport terms, and therefore all changes would fall within the ES parameters and within the approved Framework Construction Traffic Management Plan set out in the approved application.

Emergency Discharge

The proposed changes to the ED chamber compound layout do not affect the approved access or operational arrangements. It is therefore considered that there are no proposed changes at the compound that require re-assessment in traffic and transport terms.

Shaft 6

At Shaft 6 the approved compound layout includes the installation of a dropped kerb access, which was to be the subject of a s.278 agreement. The new layout retains the proposed access location, with alterations to the highway to be agreed following technical approval of the proposed works. This is considered to be within the parameters of the approved scheme.

The approved layout also included a pull in/drive through lane on Dunsbury Way and the closure of a pedestrian refuge island during the works. Whilst the pedestrian refuge island is still to be closed, the requirement for a pull in/drive through lane has been removed from the new layout, having a marginal reduction in the traffic management requirements associated with Shaft 6.

The proposed design change will not require the use of alternative sized vehicles compared to those that were assessed as part of the approved ES and access arrangements at both compounds is consistent with the approved proposals. Therefore, the required traffic management and work area layouts (including access points) remain consistent with the approved parameters.

Construction Traffic Volume

At Shaft 6, the change in construction method means there is a reduction in the amount of the reinforced concrete required, but results in an increase in the length of pile wall to be installed and a minor increase in the volume of excavated material. This will lead to a minor decrease in the total number of trips to this compound across the construction programme (-15).

The proposed design changes at the ED compound and Shaft 6 will require a change in the amount of excavated material, and subsequently a minor change in the total number of trips specifically associated with these compounds. At the ED site, the changes result in an overall increase in the volume of excavated material to be removed from the emergency discharge site and the volume of concrete to be imported, resulting in a total of 30 additional trips across the construction programme.

Cumulative Impacts

Overall, the change from the conventional tunnel pipe with a ductile iron pipeline to the single-pass reinforced concrete pressure pipe results in significant reductions in excavated volume (7654 m³) and embodied carbon (3012 TCO₂e) along the pipeline route, which offsets the minor increases generated by the changes at the ED and shaft 6 sites. Additionally, there is a reduction of delivery trips for the pipeline construction of 440 trips, shaft 6 reduces deliveries by 15 trips, whilst the ED results in a slight increase of 15 deliveries.

As such this results in a cumulative reduction in trips of 425 trips across the construction programme, therefore providing a substantial benefit to reducing the overall impact of the scheme, both during construction and following completion of the development and complies with the measures set out within the approved Framework Construction Management Plan. Therefore, taken together the design changes are not expected to result in any new significant effects in traffic and transport terms, and it is considered that all changes would fall within the ES parameters set out in the approved application.

TECHNICAL NOTE

Material Resources and Waste	<p>Conclusion from approved Revised ES 2024</p> <p>The assessment compared estimates of construction materials that would be required during construction of the reservoir and pipeline corridor to existing sales of construction materials in the region. The assessment found that the effect would be negligible and not significant on the availability of construction materials in the region.</p> <p>Assessment of proposed changes</p> <p><i>Concrete Pressure Pipe</i></p> <p>Material use</p> <p>Material type will be different – concrete and small amount of steel instead of ductile iron. Baseline for the region indicates 5.4 million tonnes sales in South East England for concrete and 4.8 million tonnes sales in the UK for pig iron. This would have a negligible effect on the material market, due to the volume of the materials in the material market (the receptor).</p> <p>Waste Generation</p> <p>Baseline for waste infrastructure in Hampshire shows capacity to manage 2,475,567 tonnes per annum of non-hazardous construction, demolition and excavation waste. Details of the new system indicate that it would generate less waste from excavation therefore having a negligible effect on waste generation</p> <p><i>Emergency Discharge and Shaft 6</i></p> <p>The change resulting in a slight increase in excavation remains within the scope of effects assessed in the ES and would be negligible.</p> <p>Cumulative Impacts</p> <p>Overall, the proposed changes decrease the level of excavated material, which are considered minor due to the whole route from change from the conventional tunnel pipe with a ductile iron pipeline to the single-pass reinforced concrete pressure. The changes remain within the scope of effects assessed in the ES and would be negligible.</p>
Water	<p>Conclusion from approved Revised ES 2024</p> <p>During construction and operation there would be no residual adverse effects that would be significant upon successful implementation of mitigation measures identified in the CEMPs submitted with the new pipeline application.</p> <p>Assessment of proposed changes</p> <p><i>Concrete Pressure Pipe</i></p> <p>No additional impacts as the pipelines are in the same location.</p> <p><i>Emergency Discharge</i></p> <p>No expected impact on watercourse as works are below ground and within the same footprint.</p> <p><i>Shaft 6</i></p> <p>The change remains within the scope of effects assessed in the ES and would be negligible and appropriately addressed by the existing mitigation and compensation measures.</p>

TECHNICAL NOTE

Effects on Climate	<p>Conclusion from approved Revised ES 2024</p> <p>The scheme is deemed to be unlikely to cause significant effects on climate or significantly affect the UK's ability to meet its emissions reduction targets.</p> <p>Assessment of proposed changes</p> <p><i>Concrete Pressure Pipe</i></p> <p>Based on a high-level assessment, the carbon emissions from the new proposed pipeline would reduce emissions from the scheme by approximately 6,950 tCO₂e. This represents a decrease of approximately 25.6% of total emissions for the pipeline scheme. This high-level assessment considers the change in emissions from the different materials (A1-3) used in the new approach and their transportation to site (A4). It does not consider any change in construction processes needed to construct the new pipeline approach. Any change in construction approach may result in a further decrease in carbon savings or represent an increase. However, this change in emissions is likely to be minor in the context of the A1-4 carbon savings.</p> <p>It is considered that operational emissions would be 0 tCO₂e for the new approach, in line with the assumptions considered for the original ES, as no new operational energy, maintenance or replacement requirements occur under the new approach.</p> <p>The reduction in emissions will not change the significance assessment in ES Chapter 16, Effects on Climate. It will reduce the scheme's impact on the UK Government's carbon budgets, further highlighting the scheme's minor, non-significant impact on the climate.</p> <p><i>Shaft 6 and Emergency Discharge</i></p> <p>Based on a high-level assessment, the carbon emissions from the changes to Shaft 6 and the Emergency Discharge shaft would increase emissions from the scheme by approximately 82.5 tCO₂e due to an overall increase in material quantities required for the scheme. This represents an increase of approximately 0.4% of total emissions for the pipeline scheme from the CPP pipeline updates. This high-level assessment considers the change in emissions from the different materials (A1-3) used in the new shaft approaches and their transportation to site (A4). It does not consider any change in construction processes needed to construct the new pipeline approach. Any change in construction approach may result in a further increase in carbon savings or represent a decrease. However, this change in emissions will be minor.</p> <p>It is considered that operational emissions would be 0 tCO₂e for the new approach, in line with the assumptions considered for the original ES, as no new operational energy, maintenance or replacement requirements occur under the new approach.</p> <p>Cumulative Impacts</p> <p>The reduction in emissions will not change the significance assessment in ES Chapter 16, Effects on Climate. It will increase the scheme's impact on the UK Government's carbon budgets, however such increase would be negligible and maintain the scheme's minor, non-significant impact on the climate.</p>
Climate vulnerability	<p>Conclusion from approved Revised ES 2024</p> <p>Without mitigation the reservoir and pipeline could be vulnerable to potential impacts linked to projected changes in the climate. Mitigation measures built into the design (i.e. embedded mitigation) that either avoids these impacts, minimises them or reduces their consequences to acceptable levels have been identified. After consideration of embedded mitigation none of the potential climate vulnerability impacts would have adverse effects that would be significant.</p>

TECHNICAL NOTE

Assessment of proposed changes

No additional impact due to the embedded mitigation.

Population and Human Health

Conclusion from approved Revised ES 2024

With the implementation of suitable mitigation measures, there would be no adverse effects that would be significant on receptors during the construction of the pipeline except for a small number of receptors close to the works. These include receptors who will experience temporary significant noise effects, the elderly and disabled who will experience temporary significant air pollution effects from construction dust and traffic and children and low income groups who will experience temporary significant effects due to the temporary loss of open space affecting their wellbeing. Mitigation measures including clear communication during construction will be undertaken to ensure effects are reduced as far as possible.

The construction of the pipeline would bring beneficial effects (although not significant) by creating employment opportunities and improving access to skills and training.

No adverse effects on population and human health during operation of the pipeline corridor have been identified.

Assessment of proposed changes

No additional impact as all changes underground.

Cumulative and In-combination Effects

Conclusion from approved Revised ES 2024

Appropriate mitigation measures, as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through CEMPs and, if necessary, Traffic Management Plans for the Scheme and any committed development, will minimise adverse construction effects resulting from simultaneous construction noise and vibration activities from several committed developments and the Scheme. Nevertheless, trenchless construction of the pipeline, in combination with the construction of other committed development, has the potential to have significant residual daytime noise effects on human receptors.

A moderate cumulative effect on one visual receptor is expected during construction of the pipeline and other committed development. Following completion, the potentially significant effect would reduce to be a slight cumulative effect. No significant cumulative effects on landscape character are expected during or post construction.

Construction and operation of the Scheme, in combination with committed developments, could have significant beneficial mental and physical health effects as well as benefits for the local economy through the generation of jobs and trade.

There is a potential for the Scheme to give rise to significant in-combination effects during construction or operation. However, with mitigation measures outlined in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 (and the pipeline CEMPs), these effects can be reduced to non-significant.

Assessment of proposed changes

No additional impact.

3. Conclusion

This report has considered whether the proposed changes to the pipeline are likely to give rise to any new or materially different significant effects to those identified in the Revised ES 2024.

A review against the matters approved under the Hybrid permission has been undertaken. The scale and nature of the changes are not considered to be material when assessed in the context of the overall pipeline development and relate solely to underground works, with no changes visible above ground. Furthermore, there will be no changes to the approved landscape reinstatement plans or to the Arboricultural Impact Assessment. In addition, the proposed changes to the pipeline and shaft construction methods would result in a reduction in pipeline size in certain locations, and fewer construction traffic movements across the scheme, notwithstanding localised minor increases in construction activity and excavation at the emergency discharge shaft. As such it is considered that both on an individual and cumulative basis that the amendments to the permitted scheme are non-material.

This Technical note demonstrates that the design changes for the Dual Pipeline changes remain within the worst case assessed in the Dual Pipeline Hybrid application and do not give rise to any new or materially different effects to those reported in the Revised ES 2024. All committed mitigation can continue to be effectively applied.

The proposed changes should, therefore, be considered as a Non-Material Amendment to the approved Dual Pipeline planning application APP/24/00405 consent under Section 96A of the Town and Country Planning Act.

Appendix B: Sweco Piling Assessment

Technical Note

Project Name: Havant Thicket Reservoir Pipeline	Author: Adam Ford MSc CEng MOA MAES
Project Reference: 65209354	Date: 24/09/2026
ACO Technical Lead: Helen Makewell	Document Reference: 65209354-SWE-ZZ-XX-T-U-0003 Revision: C01

Rev.	Date	Reason for issue	Prepared	Reviewed	Approved
C01	24/09/2026	First Issue	AF 23/09/2026	HM 23/09/2026	HA 23/09/2026

Havant Thicket Reservoir Pipeline NMA – Review of Noise Impacts from Revised Piling Strategy

1 Introduction

Sweco UK (Acoustics) has been instructed by Ward & Burke Ltd ('WAB', the Principal Contractor), on behalf of Portsmouth Water, to provide acoustic consultancy support for the proposed construction of a new water pipeline adjoining the new Havant Thicket Reservoir to Bedhampton Pumping Station. The proposed pipeline has been granted planning permission by the Local Authority, Havant Borough Council ('HBC'), under application reference APP/24/00405 (Decision Notice dated 22 September 2025).

Following progression of the detailed design, a revised piling strategy has been proposed for Shaft 6 and the Emergency Discharge shaft ('Shaft ED'). These changes, along with a wider proposal to use integrated Concrete Pressure Pipe (CPP) instead of the currently consented ductile iron pipework within concrete tunnel, has resulted in a requirement for an application for Non-Material Amendment ('NMA') to be prepared.

Following a pre-application consultation, comments have been received from the Environmental Health Officer ('EHO') requiring that:

"a further noise Technical Note (TN) quantifying the change in noise impact at affected receptors from the increase in piling at the ED Chamber and Shaft 6. The TN should identify any changes in noise levels experienced, duration of impacts, whether any additional receptors are expected to experience higher noise impacts, and whether the changes result in more receptors meeting eligibility criteria for Noise Insulation or Temporary Rehousing."

Accordingly, this Technical Note aims to address and satisfy the EHO comments relating to piling noise impacts. The proposed change in pipework construction is not anticipated to have any effect on the noise and vibration emissions resulting from the construction of the scheme and so is not discussed further in this document.

This report should be read in conjunction with, the 'Havant Thicket Main Pipeline Works Non-Material Amendment Technical Note' prepared by WAB (reference HTR-WAB-PI-ZZ-TN-W-0016 Rev S4-P01, dated 21 May 2026) and the 'Environmental Statement Volume

2 – Main Report Revised Chapter 12 Noise & Vibration’ (‘ESNV’) (and supporting appendices) prepared by AtkinsRealis¹.

2 Summary of Consented Piling Works and Proposed Amendments

The consented piling works at Shaft 6 and Shaft ED (as assessed in the ESNV) were to be delivered using primarily vibratory piling techniques, with works expected to last no more than 5 days at each location (ESNV Table 12-23). Works were to be completed during standard daytime hours only.

Following detailed design, the proposed piling strategy at Shaft 6 and Shaft ED can be summarised as follows:

- **Shaft 6:** Majority of works now to be completed using silent² piling, with an approximate ratio of 80% silent to 20% vibratory. The works will occur during standard daytime hours over a period of up to seven days.
- **Shaft ED:** Majority of works now to be completed using silent piling, with an approximate ratio of 95% silent to 5% vibratory. The works will occur during standard daytime hours over a period of up to 15 days.

Figure 1 presents the consented (left) and proposed (right) piling alignments and extents for Shaft 6. Figure 2 presents the consented (left) and proposed (right) piling alignments and extents for Shaft ED.

In both cases, it can be seen that the proposed piling will occur in approximately the same location as the consented scheme; accordingly, any changes in noise impact will be primarily a result of the amended equipment noise emissions rather than changes in proximity or propagation.

¹ AtkinsRealis (2024). HTR-ATK-ZZ-ZZ-RP-Z-0112 Revision C04 (14/05/2024) Havant Thicket Reservoir Project Environmental Statement Volume 2 – Main Report Revised Chapter 12 Noise and Vibration HTR-ATK-ZZ-ZZ-RP-Z-0112 Revision C04 (14/05/2024). AtkinsRealis.

² Silent piling, or hydraulic jacking, comprises a technique by which piles are sunk through the constant application of pressure rather than percussive or vibratory drivers. As such, the acoustic emissions (both noise and vibration) are considerably lower than with other piling methods.

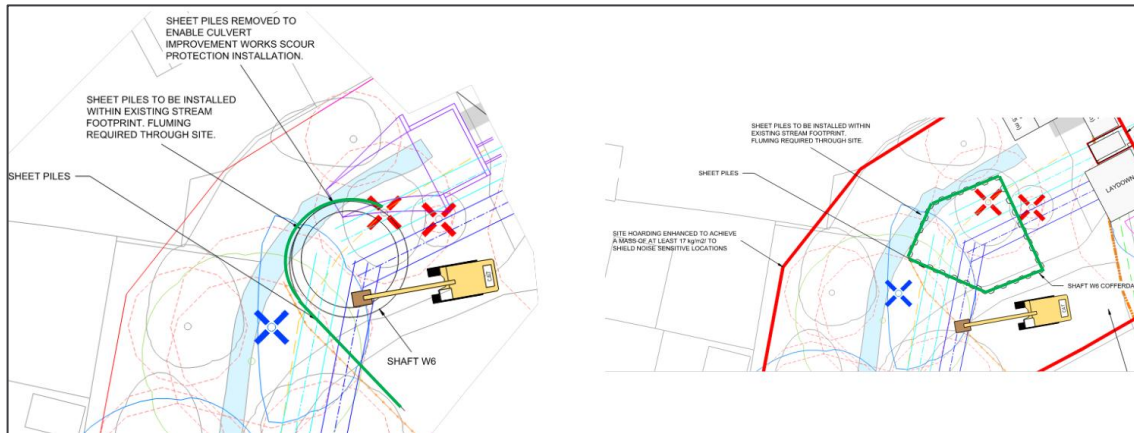


Figure 1: Shaft 6 piling extents shown in green. Consented (left) and proposed (right). Taken from Figure 4 of the WAB NMA Technical Note (2026).

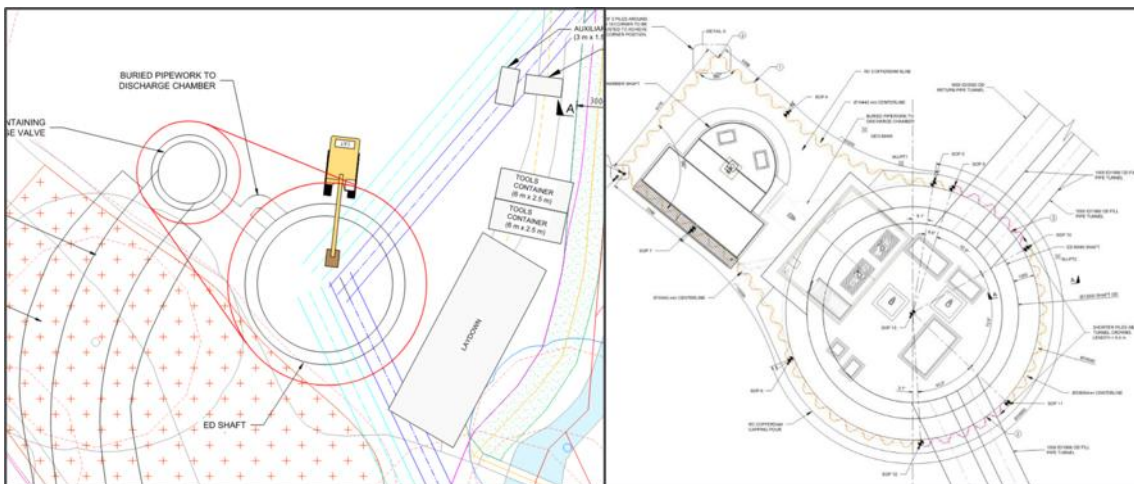


Figure 2: Shaft ED piling extents. Consented (left, shown in red) and proposed (right, shown in orange and red). Left drawing provided by WAB, right drawing taken from Figure 3 of the WAB NMA Technical Note (2026).

3 Piling Noise & Vibration Effects - Consented Scheme

3.1 Significance Thresholds

The ESNV prepared by AtkinsRealis presented an assessment of construction noise and vibration effects for the consented scheme, including the consideration of vibratory piling at Shaft 6 and Shaft ED.

As part of this assessment, construction noise and vibration thresholds for significant effects vibration were defined as follows:

- **Noise:** Significant effects would occur during daytime works where construction noise exceeds 65 dB $L_{Aeq,T}$ for a period of 10 days in any consecutive 15, or 40 days in any consecutive 6 months.
- **Vibration:** Significant effects would occur where peak particle velocity (PPV) levels exceeded 3 mm/s.

These established thresholds have been adopted in this Technical Note.

3.2 Noise Effects of the Consented Scheme

The ESNV identified that potentially significant effects may be expected at receptors located within 78m from the piling works, with Table 12-19 reporting potential significant effects at up to 45 No. residential receptors surrounding Shaft ED, and up to 74 No. residential receptors surrounding Shaft 6. However, the ESNV stated that piling works were not considered as resulting in significant effects as the works were to occur for no more than 5 days, which did not meet the defined temporal criteria for significance.

No receptor-specific noise levels are reported within the ESNV for the piling works and so Sweco UK have undertaken supplementary calculations to determine the noise levels resulting from the consented piling activities to allow for comparison with the proposed scheme. These are presented in Table 1. Calculations have been undertaken on the basis of the site-specific piling sound levels presented in Appendix A12.5 of the ESNV for vibratory piling (82.8 dB $L_{Aeq,T}$ at 10m).

Table 1: Construction Noise Levels at Receptors from Vibratory Piling (Consented Scheme) – Shaft 6 and ED

Works location	Closest identified receptor and distance from works	Vibratory piling activity level, dB $L_{Aeq,T}$ at 10m	Receptor noise level (free-field), dB $L_{Aeq,T}$
Shaft 6	45 Dunsbury Way, ≈ 8m	82.8	84.7
Shaft ED	43 Corhampton Crescent, ≈ 55m	82.8	68

Note: the resultant receptor noise levels presented above consider the contributions from piling activities only. All other site works which may be occurring simultaneously are understood to be remaining as per the consented development and so have not been considered in this evaluation.

3.3 Vibration Effects of the Consented Scheme

Table 12-23 of the ESNV identified that no exceedances over the defined vibration significance threshold were anticipated at receptors surrounding Shaft ED due to piling works. 6 No. exceedances were expected at receptors surrounding Shaft 6, primarily on Dunsbury Way. However, the ESNV concluded that significant vibration effects were not expected due to the short duration of the consented piling activities (ESNV paragraph 12.260).

As above, no receptor-specific vibration levels are reported within the ESNV and so supplementary calculations have been undertaken to determine the vibration levels expected at the worst-affected receptor off Dunsbury Way to allow for comparison with the proposed scheme. Calculations have been undertaken on the basis of a 33.3% confidence interval for vibratory piling as applied in the ESNV.

The external vibration level at the worst-affected receptor to Shaft 6 has been predicted as **approximately 8 mm/s PPV**.

4 Piling Noise & Vibration Effects - Proposed Scheme

4.1 Overview

An assessment of the noise and vibration effects expected from the proposed amended piling strategy has been undertaken to support the NMA application.

For consistency and ease of comparison, this assessment utilises the same information sources, assessment procedures and significance thresholds as presented in the ESNV for the consented scheme. The only difference is the method of piling, where silent piling has been considered compared to vibratory piling in the consented scheme.

Typical noise emission levels for silent piling methods have been taken from Table C.3 of BS 5228-1, item 9, “*sheet steel piling - hydraulic jacking*”. The operational noise level for this technique is stated as 63 dB $L_{Aeq,T}$ at 10m, approximately 20 dB lower than the vibratory piling noise level considered within the ESNV.

4.2 Noise Effects of the Proposed Scheme

Table 2 presents the predicted sound pressure level at the nearest receptors to each piling location during the silent piling works.

Table 2: Construction Noise Levels at Receptors from Silent Piling (Proposed Scheme) – Shaft 6 and ED			
Works location	Closest identified receptor and distance from works	Silent piling activity level, dB $L_{Aeq,T}$ at 10m	Receptor noise level (free-field), dB $L_{Aeq,T}$
Shaft 6	45 Dunsbury Way, ≈ 8m	63	65
Shaft ED	43 Corhampton Crescent, ≈ 55m	63	48

Note: the resultant receptor noise levels presented above consider the contributions from piling activities only. All other site works which may be occurring simultaneously are understood to be remaining as per the consented development and so have not been considered in this evaluation.

Table 2 demonstrates that the resultant receptor noise levels anticipated during the proposed silent piling operations will be substantially lower than those expected during the consented vibratory piling works (refer to Table 1). Table 2 also demonstrates that, even in the worst-cases, the significance thresholds for construction noise defined in the ESNV (65 dB $L_{Aeq,T}$) will not be exceeded at the closest receptors.

Accordingly, no significant effects, or increased impacts compared to those presented in the ESNV, are anticipated as a result of the proposed amended piling strategy at either shaft location.

With regard to the small proportion of vibrational piling that is still required to facilitate the works, (approximately 20% at Shaft 6 and 5% at Shaft ED), the associated short-term noise impacts will be no greater than those already reported within the ESNV for the consented development as the works will occur in approximately the same location.

4.3 Vibration Effects of the Proposed Scheme

Silent piling techniques do not generate any reported vibration emissions.

Accordingly, there will be no significant effects as a result of the proposed silent piling methods.

With regard to the small proportion of vibrational piling that is still required to facilitate the works, (approximately 20% at Shaft 6 and 5% at Shaft ED), the associated short-term vibration impacts will be no greater than those already reported within the ESNV for the consented development as the works will occur in approximately the same location.

4.4 Implications on Eligibility for Noise Insulation and Temporary Relhousing

The assessment presented above demonstrates that the proposed amended piling strategy will result in significantly reduced noise and vibration emissions to surrounding receptors. As such, no additional receptors will meet the eligibility criteria for Noise Insulation or Temporary Relhousing ('NITR') for this scheme.

5 Conclusion

Sweco UK (Acoustics) has been instructed by WAB to provide an evaluation of the changes in noise and vibration impact that may arise as a result of the amended piling strategies proposed at the consented Havant Thicket Reservoir Pipeline works.

This Technical Note presents a summary of the proposed changes in piling methods and alignments, the noise and vibration effects identified within the ESNV for the consented development, and a review of resultant impacts associated with the proposed amendments.

It has been demonstrated that both the noise and vibration emissions associated with the proposed amendments will be substantially lower than those expected under the consented scheme and that no significant effects are as expected as a result of piling activities.

As such, noise and vibration as a result of piling activities should not pose a material constraint to the construction of the Havant Thicket Pipeline scheme.