

Hampshire Water Transfer and Water Recycling Project



Scheme Development Summary
Public Consultation 2022



from
**Southern
Water** 

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1. Introduction

1.1. Background

This document summarises the development of Southern Water's Strategic Resource Option, now known as the 'Hampshire Water Transfer and Water Recycling Project' (the Project), from the public consultation that took place in February to April 2021 (the Spring 2021 consultation) to our 2022 consultation in July and August 2022 (the 2022 consultation).

As a result of abstraction licence changes on the rivers Test and Itchen, and the ecological risk that long-term reliance on drought permits and drought orders could pose to these rare and protected habitats, we have entered into an operating agreement with the Environment Agency (under Section 20 of the Water Resources Act 1991). This enables us to continue to meet our water supply duty until we develop alternative water resource solutions for our western supply area in Hampshire.

Our Water Resource Management Plan 2019 was prepared to meet a 1-in-200 year drought level of resilience, which forecast an overall water resource deficit in the western supply area of around 192 million litres per day (Ml/d) by 2030. Our plan sets out how we will meet this deficit through a number of leakage and demand reduction measures, and through the development of several new supply solutions, including a long-term and large-scale water resource solution.

The preferred long-term water resource solution, or 'Base Case' identified in the plan for the western supply area was a 75 Ml/d desalination plant at Fawley in the New Forest. As an adaptive plan, our Water Resource Management Plan 2019 also considered a number of strategic alternative options in parallel with the preferred solution. Our principal alternative to the Fawley desalination scheme specified in the plan was an indirect water re-use scheme (also referred to as water recycling) utilising the lower River Itchen as an environmental buffer.

Following the Price Review 19 final determination and the creation of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) 'gated process', we were required to consider a number of additional alternative schemes that were not specifically included in our Water Resource Management Plan 2019. In particular, certain water recycling options were considered, including the use of an environmental buffer (such as the creation of new lakes and wetlands to store recycled water) near to Otterbourne Water Supply Works and the enhanced use of the Havant Thicket reservoir, which is under development by Portsmouth Water on our behalf.

At the first stage of RAPID's gated process, known as Gate 1, we presented a range of options including desalination, water recycling, water transfers including enhanced use of the Havant Thicket Reservoir. Since Gate 1, we undertook a robust options appraisal process to test the options still under consideration using a range of criteria informed by environmental and planning policy, as well as legal and deliverability objectives. We also took into account known risks to our supply demand balance and undertook a future needs assessment. Regard was also had to feedback received both through consultation and through engagement with stakeholders.

From February to April 2021, Southern Water carried out a public consultation which focused primarily on Option A.1 (the desalination Base Case), but also introduced the alternatives. There were nine options and they are outlined in detail in Table 1 in Section 2.

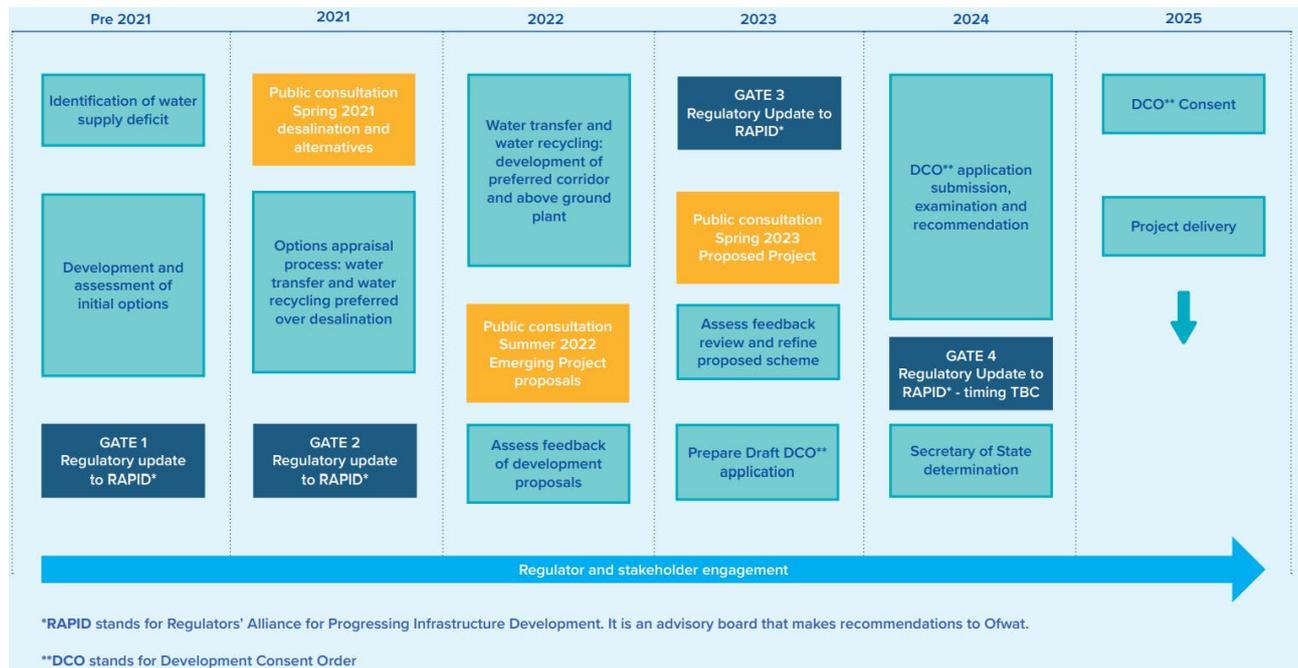
In September 2021, we provided an Interim Update to RAPID highlighting that the desalination options at Fawley had the potential to result in adverse environmental impacts, with these options ranked the lowest out of all the options considered. Our Interim Update confirmed that the desalination option at Fawley, nor

any of the other desalination options, would be progressed any further. Regulators and other statutory bodies were engaged as part of the options appraisal process and support for this approach was provided by both the Environment Agency and RAPID.

In December 2021, as part of our Gate 2 submission to RAPID, we presented the outputs of our full options appraisal process. The highest-ranking option, referred to as Option B4 and confirmed then as our new selected option, involved a combination of both water transfer and water recycling technology – now known as the Hampshire Water Transfer and Water Recycling Project.

Figure 1 provides a timeline for key project milestones.

Figure 1 - Key milestone timeline



1.2. Purpose

The purpose of this document is to summarise the evolution of options since our Spring 2021 consultation and provide an overview of the decision-making and scheme development processes that resulted in the selection and subsequent development of the preferred option that is now being consulted on as part of our 2022 consultation.

2. Stage 1: Development and Assessment of Initial Options

2.1. Options Presented at Gate 1

Table 1 details the strategic resource options that Southern Water submitted at Gate 1 to RAPID and were then subject to consultation in Spring 2021. This comprised the Base Case and eight strategic alternatives.

At Gate 1, we also submitted a joint proposal with Wessex Water and Bristol Water to RAPID for a regional water transfer scheme called ‘West Country North Sources and Transfer’. This scheme was not considered as an alternative to the Base Case as it could not deliver water supplies to address our forecast deficit by 2027. It was therefore not included in the Spring 2021 consultation.

Table 1 – Gate 1 Options

Configuration Type	Option No.	Option Description
Desalination	A.1 (Base Case)	75 MI/d of drinking water produced by desalination plant in the Fawley area supplying the Hampshire Southampton West Water Resource Zone, with the interface between the new and existing distribution system located at Testwood Water Supply Works.
	A.2	61 MI/d of drinking water produced by desalination plant in the Fawley area supplying the Hampshire Southampton West Water Resource Zone, with the interface between the new and existing distribution system located at Testwood Water Supply Works.
	D.1	Proposed to provide 40 MI/d desalinated water for dedicated industrial use at an existing large coastal industrial facility. The existing 30 MI/d supplied by South West Water to this facility was then intended to be released and redirected to Southern Water at Testwood Water Supply Works and re-purposed for drinking water supply. The remaining existing 10 MI/d supplied by Southern Water to this facility was then intended to be released and redirected to Testwood Water Supply Works and re-purposed for drinking water supply The option is supplemented by an additional 40 MI/d water recycling plant utilising treated wastewater from Budds Farm Wastewater Treatment Works. This option provides a cumulative 81 MI/d when both the desalination and water recycling components are operating at full capacity.
Water Recycling	B.1	Budds Farm Wastewater Treatment Works transfer to new 61 MI/d water recycling plant. Bulk transfer to Lower Itchen and a new 61 MI/d abstraction from the Lower Itchen. Water is then transferred for treatment at Otterbourne Water Supply Works.
	B.2	Budds Farm Wastewater Treatment Works transfer to new 61 MI/d water recycling plant. Bulk transfer to a new constructed and lined environmental buffer. Abstraction and transfer for treatment at Otterbourne Water Supply Works.
	B.3	Budds Farm Wastewater Treatment Works transfer to new 61 MI/d water recycling plant. Direct transfer direct to Otterbourne Water Supply Works for treatment.
	B.4	Budds Farm Wastewater Treatment Works transfer to new 61 MI/d water recycling plant. Transfer to Havant Thicket Reservoir which acts as an environmental buffer, then 75 MI/d direct raw water transfer to Otterbourne Water Supply Works for treatment. .

Configuration Type	Option No.	Option Description
	B.5	Peel Common Wastewater Treatment Works and Budds Farm Wastewater Treatment Works transfer to a new 75 MI/d water recycling plant. Bulk transfer to a lake that provides an environmental buffer at Otterbourne Water Supply Works for treatment.
Water Transfer	D.2	61 MI/d raw water transfer from the Havant Thicket Reservoir to Otterbourne Water Supply Works for treatment.

2.2. Post-Gate 1 Assessment

We progressed each of the options detailed in Table 1 beyond Gate 1 and the Spring 2021 consultation to further understand and assess their feasibility. Three of the Options presented at Gate 1 were not continued to Gate 2, and as such were not taken forward to the options appraisal process.

Option B.1 was an alternative option to the 75 MI/d desalination plant in Fawley that was included in our Water Resources Management Plan 2019. However, we stopped progressing it after Gate 1 following the Water Services Regulation Authority’s (Ofwat - the body responsible for the regulation of the water industry) decision not to fund further investigations as part of its Gate 1 Final Decision. This was due to environmental concerns about the impact of the recycled water release on the integrity of the River Itchen Special Area of Conservation and the scheme’s ability to meet the resource deficit.

Option D.1 was discontinued in July 2021. Part of this option relies on a South West Water abstraction from the River Avon, which is a chalk stream that already has significant pressures on its abstractions. This meant there would be uncertainty in being able to rely on the 30 MI/d supply from South West Water. Additionally, the cost of supply for the desalination element of this option was potentially commercially unviable as it would require a considerable increase in the cost of supplying the industrial facility compared to their existing commercial arrangements. These risks made it too unreliable to be a genuine alternative to the desalination Base Case in the context of the urgent need to meet the supply deficit.

Option B.3 was also discontinued in July 2021. Option B.3 was a direct water recycling solution which did not involve the transfer of recycled water to an environmental buffer before the transfer to the supply works. Direct water recycling is currently not in use in the UK and is a relatively new approach, with around four plants in operation around the world. Significant further work and lead in time would be required to build regulatory acceptance, public support, and operational experience around this new approach, and until this has been completed, we are focusing on an indirect water recycling solution. Option B.3 only allowed for direct recycling, meaning that it was not considered preferable to the desalination Base Case, particularly in the context of the urgent need to meet the supply deficit.

Further modelling of Option B.4 during late 2021 indicated a reduction in the required output of the water recycling plant from 61 MI/d to 15 MI/d. A water recycling plant delivering 61 MI/d in combination with the Havant Thicket Reservoir transfer was shown at the time to be oversized to meet the 1-in-200-year drought scenario.

Table 2 presents the options taken forward to the options appraisal process presented at Gate 2. The options that were not progressed into the options appraisal process after Gate 1 are highlighted in red.

Table 2 - Options taken forward to Gate 2

Configuration Type	Option No.
Desalination	A.1
	A.2
	D.1 – Not progressed
Water Recycling	B.1 – Not progressed
	B.2
	B.3 – Not progressed
	B.4
	B.5
Water Transfer	D.2

3. Stage 2: Options Appraisal Process

3.1. Introduction

The options appraisal process considered the various scheme options to identify a preferred option and a back-up option in order to inform our Gate 2 submission to RAPID. A back-up option was selected to mitigate potential delivery risks associated with the delivery of the preferred option.

It was important that the process was robust so that an appropriate option was selected, having regard to relevant planning policy tests. The process was developed in consultation with stakeholders and was undertaken by qualified individuals. The process was iterative and comprised:

- Site and route selection
- Consenting evaluation
- Multi-Criteria Decision Analysis
- Assessment against legal and policy objectives
- Assessment against Water for Life Hampshire strategic objectives
- Interim Business Evaluation
- Future Needs Assessment
- Final Business Evaluation

3.2. Site and Route Selection

This section provides an overview of the site and route selection stage. The outcome of this stage was the identification of the best performing sites and pipeline route configurations to be used by each option. Options fall into three groupings as follows;

- **Desalination:** for Options A.1 and A.2;
- **Water Recycling:** for Options B.2, B.4 and B.5; and
- **Water Transfer:** for Options B.4 and D.2. (Note Option B4 is a combination of both water transfer and water recycling technologies)

To identify the best performing sites and routes, a site selection process considered the performance of sites and routes against engineering, environmental and planning criteria. The process was as follows:

- Determination of a search area for the components of each option;
- Identification of terrestrial and marine sites (if required) based on initial physical and technical requirements;
- Appraisal of these sites against nearby sensitive receptors;
- Review of major development proposals and compatibility with each site;
- Assessment against relevant planning policies, and engineering criteria;
- The refinement of initial pipeline route options; and
- Evaluation of the individual components to identify a selected configuration.

The route selection involved a further assessment of the initial pipeline routes presented at Gate 1 and the Spring 2021 consultation. These initial pipeline routes had been identified having regard to environmental constraints and relevant planning policy. The best performing initial pipeline routes were identified and combined with the best performing sites to form configurations for each option. These configurations then progressed to the next stage of the options appraisal process for further assessment. It should be noted that we are not currently consulting on these initial pipeline routes, but we are consulting on the pipeline corridor

that has been developed using the best performing initial pipeline routes as the starting point, as described in Section 4.

The following sections provide an overview of the route and site selection.

3.2.1. Desalination

The desalination solution related to two options: Options A.1 and A.2. The infrastructure required for these options comprised:

- Terrestrial desalination plant;
- Terrestrial intake pumping station
- Marine intake; and
- Marine outfall.

In our Water Resource Management Plan 2019, we presented the Base Case as our preferred solution to the water supply deficit. The Base Case comprised a 75 Ml/d desalination plant at Ashlett Creek near Fawley, an abstraction from the existing Fawley Deep Dock, four potential discharge points and four initial pipeline routes from the desalination plant to Testwood Water Supply Works.

The RAPID gated process required us to assess alternatives to the Base Case, and therefore this section presents the process that we undertook to identify and assess those alternatives. The site selection process started with the identification of a search envelope for the terrestrial desalination plant, terrestrial intake pumping station, marine intake and marine outfall. Sites for the required infrastructure were then identified. Table 3 details the criteria for the terrestrial sites and Table 4 details the criteria for the marine sites.

The search area between two points along the South Coast was identified for the terrestrial sites:

- The western extent of the search area was located at Bournemouth to allow potential connectivity with the Knapp Mill Water Supply Works to Testwood Water Supply Works pipeline;
- The eastern extent of the search area was located at Eastney, which could potentially provide connectivity to Testwood Water Supply Works without crossing National Parks;

A search area for the terrestrial sites was drawn 5 km from the coastline between the western and eastern extent. Future rates of coastal erosion were also considered to ensure that infrastructure was not located in potentially vulnerable locations.

The search area for the marine sites was 800 metres from the coastline parallel to the terrestrial search area as it was considered the maximum distance for the operation of the required equipment. This distance would also be preferable from a construction and cost perspective.

Terrestrial and marine sites were identified within the search zones. Table 3 details the criteria for identifying terrestrial sites and Table 4 details the criteria for identifying marine sites.

Table 3 - Criteria for terrestrial desalination sites

Element	Details
Land Use	Avoidance of the following areas: <ul style="list-style-type: none"> ■ Densely populated residential areas, private residences, car homes, hospitals, schools, universities, places of worship, burial grounds, holiday parks, hotels, retail parks and leisure parks; ■ Key transport infrastructure; and ■ Key utilities.
Land Conditions	Avoidance of the following land conditions: <ul style="list-style-type: none"> ■ Marsh;

Element	Details
	<ul style="list-style-type: none"> ■ Mudflat; ■ Cliff face; and ■ Open water.
Site Size	<p>61 Ml/d Desalination Plant (Option A.2) - Minimum of 40,470 m² + 4,047 m² for construction</p> <p>75 Ml/d Desalination Plant (Option A.1) – Minimum of 48,564 m² + 4,047 m² for construction</p>

Table 4 - Criteria for marine desalination sites

Element	Details
Water Depth (intake)	Minimum water depth at end of intake 3 m at lowest astronomical tide
Hydrodynamics and Water Depth (outfall)	Areas where there is a minimum average current speed of 0.3 m/s and a minimum mean lowest astronomical tide of 5 m.
Marine Spatial Allocations	<p>Avoidance of the following areas:</p> <ul style="list-style-type: none"> ■ Anchorage areas; ■ Disposal and dredging areas; and ■ Naval base exclusion zones

The application of the above search area and criteria resulted in the identification of 159 terrestrial sites, 38 marine intake sites and 15 marine outfall sites. These are shown in Figure 2.

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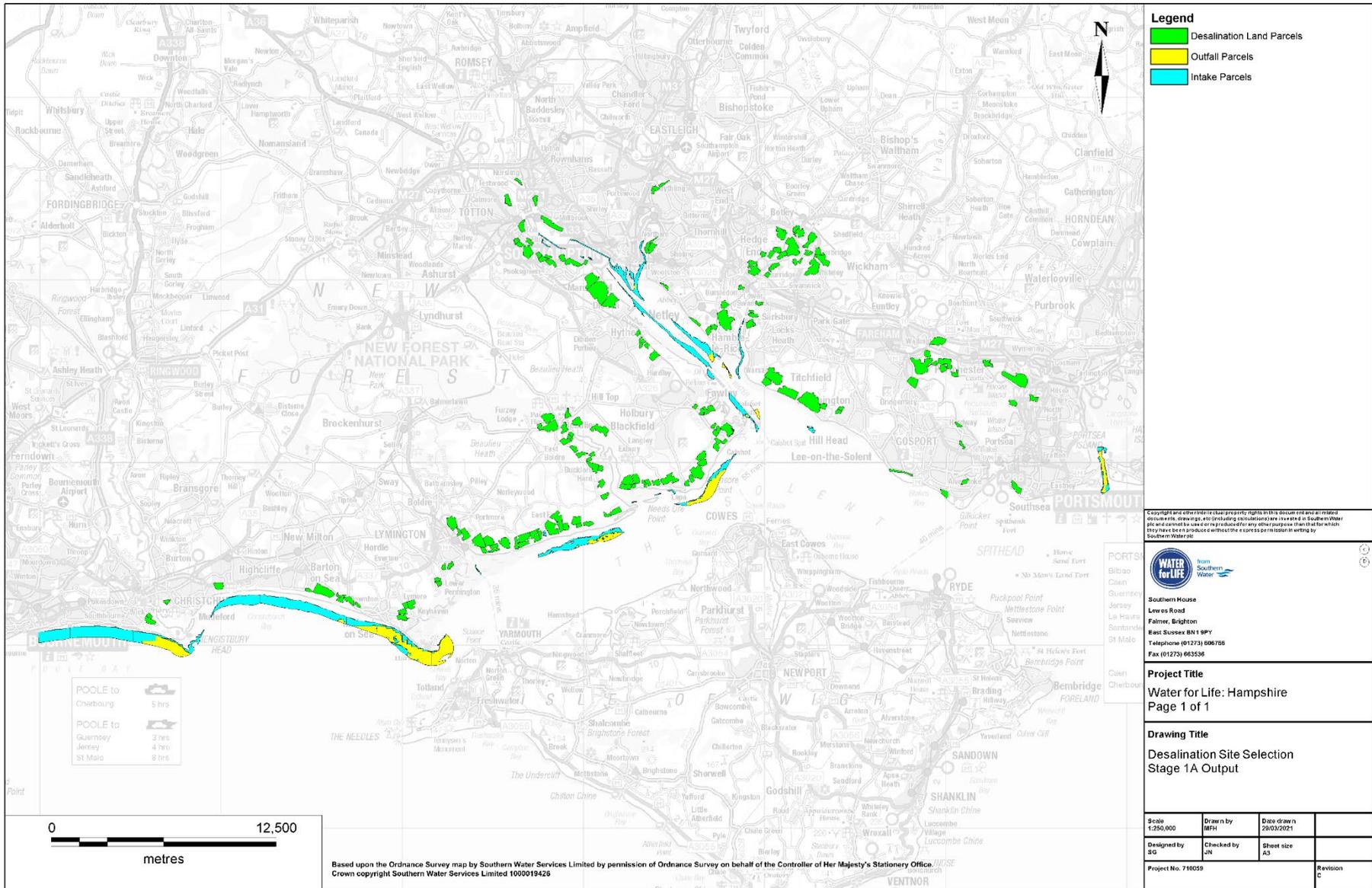


Figure 2 - Identified terrestrial and marine desalination sites

Long List of Sites

This stage aimed to refine the long list of 159 terrestrial sites, 38 marine intake sites and 15 marine outfall sites into a short list. To create a short list of terrestrial sites, an 800m buffer was created around each of the marine intake sites as a result of the technical limits of equipment associated with the intake for the desalination plant. Any sites outside of the buffer were discounted as they would be unviable from a technical perspective given the distances. This refinement process resulted in the progression of 54 terrestrial sites, 26 marine intake sites and 14 marine outfall sites.

These sites were then grouped into clusters to form viable configurations that do not have large distances between the components. These sites are split across five broad geographical clusters named A, B, C, D and E, the western extent being Christchurch (A) and the eastern extent Hill Head (E).

These sites were then assessed against a set of planning considerations to identify a short list of sites. For the terrestrial sites, these included proximity to planning designations such as:

- Special Areas of Conservation / Ramsar / Special Protection Area (including potential and candidate sites);
- Site of Special Scientific Interest / National Nature Reserve;
- Scheduled Monuments;
- National Parks / Areas of Outstanding Natural Beauty / Green Belt;
- Ancient Woodland;
- Grade 1 and 2* Registered Parks and Gardens and Listed Buildings and Battlefield Sites;
- Residential (noise/vibration and air quality impact);
- Hospitals, Care Homes, Schools; and
- Amenity Spaces e.g., allotments, public parks, playgrounds, playing fields.

For the marine sites, these included:

- Special Area of Conservation / Ramsar / Special Protection Area (including potential and candidate sites);
- Site of Special Scientific Interest;
- Marine Conservation Zone;
- Scheduled Monuments;
- Marine Scheduled Monuments;
- Protected wrecks sites;
- Proximity to Residential receptors (noise / vibration and air quality impact); and
- Recreational Areas e.g. yachting, fishing and diving.

The 54 terrestrial sites, 26 marine intake sites and 14 marine outfall sites were assessed against the above criteria, and the five best performing sites for each component type (terrestrial, marine intake and marine outfall) for each cluster progressed to the short list stage. A total of 28 terrestrial sites, 19 marine intake sites and 13 marine outfall sites were identified for the short list, as shown in Figure 3.

Short List of Sites

The short list was assessed against environmental, planning and engineering considerations, such as flood risk, ground conditions, ground contamination, historic environment and transport accessibility. We also considered potential interactions with approved or accepted Development Consent Order applications made within 5 years, or developments screened or determined to be EIA developments or subject to Transport and Works Orders within 3 years.

Following this assessment, a total of 16 terrestrial sites, 15 marine intake sites and 11 marine outfall sites across the 5 clusters were progressed to the next stage of the site selection process.

An assessment against national policy was undertaken on the remaining clusters. The marine sites were near Special Areas of Conservation and Special Protection Areas. Therefore, clusters A, B, C, D and E had the potential for adverse effects to these ecological designations and therefore these options were considered to have greater potential environmental impacts than the Base Case. The aim of this site selection was to identify if there were any suitable alternatives to the Base Case. Given the potential impacts that the alternatives in clusters A, B, C, D and E would pose, these were not considered to be suitable alternatives. The Base Case was therefore taken forward for further assessment to identify a preferred configuration.

Assessment of Sites

Each individual component of the Base Case (desalination plant, intake and outfall infrastructure and initial pipeline routes) was considered in further detail. Table 5 details the component options for the Base Case that were then assessed. The potential options for the Base Case are shown in Figure 4.

Table 5 – Summary of Base Case component options

Solution	Terrestrial Site	Intake and Outfall (Marine)	Initial Pipeline Routes
Desalination	Ashlett Creek	<p>Fawley to Abstraction / Discharge Route 1 (intake from the existing Fawley Deep Dock and outfall most direct route to marine discharge site)</p> <p>Fawley to Abstraction Discharge Route 2 (Calshot Intake / Outfall) – note uses redundant Fawley Power Station water tunnels</p> <p>Fawley to Abstraction Discharge Route 3 (Lepe) (this option included a terrestrial intake pumping station)</p> <p>Fawley to Abstraction Discharge Route 4 (Lepe) (this option included a terrestrial intake pumping station)</p>	<p>Fawley to Testwood Route 1</p> <p>Fawley to Testwood Route 2</p> <p>Fawley to Testwood Route 4</p> <p>Fawley to Testwood Route SIA</p> <p>Initial pipeline route 3 was discounted prior to Stage 4 owing to significant engineering feasibility issues associated with the routeing along a live freight railway</p>

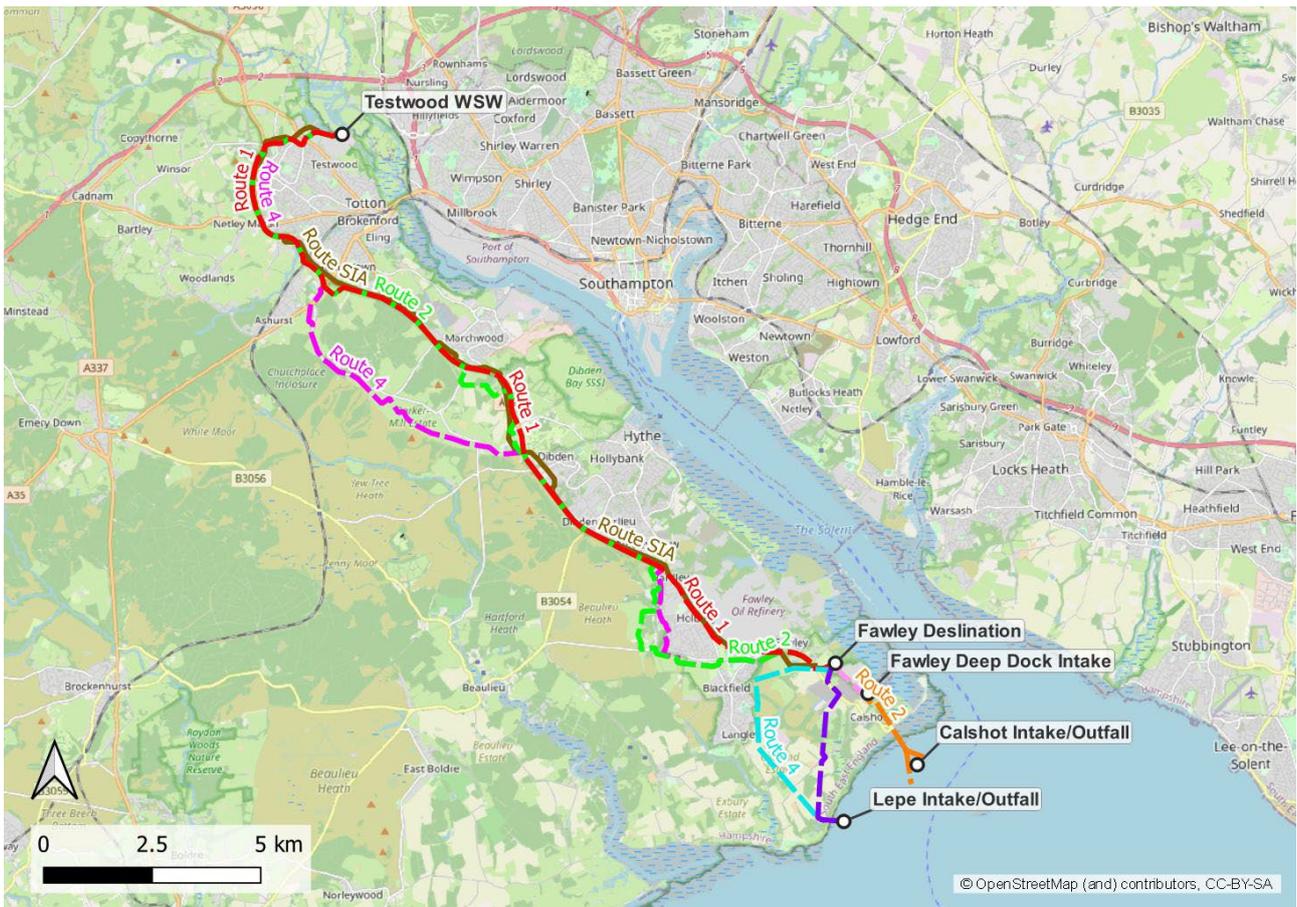


Figure 4 - Base Case site and route options

A more detailed assessment of the selected desalination option is summarised in Table 6, below.

Table 6 – Assessment of the preferred desalination option

Sub-Component	Environmental and Planning Considerations
Terrestrial Site	The site for the desalination plant was located within the National Park, which would be contrary to the Draft National Policy Statement for Water Resources Infrastructure (dNPS).
Marine Intake and Outfall (Lepe Option)	This option is located in close proximity to the Solent and Southampton Water Special Protection Area and Solent Maritime Special Area of Conservation and therefore had the potential to pose a significant adverse effect on the integrity of these sites. Such an option would be contrary to the dNPS unless it was demonstrated that there was no less damaging feasible alternative solution.
Marine Intake and Outfall (Calshot Option)	Further environmental information, especially in relation to potential to impact internationally designated ecological sites within the Solent, would be required to establish the potential for significant adverse effects on the integrity of these sites. In view of the potential to re-use existing infrastructure this, Option was considered preferable to the Lepe intake / outfall Option above, however there remained potential to impact the habitat that is functionally linked to the River Itchen Special Area of Conservation and River Test Site of Special Scientific Interest.

Sub-Component	Environmental and Planning Considerations
Initial Pipeline Routes (Four considered: 1, 2, 4 and SIA)	Initial pipeline routes 1 and 2 were likely to have fewer potential impacts on the New Forest National Park and other national level designations, although there remained significant challenges associated with the deliverability of these initial pipeline routes.

Conclusions

The assessment set out above determined that the Calshot marine intake / outfall options should be taken forward and the Lepe options discounted due to the potential of that option to pose significant adverse effects to designated sites. The desalination plant site at Ashlett Creek was progressed as this was the only remaining site for desalination. Regarding the initial pipeline routes, routes 1 and 2 were recommended to be included within the preferred configuration. These components were progressed for Option A.1 and A.2.

3.2.2. Water Recycling

The water recycling site and route selection related to Options B.2, B.4 and B.5. The following sections detail the considerations applied to the potential siting for the water recycling plant.

A terrestrial search area for the water recycling plant was determined by two factors:

- A search radius of 1.5 km around Budds Farm Wastewater Treatment Works. This distance was chosen by increasing the search area from Budds Farm Wastewater Treatment Works in 500m increments to identify a site that minimised pipeline distances and therefore carbon footprint.
- Areas of coastline susceptible to sea flooding and coastal erosion and where major infrastructure development would not be suitable.

Table 7 details the criteria used to determine suitability of sites within the 1.5km search area.

Table 7 - Site search criteria for water recycling

Element	Details
Land Use	Avoidance of the following areas: <ul style="list-style-type: none"> ■ Densely populated residential areas, private residences, care homes, hospitals, schools, universities, places of worship, burial grounds, holiday parks, hotels, retail parks and leisure parks; ■ Key transport infrastructure; and ■ Key Utilities.
Land Conditions	Avoidance of the following areas: <ul style="list-style-type: none"> ■ Marsh; ■ Mudflat; ■ Cliff face; and ■ Open water.
Site Size	61 Ml/d water recycling plant (Options B.2 and B.4) - Minimum of 40,470 m ² + 4,047 m ² for construction 75 Ml/d water recycling plant (Options B.5) – Minimum of 48,564 m ² + 4,047 m ² for construction

The application of the search area and search criteria resulted in the identification of 17 sites. These are shown in Figure 5.

● Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

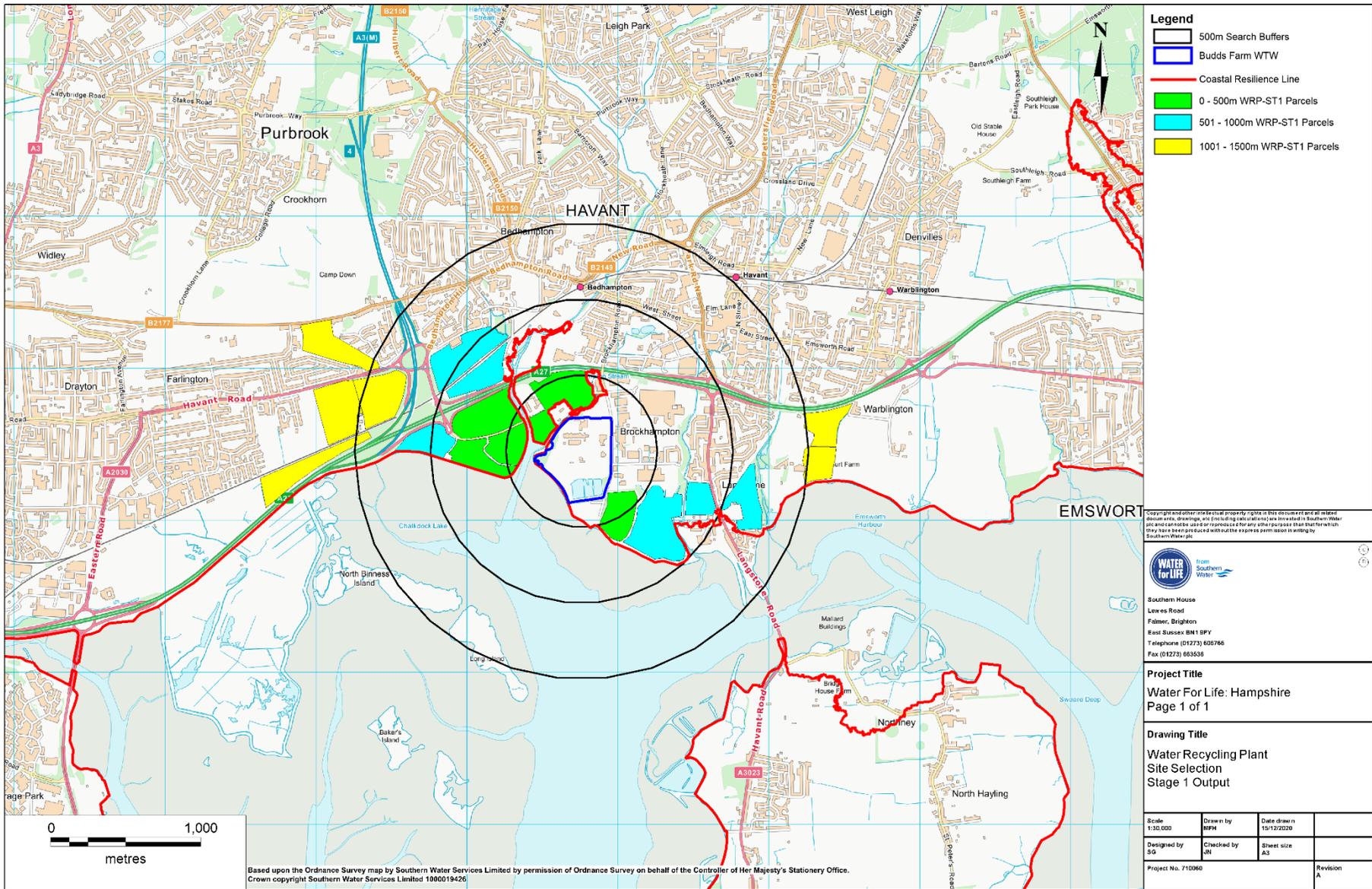


Figure 5 – Identified water recycling sites

Long List of Sites

The 17 sites were assessed against the same planning considerations as desalination options, outlined in Section 3.2.1. The sites were then considered in terms of their proximity to these designations, resulting in a short list of 7 best performing sites. Some sites did not progress because of their proximity to ecological sites in Langstone Harbour, and other sites were near residential areas.

Short List of Sites

The 7 short listed sites were assessed against additional environmental, planning and engineering considerations, such as flood risk, ground conditions, ground contamination, historic environment and transport accessibility. Approved or accepted Development Consent Order applications made within 5 years, or developments screened or determined to be EIA developments or subject to Transport and Works Orders within 3 years, were also taken into account. The 5 best performing sites progressed for further assessment and are shown in Figure 6.

● Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

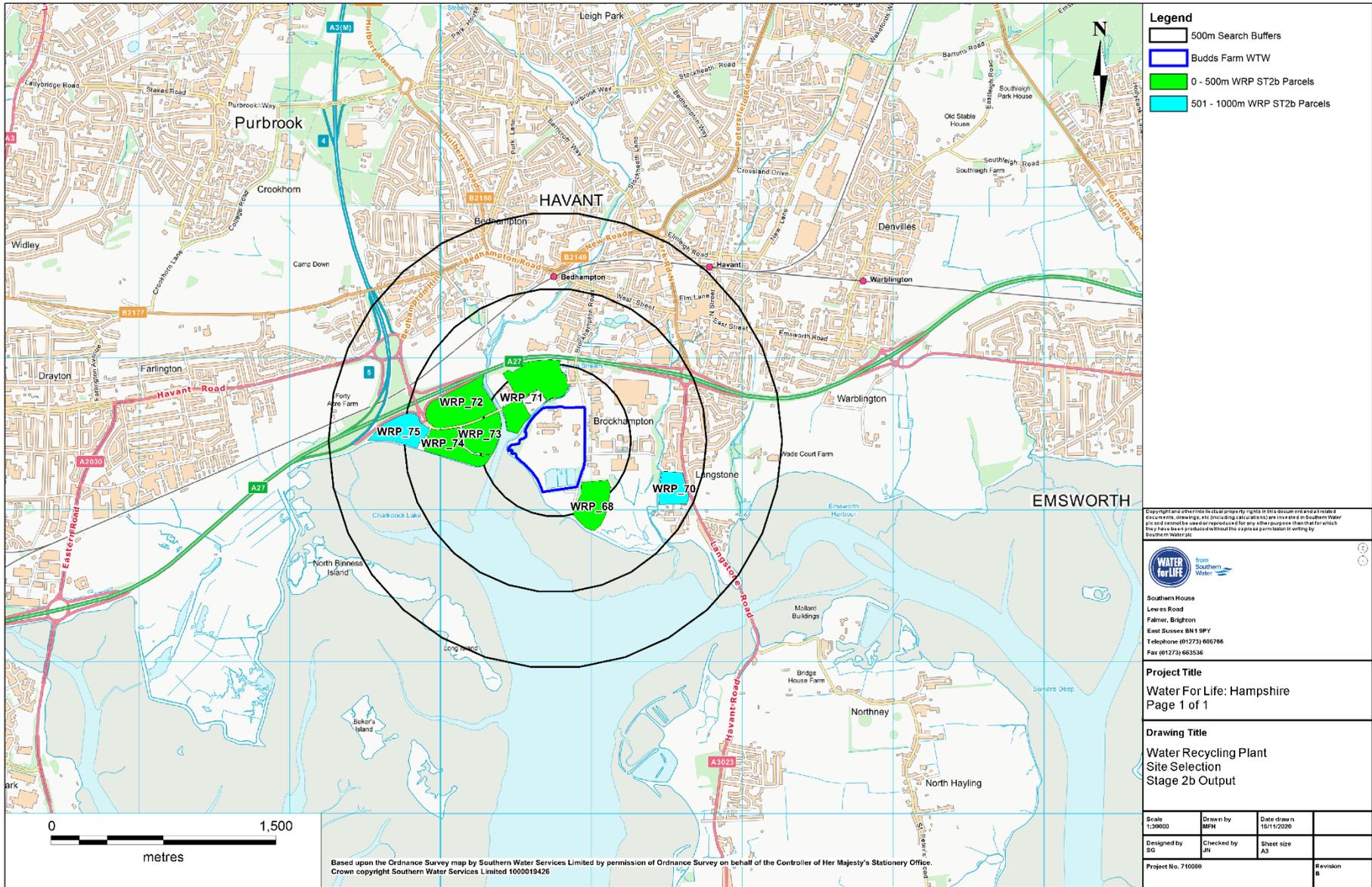


Figure 6 - Water recycling sites short list

Assessment of Sites

Each of the five shortlisted sites were assessed against environmental and planning considerations, as set out in Table 8.

Table 8 - Water recycling sites environmental and planning considerations

Site	Environmental and Planning Considerations
WRP_68	This site is adjacent to a Site of Importance for Nature Conservation and within a Secondary Support Area in the Solent and Waders Brent Goose Strategy. These ecological considerations limited this being a potentially suitable site.
WRP_70	This site is designated as a Secondary Support Area in the Solent and Waders Brent Goose Strategy. The site is also close to the AONB, existing industrial land uses and the A27. The Secondary Support Area and proximity to the AONB limited this being a potentially suitable site.
WRP_71	This site is allocated within the Havant Borough Council adopted Core Strategy (2011) and Allocations (2014) as a site suitable for employment and warehouse use. It is located in the Broadmarsh Industrial Area, which the Core Strategy identifies as potentially accommodating 16,300 square metres of new employment floorspace and between 233 and 452 jobs. The site is already developed and comprises existing / active warehousing and office uses. The use of this site would lead to a loss of employment land and a net loss of existing employment floor area. Whilst this would conflict with Local Plan policy, it could potentially provide a suitable site subject to land assembly. Existing infrastructure may also present engineering challenges for this site. There are no significant environmental constraints associated with this site.
WRP_72	The western part of the site is identified as a low use site in the Solent and Waders Brent Goose Strategy, which may require mitigation measures to be put in place. The site is designated as a 'gateway' employment site and outline planning permission was granted in June 2022 for a mix of employment uses (falling within use classes E, B2, B8). The site is also a former landfill site, which would require some mitigation measures to be put in place. The site was considered to be potentially suitable.
WRP_75	This site is designated as a Core Area in the Solent and Waders Brent Goose Strategy. This designation poses a significant constraint to future development on this site as this constitutes functional habitat associated with the Special Protection Area and Ramsar wetlands of the Solent Coast. This site was not considered to be suitable due to the resulting conflict with the dNPS for Water Resources Infrastructure.

On the basis of this assessment, sites WRP_71 and WRP_72 were identified as the most preferable sites. WRP_71, however, is already developed and comprises existing / active warehousing and office uses and is considered to be significantly more difficult to deliver and develop than WRP_72. WRP_72 has an outline

planning permission and is adjacent to ecologically sensitive receptors but there are no other impediments to delivery. It was therefore recommended that WRP_72 was taken forward.

Initial Pipeline Routes

The initial pipeline routes for water recycling identified at Gate 1 and presented in the Spring 2021 consultation are shown in Figure 7. These initial pipeline routes relate to Options B.2 and B.5¹.

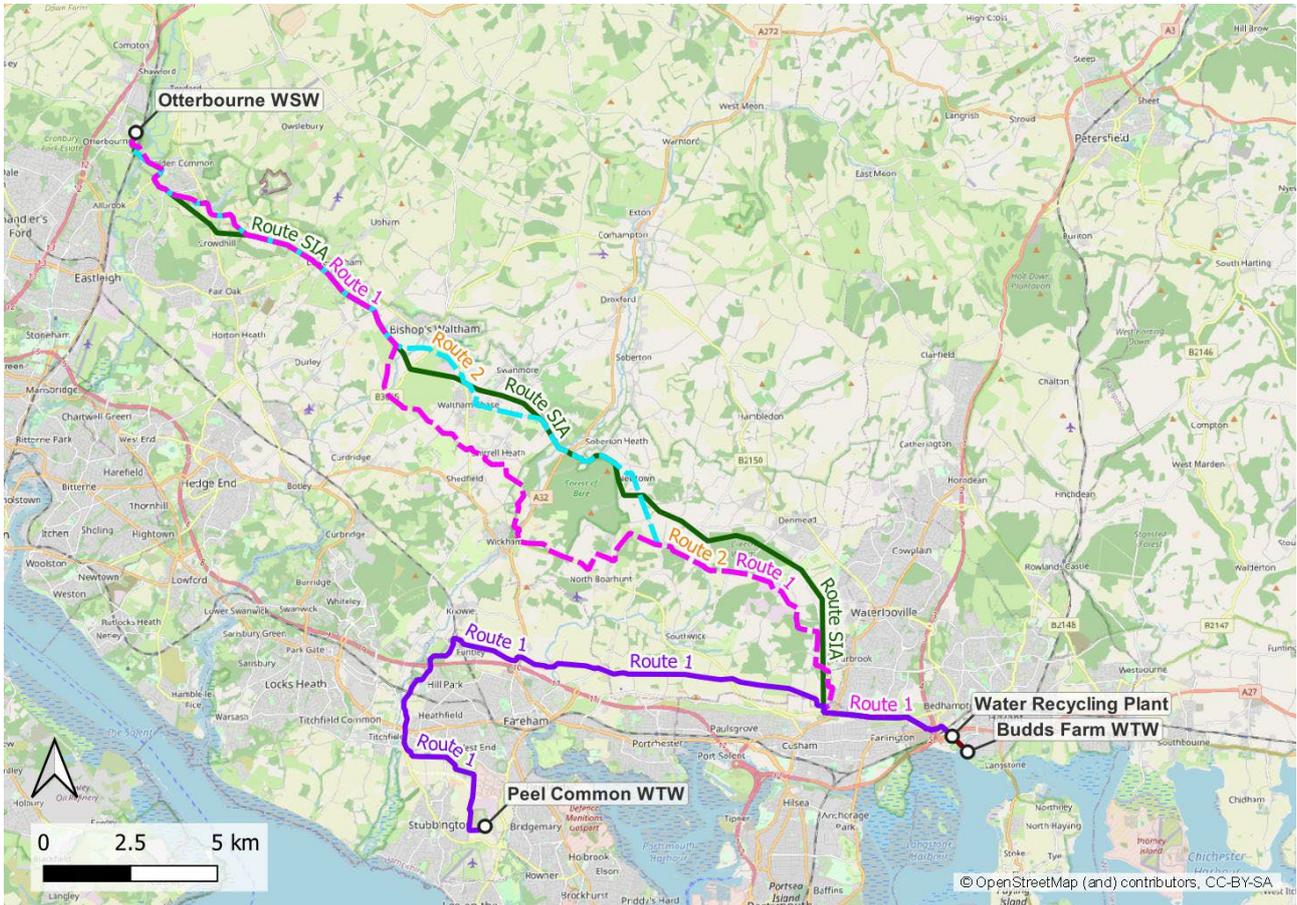


Figure 7 – Initial water recycling pipeline routes

Table 9 summarises the environmental and planning considerations for the initial pipeline routes for water recycling.

Table 9 - Water recycling initial pipeline routes environmental and planning considerations

Initial Pipeline Route	Environmental and planning considerations
Initial Pipeline Route 1	<p>Appropriate routing and mitigation for the crossing of the River Itchen Special Area of Conservation would be required.</p> <p>Potential effects on ancient woodland would require appropriate mitigation to avoid potentially unacceptable effects.</p> <p>The pipeline is within the National Park but would be underground. Future work would be needed to identify siting requirements for potential pumping stations.</p>

¹ Option B.4 combined water recycling with water transfer and therefore consists of an alternative set of initial pipeline routes. Options B.2 and B.5 do not utilise the Havant Thicket Reservoir.

Initial Pipeline Route	Environmental and planning considerations
Initial Pipeline Route 2	<p>Appropriate routing and mitigation for the crossing of the River Itchen Special Area of Conservation would be required.</p> <p>Potential effects on ancient woodland would require appropriate mitigation to avoid potentially unacceptable effects.</p> <p>The pipeline is within the National Park but would be underground. Future work would be needed to identify siting requirements for potential pumping stations.</p> <p>Appropriate routing would be required to reduce potential impacts on nationally designated cultural heritage features.</p>
Initial Pipeline Route SIA	<p>Appropriate routing and mitigation for the crossing of the River Itchen Special Area of Conservation would be required.</p> <p>Potential effects on ancient woodland would require appropriate mitigation to avoid potentially unacceptable effects.</p> <p>The pipeline is within the National Park but would be underground. Future work would be needed to identify siting requirements for potential pumping stations.</p>

All three initial pipelines route options performed in a comparable way and each needs to cross the River Itchen Special Area of Conservation prior to connecting into Otterbourne Water Supply Works. All routes would run partially through the South Downs National Park and would require appropriate siting to avoid impacts on ancient woodland. It was concluded that initial pipeline route 1 and initial pipeline route 2 would be progressed. This would provide optionality around the Forest of Bere to take a northern route using initial pipeline route 1 which further intersects the South Downs National Park, or a southern route outside of the National Park which would be longer.

WRP_72 and initial pipeline routes 1 and 2 were taken forward for Options B.2 and B.5. For Option B.4 which also includes the requirement for a water recycling plant, WRP_72 was also taken forward.

3.2.3. Water Transfer

Option B.4 comprises both water recycling (Option B.2) and water transfer (Option D.2) technology. The results presented for the water recycling plant sites for Option B.2 and Option B5 above apply equally to Option B.4. These are not considered further in this section. This section identifies the site for a high lift pumping station and initial pipeline routes between the Havant Thicket Reservoir and Otterbourne Water Supply Works for Options B.4 and D.2.

High Lift Pumping Station Site Selection

A search area for the high -lift pumping station was driven by the proximity to the Havant Thicket Reservoir. The search area was initially located to the west of the proposed reservoir.

Table 10 details the criteria used to identify suitable sites for the high lift pumping station.



Table 10 - Site search criteria for water transfer high lift pumping station

Element	Details
Land Use	<p>Avoidance of the following areas:</p> <ul style="list-style-type: none"> ■ Densely populated residential areas, private residences, care homes, hospitals, schools, universities, places of worship, burial grounds, holiday parks, hotels, retail parks and leisure parks; ■ Key transport infrastructure; and ■ Key Utilities.
Land Conditions	<p>Avoidance of the following areas:</p> <ul style="list-style-type: none"> ■ Marsh; ■ Mudflat; ■ Cliff face; and ■ Open water.
Site Size	6,341 m ² + 4,046 m ² for construction compound

The application of the search area and criteria resulted in the identification of 18 sites, shown in Figure 8.

Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

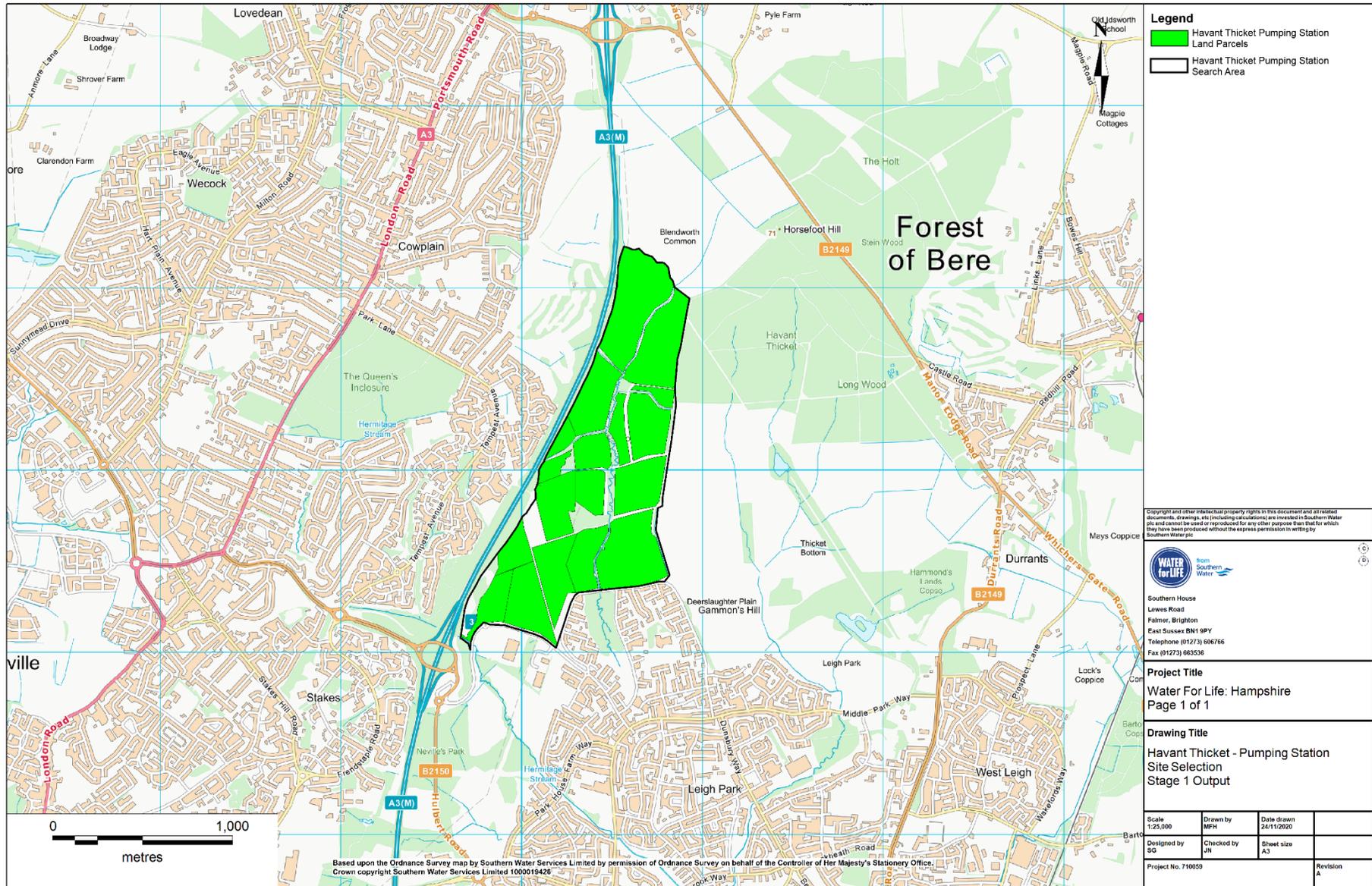


Figure 8 - Identified water transfer sites

Long List of Sites

The 18 sites were assessed against the same planning considerations as those used for desalination, outlined in Section 3.2.1. The sites were then considered in terms of their proximity to these designations:

The six best performing sites were progressed to the short list stage.

Short List of Sites

The six short listed sites were assessed against additional environmental, planning and engineering considerations, such as flood risk, ground conditions, ground contamination, historic environment and transport accessibility. Approved or accepted Development Consent Order applications made within 5 years, and developments screened or determined to be EIA developments as well as those subject to Transport and Works Orders within 3 years, were also taken into account. Two sites had the potential to conflict with a planned development and were therefore excluded from further consideration, and one site scored lower because of its inaccessibility and proximity to the South Downs National Park. The remaining three sites progressed for further assessment. These are shown in Figure 9.

Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

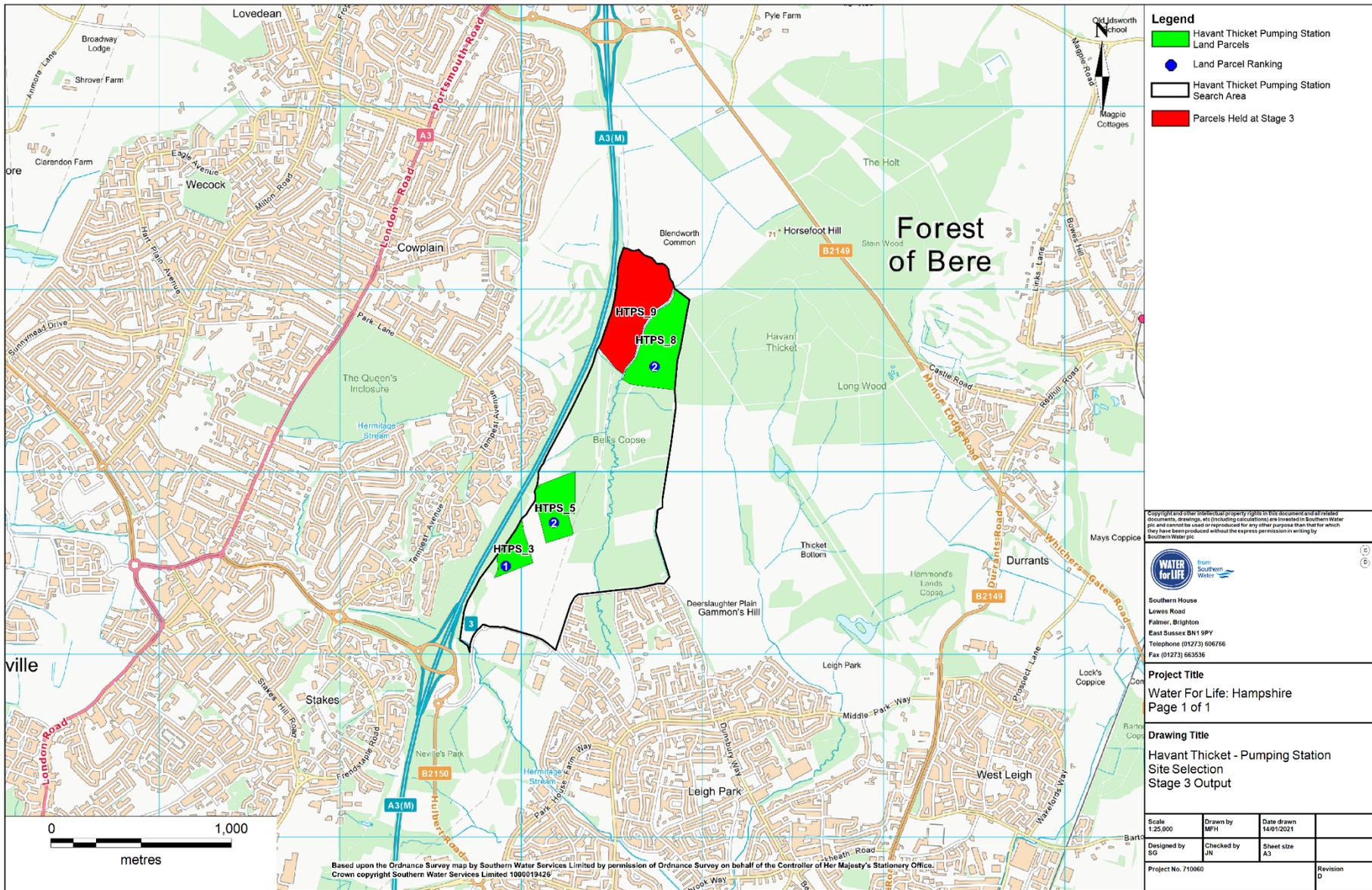


Figure 9 - Water transfer sites short list

Assessment of Sites

The three remaining sites were considered using further environmental, planning and engineering criteria, as summarised in Table 11.

Table 11 - Water transfer high lift pumping station sites environmental and planning considerations

Site	Environmental and planning considerations
HLPS_3	Bats associated with the Singleton and Cocking Tunnels Special Area of Conservation are understood to be linked to bat populations recorded within the Havant Thicket reservoir site and surrounding areas. There is therefore potential for impacts to habitats functionally linked to the Special Area of Conservation. This site is also a habitat mitigation site for the adjacent Dunsbury Park development. There would be a need for further investigation of the potential mitigation required to ensure no adverse effects on integrity of the Special Area of Conservation and there may be a need to find replacement land for the habitat mitigation associated with the Dunsbury Park mitigation site.
HLPS_5	There would be a need for further investigation of the potential mitigation required to ensure no adverse effects on integrity of the Special Area of Conservation. However, this site has the fewest anticipated environmental impacts, has no restrictive designations, and is not within the proposed replacement habitat for the Dunsbury Park development.
HLPS_8	As with HLPS_3, the bats present on the site are linked to the Special Area of Conservation and is therefore potential for impacts to habitats functionally linked to the Special Area of Conservation. There would be a need for further investigation of the potential mitigation required to ensure no adverse effects on integrity of the Special Area of Conservation. This site also lies immediately adjacent to an area of ancient, replanted woodland. The site is also located on the Blendworth Common (South) Site of Importance for Nature Conservation. This site is considered to have greater potential for significant adverse environmental impact, due to the proximity of ancient woodland and the designation of the site as a Site of Importance for Nature Conservation.

Site HLPS_8 was considered to have greater potential for significant environmental effects due to the proximity of ancient woodland and priority habitat as well as being designated a Site of Importance for Nature Conservation. HLPS_5 was considered to have the fewest potential environmental impacts and it is not designated as mitigation habitat for the Dunsbury Park development.

Initial Pipeline Routes

The initial pipelines routes presented at Gate 1 and the Spring 2021 consultation for the water transfer Option D.2 are shown in Figure 10.

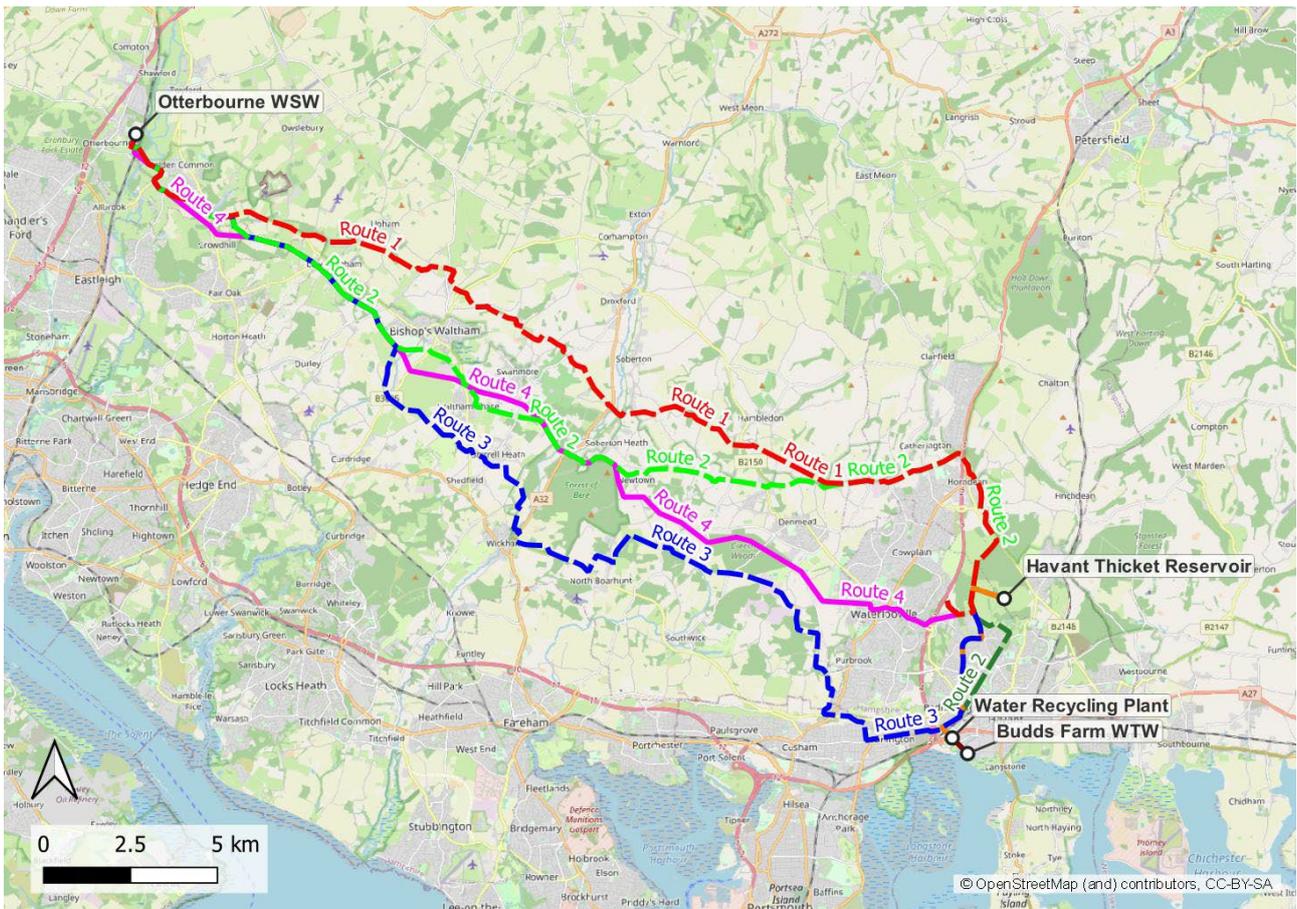


Figure 10 - Initial water transfer pipeline routes

Table 12 summarises the environmental and planning considerations for the initial pipeline routes for water transfer

Table 12 – Initial water transfer pipeline routes environmental and planning considerations

Initial Pipeline Route	Environmental and planning considerations
Initial Pipeline Route 1	<p>Appropriate routing and mitigation of watercourse crossings would be required to avoid potential impacts on the integrity of the Special Protection Area.</p> <p>Potential effects on ancient woodland would also need to be further assessed and appropriate mitigation implemented to avoid potentially unacceptable effects.</p> <p>Initial pipeline route 1 would have a significantly impact on the National Park and greater environmental impacts when compared to the other considered initial pipeline routes and was therefore not considered a preferred initial pipeline route.</p>
Initial Pipeline Route 2	<p>Appropriate routing and mitigation of watercourse crossings would be required to avoid potential impacts on the integrity of the Special Protection Area.</p> <p>Potential effects on ancient woodland would also need to be considered further and appropriate mitigation implemented to avoid likely unacceptable effects.</p> <p>There would be a potentially greater impact on ancient woodland associated with</p>

Initial Pipeline Route	Environmental and planning considerations
	<p>this initial pipeline route owing to the routing north along the edge of Staunton Country Park.</p> <p>This initial pipeline route would have the least impact on the South Downs National Park and would have fewer environmental impacts from a landscape perspective compared to initial pipeline route 1.</p>
Initial Pipeline Route 3	<p>Appropriate routeing and mitigation of watercourse crossings would be required to avoid potential impacts on the integrity of the Special Protection Area.</p> <p>Potential effects on ancient woodland would also need to be considered further and appropriate mitigation implemented to avoid potentially unacceptable effects. The environmental impact associated with this initial pipeline option is considered to be lower than for initial pipeline routes 1 and 2, including the potential impact on ancient woodland.</p> <p>This initial pipeline route would have a limited impact on the South Downs National Park and would have fewer environmental impacts from a landscape perspective compared to initial pipeline route 1.</p>
Initial Pipeline Route 4	<p>Appropriate routeing and mitigation of watercourse crossings would be required to avoid potential impacts on the integrity of the Special Protection Area.</p> <p>Effects on ancient woodland would also need to be considered further and appropriate mitigation implemented to avoid potentially unacceptable effects.</p> <p>This initial pipeline route would have a limited impact on the South Downs National Park and would have fewer environmental impacts from a landscape perspective compared to initial pipeline route 1.</p>

All initial pipeline routes considered at this stage in the process would intersect the South Downs National Park. However, initial pipeline route 1 would have a significantly greater impact than the other initial pipeline routes. Therefore, it was not considered a preferred option in view of the availability of other alternatives. All initial pipeline routes considered at this stage have potential to impact on the Special Protection Area associated with the crossings of designated watercourses. As such, all routes would require appropriate design of the crossings to avoid impacts to the integrity of the Special Protection Area where possible. All options have the potential to affect areas of ancient woodland, with initial pipelines routes 1 and 2 potentially having a greater impact on ancient woodland when they are in proximity to the northern edge of Staunton Country Park.

Two routes from the water recycling plant to Havant Thicket Reservoir were also considered. The risks associated with these routes were similar. Both routes would potentially impact ancient woodland although this would be possible to mitigate through the type of construction technique. Both routes would also have an interface with Staunton Country Park which is a grade II* listed park and garden. There were no significant differentiators or reasons why both routes should not be progressed.

Following this evaluation, it was recommended that initial pipelines routes 3 and 4 should be progressed and initial pipeline routes 1 and 2 between the water recycling plant and Havant Thicket Reservoir should be taken forward.

Outcomes for B.4

The outcome of the site selection process recommended that the following components were taken forward:

- Site WRP_72;
- Initial pipeline route 3 and initial pipeline route 4 to connect Havant Thicket Reservoir to Otterbourne Water Supply Works;
- Site HLPS_5 (as a baseline only against which future alternative locations, if different, can be compared against and original assumptions and judgements reviewed accordingly);
- Both potential initial pipeline routes between the water recycling plant and Havant Thicket Reservoir.

Outcomes for D.2

The outcome of the site selection process recommended that the following components were taken forward:

- Initial pipeline route 3 and initial pipeline route 4 to connect Havant Thicket Reservoir to Otterbourne Water Supply Works; and
- Site HLPS_5 (as a baseline only against which future alternative locations, if different can be compared against and original assumptions and judgements reviewed accordingly).

3.3. Consenting Evaluation

A consenting evaluation was undertaken for the selected configurations using criteria informed by:

- Policy tests set out in the Draft National Policy Statement (dNPS) for Water Resources Infrastructure (November 2018)
- National Planning Policy Framework (2021) (NPPF)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Habitat Regulations)
- Marine Policy Statement (2011)
- Marine Plans (South Inshore and South Offshore) (2018)

The consenting evaluation criteria and sub-criteria are detailed in Table 13.

Table 13 - Consenting evaluation criteria

Criterion	Sub-criteria
Air Quality and Emissions	<ul style="list-style-type: none"> ■ Dust ■ Vehicular emissions ■ Odour
Biodiversity and Nature Conservation Terrestrial (International)	<ul style="list-style-type: none"> ■ Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest, Ramsar sites and all potential, possible and candidate sites ■ Functionally linked habitat
Biodiversity and Nature Conservation Terrestrial (National)	<ul style="list-style-type: none"> ■ Nationally designated sites ■ Priority habitats ■ Ancient woodland and veteran trees
Biodiversity and Nature Conservation Marine – Habitats Regulation Assessment	<ul style="list-style-type: none"> ■ Special Areas of Conservation, Special Protection Areas, Ramsar and all potential, possible and candidate sites ■ Functionally linked habitat
Biodiversity and Nature Conservation Marine	<ul style="list-style-type: none"> ■ Nationally designated sites ■ Impact on priority habitats

Criterion	Sub-criteria
Carbon	<ul style="list-style-type: none"> ■ Embodied carbon ■ Carbon emissions
Coastal Change / processes	<ul style="list-style-type: none"> ■ Impact on coastal processes (coastal erosion / deposition)
Geology and Soils	<ul style="list-style-type: none"> ■ Designated sites ■ Soil resource ■ Risk of mobilisation of contaminants
Historic Environment – Terrestrial	<ul style="list-style-type: none"> ■ Heritage assets ■ Unknown archaeology (impact on areas of archaeological potential)
Historic Environment – Marine	<ul style="list-style-type: none"> ■ Heritage assets ■ Unknown archaeology (impact on areas of archaeological potential)
Landscape / Seascape and Townscape and Visual Amenity	<ul style="list-style-type: none"> ■ Nationally and regionally important sites ■ Visual amenity
Major accidents and disasters	<ul style="list-style-type: none"> ■ Risks associated with existing facilities ■ Risks associated with the operation of the plant itself
Resource and waste management	<ul style="list-style-type: none"> ■ Waste generation ■ Waste facilities / infrastructure ■ Impact on Mineral Safeguarding Areas ■ Proximity to licensed dredging, disposal and extraction areas
Socio-economic impact	<ul style="list-style-type: none"> ■ Impacts on Public Rights of Way and recreational facilities ■ Impact on community facilities ■ Impact on marine recreation ■ Impact on commercial fisheries ■ Impact on licensing areas
Traffic and Transport	<ul style="list-style-type: none"> ■ Impact on shipping and navigation ■ Impact on marine vessel users ■ Impact on road and rail network ■ Impact on road users
Water Quality and Resources	<ul style="list-style-type: none"> ■ Impact on marine water quality ■ Impact on terrestrial water quality ■ Impact on watercourse geomorphology and hydrology ■ Impact on groundwater resources
Flood Risk	<ul style="list-style-type: none"> ■ Impact on flood risk ■ Impact on flood defences
Interface with Future Development and Planning	<ul style="list-style-type: none"> ■ Risks associated with existing/future Nationally Significant Infrastructure Projects ■ Risks associated with 'other' development ■ Risks associated with compromising future marine development
Land Use (Special Category Land)	<ul style="list-style-type: none"> ■ Impact on Special Categories of Land
Green Belt	<ul style="list-style-type: none"> ■ Impact on Green Belt
Technology and compliance with regulatory approvals	<ul style="list-style-type: none"> ■ Technological viability ■ Ability to secure necessary regulatory permits and licences

Criterion	Sub-criteria
Constructability	<ul style="list-style-type: none"> ■ Construction risks ■ Construction timescales ■ Interfaces with utilities ■ Topography challenges
Resilience	<ul style="list-style-type: none"> ■ Likely resilience of the solution ■ Self-sufficiency of the solution
Cost	<ul style="list-style-type: none"> ■ Capital cost ■ Operational cost

The evaluation identified potential conflicts against the criteria during both construction and operation. It also identified the potential design and mitigation requirements that would need to be considered. Each option was RAG rated against each topic to determine deliverability in planning, environmental and engineering terms.

The main conclusions of the Consenting Evaluation were as follows:

- Options A.1 and A.2 were expected to give rise to significant effects on the integrity of multiple Special Protection Areas. The Habitat Regulations means that such an option would not be acceptable where there was a suitable alternative. These options could therefore not be considered to be preferable.
- Options B.2 and B.5 were considered to have fewer environmental impacts than Options A.1 and A.2 but impacts in relation to a required buffer lake would need to be reviewed further. Pipelines for these option routes would cross the River Itchen Special Area of Conservation. Any potential effects to the River Itchen would require mitigation to avoid adverse impacts on the integrity of the river.
- Option B.4, which does not require an EBL, would have fewer environmental impacts than Options B.2 / B.5 Pipelines for these option routes would cross the River Itchen Special Area of Conservation. Any potential effects to the River Itchen would require mitigation to avoid adverse impacts on the integrity of the river.
- Option D.2 was considered the best performing option within the Consenting Evaluation. Pipelines for these option routes would cross the River Itchen Special Area of Conservation. Any potential effects to the River Itchen would require mitigation to avoid adverse impacts on the integrity of the river. Further analysis is needed about the ability of D.2 to meet the long-term supply duty during drought conditions and to provide a sufficient level of long-term resilience.
- Further work is needed in respect of Options D.2 / B.4 in relation to:
 1. Crossing the River Itchen Special Area of Conservation;
 2. Seeking to minimise and avoid impacts on the South Downs National Park;
 3. Avoiding and minimising effects on ancient woodland;
 4. Avoiding and reducing impacts on heritage assets; and
 5. Further refinement of the design of the intermediate pumping stations and break pressure tanks.

The outcomes and ranking of the consenting evaluation process is summarised in Table 14, below.

Table 14 - Consenting evaluation outcomes

Consenting Evaluation Ranking	Option	Consenting Evaluation Outcomes
1	D.2	<ul style="list-style-type: none"> ■ Has fewest environmental impacts. ■ Potential to impact the River Itchen Special Area of Conservation at the crossing points with the pipeline route. It is considered likely that significant adverse effects to the integrity of the Special Area of Conservation can be avoided through a design and engineering solution. ■ The pipeline routes would run partly through the South Downs National Park and there is a need for further engagement with the South Downs National Park Authority and further route development to minimise impact. ■ There is potential for effects on ancient woodland that need to be further considered and avoided where practicable. ■ Further work is needed to define the location and siting of the break pressure tank and intermediate pumping station.
2	B.4	<ul style="list-style-type: none"> ■ This has fewer environmental impacts than A.1 / A.2 and would not lead to the same marine impacts, or significant adverse effects to the integrity of the Solent and Dorset Coast Special Protection Area. It has fewer environmental impacts than Options B.2 / B.5. ■ Potential to impact the River Itchen Special Area of Conservation at the crossing points with the pipeline route. It is considered likely that significant adverse effects to the integrity of the Special Area of Conservation can be avoided through a design and engineering solution. ■ The pipeline routes would run partly through the South Downs National Park and there is a need for further engagement with the South Downs National Park Authority and further route development to minimise impact. ■ There is potential for effects on ancient woodland that need to be further considered and avoided where practicable. ■ Further work is needed to define the location and siting of the break pressure tank and intermediate pumping station.
3	B.2	<ul style="list-style-type: none"> ■ This has fewer environmental impacts than A.1 / A.2 and would not lead to the same marine impacts, or significant adverse effects to the integrity of the Special Protection Area. ■ Potential to impact the River Itchen Special Area of Conservation at the crossing points with the pipeline route. It is considered likely that significant adverse effects to the integrity of the Special Area of Conservation can be avoided through a design and engineering solution. ■ The pipeline routes would run partly through the South Downs National Park and there is a need for further engagement with the South Downs National Park Authority and further route development to minimise impact. ■ There is potential for effects on ancient woodland that need to be further considered and avoided where practicable. ■ The Otterbourne EBL has the potential to affect the integrity of the River Itchen Special Area of Conservation during construction and during operation as a result of the emergency discharge. As the level of design development is at an early stage, on a precautionary basis an adverse effect on integrity cannot be ruled out. However, it is likely that mitigation measures, supported by further design / modelling evidence will allow significant adverse effects to be avoided.

Consenting Evaluation Ranking	Option	Consenting Evaluation Outcomes
		<ul style="list-style-type: none"> ■ The Otterbourne EBL would need to be subject to further assessment post Gate 2 in parallel to further work in relation to the risks to the River Itchen Special Area of Conservation. ■ Further work is needed to define the location and siting of the break pressure tank and intermediate pumping station. ■ Initial modelling indicated that no risk or pathway to Langstone Harbour designations was expected.
3	B.5	<ul style="list-style-type: none"> ■ The infrastructure required for Option B.5 would be the same as for Option B.2 with the exception of the additional connecting pipeline between Peel Common and the water recycling plant. ■ Whilst the construction of the additional length of pipeline would increase the number of potentially affected receptors for certain planning topics, the level of planning risk for each of the topics would be the same as reported for Option B.2. ■ Further work is needed to define the location and siting of the break pressure tank and intermediate pumping station. ■ There are potential benefits on the water environment associated with B.5 as some flows would be diverted from the Peel Common Wastewater Treatment Works Long Sea Outfall which is a less well mixed environment than the Eastney Long Sea Outfall.
5	A.1	<ul style="list-style-type: none"> ■ A.1 would lead to a range of significant environmental impacts, including the potential to harm the integrity of a Special Protection Area, and is not considered preferable, as there are other options that would lead to fewer impacts. ■ The location of the terrestrial site for desalination within the New Forest National Park and the likely significant landscape and visual impacts would be in conflict with the dNPS. ■ There is potential for direct and indirect effects on ancient woodland and the New Forest Site of Special Scientific Interest that need to be further considered and avoided. ■ Significant constructability and traffic and transport risks related to construction in the Hythe Bypass. ■ Potential for direct impacts on nationally designated heritage assets. ■ Production of solid waste as a result of the desalination process that would presently need to be landfilled and therefore make achieving waste hierarchy requirements and non-compliance with zero to waste landfill policies difficult.
5	A.2	<ul style="list-style-type: none"> ■ Refer to the summary for A.1.

3.4. Multi-Criteria Decision Analysis

Economic appraisal helps decision-makers to consider how well an investment or intervention performs when considering its impacts on ‘economic wellbeing’ or ‘public value’ from the perspective of customers, the wider UK population (individuals, households, businesses) and the environment (collectively referred to as ‘economic benefits’), relative to the costs of delivering that investment or intervention. These impacts can be measured in either monetary or non-monetary terms, in line with best practice guidance from our regulators and from the UK Government.



The Water Resources Planning Guideline² defines a best value plan as one that:

- Considers factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society;
- Is efficient and affordable to deliver, legally compliant and accounts for the range of legislation that applies to it; and
- And where the outcome of increased benefits will be typically measured relative to the 'least cost' programme that delivers the minimum requirements to meet supply duties.

We used the multi-criteria decision analysis to inform our assessment of the relative performance of the options against best value as part of the overall options appraisal process. The aim of the multi-criteria decision analysis was to provide an overall ranking of options.

The methodology used for the multi-criteria decision analysis comprised of three key strands of activity:

- Consideration of best practice guidance on the economic appraisal of resilience plans and infrastructure investments against best value, and specifically the appraisal of different types of customer, environmental, social and cost impacts associated with major infrastructure projects;
- Development of a comprehensive best value appraisal framework which, using 23 best value criteria, enabled a consistent assessment of the relative performance of the options in terms of their net social impact, their cost to deliver, and the balance between these two factors; and
- Extensive scenario analysis to consider the sensitivity of the results to different views on the relative importance (weighting) of the different criteria within Southern Water's best value appraisal framework, based on HM Treasury Green Book guidance on switching values, considering the different factors within net social impact, cost, and again the balance between the two.

Following the development of the 23 best value criteria, and the application of the importance weighting to these, the sub criteria were summarised into five best value 'lenses'. These five lenses are:

- Best Value Ranking 1: Whole life cost;
- Best Value Ranking 2: Average affordability;
- Best Value Ranking 3: Net social impact;
- Best Value Ranking 4: Net social impact relative to whole life cost; and
- Best Value Ranking 5: Net social impact relative to affordability.

The outcomes of the multi-criteria decision analysis provided a ranking of the options against these five best value lenses.

A breakdown of how the options performed against each best value lens is shown in Table 15.

Table 15 - Multi-Criteria Decision Analysis best value lenses breakdown

Option	Best Value Ranking				
	1: Whole Life Cost	2: Average Affordability	3: Net Social Impact	4: Net Social Impact Relative to Whole Life Cost	5: Net Social Impact Relative to Affordability
A.1	5	5	5	5	5
A.2	5	5	6	6	6
B.2	3	3	4	4	4
B.4	2	2	3	2	2
B.5	4	4	2	3	3
D.2	1	1	1	1	1

² Environment Agency, Natural England and Ofwat, Water Resources Planning Guideline, July 2021, Section 9.1

The ranking of the options following the multi-criteria decision analysis is shown in Table 16.

Table 16 - Multi-Criteria Decision Analysis ranking

Option	Multi-Criteria Decision Analysis Ranking
A.1	5
A.2	5
B.2	3
B.4	3
B.5	3
D.2	1

3.5. Legal and Policy Objectives

The options were assessed against the legal and policy objectives using a RAG rating defined as follows:

- **RED:** Based on the available information the option does not meet and would not be expected to meet the relevant objectives;
- **AMBER:** based on the available information there is a risk that the option may not meet, or may not fully meet, the relevant objectives or that significant known or expected barriers would need to be overcome in order for it to meet or fully meet the relevant objectives; and
- **GREEN:** based on the available information the option is considered to mainly or fully meet the objectives.

The ranking of the options from the legal and policy objectives review are shown in Table 17.

Table 17 - Legal and Policy Obligations ranking

Option	Legal and Policy Obligations Ranking
A.1	Red
A.2	Red
B.2	Amber
B.4	Amber
B.5	Amber
D.2	Amber

3.6. Water for Life Hampshire Strategic Objectives

To assess the options against the Water for Life Hampshire strategic objectives, a matrix was prepared to capture the strategic objectives of the project. The matrix is shown in Table 18.

Table 18 - Matrix of Water for Life Hampshire Strategic Objectives

Strategic Objective	Definition	Purpose
Best Value	Southern Water will deliver solutions which provide the best value to its customers whilst discharging Southern Water’s ‘all best endeavours’ legal obligation in the Section 20 agreement and all other legal and policy requirements and obligations.	To ensure a fundable plan (acceptable to Ofwat)



Strategic Objective	Definition	Purpose
Net Zero Carbon	Southern Water will deliver solutions which ensure that it can continue to make progress towards meeting, and to support and contribute to, Water UK’s commitment to become net zero carbon by 2030.	To meet industry-wide commitments
Adaptability	<p>Southern Water will ensure that all projects within the Programme are sustainable by being flexible and adaptable, including in terms of their:</p> <ol style="list-style-type: none"> 1. Capacity and scalability; 2. Ability to contribute to strategic reinforcement of the regional and national network; 3. Ability to rely on appropriate transitional measures to manage risks around delivery timescales; and 4. Ability to allow for technological innovation. 	To ensure suitability to meeting long term water supply requirements and therefore sustainability of supply

The options were assessed against the Water for Life Hampshire strategic objectives matrix using a RAG rating defined as follows:

- **RED:** Based on the available information the option does not meet and would not be expected to meet the relevant objectives;
- **AMBER:** based on the available information there is a risk that the option may not meet, or may not fully meet, the relevant objectives or that significant known or expected barriers would need to be overcome in order for it to meet or fully meet the relevant objectives; and
- **GREEN:** based on the available information the option is considered to mainly or fully meet the objectives.

The ranking of the options from the Water for Life Hampshire strategic objectives review are shown in Table 19.

Table 19 - Water for Life Hampshire strategic objectives ranking

Option	Water for Life Hampshire Strategic Objectives Ranking		
	Best Value	Net Zero Carbon	Adaptability
A.1	Red	Amber	Amber
A.2	Red	Amber	Amber
B.2	Amber	Amber	Amber
B.4	Amber	Amber	Green
B.5	Amber	Amber	Amber
D.2	Green	Amber	Green



3.7. Interim Business Evaluation

The overall ranking of the options appraisal process at the interim business evaluation stage is shown in Table 20.

Table 20 - Overall ranking of the Options Appraisal Process

Option	Overall Ranking
D.2	1
B.4	2
B.2	3
B.5	4
A.1	=5
A.2	=5

In summary:

- Options D.2 and B.4 were ranked 1st and 2nd respectively, with Option D.2 considered the most favourable option as it had a lower capital cost. Options D.2 and B.4 are also considered the most adaptable and able to meet future needs, on account of the flexibility and evolvability afforded by their integration with Havant Thicket Reservoir;
- Options B.2 and B.5 were ranked 3rd and 4th respectively, with neither option being evaluated as favourably under the ‘adaptability’ criteria as Options D.2 and B.4; and
- Option A.1 and A.2 would lead to a range of significant environmental impacts, including the potential to harm the integrity of a Special Protection Area. Therefore, they are not considered preferable, as there are other options that would lead to fewer impacts. These Options were therefore ranked the joint 5th and least favoured options. It was recommended that they should not be progressed beyond Gate 2.

Following the options appraisal process, Option D.2 was ranked the highest. Options A.1 and A.2 were not progressed following the interim business evaluation.

3.8. Future Needs Assessment

An assessment was undertaken to establish whether the options could meet the needs of a larger supply deficit given the water supply challenges faced in Hampshire. This tested whether the required capacity of the options could be expanded to meet a supply deficit of 87 MI/d. Table 21 outlines a revised ranking of the options when this updated capacity requirement is applied to the options that progressed from the interim business evaluation stage of the process.

Table 21 - Overall ranking of the options appraisal process revised to meet the updated deficit

Option	Overall Ranking	Resolves Revised 87 MI/d Deficit?
B.4	1	✓
B.5	2	✓
B.2	=3	✗
D.2	=3	✗

Options B.2 and D.2 were not capable of meeting the updated deficit and could not be amended to meet the updated deficit. Therefore, both options were considered to be the least favourable options.

Options B.4 and B.5 could be adapted to provide a transfer of 87 MI/d which would meet the updated deficit. As such, both options were considered viable options. Option B.4 is regarded as more preferable than

Option B.5 on account of its flexibility as it has the potential to evolve further through integration with Havant Thicket Reservoir.

3.9. Final Business Evaluation

Following the future needs assessment, a high-level review of the outcomes of the assessment was undertaken to check whether the outcomes would result in any changes to previous conclusions from the optional appraisal.

A summary of the final business evaluation is as follows:

- Option B.4 was ranked 1st on account of its lower cost relative to Option B.5, its excellent continued scalability to meet future needs (on account of the flexibility afforded by the integration of Havant Thicket Reservoir and water recycling working in tandem) and the means by which the option represents a regionally resilient solution that supports both Southern Water and Portsmouth Water; and
- Option B.5 was ranked 2nd on account of its relatively higher cost relative to Option B.4, its lower flexibility in scalability terms and its lesser ability to act as a regional asset that benefits both Southern Water and Portsmouth Water.

3.10. Options Appraisal Process Conclusions and Recommendations

It was recommended that Option B.4 be confirmed as the selected option at Gate 2 with Option B.5 as the back-up option for the following reasons:

- Based on the information currently available Option B.4 is considered to have fewer environmental impacts than Option B.5, as the development of an environmental buffer would not be required.
- Option B.4 can be constructed and commissioned quicker than Option B.5, and therefore provides a good option to maintain compliance with Southern Water's supply obligations. This reduces reliance on the prolonged use of interim measures and reduces operating costs.
- Option B.4 has the second lowest whole life cost forecasts and, relative to desalination, a low energy burden.
- Option B.4 would support the objective of promoting Havant Thicket Reservoir as a water resource asset that can potentially meet Southern Water and Portsmouth Water's future needs to 2040 and beyond, and is also geographically well located for both companies.
- Unlike Option B.5, Option B.4 does not exhaust supplies of treated wastewater locally and therefore can be further evolved to meet as yet unknown future needs.
- Option B.4 is regarded as more resilient than Option B.5 as it is not wholly reliant on a single process.

4. Stage 3: Water Transfer and Recycling

4.1. Development of a Preferred Corridor and Above Ground Plant

Following the options appraisal process, Option B.4 was confirmed in the Gate 2 submission as the selected option and Option B.5 was confirmed as the back-up option. This section outlines how Option B.4 has been developed following the options appraisal process and Gate 2 submission in order to identify a preferred corridor.

The back-up option, Option B.5, is not being developed further in its entirety at this stage and is not progressing through any consent process. However, as Options B.4 and B.5 share some of the same components (including some of the pipelines), the progress made in developing these components for Option B.4 means that same components are progressed for Option B.5.

The stages of the development of the corridor and above ground plant was as follows:

- Updates to any previously undertaken site selection given the changes to project requirements;
- Defining and dividing corridors from the pipelines that progressed from Gate 2 for Options B.4 and B.5. This stage included a back-check of any additional potential pipelines post Gate 2;
- Identification of above ground plant zones that are required to accompany the pipelines;
- Evaluation of the corridor sections and above ground plant against criteria developed with our technical teams; and
- Identification of a preferred corridor route.

4.2. Site Selection

The design evolution process continued after Gate 2 and changes to sites were considered using the site selection criteria described in the options appraisal process. This related to the water recycling plant and the high lift pumping station. The following sections present the summary of this additional option appraisal work.

4.2.1. Water Recycling Plant

In the option appraisal process at Gate 2, the site selection for the water recycling plant used a minimum site size of 40,470 m² for a 61 MI/d plant (Option B.2), and a minimum site size of 48,564 m² for a 75 MI/d plant (Option B.5). As outlined in Section 2, for Option B.4 the plant size was reduced to a minimum 15 MI/d water recycling plant, rather than the original 61 MI/d or 75 MI/d plant that would be required for Option B.2 and B.5.

The future needs assessment outlined that the options would need to be adaptable to respond to a larger supply deficit in the future and the dNPS also requires us to ensure that our proposals can provide resilience in the future. To ensure our water recycling plant site could fulfil this, we amended our search criteria to 60,000 m² so that we could provide a 15 MI/d water recycling plant with potential to expand up to a 60 MI/d water recycling plant if required. This larger parcel size, based on a more developed understanding of the Project, also provides sufficient additional space for locating the high lift pumping station, tunnel shafts for connecting pipelines, on-site construction working areas and site access arrangements.

As the new site search criteria was larger than the original site selection criteria described in Section 3, a back-check was undertaken to identify sites that meet the revised site size. Figure 11 shows all the sites that were identified in the previous site selection for the water recycling plant. The sites in red have an area of less than the 60,000 m² and were therefore not progressed as they were too small.

Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

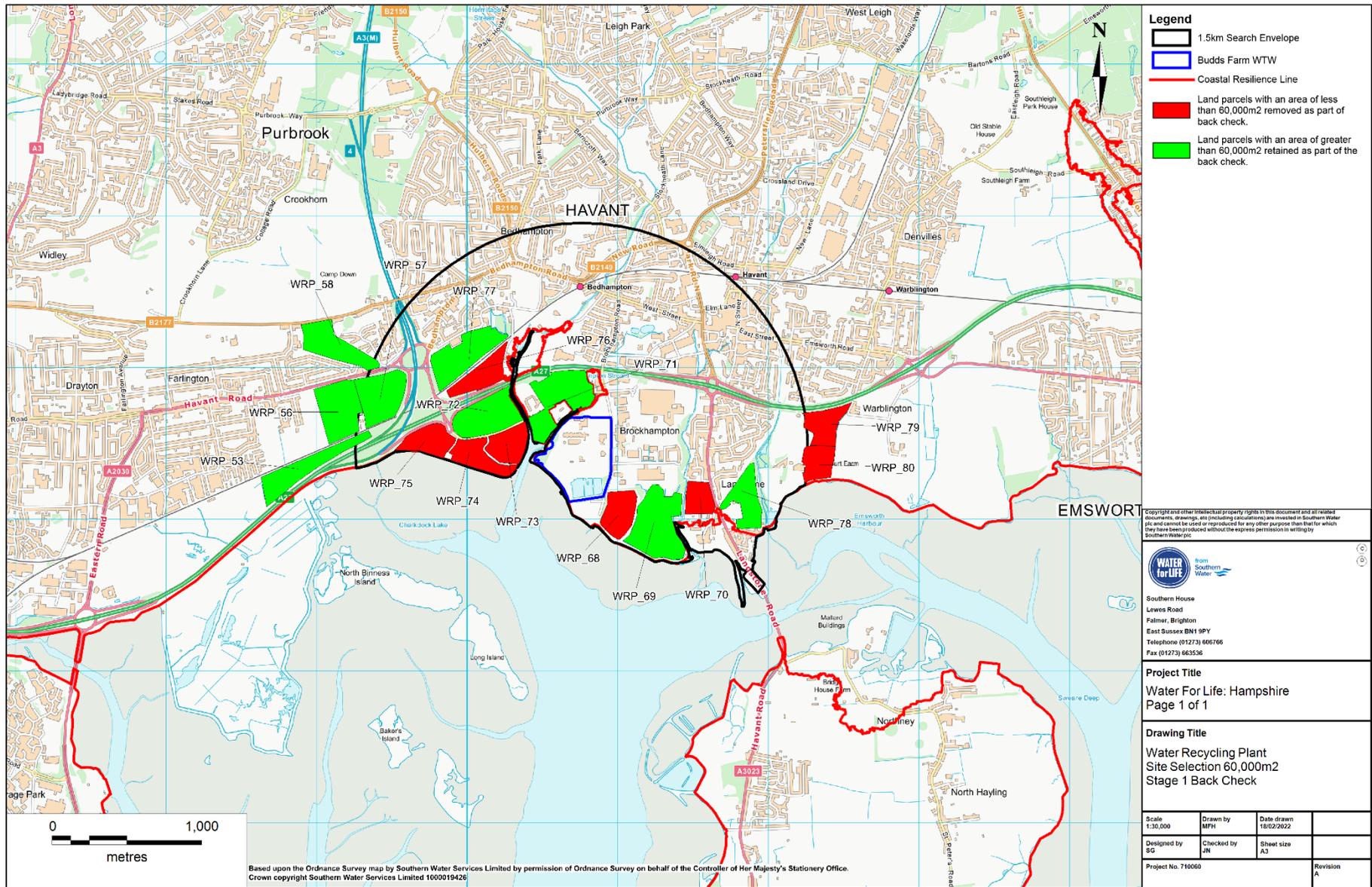


Figure 11 - Water recycling plant site comparison

We then undertook an assessment using the same site selection process as described in Section 3.2.1 which was applied to the remaining sites. This confirmed that options WRP_71 and WRP_72 were the best performing sites, and therefore WRP_72 remained the preferred site. We also identified that if we were to search for a site that could fit just the 15 Ml/d water recycling plant, site WRP_72 would remain as the best performing site. Further details on the reason for selecting WRP_72 as the preferred site can be found in Section 3.2.1.

4.2.2. High Lift Pumping Station

The previous site selection for the high lift pumping station related to a search area west of Havant Thicket Reservoir. With pipeline routes 3 and 4 for water transfer and water recycling being progressed, this means that the high lift pumping station could now potentially be sited to the south, as well as to the west, of the Havant Thicket Reservoir. We looked at a different search area to the west of the Havant Thicket Reservoir which is led by the route of pipeline route 4, compared to the site selection outlined in Section 3, to reflect the development of the pipeline routes in this area.

Two new search areas were therefore defined, reflecting the western (pipeline route 4) and southern (pipeline route 3) pipeline corridors from Havant Thicket Reservoir. The search area was defined using the following criteria:

- Within 500 m of the boundary of the pipeline corridors;
- Within 4 km of the footprint of the Havant Thicket Reservoir, but not within the footprint;
- Ground level of equal or less than 30 metres above sea level to enable sufficient hydraulic connectivity with Havant Thicket Reservoir; and
- Outside areas of coastline susceptible to sea flooding and coastal erosion as major infrastructure development would not be suitable in these areas.

Later sections of this document outline that only the southern pipeline route from Havant Thicket Reservoir is being progressed, and therefore this section only details the site selection for the southern search area. A site selection for the western search area has been undertaken, which employed the same methodology. Table 22 details the criteria used to determine suitable sites.

Table 22 - Site search criteria for water transfer and water recycling high lift pumping station

Element	Details
Land Use	Avoidance of the following areas: <ul style="list-style-type: none"> ■ Densely populated residential areas, private residences, car homes, hospitals, schools, universities, places of worship, burial grounds, holiday parks, hotels, retail parks and leisure parks; ■ Key transport infrastructure; and ■ Key Utilities.
Land Conditions	Avoidance of the following areas: <ul style="list-style-type: none"> ■ Marsh; ■ Mudflat; ■ Cliff face; and ■ Open water.
Site Size	High lift pumping station with a tank requires 5,320 m ² plus 4,047 m ² for a temporary construction compound. High lift pumping station without a tank requires 4,620 m ² plus 4,047 m ² for a temporary construction compound.

Long list of Sites

For the southern search area, 34 sites were identified. This list of sites was then assessed against an initial set of environmental planning considerations set out in the site selection process sections within Section 3. The variance between the best performing and least well performing parcels was principally proximity to ancient woodland, listed buildings, registered parks and gardens, residential properties, and amenity spaces.

As a result, nine sites progressed to the shortlist stage.

Shortlisted Sites

The five short listed sites were assessed against additional environmental, planning and engineering considerations, such as flood risk, ground conditions, ground contamination, historic environment and transport accessibility. Approved or accepted Development Consent Order developments made within 5 years, or developments subject to Transport and Works Orders within three years, were also taken into account. None of the shortlisted sites had the potential to conflict with a planned development. Five sites progressed to further assessment. The sites that did not progressed performed worse as a result of poor access to transport routes and proximity to scheduled monuments, national trails, public rights of way and rivers. The five sites are shown in Figure 12.

Hampshire Water Transfer and Water Recycling Project – Scheme Development Summary

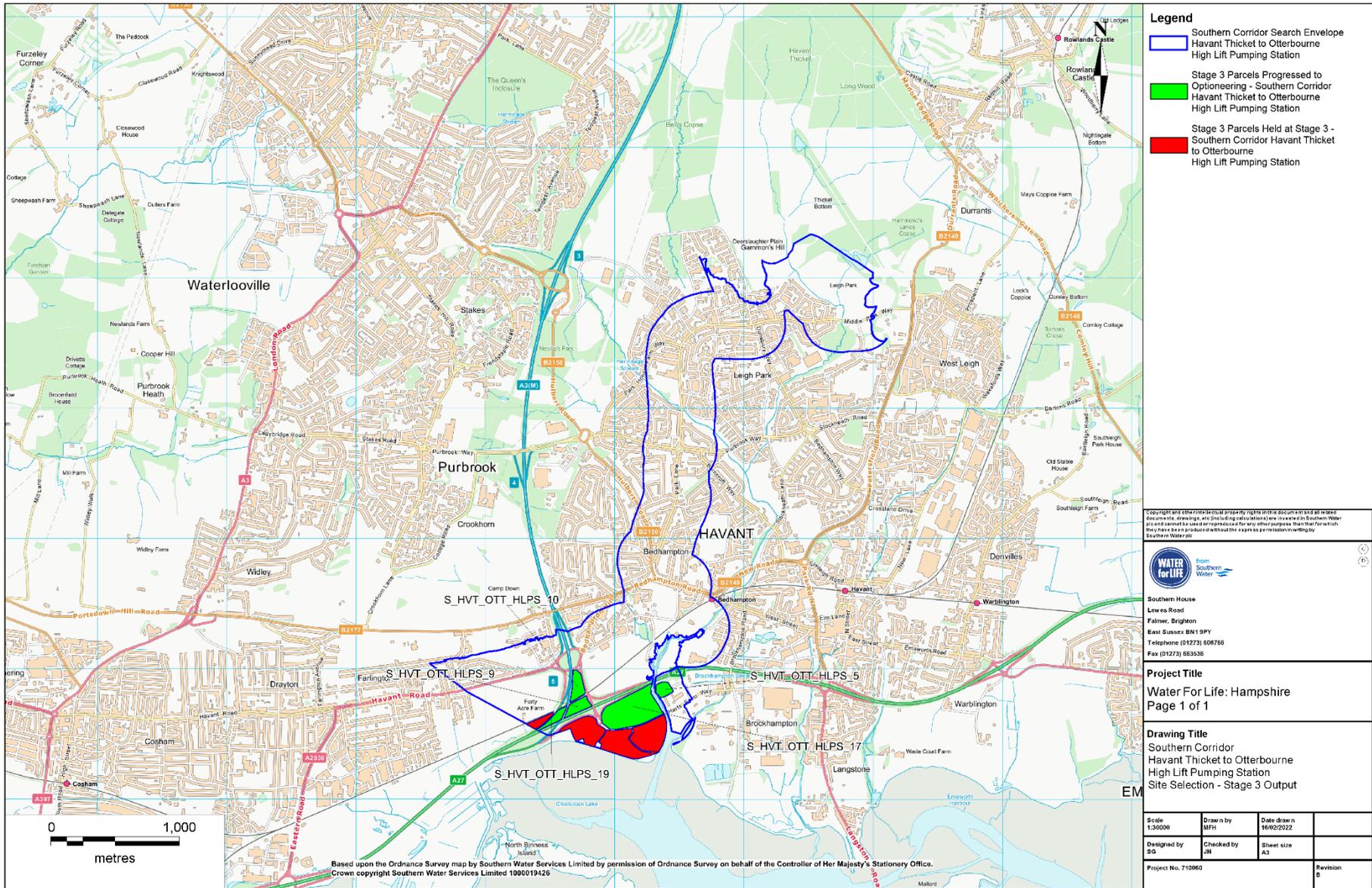


Figure 12 - High lift pumping station sites

Assessment of Sites

The five sites were considered against further environmental, planning and engineering criteria, and the outcomes of these evaluations are summarised in Table 23 below.

Table 23 – High lift pumping station environmental and planning considerations

Site	Environmental and planning considerations
S_HLPS_5	<p>Developing this site would result in the potential displacement or loss of employment space which would also have potential planning and cost implications associated with the acquisition of this site.</p> <p>The site is located 410 m north of the Solent Maritime Special Area of Conservation, Langstone Harbour Site of Special Scientific Interest and Chichester and Langstone Harbour Special Protection Area and Ramsar sites. As a result, there is potential for impacts to these sites, however this is not considered to be a reason to not take the site forward, and this will need to be subject to further assessment under the Habitats Regulations.</p> <p>The site is constrained by the existing employment developments surrounding the site to the south and east and the A27 and Hermitage Stream to the north and west. This site is located 40 m from the preferred water recycling plant site and as such localised infrastructure would be required to cater for two sites, such as road access and localised pipeline connections. However, the water recycling plant and high lift pumping station on a single site would remain preferable.</p> <p>It was recommended that this site is not progressed.</p>
S_HLPS_9	<p>The site is located 173 m north of the Solent Maritime Special Area of Conservation, Langstone Harbour Site of Special Scientific Interest and Chichester and Langstone Harbour Special Protection Area and Ramsar sites. As a result, there is potential for impacts to these site, and this will need to be subject to further assessment.</p> <p>Site is located on land between a railway line, A3(M) and a major roundabout. The site appears to be mostly undesignated woodland. A private access track runs along the northern boundary of the site and there appears to be informal footpaths running through the site.</p> <p>Whist the woodland site does not have a formal local or national nature conservation designation, constructing the high lift pumping station in this location would result in the loss of numerous trees, particularly given the landscape and visual amenity impacts. There may also be potential ecological impacts that would require further investigation to determine whether any part of this site could be classed as priority habitat.</p> <p>As there is land owned by National Highways and Network Rail, negotiations with both parties should be commenced as early as possible to acquire the land/interests/rights and negotiate protective measures by agreement.</p> <p>It was recommended that this site is not progressed.</p>
S_HLPS_10	<p>The site is located 294 m north of the Solent Maritime Special Area of Conservation, Langstone Harbour Site of Special Scientific Interest and Chichester and Langstone Harbour Special Protection Area and Ramsar sites. As a result, there is potential for impacts to these site, and this will need to be subject to further assessment.</p> <p>The site is located on land between a railway line, A3(M) and a major roundabout. The site appears to be mostly undesignated woodland with some potential informal uses towards the centre of the site. To the south of the site, there are some storage units or cabins associated</p>

Site	Environmental and planning considerations
	<p>with the railway. Whilst the woodland site does not have a formal local or national nature conservation designation, constructing the high lift pumping station in this location would result in the loss of numerous trees, particularly given the landscape and visual amenity impacts. There may also be potential ecological impacts that would require further investigation to determine whether any part of this site could be classed as priority habitat.</p> <p>As there is land owned by National Highways and Network Rail, negotiations with both parties should be commenced as early as possible to acquire the land/interests/rights and negotiate protective measures by agreement.</p> <p>It was recommended that this site is not progressed.</p>
S_HLPS_17	<p>This site is located 160 m north of the Solent Maritime Special Area of Conservation, Langstone Harbour Site of Special Scientific Interest and Chichester and Langstone Harbour Special Protection Area and Ramsar sites. As a result, there is potential for impacts to these site, and this will need to be subject to further assessment.</p> <p>The site is allocated in the adopted Havant Borough Local Plan 2014 as a gateway employment site for over 20,000 m² of manufacturing and warehouse use with an outline planning application approved in June 2022 on the site for the development of the whole site for 29,000 m² of employment units (Ref APP/21/00189).</p> <p>The site has the advantage of allowing the co-location of the water recycling plant and high lift pumping station in a single location and reduce the overall land take required compared to if two sites were used (such as road accesses and connecting infrastructure), this would result in a reduced impacts such as noise, traffic and operating impacts are located on one site rather than two.</p>
S_HLPS_19	<p>The site is located 146m north of the Solent Maritime Special Area of Conservation, Langstone Harbour Site of Special Scientific Interest and Chichester and Langstone Harbour Special Protection Area and Ramsar sites. As a result, there is potential for impacts to these site, and this will need to be subject to further assessment.</p> <p>Site is located on land between a railway line, A3(M) and a major roundabout. The site is covered in dense woodland. Whilst the woodland on site does not have a formal local or national nature conservation designation, constructing the high lift pumping station in this location would result in the loss of numerous trees, particularly given the landscape and visual amenity impacts. There may also be potential ecological impacts that would require further investigation to determine whether any of this site could be classed as priority habitat.</p> <p>As the land is owned by National Highways and Network Rail, negotiations with both parties should be commenced as early as possible to acquire the land/interests/rights and negotiate protective measures by agreement.</p> <p>It was recommended that this site is not progressed.</p>

On the basis of the site assessment, it was considered that site S_HLPS_17 would be the preferred site for the high lift pumping station in association with the southern corridor route (pipeline route 3). Sites S_HLPS_11, S_HLPS_9, S_HLPS_19 are located on land with dense woodland which could lead to a loss of trees and subsequent landscape and visual amenity impacts. These sites are therefore considered to have the potential for significant adverse environmental impacts and as such are not being progressed.

Site S_HLPS_5 is constrained by the size of the site and the existing business use. S_HLPS_17 is the same site as that proposed for the water recycling plant - combining the high lift pumping station with the water recycling plant site would reduce the need for multiple sites and improve the viability of the wider scheme. It is therefore recommended that this site be taken forward as the preferred site.

4.3. Defining Corridor Sections and Above Ground Plant Zones

4.3.1. Pipeline Routes

This section provides an overview of how we took the pipeline routes outlined in Section 3.2 and expanded these into the corridor sections. We then evaluated the corridor sections to identify a preferred corridor. A corridor is a wider area of land where a pipeline could be sited. This approach allows us to make refinements to our pipeline routes responding to more local constraints.

The starting point was taking the pipeline routes that we identified as the best performing routes in Section 3.2 for water recycling and water transfer. Our selected option following the options appraisal process was Option B.4, so we looked at both the water transfer and Option B.5's water recycling pipeline routes. Figure 13 provides a plan of the indicative pipeline routes for water transfer and Figure 14 provides a plan of the indicative pipeline routes for water recycling.

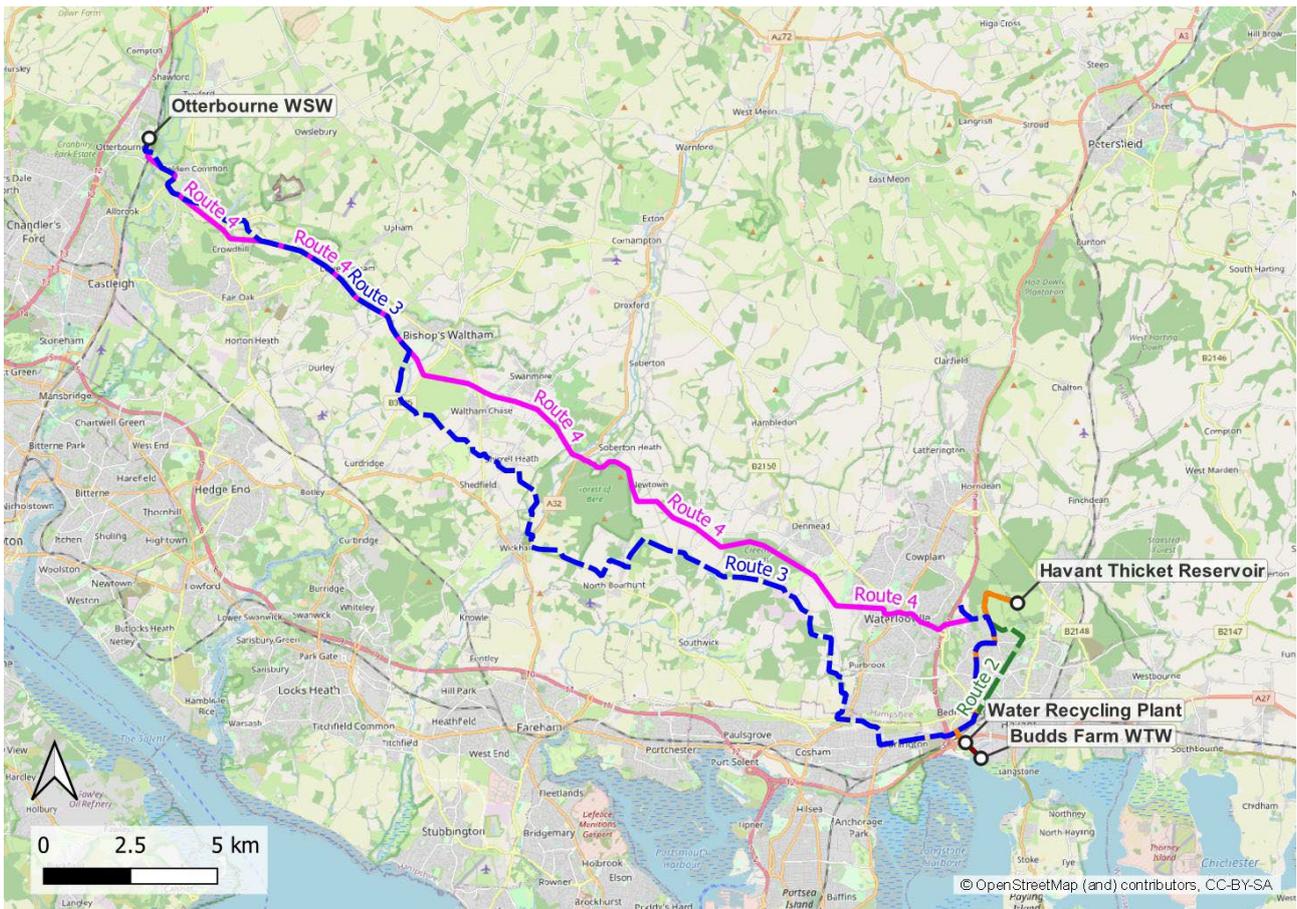


Figure 13 - Progressed pipeline routes for Option B.4

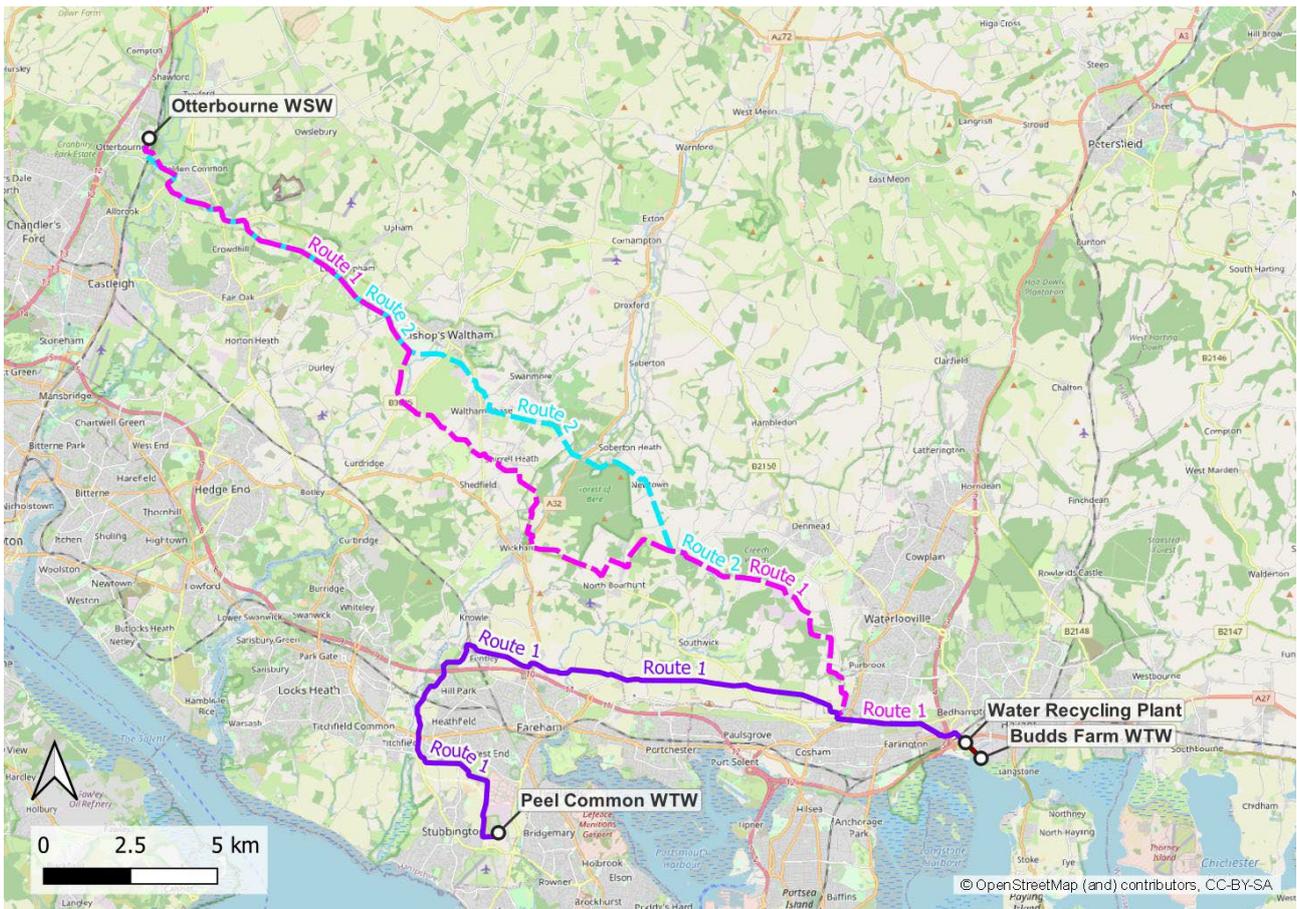


Figure 14 - Progressed pipeline routes for Option B.5

4.3.2. Back-Check of Pipeline Routes

Following Gate 2, a back-check of these pipeline routes took place in order to:

- Improve the hydraulic performance of the pipeline route. Additional topographical data (Environment Agency Light Detection and Ranging) was considered;
- identify any additional potential alternative pipeline routes that would avoid or reduce interference with high-risk or constrained areas, including the South Downs National Park;
- Account for changes to land use since the routes were drawn pre-Gate 2, as a result of new development shown by updated aerial imagery;
- Consider with greater significance the potential for routes that diverge from the direct route options developed pre-Gate 2; and
- Include corridors that lead to and contain tunnelling shafts or portals, which are considered necessary where there are significant constraints for planning and construction, such as dense urban areas.

Following this back-check, an additional pipeline route was identified which has been assessed using the same process as the other pipelines at previous stages of the options appraisal process detailed in Section 3, to ensure the inclusion of this additional pipeline route would not increase the level of impact identified for Option B.4 as part of the earlier options appraisal process. This pipeline route is known as Route 5. This route followed a similar route to the northern section of the pipeline between the Peel Common Wastewater Treatment Works and the water recycling plant as part of Option B.5 (the southern Route 1 in Figure 14).

The back-check followed the same format of the Consenting Evaluation that was part of the options appraisal process, as outlined in Section 4.3.2. The consenting evaluation concluded that the inclusion of Route 5 would not result in an increase to the overall environmental impacts of Option B.4 or B.5.

4.3.3. Combination of Pipeline Routes

To ensure all potential options were considered, we combined Route 5 with the best performing pipeline routes for water transfer shown in Figure 7 and water recycling in Figure 8. The pipeline route to transfer water from Peel Common Wastewater Treatment Works to the water recycling plant (shown in Figure 14) was not included for Option B.4, as this is part of Option B.5 which we are not progressed at the same rate as Option B.4. The result of the combined pipeline routes is shown in Figure 15.

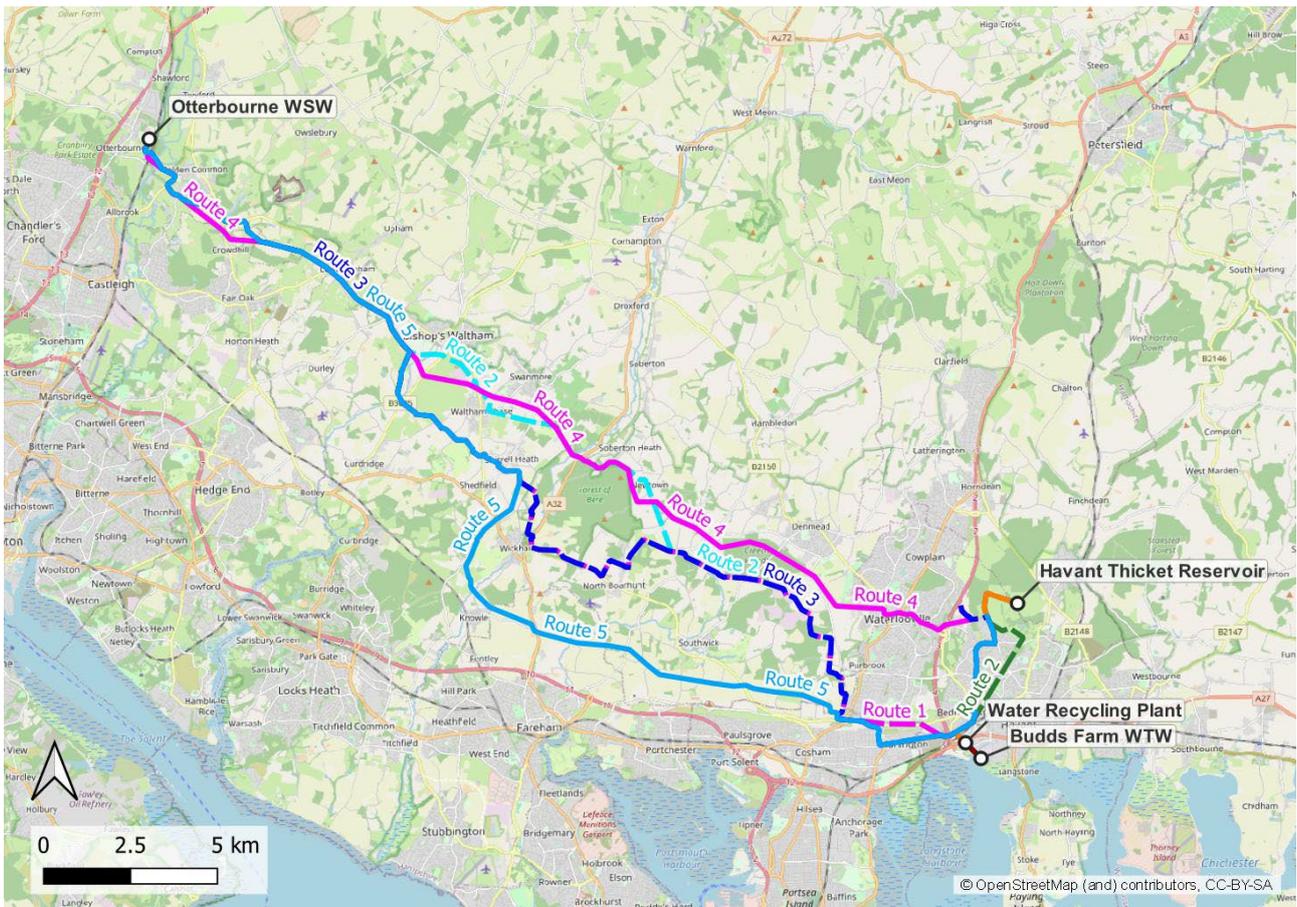


Figure 15 - Combined pipeline routes for Option B.4 and B.5

4.3.4. Corridor Identification

The pipeline routes were developed into corridors to identify potential zones where a pipeline could reasonably be laid. Corridors are wider areas of land where a pipeline could be located. The corridors were sized to allow for the pipeline route to be defined to reflect a number of localised constraints following further data collection. The corridors were then divided into corridor sections so that each section could be assessed.

Alternative corridors that do not necessarily follow the pipeline routes shown in Figure 15 were identified at later stages throughout the evaluation of corridor sections. These were identified to aid engineering and constructability considerations and provide alternative routes where there were significant environmental or

planning constraints. These routes have been subject to back checking so the process is robust in accordance with previous stages.

Further route refinement within the corridor that will take place at future stages of the project will have regard to consultation feedback and ongoing engagement with interested parties as the design development of the scheme progresses.

4.3.5. Above Ground Plant

Once the pipeline corridors were defined, the initial requirements for above ground plant were identified through hydraulic modelling and calculations for the pipeline corridors. The following above ground plant were currently identified as necessary for the operation of the pipelines:

- High lift pumping station: please refer to Section 4.2.2
- Intermediate pumping station: required as a result of significant distance and/or a large amount of static head to overcome during the transfer; and
- Break pressure tanks: required within the pipeline route to mitigate potential surge issues and reduce overall pumping costs and energy requirements.

The exact locations of the intermediate pumping station and break pressure tanks can only be finalised once a preferred route has been confirmed. Potential zones for siting the above ground plant at this initial stage have been produced through an iterative process employing the following parameters:

- Hydraulics data;
- Emergency discharge availability/impact;
- Dimensions – land take/maximum area for the infrastructure;
- Proximity requirements, especially in relation to the pipeline;
- Access arrangements;
- Energy requirements;
- Other associated development required; and
- Operational details.

As the development of the Project progresses, we may identify a need for additional above ground equipment.

4.3.6. Corridor Section and Above Ground Plant Refinement Evaluation

Following the identification of corridor sections and above ground plant, a process to refine the options took place to identify the preferred corridor. Engineering and constructability site visits were undertaken to progress the understanding of constraints beyond the initial desk-based assessments. This resulted in additional route options being identified, which were considered as potentially more suitable than the existing routes.

Figure 16 shows the corridor sections that were taken forward to the corridor section and above ground plant evaluation.

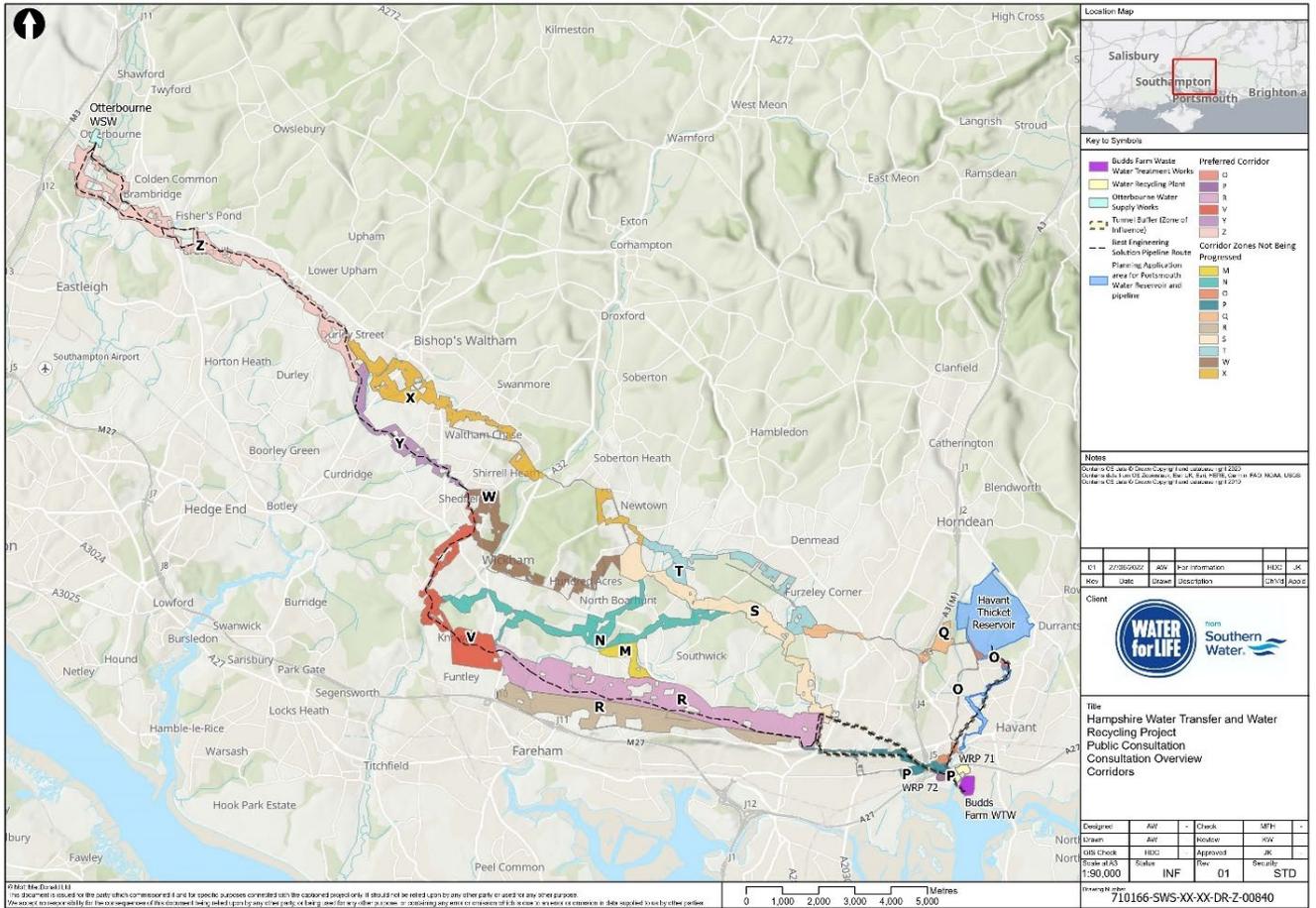


Figure 16- Corridor section options

4.4. Corridor Sections and Above Ground Plant Refinement Methodology

4.4.1. Evaluation Topics

The evaluation of the pipeline corridors and above ground plant were then assessed using criteria informed by those used at Gate 2, namely:

- Constructability
- Hydraulics
- Landscape
- Ecology
- Heritage
- Water Quality
- Flood Risk
- Geology and Soils
- Socio-economics
- Planning
- Special Categories of Land

4.5. Corridor Section Evaluation: The Preferred Corridor

This section sets out the conclusions of the evaluations of each corridor section. The Book of Maps provides plans of all the corridor sections described below.

4.5.1. Corridor Section O

Corridor Section O is required to connect the water recycling plant to Havant Ticket Reservoir. Two options have been considered: an open cut route constructed within the existing road network, and a tunnel. At the north of the corridor, the route would require an open cut connection into the Havant Thicket Reservoir.

Depending on the route selected from the Havant Thicket Reservoir to Otterbourne, two pipelines may be required in this corridor.

Maps of Corridor Section O can be viewed in Sheet 1 and 2 of the Book of Maps.

Table 24 - Corridor Section O constraints overview

Topic	Open Cut Route	Tunnelled Route
Constructability	Two pipelines could be required, with a trench approximately 4m wide. This would need temporary road closures, including sections of Bedhampton Road, Park Lane and Middle Park Way. The route would follow a similar route to the Portsmouth Water scheme, but would be commenced after those works had been completed.	Tunnelling would mean construction works will be mostly underground with some surface construction works at either end of the corridor section for the tunnel drive and reception shafts. Intermediate shafts may be required along the tunnel route to allow for safe operation of the Tunnel Boring Machine, and these will be identified at subsequent design stages.
Hydraulics	Due to the topography of the corridor, both the open cut and tunnelled options would need to be pumped. The pipeline from the Havant Thicket Reservoir can utilise a gravity feed due to the topography of the corridor.	
Landscape	The north of the route intersects Staunton Country Park and the above ground construction would potentially temporarily impact access to certain areas as well as landscape quality. The south of the route intersects Bidbury and Bedhampton Park and the above ground construction could lead to temporary restrictions to access and loss of landscape features.	The tunnel reception shaft in the proximity of the Havant Thicket Reservoir would be potentially located within Staunton Country Park and above ground construction would temporarily impact. Open cut construction would still be required to connect the tunnel to the reservoir.
Ecology	The route crosses the Hermitage Stream, which is upstream of the Solent Maritime SAC and the Solent and Southampton Water Ramsar site. There is potential for pollution resulting from construction works which could adversely impact water quality in the stream and the designated sites.	There is potential for impacts on deciduous woodland and floodplain and coastal grazing marsh priority habitat as a result of the construction of tunnel launch and reception sites. Further detailed design stages would aim to reduce the potential for impacts through sensitive siting of the shafts.

Topic	Open Cut Route	Tunnelled Route
	<p>Impacts can be reduced by a trenchless crossing underneath the Hermitage Stream and the implementation of best practice measures.</p> <p>Sections of the corridor section intersect floodplain and coastal grazing marsh and deciduous woodland priority habitat. There is potential for a temporary loss of habitats during construction which would require reinstatement.</p>	
Heritage	<p>The route would intersect the Bidbury, Old Brockhampton and the Sir George Staunton Conservation Areas and could harm these heritage assets.</p> <p>The north of the corridor section route intersects the Leigh Park Grade II* Listed Park and Garden at Staunton Country Park. Construction has the potential to affect the character and setting of the park, which further design would seek to reduce.</p>	<p>The tunnel launch shaft will be in the proximity of the Bedhampton and the Old Brockhampton Conservation Areas. The tunnel reception shaft will be within the Sir George Staunton Conservation Area. Construction has the potential to affect the character and setting of the park, which further design would seek to reduce.</p> <p>The north of the corridor section intersects the Leigh Park Grade II* Listed Park and Garden at Staunton Country Park. Construction has the potential to affect the character and setting of the park, which further design would seek to reduce.</p>
Water Quality	<p>The corridor section route intersects several watercourses in Havant, including the Hermitage Stream. There is therefore potential for pollution generated by construction activities. Trenchless crossing and the implementation of best practice measures would seek to reduce impacts.</p> <p>The south of the corridor section is within a Source Protection Zone 1 and Drinking Water Safeguarding Zone for Bedhampton Spring. Construction in this area has potential for impacts to groundwater quality.</p>	<p>Tunnelling has the potential to impact on the quality and quantity of groundwater within the East Hants Chalk and South Hants Lambeth Group. The south of the corridor section is within a Source Protection Zone 1 and Drinking Water Safeguarding Zone for Bedhampton Spring. Tunnelling within this area has potential for impacts to groundwater quality.</p>
Flood Risk	<p>The corridor section route intersects areas at high risk of flooding. Further work would be needed to understand the potential of construction works to increase flood risk.</p>	<p>The launch and reception shafts are located outside of high flood risk areas.</p>

Topic	Open Cut Route	Tunnelled Route
Geology and Soils	<p>The corridor section route runs along the road network and there is potential contamination that could be mobilised during construction.</p> <p>A section of the south of the corridor section would intersect Grade 1 agricultural land, which could be adversely impacted during construction.</p>	No constraints identified
Socio-economics	<p>Construction works would lead to temporary impacts to the road network in Havant, which could be considered significant. This would affect access to residential properties and community facilities.</p> <p>Construction close to residential properties has the potential to impact on air quality, noise and vibration.</p> <p>Access to Staunton Country Park and Bidbury and Bedhampton Park may be restricted during construction.</p>	<p>There is potential for vibration impacts during tunnelling. Excavated materials would also increase road traffic.</p> <p>Access to Staunton Country Park and Bidbury and Bedhampton Park may be restricted during construction.</p>
Special Category Land	Staunton Country Park and Leigh Park are public open space and construction may lead to temporary closures to parts of these areas.	

Conclusion

A tunnelled route for Corridor Section O is the preferable option. This would avoid construction within the road network, which would result in adverse impacts on the local transport network and restrict access to community facilities. Likely impacts of dust emissions, noise and vibration would also be significantly reduced.

A tunnelled route would avoid intersecting the Hermitage Stream, which is linked to ecological sites in Langstone Harbour. The tunnelled route would also not impact high flood risk zones.

Impacts on open space would be reduced by tunnelling. However, construction works within Staunton Country Park and Leigh Park listed park and garden could not be avoided.

4.5.2. Corridor Section P

This corridor section connects Corridor Section O to Corridor Section R. It involves routing through Drayton and Farlington, to Portsdown Hill. Two options for the pipeline were considered: an open cut route within the existing road network, or a tunnelled route.

There is optionality in the open cut route to either route south following Havant Road and Farlington Avenue or further north along Portsdown Hill Road.

There are two potential tunnelled routes, a northern option (P1) and a southern option (P2).

Maps of Corridor Section P can be viewed in Sheet 2 and 3 of the Book of Maps.

Table 25 - Corridor Section P constraints overview

Topic	Open Cut Route Constraints	Tunnelled Route Constraints
Constructability	<p>Trenchless crossing of the A27, A3(M) and the west coast railway line would be required.</p> <p>Open cut construction would be required along sections of Havant Road, Portsdown Hill Road, and Farlington Avenue. This is likely to result in impacts on the transport network in Drayton and Farlington.</p>	<p>As a result of the topography of the corridor, a deep tunnel will be required.</p> <p>The tunnel launch shaft would preferably be located near to the water recycling plant site, and the reception shaft would be located on the ridge of Portsdown Hill. For the tunnel reception shaft, there is optionality to site the shaft further to the north, or further to the south.</p>
Hydraulics	<p>Corridor Section P rises from east to west relatively sharply up to the ridge of Portsdown Hill. Therefore, the pumping station must be located to the east before the pipeline ascent of Portsdown Hill.</p> <p>The open cut route through Farlington Avenue would require several bends which is hydraulically undesirable as it results in greater energy losses.</p>	<p>Corridor Section P rises from east to west relatively sharply up to the ridge of Portsdown Hill. Therefore, the pumping station must be located to the east before the pipeline ascent of Portsdown Hill to allow the water to be transferred up Portsdown Hill.</p>
Landscape	<p>Open cut construction on the ridge of Portsdown Hill would result in temporary adverse impacts to the visual amenity of the area given Portsdown Hill is an elevated and highly visible landscape. The route also intersects the Portsdown Hill Open Downs Landscape Character Area, where there is potential for adverse impacts to landscape quality.</p>	<p>The tunnel reception shaft is located on the ridge of Portsdown Hill. As Portsdown Hill is an elevated and highly visible landscape, construction works would potentially temporarily adversely impact the visual amenity of the area. Siting the tunnel reception shaft further north would reduce these impacts.</p>
Ecology	<p>The south of the corridor section is in the proximity of the Chichester and Langstone Harbour Special Protection Area and Ramsar sites. There is potential for impacts to habitats that are functionally linked to these sites. Noise and vibration generated by construction works also have the potential to impact these sites.</p>	<p>No significant constraints identified.</p>

Topic	Open Cut Route Constraints	Tunnelled Route Constraints
	The corridor section intersects areas of lowland meadow and grassland priority habitat. The route also intersects several locally designated Sites of Importance for Nature Conservation.	
Heritage	Fort Purbrook is directly north of the corridor section, north of Portsdown Hill Road. The fort is designated as a scheduled monument and Grade II* listed building. Construction of the pipeline has potential to temporarily adversely affect the setting of the fort. There is also potential for buried archaeology surrounding Portsdown Hill which could be encountered during construction of the pipeline. The southern open cut route would be preferable from a heritage perspective.	The southern tunnel route (P2) would be in close proximity to Fort Purbrook which is designated as a scheduled monument and Grade II* listed building. Therefore, the northern tunnelled route would be preferred.
Water Quality	The south of the corridor section is in the proximity of Langstone Harbour. There is potential for pollution to reach the harbour as a result of construction activity. Best practice mitigation would be employed to avoid impacts.	The northern tunnel option (P1) would be located within Source Protection Zone 1, and therefore construction of the tunnel has the potential to adversely impact groundwater quantity and quality. Further detailed design in the future would be required to reduce potential impacts.
Flood Risk	The corridor section does not intersect any high-risk flood zones.	The northern tunnel reception shaft option is located south of a high-risk flood area. Further detailed siting would be required to ensure there is no impact on flood risk.
Geology and Soils	The corridor section has the potential to encounter sources of contamination in Farlington and at Fort Purbrook which could potentially be mobilised as a result of construction works.	The southern tunnel route (P2) has the potential to encounter sources of contamination at Fort Purbrook which could potentially be mobilised as a result of construction works.
Planning	The corridor section intersects with a housing development under construction south of Havant Road.	No constraints identified.

Topic	Open Cut Route Constraints	Tunnelled Route Constraints
	<p>However, the pipeline could be routed to avoid this.</p> <p>The north of the corridor section intersects Countryside Rights of Way land south of Portsdown Hill Road.</p>	
Socio-economics	<p>Open cut construction has the potential for disturbance to residential properties through noise, vibration and air quality, and impact access to properties and community facilities.</p>	<p>There is potential for vibration impacts during construction of the tunnel.</p> <p>Material will be removed from the tunnel at the tunnel launch shaft. There would be an increase in traffic on the wider road network.</p>
Special Category Land	<p>The southern open cut route intersects land held by the Ministry of Defence on Farlington Avenue.</p>	<p>The southern tunnel (P2) would intersect land held by the Ministry of Defence on Farlington Avenue.</p>

Conclusion

A tunnelled route would reduce the potential air quality, noise, vibration, socio-economic, transport and landscape impacts relative to the open cut route. An open cut route is therefore not being progressed. A tunnelled route with optionality for a northern (P1) or southern tunnel (P2) is being taken forward.

4.5.3. Corridor Section R

Corridor Section R routes east to west along the ridge of Portsdown Hill and south of Southwick before crossing the valley of the River Wallington. This corridor section would be constructed using an open cut method.

Maps of Corridor Section R can be viewed on Sheets 3, 4, 5 and 6 of the Book of Maps.

Table 26 - Corridor Section R constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>The corridor section is principally located on agricultural land. The River Wallington would be crossed using a trenchless technique.</p> <p>This corridor section runs through an existing utility corridor used by several suppliers. Most of the existing utilities run along the southern section including gas mains and high-voltage cables. The pipeline route is positioned further north to avoid these where possible.</p>
Hydraulics	<p>The corridor section is routed east to west. The south of the corridor section is along the ridge of Portsdown Hill, and the north of the corridor section follows the base of the River Wallington valley.</p> <p>The pipeline route should, where possible, avoid undulating sections Corridor Section R.</p>

Topic	Open Cut Route Constraints
Landscape	<p>The corridor section intersects the Portsdown Hill and Forest of Bere Special Landscape Quality Areas and the Portsdown Hill Open Downs Landscape Character Area.</p> <p>To avoid temporary impacts on the landscape, the pipeline should be routed adjacent to the existing B-road, as the backdrop of woodland would provide screening.</p>
Ecology	<p>Most of this corridor section is arable land. There is potential for impacts to habitats functionally linked to the Portsmouth Harbour Ramsar and Special Protection Area, as well as hydrological impacts when crossing the River Wallington. Trenchless construction underneath the river and best practice methods would reduce impacts.</p> <p>Northern sections of the corridor intersect lowland meadows with adjacent deciduous woodland priority habitat. One area of lowland meadow is likely to be unavoidable within the corridor. However, any loss of the priority habitat will be temporary and reversible. In this area, the corridor section is directly adjacent to the Stroud Coppice ancient woodland and Site of Importance for Nature Conservation. A buffer would be required to avoid impacts. Species associated with the Site of Importance for Nature Conservation may be disturbed during the works. Routing further south in the corridor section would avoid interfaces with these ecological sites.</p> <p>There are two Sites of Importance for Nature Conservation within the corridor, further pipeline routing should avoid intersecting with these sites.</p>
Heritage	<p>The corridor section is in the proximity of Fort Southwick (grade I), Fort Nelson (grade I) and Fort Widley (grade II*) listed buildings and scheduled monuments. As a result of the open landscape area, the setting of these assets will be sensitive to temporary construction impacts. The corridor section also include the Church of St Nicholas (grade I listed building), The Nelson Monument (grade II* listed building) and the World War II Heavy Anti-Aircraft Gunsite at Monument Farm scheduled monument.</p> <p>To mitigate impacts on the settings of heritage assets, a northern route would be preferred, to move further down the Portsdown Hill ridge, out of view.</p> <p>Below ground works are likely to encounter archaeological remains associated with heritage assets. Further archaeological assessment would be required. The west of the corridor section is less sensitive, but there is still potential for buried archaeology.</p>
Water Quality	<p>The corridor section crosses the River Wallington, where there is potential for impacts to the hydrology and geomorphology of the river. Trenchless crossing of the river and its floodplain and best practice mitigation would be employed to reduce the potential for impacts.</p> <p>At the far north of the corridor, there is potential for impacts to the geomorphology from the crossing of an unnamed watercourse near Southwick Park Lake. Impacts could be minimised when open cut trenching by using temporary dams to allow work to be undertaken in dry conditions, and reinstating the channel once the trench has been installed. Once operational, the pipeline could become exposed as a result of adjustment of the bed and banks of the watercourse, which could result in geomorphological instability.</p>

Topic	Open Cut Route Constraints
	<p>There is potential for impact on water quality during construction as a result of sediment supply and contaminants to Potwell Tributary, River Wallington below Southwick and an unnamed watercourse near Southwick Park Lake. Best practice mitigation would be required to prevent these impacts. Routing through the south of the corridor section would minimise impacts by reducing interfaces with watercourses.</p> <p>The west of the corridor section is within Source Protection Zone 3 and a Drinking Water Safeguarded Zone, with the south west of the corridor section within Source Protection Zone 1. Mitigation is required to ensure there would be no impacts to groundwater as a result of construction.</p>
Flood Risk	<p>The corridor section intersects high risk flood areas associated with the River Wallington</p>
Geology and Soils	<p>The Portsdown Oil Fuel Reservoir is located at the south of the corridor. There are additional historic landfills and potentially contaminated land associated with previous military uses directly south of the corridor section which should be avoided.</p> <p>Parts of the west of the corridor section is Grade 1 agricultural land.</p>
Planning	<p>The southeast of the corridor section intersects with designated open space.</p> <p>The west of the corridor section is within the approved Welborne Garden Village development, comprising 6000 dwellings, community facilities, commercial and employment space.</p>
Socio-economics	<p>The west of the corridor section is adjacent to Boundary Oak School, future pipeline route refinement would be required to ensure impacts are avoided.</p>
Special Category Land	<p>Southern sections of the corridor section is owned by the Ministry of Defence, and these areas should be avoided by the pipeline.</p>

Conclusion

There are significant constraints relating to heritage and landscape in this corridor section during construction.

Acknowledging the constraints associated with the south of the corridor, it is proposed that this corridor section is reduced in size, to follow a northern route which would avoid the identified heritage assets. The south of the corridor section is therefore not being progressed, but the north of the corridor is being progressed as part of the preferred corridor as the significant constraints within the corridor section are avoided by removing the southern part.

This corridor section would avoid the need for the initial pipeline routes that were identified before Gate 2 further north, which intersect the South Downs National Park.

Corridor Section R potentially reduces the number of permanent above ground plant needed across the pipeline route compared to other corridor options. However, there is a possibility that the requirement for additional above ground plant is identified as the scheme is developed further, and is dependent on pipeline routing and system design.

4.5.4. Corridor Section V

Corridor Section V connects from Corridor Section R northwards towards Corridor Section Y. It crosses the River Meon and passes to the west of Wickham. There are two options to reduce the length of construction works needed on Titchfield Lane, a western option which includes an area of ancient woodland and an eastern option which goes further into Wickham Park Golf Club.

Maps of Corridor Section V can be viewed on Sheets 6 and 7 of the Book of Maps.

Table 27 - Corridor Section V constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>A crossing of the Winchester Road (A32) is required, which could be constructed using an open cut or trenchless method. Open cut construction would involve a lane closure which has the potential for disruption on this route.</p> <p>The corridor section involves routing along Titchfield Lane which is a narrow and busy route. To avoid a temporary road closure, there are two alternative locations where a crossing of the road can be made.</p> <p>Crossing of the River Meon can be completed through trenchless construction.</p>
Hydraulics	<p>The crossing of the River Meon is one of the lowest points within the corridor section route. The topography increases north of Wickham, which means that a pumping station may be needed at the Intermediate Pumping Station 3 Zone.</p>
Landscape	<p>The corridor section is within the Lower Meon Valley Area of Special Landscape Quality and adjacent to the western boundary of Portsdown Hill and Fareham Areas of Special Landscape Quality. The landscape is described as a wooded and enclosed and the Hampshire Character Assessment notes the tranquillity of the landscape.</p> <p>Ancient woodland is adjacent to the corridor section, meaning that the siting of the pipeline route should ensure an adequate buffer to avoid impacts.</p> <p>There are 9 TPOs throughout the corridor section.</p> <p>This corridor section would provide a route outside of the South Downs National Park.</p>
Ecology	<p>The corridor section crosses the River Meon which is upstream of the Southampton and Solent Water Ramsar. It is also a compensatory habitat under the Southern Water drought scheme. Any hydrological impacts to the River Meon could potentially impact the Ramsar site. Trenchless crossing of the River Meon would reduce the potential for impacts, and could be extended across the floodplain grazing marsh to avoid impacts to this functionally linked habitat. Further assessment is required to ensure that trenchless crossing of the River Meon would not pose a hydrogeological risk to the watercourse or the functionally linked floodplain grazing marsh.</p> <p>The western alternative route at Titchfield Lane would intersect an area of deciduous woodland priority habitat and ancient woodland. A route along Titchfield Lane, or the eastern option would be preferred in terms of the dNPS as it would avoid ancient woodland.</p>
Heritage	<p>The corridor section is directly adjacent to Little Park Mansion which is a grade II listed building.</p>

Topic	Open Cut Route Constraints
	<p>The Chichester to Bitterne Roman Road intersects the corridor section and there is a high potential for archaeology.</p> <p>The eastern option at Titchfield Lane is least preferred as the pipeline route would be close to the Wickham Heritage Conservation Area.</p>
Water Quality	The corridor section crosses the river Meon which is a chalk river and as such is sensitive to the supply of fine sediment or changes in hydrology. Trenchless crossing of this watercourse and its associated floodplain would reduce potential impacts.
Flood Risk	The corridor section crosses areas of flood zone 2 and 3 associated with the river Meon. Flood risk will need to be managed during construction in this area.
Geology and Soils	Historic landfills have been identified adjacent to the corridor section. Mitigation is required to ensure there is no mobilisation of contaminants as a result of construction activities.
Planning	The corridor section intersects the Welborne Garden Village development. The corridor section also intersects land subject to an application for 200 dwellings and green infrastructure. Further coordination would be required.
Socio-economics	The corridor section intersects Wickham Park Golf Club, and therefore construction will result in land take from the golf club. The western route at Titchfield Lane or the route along Titchfield Lane would reduce the amount of land required. The eastern option crosses further into the golf club, requiring more land.
Special Category Land	<p>The south east of the corridor section intersects with land owned by Homes England.</p> <p>The arrangements for the land required within Wickham Park Golf Club would need to be established.</p>

Conclusion

This corridor is outside of the South Downs National Park but is located in a sensitive landscape. There is potential for ecological and hydrological impacts associated with watercourse crossings, requiring mitigation. The corridor section crosses Wickham Park Golf Club and there are intersections with other development proposals, which require further co-ordination.

Additional options were introduced to address constructability constraints associated with works to Titchfield Lane. The western route is not preferred as a result of direct impacts to ancient woodland and the golf club. The original route and the eastern route have constraints relating to impacts on the road network and impacts on Wickham Park Golf Club.

This corridor section is being progressed as part of the preferred corridor.

4.5.5. Corridor Section Y

Corridor Section Y connects northwest from either Corridor Section V or Corridor Section W to Corridor Section Z. Given the corridor section's proximity to residential receptors when crossing Winchester Road and Black Horse Lane there are options in the corridor section.

Maps of Corridor Section Y can be viewed on Sheets 8 and 9 of the Book of Maps.

Table 28 - Corridor Section Y constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>The crossing at the High Street in Shirrell Heath is a pinch point close to several residential properties.</p> <p>Another pinch point is located when crossing Winchester Road (B2177). A trenchless crossing would likely be required, however there is limited space to the west of Winchester Road given the residential properties in the area. The northern option provides an alternative route further north for crossing Winchester Road, where there are fewer residential properties.</p> <p>Trenchless crossing of the River Hamble would be required.</p>
Hydraulics	<p>The corridor section crosses three river valleys related to the River Meon and Hamble, with little scope to avoid high points. Trenchless crossings at Shirrell Heath and Curdridge Lane would flatten the hydraulic profile.</p>
Landscape	<p>Construction may have temporary effects on landscape, including, field boundaries, trees and woodland. There is potential for visual amenity impacts on residential receptors during construction. The corridor section crosses Pilgrims Trail long distance route. There is potential for a change of view from this route during construction.</p>
Ecology	<p>The corridor section crosses the River Hamble which is upstream of the Solent Maritime Special Area of Conservation and Solent and Southampton Water Ramsar. A trenchless crossing would be needed to avoid hydrogeological impacts.</p> <p>The corridor section crosses an area of deciduous woodland priority habitat. The northern option at Winchester Road and Black Horse Lane crosses traditional orchard priority habitat. If habitats were lost, compensation may be required.</p> <p>Turtle Dove population(s) have been identified within the corridor section. Removal of hedgerows and scrub within the proximity of these areas should be avoided.</p>
Heritage	<p>There are no nationally designated heritage assets within the corridor section. There is potential for buried archaeology around the River Hamble. Careful placement of trenchless crossing shafts would be required.</p>
Water Quality	<p>The River Hamble should be crossed trenchless to avoid impacts to the hydrology or geomorphology of the watercourse. The corridor section is within the River Hamble and Hamble Estuary Urban Waste Water Treatment Directive Catchments. Construction works should consider how temporary waste water is managed.</p>
Flood Risk	<p>The corridor section crosses flood zone 2 and 3 when crossing the River Hamble. Trenchless construction across the river would minimise and avoid impacts within high-risk flood areas.</p>
Geology and Soils	<p>The corridor section crosses the Land at Rossgarth historic landfill. The northern option at Winchester Road and Black Horse Lane would avoid potential contaminated land impacts.</p>

Topic	Open Cut Route Constraints
	<p>Shirrell Heath Sand Pit is adjacent to the corridor section and Ash House Farm historic landfill is partially within the corridor section. There is potential for contaminated land in this area.</p> <p>The corridor section intersects areas of Grade 1 agricultural land.</p>
Planning	<p>South of Waltham Chase, west of the Winchester Road, there is a minerals and waste application for the excavation of 230,000 tonnes of soft sand with phased working and restoration backfilling with up to 435,000 tonnes of clean inert waste/materials. If construction works are to take place alongside the working of this site, there is potential for disruption to the road network and residents.</p>
Socio-economics	<p>The corridor section passes near to residential properties. The northern option at Winchester Road and Black Horse would be preferred as it avoids residential receptors.</p> <p>The corridor section is adjacent to the Meon Valley Hotel and Country Club. Routing to the north of the corridor section will mitigate impacts on this site.</p>
Special Category Land	<p>There is potential for impacts to open space provided by the Meon Valley Hotel and Country Club.</p>

Conclusion

The most significant constraints within this corridor section relate to constructability and the potential for construction work taking place close to residential properties. The northern option at Winchester Road and Black Horse Lane can be utilised to reduce potential impacts as well as standard construction mitigation. This corridor section is part of the preferred corridor.

4.5.6. Corridor Section Z

Corridor Section Z connects Corridor Sections X and Y in the southeast to Otterbourne in the north. The below table details the constraints within Corridor Section Z.

At Durley Street south of Newtown, there is optionality in the corridor section to avoid intersections with watercourses and electricity cables.

There is further optionality south of Fisher’s Pond, where the corridor section splits. The northern route (Z1) along Portsmouth Road (B2177), and the southern route (Z2) passes north of Crowdhill and adjacent to the Park Pale at Marwell scheduled monument, which is within an area of high archaeological potential.

At the north west of the corridor section, there are two options for crossing the River Itchen. The northern route (Z3) passes through the South Downs National Park. The southern route (Z4) passes south, outside of the South Downs National Park but intersects the floodplain of an upstream tributary of the River Itchen. Both. Both options would involve tunnelling under the River Itchen to avoid any direct works within the river.

Maps of Corridor Section Z can be viewed on Sheets 9, 10 and 11 of the Book of Maps.

Table 29 - Corridor Section Z constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>South of Newtown, the corridor section runs close to overhead power lines. To avoid this, the route would need to be located further north, encroaching on playing fields in Newtown. An alternative option was identified which allows the route to pass south of the overhead power lines.</p> <p>At Fisher’s Pond there are two options. There is the option to route north (Z1), along Portsmouth Road (B2177), and then continue north through Fisher’s Pond along Main Road (B3354). A culvert crosses Main Road, therefore a trenchless crossing could be required and associated temporary road closure and traffic management measures. Alternative to this route is routing further south using route Z2 towards Crowdhill. This involves a trenchless crossing of Winchester Road, re-joining the northern option near Brambridge.</p> <p>The constructability considerations for the two River Itchen options are described below:</p> <ul style="list-style-type: none"> ■ Northern Route (Z3): A tunnel to travel the full length under the River Itchen and cross the South West Main Line railway at an acute angle. An engineering case to justify the railway crossing at this angle would be needed, approved by Network Rail. A launch shaft would be constructed to the east of the River Itchen with reception shaft to the west of the railway. Leading to and from the shafts the pipeline would likely be laid as open cut. ■ Southern Route (Z4): The southern route would avoid construction in the National Park. A tunnel to travel the full length under the River Itchen is envisaged. This route crosses the South West Main Line railway at a more acceptable angle. Further engagement with Network Rail would be required. A launch shaft will be constructed to the east of the River Itchen with reception shaft to the west of the railway. Leading to and from the shafts the pipeline would likely be laid as open cut. This route provides a greater number of crossing opportunities of the River Itchen, with a view to increase the distance from the chalk aquifer which ground water is abstracted from. The further south the crossing is made, the more likely the crossing can be made through the impermeable clay strata which will offer protection to the nearby groundwater resources.
Hydraulics	<p>The east of the corridor section is hydraulically unconstrained except for a local high point south of Lower Upham. There is an opportunity to site a break pressure tank to enable gravity flows to Otterbourne in this corridor section. Should a break pressure tank not be required, the pipeline should be routed as far north as possible as it passes the two potential break pressure tanks sites to avoid elevation changes.</p> <p>There are no hydraulic differences between the two River Itchen crossing options.</p>
Landscape	<p>The length of the corridor section is in proximity of the South Downs National Park, especially at Lower Upham, but only a short section intersects the National Park (section Z3). The route should be sited to avoid potential adverse impacts on the setting of the National Park, in accordance with the dNPS.</p> <p>The landscape considerations of the two River Itchen options are described below:</p> <ul style="list-style-type: none"> ■ Northern Route (Z3): This route intersects the South Downs National Park and the remaining corridor section is within its setting. There is an alternative option to cross from east of the River Itchen to Otterbourne, which would be preferable in line with the dNPS.

Topic	Open Cut Route Constraints
	<ul style="list-style-type: none"> ■ Southern Route (Z4): This option is outside of the South Downs National Park. The corridor section is within a locally designated valued landscape where there is limited potential for effects on the special qualities of the landscape. Construction activity and siting would seek to reduce impacts to landscape character. There are TPOs within and adjacent to the corridor section which should be avoided. The corridor section intersects with the Itchen Way. There is potential for intrusive works to affect views from this route. <p>There are 4 TPO groups and 27 individual TPO trees within or adjacent to the corridor section. The route should avoid impact with these trees.</p> <p>Loss of trees, woodland and other landscape features will have an impact on Forest of Bere and Itchen Valley Landscape Character Areas.</p>
Ecology	<p>The corridor section intersects areas of floodplain grazing marsh, lowland meadow and deciduous woodland priority habitat, and the following Sites of Importance for Nature Conservation: Kimbers Copse, Chestnut Gulley Wood and Fielders Farm Meadows. These areas should be avoided where possible to prevent habitat loss.</p> <p>The northern route (Z1) at Fisher's Pond is preferred to avoid impacts to woodland within the southern route (Z2).</p> <p>The ecology considerations of the River Itchen crossing routes is as follows:</p> <ul style="list-style-type: none"> ■ Northern Route (Z3): This route involves tunnelling under the River Itchen and therefore avoids direct impacts on the Special Area of Conservation and Site of Special Scientific Interest designation. The further reduction of impacts is reliant upon constructing the tunnel within the clay ground and avoiding alluvium which supports habitats within the River Itchen. Further design work is required to ensure this. West of the River Itchen, the route intersects floodplain grazing marsh priority habitat associated with a tributary of the River Itchen, which should be considered functionally linked to the River Itchen Special Area of Conservation. Siting the pipeline route as far east within the corridor section would reduce the potential loss of habitat. ■ Southern Route (Z4): This route involves tunnelling under the River Itchen, which avoids impacts on the Special Area of Conservation and Site of Special Scientific Interest designation. The reduction of impacts assumes on a tunnel within the clay ground and that avoiding alluvium which supports habitats within the River Itchen. Further design work is required to ensure this is feasible. As this route option is sited further south to avoid intersecting the South Downs National Park, the route intersects with a tributary of the River Itchen which has the potential to harm the SPA. Trenchless crossing of this tributary would reduce impacts however this is unlikely to result in a significant reduction in risk as construction activity will be required within the floodplain of the tributary. The intersection of the tributary of the River Itchen west of the River Itchen would result in intersecting floodplain grazing marsh priority habitat. Construction activity is likely to result in the loss of priority habitat. The route is adjacent to the Otterbourne Wood Site of Importance for Nature Conservation. There is potential for impacts to root protection zones, and therefore adequate buffers should be implemented to avoid these impacts.
Heritage	<p>The southern route (Z2) at Fisher's Pond is adjacent to the Park Pale at Marwell Scheduled Monument. This is associated with further heritage assets at Marwell Manor which is north east of the corridor section where there are further Scheduled Monuments. There is potential for nationally significant buried archaeology in this area which could be impacted during construction.</p>

Topic	Open Cut Route Constraints
	<p>The southern River Itchen crossing option (Z4) is adjacent to the Moat Otterbourne Manor scheduled monument. There is potential for impacts to the setting of this site. The northern route (Z3) is approximately 200 m away from the scheduled monument.</p>
Water Quality	<p>South of Newtown, the corridor section runs along the route of a watercourse. This watercourse drains into a sensitive system related to the River Hamble, and therefore mitigation will be required to avoid increased in the supply of fine sediment and contaminants. The southern option at Durley Street is preferable to avoid this watercourse.</p> <p>South of Lower Upham, the corridor section crosses Source Protection Zone 1 and 2. There may be constraints related to deep excavation in this area, although near-surface excavations are likely to be acceptable.</p> <p>The southern route option (Z2) at Fisher’s Pond is preferred, however both options would involve more than one water course crossing. The northern option (Z1) would involve crossing in Source Protection Zone 2, but this would be avoided in the southern option.</p> <p>Crossing the River Itchen involves crossing a number of other watercourses that are connected to it. During construction there is potential for water quality impacts through the supply of fine sediment and contaminants. A tunnelled crossing of the River Itchen would avoid direct impacts. The southern route intersects (Z4) an additional tributary of the River Itchen and has potential for greater water quality impacts than the northern route (Z3).</p> <p>The area is within Source Protection Zone 1. Therefore, there will be constraints related to deeper excavations for trenchless crossings. Construction work related to the crossing would be preferable within the London Clay, below the alluvium that supports the river and above the chalk that supports the groundwater abstraction.</p>
Flood Risk	<p>South of Fisher’s Pond, the corridor section intersects Flood Zone 2 and 3. The southern option (Z2) runs along flood zone 2 and 3, and as a result of the sequential test, the northern option (Z1) would only involve a minor crossing of flood zone 2 and 3.</p> <p>Further detailed siting of tunnel launch and reception shafts would be required for crossing the River Itchen given the proximity to areas of Flood Zone 2 and 3.</p>
Geology and Soils	<p>The western option at Durley Street would be preferred, to avoid existing sources of contamination.</p> <p>The south route (Z2) at Fisher’s Pond crosses through Crowdhill historic landfill. Ground investigation is required to assess contamination risk. Therefore, the northern option (Z1) is preferred.</p> <p>The southern route (Z4) across the River Itchen intersects with a historic landfill at land between Brambridge Road and Kiln Lane. There is potential for the mobilisation of contaminants which could impact human health and controlled waters. Construction in this area should be avoided. Ground investigation is required to assess the risk posed by this source of contamination. The potential pipeline and tunnel route would avoid this site.</p>

Topic	Open Cut Route Constraints
	Crossing of the River Itchen and South Downs National Park would be preferable within the London Clay to keep out of the principal aquifer.
Planning	<p>The corridor section is adjacent to housing allocations south of Bishop’s Waltham. The southern option at Durley Street would be preferred to avoid any potential impacts related to compatibility with future developments.</p> <p>The corridor section intersects the route of the Esso Southampton to London Pipeline, consultation is required to understand potential for compatibility and constraints.</p>
Socio-economics	<p>The southern option at Durley Street is preferred to avoid impacts to playing field south of Newtown.</p> <p>The southern route (Z2) at Fisher’s Pond is preferred to avoid disruption to the road network and local community.</p>
Special Category Land	West of Bishop’s Waltham are allotments, which are adjacent to the corridor section.

Conclusion

The corridor section runs south of the South Downs National Park except for optionality at Z3 which intersects a small part of the National Park. Routing should seek to limit any potential impacts to the setting of the National Park.

This corridor section is to be taken forward as part of the preferred corridor section as it is required for the connection to Otterbourne.

Both the northern (Z3) and southern (Z4) routes for crossing the River Itchen are being taken forward to allow for comparison given the potential constraints associated with each option. Both routes would tunnel under the River Itchen.

The northern route (Z3) is within the South Downs National Park and therefore a reasonable alternative should be sought in line with the dNPS. The southern route (Z4) has increased interfaces with tributaries of the River Itchen, which could harm the River Itchen Special Area of Conservation and Site of Special Scientific Interest.

4.6. Corridor Section Evaluation: Corridor Sections that are Not Being Progressed

4.6.1. Corridor Section Q

This corridor section has been identified as an alternative corridor section to Corridor Section O as the first part of the pipeline corridor from Havant Thicket Reservoir to Otterbourne. This route encounters a number of level differences as a result of underpasses and overpasses, which would make construction challenging. A tunnelled route was not progressed as no adequate locations for intermediate shafts required for the safe operation of the tunnel boring machine were identified. As such, only an open cut route was taken forward for evaluation.

Corridor Section O also acts as a connection from the water recycling plant to Havant Thicket Reservoir, as well as potentially the first part of the transfer pipeline from Havant Thicket Reservoir to Otterbourne, therefore, if this corridor section were to be progressed, Corridor Section O would still be required.



Maps of Corridor Section Q can be viewed in Sheet 12 and 13 of the Book of Maps.

Table 30 - Corridor Section Q constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>At the east end of the route, a full road closure is potentially required on Calshot Road to cross a culvert under the road.</p> <p>Trenchless crossings would be required for crossing the A3(M). The A3(M) is in a cutting at this point, and therefore the shaft will need to be deep. Locating the shaft to the west of the A3(M) will be very difficult due to the lack of access due to housing and wooded areas.</p> <p>Level differences and various underpasses make open cut through Waterlooville unviable. Trenchless construction would be difficult due to limited space available for shafts, and deep crossings required to account for level differences and underpasses. Longer lengths of the corridor section would only be possible by tunnelling. An alternative to the open cut route by tunnelling was considered. However, intermediate shafts would have to be located within the road network, which would result in extended periods of road closures on key routes in Waterlooville. Therefore, this option was not progressed.</p> <p>Trenchless construction would be required around the under-construction Berewood development. The trenchless route will need to be deep to account for drainage channels. The ground in the area of this route has a high water content presenting further constructability constraints.</p>
Hydraulics	<p>The topology of the corridor section peaks in the centre of Waterlooville which precludes the possibility of a gravity feed from east to west through open cut construction. This means that a pumping station would be required to the east of the A3(M) and west of Havant Thicket Reservoir.</p> <p>The built ground level within the corridor section is undulating with relatively sharp ground level changes, especially in the centre of Waterlooville and around the B2150 and A3(M). This would require many air and washout valves, or a flatter pipeline profile which will require substantially deep trenches or trenchless construction in multiple locations. This is hydraulically undesirable as it leads to higher energy losses.</p>
Landscape	<p>Trenchless crossing of the A3(M) will require construction shafts in wooded areas, and therefore there is potential for the loss of areas of woodland which characterises the landscape.</p>
Ecology	<p>The route crosses the Hermitage Stream, which is upstream of the Solent Maritime Special Area of Conservation and the Solent and Southampton Water Ramsar site. There is potential for pollution as a result of construction activity which would adversely impact water quality within the stream and the designated sites. Trenchless construction underneath the river and best practice measures would be employed which would reduce the potential for impacts.</p> <p>Deciduous woodland priority habitat can be found adjacent to the A3(M) within the corridor section and floodplain grazing marsh priority habitat is found within the west of the corridor section. There is potential for temporary loss of habitats during construction which would require reinstatement.</p>

Topic	Open Cut Route Constraints
	<p>The corridor section intersects a Site of Importance for Nature Conservation and is within the Havant Castle Bechstein Bat area.</p>
Heritage	<p>There are no designated heritage assets or sites within the corridor section. At the eastern end of the corridor section, there are two non-designated heritage assets within the corridor section: scatter or flint flakes and possible enclosure at Dunsbury Hill. Detailed assessment is required to identify the potential for impacts and mitigation.</p> <p>As a result of a lack of development at the east of the corridor section, the potential for buried archaeology is unknown. West of Waterlooville, the route should be kept as far south as possible, away from the watercourse to avoid encountering buried archaeology located around the river.</p>
Water Quality	<p>Crossing of the Hermitage Stream, Potwell Tributary, Old Park Stream and Park Lane Stream will be required. There is potential for pollution to the watercourses as a result of construction works. Trenchless crossing of the watercourses and best practice mitigation should be employed to reduce potential impacts.</p> <p>The corridor section is within Source Protection Zone 1, there is potential for impacts on groundwater quality resulting from the introduction of contaminants during construction.</p>
Flood Risk	<p>The corridor section intersects with high flood risk areas associated with river crossings.</p>
Geology and Soils	<p>Dunsbury Hill Farm historic landfill is within the corridor section at the east end. If construction is required within this area, suitable mitigation will be required.</p>
Planning	<p>West of Waterlooville, the corridor section route intersects the under-construction Berewood development. Further siting of the pipeline route at future design stages would be required to avoid impacts to this development.</p> <p>West of Havant Thicket Reservoir, the corridor section intersects consented commercial/employment development which is under-construction. It is assumed that the pipeline can be routed to avoid conflict with this development.</p>
Socio-economics	<p>The open cut route through the road network in Waterlooville would be near a large volume of housing and community facilities including schools. There is potential for temporary impacts to human receptors through dust emissions, vehicular/plant emissions, and the generation of noise and vibration during construction with limited scope to avoid impacts resulting from proximity to receptors.</p> <p>Construction within the road network would result in disruption to a key transport route in Waterlooville, as well as potentially restrict the access to community facilities and businesses.</p>
Special Category Land	<p>There is potential for an area of woodland east of the A3(M) to be undesignated public open spaces given the proximity of residential properties. However, that would need to be confirmed through further surveys and questionnaires.</p>

Conclusion

An open cut route would have numerous constructability, hydraulics and engineering constraints related to ground level differences and the limited space available given the corridor section runs through a built-up area. A tunnelled route was considered to be unviable given the lack of available space in Waterlooville for intermediate shafts.

The environmental constraints relate to potential ecological and landscape impacts associated with the crossing of the A3(M). There is also potential for impacts to residential properties and community facilities through noise, vibration and air quality.

4.6.2. Corridor Section M

Corridor Section M has been identified as a connection from Corridor Section R northwards to Corridor Section N which is an alternative to Corridor Section W. It involves descending from Portsdown Hill into the valley or the River Wallington.

Maps of Corridor Section M can be viewed in Sheet 5 of the Book of Maps.

Table 31 - Corridor Section M constraints overview

Topic	Open Cut Route Constraints
Constructability	The corridor section is located in mostly agricultural land, and there are limited major crossings. The River Wallington would be crossed using trenchless techniques. Trenchless crossings of roads and hedgerows can be utilised when required.
Hydraulics	The corridor section runs north to south into the River Wallington Valley. Utilisation of this option would increase the risk of requiring additional above ground plant across the route.
Landscape	The corridor section is within the Forest of Bere Landscape Character Area. There is potential for the loss of field boundaries and trees which would result in disruption to the existing landcover. Loss of landscape defining features should be avoided and minimised where possible. The corridor section intersects Wayfarer’s Walk, Pilgrim’s Trail, Staunton Way and Allen King Way. There is potential for disruption to the appreciation of views from these routes.
Ecology	The corridor section is adjacent to areas of ancient woodland. Therefore, appropriate buffers should be applied to avoid direct and indirect impacts to ancient woodland. There is potential for impacts to deciduous woodland and floodplain grazing marsh priority habitat. Works within these areas should be reduced and avoided where possible. Any loss of priority habitat should be compensated. The corridor section is adjacent to Ashleydown Coppice and Ham Coppice SINSs. Therefore, appropriate buffers should be applied to avoid direct and indirect impacts to these sites.
Heritage	The corridor section is approximately 730m west of Southwick Brewhouse scheduled monument, approximately 850m west of Southwick Priory scheduled monument, and approximately 640m west of the Church of St James without the Priory Gate Grade I listed building. Direct impacts to the scheduled monuments would be avoided given the

	<p>distance. However, there is potential for impacts to the settings of these heritage assets during construction.</p> <p>The corridor section is approximately 150m west of Southwick Conservation Area. There is potential for impacts to the character and setting of the conservation area as a result of construction activities.</p> <p>There is potential for buried archaeology within the corridor section as a result of the presence of post-medieval heritage sites.</p>
Water Quality	<p>The corridor section crosses the Potwell Tributary, which is a tributary of the River Wallington. There is potential for sediment supply and impacts to water quality during construction. Trenchless construction can be employed to avoid construction activity within the river.</p>
Flood Risk	<p>The corridor section intersects Flood Zone 2 and 3 associated with the crossing of a tributary of the River Wallington. There is potential for extended sections of the corridor section to run parallel and adjacent to high flood risk areas. In accordance with the sequential test, more suitable alternatives should be explored above this corridor section considering this interface with a high-risk flood zone and the potential to increase flood risk during construction.</p>
Geology and Soils	<p>Sections of the corridor section are within Grade 3 agricultural land.</p>
Planning	<p>The corridor section does not directly intersect any existing development or consented sites, however does run adjacent to a small number of residential properties. The pipeline should be sited to avoid close proximity to existing properties.</p>
Socio-economics	<p>No constraints identified</p>
Special Category Land	<p>No constraints identified</p>

Conclusion

This corridor could provide an alternative to a route through part of Corridor Section R, by routing further north and reducing the interfaces with heritage assets south of Corridor Section R. It avoids the interfaces with consented developments in the west of Corridor Section R. This is also an alternative to a route through Corridor Section S where there is potential for impacts to ancient woodland, ecological sites and a number of constructability constraints.

Corridor Section M is largely in an area at high risk of flooding. National policy dictates that the sequential test should be applied. There are currently other corridor sections that do not pass through high flood risk areas to the extent of Corridor Section M, and these should be progressed ahead of this corridor section.

The elevation of this corridor section results in an increased likelihood of requiring additional permanent above ground plant further along the pipeline route in Corridor Sections V and Z.

As a result of the above constraints, this corridor section is not currently being progressed.

4.6.3. Corridor Section S

Corridor Section S runs from the Corridor Section R intersection west of Widley, prior to progressing south of Furzeley Corner and towards Shoot Hill before joining with Corridor Sections W or X.

Maps of Corridor Section S can be viewed in Sheet 3, 13 and 14 of the Book of Maps.

Table 32 - Corridor Section S constraints overview

Topic	Open Cut Route Constraints
Constructability	<p>Predominantly over open agricultural land.</p> <p>One major pinch point is between two areas of ancient woodland (Dunslund Coppice and Wards Coppice) south of Furzeley Corner.</p> <p>Further access points to the road network may be required.</p> <p>Further along route there appears to be habitat corridors joining sections of ancient woodland and these would need to be cleared if open cut option is used. This would also form a permanent wayleave where no major vegetation would be allowed to grow to protect the pipeline and maintain access.</p> <p>The corridor section goes straight through a solar farm which is approximately 850m long. A trenchless technique would require clearing a section of solar panels and associated infrastructure to allow access and construction from the intermediate locations.</p> <p>An open cut solution would require the whole wayleave to be cleared of panels and associated infrastructure.</p> <p>A route through Furzeley Golf Course then heading West along the Southern boundary of Creech Wood would avoid the solar farm but still involve either removing some solar panels and infrastructure to allow an open cut option or a trenchless solution to get from the golf course to the West of the solar farm.</p> <p>There may also be potential risks associated with accessing the pipeline for maintenance.</p>
Hydraulics	<p>There are no major elevation changes, with the possible exception of any trenchless sections. There are no constraints relating the hydraulics of the corridor section.</p>
Landscape	<p>The corridor section is within the Forest of Bere Landscape Character Area (LCA) characterised as a secluded landscape comprising pastures and woodland. Construction of the pipeline route has the potential to impact the tranquillity of the landscape and result in the temporary loss of woodland.</p> <p>There is potential for limited impacts to the visual amenity of residential receptors in proximity of the corridor section. The corridor section additionally intersects Allan King Way and Wayfarer’s Walk long distance routes where there is potential for intrusive works to disrupt the appreciation of views during construction.</p>
Ecology	<p>The corridor section crosses the River Wallington which is functionally linked to the Portsmouth Harbour Special Protection Area and Ramsar in two locations. Impacts to the hydrology of the watercourse has the potential to impact these designated sites. Trenchless crossing of the river would avoid these impacts.</p> <p>The corridor section intersects multiple priority habitats: floodplain grazing marsh, deciduous woodland, lowland meadows, fen marsh and swamp, as well as intersecting a</p>

Topic	Open Cut Route Constraints
	<p>number of Sites of Importance for Nature Conservation. Some intersections will be unavoidable within the proximity of the River Wallington, east of Beckford Lane.</p> <p>The corridor section route is flanked by ancient woodland in parts. There is a section where the corridor section passes through a pinch point between two areas of ancient woodland where it would not be feasible to provide a minimum of 15m buffer as advised by Natural England and the Forestry Commission (see <i>Ancient woodland, ancient trees and veteran trees: advice for making planning decisions</i>, 2022). Given the pipeline would be laid within a trench, there will be direct impacts to the root systems of trees within the ancient woodland. To avoid this impact, a tunnel would be required given the depth and distance a trenchless solution would be needed for. Permanent tunnel shafts would have a large land take impact, and a permanent access road would be required. There is currently no road access to this location and therefore a route of approximately 1 km would be required. A tunnelled option would result in significant construction activity in the proximity of ancient woodland and construction of the tunnel has the potential to pose further indirect impacts through polluting the ground and ground water.</p>
Heritage	<p>No nationally designated heritage sites within the corridor section. There are multiple grade II listed heritage assets located north of the northern section of the corridor section. Mitigation would be required to avoid impacts to the setting and character of these assets.</p> <p>The Chichester to Bitterne Roman Road intersects the corridor section. There is potential for buried archaeology in this area.</p>
Water Quality	<p>The east of the corridor section is within Source Protection Zone 1, and the west of the corridor section is within Source Protection Zone 2. Mitigation will be required to ensure there are no impacts to groundwater during construction.</p> <p>The corridor section crosses multiple rivers along the corridor section but these are not sensitive, standard mitigation will be required to ensure impacts to the geomorphology of the watercourses are avoided and sediment supply is prevented. Trenchless crossing of watercourses would reduce these risks.</p>
Flood Risk	<p>South of Hipley, the corridor section runs through flood zone 2 and 3 for a distance of approximately 250 m, alongside the River Wallington. Trenchless crossing of the river can be utilised but this is unlikely to stretch across the length of the flood risk areas. South of the intersection, the corridor section runs adjacent to flood zone 2 and 3. In line with the sequential test, there are other corridor sections with less of an interface with high risk flood zones.</p>
Geology and Soils	<p>No impact on geologically designated sites.</p> <p>No sources of contamination within the corridor section have been identified.</p> <p>The length of the corridor section runs through Grade 4 agricultural land, based on the Agricultural Land Classification. Grade 4 land is categorised as poor quality agricultural land. This land does not constitute the Best and Most Versatile (BMV) agricultural land, which falls in grades 1 to 3a.</p>
Socio-economics	<p>The corridor section intersects with Furzeley Golf Course. Construction of the pipeline could result in land take from the golf course.</p>

Topic	Open Cut Route Constraints
	Construction through the solar farm will be complicated and compensation may be required if there is disruption to the operation of the site.
Planning	There is an existing solar farm within the corridor section at Furzeley Corner. We would need to agree an interface with this development.
Special Category Land	<p>There is concern around the potential land take at the golf course. Engagement will be required to agree arrangements during construction and potentially provision of replacement land.</p> <p>There are implications relating to construction of the pipeline through the solar farm. There is limited opportunity to route around the solar farm given this would involve routing through either ancient woodland to the south, or Furzeley Golf Course and land owned by the Department for Environment, Food and Rural Affairs (Defra) to the north.</p>

Conclusion

The intersection with the solar park at Furzeley Corner presents significant constructability risks, given there is no opportunity to route around this site as ancient woodland lies to the south. To the north lies Furzeley Golf Course and Defra owned land. Therefore, there would potentially be a need to provide replacement land as Crown land would be affected. There would be a potential need for extensive lengths of tunnelling or trenchless solutions.

Another significant constraint is the proximity to ancient woodland at a pinch point in the corridor section, where there is potential for direct impacts. The dNPS requires avoiding loss or deterioration of ancient woodland unless there are wholly exceptional reasons. To avoid this impact, a tunnel would be required given the depth and distance a trenchless solution would be needed for. Permanent tunnel shafts would have a large land take impact, and a permanent access road would be required. There is currently no road access to this location and therefore a route of approximately 1 km would be required. A tunnelled option would result in significant construction activity in the proximity of ancient woodland.

Other constraints are related to the presence of priority habitats and impacts on functionally linked habitat within the Portsmouth Harbour Special Protection Area and Ramsar, which are unavoidable.

Due to the topography of this route, there is increased likelihood of requiring additional permanent above ground plant further along the route. As a result of the constructability challenges, environmental constraints and requirement for further permanent above ground plant, this corridor section should not currently be progressed.

4.6.4. Corridor Section W

Corridor Section W runs from Creech Farm west of Furzeley Corner before intersecting the B2177 and joining with Corridor Section R near Carmans Farm to the west.

Maps of Corridor Section W can be viewed on Sheets 7 and 15 of the Book of Maps.

Table 33 - Corridor Section W constraints overview

Topic	Constraints
Constructability	<p>At the east of the corridor section, a crossing of Trampers Lane is required. Given that this road is narrow, a road closure will be required. The corridor section will come into close proximity of residential properties on the west side of Trampers Lane and further west, on Firgrove Lane.</p> <p>Construction is required on Southwick Road (B2177) which is a busy road with various junctions. A lane closure would be required which would cause disruption. There is an off-road option north of North Boarhunt which could be utilised to reduce the distance construction is required on Southwick Road. West of Hundred Acres, there is an option for the corridor section to continue along Southwick Road to the junction with the A32 in Wickham, or route through open fields north of Southwick Road (within the South Downs National Park).</p> <p>Once the A32 has been crossed by both options, a crossing of the River Meon is required. Trenchless crossing would be required, and woodland would need to be cleared to allow for shaft construction.</p> <p>The original corridor section runs north adjacent to a disused railway, which is crossed at Northfields Farm House. There is an option to route west earlier which could be utilised to minimise the intersection with the South Downs National Park in this section. Trenchless crossing of the disused railway will be required for both options.</p>
Hydraulics	<p>The corridor section is constrained by the Forest of Bere and residential properties, which forces the corridor section through undesirable changes in elevation, including a local high point in the centre of the corridor section, as well as a number of bends which is hydraulically undesirable, leading to higher energy losses. The corridor section crosses the Meon Valley to the west where there is a steep level change. An intermediate pumping station is required before the elevation increase within this corridor section.</p>
Landscape	<p>This corridor section intersects the South Downs National Park. Given the dNPS requires looking at options to develop the Project outside of the National Park in the first instance, the intersection presents significant risks to the consentability of this corridor section. Given there are other corridor sections that do not intersect the National Park, these should be preferred over this corridor section.</p> <p>There is difficulty in identifying alternatives as part of this corridor section that go outside of the South Downs National Park, as the South Downs National Park is adjacent to Wickham. Therefore, an alternative route would have to divert around Wickham.</p>
Ecology	<p>The corridor section crosses the River Meon which is upstream of the Southampton and Solent Water Ramsar. It is also compensatory habitat under a Southern Water drought scheme being delivered separate to this Project. Any hydrological impacts to the River Meon could potentially impact the Ramsar site. Trenchless crossing of the River Meon would reduce the potential for impacts on it, and if it is extended across the floodplain grazing marsh then it can avoid impacts to this functionally linked habitat adjacent to the river. Further assessment is required to ensure trenchless crossing of the River Meon would not pose hydrogeological impacts to the watercourse or the functionally linked floodplain grazing marsh.</p>

Topic	Constraints
	There is potential for habitat losses within this corridor section associated with the corridor section intersecting priority habitats, the South Downs National Park and Sites of Importance for Nature Conservation. Land take from these sites should be minimised.
Heritage	<p>The corridor section is in the vicinity of grade II and II* listed buildings, however these are not within the corridor section. The southern corridor section which continues along Southwick Road to the A32 junction will be in closer proximity to listed buildings, including St Nicholas’s Church (grade II* listed), as well as Wickham Conservation Area. Mitigation could be required for any potential settings impacts.</p> <p>Much of the corridor section traverses undeveloped land where there is potential for buried archaeology.</p>
Water Quality	<p>Trenchless crossing of the River Meon would reduce the potential for impacts to the hydrology and geomorphology of the river.</p> <p>The pipeline route would be preferred near the River Meon, as this keeps to the west of the corridor section, away from the floodplain.</p>
Flood Risk	The corridor section crosses flood zone 3 when crossing the River Meon. Mitigation will be required to manage flood risk.
Geology and Soils	<p>No impact to geologically designated sites.</p> <p>The northern off-road route at North Boarhunt is preferred over routing on the road and the option to route west out of the South Downs National Park earlier is preferred to avoid closed permitted landfill to the north of the other route.</p>
Socio-economics	<p>Avoiding the B2177 would be preferred by either routing north or south given the disruption that would be caused through construction on this busy route.</p> <p>If the southern corridor section option along Southwick Road to the A32 junction in Wickham is followed, access to St Nicholas Church would be impacted.</p>
Planning	Given the intersection of the corridor with the South Downs National Park, and the requirements of the dNPS, an alternative corridor section should be progressed.
Special Category Land	<p>There are playing fields and allotments in North Boarhunt that should be avoided if possible.</p> <p>Routing south of the B2177 would involve routing through Wickham Common, an area of common land. Under the Commons Act 2006, areas of common land are safeguarded to ensure the special qualities of the land are protected.</p>

Conclusion

There are significant constraints related to the intersection with the South Downs National Park, which is afforded significant protection in the dNPS. Given that there are other alternatives, this corridor section is not currently being progressed.

4.6.5. Corridor Section N

Corridor Section N is an alternative to Corridor Section W which routes through the South Downs National Park from Corridor Section S to Corridor Section V.

Maps of Corridor Section N can be viewed in Sheet 5, 6 and 14 of the Book of Maps.

Table 34 - Corridor Section N constraints overview

Topic	Constraints
Constructability	<p>This corridor section is located in mostly open agricultural land which lends itself to an open cut method.</p> <p>Along the corridor section there are minor and busy roads for the pipeline to cross, which can be constructed using open cut with a full road closure for the minor roads, and a lane closure for the major roads of suitable width.</p> <p>There are numerous locations where HV overhead cables are present so the route would need to be selected to mitigate the risk of crossing these.</p> <p>For the northern option, the River Meon would need to be crossed using a pipe jack technique due to the distance of the crossing, with a shaft constructed either side of the river. The western shaft would be situated in Wickham Park Golf Course.</p>
Hydraulics	<p>This corridor section is hydraulically similar to the Corridor Section W, in that the pipeline will pass over a local high point in between the River Wallington valley and the River Meon valley. A key difference is that this corridor section places the pipeline closer to the deepest parts of the River Wallington valley and runs alongside the River Wallington for some distance. Due to the relatively short distance to the start of the route, this key difference is unlikely to require additional intermediate pumping. However, it may increase the pressure requirements in some scenarios. A second key difference is this corridor section is predominantly routed through fields, avoiding the requirement for a large number of pipeline bends as found within Corridor Section W which is routed via the road network in parts, this may alleviate some of the pressure requirements.</p>
Landscape	<p>The corridor section intersects the previously local designated landscape of Winchester (now considered valued) Meon Valley, and Forest of Bere Area of Special Landscape Quality, as well as the Forest of Bere East and Meon Valley Landscape Character Areas. There is potential for temporary impacts to landscape defining features and tranquility as a result of construction activity.</p> <p>It also passes Allen King Way, and Pilgrims Trail Long Distance Path and ends next to the Meon Valley trail.</p> <p>This corridor section would be preferable to the Corridor Section W as it would avoid the South Downs National Park.</p> <p>There would also be a need to avoid areas of woodland.</p>
Ecology	<p>There are numerous large areas of deciduous and ancient woodland directly adjacent to the corridor section. There would be no direct impact if buffers between the woodland and the construction and operation of the pipeline are implemented.</p> <p>There are a number of Sites of Importance for Nature Conservation adjacent to the corridor section. There would be no impact assumed if buffers are implemented.</p>

Topic	Constraints
	<p>The corridor section crosses the River Meon, which is upstream of the Southampton and Solent Water Ramsar site. It is also compensatory habitat under the Southern Water drought scheme. Any hydrological impacts to the River Meon could potentially impact the Ramsar site. Trenchless crossing of the River Meon would reduce the potential for impacts on it, and if it is extended across the floodplain grazing marsh then it can avoid impacts to this functionally linked habitat adjacent to the river. Further assessment is required to ensure trenchless crossing of the River Meon would not pose hydrogeological impacts to the watercourse or the functionally linked floodplain grazing marsh.</p>
Heritage	<p>There are no nationally designated heritage assets within the corridor section. Three grade II listed buildings are located in and near to the corridor section. Further assessment is required to evaluate any impact and understand likely mitigation requirements.</p> <p>There are a number of non-designated heritage assets within the corridor section, where construction works have the potential to pose impacts to buried archaeology. Further assessment is required to identify risk.</p>
Water Quality	<p>There are potential impacts to water quality through sediment supply and contamination during construction on the River Wallington below Southwick, River Meon and an unnamed watercourse at Prior's Hold Farm. Best practice mitigation would be required to avoid impacts.</p> <p>Trenchless crossing of the River Meon will prevent geomorphological and hydrological impacts during construction.</p> <p>The south of the corridor section intersects Source Protection Zone 2c and 3 designated for the Maindell abstraction. There is potential for impacts to groundwater quality as a result of construction activity. Best practice measures would be required to avoid impacts.</p>
Flood Risk	<p>As a result of the watercourse crossings within the corridor section, the corridor section intersects flood zone 2 and 3 and is routed through this area for an extended distance. In accordance with the sequential test, other corridor sections should be progressed ahead of this corridor section. Consultation with the EA and local flood authority is required to identify detail flood risk of the area. A localised assessment of topography during the detailed design stage will assist in defining overland flow pathways.</p>
Geology and Soils	<p>No impact on geologically designated sites.</p> <p>There is potential to construction within areas of contamination to impact controlled waters within the corridor section. Ground investigation is required to identify the risk posed by any sources of contamination within or in proximity to the corridor section.</p>
Socio-economics	<p>The majority of the site is agricultural and therefore there are no major constraints.</p> <p>The crossing of the A32 may temporarily affect access to community services in Wickham</p>

Topic	Constraints
Planning	Pipeline corridor section runs adjacent to a mobile home park and a number of rural dwellings in the North Boarhunt and Wickham areas. Best construction practice measures should mitigate this impact.
Special Category Land	The west of the corridor section is designated as open space by Fareham Borough Council.

Conclusion

This corridor section would route further south than the original corridor section, and therefore reduces the impact on the South Downs National Park. Mitigation would be required to avoid impacts to areas of woodlands and Sites of Importance for Nature Conservation in this area. Trenchless crossing of the river Meon is required to avoid sediment supply to the River Wallington. However, this option is considered preferable to Corridor Section W.

The most significant constraint within this pipeline is the intersection with an area of high flood risk around the River Wallington. There are other corridor sections that have fewer intersections with high-risk flood areas, and in line with the sequential test within the dNPS these should be progressed above this corridor. As such, this corridor is not currently being progressed.

4.6.6. Corridor Section T

The corridor section links Corridor Section X and Corridor Section Q. It lies within the South Downs National Park.

The corridor section begins at a point southeast of Furzeley Corner. It heads northwest along Forest Road and crosses Bunker’s Hill. There is an option for the corridor section to route south of Forest Road through Creech Woods. The River Wallington is crossed in multiple locations by the corridor section.

The south and west ends of the corridor section are through open fields where construction can be open cut. At the east of the corridor section, open cut will likely be difficult around Newlands Lane and Furzeley Golf Course as a result of a pond, drainage channels and residential properties.

The corridor section is narrow in several sections as it is routed through pinch points and along the road network. Therefore, a large number of pipeline bends will be required which will be hydraulically undesirable, leading to higher energy losses.

The corridor section cuts through the area where the two sides of Furzeley Golf Course meet at Furzeley Road. There is potential for land take from the golf course and impacts to the access.

Maps of Corridor Section T can be viewed in Sheet 13 and 14 of the Book of Maps.

Table 35 - Corridor Section T constraints overview

Topic	Constraints
Constructability	<p>The south and west ends of the corridor section are through open fields where construction can be open cut. At the east of the corridor section, open cut may be difficult around Newlands Lane and Furzeley Golf Course as a result of a pond, drainage channels and residential properties.</p> <p>The central section of the corridor section passes Creech Woods, there are two corridor section options, the first cuts through Creech Woods between Furzeley Road and Bunkers Hill, the second routes north of Creech Woods, along Forest Road south of</p>

Topic	Constraints
	<p>Denmead. The first option through Creech Woods could not be constructed open cut, given the limited clearance provided by the woodland, and therefore the section would need to be tunnelled. This route would also result in disruption to road users and residents on Bunkers Hill.</p> <p>The second route option would require construction within Forest Road, which is a busy route on a narrow road. There are locations where fields south of the road could be used, but road closures may be required at certain pinch points.</p>
Hydraulics	<p>Creech Woods is located on a localised hill and avoiding this area reduces the level of elevation change across the corridor section. There is a low level of elevation change throughout the remainder of the corridor section.</p> <p>The corridor section is narrow in several areas as it is routed through pinch points and along the road network. Therefore, a large number of pipeline bends will be required which will be hydraulically undesirable, leading to higher energy losses.</p>
Landscape	<p>There is potential for the loss of woodland and trees throughout the corridor section which define the character Forest of Bere Landscape Character Area. The pipeline route should be sited so that it avoids the removal of trees.</p> <p>Construction activities could adversely impact the visual amenity of residential receptors in the proximity of the corridor section.</p> <p>Users of the Allan King Way and Wayfarer’s Walk long distance routes could experience a disruption to the views during construction.</p> <p>There is 1 Tree reservation Order (TPO) group and 16 individual TPO trees located on the boundary of the corridor section. These areas should be avoided by the pipeline route to avoid potential damage to trees.</p>
Ecology	<p>The River Wallington is crossed in multiple locations by the corridor section. The watercourse is upstream of Portsmouth Harbour Special Protection Area and Ramsar. Any potential impacts to the hydrology of the river could impact the designated sites within Portsmouth Harbour. Impacts can be reduced through trenchless crossings of watercourses and the adjacent floodplain grazing marshes designated as priority habitat.</p> <p>The corridor section through Creech Woods would intersect with Creech Walk East Site of Importance for Nature Conservation. There is potential for a temporary loss of habitat.</p>
Heritage	<p>No impacts on any heritage assets within the corridor section. There is potential for buried archaeology in areas of open, undisturbed ground given their lack of development</p>
Water Quality	<p>There are four main river crossings within the corridor section. To avoid impacts on the hydrology and geomorphology of these rivers, trenchless crossings would be made.</p> <p>The corridor section is within Source Protection Zone 1 at Worlds End and Furzeley Corner. Mitigation will be required to ensure there are no impacts to groundwater during construction.</p>
Flood Risk	<p>The corridor section crosses flood zone 2 and 3 areas around river crossing sites, and the majority of the north corridor section along Forest Road is directly south of flood zone</p>

Topic	Constraints
	2 and 3. In line with the sequential test referenced in the dNPS, other alternatives have less interfaces with high flood risk areas and therefore should be pursued above this corridor section.
Geology and Soils	No impact on geologically designated sites. No significant sources of contamination within or around the corridor section. Construction within the road sections could encounter sources of contamination.
Socio-economics	There is potential for disruption to residential properties to the south of Denmead adjacent to the corridor section route as a result of construction activity in the road network, which could result in likely indirect air quality, noise and vibration impacts. The corridor section cuts through the area where the two sides of Furzeley Golf Course meet at Furzeley Road. There is potential for land take from the golf course and impacts to the access. It would be preferred to minimise construction on Forest Road given the potential for significant disruption to this key route.
Planning	The corridor section intersects the Denmead Waterlooville Settlement Gap Policy Area designated by the Denmead Neighbourhood Plan. Construction should aim to limit impacts to the rural character of this area.
Special Category Land	The corridor section route through Creech Woods intersects land owned by Defra and is Crown Land. Given the potential for disruption to Furzeley Golf Course, which has been identified as green space, consultation will be required to identify suitable arrangements during construction.

Conclusion

There are constructability challenges in this corridor section in relation to in-road works. Routing south of Forest Road through Creech Woods would result in adverse ecology and landscape impacts. Additionally, Creech Woods is owned by Defra. The alternative to this is routing along Forest Road south of Denmead, which could require road closure which will generate disruption to the road network posing impacts for the wider community in this area. This corridor section would also result in a route directly into the South Downs National Park and for this reason this corridor section is not being taken forward at this stage.

4.6.7. Corridor Section X

The corridor section links Corridor Section S or T to Corridor Section Z. Part of the corridor section intersects with the South Downs National Park between Budden’s Lane and Bishop’s Wood Road.

The corridor section begins at Newtown and heads north west and crosses Hundred Acres Road. It continues north west, following Liberty Road and Heath Road, crosses the A32 west of Soberton Heath, the River Meon, the Winchester Road (B2177), the River Hamble and joins Corridor Section Z at a point south west of Walthams Cross.

At the southeast of the corridor section, there are two corridor section sub-options have been developed through Newtown:

- Option X1 routes along Church Road, which is a narrow road passing a church and a school, and a road closure would potentially be required. East runs close to overhead power lines and tracks the route of a watercourse which drains into a sensitive system related to the River Hamble. A proposal to move this further east would encroach on playing fields in Newtown
- Option X2 crosses Church Road and routes west across open fields, crossing Hundred Acres Road and routing north to Liberty Road.

After the corridor section crosses the Winchester Road (B2177), two corridor section sub-options have been developed:

- X3 routes south along Bishop’s Wood Road and Forest Road. This would pose disruption to this road route.
- X4 routes north, south of Swanmore, and heads across open fields however the elevation changes as a result of a hill to the north. This would cross a playing field in Swanmore.

Maps of Corridor Section X can be viewed on Sheets 8, 9, 15 and 16 of the Book of Maps.

Table 36 - Corridor Section X constraints overview

Topic	Constraints
Constructability	<p>At the south east of the corridor section, there are two route options through Newtown. One option routes along Church Road, which is a narrow road passing a church and a school. A road closure will be required. The second option crosses Church Road and routes west across open fields, crossing Hundred Acres Road and routing north to Liberty Road where this options joins back to the first option.</p> <p>The route follows Liberty Road and Heath Road, which are narrow roads where road closures would be required to accommodate construction work.</p> <p>There is a significant level difference between Heath Road to the A32, open cut would be difficult as a result of the topography. A road closure would be required on Budden’s Lane.</p> <p>At the end of Budden’s Lane, the corridor section crosses a disused railway line and the A32, which are at different levels. Construction would need to take place under the railway. There is limited place for shafts as a result of woodland and residential properties.</p> <p>A trenchless crossing of the River Meon is required west of the A32.</p> <p>East of Waltham Chase, there are two options for the pipeline route. The first option routes south along Bishop’s Wood Road and Forest Road. This would pose disruption to this road route. The second option routes north, south of Swanmore, is across open fields. This would cross public open space in Swanmore.</p> <p>The north west of the corridor section requires trenchless crossing of the River Hamble. The route will need to be sited to avoid intersections with overhead pylons.</p> <p>The west of the corridor section, after the Meon Valley is less constrained allowing for greater flexibility in pipeline routing</p>
Hydraulics	<p>The east of the corridor section follows the local road network, which will require several bends and is undesirable for hydraulics. The corridor section reaches the highest point of the northern corridor section routes.</p>

Topic	Constraints
	<p>South of Bishop’s Waltham, the southern corridor section option would be preferred to avoid elevation changes as a result of a hill to the north.</p> <p>An intermediate pumping station will be required in the middle of the corridor section to lift flows from the Meon Valley after gravitating from Break Pressure Tank 3.</p>
Landscape	<p>The corridor section will intersect the South Downs National Park for a section along Budden’s Lane and Bishop’s Wood Road.</p> <p>The dNPS requires the National Park to be avoided unless there are exceptional circumstances. Given there are other corridor sections that do not intersect the National Park, these should be preferred over this corridor section.</p> <p>There are 3 TPO groups and 5 individual TPO trees within the corridor section. Construction works should avoid the removal of these trees.</p>
Ecology	<p>There are a number of large areas of ancient woodland adjacent to the corridor section within the South Downs National Park. Construction works should not result in the loss of any areas of ancient woodland.</p> <p>The corridor section crosses the River Hamble which is upstream of the Solent and Southampton Water Ramsar. Hydrological impacts to the river have the potential to indirectly impact the Ramsar site. The corridor section also intersects with floodplain grazing marsh associated with the River Hamble and River Meon. Trenchless crossing of the river will avoid impacts. The River Meon is also compensatory habitat under a Southern Water drought scheme being delivered separate to this project. Any hydrological impacts to the River Meon could potentially impact the Ramsar site. Trenchless crossing of the River Meon would reduce the potential for impacts on it, and if it is extended across the floodplain grazing marsh then it can avoid impacts to this functionally linked habitat adjacent to the river. Further assessment is required to ensure trenchless crossing of the River Meon would not pose hydrogeological impacts to the watercourse or the functionally linked floodplain grazing marsh. Turtle Dove population(s) have been identified within the corridor section. Removal of dense hedgerows and scrub within the proximity of these areas should be avoided.</p> <p>There is potential for significant populations of barbastelle bats within the Meon Valley and Bere Forest. Loss of habitats as a result of construction will impact these protected species.</p> <p>The corridor section intersects Bishops Waltham Branch Line Local Nature Reserve and a number of Sites of Importance for Nature Conservation. There is potential for loss of habitats within these sites.</p>
Heritage	<p>There are no designated heritage assets within the corridor section.</p> <p>Bishop’s Waltham Palace and Fishponds scheduled monument, and the wider Bishop’s Waltham conservation area is adjacent to the northwest of the corridor section. There are potential for impacts relating to the setting of these assets and buried archaeology.</p> <p>There is potential for buried archaeology around water crossings within the corridor section.</p>

Topic	Constraints
Water Quality	<p>There are several watercourse crossings within the corridor section. The most sensitive is the River Meon, which is a chalk river sensitive to sediment supply. Interaction with the river and its floodplain should be minimised through trenchless construction.</p> <p>The corridor section crosses a Source Protection Zone 1 in Newtown and south of Soberton Heath. Mitigation will be required to ensure there are no impacts to groundwater during construction.</p> <p>The River Hamble requires crossing, and a branch of this river is crossed multiple times by this corridor section south of Bishop’s Waltham. Trenchless construction may be required for longer sections within this wetland area.</p>
Flood Risk	<p>The corridor section intersects flood zone 3 when crossing the River Meon, the River Hamble and a larger wetland area south of Swanmore. Flood risk will need to be managed during construction.</p>
Geology and Soils	<p>There is a water treatment works historic landfill adjacent to the west of Bishops Waltham Railway Path within the corridor section. Ground investigation would be due to proximity of the landfill and the potential for contamination.</p> <p>South of Bishop’s Waltham, the southern option is preferred to avoid potential contamination associated with a water treatment works within the northern option.</p>
Socio-economics	<p>The church and school on Church Road in Newtown will be significantly impacted if road closures are required.</p> <p>There is potential for significant disruption to the local community as a result of road closures on Liberty Road and Heath Road.</p> <p>The corridor section crosses a playing field south of Swanmore. Mitigation through routing to avoid this site is required.</p>
Planning	<p>There are allocated housing sites that have been developed at Swanmore, therefore there are sensitive residential receptors in this area.</p> <p>The corridor section runs in close proximity to developed housing allocation south of Bishop’s Waltham.</p> <p>The corridor section crosses the site of an application for a solar farm south of Bishop’s Waltham. The northern route is preferred to avoid this potential future development.</p>
Special Category Land	<p>Public open space will be impacted at the playing fields in Swanmore.</p>

Conclusion

There are significant constraints related to the intersection with the South Downs National Park. The dNPS requires us to look to develop the Project outside of the National Park in the first instance, therefore, this corridor section is not being progressed as there are other alternatives available outside of the National Park.

Additionally, there are significant constraints related to ecology and constructability within this corridor section.



4.7. Above Ground Plant Zones Evaluation Outcomes

The book of maps which accompanies the Scheme Development Summary provides plans of all the above ground plant zones described below.

4.7.1. Intermediate Pumping Station 1 Zone

For routes through Corridor Sections S, W and Y, an intermediate pumping station at either this location or the Intermediate Pumping Station 5 Zone would be required.

The pumping station would need to be located at the east of Corridor Section W to account for the level changes at the west of the corridor section.

The zone is located directly adjacent to the Goathouse Complex Site of Importance for Nature Conservation between an ancient woodland (Goathouse Coppice) and Goathouse Farm House. The zone is within the Forest of Bere Local Character Area and is in the proximity of the River Wallington.

The zone for Intermediate Pumping Station 1 can be seen in Sheet 16 of the Book of Maps.

Table 37 - Intermediate Pumping Station 1 Zone constraints overview

Topic	Constraints
Constructability	<p>Constrained area between an ancient woodland (Goathouse Coppice) and Goathouse Farm house, which is further restricted by the need to avoid 15 metre protection zone.</p> <p>Access route would need to be created from Goathou/Trampers Lane. For construction this would probably have to be separate to the farm house access road.</p> <p>During construction, traffic management may be necessary as Goathouse/Trampers Lane is very narrow.</p>
Hydraulics	<p>For routes through Corridor Sections S, W and Y, an intermediate pumping station at either this location, or the Intermediate Pumping Station 5 zone will be required.</p> <p>The pumping station is located at the east of the corridor section to account for the level changes at the west of the corridor section.</p>
Landscape	<p>The site is immediately adjacent to the boundary of the South Downs National Park and could therefore potentially affect its setting. The dNPS requires development to avoid compromising the purposes of nationally designated areas, and such projects should be designed sensitively.</p> <p>The site is within the Forest of Bere Landscape Character Area, which is noted for its tranquillity, and therefore there is potential for construction activity to impact on the tranquillity of the area.</p>
Ecology	<p>There is potential for damage or loss of ancient woodland trees directly adjacent to the site. Mitigation is required during construction to avoid any potential damage to ancient woodland.</p> <p>Goathouse Complex Site of Importance for Nature Conservation is directly adjacent to the site. Standard mitigation and construction buffers are required to avoid impacts to this site through construction pollution.</p>
Heritage	No issues of note.

Topic	Constraints
Water Quality	The site is in the proximity of the River Wallington, therefore the supply of sediments and contaminants should be avoided during construction.
Flood Risk	No issues of note.
Geology and Soils	No issues of note.
Socio-economics	No issues of note.
Planning	No issues of note.
Special Category Land	No issues of note.

Conclusion

The site is located immediately adjacent to the South Downs National Park and could therefore affect its setting. The dNPS requires development to avoid impacts when located outside the boundary of a National Park. There is also proximity to ancient woodland and a Site of Importance for Nature Conservation. This site is not being progressed.

4.7.2. Intermediate Pumping Station 2 Zone

This pumping station in Corridor Section X is required to lift flows after the break pressure tank further east in the corridor section. Moving the pumping station along the corridor section in either direction may increase the lift requirement due to local changes in elevation.

The pumping station is located at the east of the corridor section to account for the level changes at the west of the corridor section.

The zone is located directly South of Hillpound between Gravel Hill and Mislingford Road within the Forest of Bere West Landscape Character Area and within the setting of the South Downs National Park.

Overhead high voltage cables run across the North of this zone and ancient woodland trees are adjacent to the zone. Users of the Pilgrims Trail would overlook the zone.

The zone is within the River Hamble Urban Waste Water Treatment Directive Catchment and is in the proximity of the Moors Stream.

The zone for Intermediate Pumping Station 2 can be seen in Sheet 15 of the Book of Maps.

Table 38 - Intermediate Pumping Station 2 Zone constraints overview

Topic	Constraints
Constructability	<p>Access route from Gravel Hill, Mislingford Road or Bishop's Wood Road and would need to give adequate vision for entering and exiting.</p> <p>Overhead high voltage cables running across the North of this zone would mean the Intermediate Pumping Station would need to be built in the southern section.</p>

Topic	Constraints
	Permanent access and road would need to be constructed.
Hydraulics	This pumping station is required to lift flows after the break pressure tank further east in the corridor section. Moving the pumping station along the corridor section in either direction may increase the lift requirement due to local changes in elevation.
Landscape	The site is within proximity to the South Downs National Park. The corridor section is within the Forest of Bere West Landscape Character Area, and construction could impact the landscape through loss of woodland and the addition of a new built form. There is potential for impacts to the views of residents on Ochardelea, Gravel Hill and Mislingford Road, as well as the views from Pilgrims Trail.
Ecology	There is potential for loss of lowland mixed deciduous woodland priority habitat within the site. The pumping station should be sited to avoid this area. There is potential for damage or loss of ancient woodland trees directly adjacent to the site. Mitigation is required during construction to avoid any potential damage to ancient woodland.
Heritage	No issues of note
Water Quality	The site is in the proximity of the Moors Stream. Construction works should avoid the supply of sediment and contaminants into the river. The site is within the River Hamble Urban Waste Water Treatment Directive Catchment. Waste water and surface water during construction should be managed through standard mitigation.
Flood Risk	No issues of note
Geology and Soils	No issues of note
Socio-economics	The pumping station zone is adjacent to residential receptors on Orchardlea. Siting the pumping street away from these receptors would avoid potential impacts.
Planning	No issues of note
Special Category Land	No issues of note

Conclusion

This site is within proximity to the National Park with the potential to effect its setting. The site also has the potential for impacts on ancient woodland directly adjacent to it. Given there are better performing corridor sections available, this site is not currently being progressed.

4.7.3. Intermediate Pumping Station 3 Zone

Intermediate Pumping Station 3 is one option for the intermediate pumping station required in Corridor Section V.

The zone for Intermediate Pumping Station 3 can be seen in Sheet 7 of the Book of Maps.

Table 39 - Intermediate Pumping Station 3 Zone constraints overview

Topic	Constraints
Constructability	Open agricultural land, straight forward access route from Titchfield Lane although access would need to give adequate vision for entering and exiting. During construction traffic management may be necessary as Titchfield Lane is fairly narrow and quite busy.
Hydraulics	If a smaller pipeline diameter option is chosen, or the break pressure tank in Corridor Section R cannot be sited in an optimal location, an intermediate pumping station may be required to lift flows from the low point of the of the unavoidable Meon Valley crossing. An intermediate pumping station may not be required in this corridor section if a larger pipeline diameter option is chosen.
Landscape	The corridor section is within the Forest of Bere Local Character Area, characterised by its woodland area. During construction, loss of woodland should be avoided. There is potential for limited adverse impacts to the visual amenity of residential receptors on Titchfield Lane. The pumping station should be sited so impacts are reduced.
Ecology	No constraints identified
Heritage	Little Park Mansions grade II listed is directly south of the zone. Construction and operation of the site could impact the setting and character of this asset. The Chichester to Betterne Roman road runs directly adjacent to the south of the site. There is potential for buried archaeology in this area. Therefore, further assessment is required to assess risks.
Water Quality	The site is within the Hamble Estuary Urban Waste Water Treatment Directive Catchment. Waste water and surface water during construction should be managed through standard mitigation.
Flood Risk	No constraints identified
Geology and Soils	No constraints identified
Planning	No constraints identified
Socio-economics	No constraints identified

Topic	Constraints
Special Category Land	No constraints identified

Conclusion

There is a Roman road in the immediate proximity of the site. Therefore, there is potential for buried archaeology within the site. Detailed siting within this zone should seek to maximise the distance between residential properties and infrastructure, and minimise any loss of woodland. There are no significant environmental impacts associated with this site and therefore the Intermediate Pumping Station 3 Zone is being taken forward.

4.7.4. Intermediate Pumping Station 4 Zone

Intermediate Pumping Station 4 is the alternative intermediate pumping station to Intermediate Pumping Station 3 in Corridor Section V.

The zone for Intermediate Pumping Station 4 is shown on Sheet 7 of the Book of Maps.

Table 40 - Intermediate Pumping Station 4 Zone constraints overview

Topic	Constraints
Constructability	<p>Open agricultural land, straight forward access route from Titchfield Lane although access would need to give adequate vision for entering and exiting. Siting of access point would need to be carefully positioned due to the junction opposite and various smaller road junctions in vicinity.</p> <p>During construction traffic management may be necessary as Titchfield Lane is fairly narrow and quite busy.</p>
Hydraulics	<p>If a smaller pipeline diameter option is chosen, or the break pressure tank in Corridor Section R cannot be sited in an optimal location, an intermediate pumping station may be required to lift flows from the low point of the of the unavoidable Meon Valley crossing. An intermediate pumping station may not be required in this corridor section if a larger pipeline diameter option is chosen.</p>
Landscape	<p>The site is within a valued landscape (previous Winchester Lower Meon Valley SLQ). This area is described as a wooded enclosed landscape. Construction footprint should be minimised to avoid the potential for loss of woodland and trees which define the landscape quality and character.</p> <p>There is potential for adverse impacts to the visual amenity of residential receptors on Titchfield Lane. The pumping station should be sited so impacts are reduced.</p>
Ecology	<p>Quob Copse Site of Importance for Nature Conservation is within 30 metres of the site. Standard mitigation is required to avoid impacts to this site through construction pollution.</p>
Heritage	<p>Little Tapnage Farmhouse grade II listed is directly south of the zone. Construction and operation of the site could impact the setting and character of this asset.</p>

Topic	Constraints
Water Quality	The site is approximately 500 m from the River Meon, which is a chalk river sensitive to fine sediment supply and contaminants. Mitigation is required to avoid the polluting of this watercourse during construction.
Flood Risk	No constraints identified.
Geology and Soils	The Quob Copse historic landfill is located adjacent to the site. There is potential for the mobilisation of contaminants during construction works.
Planning	No constraints identified.
Socio-economics	No constraints identified.
Special Category Land	No constraints identified.

Conclusion

This site is adjacent to a landfill site and therefore there is potential for ground contamination constraints that would require appropriate controls and mitigation. A Grade II Listed farmhouse lies to the south. It would be preferable to site away from the nearby residential receptors to minimise impacts on residential properties. There are no significant impacts associated with this site and therefore the Intermediate Pumping Station 4 zone is being taken forward.

4.7.5. Intermediate Pumping Station 5 Zone

Intermediate Pumping Station 5 is an intermediate pumping station within Corridor Section Y. It would only be required for routes through Corridor Sections S, W and Y.

The zone for Intermediate Pumping Station 5 is shown on Sheet 7 of the Book of Maps.

Table 41 - Intermediate Pumping Station 5 Zone constraints overview

Topic	Constraints
Constructability	<p>Straight forward access route from Curdrige Lane, although access would need to give adequate vision for entering and exiting.</p> <p>During construction, traffic management may be necessary as Curdrige Lane is fairly narrow and quite busy.</p> <p>Permanent access and road would need to be constructed.</p>
Hydraulics	For routes through Corridor Sections S, W and Y, an intermediate pumping station is required at either this location or the Intermediate Pumping Station 1 zone.
Landscape	There is potential for impacts to farmland and field boundaries which contribute to the Forest of Bere West Landscape Character Area. Construction footprint and loss of these features should be minimised.

Topic	Constraints
	There is potential for limited impacts to the views of residential receptors on Curdrige Lane during construction and operation.
Ecology	No constraints identified
Heritage	Goodman’s Farmhouse grade II listed building is adjacent to the site to the east. There is potential for impacts to the setting and character.
Water Quality	The site is in the proximity of the river Hamble, therefore the supply of sediments and contaminants should be avoided during construction. The site is within the River Hamble Urban Waste Water Treatment Directive Catchment. Waste water and surface water during construction should be managed through standard mitigation.
Flood Risk	No constraints identified
Geology and Soils	There is a former sandpit at the site location which is not designated as a landfill. The ground may have been backfilled with unknown material where there will be potential for contamination. The site is adjacent to an industrial estate where there may be existing sources of contamination.
Planning	No constraints identified
Socio-economics	No constraints identified
Special Category Land	No constraints identified

Conclusions

Limited constraints have been identified with the exception of potential limitations related to siting and design, due to the proximity of residential receptors and a Grade II Listed Building. Potential contamination risks and the proximity of the River Hamble would need to be managed through appropriate environmental controls. This site is not currently being progressed as it is not required for the corridor sections taken forward as part of the preferred option.

4.7.6. Break Pressure Tank 1 Zone

Break Pressure Tank 1 is one option for the break pressure tank that is required in Corridor Section R.

The zone for Break Pressure Tank 1 can be seen in Sheet 3 of the Book of Maps.

Table 42 - Break Pressure Tank 1 Zone constraints overview

Topic	Constraints
Constructability	<p>Temporary and permanent access would potentially pass through an existing Portsmouth Water underground raised reservoir site located north of Portsdown Hill Road, although some alterations to the junction would be required.</p> <p>Natural slope of the ground lends itself to cutting into the slope and shielding any above ground structures from view.</p>
Hydraulics	<p>This is the first highest point along the preferred corridor and potentially the highest point throughout the corridor sections. As such, this location is conducive to the siting of a break pressure tank. The elevation at this point is sufficient to enable gravity flows for the remainder of the downstream pipeline through Corridor Sections R and V. This presents the opportunity to significantly reduce pumping costs and improve hydraulic control of the system.</p>
Landscape	<p>The site is located on an elevated exposed east-west ridge. Long panoramic views over the Forest of Bere are visible from this location. Construction and operation of the break pressure tank has the potential to result in impacts to landscape defining features. However, minimising construction footprint will reduce the extent of impacts.</p> <p>The site is intersected by Wayfarers Walk long distance route. There is potential for impacts on views from this route.</p>
Ecology	<p>Portsdown Site of Special Scientific Interest is within 100 m of the break pressure tank zone. There is potential for impacts through air and waterborne pollution.</p>
Heritage	<p>The Fort Widley Scheduled Monument is located to the west of the break pressure tank zone. Construction and operation of the break pressure tank could impact the setting of the fort and any buried archaeology in the area.</p>
Water Quality	<p>There is potential for supply of sediment and contaminants as the site is within the catchment of the Potwell Tributary, posing an impact to the water quality of these water bodies.</p>
Flood Risk	No constraints identified
Geology and Soils	No constraints identified
Planning	The site is located within Portsdown Hill open space area adopted by Portsmouth Local Plan.
Socio-economics	No constraints identified
Special Category Land	The site is located within Portsdown Hill open space area adopted by Portsmouth Local Plan.

Conclusion

This site is optimum from a hydraulics perspective although there are potential constraints associated with heritage, landscape and open space constraints which should be considered in further detail. Further work will be undertaken to determine whether it is possible to adjust the siting of the Break Pressure Tank 1 to minimise impacts whilst optimising hydraulic viability.

This site is being taken forward as part of the preferred corridor.

4.7.7. Break Pressure Tank 2 Zone

Break Pressure Tank 2 is the alternative to Break Pressure Tank 1 within Corridor Section R.

The zone for Break Pressure Tank 2 can be seen in Sheet 3, 4 and 5 of the Book of Maps.

Table 43 - Break Pressure Tank 2 Zone constraints overview

Topic	Constraints
Constructability	<p>There is a direct access route from Portsdown Hill Road although access would need to give adequate vision for entering and exiting.</p> <p>Sites more exposed further to the West so will have impact on visuals unless all above ground structures are lowered out of sight.</p>
Hydraulics	<p>This is a high point along the corridor sections. The elevation at this point is sufficient to enable gravity flows for the remainder of the downstream pipeline and presents the same hydraulic advantages as per Break Pressure Tank 1.</p>
Landscape	<p>A section of the Break Pressure Tank zone to the west is within the Portsdown Hill area of Special Landscape Quality. There is potential for impacts to the 'high scenic quality' of this area. The break pressure tank should be located to the east of the zone to avoid impacts to this designation.</p> <p>The site is located on an elevated exposed east-west ridge. Long panoramic views over the Forest of Bere visible from this location. Construction and operation of the break pressure tank has the potential to result in impacts to landscape defining features, however, minimising construction footprint will reduce the extent of impacts.</p> <p>The Allan King Way and Pilgrim's Trail intersect the zone in two locations. There is potential for impact to views from these routes during construction and operation.</p>
Ecology	<p>There is potential for temporary disturbance to habitat functionally linked to the Chichester and Langstone Harbours Ramsar and Special Protection Area during construction.</p> <p>The break pressure tank zone covers Crooked Walk Banks and Fort Widely and Surrounds Site of Importance for Nature Conservation. There is potential for temporary disturbance from noise, visual and vibration during construction. Siting of the break pressure tank should avoid the Site of Importance for Nature Conservation areas.</p>
Heritage	<p>The break pressure tank zone is adjacent to Fort Nelson, Fort Southwick, Fort Widley and World War II Heavy Anti-aircraft gun site scheduled monuments. The three forts are also grade I and II* listed buildings. If the break pressure tank is to be sited in this</p>

Topic	Constraints
	<p>zone, it should be sensitively sited so impacts on the setting and character of the heritage assets can be reduced during construction and operation.</p> <p>There is potential for buried archaeology within and around the break pressure tank zone as a result of known non-designated heritage assets. Further assessment is required to identify high risk areas.</p>
Water Quality	There is potential for supply of sediment and contaminants as the site is within the catchment of the Potwell Tributary and the River Wallington below Southwick, posing an impact to the water quality of these water bodies.
Flood Risk	No constraints identified
Geology and Soils	A section of the south of the break pressure tank zone is on land where there is an underground oil storage reservoir, which is potentially still in use. Therefore, siting the break pressure tank away from this area is preferable.
Planning	A small section at the south eastern end of the site is located within Portsdown Hill open space area adopted by Portsmouth Local Plan.
Socio-economics	No constraints identified
Special Category Land	Sections of the break pressure tank zone is owned by the MoD. This land should be avoided where possible.

Conclusion

There are several constraints across multiple topics within the zone, including impacts on landscape and views, nationally designated heritage assets, ecological features and a section which includes an underground oil storage reservoir, open space and MoD owned land. Therefore, Break Pressure Tank Zone 1 is being taken forwards and Break Pressure Tank Zone 2 is not currently being progressed.

4.7.8. Break Pressure Tank 3 Zone

A break pressure tank is likely required in Corridor Section X before this section descends towards the Meon Valley.

The zone was selected as it is at the highest point of the corridor section before being constrained by woodland. It is hydraulically unfeasible to move the zone further south, as the outlet main would need to be laid deeper to enable gravity flow west of the corridor section.

South Downs National Park is immediately adjacent to the site.

The zone for Break Pressure Tank 3 can be seen in Sheet 15 of the Book of Maps.

Table 44 - Break Pressure Tank 3 Zone constraints overview

Topic	Constraints
Constructability	An access route at Liberty Road would need to have adequate vision for entering and exiting. A permanent access would need to be constructed.

Topic	Constraints
	<p>During construction, traffic management would probably be required due to Liberty Road being narrow and not good visibility.</p> <p>Close proximity to the National Park would need to be carefully managed.</p>
Hydraulics	<p>A break pressure tank is likely required in this corridor section before it towards the Meon Valley. The location of this break pressure tank zone was selected as it is at the highest point of the corridor section before being constrained by woodland. It is hydraulically unfeasible to move this break pressure tank zone further south, as the outlet main would need to be laid deeper to enable gravity flow west of the corridor section.</p>
Landscape	<p>The South Downs National Park is immediately adjacent to the site. There is potential for effects on the special qualities of the South Downs National Park. Construction works within the National Park and works that will pose indirect impacts should be avoided.</p> <p>There is potential for limited visual amenity impacts to properties in Liberty Road during construction.</p>
Ecology	<p>Given the proximity to the South Downs National Park, there is potential for indirect impacts to habitats within the National Park.</p> <p>There is potential for damage or loss of ancient woodland trees directly adjacent to the site. Mitigation is required during construction to avoid any potential damage to ancient woodland.</p> <p>West Walk Site of Importance for Nature Conservation is directly adjacent to the site. Standard mitigation and construction buffers are required to avoid impacts to this site through construction pollution.</p>
Heritage	No issues of note
Water Quality	The site is in the proximity of the Upper Wallington. Construction works should avoid the supply of sediment and contaminants into the river.
Flood Risk	No issues of note
Geology and Soils	No issues of note
Socio-economics	No issues of note
Planning	No issues of note
Special Category Land	No issues of note

Conclusion

The dNPS affords the highest status of protection to National Parks in relation to landscape and scenic beauty. Given the potential for effects on the special qualities of the South Downs National Park, this zone is not being progressed.

4.7.9. Break Pressure Tank 4 Zone

Break Pressure Tank 4 is one option for the break pressure tank that is required in Corridor Section Z.

The zone for Break Pressure Tank 4 is shown on Sheet 9 of the Book of Maps.

Table 45 - Break Pressure Tank 4 Zone constraints overview

Topic	Constraints
Constructability	Only access via private road off Scivier's Lane. Permanent access and road would need to be constructed. Construction activities close to large residential houses/building so disruption would need to be mitigated carefully.
Hydraulics	This break pressure tank is preferred over the Break Pressure Tank 5 zone, as it will provide a greater level of hydraulic control owing to its higher elevation. For routes through Corridor Sections R and V, if Break Pressure Tank 1 or Break Pressure Tank 2 are constructed in an optimal location and a larger pipeline diameter is used, a break pressure tank may not be required in Corridor Section Z. If a break pressure tank is required in Corridor Section Z, only one of Break Pressure Tank 4 or Break Pressure Tank 5 is needed.
Landscape	Construction should avoid the loss of parkland/pasture landscape features that contribute to the Forest of Bere West Landscape Character Area. There is potential for moderate to large adverse impacts to the views of residential receptors on Sciviers Lane. Construction duration and footprint should be minimised to reduce impacts.
Ecology	There is potential for the loss of lowland mixed deciduous woodland. The break pressure tank should be sited to avoid these areas and provide appropriate construction buffers to avoid indirect impacts. Barbastelle bats have been identified within the site. Therefore, there is potential for the loss of species and habitats during construction. Loss of woodland should be avoided.
Heritage	No constraints identified
Water Quality	The site is in the proximity of the Upper Hamble and Horton Heath Stream, therefore the supply of sediments and contaminants should be avoided during construction. The site is within the River Hamble Urban Waste Water Treatment Directive Catchment. Waste water and surface water during construction should be managed through standard mitigation. The site is within Source Protection Zone 1 and 2 at Lower Upham. Mitigation would be required to ensure there are no impacts to groundwater as a result of construction on this site.

Topic	Constraints
Flood Risk	No constraints identified
Geology and Soils	No constraints identified
Planning	No constraints identified
Socio-economics	No constraints identified
Special Category Land	No constraints identified

Conclusion

There are limited constraints associated with this site based on current information, with the exception of the proximity of residential receptors. Further work would need to be undertaken to reduce impacts on residential receptors. This site is being taken forward as part of the preferred corridor.

4.7.10. Break Pressure Tank 5 Zone

Break Pressure Tank 5 is the alternative option for a break pressure tank in Corridor Section Z.

The zone for Break Pressure Tank 5 is shown on Sheet 10 of the Book of Maps.

Table 46 - Break Pressure Tank 5 Zone constraints overview

Topic	Constraints
Constructability	<p>Straight forward access route from B3354 although access would need to give adequate vision for entering and exiting and level difference between road and field dealt with. Permanent access and road would need to be constructed.</p> <p>Overhead high voltage cables in vicinity would need to be managed.</p>
Hydraulics	<p>This break pressure tank provides a lower level of hydraulic control.</p> <p>For routes through Corridor Sections R and V, if Break Pressure Tank 1 or Break Pressure Tank 2 are constructed in an optimal location and a larger pipe diameter is used, a break pressure tank may not be required. If Break Pressure Tank 4 or Break Pressure Tank 5 are required, only one is needed.</p>
Landscape	<p>Construction should avoid the loss of pasture and field boundary landscape features that contribute to the Forest of Bere West Landscape Character Area.</p> <p>There is potential for moderate to large adverse impacts to the views from Hillview Manor Park in Crowdhill which is adjacent to the site. Construction duration and footprint should be minimised to reduce impacts.</p>
Ecology	<p>There is potential for damage or loss of ancient woodland trees directly adjacent to the site.</p>

Topic	Constraints
Heritage	The Park Pale at Marwell scheduled monument is adjacent to the site. This is associated with further heritage assets at Marwell Manor. Construction and operation of the break pressure tank has potential to impact the setting and character of the scheduled monument.
Water Quality	The site is in the proximity of Bow Lake, therefore the supply of sediments and contaminants should be avoided during construction. The site is within the River Itchen Urban Waste Water Treatment Directive Catchment. Waste water and surface water during construction should be managed through standard mitigation.
Flood Risk	No constraints identified
Geology and Soils	The site is located on Crowdhill historic landfill. Ground investigations are required to assess the contamination risk. It is likely that this will present a significant risk due to the potential industrial waste input.
Planning	No constraints identified
Socio-economics	No constraints identified
Special Category Land	No constraints identified

Conclusion

Compared to the Break Pressure Tank 4 zone, this zone is considered to have a greater number of constraints particularly from a heritage, landscape, water and ecology perspective. This site is not therefore being progressed.

4.8. Corridor Section and Above Ground Plant Refinement Evaluation Conclusions

4.8.1. Summary of the Preferred Corridor

Following the corridor section and above ground plant refinement evaluation, a preferred pipeline corridor has been identified. The preferred corridor was selected to route outside of the National Park where possible, given that the dNPS affords the highest status of protection to National Parks in relation to landscape and scenic beauty, and requires us to look to develop the Project outside of the National Park in the first instance. Part of Corridor Section Z (option Z3) is within the South Downs National Park. However, we have provided optionality (options Z3 and Z4) for crossing the River Itchen which provides routes within and outside the South Downs National Park to acknowledge the other ecological constraints in this area. The preferred corridor also reduces the amount of permanent above ground plant that is required to accompany the pipeline.



The preferred corridor proposes to utilise tunnelled routes through Corridor Sections O and P to avoid constructability challenges and reduce above ground construction activity, and likely impacts in close proximity to residential properties, where there is potential for indirect impacts on air quality, noise and vibration, and significant disruption to local roads within a densely populated urban area

The preferred corridor passes through Corridor Section R. It is acknowledged that there could be possible landscape and heritage setting impacts associated with the Scheduled Monuments south of Corridor Section R. In light of this, a route further north in Corridor Section R could be utilised, however there is risk of requiring additional above ground plant along the pipeline by taking a more northerly route.

The preferred corridor is shown in Figure 17.

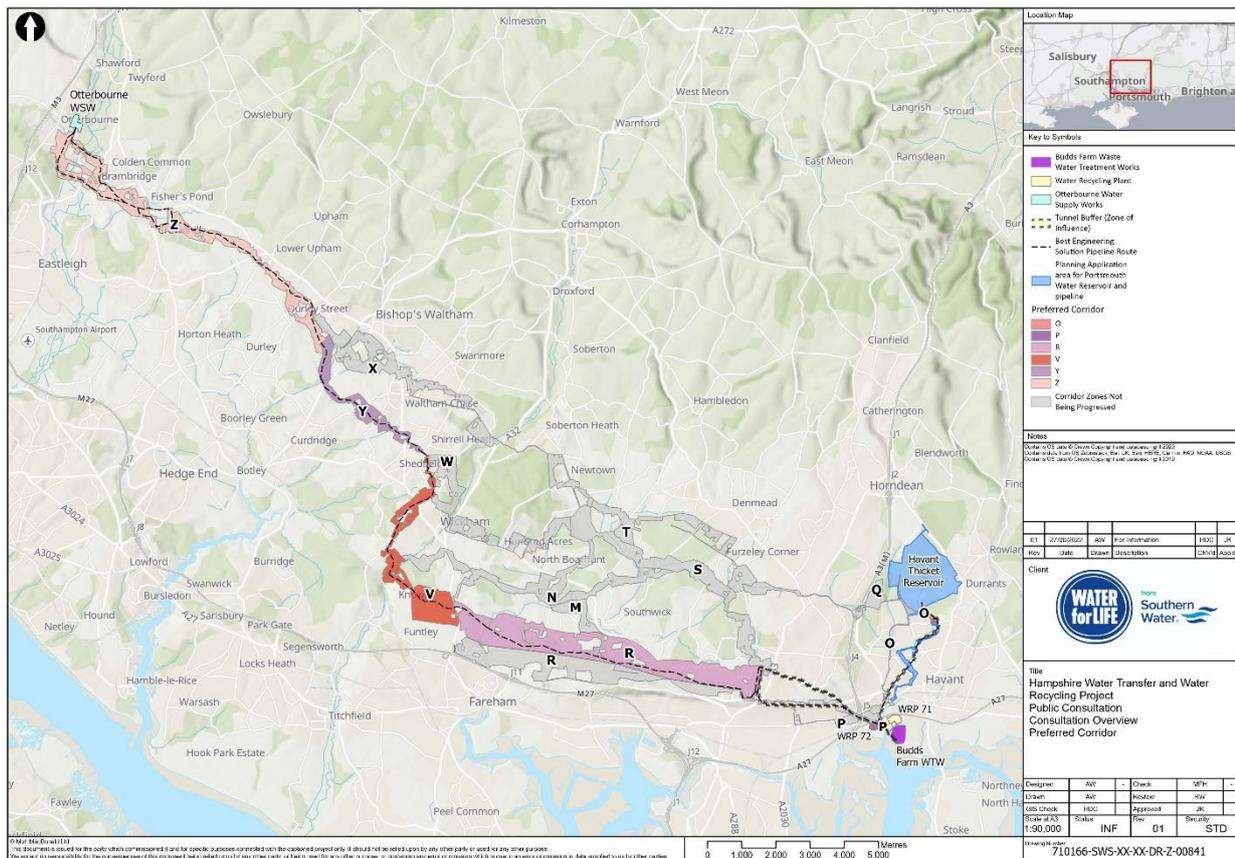


Figure 17 - Preferred corridor

4.8.2. Indicative Pipeline Route

We are showing an indicative pipeline route within the preferred corridor (black dotted line in Figure 17). This represents the best route for a pipeline solely from an engineering perspective, based largely on the topographic levels of the land. We are calling this our ‘best engineering solution’ pipeline route. We expect this route to change as we develop this further, taking into account other key factors, including the feedback we receive from this consultation and ongoing engagement.