



Grand Union
Canal Transfer

Grand Union Canal Transfer Site and Route Evaluation Report

September 2024



Contents

1	Introduction	1
1.1	The Project	1
1.2	Purpose of the Report	2
1.3	Structure of the Report	2
2	Scheme Background and Context	3
2.1	Project Overview	3
2.2	Transfer from Minworth WwRC to Discharge into the Coventry Canal	4
2.3	Transfer of Water Through the Coventry, Oxford and Grand Union Canals	4
2.4	Abstraction, Treatment and Transfer of Water to AfW Customers	5
2.5	Other Works	5
3	Overview of Methodology	6
3.1	Option development through the RAPID Gated Process	6
3.2	Option Evaluation	6
3.3	Additional Work	9
4	Advanced Water Treatment Plant	11
4.1	Strategic Context	11
4.2	RAPID Gate 2 Site	11
4.3	Alternative Sites Considered	12
4.4	Assessment of Alternative Sites	14
4.5	Summary of Assessment and Conclusions	14
5	Minworth to Grand Union Canal Transfer	16
5.1	Strategic Context	16
5.2	Identified Transfer Options	18
5.2.1	Sub-Route 1 – Birmingham and Fazeley Canal	18
5.2.2	Sub-Route 2 – River Tame to Coventry Canal	19
5.2.3	Sub-Route 3 – Pipeline to Coventry Canal at Atherstone	20
5.2.4	Sub-Route 4 – Birmingham and Fazeley Canal	21
5.2.5	Sub-Route 5 – Pipeline to Grand Union Canal at Copt Heath	22
5.2.6	Sub-Route 6 – Pipeline to Grand Union Canal at Leamington Trough Pound	23
5.3	Assessment of Transfer Options	24
5.3.1	Sub-Route 1 – Birmingham and Fazeley Canal	24
5.3.2	Sub-Route 2 – River Tame to Coventry Canal	24
5.3.3	Sub-Route 3 – Pipeline to Coventry Canal at Atherstone	24
5.3.4	Sub-Route 4 – Birmingham and Fazeley Canal	25

5.3.5	Sub-Route 5 – Pipeline to Grand Union Canal at Copt Heath	25
5.3.6	Sub-Route 6 – Pipeline to Grand Union Canal at Leamington Trough Pound	25
5.4	Summary of Assessment and Conclusions of Sub-Route Options	26
5.5	Alternative Outfall Location Options for the Preferred Corridor	26
5.5.1	Coleshill Road	28
5.5.2	Atherstone Golf Course	28
5.6	Summary of Assessment and Conclusions of Outfall Location Options	29
6	Abstraction, Water Treatment Works and Storage	30
6.1	Strategic Context	30
6.2	RAPID Gate 2 Site and Review	33
6.3	Alternative Sites Considered	35
6.4	Assessment of Alternative Sites	39
6.4.1	Options considered not suitable for further work at this stage following a preliminary high level project team appraisal	39
6.4.2	Options considered not suitable for further work at this stage following preliminary planning appraisal	39
6.4.3	Options not progressed to further work at this stage following detailed appraisal	40
6.4.4	Options subject to enhanced appraisal	41
6.5	Summary of Assessment Outcomes and Conclusions	44
7	Transfer to Chaul End	48
7.1	Strategic Context	48
7.2	RAPID Gate 2 Transfer Route	48
7.3	Alternative Transfer Routes Considered	49
7.3.1	Summary of potential transfer pipeline corridors considered	49
7.3.2	Alternative transfer pipeline corridors from Site B	51
7.3.3	Alternative transfer pipeline corridors from Site H	52
7.3.4	Alternative transfer pipeline corridors from Site H and from Site P	53
7.4	Assessment of Alternative Transfer Routes	54
7.4.1	Alternative drinking water transfer pipeline corridors from Site B (water storage and WTW) – northern section only	54
7.4.2	Alternative drinking water transfer pipeline corridors from Site H (water storage and WTW) to Chaul End	56
7.4.3	Raw water transfer pipeline corridor from Site H (water storage) to Site P (WTW) to Chaul End	59
7.4.4	Alternative drinking water transfer pipeline corridors from Site P (WTW) to Chaul End	60
7.5	Summary of Assessment and Conclusions	61
8	Summary and Conclusion	64
	Glossary	66

A.	Advanced Water Treatment Works – Site Assessment Summary	67
B.	Minworth to Grand Union Canal – Transfer Options Assessment Summary	71
C.	Abstraction, Treatment and Storage – Site Assessment Summary	78
D.	Transfer to Chaul End - Transfer Options Assessment Summary	84

Tables

Table 5.1:	Summary of sub-route options	16
Table 6.1:	Options not progressed following high level project team appraisal	39
Table 6.2:	Options not progressed following preliminary planning appraisal	39
Table 6.3:	Options not progressed following detailed appraisal	40
Table 6.4:	Aspects considered as part of the enhanced appraisal	41
Table 6.5:	Summary of sites considered to offer the greatest potential	42

Figures

Figure 1.1:	Illustrative plan of the GUC Transfer Project	1
Figure 2.1:	Overview of development required by the GUC Transfer Project	3
Figure 3.1:	Options Review Methodology	7
Figure 4.1:	RAPID Gate 2 Location of AWTP	12
Figure 4.2:	AWTP Alternative Sites	13
Figure 5.1:	Plan showing sub-option	17
Figure 5.2:	Sub-route 1 flow path.	18
Figure 5.3:	Sub-route 2 flow path.	19
Figure 5.4:	Sub-route 3 flow path.	20
Figure 5.5:	Sub-route 4 flow path.	21
Figure 5.6:	Sub-route 5 flow path.	22
Figure 5.7:	Sub-route 6 flow path.	23
Figure 5.8:	Sub-route 3 Pipeline Corridor	26
Figure 5.9:	Alternative Outfall Location Options for the Preferred Corridor	27
Figure 6.1:	Map of AfW's central region showing options at RAPID Gates 1 and 2.	32
Figure 6.2:	Designations at the RAPID Gate 2 Leighton Buzzard Site	34
Figure 6.3:	Map showing environmental designations within the search area	36
Figure 6.4:	Map of 23 sites identified within the search area	38
Figure 6.5:	WTW Site Options for Consultation	45
Figure 6.6:	Bletchley Option (Site B)	46
Figure 6.7:	Slapton Option (Site H)	47

Figure 6.8: Leighton Buzzard Option – WTW Only (Site P)	47
Figure 7.1: RAPID Gate 2 transfer route	48
Figure 7.2: Potential pipeline routes	50
Figure 7.3: Site B alternative transfer pipeline corridors	51
Figure 7.4: Potential transfer pipeline corridors from Site H	53
Figure 7.5: Southern Pipeline Corridor Options for Consultation	63

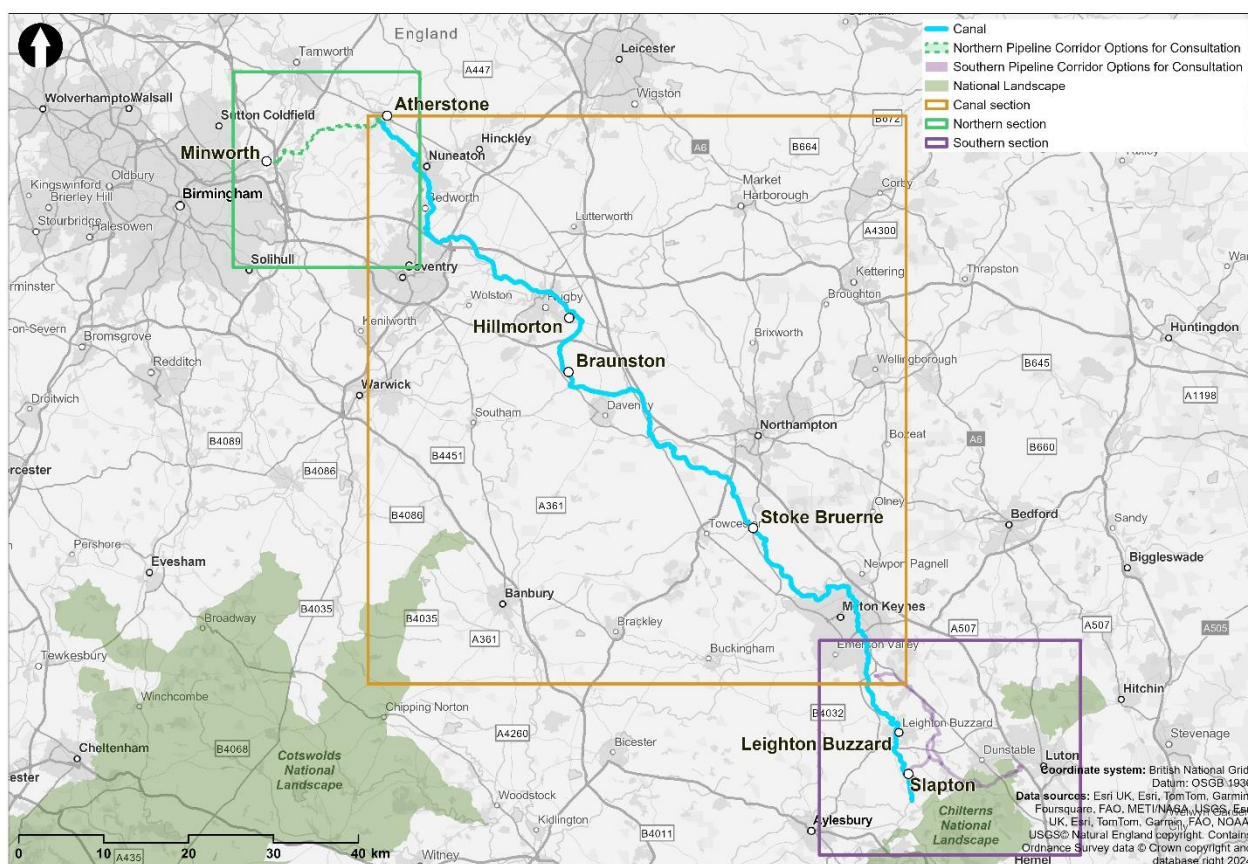
1 Introduction

The Grand Union Canal (GUC) Transfer is a new project to bring water from the Midlands to the southeast. It is a joint water transfer project between two water companies, Severn Trent (ST) and Affinity Water (AFW), and the Canal & River Trust charity (the Trust) who are the owner and navigation authority of the canals in England and Wales. This report sets out the work that has been undertaken to evaluate the sites and routes for the GUC Transfer project. The report does not include any evaluation work relating to the canal section of the route. This information will be provided as part of future public consultations.

1.1 The Project

The GUC Transfer Project will be designed to transfer 115 million litres of highly treated recycled water per day from ST's Minworth Wastewater Recycling Centre (WwRC) into AFW's water supply network for customers. This will require a combination of new pipelines, water treatment plants and other infrastructure as well as improvement to the canals to enable water to be transferred through them.

Figure 1.1: Illustrative plan of the GUC Transfer Project



In the northern section of the scheme, water from Minworth WwRC will receive enhanced treatment. The water will be transferred using the existing canal network (the Coventry, Oxford and Grand Union Canals, collectively referred to as GUC for this project), owned and operated by the Trust. To manage flow velocities and level changes within the canal system resulting from the transferred water, a range of ancillary infrastructure, along with bank raising and adaptations to existing equipment will be required.

In the southern section of the scheme, the water will then be abstracted and transferred into a new water treatment works (WTW) in the north Buckinghamshire/ south Bedfordshire area. Water storage will also be developed, providing up to five days storage. Following treatment, the clean drinking water will then be transferred through a new buried pipeline into AfW's supply for customers.

1.2 Purpose of the Report

This report has been prepared to provide an overview of the site and pipeline assessment process for the various elements of the GUC Transfer Project. It provides the outcome of the initial appraisal of the identified options for the various elements of the GUC Transfer Project that have been the subject of a consistent engineering, environmental, planning and land assessment. This will form the basis for the site selection of the scheme that will be the subject of the Development Consent Order (DCO) application.

This report provides an overview of the progress to date for the purposes of non-statutory consultation which will help inform the selection of preferred options, alongside more detailed assessment as the project progresses. As noted above, the report does not include the evaluation of the canal section of the route. This will be provided as part of future public consultations.

1.3 Structure of the Report

The structure of this report is summarised below:

- **Chapter 2** (Scheme Background and Context)
- **Chapter 3** (Methodology)
- **Chapter 4** (Advanced Water Treatment Plant)
- **Chapter 5** (Minworth to Grand Union Canal Transfer)
- **Chapter 6** (Abstraction, Water Treatment Works and Storage)
- **Chapter 7** (Transfer to Chaul End)
- **Chapter 8** (Summary and Conclusions)

2 Scheme Background and Context

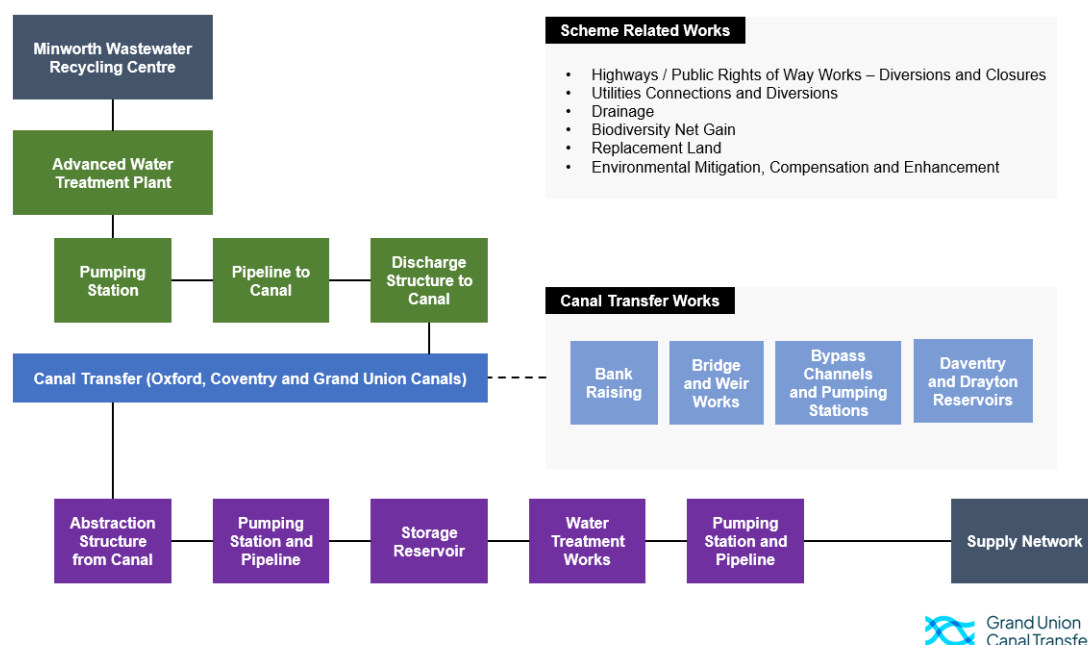
2.1 Project Overview

Starting at Minworth WwRC, water will be treated in a new Advanced Water Treatment Plant (AWTP) and then transferred to the Coventry Canal, where it will begin an approximately 131-kilometre journey along the canal. The water from Minworth's WwRC is currently discharged into the River Tame. The proposed AWTP plant at Minworth WwRC will undertake further treatment to some of its water to ensure that the water to be transported via the Coventry, Oxford and Grand Union canals meets the environmental requirements for discharge into the existing canal network. Water will be helped on its way by using the existing canal network.

To manage flow velocities and level changes within the canal system resulting from the increased volume of water being transferred, a range of new infrastructure works will be required, including new pipes, bypasses, pumping stations, canal-widening, bank raising and improvements to existing equipment. The water will then be abstracted, stored and transferred to a new water treatment works (WTW) in the north Buckinghamshire/ south Bedfordshire area. Water storage will also be developed, providing up to five days storage. Following treatment, the clean drinking water will then be transferred through a new buried pipeline into AfW's supply for customers.

The elements that make up the proposed development are summarised in Figure 2.1.

Figure 2.1: Overview of development required by the GUC Transfer Project



Minworth WwRC is ST's largest WwRC with a capacity to treat wastewater produced by a population of 1.75 million people in the Birmingham area. Additionally, the WwRC also treats a high volume of imported sludge from industry and regional works. Minworth WwRC is located in Sutton Coldfield, north east of Birmingham, and between the villages of Minworth and Curdworth. The WwRC lies within the administrative boundary of Birmingham City Council but is close to the boundary with North Warwickshire Borough Council.

The AWTP will be developed within or in the vicinity of the existing Minworth WwRC site to treat flow diverted from the current discharge into the River Tame. The design details of the proposed new treatment processes are being developed to ensure that any substances that may cause any deterioration of the receiving waterbodies or create an impediment to achieving target Water Framework Directive (WFD) status will be removed as part of the treatment process.

The new AWTP will include an activated carbon treatment process, which will include flocculation, and sedimentation followed by ozone oxidation, biologically active carbon (BAC) filtration, and granular activated carbon (GAC) adsorption.

The AWTP will require a site in excess of 5 hectares to accommodate the necessary plant and buildings to be developed either within or in the vicinity of Minworth WwRC along with the wetlands.

2.2 Transfer from Minworth WwRC to Discharge into the Coventry Canal

The treated water from Minworth WwRC will be delivered to the Coventry Canal by a new pumping station at Minworth WwRC and a new buried raw water pipeline which will run approximately due east from Minworth to a discharge point near Atherstone, Warwickshire. This section of the Project will be within the administrative area of North Warwickshire Borough Council.

The 1000mm diameter pipeline will be approximately 18km long and will include a level-controlled break tank. The treated water will be pumped as far as the break tank and then flow under gravity to the discharge location into the Coventry Canal.

A discharge structure will be required to release the treated water into the Coventry Canal in a controlled way at a sufficiently low velocity to avoid compromising and adversely impacting canal users and wildlife.

2.3 Transfer of Water Through the Coventry, Oxford and Grand Union Canals

Approximately 131km of canal will be utilised to transfer water from Atherstone to the north Buckinghamshire/ south Bedfordshire area. The water will travel along the Coventry Canal at Atherstone southwards into the Oxford Canal, through the Oxford Canal, and then into the GUC to an abstraction point in north Buckinghamshire/ south Bedfordshire area. This incorporates the administrative areas of North Warwickshire Borough Council, Nuneaton and Bedworth Borough Council, Coventry City Council, Rugby Borough Council, West Northamptonshire Council, Milton Keynes City Council, Buckinghamshire Council and Central Bedfordshire Council.

To manage flow velocities and level changes within the canal system resulting from the transferred water, a range of new infrastructure, along with adaptations to existing equipment will be required. At this stage of the design development process, this work is expected to include:

- Pumping stations and gravity bypasses, to detour around 'uphill' and 'downhill' locks along the route.
- The potential raising of canal banks and towpath levels where necessary.
- The adaptation of some existing bridges to maintain sufficient head room for vessels and people using the towpaths.
- The improvement to a number of existing waste weirs to maintain a consistent water level.

The Trust's existing Daventry and Drayton reservoirs store water and release it into the canal network to maintain flows. This will continue as part of the project. At this stage of the project design, the project includes sending some water into the reservoirs, to use as storage for when there may be less water in the canal system from Minworth.

2.4 Abstraction, Treatment and Transfer of Water to AfW Customers

Water will be abstracted from the canal at a location located in the north Buckinghamshire/ south Bedfordshire area and will require the construction of an abstraction structure on the canal, which will include a weir built into the bank and a pumping station.

New water storage will be required to store water before it goes through to treatment. This will allow the transfer to be more resilient as it will provide a buffer between the water in the canal and the water reaching the new WTW. If there were issues on the canal, the new storage would provide up to 5 days storage, storing up to 575,000m³ of water. The current design assumes non-impounding embanked storage that will be filled with raw water via the abstraction from the canal.

The water abstracted from the canal would require treatment to potable (drinking) water standards. This will require the construction of a new WTW capable of removing pollutants and contaminants from the water. This is currently proposed to involve a multi-stage process, including tertiary treatment by ultra-violet. This will require a site in excess of 10 hectares to accommodate the necessary plant and buildings.

From the WTW, water would be pumped through a new buried pipeline to an existing Water Supply Reservoir (WSR), located near Luton. At this stage of project design this is anticipated to require in the region of 15-30km of new buried pipeline (depending upon the location of the WTW), involving development within the administrative areas of Central Bedfordshire Council and Buckinghamshire Council and possibly Luton Borough Council depending upon the routeing of the pipeline.

2.5 Other Works

Other works will be required to support the construction and operation of the project. At this stage of the project design process, these could include, but not be limited to:

- Temporary works to support construction, including access, compounds, working areas;
- Permanent works to support operation and maintenance;
- Land drainage works;
- Access and utility connections including electrical sub-stations, telecoms, water and sewerage facilities; and
- Reinstatement following construction, landscaping, environmental mitigation, enhancement, Biodiversity Net Gain and compensation measures.

3 Overview of Methodology

3.1 Option development through the RAPID Gated Process

Ofwat has provided funding for water companies to investigate, then develop, Strategic Resource Options (SROs) to help meet national water needs that will benefit customers and wider society, and help to protect and enhance the environment.

The development of these nationally important SROs is being overseen by the Regulators' Alliance for Progressing Infrastructure Development (RAPID), an alliance of regulators, including the Environment Agency, Ofwat and Drinking Water Inspectorate, formed to help accelerate the development of new water infrastructure.

AfW and ST are jointly developing two separate SROs, the GUC Transfer SRO and the Minworth SRO respectively, each of which is progressing through the RAPID gated process¹ and combine to form the GUC Transfer Project which will be the subject of the DCO application. The SROs were identified through the Water Resources Management Plan 2019 process^{2,3}.

The gated process has involved submissions to RAPID to review the progression of the SROs, their cost efficiency and whether solutions merit further investigation. Through this RAPID process, options for delivering the project have been developed and assessed. RAPID Gate 1 assessments were submitted to RAPID in July 2021⁴ and RAPID Gate 2 assessments were submitted to RAPID in November 2022⁵.

3.2 Option Evaluation

The purpose of the option evaluation exercise undertaken was to ensure that developing options were subject to consistent engineering, environmental, planning and land assessments, of an appropriate level of detail, to inform decisions around option selection for progression through the DCO process. The methodology used is consistent with the approach advocated in the All Company Working Group Design principles for Strategic Resource Options⁶. This comprises a series of stages as summarised below in Figure 3.1 and explained in subsequent sections of this document.

¹ [RAPID Gated Process](#)

² [Affinity Water WRMP19 Documents](#)

³ [Severn Trent Water WRMP19 Documents](#)

⁴ [Gate 1 Submissions](#)

⁵ [Gate 2 Submissions](#)

⁶ [Water Resources: Design Principles & User Guidance, All Company Working Group \(March 2023\)](#)

Figure 3.1: Options Review Methodology



Stage 1 of this optioneering process took the engineering options for the pipelines needed in the northern and southern parts of the project to connect treatment infrastructure to the canal and the treatment works sites, that were identified through the previous phases of work (RAPID Gates 1 and 2), and applied criteria to identify pipeline corridors and sites for subsequent assessment. This report expands in sections 4 to 7 on how the RAPID Gate 1 and 2 work fed into developing options for the optioneering process. Stage 1 also included the identification of any other potential new options generated by this review work.

Exclusionary criteria, as summarised in Table 3.1, were used to ensure that identified options avoided, as far as practicable, constraints and designations that are likely to represent significant challenges to securing necessary consents for development and pose risks to delivery of the scheme. These criteria were used in Stage 1 to define the initial route corridors and sites available to the project, seeking to identify and exclude sites and options. Exclusionary criteria differ for site and pipeline development, reflecting that pipeline developments have less requirement for above ground, permanent development.

Table 3.1: Summary of exclusionary criteria

Site development	Pipeline development
Buildings and settlements – avoid existing settlements, unless alternative site are not feasible.	Building and settlements – avoid routeing beneath habitable buildings and where routed through settlements, limit likely impacts, through route selection.
Ancient woodland - avoid areas of mapped ancient woodland. Seek to locate construction activities at least 15m away.	Ancient woodland – avoid areas of mapped ancient woodland. If unavoidable, trenchless pipeline construction will be necessary.
Scheduled Monuments – avoid siting in locations which will impact the setting of a Scheduled Monument.	Scheduled Monuments – avoid routeing beneath Scheduled Monuments,
National Landscape – prioritise locations that avoid impact to the National Landscape. Where locations within the National Landscape are unavoidable, minimise potential impacts through site selection.	National Landscape – avoid routeing through National Landscape, but if this is not possible, minimise likely impacts through routeing.
Environmental designations – no siting within any International or National biodiversity designations.	Environmental designations – avoid routeing through International and National biodiversity designations. If unavoidable, trenchless pipeline construction will be necessary.
Flood zone – avoid siting above ground development within Flood Zone 3 for river and sea flooding or areas of high risk of surface water flooding.	Flood zone – avoid being routed within Flood Zone 3 for river and sea flooding or areas of high risk of surface water flooding. If unavoidable, mitigation will be adopted.
Green Belt – prioritise locations that avoid impact to the Green Belt. Where locations within the Green Belt are unavoidable, minimise potential impacts through site selection.	Existing infrastructure and main river crossings – minimise the number of crossings of major infrastructure

Stage 2a and 2b took the identified options and sites and screened them against engineering, environment, planning and land criteria. This facilitated a comparison assessment of the corridors and sites against criteria derived from national policy objectives and/or engineering requirements and known environmental limitations that inform the project's design. A summary of the criteria used is included in Table 3.2. The stage was used to identify which pipeline corridors and sites were considered less preferable and unlikely to proceed.

Table 3.2: Criteria considered for pipeline corridor and site evaluation

Consideration	Aspects considered for pipeline corridor	Aspects considered for site evaluation
Engineering	- Construction cost - Embedded carbon - Flexibility - Operational cost - Operational carbon - Route selection features - Route selection means of access	- Construction cost - Embedded carbon - Operational cost - Operational carbon - Site features, including geology and ground conditions - Site location - Means of access
Environment and Social	- Biodiversity, flora and fauna – designated sites and ancient woodland - Soils – agricultural land and landfill sites - Water – flood zones - Water Framework Directive impacts - Landscape - Historic environment - Population and human health – property and community assets	- Biodiversity, flora and fauna – designated sites and ancient woodland - Soils – agricultural land and landfill sites - Water – flood zones - Landscape - Historic environment - Population and human health – property and community assets

Consideration	Aspects considered for pipeline corridor	Aspects considered for site evaluation
Planning	- Existing or designated use of the site - Emerging potential designated use or evidence of land being promoted for development - Mineral extraction - Green Belt - Neighbouring land uses	- Existing or designated use of the site - Emerging potential designated use or evidence of land being promoted for development - Mineral extraction - Green Belt - Neighbouring land uses
Land	- Special category land - Residential land impact risks - Acquisition costs risks	- Special category land - Residential land impact risks - Acquisition costs risks

Stage 3 involved workshops with engineering, environment, planning and land teams to discuss the findings of the review, identify the options with the greatest potential and discuss and challenge the justifications for their selection or rejection. The workshop enabled the outcomes to be carefully reviewed to ensure all options were considered comparatively, with the results robustly tested. The workshop considered the need for verification of assessments undertaken and also identified any disciplines where additional consideration of opportunities and constraints relating to options identified as having the greatest potential was necessary (through Stage 4).

Stage 4 enabled engineering, environment, planning and land teams to undertake additional technical work on those options with the greatest potential. Additional consideration of opportunities and constraints that were identified via the workshop in Stage 3 along with any additional sites identified.

Stage 5 involved further workshops with engineering, environment, planning and land teams to discuss the overall findings of the options review process. The aim of the workshop was to identify those options with the greatest potential. Where this consideration of options concluded that additional assessments were necessary to inform the decision-making process, those additional assessments were undertaken before another workshop held to discuss outcomes. Through Stage 5 options with the greatest potential were identified for consideration through non-statutory consultation.

Stage 6 is the formal writing up of the Site and Route Evaluation Report for non-statutory consultation (this document).

The outcomes from the non-statutory consultation and additional surveys and assessments will be considered prior to confirming selection of preferred option(s) for the future progression of the Project.

3.3 Additional Work

It should be noted that the assessment outcomes reported are predominantly based on desk-based assessments. At the time of this report, ecological and engineering site-based surveys have not yet been completed for site options and corridors, nor has engagement with all potentially affected landowners been completed across the site options and corridors.

Information from further assessments and engagement will be reviewed, alongside the consultation responses to the non-statutory consultation process, and will be taken into account as part of the subsequent refinement and final selection of preferred site options and transfer pipeline corridors. This will include reviewing conclusions reached to date in light of any new information received.

Further engineering design work, environmental and technical assessments, and engagement will be undertaken on the preferred site options and pipeline corridors, leading to the identification of preferred designs for the sites and pipeline corridors, as well as construction working areas required for their proposed construction. Further Statutory Consultation in accordance with the Planning Act 2008 will then be undertaken on those proposals before the application for development consent is finalised.

In relation to transfer elements of the project, it is important to note that the inclusion of land does not mean that the full site or corridor will be developed. At this stage, the assessments have been undertaken on the approximately 200m wide potential transfer pipeline corridors. The corridors have deliberately been kept broad to provide flexibility for the consideration of appropriate routeing as part of the further progression of the project. This includes environmental and engineering assessments and landowner engagement referred to above.

Some environmental designations and other constraints have been avoided through the optioneering review of the potential transfer pipeline corridors. Corridor routeing has sought to avoid existing settlements where practicable. However, some environmental designations and other constraints, together with some buildings remain within the corridors at the current time. As work progresses, the corridors will be refined and narrowed as transfer pipeline route selection is undertaken and confirmed. Where residential properties are currently shown within corridors, these will be avoided by pipeline route selection.

4 Advanced Water Treatment Plant

4.1 Strategic Context

Minworth SRO is one of the SRO projects being developed as part of the Water Resources South East (WRSE) Regional Plan to help secure the national water supply under the National Framework for Water Resources. ST and AfW are required to deliver Minworth SRO (as part of the GUC Transfer Project) which will provide a source of raw water to support inter-regional transfers from the Water Resources West (WRW) region to the WRSE region.

Minworth WwRC is an Activated Sludge Treatment Works located to the east of Birmingham near Sutton Coldfield. Through the National Framework for Water Resources, it has been identified that Minworth SRO will provide water to the GUC Transfer SRO by diverting some of the recycled wastewater from Minworth WwRC to a new Advanced Water Treatment Plant (AWTP) and transfer treated water to AfW and Thames Water regions to supplement existing water supplies. Minworth was identified as the optimal place to locate the new AWTP from an environmental and supply perspective, noting it being an existing works site and the corresponding reduction in cost and operational risk relating to flow, transfer and treatment.

An AWTP to treat Minworth's recycled wastewater is required to meet the necessary environmental discharge requirements. The AWTP is required for the GUC Transfer Project and is to be built in 4 trains to provide operational flexibility and resilience for the operating regimes potentially required in the future, though the DCO for this project is only seeking consent for those elements that are required for the GUC Transfer Project.

4.2 RAPID Gate 2 Site

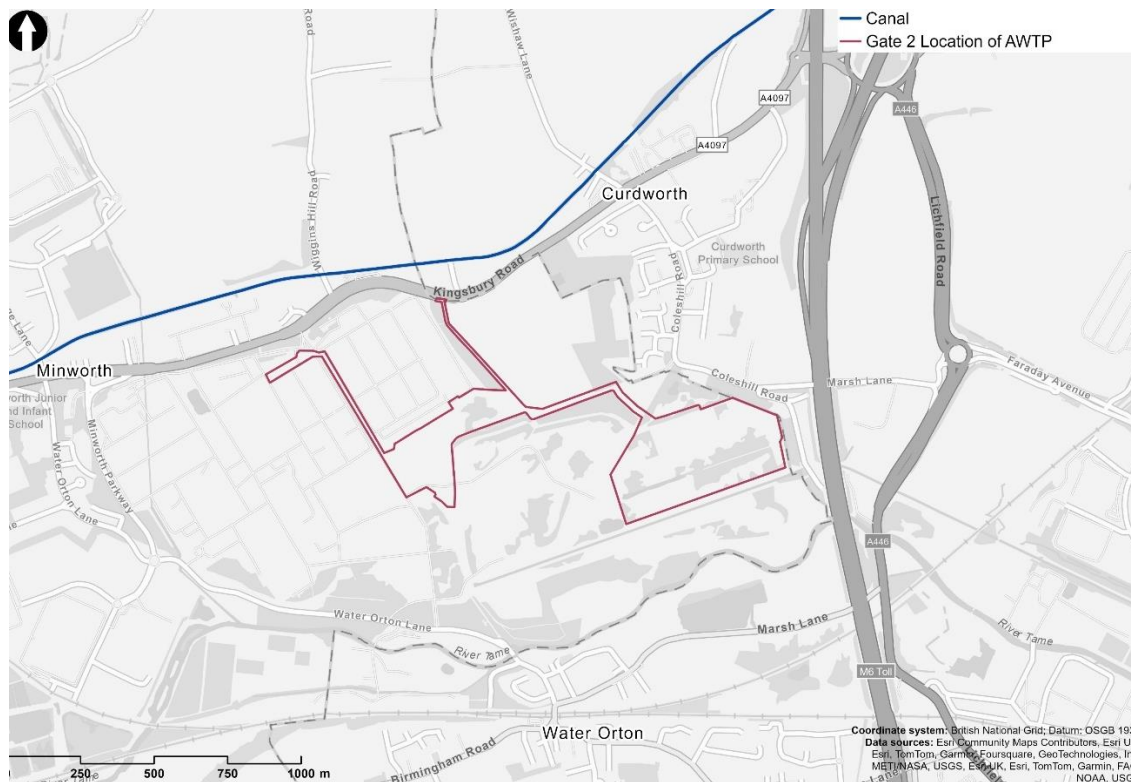
The site that was identified for the AWTP at RAPID Gate 2 is shown in Figure 4.1 and was situated within the operational boundary of the Minworth WwRC site. After the RAPID Gate 2 submission, a ST strategic review of the operational requirements of the WwRC site confirmed that the site identified for the AWTP was required for a different future expansion project, to provide phosphorous removal for the whole of the Minworth WwRC site to meet anticipated changes to discharge permits.

Due to those identified future requirements for the land within the operational Minworth WwRC site to allow ongoing operation of that site, an additional optioneering exercise was undertaken to determine the most favourable location for the AWTP. In addition to the phosphorous removal scheme, the following other operational land demands required consideration as part of this process:

- Network Response Team (NRT) Tanker Area expansion.
- New Activated Sludge Process Train to enhance the capacity of Minworth WwRC.
- Upgrade of the Storm Overflow storage capacity and additional sludge drying facilities.

The identified land uses and corresponding projects are required in connection with the discharge permit for the Minworth WwRC and are therefore given priority over the Minworth SRO when allocating the land required.

Figure 4.1: RAPID Gate 2 Location of AWTP



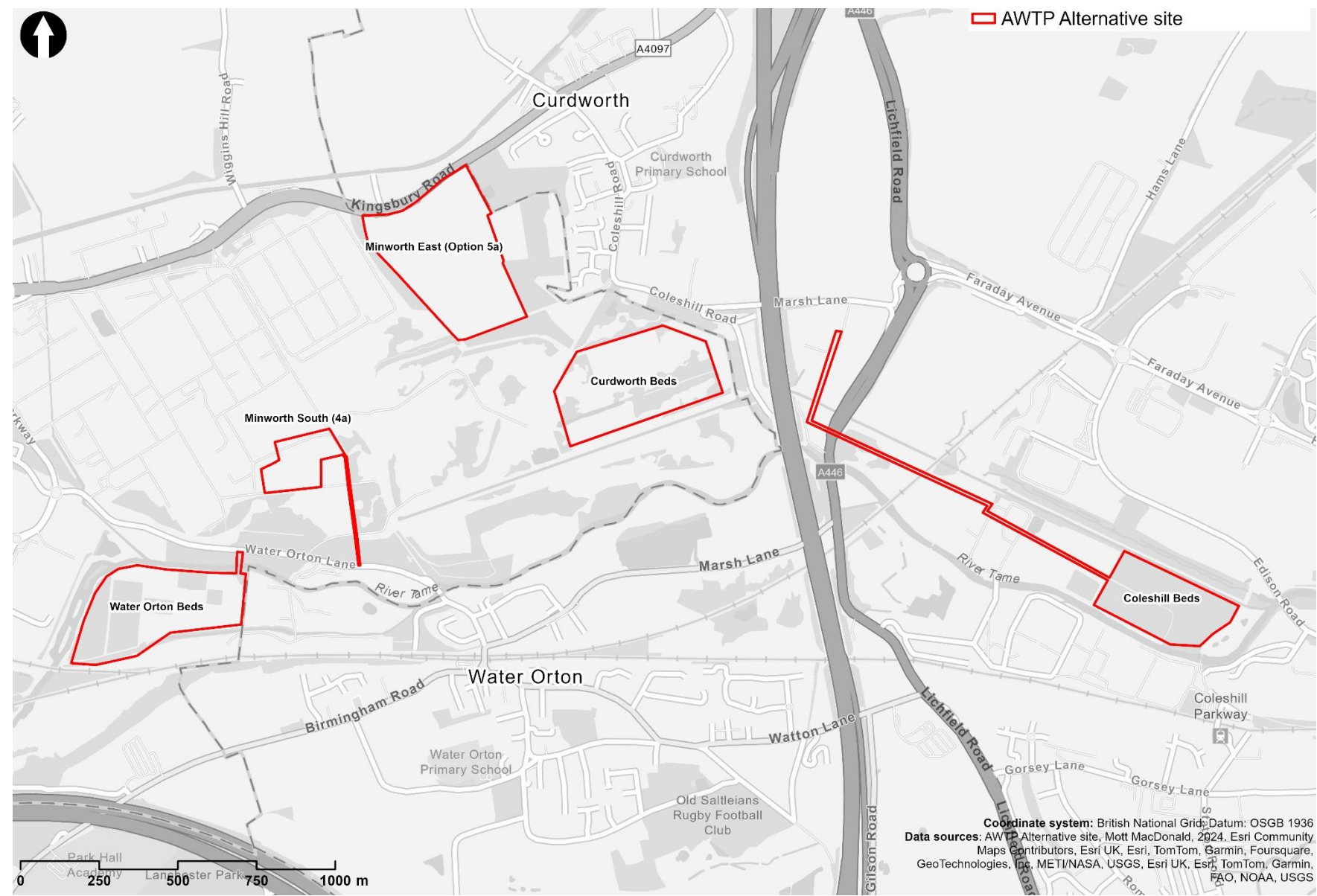
4.3 Alternative Sites Considered

An optioneering exercise was undertaken to determine the favourable location for the AWTP utilising consistent engineering, environmental, planning and land assessments of an appropriate level of detail to derive a preferred site ahead of non-statutory consultation. Following initial discussions with ST on the available land for the AWTP, 5 sites were identified as having the greatest potential, which are shown in Figure 4.2 and summarised below:

- **Minworth South (Option 4a)** – siting of the AWTP on the current location for the NRT tanker area.
- **Minworth East (Option 5a)** – locating the AWTP in the field to the east of Minworth outside of the current operational boundary of the Minworth WwRC site but within the ownership of ST.
- **Coleshill Beds** – locating the AWTP at the Coleshill site on land formerly used for sludge drying.
- **Curdworth Beds** – siting on the former sludge drying beds located to the south east of the main envelope of the Minworth WwRC site.
- **Water Orton Beds** – locating the AWTP on former sludge drying beds located immediately south of the Minworth WwRC site.

A further option was initially considered. This option proposed to locate the AWTP at Coleshill, specifically on the site of a demolished incinerator. However, this site was discounted due to the size of the site not being large enough for the AWTP.

Figure 4.2: AWTP Alternative Sites



4.4 Assessment of Alternative Sites

Minworth South is currently occupied by the NRT team and discussions initially focussed on the long-term occupier of the land and whether it was suitable for the AWTP. In addition to its long-term availability, the site has several other engineering challenges including the requirement for a significant amount of additional distribution pipes from the effluent channel and to the conveyance pipelines. It would also require the diversion of critical existing infrastructure and is constrained in terms of overall area for the AWTP.

Minworth East is considered to have an 'operational status' and is within ST's land ownership. Through the assessment, it was identified as favourable from an engineering perspective, technically viable and cost effective. This option involved the least number of pipelines and pumping and was considered to have a lower risk from contaminated land and other geotechnical challenges. The northern part of the site was located outside of the Flood Zone, and there were considered to be no significant environmental risks. However, the site was not preferable as the land within the site may be required for future operational development, associated with storm overflow storage infrastructure.

The locating of the AWTP on the **Coleshill Beds** site also had significant challenges, including being sited approximately 2km away from the Minworth WwRC's effluent channel, which is the required feed for the AWTP and would involve additional pumping requirements. Consequently, the option would require significantly more and longer distribution pipelines which would have to cross significant public infrastructure, including HS2 and the M6/M42 motorway. The land is also likely contaminated and there is a risk of ecological and flood risk impacts. The **Water Orton Beds** site had similar findings, though flood risk was identified as a more significant constraint than the Coleshill Beds site.

The **Curdworth Beds** site has similar challenges and characteristics as the Coleshill Beds and Water Orton Beds locations. However, this site performed better due to requiring less additional pipes and pumping. The option also provides greater flexibility providing sufficient capacity for the required stream for the GUC Transfer Project and the wetlands, whilst providing the opportunity for further streams in the future, if required and consented. It would also enable parts of the AWTP to remain on the RAPID Gate 2 site.

Considering the engineering, planning and environmental constraints associated with the other sites, and through subsequent technical workshops and engagement with internal stakeholders, the result of the optioneering process was that the Curdworth Beds site was the preferred site option for the AWTP.

A summary of the assessment outcomes for each site is presented at **Appendix A**.

4.5 Summary of Assessment and Conclusions

A strategic review of the operational requirements of the Minworth WwRCs site confirmed that the RAPID Gate 2 location identified for the AWTP was required for a future expansion project related to the discharge permit for the site. An optioneering exercise was undertaken to determine the most favourable location for the AWTP utilising consistent engineering, environmental, planning and land assessments of an appropriate level of detail to derive a preferred site ahead of non-statutory consultation.

Several of the sites identified, including Minworth South, Coleshill Beds and Water Orton Beds, contain engineering constraints associated with the construction and operation of the AWTP, including overall site capacity and the requirement for significant distribution pipes interfacing with public infrastructure. The Minworth East site, whilst preferable from an engineering perspective, would be located on land that may be required for the future operational development, such as enhancing storm overflow storage capacity.

The Curdworth Beds site, whilst having some complex technical constraints, performed better than other sites due to requiring less additional pipelines and pumping. The option remains within the operational envelope of the Minworth WwRCs site and provides flexibility for future expansion in the future, if required. Elements of the AWTP will also remain on the RAPID Gate 2 site. Through the optioneering process, it was confirmed that the Curdworth Beds site was the preferred site option for the AWTP.

These conclusions reflect the information on the sites and their development available at the time of the optioneering process and are reached in advance of the non-statutory consultation process and planned site surveys and investigations. The outcomes from the non-statutory consultation and additional surveys and assessments will be considered prior to confirming the preferred option.

5 Minworth to Grand Union Canal Transfer

5.1 Strategic Context

Development of the GUC Transfer Project has evolved from AFW's Water Resources Management Plan (WRMP) 2019 through RAPID Gates 1 and 2 and has considered and assessed the transfer of the recycled water into the GUC, covering the discharge location in the ST water supply area and the potential canal routes associated with these discharge locations.

Initial assessment work and workshops with ST, AFW, The Trust and the Environment Agency sought to establish a series of sub-route options for transferring the water into the GUC to be assessed. Involvement of the Environment Agency and The Trust as part of the process allowed for multiple considerations to be factored into generating an unconstrained list of sub-route options for the GUC Transfer Project to enable further investigation via the technical workstreams to identify a preferred sub-route.

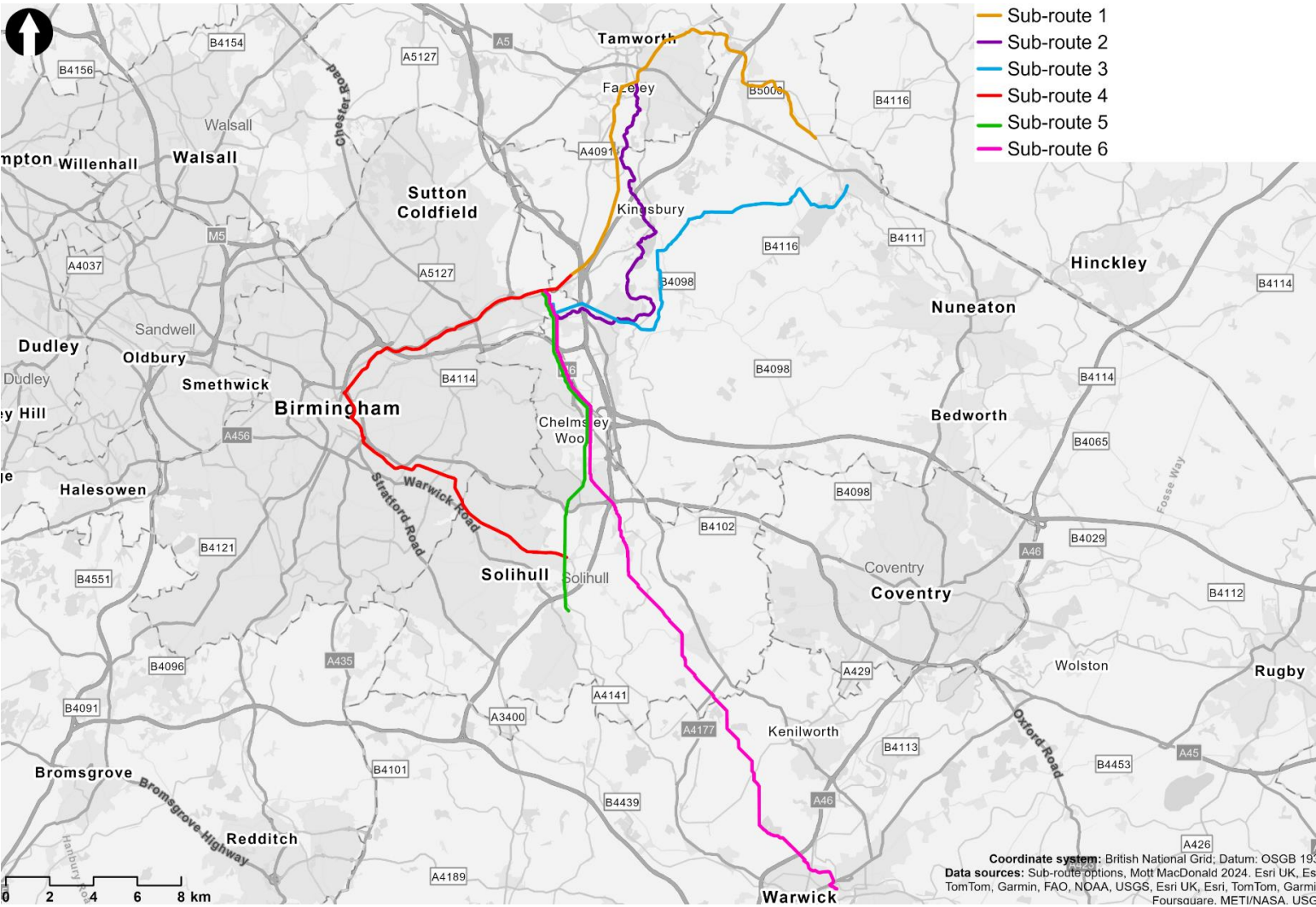
The initial work sought to identify sub-route options which could facilitate the canal transfer. The purpose of generating multiple options was to ensure a robust and consistent assessment process of sub-route options to identify a preferred mode for the transfer of recycled wastewater.

The sub-routes identified through the initial assessment work are summarised in Table 5.1 and shown within Figure 5.1, with a more detailed summary of each provided within Section 5.2.

Table 5.1: Summary of sub-route options

Route Name	Mode	Description
Sub-Route 1	Canal	Discharge from Minworth into Birmingham Fazeley Canal. Connection to Coventry Canal at Fazeley and transfer south via Coventry/Oxford Canal to Grand Union Canal just north of Daventry.
Sub-Route 2	River and Canal	Discharge from Minworth into the River Tame. Connection to Coventry Canal at Fazeley and transfer south via Coventry/Oxford Canal to Grand Union Canal just north of Daventry.
Sub-Route 3	Pipeline	Discharge from Minworth into a new proposed pipeline across country to Coventry Canal at Atherstone and transfer south via Coventry/Oxford Canal to Grand Union Canal just north of Daventry.
Sub-Route 4	Canal	Discharge from Minworth into Birmingham Fazeley Canal. Connection to Grand Union Canal near Junction 6 of the M6 and transfer south via Grand Union Canal.
Sub-Route 5	Pipeline	Discharge from Minworth into a new proposed pipeline across country to Grand Union Canal at Copt Heath and transfer south via Grand Union Canal
Sub-Route 6	Pipeline	Discharge from Minworth into a new proposed pipeline across country to Grand Union Canal at Leamington Trough Pound, south of Leamington Spa and transfer south via Grand Union Canal

Figure 5.1: Plan showing sub-option

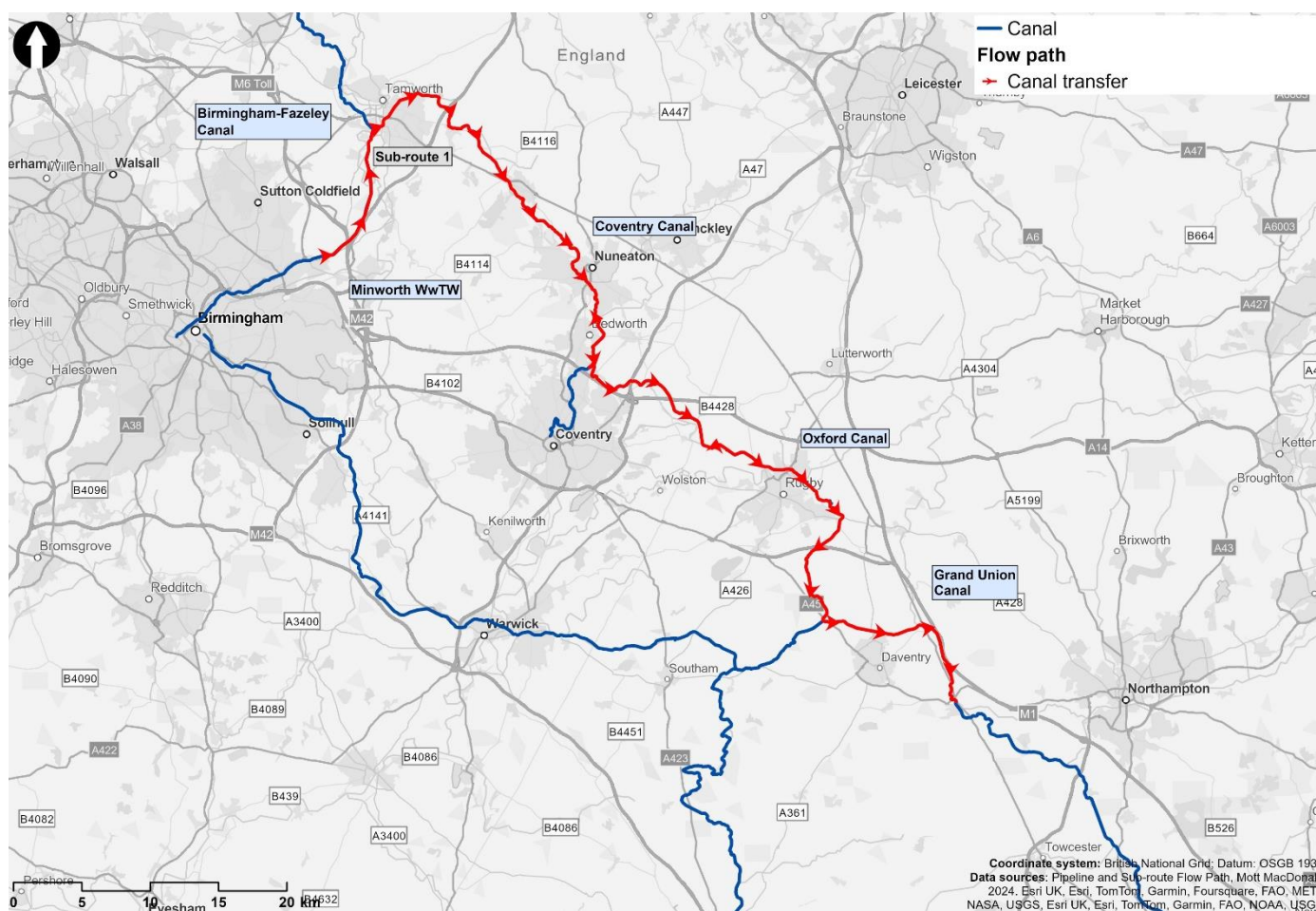


5.2 Identified Transfer Options

5.2.1 Sub-Route 1 – Birmingham and Fazeley Canal

The Birmingham and Fazeley Canal passes north of the existing Minworth WwRCs site and offers an efficient means to discharge into the canal network. Sub-route 1 would discharge water a short distance northward from Minworth WwRC into the Birmingham and Fazeley Canal. The canal runs approximately south-west to north-east where it connects to the Coventry Canal at Fazeley in Staffordshire. The Coventry Canal then connects to the Oxford Canal and finally to the GUC near Braunston.

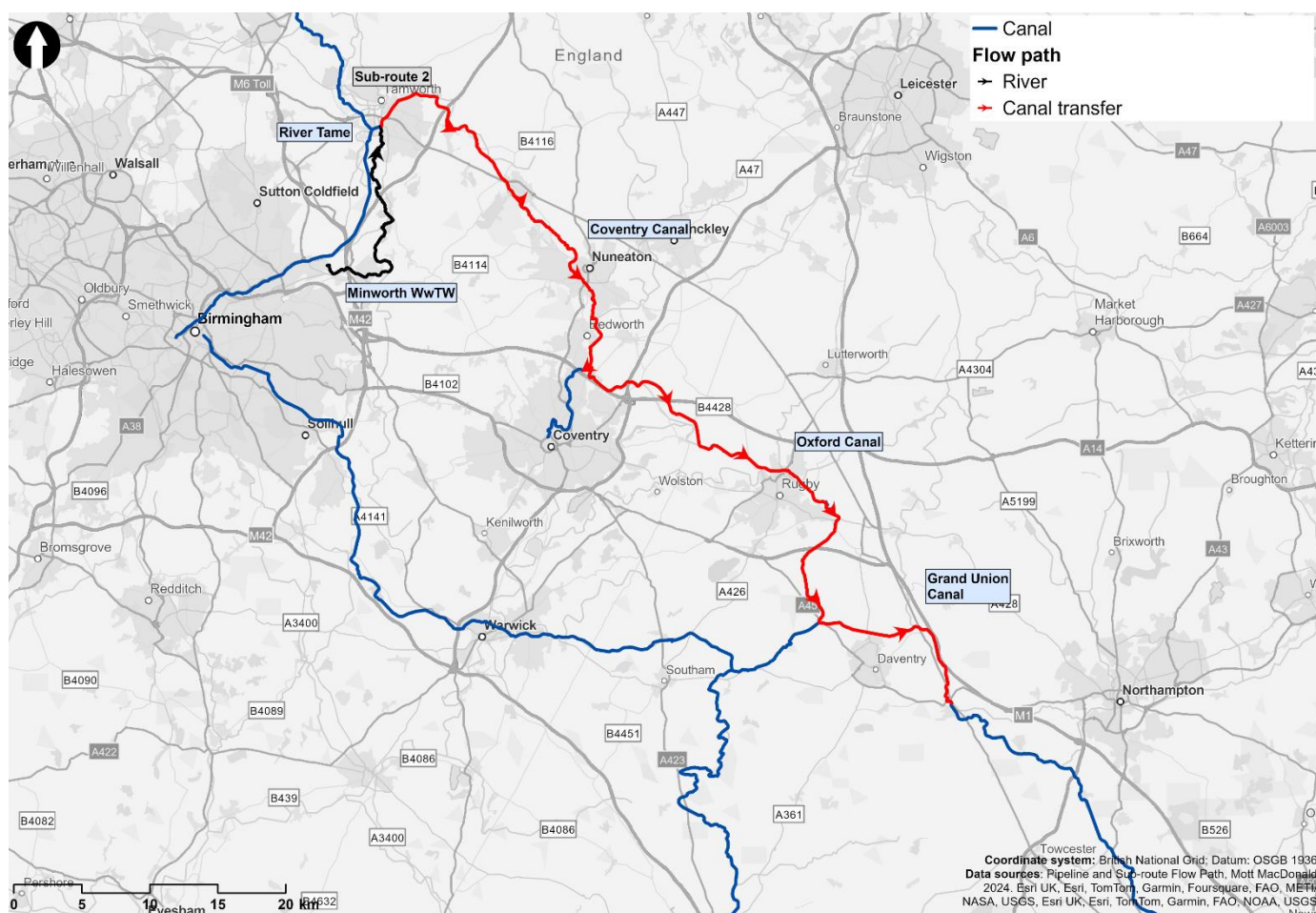
Figure 5.2: Sub-route 1 flow path.



5.2.2 Sub-Route 2 – River Tame to Coventry Canal

The existing configuration at Minworth WwRC is to discharge to the River Tame at two specific locations from both the Minworth and Coleshill WwRC. Sub-route 2 utilises this existing arrangement by discharging recycled water to the River Tame which runs approximately north-eastwards and crosses underneath the Coventry Canal, close to Fazeley. This would be a suitable location to abstract from the river and discharge into the Coventry Canal, connecting to the GUC as per sub-route 1.

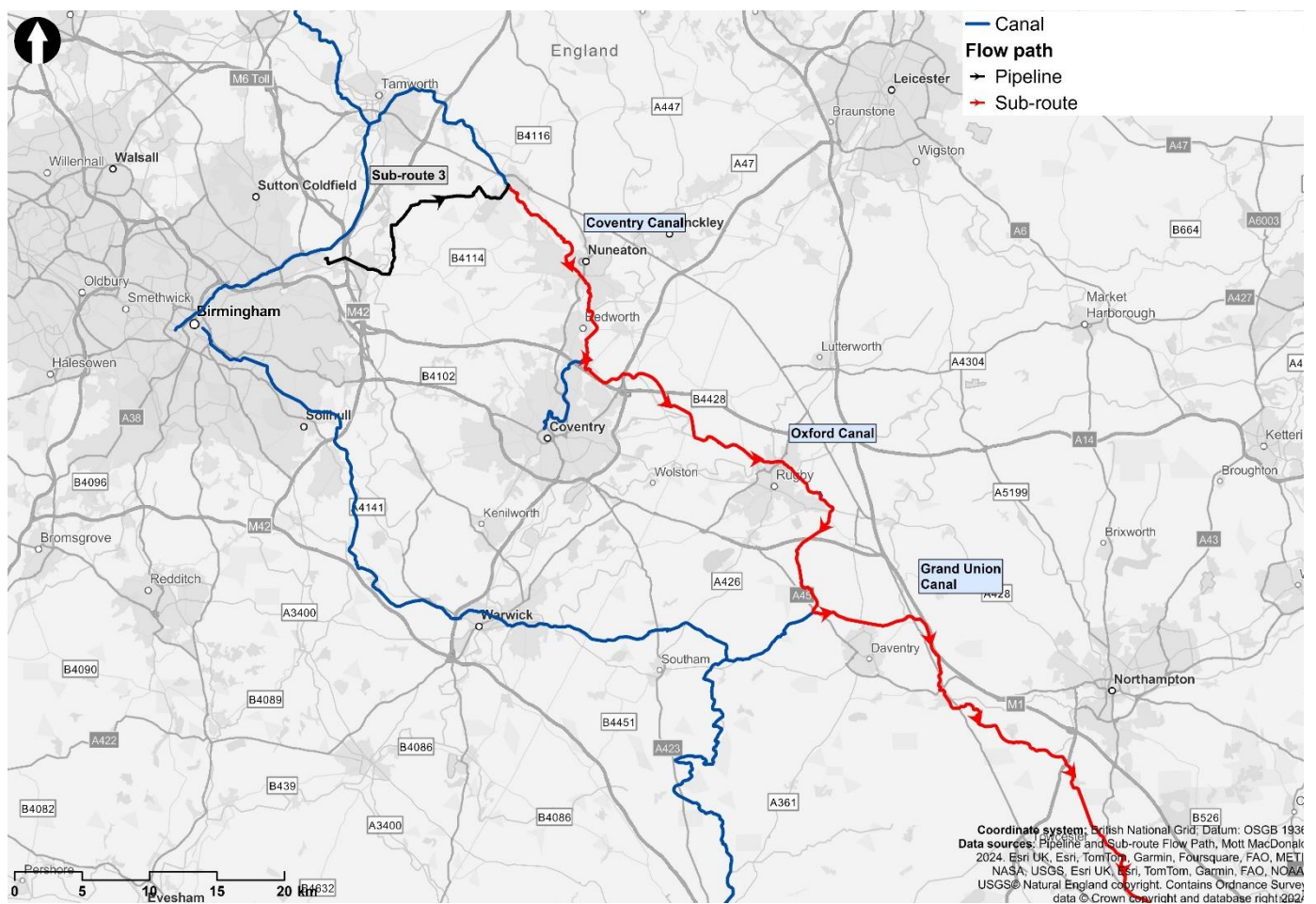
Figure 5.3: Sub-route 2 flow path.



5.2.3 Sub-Route 3 – Pipeline to Coventry Canal at Atherstone

Sub-route 3 follows a similar routing to sub-routes 1 and 2, leaving Minworth WwRC and flowing north before coming back south in the direction of its intended destination and offers an alternative to remove the initial flow north in the canal. Sub-route 3 would transfer water via a new pipeline to discharge into the Coventry Canal at Atherstone, connecting to the GUC as per sub-routes 1 and 2.

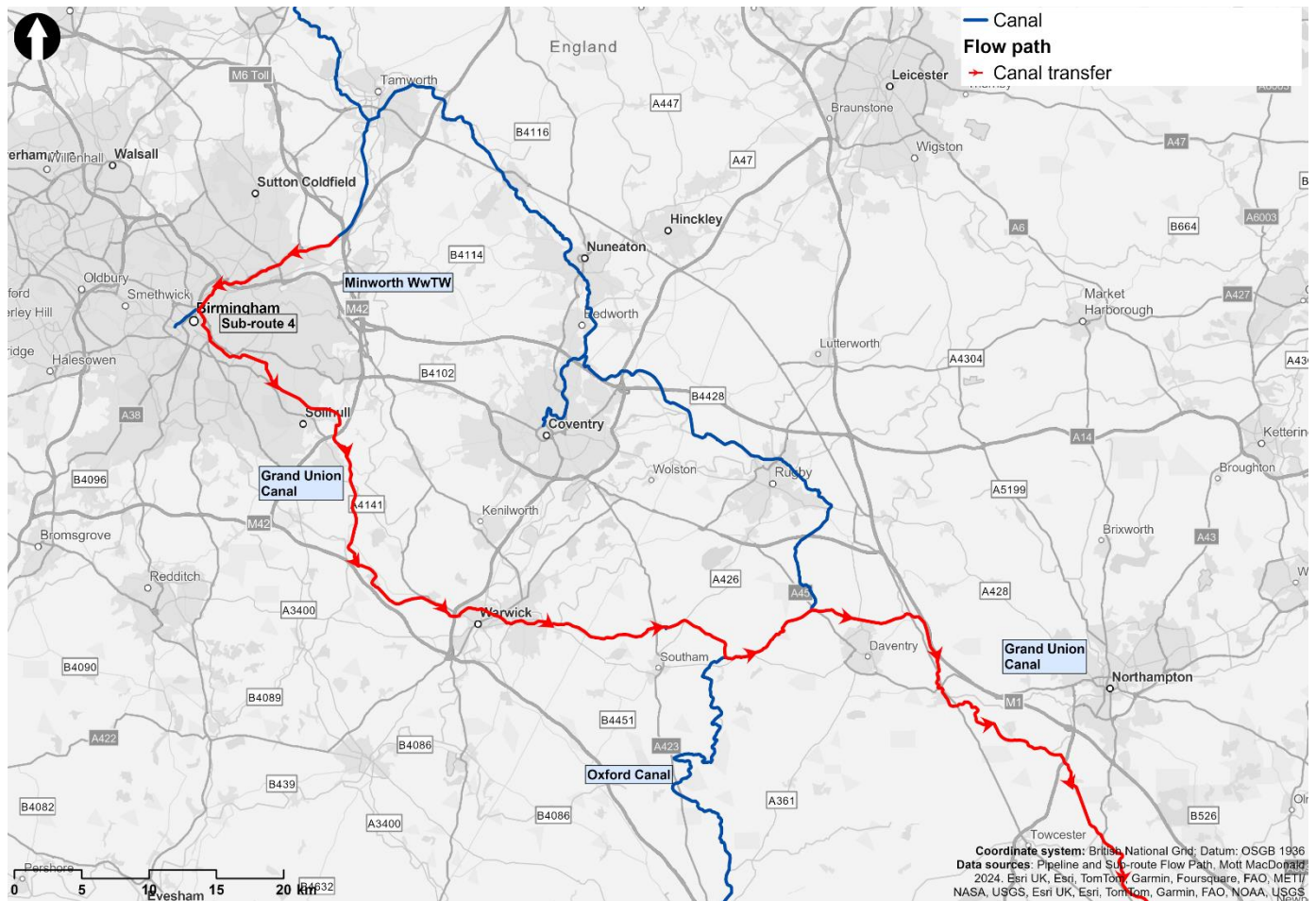
Figure 5.4: Sub-route 3 flow path.



5.2.4 Sub-Route 4 – Birmingham and Fazeley Canal

Sub-route 4 would adopt the same discharge into the Birmingham and Fazeley Canal as sub-option 1, however; it would flow to the west and back into Birmingham. The canal then meets the Birmingham and Warwick Junction Canal, where it flows south until its confluence with the GUC due west of Kington Hill local park.

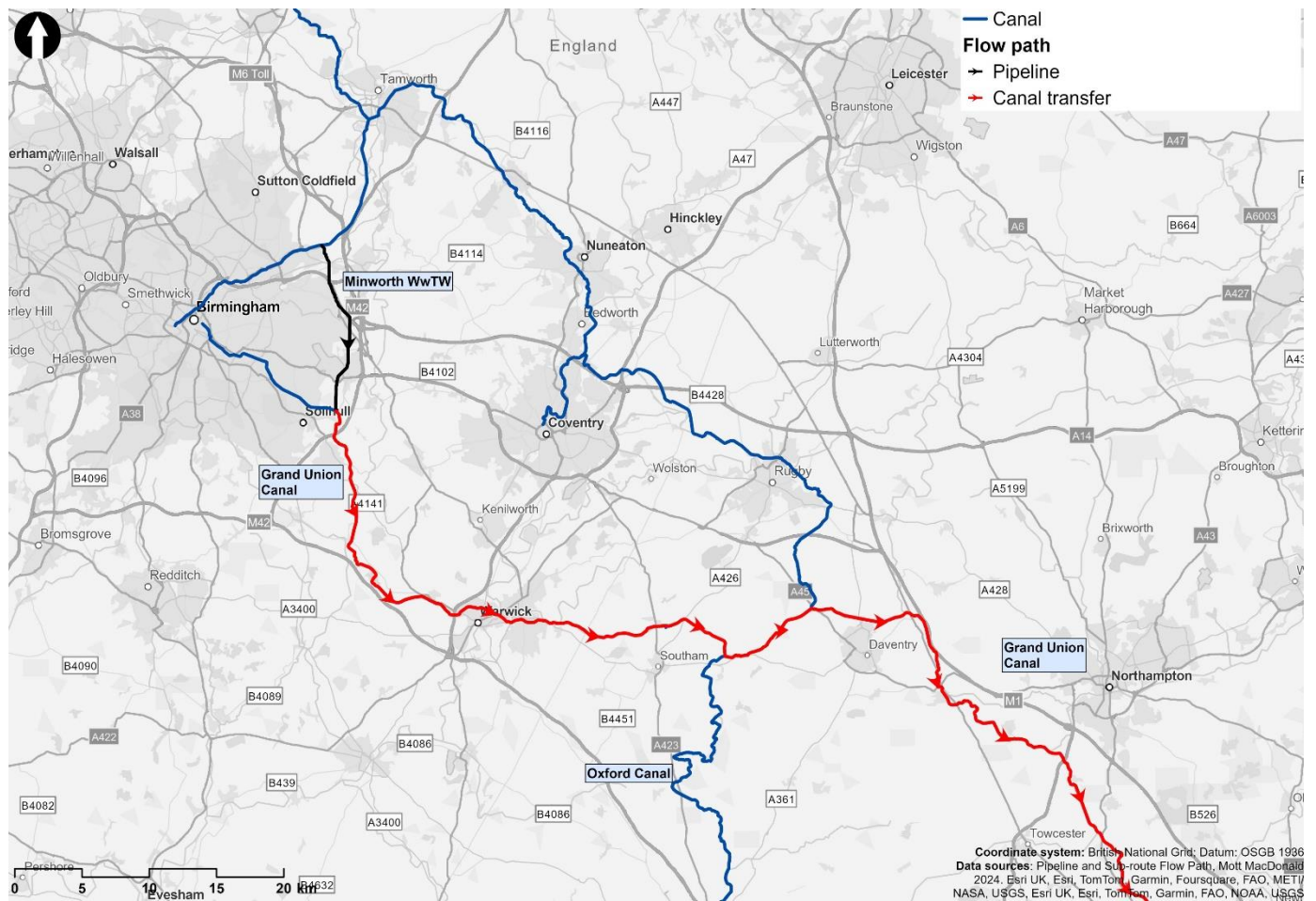
Figure 5.5: Sub-route 4 flow path.



5.2.5 Sub-Route 5 – Pipeline to Grand Union Canal at Copt Heath

Sub-route 5 would take water via a pipeline to a discharge point at Copt Heath Wharf which sits on the GUC to the north of Copt Heath and the M42. Once in the GUC, this route would follow the canal into the AfW supply area for abstraction and distribution.

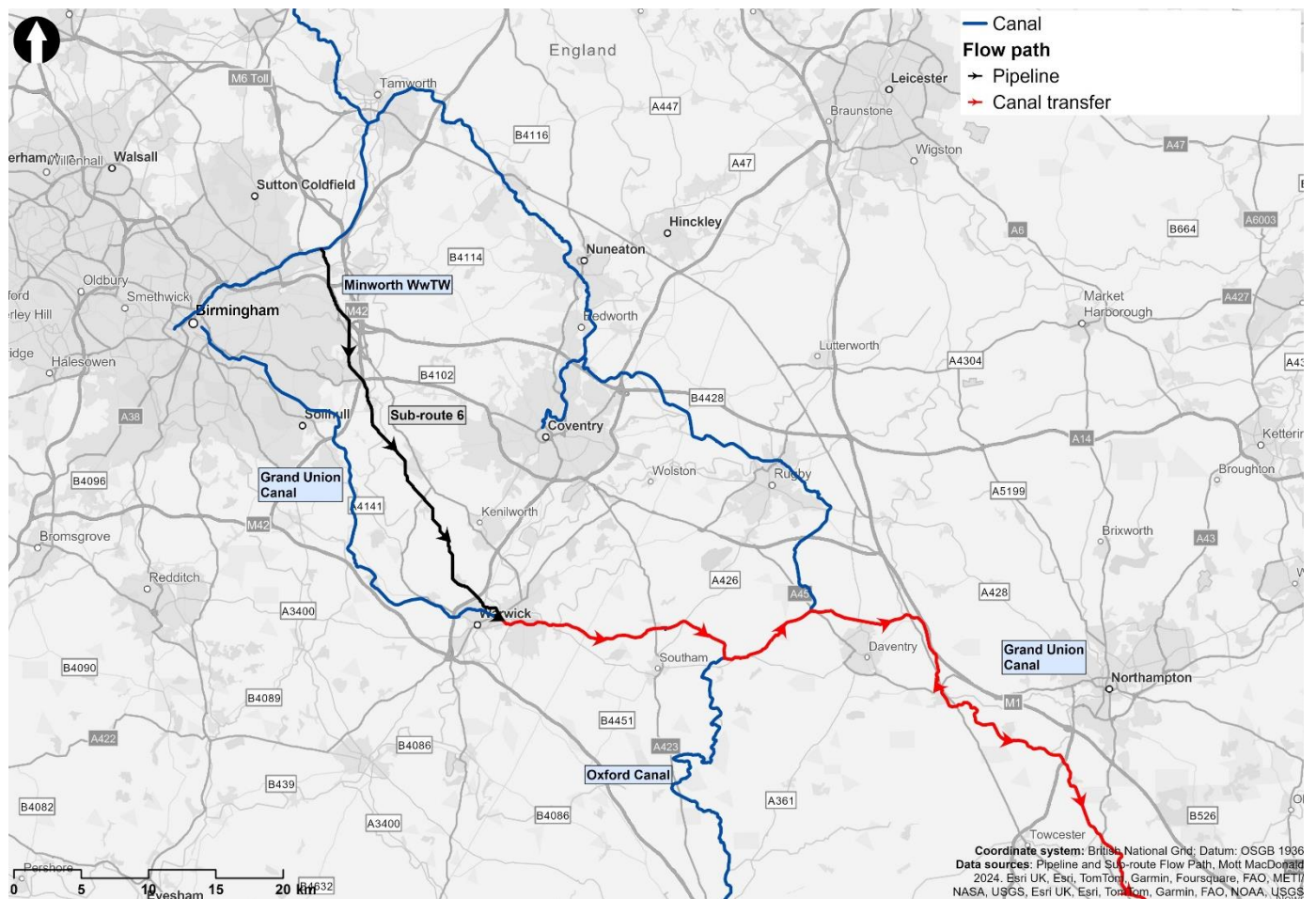
Figure 5.6: Sub-route 5 flow path.



5.2.6 Sub-Route 6 – Pipeline to Grand Union Canal at Leamington Trough Pound

Sub-route 6 is a variant of sub-route 5, in which the transfer of water is completed further downstream, into the Leamington Trough Pound. The total length of the pipeline is much longer in this sub-route, running north-west to south-east sub-parallel to the A452 which connects Leamington Spa to Coleshill and Sutton Coldfield.

Figure 5.7: Sub-route 6 flow path.



5.3 Assessment of Transfer Options

The sub-route options have been the subject of assessment through RAPID Gate 1 where three sub-options were considered and taken forward to RAPID Gate 2⁷ for further assessment to select a preferred sub-option to develop further within RAPID Gate 3. The sub-route options have been further reviewed to ensure that the options have been subject to consistent engineering, environmental, planning and land assessments of an appropriate level of detail, to be used as the basis for decisions around option selection for progression through the DCO process.

Those options utilising existing infrastructure (i.e. river and canal) have focussed on the assets for assessment, however, for those options with new infrastructure (i.e. pipelines) a corridor-based assessment has been followed, as the exact location of the infrastructure would be subject to further design work and investigation.

A summary of the assessment outcomes for each sub-route option is presented at **Appendix B**.

5.3.1 Sub-Route 1 – Birmingham and Fazeley Canal

Sub-route 1 performed favourably alongside other sub-routes, particularly those western sub-routes, namely sub-routes 4, 5 and 6. However, a number of issues were identified following further assessment, the most significant being the hydraulic implications and several sections that would limit the capacity to transfer flow and achieve the required peak flow without additional measures.

Due to being an existing asset, the planning and land impacts are not considered significant. However, the assessment identified potential negative environmental impacts through the River Tame and River Anker flood plains. The addition of transfer flow into the canal may also be unacceptable from a flood risk perspective, where an element of the sub-route is fully within the flood risk area.

5.3.2 Sub-Route 2 – River Tame to Coventry Canal

Sub-route 2 utilises the River Tame which currently receives water from the Minworth WwRC site. The assessment confirmed that River Tame has a significant flood zone extent and locating the extraction and transfer point on the River Tame could cause a potential deterioration of the water source quality. This is due to it being mixed with the storm flows, then conveyed into the Canal with potentially more sediments and other pollutants.

As stated above, this sub-route utilises the River Tame before water is abstracted, treated and discharged into the canal. This route would therefore require a new abstraction point and license, in addition to the discharge permits required for all sub-routes. Furthermore, this route would encompass treating water twice, once at Minworth and again post-abstraction, which would minimise the efficiency of this route. The sub-route was assessed as being the least flexible due to it being a natural system that is impacted by seasonal environmental changes, most notably being the frequent flooding experienced across the majority of the sub-route. Significant works would also be required in the flood plain to lift the flow out of the river and up to the canal.

5.3.3 Sub-Route 3 – Pipeline to Coventry Canal at Atherstone

Sub-route 3 would transfer recycled water via a new pipeline from Minworth to discharge to the Coventry Canal at Atherstone. Through the assessment work undertaken sub-route 3 has several advantages over the other options considered. The sub-route involves less work to locks, fewer and easier to construct pumping stations and avoids the canal section from Minworth to Atherstone required by sub-routes 1 and 2 which would require greater intervention.

⁷ Grand Union Canal – Annex A1.2 Gate 2 Position Paper – Route Selection (November 2022)

The assessment work confirmed that the pipeline routes provide most flexibility as they reduce the amount of canal infrastructure requiring modification. Sub-route 3 is considered the most flexible as it is largely rural and less vulnerable to interfacing projects, which is more likely with sub-routes 5 and 6. Sub-route 3 also has the shortest overall programme, being shorter and easier to construct than other pipeline options resulting in a shorter period of disruption.

5.3.4 Sub-Route 4 – Birmingham and Fazeley Canal

Sub-route 4 would take water into the Birmingham and Fazeley Canal to the west and into Birmingham. The route is significantly more urbanised and potentially more complex from a land and planning perspective. The upgrade to the canal system within the Birmingham and Fazeley Canal approach to Gravelly Hill in Birmingham, and around Birmingham up to the connection with the GUC, would require works to be undertaken within the heavily built-up area of Birmingham, therefore increasing the complexity of this option and number of receptors likely to be affected during construction.

It was identified through the engineering assessment that the sub-route would potentially require the upgrade of the whole lock section and significant amounts of canal structures (such as bridges and aqueducts) to enable the water transfer in this direction of the Birmingham and Fazeley Canal from Minworth. This contrasts with other western sub-routes that would bypass these works via a piped option.

5.3.5 Sub-Route 5 – Pipeline to Grand Union Canal at Copt Heath

Sub-route 5 would involve the transfer of water via a pumped pipeline of approximately 15.75km to a discharge point at Copt Heath. The engineering assessment identified that any route would need to navigate several complex interfacing land uses, including HS2, Birmingham International Airport and the NEC lying almost due south from Minworth, and several major trunk roads including M6, M6 toll road, M42, A452, A446 and A45. This would impact the flexibility of the option and could potentially impact the overall delivery of the transfer.

Sub-route 5 offers benefits in relation to sub-route 4 as it bypasses the urban area and corresponding works to the Birmingham and Fazeley Canal. However, the proposed discharge location is situated upstream and potentially involves more upgrades to the canal infrastructure than other sub-options that were assessed.

5.3.6 Sub-Route 6 – Pipeline to Grand Union Canal at Leamington Trough Pound

Sub-route 6 presents similar characteristics to sub-route 5, in that it faces similar constraints associated with infrastructure interfaces within the Birmingham area, including the airport, NEC, HS2 and several major trunk roads. The route performs strongest out of the western transfer options, avoiding work associated with the Birmingham and Fazeley Canal, and reduces works to canal infrastructure, including the number of locks for upgrade between Minworth and Leamington Spa. It also avoids the significant level variation of Hatton Locks and reducing the extent of upgrades required overall.

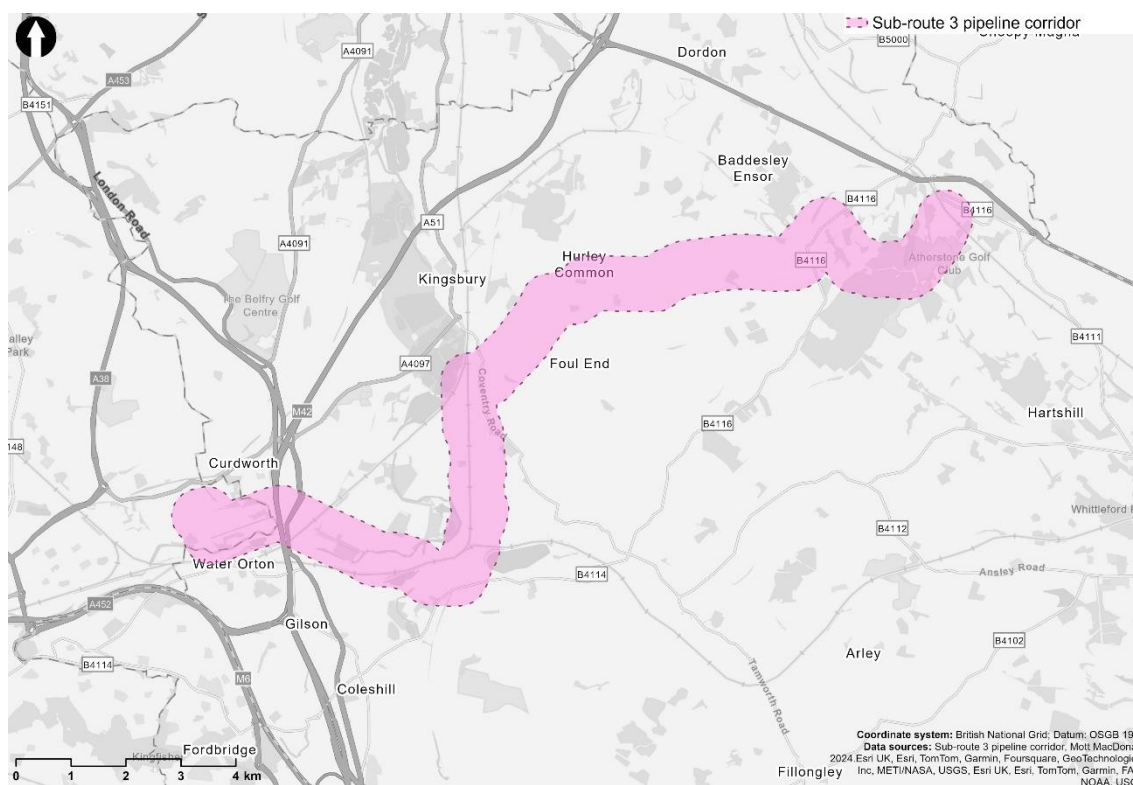
Whilst preferable of the other western sub-routes, the route was assessed as having several constraints including material use and carbon impacts. Sub-route 6 would require the most material for the construction and the additional pumping requirement results in much higher carbon costs than cannot be mitigated sufficiently in comparison to other options. Operationally, the option also has more points of failure and would generally be more difficult to operate to minimise negative fluctuations and adapt to long-term trends.

5.4 Summary of Assessment and Conclusions of Sub-Route Options

An optioneering exercise has been undertaken to assess sub-route options for the transfer of the water into the GUC. Multiple options were generated covering a range of transport modes, including canal only, river and canal and pipeline route options. The options generated were subject to a robust and consistent assessment process, covering engineering, environment, planning and land disciplines to identify a preferred mode for the transfer of recycled wastewater.

Sub-route 3 would transfer recycled wastewater via a new pipeline from Minworth to discharge to the Coventry Canal at Atherstone. Following the assessment process, sub-route 3 was confirmed as the preferred option, presenting lowest overall risk, through reducing the amount of canal infrastructure requiring modification, and presenting the shortest overall programme. It was also the most flexible option, with a largely rural corridor and less vulnerable to interfacing projects around Minworth.

Figure 5.8: Sub-route 3 Pipeline Corridor

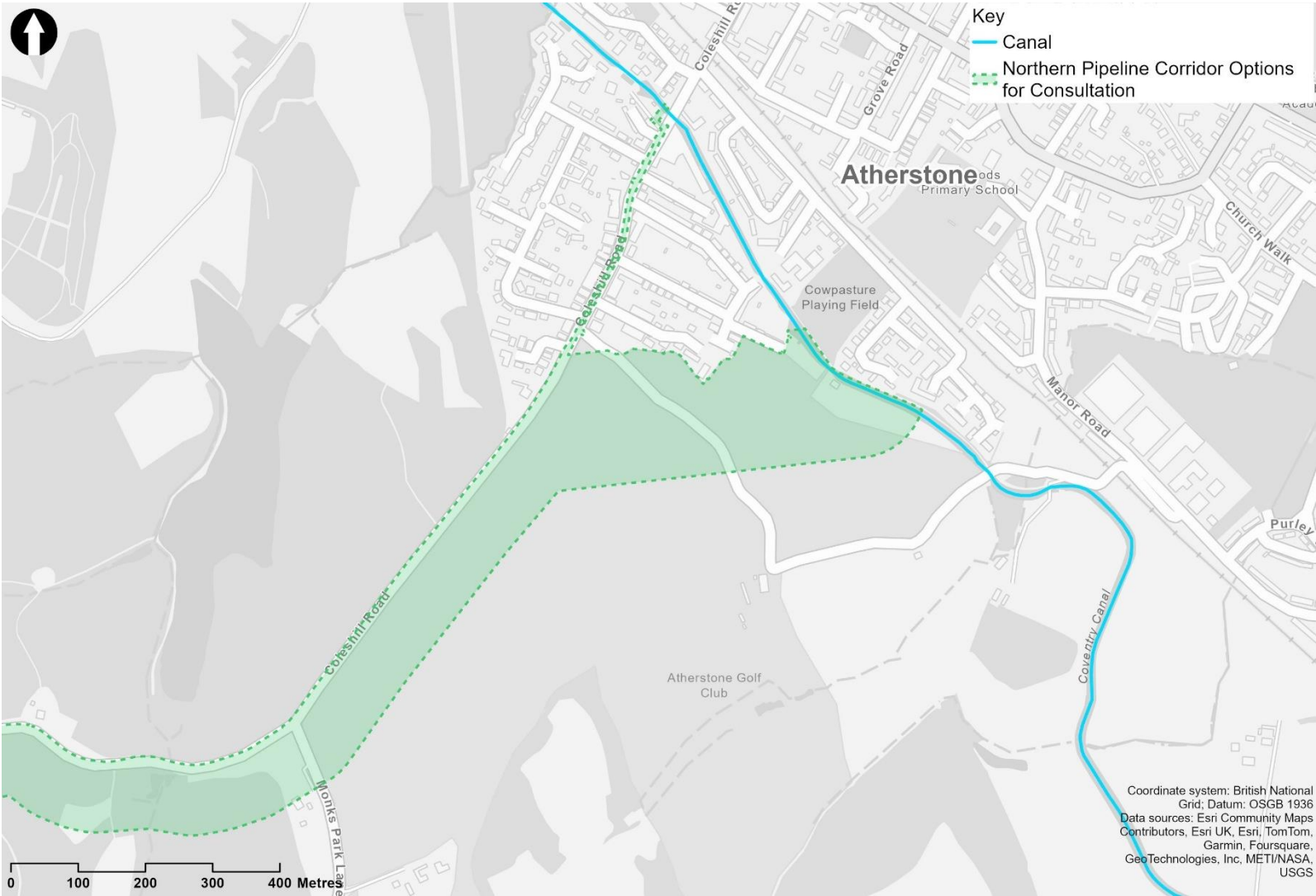


5.5 Alternative Outfall Location Options for the Preferred Corridor

Following selection of the preferred pipeline corridor for the transfer of water from the Minworth WwRC AWTP to discharge via the Coventry Canal at Atherstone, a more detailed review of the pipeline corridor was undertaken. The purpose of the review to ensure that the optimal pipeline corridor is taken forward for further assessment and to inform non-statutory consultation for the GUC Transfer Project.

A key component of this review has been reviewing the preferred outfall location. Two options were identified as being deliverable and subject to further assessment as part of the optioneering process, covering engineering, environment, planning and land disciplines. The two alternative options are shown in Figure 5.9 and include an option via Coleshill Road, and an option through Atherstone Golf Course.

Figure 5.9: Alternative Outfall Location Options for the Preferred Corridor



5.5.1 Coleshill Road

The Coleshill Road option involves the pipeline corridor following the alignment of Coleshill Road into Atherstone, discharging into the canal via an existing access to the canal side and a new discharge structure.

The construction of the water transfer pipeline within the highway along Coleshill Road would require the diversion of significant utilities in the area, including the large sewer main in south Atherstone. Coleshill Road has properties either side through Atherstone, and as a result there would be a much-reduced construction area and access arrangements, with significant disruption to the local population and businesses over an extended construction programme.

The engineering assessment confirmed that with the discharge location being adjacent to a series of locks, upstream of an existing road bridge where the canal narrows, there is a potential hydraulic restriction which would mean that the option is not considered optimal when compared with the Atherstone Golf Course option (see 5.5.2).

The Coleshill Road option would involve work primarily within the highway boundary, and no significant impacts were identified in relation to planning and land considerations. Furthermore, the discharge location for this option falls on land occupied by the Trust, which would be advantageous for land access and acquisition. Impacts to the natural environment and local amenity would not be as significant as the Atherstone Golf Course option, though the proximity of the works to residential, commercial properties and community assets is an important consideration. The option would require extensive traffic management implementation and the works would take a considerable time to complete, which would have a significant local amenity impact.

5.5.2 Atherstone Golf Course

The Atherstone Golf Course option follows Coleshill Road until the road reaches the first residential properties of Atherstone where the route then diverges east through the golf course and joins Coventry Canal just south of the Westwood Recreation Area. The route is still within the Atherstone Pound, but downstream of the Coleshill Road option.

The Atherstone Golf Course option would avoid the diversion of a significant number of utilities and the large sewer main in south Atherstone that are associated with the Coleshill Road Option (see Section 5.5.1). It would also avoid the extensive road closure of Coleshill Road and corresponding impacts on local residents, reducing programme and allowing increased space for construction. The outfall location is located further downstream than the Coleshill Road option and avoids the identified hydraulic issues.

The option would result in temporary disruption to Atherstone Golf Course through the construction of the pipeline, which would require further investigation. Part of the land associated with the golf course option is 'Common Land', though it is likely that due to the nature and extent of the works that it would be below the threshold requiring deregistration and replacement common land to be provided (i.e. temporary use or footprint under 200m²), though common land consent would still be required.

The option passes through an area of high ecological potential, within an ancient woodland where veteran trees are present. This presents a significant constraint. Further investigation of the constraints and opportunities to avoid, reduce or mitigate impacts will be undertaken. Noting the extent of potential land available for the option within the pipeline corridor it has been identified that there may be a feasible route through that would minimise the overall impact through detailed design of the alignment, and available construction techniques. This would be subject to further assessment and investigation work to be undertaken.

5.6 Summary of Assessment and Conclusions of Outfall Location Options

Following the assessment and workshops with the respective workstream teams, the outcome was that the Atherstone Golf Course option was generally preferred. This is due to the significant engineering benefits both operationally and through the construction of the pipeline itself, avoiding significant utility diversions and disruption to the residents of Atherstone. Whilst this option would have a greater impact on the natural environment, it was identified that this could be minimised and mitigated through detailed design and the use of available construction techniques, subject to further investigation and assessment.

These conclusions reflect the information available in relation to the options at the Scheme development stage, in advance of non-statutory consultation and planned site surveys and investigations. To confirm the preferred option for the outfall location, it is proposed to consult on both options through non-statutory consultation, along with consideration of the overall pipeline corridor. The outcomes from non-statutory consultation and additional surveys and assessments will be considered prior to confirming the selection of a preferred option for the future progression of the project.

6 Abstraction, Water Treatment Works and Storage

6.1 Strategic Context

Where to abstract the transferred water from the GUC, treat and store the water and where to connect into AfW's water network has evolved through RAPID Gates 1 and 2, which included the consideration and assessment of:

- The point within the GUC canal system water should be abstracted.
- Potential locations for the WTWs.
- The need for storage and the amount of storage required.
- Where the water is needed within AfW's water network.

At RAPID Gate 1 (July 2021) options for abstraction and location of the WTW focused on AfW's central region where there was the predicted deficit in water supply. AfW's Water Resources Management Plan 2019 identified deficits in the north and north east of AfW's central region.

Sites were identified within AfW's central region within a search area based on AfW's water supply infrastructure 5km either side of the GUC as it passes through their supply area. Potential sites were considered through RAPID Gate 1 and Gate 2 which were in reasonable proximity to major water distribution mains, in close proximity to planned or existing water storage, in excess of 10 hectares, outside of Environment Agency flood plains and not in conflict with areas reserved for the delivery of HS2.

The process resulted in eight abstraction options, including a site in Tring which, although outside of AfW's supply area, was included following the Environment Agency's feedback that abstraction locations needed to be considered upstream of the canal's interactions with sensitive chalk streams. The following three sites were considered at RAPID Gate 1:

- Tring
- Hemel Hempstead
- The Grove

At RAPID Gate 1, the treatment process requirements were explored based on drinking water requirements. This work identified that should it not be possible to temporarily abstract water from the canal as normal, raw water storage should be provided as a buffer and to provide operational resilience.

At RAPID Gate 2 (November 2022), the WTW sites from RAPID Gate 1 were considered alongside a further site identified at Leighton Buzzard. The Leighton Buzzard site was included in response to review by the Environment Agency and in consideration of the risk to changes in flow regime in the chalk streams that interact with the canal network south of the Tring summit.

Alongside the four sites under consideration, the following three options for connection into AfW's water network were considered:

- Underground reservoir near Luton
- Boxted
- Abbots Langley

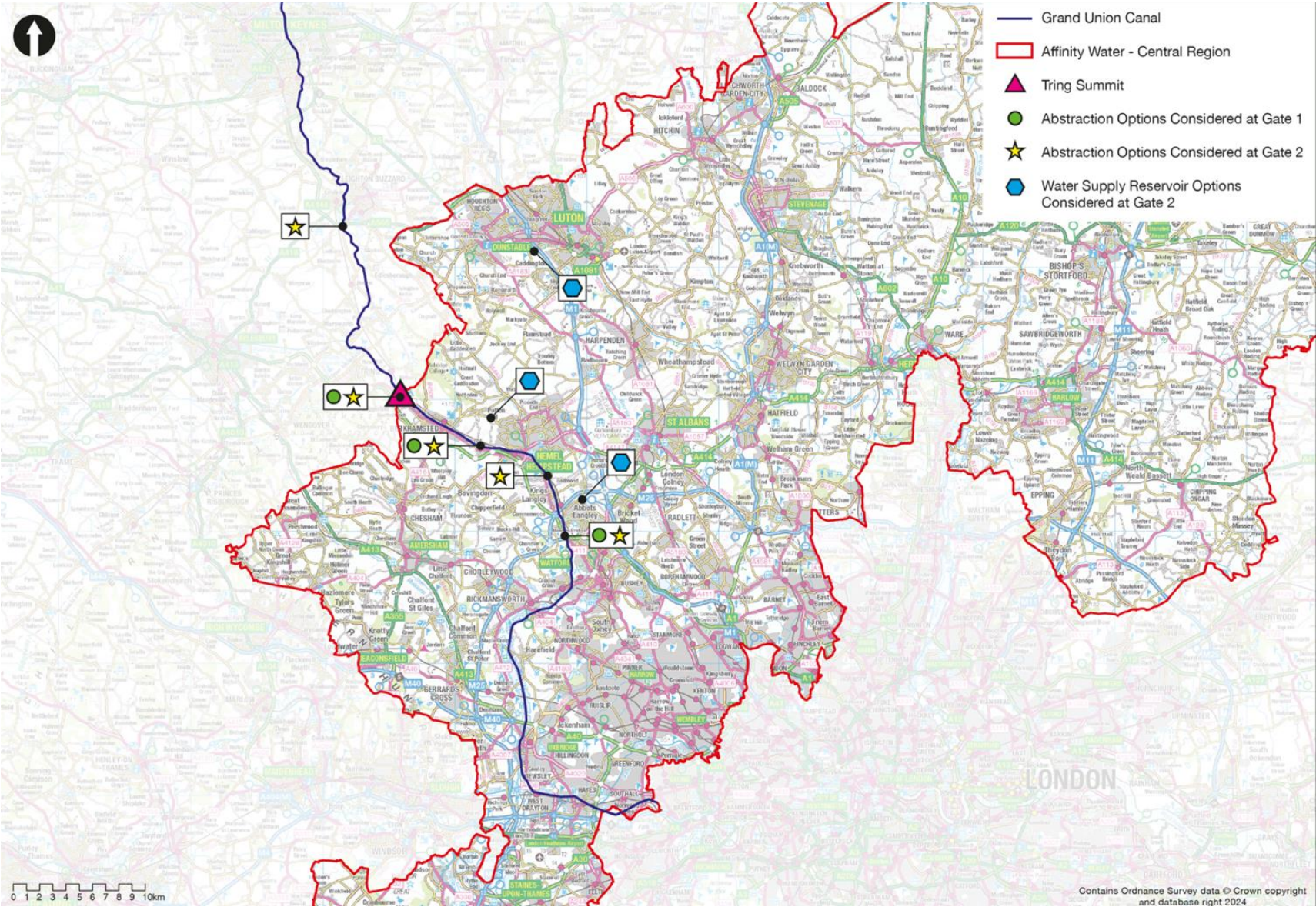
Criteria for site consideration included site constraints, energy efficiency, environmental risk, carbon emissions, cost, and social and environmental benefits. The assessment was further informed by two key outcomes during the RAPID Gate 2 assessment work:

- AfW confirmed their assessment that the underground reservoir near Luton would be the most useful site from which to manage water into supply. This finding came from AWL's Connect 2050⁸ strategy study which examined the supply demand balance at a network demand level up to 2050 and considers the best options to meet the forecast deficits.
- There were concerns about abstracting water south of the Tring summit on the GUC, the highest of the three summits on the GUC. The canal south of Tring is very interconnected with local high quality chalk streams. Although the transfer of GUC Transfer Project water over the Tring summit was, at the time, considered to be infrequent, the Environment Agency were concerned that this would impact on the flow regime within these chalk streams. Furthermore, from Leighton Buzzard, the GUC starts rising towards the south-east. To pass flow further along the canal, it would be necessary to bypass the locks up to Tring utilising a series of new pumping stations and pipelines.

The Leighton Buzzard site option transferring water to the underground reservoir near Luton was therefore considered at RAPID Gate 2 as it would abstract from the GUC upstream and is topographically lower than Tring, therefore avoiding interaction with the chalk streams south of the Tring summit.

⁸ [Affinity Water Connect 2050 Report](#)

Figure 6.1: Map of AfW’s central region showing options at RAPID Gates 1 and 2.



6.2 RAPID Gate 2 Site and Review

For RAPID Gate 2 and to further assess the feasibility and cost of the GUC Transfer Project for RAPID's consideration, work was undertaken to develop an example WTW site. Flow was proposed to be abstracted from the GUC just south of the A4146 bridge, adjacent to the River Ouzel and near to Leighton Buzzard. Flow would pass beneath the River Ouzel and be pumped into a water storage, before gravitating into the first stage of treatment. The water storage was sized to provide five-day storage (575,000m³).

The Leighton Buzzard site for the treatment works was proposed close to the abstraction point, slightly raised from the river and canal and adjacent to an operational sand quarry (Grovebury Road). Additional interstage pumping would be required in the treatment works.

Final high-lift pumps would transfer potable treated water via a new pipeline approximately 15.6km long, to a new clean water holding tank at the existing underground reservoir near Luton.

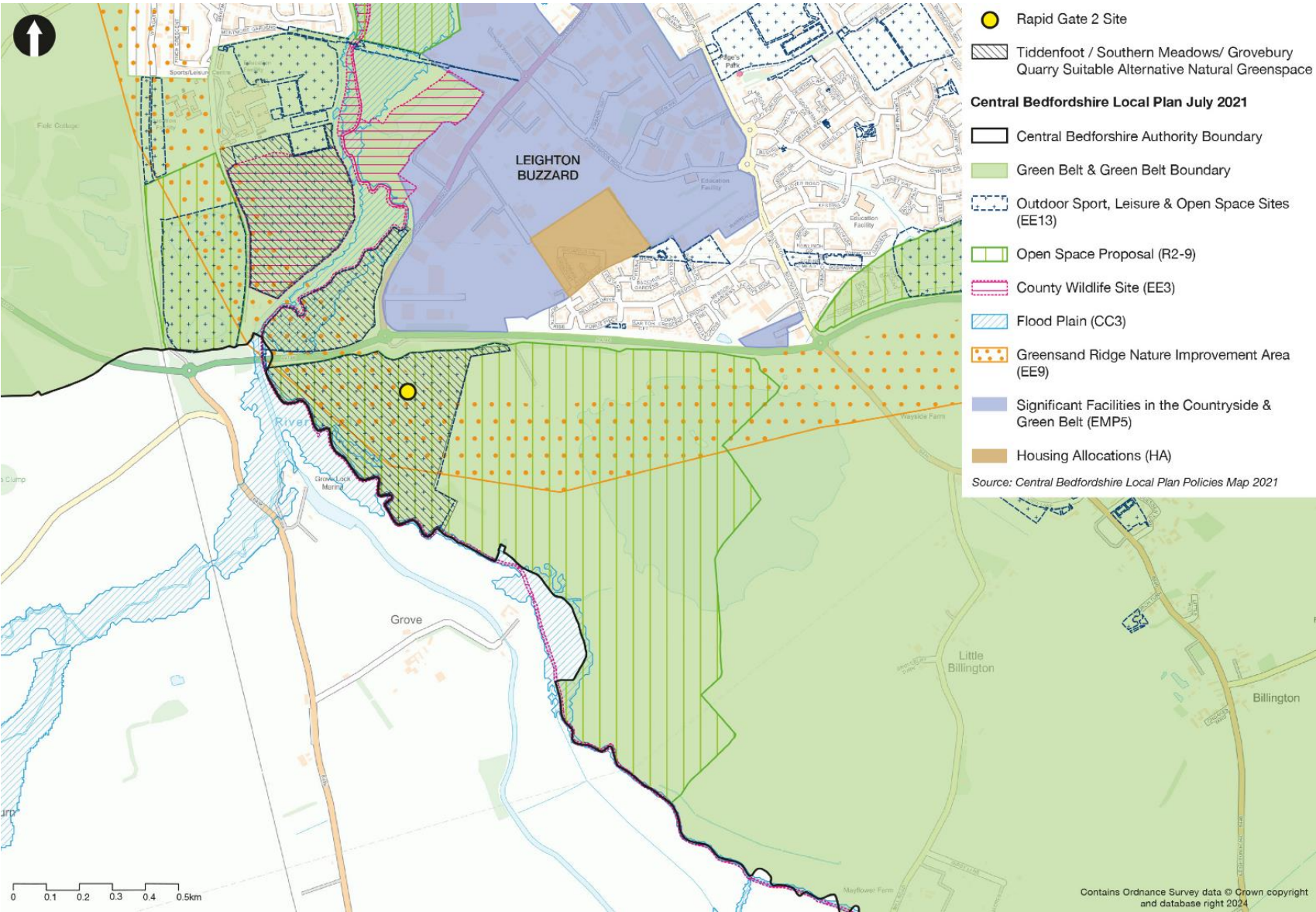
A review of the RAPID Gate 1 and 2 site assessment work was undertaken within Gate 3 as part of the optioneering exercise to ensure the options have been subject to consistent engineering, environmental, planning and land assessments. This included reviewing the RAPID Gate 2 site at Leighton Buzzard.

The locational advantages of the Leighton Buzzard site were noted as being close to the GUC and having the space to accommodate a WTW and water storage. However, several planning designations and constraints were identified. These include:

- The site's location within the Green Belt. Planning policy, including that set out in the Water Resource Infrastructure National Policy Statement (WRINPS), requires consideration of whether there are other sites outside of the Green Belt or sites within the Green Belt that are less harmful.
- The site's designation as a Suitable Alternative Natural Greenspace (SANG) by Central Bedfordshire Council in March 2023. The purpose of the designation is to relieve recreational pressure on the Chiltern Beechwoods Special Area of Conservation (SAC) and land within the Leighton Buzzard RAPID Gate 2 site is part of larger SANG designation.
- Other planning designations and allocations. The site is allocated as an Outdoor Sport Leisure and Open Space Site. It also sits within the Greensand Ridge Nature Improvement Policy, as set out in Central Bedfordshire Local Plan.

On the basis of the above, it was determined that further site options should be considered and evaluated within the RAPID Gate 3 optioneering process.

Figure 6.2: Designations at the RAPID Gate 2 Leighton Buzzard Site



6.3 Alternative Sites Considered

A site assessment review of alternatives was undertaken based on the methodology set out in section 3 of this report. The review considered the Leighton Buzzard RAPID Gate 2 site and identified and assessed other options for the abstraction and siting of the WTW that would:

1. Abstract water before the Tring Summit and before the canal started rising towards the summit.
2. Facilitate the transfer of the treated water to the underground reservoir near Luton.
3. Allow for consideration of sites outside of the Green Belt or sites where they may be less harmful to the Green Belt.

The site search area was developed and expanded through the assessment period. The search area extended north and south of Leighton Buzzard and was defined based on the:

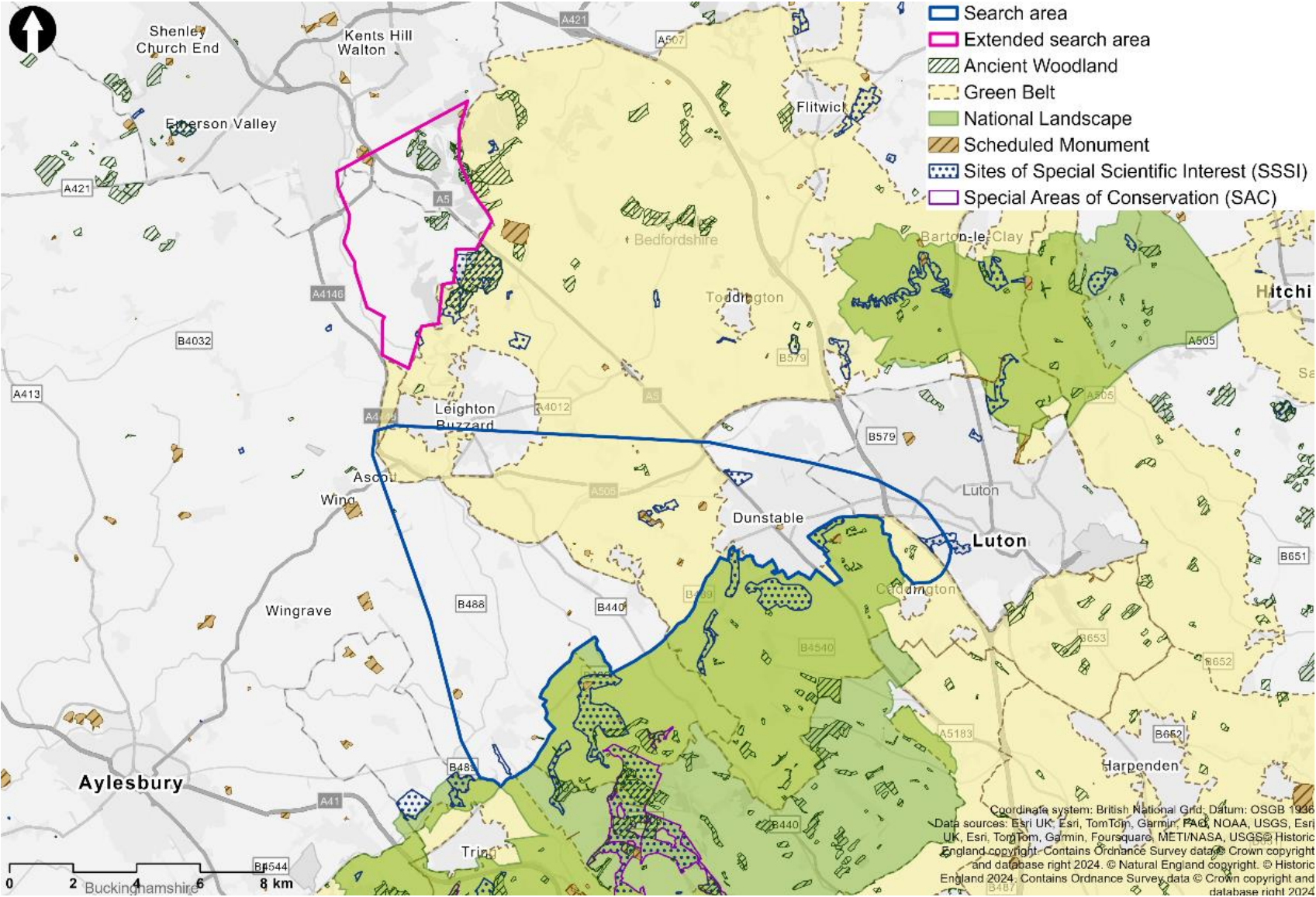
- Location of the GUC and the underground reservoir near Luton
- Boundary of the Chilterns National Landscape designation – built above ground development within the National Landscape would not be supported by planning policy if there are alternatives available outside of that area.

Sites were identified based on the high-level criteria as set out in Table 3.1 and sought to avoid:

- Building and settlements
- Ancient woodland
- Scheduled monuments
- National landscape
- Environmental designations (international and national biodiversity designations)
- Flood zones

The extent of the search area and the environmental designations relating to it are shown in Figure 6.3.

Figure 6.3: Map showing environmental designations within the search area



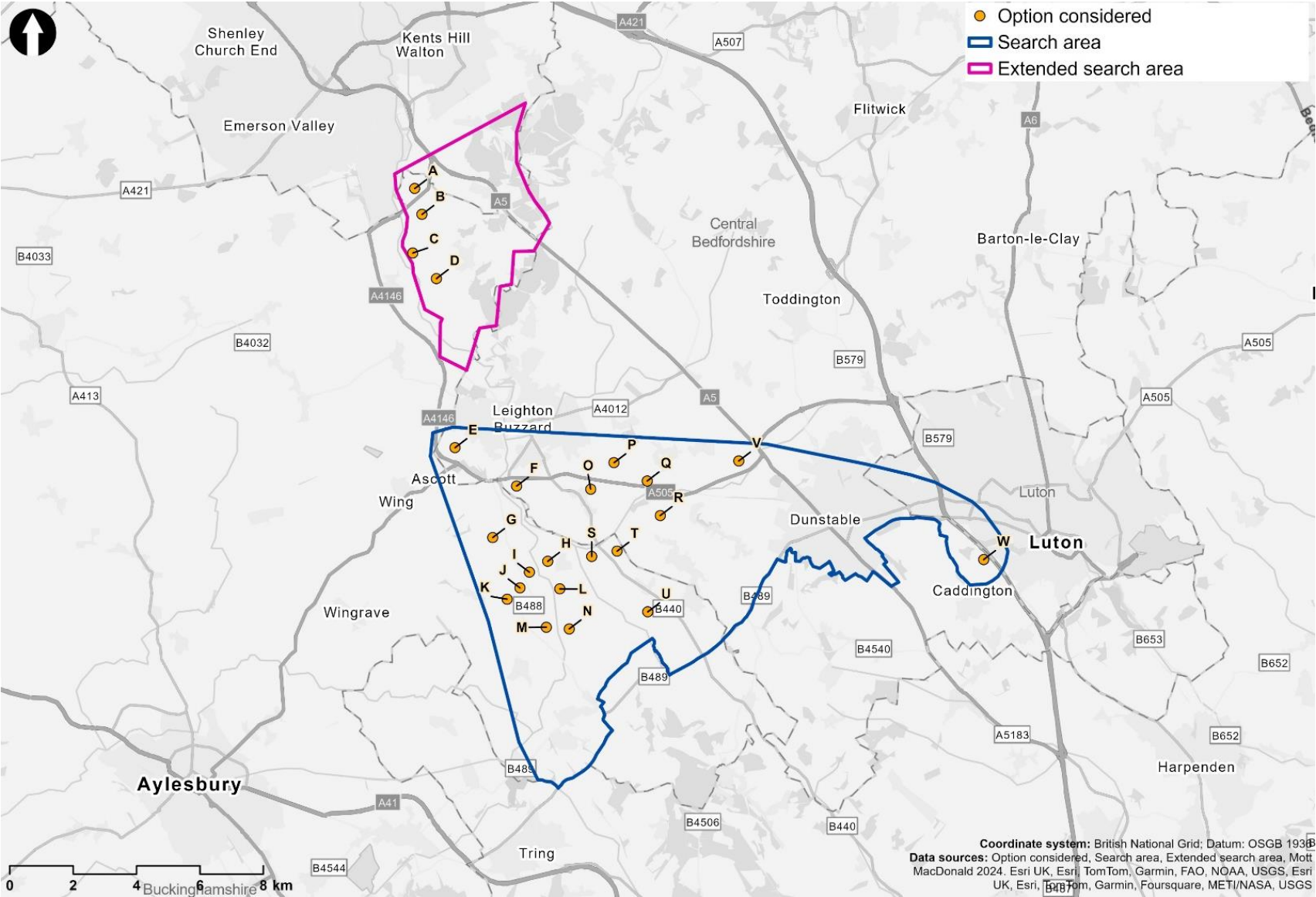
Whilst the search areas sought to avoid Green Belt land, the extent of Green Belt land within Central Bedfordshire District meant that the search area did extend into the Green Belt east and south of Leighton Buzzard as sites within this location were well located to the GUC and underground reservoir near Luton. As part of the site consideration and assessment process, the locational advantage of these sites was considered against Green Belt policy considerations.

Consideration was given to the potential for the water storage and WTW to be located on or adjoining existing operational water sector sites within the search areas. However, the opportunity to do so is limited by the lack of any large-scale existing water resources infrastructure within the search areas, and as the majority of the search areas lie outside of AFW's operational supply area. The exception to this is the existing operational underground reservoir near Luton, therefore the potential to accommodate water storage and WTW alongside that location was considered in the assessment.

A minimum size requirement of 10 hectares was applied to the site requirements, which would include the space necessary to accommodate the WTW plus some capacity to accommodate the water storage. The area needed for the storage is influenced by the topography of the site meaning that in most circumstances sites need to be in excess of 10 hectares.

In total, 23 sites were identified within the search areas, as identified in the figure below, and subsequently assessed.

Figure 6.4: Map of 23 sites identified within the search area



6.4 Assessment of Alternative Sites

As part of the staged approach to the methodology, all of the identified site options were assessed, with the extent of the assessment undertaken dependent on how far an option progressed through the appraisal process. For some options, the decision not to undertake further work at this stage was made early in the process. For other options that progressed through the appraisal process, more detailed assessment was carried out.

The outcome of the assessment process for the 23 site options is set out below based on the stage the site reached in the decision-making process.

6.4.1 Options considered not suitable for further work at this stage following a preliminary high level project team appraisal

Table 6.1: Options not progressed to further work at this stage following high level project team appraisal

Site Name	Description
Sites M and N	Poor or difficult accessibility during construction and on-going operation of WTW. Traffic would need to be routed through Horton to the north of the site and Ivinghoe to the south. These sections of the B488 involve the routing through residential settlements with on street parking limiting the width of the carriageway. Whilst operational traffic associated with the WTW would be limited, access for tankers and HGVs will be required on an on-going basis.
Sites K and G	Poor or difficult accessibility during construction during construction and on-going operation of WTW. Access to the site based on the existing road network would be via the B488 and Aylesbury Road which crosses the railway in two locations. In both locations, the crossing involves the road significantly narrowing under the railway bridge with the tunnels having apparent height and width restrictions. Alternative access would involve routing traffic through the settlements of Ledburn, Crafton and Mentmore using rural roads.
Site L	Poor or difficult accessibility during construction and on-going operation of WTW. Access to the site would need to be through Slapton, a residential settlement with on street parking limiting the width of the carriageway. Other access opportunities limited by the need to cross the Grand Union Canal.

6.4.2 Options considered not suitable for further work at this stage following preliminary planning appraisal

In addition, a planning focused evaluation of sites was undertaken that included consideration of:

- The Green Belt designation criteria - unrestricted sprawl of large built-up areas, prevent neighbouring towns merging into one another, safeguarding the countryside from encroachment, preserve the setting and special character of historic towns; and to assist in urban regeneration, by encouraging the recycling of derelict and other urban land.
- Countryside policy (Policy S3 Aylesbury Vale Local Plan) criteria – development should avoid compromising the character of the countryside between settlements; avoid a negative impact on the identities of neighbouring settlements or communities leading to their coalescence; maintain the individual identity of villages and avoid extensions to built-up areas that might lead to further coalescence between settlements.

Table 6.2: Options not progressed to further work at this stage following preliminary planning appraisal

Site Name	Description
Site J	Site option is adjacent to railway line and site is flat and relatively open. Access reasonable from B488 and Horton Road, although would need to avoid routing any traffic through Slapton. Long, thin configuration of the site along with its openness would make siting of a WTW in this location difficult without compromising the character of the countryside between settlements.
Sites S, T and U	Reasonable access off Leighton Road but road is rural in nature. Landscape is flat and open interspersed with individual properties/farms. Views over the land from higher land at Leighton

Site Name	Description
	Buzzard and escarpment. Introduction of WTW structures would be significant addition to the landscape and surrounding countryside in this location.
Site O	Good access opportunities from the A505 and background noise from A505. Marked difference in the character of land to south of A505. More rural and open landscape with views from higher land to the east. Proximity to Little Billington noted. Introduction of WTW structures would be significant addition to the landscape and surrounding countryside in this location.
Site R	Good access opportunities from the A505 and background noise from A505. Marked difference on land to south of A505. More rural and open landscape with views from higher land to the east. Site flat with pockets of hedgerow and tree belts. Proximity to the settlements of Lower End and Tottenhoe noted. Introduction of WTW structures would be significant addition to the landscape and surrounding countryside in this location.
Site E	Good accessibility off Wing Road. Site comprises a number of well-defined agricultural fields with hedgerow and tree belts. Development would significantly impact on the open and attractive landscape features.
Site W	Second covered reservoir being constructed to the west of the existing reservoir. Reservoirs are in an elevated position. Towards the M1 land steeply slopes downwards. WTW would be highly visible in the vicinity of the reservoirs. Moving southwards, the landscape is open accommodating the heritage trail that leads from the ancient woodland. Viewed from the M1 the land appears open and attractive. Area appears well used recreationally being well located to the new housing developed at Chaul End. New access would be required from Chaul End Road where there are a number of properties on and in the vicinity of Chaul End Road. Development would impact on recreational enjoyment of area, occupy an elevated position and be close to a residential area.

6.4.3 Options not progressed to further work at this stage following detailed appraisal

The remaining ten sites were subject to the engineering, environment, planning and land assessment set out in Section 3. A summary of the assessment outcomes for each of the ten site option is presented at **Appendix C**.

The sites not progressed to further work at this stage following this assessment and the reasons for not progressing those options are summarised within Table 6.3.

Table 6.3: Options not progressed to further work at this stage following detailed appraisal

Site Name	Description
Site I	Concerns have been raised about the viability and developability of the site, primarily focusing on the ability to accommodate the water storage. The flatness of the site necessitates greater excavation, and there's a risk of inundation or flooding to the railway. Two national transfer gas mains through the site would be costly and difficult to divert. From a biodiversity perspective, the site has no major obstacles to development, but habitats of principal importance need to be considered. From a landscape perspective, the site was not favoured due to its elevated nature and the surrounding open countryside and potential distance views from the National Landscape. In planning terms, the proposed development's scale requires careful consideration of its impact on the countryside and potential amenity impacts to nearby properties.
Site F	The site's topography minimises cut and fill requirements for the water storage, interstage pumping across treatment works, and inundation/flood risk, making it a preferred engineering site. There are, however, significant planning constraints. The western part of site F also forms part of a designated SANG with proposals in place to enhance the opportunities for outdoor recreation and provide an alternative destination for local residents to mitigate the impact of visitors to the Chilterns Beechwood Special Area of Conservation. It is cited that the close proximity of both the Grand Union Canal and the River Ouzel further increases the value of the site for recreation and conservation. Furthermore, the site is within the Green Belt where there is a presumption against inappropriate development in the Green Belt except in very special circumstances. As part of establishing very special circumstances there would need to be no alternative sites that perform the same function that don't result in the same harm to the Green Belt. This, alongside allocations and proposals to actively develop Site F as open space and SANG, it is not considered that the site should be progressed to further work at this stage.
Site V	Concerns have been raised about the viability and developability of the site, primarily focusing on the ability to accommodate the water storage. The flatness of the site necessitates greater excavation. High voltage power lines run through the site, and these would be costly to relocate or avoid.

Site Name	Description
Site A	The site option includes land which has already been granted consent for 1800 houses and associated infrastructure so would be unavailable for the development of the WTW and storage.
Site C	Road access would be difficult, especially for large earthmoving vehicles required for water storage construction. The access route is subject to flood risk and rural roads may require road strengthening, passing places and traffic management to facilitate the development. Proximity to commercial and residential properties. Includes land at risk of fluvial flooding. Located within land designated as Countryside and an Area of Attractive Landscape.
Site D	Road access would be difficult as there is a 7 tonnes existing weight and access routes are subject to flood risk. Would require the new roads and a bridge to facilitate safe access during construction. Proximity to commercial and residential properties. Includes land at risk of fluvial flooding. Located within land designated as Countryside and as an Area of Attractive Landscape.

6.4.4 Options subject to enhanced appraisal

Following the detailed appraisal, site options H and B underwent further consideration. For site option H, a further option was developed whereby sites P and Q, whilst considered less favourable for storage, could potentially be utilised for the WTW development with site option H providing storage.

The following site options were therefore considered that may have more potential:

- Bletchley Option (Site B) – WTW and storage
- West of Slapton Option (Site H) – WTW and storage
- West of Slapton Option (Site H) – Storage only with WTW at a separate site east of Leighton Buzzard (Site P or Site Q)

To further assess and consider these options, an enhanced appraisal of them was undertaken against the criteria contained within Table 6.4.

Table 6.4: Aspects considered as part of the enhanced appraisal

Consideration	Aspects considered
Engineering	• Access during construction and operation • Site conditions – topography, contaminated land, conflict with existing services • Utilities – connection to power supply • Pipeline infrastructure required • Proximity to airports/airfields
Environment and Social	• Potential impact on designated biodiversity sites (statutory and non-statutory) • Potential impact on habitats and species where known to be present • Baseline Biodiversity Net Gain habitat • Potential impacts to woodland and forestry • Potential impact on water features and quality • Potential impact on air quality • Potential impact to community facilities and sites • Potential impact on heritage assets • Potential landscape and visual impacts • Potential noise impacts • Traffic and transport – suitability of construction traffic routes
Planning	• Interaction with other Nationally Significant Infrastructure Projects • Evidence of land being promoted for development • Neighbouring land uses • Proximity to urban areas, potential for benefits and accessibility (storage only)
Land	• Loss of assets • Reasonableness of land acquisition costs

Consideration	Aspects considered
	- Impact on access to land - Special category land

A combined summary of the detailed and enhanced assessment for each of the options with the greatest potential is set out in Table 6.5 and the discipline summary is presented within **Appendix C**.

Table 6.5: Summary of sites considered that may have more potential

Bletchley option (Site B WTW and storage)	
Engineering assessment	The site is relatively flat but has sufficient slope to allow for the construction of the water storage. Likely that import and export of material from the site will be required to facilitate construction (subject to more detailed investigation of ground conditions). Abstracting water on this part of the GUC would reduce the amount of development that would be needed further south on the canal. Better recorded water quality at this abstraction location as further south on the canal there are inputs from local streams and drains that potentially result in poorer water quality. This could mean that less treatment processes would be required at this location.
Environment and social assessment	Site is mainly low quality grassland habitats and arable fields (with groups of tree stands), with a parcel of woodland. Includes hedgerow boundaries and hedgerows with trees present. Surveys required to determine if hedgerows are protected and if veteran trees are present. Woodland is of high distinctiveness in BNG terms. No designated or non-designated biodiversity sites within the option boundary but does fall within several SSSI impact risk zones. Some protected species noted adjacent to the site. Proximity of residential properties and businesses to the option boundary is noted. Potential for a single non-designated heritage asset to be present (linear/trackway identified from aerial photographs). Site considered to be well screened from the north.
Land	Agricultural land with no special category land.
Planning	Within the countryside where there is a policy presumption against development that would compromise the character of the countryside. Designated as an area of attractive landscape where there is a need to have regard to the character of the landscape and provide mitigation to overcome any adverse impact. Located within the Greensand Ridge Nature Improvement Area where there is an onus on developing biodiversity, minimising visual impact and protecting local amenity. Proximity to residential areas and residential development in the Bletchley area where there is the opportunity to promote recreational benefit of the storage. Site is within Minerals Safeguarding Area for Sand and Gravel. Northern parts of the site are known to be being promoted by landowner/developer for potential future residential development through the Buckinghamshire Council Housing and Economic Land Availability Assessment, as part of the preparation of a new local plan.
Slapton option (Site H WTW and storage)	
Engineering assessment	Flat site meaning unlikely that all excavated material can be reused on site and will need to be exported off site. The suitability of the existing bridge on Horton Road over the GUC for construction traffic access requires further consideration. Site is also within Buckinghamshire's Freight Strategy Zone and restrictions need to be fully explored. Additional development, including pumping stations, on the GUC would be required south from Leighton Buzzard. Poorer quality water recorded south of Leighton Buzzard meaning increased on site treatment could be required.
Environment and social assessment	The site is generally open agricultural or woodland planting land intersected and bordered by hedgerows and relatively recent woodland plantation. Surveys required to determine if hedgerows are protected and if veteran trees are present. There is an important wildlife corridor (Green Lane) that bisects the centre of the site. It is designated as a local wildlife site due to its hedges and ditches. The site is on the western edge of the village of Slapton. There are some intermittent belts of vegetation to the village edge that will help screen the proposed works. There are a number of residential, commercial and community properties and facilities within close proximity to the site, including an equestrian centre and sports playing field and park. There are two public rights of way running through the site and recreational use of the canal adjacent to the option boundary. No heritage sites within the boundary.
Land	No Special Category Land. Multiple residential properties at Slapton to the east of the site option is noted.

Bletchley option (Site B WTW and storage)

Planning	Within the the countryside where there is a policy presumption against development that would compromise the character of the countryside. Close proximity to Bury Farm Equestrian Centre, Grand Union Canal, Lock Keeper's cottage, Hill Farm and village of Slapton noted. Public Rights of Way running through the site providing access to the canal. Potential to develop recreational benefit of storage. Potential impact on neighbouring land uses during construction, in particular amenity and highway impacts. Site is within Minerals Safeguarding Area for Sand and Gravel.
----------	---

Slapton option (Site H Storage only)

Engineering assessment	Same issues as for storage and WTW together except has reduced operational vehicle access requirement (i.e. only visits for inspection/maintenance required). Option will require pumping and screening facilities on site to transfer water from the water storage for treatment.
Environment and social assessment	Assessment for storage and WTW option applies, however, storage only option is likely to reduce the extent of landscape and visual impacts.
Land	Assessment for storage and WTW option applies.
Planning	Would still represent development within the Countryside and would be contrary to policy but there would be less above ground built development and opportunities to assimilate storage within countryside location, developing the recreational and ecological potential of the site. Lesser impact on local amenity both during construction and once operational.

East of Leighton Buzzard (Site P) (WTW Only)

Engineering assessment	Good access from the A505. Would require a raw water pipeline to link with the site west of Slapton where water would be abstracted and stored. High voltage power lines adjacent to the site. Good resilience to future flood risk
Environment and social assessment	Generally open agricultural land bordered by well-maintained mature native deciduous trees and shrub hedgerows. Surveys required to determine if hedgerows are protected and if veteran trees are present. Small copse of scrub and likely relatively immature woodland to northeast of site boundary. No designated nature conservation sites or heritage sites within the site option boundary. Proximity of residential properties along Leighton Road, Billington Road and Leighton Buzzard Rugby Club noted. Potential impact on residential and recreational views.
Land	No Special Category Land. Understood one landowner for the entire landholding.
Planning	Within the Green Belt and would be considered inappropriate development. It would be necessary to demonstrate very special circumstances to outweigh any harm as required by planning policy. Located within the Greensand Ridge Nature Improvement Area where there is an onus on developing biodiversity, minimising visual impact and protecting local amenity. Planning permission has been granted (April 2024) for an energy park (wind turbine, solar array, battery energy storage, EV charging including new access) to the west of the proposed site. In terms of land use, to the south of the site is the A505, with residential/commercial areas of Leighton Buzzard to the north and west and Billington Road to the east. To the north is a site allocated for Outdoor Sport Leisure and Open Space.

East of Leighton Buzzard (Site Q) (WTW Only)

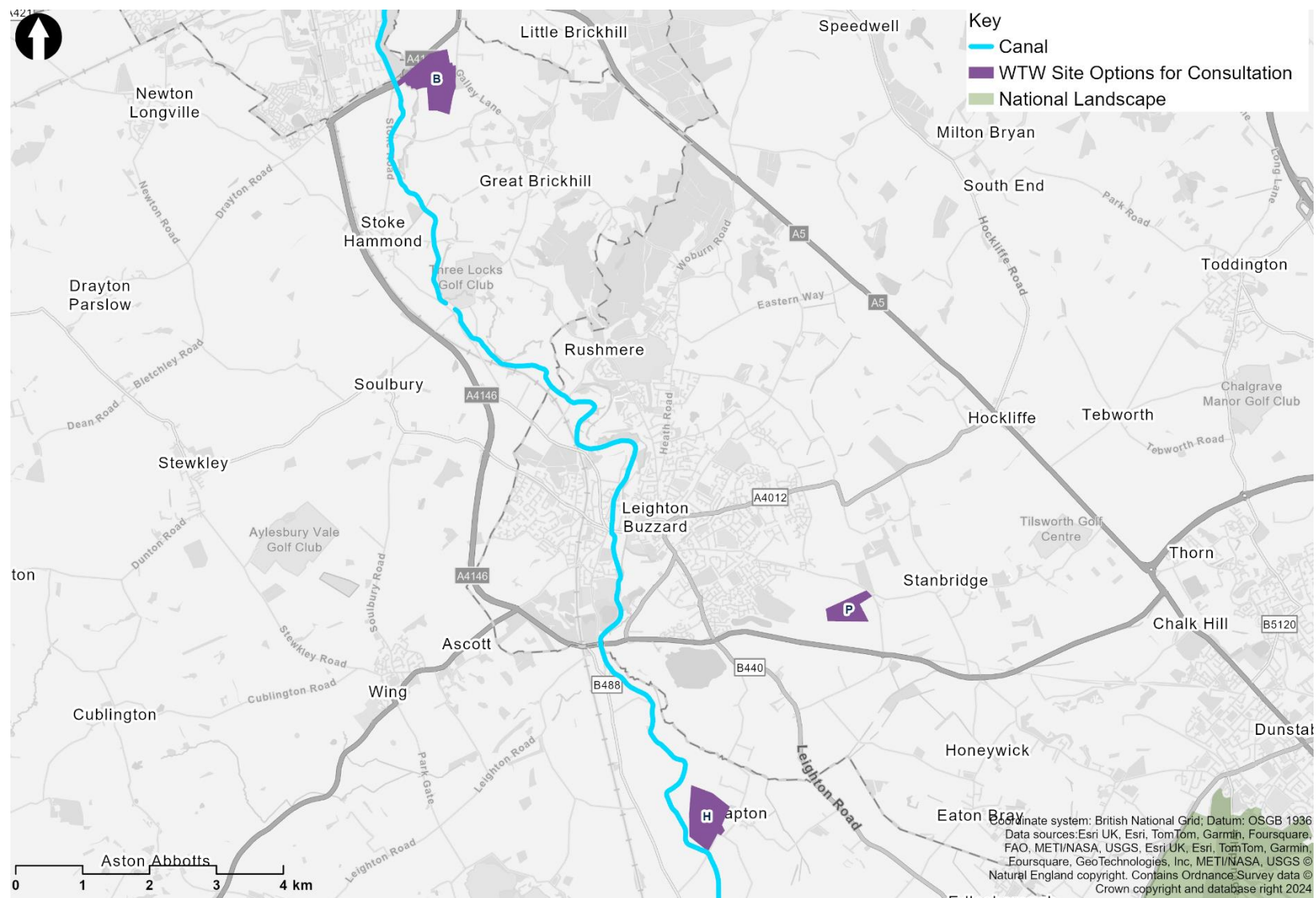
Engineering assessment	Good access from the A505. Would require a raw water pipeline to link with the site west of Slapton where water would be abstracted and stored. High voltage power lines adjacent to the site. Good resilience to future flood risk
Environment and social assessment	Generally open agricultural land bordered by well-maintained mature native deciduous trees and shrub hedgerows. Woodland plantation to north and south beyond boundary. Scattered individual trees within hedgerow along eastern and northwestern boundary are likely semi mature to mature. Noted smaller field sizes closer to village of Stanbridge, which is east of the site option. No designated nature conservation sites or heritage sites within the site option boundary. Directly surrounding the site are agricultural fields. Proximity of residential and commercial properties along Leighton Road, Billington Road and Station Road noted. Potential to directly impact two public rights of way. Potential impact on residential and recreational views.
Land	No Special Category Land.

Planning	Within the Green Belt and would be considered inappropriate development. It would be necessary to demonstrate very special circumstances to outweigh any harm as required by planning policy. In terms of land use, to the south of the site is the A505 with the site predominantly surrounded by agricultural land.
----------	---

6.5 Summary of Assessment Outcomes and Conclusions

Following the detailed appraisal and workshop, and the enhanced assessment reported above, the assessment outcomes led to the conclusion that for the purposes of non-statutory consultation site options H and B remain, on the work done to date, as sites that may have more potential for water treatment and storage, as shown in Figure 6.5.

Figure 6.5: WTW Site Options that may have more potential for Consultation



The assessment outcomes recognised, at this optioneering stage of assessment, the potential for impacts associated with accommodating the WTW on the site west of Slapton (Site H). Consequently, it was concluded to take forward to non-statutory consultation both the option to accommodate the water storage and WTW on Site H, and the option to accommodate only the water storage on Site H, with the WTW located on another separate site. Of the alternative potential WTW sites P and Q, Site P may be the more appropriate location for the WTW, given the recently consented development adjoining that site, notwithstanding its Green Belt location.

The following site options, of which more work has at this stage been undertaken, are therefore seen as sites that may have more potential for water treatment and storage:

- Bletchley Option (Site B – Figure 6.6) – WTW and storage (Figure 6.6)
- West of Slapton Option (Site H – Figure 6.7) – WTW and storage (Figure 6.7 H)
- West of Slapton Option (Site H) – Storage only with WTW on a site east of Leighton Buzzard (Site P - Figure 6.8)

These conclusions reflect the information available at the time of optioneering and are reached in advance of the non-statutory consultation process and planned site surveys and investigations. The outcomes from the non-statutory consultation and additional surveys and assessments will be considered prior to confirming selection of preferred option(s) for the future progression of the Project.

Figure 6.6: Bletchley Option (Site B)

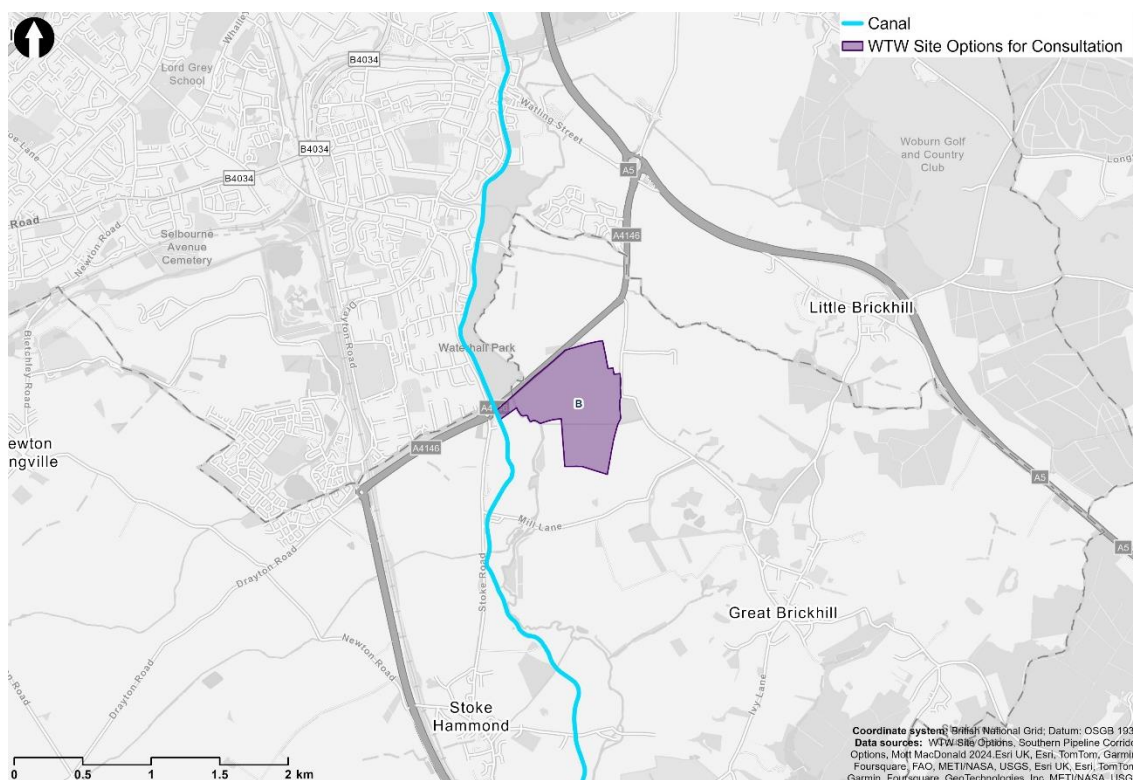


Figure 6.7: Slapton Option (Site H)

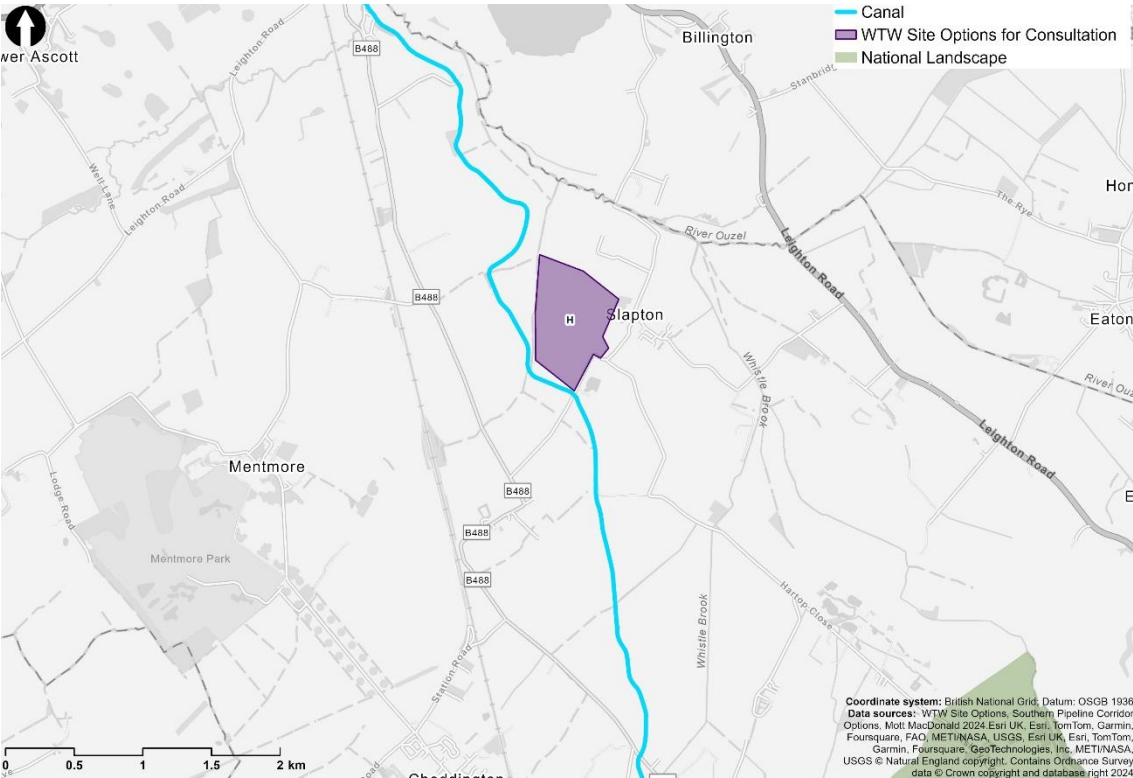
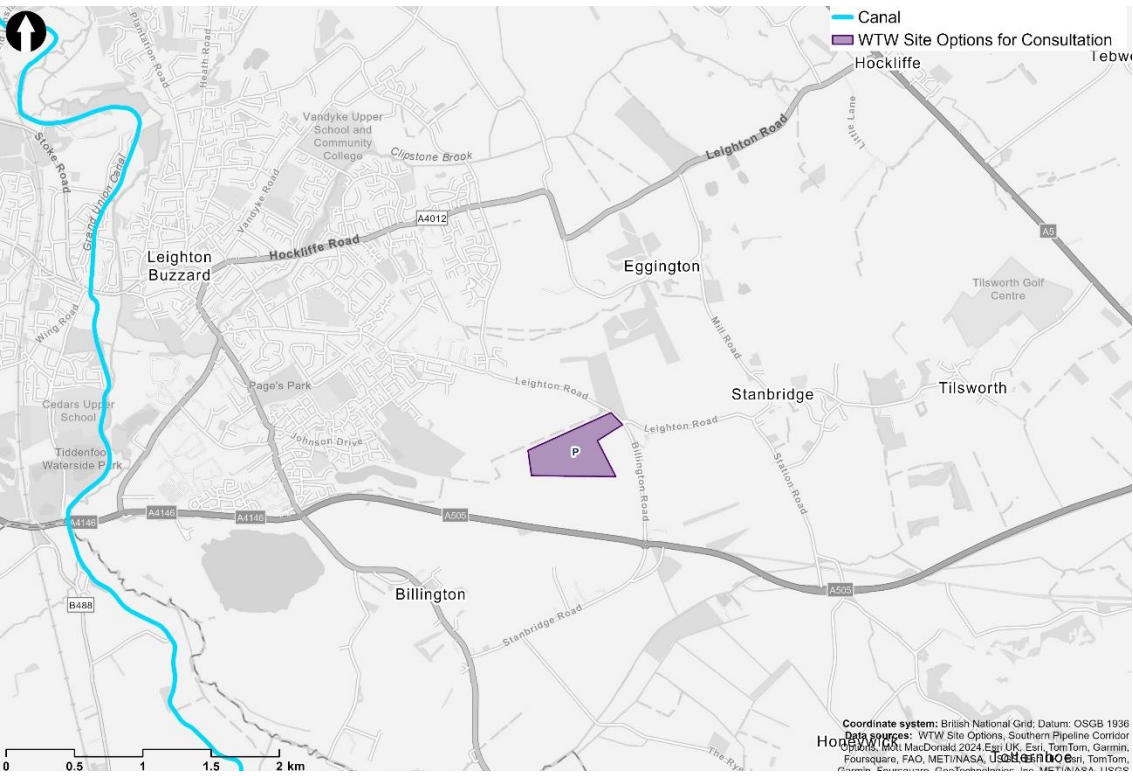


Figure 6.8: Leighton Buzzard Option – WTW Only (Site P)



7 Transfer to Chaul End

7.1 Strategic Context

As explained in section 6.1, development of the GUC Transfer Project has evolved through RAPID Gates 1 and 2.

AfW confirmed through this process and the associated assessment that the underground reservoir near Luton would be operationally preferable site from which to manage water into supply. This finding is included in AWL's Connect 2050⁹ strategy study, which examined the supply demand balance at a network demand level up to 2050 and considered the best options to meet the forecast deficits. AfW therefore identified the underground reservoir near Luton as the proposed destination for drinking water from the GUC Transfer Project.

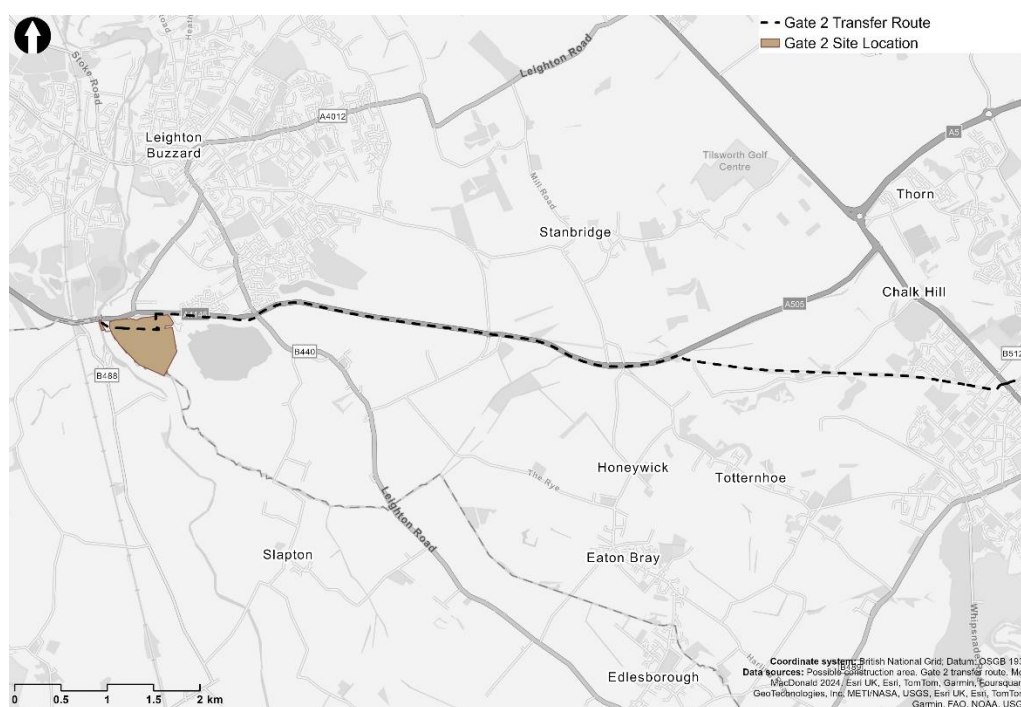
To facilitate this, there is a need to identify a raw water pipeline transfer route from the canal to the water storage and WTW site(s), as well as an additional pipeline transfer route for the onward transfer of drinking water to Chaul End, the location of the underground reservoir near Luton.

7.2 RAPID Gate 2 Transfer Route

At RAPID Gate 2, the potential site considered for the water storage and WTW was site F, part of the former Grovebury Quarry site to the south of Leighton Buzzard, as explained in section 6 above.

An engineering led assessment of potential transfer routes was undertaken and reported to RAPID at Gate 2. The conclusion of this was the identification of a potential water pipeline transfer route from site F to Chaul End, broadly passing in an easterly direction from site F alongside the A5050 road corridor, and then eastwards through Dunstable and the southern edge of Houghton Regis. The route is illustrated in Figure 7.1.

Figure 7.1: RAPID Gate 2 transfer route



⁹ Affinity Water Connect 2050 Report

7.3 Alternative Transfer Routes Considered

As described in Section 6, an updated review of site F (the preferred site from RAPID Gate 2) during RAPID Gate 3 optioneering confirmed that site F was no longer available to the project. Therefore, consideration was given to alternative potential pipeline transfer routes between the canal to the water storage and WTW site(s), and an additional pipeline transfer route for the onward transfer of drinking water to Chaul End. This work was undertaken alongside and additional to the consideration of potential water storage and WTW sites as reported in Section 6 of this report, consistent with the methodology set out in section 3 of this report.

For the purposes of the assessment process, pipeline corridors of approximately 200m width were identified as part of a desk-based exercise using GIS data and other publicly available information on planning, environmental, engineering and land constraints and designations.

The identification of potential pipeline corridors sought to avoid (as set out in Table 3.1):

- Building and settlements
- Ancient woodland
- Scheduled monuments
- Environmental designations (international and national biodiversity designations)
- Flood zones

The extent of Green Belt land within the search area for the pipeline corridors meant it was not feasible to exclude land within the Green Belt from the search area. It should also be noted that buried pipeline infrastructure is not expected to constitute 'inappropriate development' in the Green Belt. However, temporary works and permanent above ground infrastructure may represent 'inappropriate development', for which justification would need to be made as part of any application for development consent.

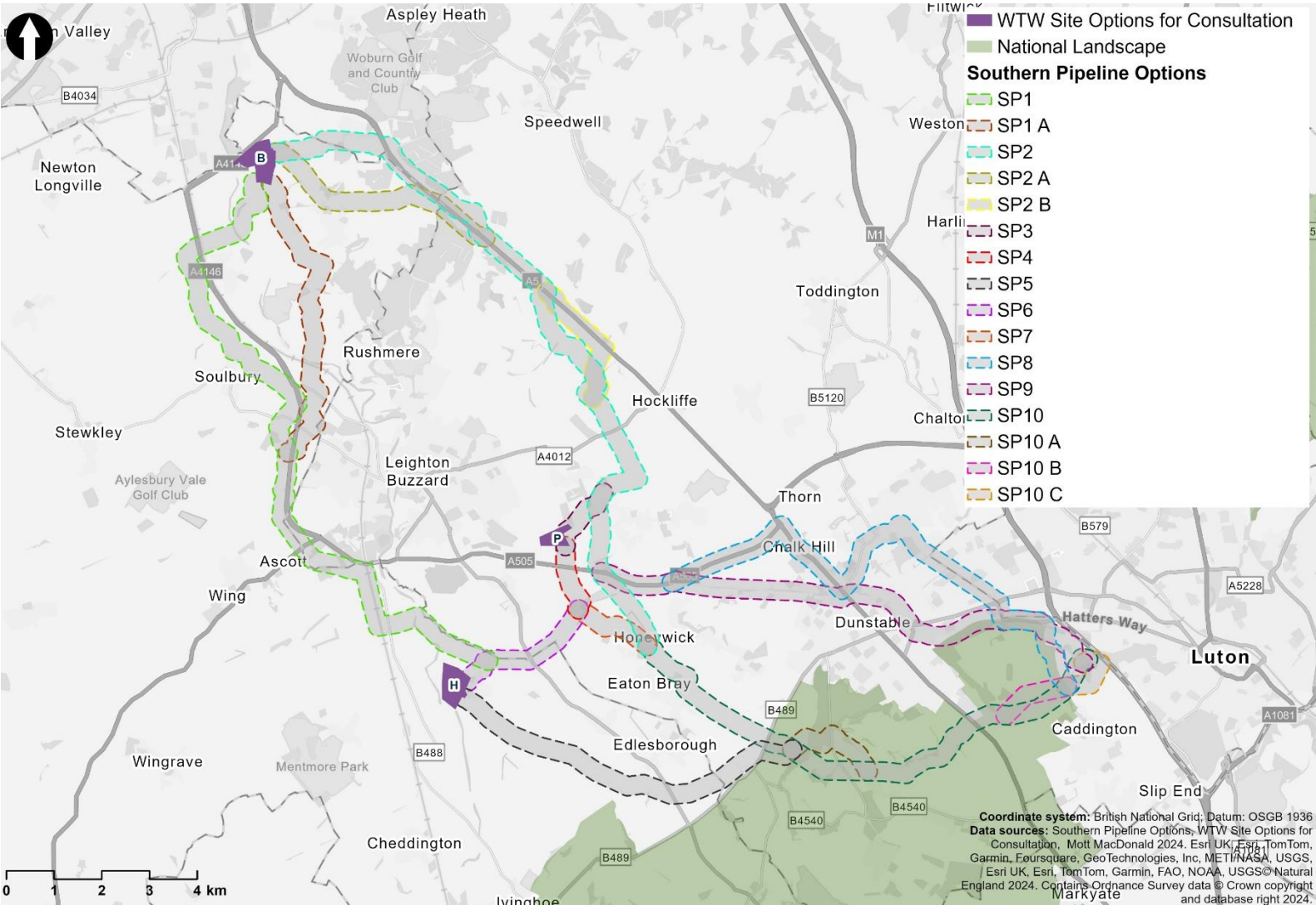
On a similar basis, the extent of the Chilterns National Landscape (former AONB) and its position and proximity to Chaul End, means that it is not feasible to exclude land within the National Landscape from the search area for potential pipeline corridors. National and local planning policy for the protection of National Landscapes is clear that major development should only exceptionally be permitted within the designated landscape and that applications for consent must set out, for the decision maker to consider, the need for the development including national considerations, the cost and scope for developing outside of the National Landscape or meeting the need in some other way, and any detrimental effects on the environment, landscape and recreational opportunities and how that could be moderated.

For the purposes of the potential pipeline corridor assessment, potential corridors that could avoid or minimise the extent of development within the National Landscape were identified and assessed, alongside potential pipeline corridors that pass through the National Landscape. The eventual selection of a preferred pipeline corridor and more detailed routeing for the preferred option(s) for the DCO application will need to fully explore and justify its position in relation to the National Landscape and the policy protection that is afforded to it. This includes consideration of the need to avoid or minimise impacts on the National Landscape, and setting out the case for major development within the designated landscape.

7.3.1 Summary of potential transfer pipeline corridors considered

From the desk-based work undertaken, the potential pipeline routes from Sites B, H and P to the Chaul End are summarised below.

Figure 7.2: Potential pipeline routes



As can be seen from the figure overleaf, the series of potential pipeline corridors that were identified for assessment have the potential to link together in differing combinations to form potential raw water transfer pipeline routes between the canal and the water storage and WTW site, and to form potential drinking water transfer pipeline routes from the WTW site to Chaul End.

These are described in further detail below and illustrated on the plans provided.

7.3.2 Alternative transfer pipeline corridors from Site B

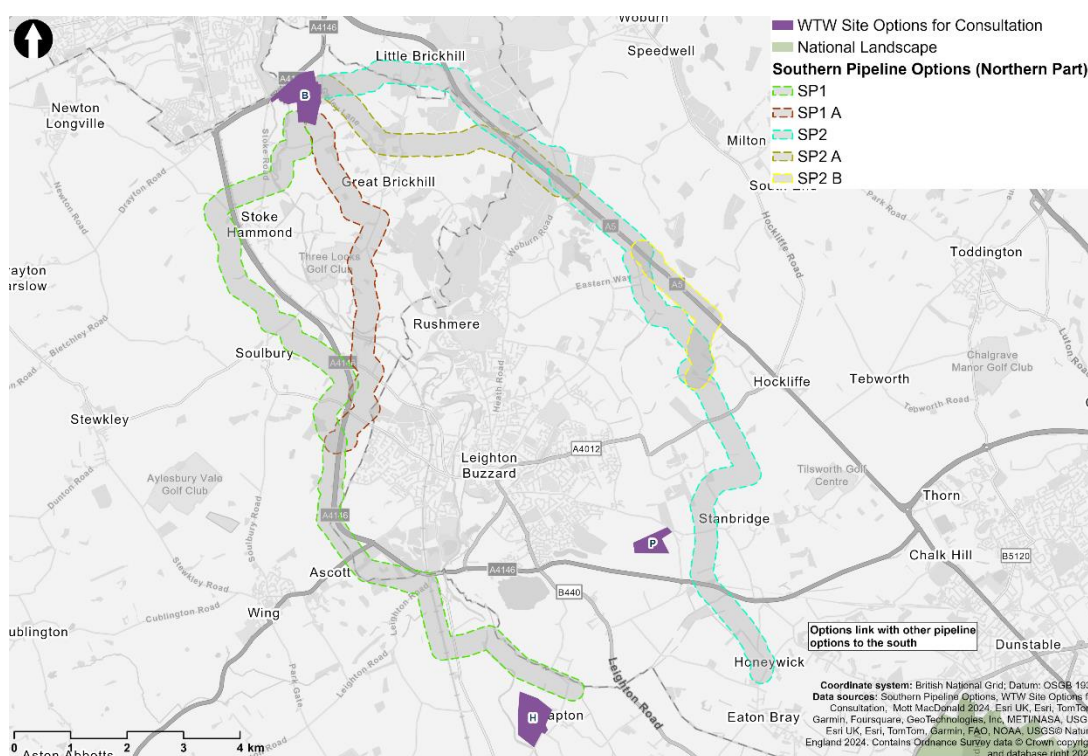
Site B lies in close proximity to the GUC. The raw water transfer pipeline from the canal to the water storage and WTW location would be within the boundary of Site B.

Following treatment at the WTW, there are two broad potential transfer pipeline corridor options that have been identified to transfer the drinking water south from Site B towards Chaul End for the northern part of the transfer route:

- **Corridor SP1 (including sub-option SP1A)** - a potential corridor routing south from Site B, crossing the River Ouzel and canal, and then the mainline railway line and A4146, with sub-options to the west (SP1) or east (SP1A) of Stoke Hammond, with the pipeline corridor routed to the west of the A4146 and Leighton Buzzard before crossing back over the mainline railway to the east of Ledburn and routing to the north of Slapton where it joins other pipeline corridors for the section towards Chaul End
- **Corridor SP2 (including sub-options SP2A, SP2B)** – a potential corridor routing east and then south from Site B, with sub-options to the north of Great Brickhill (SP2A) or to the south of Little Brickhill (SP2), with the pipeline broadly following the A5 road corridor to the north and south of the road with sub-options (SP2 or SP2B) north of Church End, crossing the A4012 between Hockcliffe and Eggington before routing to the west of Stanbridge where it joins other pipeline corridors for the section towards Chaul End.

These potential transfer pipeline corridors are shown in Figure 7.3.

Figure 7.3: Site B alternative transfer pipeline corridors



For the southern part of the transfer route from Site B, the potential transfer pipeline corridors join with the proposed pipeline corridors from water storage and WTW site options from Site H (water storage and WTW) or Site H (water storage) and Site P (WTW) to Chaul End, as described below.

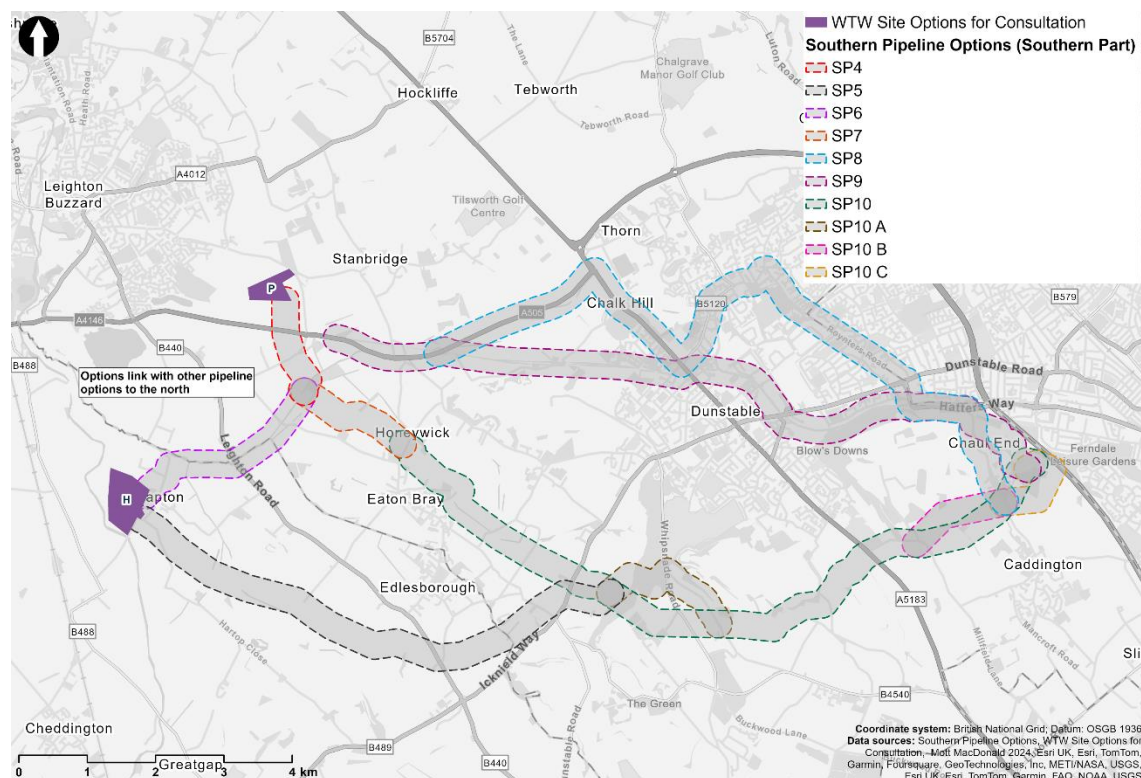
7.3.3 Alternative transfer pipeline corridors from Site H

Site H lies in close proximity to the GUC. If Site H is considered as the preferred location for the water storage and water treatment, the raw water transfer pipeline from the canal to the water storage and WTW location would be within the boundary of Site H.

Once the water is treated at the WTW on Site H, there is a need for a drinking water pipeline transfer from the WTW to Chaul End. There are a number of potential transfer pipeline corridor options that have been identified to transfer the drinking water from Site H towards Chaul End, as described below:

- **Corridor SP6, SP7 and SP10** – a potential corridor routeing to the north east around Slapton village, and then to the south of Billington before routeing to the south east passing between Totternhoe and Eaton Bray where it routes south and eastwards through the Dunstable Downs and Chilterns National Landscape, routeing to the north of Whipsnade and Kensworth before crossing the A5183 and routeing east between Caddington and Chaul End to reach the existing underground reservoir. There are a number of potential sub-options associated with this corridor, particularly within the Chilterns National Landscape and for the final section towards the existing underground reservoir.
- **Corridor SP5 and SP10** - a potential corridor routeing south east from Site H at Slapton, routeing to the south of Edlesborough and then (joining with corridor SP10 as described above), eastwards through the Dunstable Downs routeing to the north of Whipsnade and Kensworth before crossing the A5183 and routeing east between Caddington and Chaul End to reach the existing underground reservoir.
- **Corridor SP6 and then corridor SP8** – a potential corridor routeing to the north east around Slapton village, and then to the south of Billington before routeing broadly alongside the A505 road corridor and then southwards within the A505 through Chalk Hill before then routeing through urban roads within Dunstable and Houghton Regis before routeing around Chaul End to the existing underground reservoir.
- **Corridor SP6 and then corridor SP9** – a potential corridor routeing to the north east around Slapton village, and then to the south of Billington before routeing alongside the A505 road corridor to the north of Lower End, and then eastwards along the disused railway line corridor to Dunstable, crossing the A505 within Dunstable and then routed within the Luton Guided Busway corridor through Dunstable and to the south of Houghton Regis, before routeing around Chaul End to the existing underground reservoir.

Figure 7.4: Potential transfer pipeline corridors from Site H



7.3.4 Alternative transfer pipeline corridors from Site H and from Site P

Site H lies in close proximity to the GUC. If Site H is considered as the preferred location for the water storage only, with the WTW to be located on Site P, there would be a raw water pipeline from the canal to the water storage within Site H, as well as a further raw water transfer pipeline from Site H to Site P. Once the water is treated at the WTW on Site P, there is a need for a drinking water pipeline transfer from the WTW to Chaul End.

There is a single potential transfer pipeline corridor option that has been identified to transfer the raw water from the water storage on Site H to the WTW on Site P:

- **Corridor SP6 and SP4** – a potential corridor routing to the north east around Slapton village, and then to the south of Billington before routing to the north, crossing the A505 to the potential WTW site location at Site P, to the east of Leighton Buzzard.

From the potential WTW on Site P, there are a number of potential transfer pipeline corridor options that have been identified to transfer the drinking water from Site P towards Chaul End. These options are broadly the same as the potential transfer pipeline options associated with a WTW on Site H, as described below:

- **Corridor SP4, SP7 and SP10** – a potential corridor routing to the south from Site P crossing the A505 and then routing to the south east passing (as per the corridor described for Site H above) between Totternhoe and Eaton Bray where it routes south and eastwards through the Dunstable Downs and Chilterns National Landscape, routing to the north of Whipsnade and Kensworth before crossing the A5183 and routing east between Caddington and Chaul End to reach the existing underground reservoir. There are a number of potential sub-options associated with this corridor, particularly within the Chilterns National Landscape and for the final section towards the existing underground reservoir.

- **Corridor SP4 and then corridor SP8** – a potential corridor routeing to the south from Site P to the A505 road corridor before routeing broadly alongside the A505 road corridor and then southwards within the A505 through Chalk Hill before then routeing through urban roads within Dunstable and Houghton Regis before routeing around Chaul End to the existing underground reservoir.
- **Corridor SP4 and then corridor SP9** – a potential corridor routeing to the south from Site P to the A505 road corridor before routeing alongside the A505 road corridor to the north of Lower End, and then eastwards along the disused railway line corridor to Dunstable, crossing the A505 within Dunstable and then routed within the Luton Guided Busway corridor through Dunstable and to the south of Houghton Regis, before routeing around Chaul End to the existing underground reservoir.

A potential corridor utilising options SP4, SP6, SP5 and SP10 has not been identified in association with Site P for the WTW, as such a combination of corridor routes involves routeing the potential drinking water transfer pipeline to the west and south back to Site H, before then heading south and then east again – and so would lead to a significantly greater length of pipeline than the more direct SP4, SP7 and SP10 route.

These potential transfer pipeline corridors are shown in Figure 7.4 and a summary of the assessment findings contained in Section 7.4.

7.4 Assessment of Alternative Transfer Routes

The identified potential transfer pipeline corridors were assessed, with the extent of the assessment undertaken dependent on how far an option progressed through the appraisal process.

A summary of the outcome of the assessment process for the potential pipeline transfer corridors is set out below, supported by tables in Appendix D. As stated in section 3 of this report, it should be noted that the assessment outcomes reported below are predominantly based on desk based assessments. At the time of this report, ecological and engineering site based surveys have not yet been completed for these corridors, nor has engagement with all potentially affected landowners been undertaken across the corridors.

Information from further assessments and engagement will be undertaken, as well as analysis of consultation responses to the Non Statutory Consultation process will be taken into account as part of the subsequent selection of preferred transfer pipeline corridors.

7.4.1 Alternative drinking water transfer pipeline corridors from Site B (water storage and WTW) – northern section only

7.4.1.1 Corridor Option SP1

This section of the pipeline corridor option extends to approximately 15km in length. The route requires the pipeline to cross the River Ouzel, the GUC itself, the mainline railway, A4146 and A418. These crossings involve environmental and engineering risks and complexity, and would be likely to increase the overall cost of this option compared to options with less complex crossings. Installing the pipeline below the GUC and railway represent ongoing operational risks due to constraints on future maintenance of those sections of pipeline.

The pipeline corridor option passes through open countryside, with sections routeing close to villages and isolated residential, equestrian and other properties. There is the potential for properties to experience some disruption during construction. Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

The corridor encroaches partly into an SSSI and part of a Registered Park and Garden (both of which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, and county and local level environmental designations which may require routeing refinement and/or mitigation. There may be potential for special category land within the pipeline corridor.

From the assessment work undertaken to date, the additional crossings are considered to make this transfer pipeline corridor less preferable than other potential corridor options.

7.4.1.2 Corridor Sub-option SP1A

Sub-option 1A is an alternative routeing for the northernmost section of corridor Option 1. Sub-option SP1A involves approximately 1km shorter overall length than Option SP1, however the route (in common with SP1) requires the drinking water transfer pipeline to cross the River Ouzel, the GUC itself, together with the mainline railway, and A4146.

Like option SP1, this pipeline corridor option passes through open countryside, with sections routeing close to villages and isolated residential, equestrian and other properties as well as a golf course. There is the potential for properties to experience some disruption during construction. Parts of the sub-option route are designated as an Area of Attractive Landscape, Green Belt and Minerals Safeguarding Areas. The corridor also intersects with areas of floodplain, and county and local level environmental designations which may require routeing refinement and/or mitigation. There is special category land within the pipeline corridor.

From the assessment work undertaken to date, the additional crossings are considered to make this transfer pipeline corridor less preferable than other potential corridor options.

7.4.1.3 Corridor Option SP2

This section of the pipeline corridor option extends to approximately 16km in length and the routeing to the east from Site B avoids crossings of the River Ouzel and the GUC itself associated with Option SP1/1A. Option SP2 requires a number of major road crossings including the A5 (twice), A2012 and A505, which would require trenchless crossings of these features.

The majority of this pipeline corridor option passes through open countryside, with sections routeing close to neighbouring villages and isolated residential, equestrian and other properties. There is the potential for properties to experience some disruption during construction. Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. There are conservation areas and other local planning designations near to or affecting parts of the corridor, and a playing field within the corridor. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

The corridor intersects with areas of floodplain, county and local level environmental designations (including wildlife sites) and a former landfill site which may require routeing refinement and/or mitigation. There is an area of Ancient Woodland close to the corridor. There is special category land within the pipeline corridor.

From the assessment work undertaken to date, Option SP2 is considered to be preferable to Option SP1 or sub-option SP1A, having fewer notable infrastructure crossings and avoiding the mainline railway and River Ouzel crossings associated with those options, and less likelihood of significant environmental impact, and should be taken forward to non-statutory consultation.

7.4.1.4 Corridor Sub-options SP2A and SP2B

Sub-option 2A is a potential alternative route corridor for the northernmost section of Option SP2. The pipeline corridor follows a route further south than Option SP2 and the sub-option is approximately 200m shorter route than Option SP2.

The pipeline corridor option passes through open countryside, with sections close to neighbouring villages and isolated residential, equestrian and other properties. There is the potential for properties to experience some disruption during construction.

Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan. The corridor intersects with a small part of an SSSI, and with county and local level environmental designations (including wildlife sites), a listed building, and a former landfill site which may require routeing refinement and/or mitigation. There may be potential for special category land within the pipeline corridor.

From the assessment work undertaken to date, sub-option SP2A is considered to be a potential alternative corridor to the northernmost part of Option SP2, and should be taken forward to non-statutory consultation.

Sub-option 2B is a potential alternative route corridor for an approximately 3km section of Option SP2, to the north of Church End. The pipeline corridor follows a route closer to the A5, before routeing south and then west of Church End to rejoin Option SP2. The sub-option would require a trenchless crossing under the A5 (as for Option SP2).

The pipeline corridor option passes through open countryside, with sections close to isolated properties. There is the potential for properties to experience some disruption during construction.

Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. The corridor intersects with a small part of a registered park and garden (which could potentially be avoided by narrowing the corridor) and with part of a county level environmental designation (wildlife site) which may require routeing refinement and/or mitigation. There may be potential for special category land within the pipeline corridor.

From the assessment work undertaken to date, sub-option SP2B is considered to be a potential alternative corridor to the northernmost part of Option SP2, and should be taken forward to non-statutory consultation.

7.4.2 Alternative drinking water transfer pipeline corridors from Site H (water storage and WTW) to Chaul End

7.4.2.1 Corridor Option SP6, SP7 and SP10

This section of the pipeline corridor option extends to approximately 16km in length and requires the pipeline to cross the A5183, and potentially also the River Ouzel, which would require trenchless crossings. There is a need for use of a trenchless technique to construct below the Dunstable Downs, which requires sensitive routeing to minimise impacts on Dunstable Downs during construction, and represents some engineering risk and additional cost.

The majority of this pipeline corridor option passes through open countryside, with sections close to neighbouring villages and isolated properties, as well as open space, and part of a gliding club. There is the potential for properties to experience some disruption during construction.

Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor encroaches partly into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations (including

wildlife sites), and two areas of Ancient Woodland which may require routing refinement and/or mitigation. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

Part of the corridor passes through National Trust land at Dunstable Downs and intersects with an area of potential common land. This is a potentially significant land constraint, and there are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, Option SP10 is considered to be a potential corridor Option, and should be taken forward to non-statutory consultation, and for engagement with the National Trust and other stakeholders.

7.4.2.2 Corridor Sub-options SP10A, SP10B and SP10C

Sub-option 10A is a potential alternative route corridor for an approximately 2km central section of Option SP10 where the pipeline corridor routes through the Dunstable Downs. This pipeline corridor sub-option routes to the north of the National Trust visitor centre and then south east to rejoin option SP10. The route is approximately 300m longer than Option SP10 and would require sensitive routing to minimise impacts on Dunstable Downs during construction.

The whole of the sub-option lies within the Chilterns National Landscape, and within the Green Belt. Parts of the route are within a Minerals Safeguarding Area. The corridor intersects with part of an SSSI, and with county and local level environmental designations, and lies close to Ancient Woodland and a former landfill site which may require routing refinement and/or mitigation. Part of the sub-option pass through National Trust land, and could intersect common land. These are potentially significant land constraints and there is special category land within the sub-option corridor.

From the assessment work undertaken to date, and given the constraints associated with Option SP10, sub-option SP10A is considered to be a potential alternative corridor that should be taken forward to non-statutory consultation, and for engagement with the National Trust and other stakeholders.

Sub-option 10B is a potential alternative route corridor for an approximately 1.5km eastern section of Option SP10 where the pipeline corridor routes to the north of Caddington. The sub-option passes through open countryside and there is the potential for isolated properties to experience some disruption during construction.

The whole of the sub-option lies within the Chilterns National Landscape, and within the Green Belt. The corridor lies close to Ancient Woodland and land within the corridor includes grade 2 and 3 agricultural land. There is unlikely to be special category land within the sub-option corridor.

From the assessment work undertaken to date, sub-option SP10B is considered to be a potential alternative corridor to SP10 that should be taken forward to non-statutory consultation.

Sub-option 10C is a potential alternative route corridor for the approximately 800m final section of Option SP10 where the pipeline corridor routes to the existing underground reservoir. The pipeline corridor sub-option follows a route further to the east, around an area of woodland. The sub-option route is approximately 500m longer than Option SP10.

An initial small section of the sub-option lies within the Chilterns National Landscape, and the whole sub-option lies within the Green Belt. The area of woodland lying adjacent to the sub-option includes parts of Ancient Woodland and a County Wildlife Site. There is unlikely to be special category land within the sub-option corridor.

From the assessment work undertaken to date, and given the woodland constraints on the final section of Option SP10, sub-option SP10C is considered to be a potential alternative corridor that should be taken forward to non-statutory consultation.

7.4.2.3 Corridor Option SP5 and SP10

This section of the pipeline corridor option extends to approximately 15km in length and requires the pipeline to cross the A5183 by a trenchless crossing, but avoids the River Ouzel. A trenchless section of the pipeline below the Dunstable Downs requires sensitive routeing to minimise impacts on Dunstable Downs during construction, and represents some engineering risk and additional cost. The corridor also crosses high voltage electricity lines.

The corridor passes through open countryside, with sections close to neighbouring villages and isolated residential, equestrian and other properties and part of a gliding club. There is the potential for properties to experience some disruption during construction.

Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, Minerals Safeguarding Areas and an Area of Attractive Landscape. The corridor encroaches partly into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor intersects with areas of floodplain, county and local level environmental designations, and two areas of Ancient Woodland which may require routeing refinement and/or mitigation. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

Part of the corridor passes through National Trust land at Dunstable Downs and may involve common land. This is a potentially significant land constraint, and there are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, Option SP5 and SP10 is considered to be a potential corridor Option, and should be taken forward to non-statutory consultation, and for engagement with the National Trust and other stakeholders.

7.4.2.4 Corridor Option SP6 and SP8

This section of the pipeline corridor option extends to approximately 17km in length and requires the pipeline to cross the River Ouzel, which would require trenchless crossing. The first half of this corridor passes through open countryside, with the second half routeing through built up areas comprising parts of Dunstable and Houghton Regis. There is a significant length of in road pipeline construction proposed, which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.

The sections of pipeline constructed close to rural communities and properties have the potential to experience some disruption during construction. The sections of in road construction through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.

Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor partially encroaches into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations which may require routeing refinement and/or mitigation. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

There are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, the significant lengths of in road and urban construction associated with the Option 6 and Option 8 corridor are considered to make this transfer pipeline corridor less preferable than other potential corridor options.

7.4.2.5 Corridor Option SP6 and SP9

Approximately the first half of this 15km pipeline corridor option passes through open countryside, with the second half routeing through built up areas comprising parts of Dunstable and Houghton Regis. This pipeline option requires the pipeline to cross the River Ouzel, which would require trenchless crossing. There is a significant length of pipeline construction proposed either in road, within the guided busway corridor, or within the disused railway line, each of which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.

The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction, and construction along the guided busway corridor through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.

Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor partially encroaches into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, and county and local level environmental designations which may require routeing refinement and/or mitigation. Some areas of land south are being promoted by landowners/developers as potential future development sites through the emerging local plan. There are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, the significant lengths of in road, guided busway and urban construction associated with the Option 6 and Option 9 corridor are considered to make this transfer pipeline corridor less preferable than other potential corridor options.

7.4.3 Raw water transfer pipeline corridor from Site H (water storage) to Site P (WTW) to Chaul End

7.4.3.1 Corridor Option SP6, SP4

This section of the pipeline corridor option extends to approximately 4.5km in length and the route requires the pipeline to cross the A505 and the River Ouzel, which would require trenchless crossings of these features. The option passes through open countryside, with sections routeing close to neighbouring villages and isolated residential, equestrian and other properties, and open space. There is the potential for parts of these settlements and other properties to experience some disruption during construction.

Parts of the route are designated as Green Belt, Minerals Safeguarding Areas and an Area of Attractive Landscape. The corridor also intersects with areas of floodplain and county and local level environmental designations which may require routeing refinement and/or mitigation. There are planning applications and permissions for development within parts of the corridor.

There are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, Option SP6 and SP4 is considered to be a potential corridor Option, and should be taken forward to non-statutory consultation.

7.4.4 Alternative drinking water transfer pipeline corridors from Site P (WTW) to Chaul End

7.4.4.1 Corridor SP4, SP7 and SP10

This section of the pipeline corridor option extends to approximately 14.5km in length and requires the pipeline to cross the A505 and A5183, which would require trenchless crossings of these features. There is also a need for trenchless construction of a section of the pipeline below the Dunstable Downs, requiring sensitive routeing to minimise impacts, and which represents some engineering risk and additional cost.

The majority of this drinking water transfer pipeline corridor option passes through open countryside, with sections close to neighbouring villages and isolated residential, equestrian and other properties, open space, and part of a gliding club.

There is the potential for properties to experience some disruption during construction.

Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor encroaches partly into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations, and two areas of Ancient Woodland which may require routeing refinement and/or mitigation. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

Part of the corridor passes through National Trust land at Dunstable Downs and may involve common land. This is a potentially significant land constraint, and there are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, Corridor Option SP4, SP7 and SP10 is considered to be a potential corridor Option, and should be taken forward to non-statutory consultation, and for engagement with the National Trust and other stakeholders.

7.4.4.2 Corridor SP4 and then corridor SP8

This section of the pipeline corridor option extends to approximately 14.5km in length and requires the pipeline to cross the A505 and other major roads which may require trenchless crossing. The first half of this corridor option passes through open countryside, with sections routeing close to neighbouring villages and isolated residential, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. There is a significant length of in road pipeline construction proposed, which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.

The sections of pipeline constructed close to rural communities and properties have the potential to experience some disruption during construction. The sections of in road construction through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.

Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor partially encroaches into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also

intersects with areas of floodplain, a former landfill site and county and local level environmental designations which may require routeing refinement and/or mitigation. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

There are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, the significant lengths of in road and urban construction associated with the Option 4 and Option 8 corridor are considered to make this transfer pipeline corridor less preferable than other potential corridor options.

7.4.4.3 Corridor SP4 and then corridor SP9

This section of the pipeline corridor option extends to approximately 12.5km in length. Approximately the first half passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. The route requires a significant length of pipeline construction proposed either in road, within the guided busway corridor, or within the disused railway line, each of which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.

The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction, and construction along the guided busway corridor through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.

Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor partially encroaches into an SSSI (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, and county and local level environmental designations which may require routeing refinement and/or mitigation. A significant length of the former railway line is a county wildlife site. Some areas of land are being promoted by landowners/developers as potential future development sites through the emerging local plan.

There are areas of land including public open space that will be special category land within the pipeline corridor.

From the assessment work undertaken to date, the significant lengths of in road, guided busway and urban construction associated with the Option 4 and Option 9 corridor are considered to make this drinking water transfer pipeline corridor less preferable than other potential corridor options.

7.5 Summary of Assessment and Conclusions

As reported in Section 6 of this report, site options H and B, with an alternative potential use of Site H for water storage and Site P for WTW, are sites that may have more potential for water treatment and storage.

It is necessary to identify potential transfer routes to provide for a raw water pipeline transfer from the canal to these sites and the transfer of drinking water from these sites on to the existing operational site at Chaul End where it will enter public water supply.

Following the detailed appraisal and workshop consideration of the outcomes, the conclusion reached for the purposes of the non-statutory consultation was that the following options are therefore taken forward to the non-statutory consultation (Figure 7.5):

Pipeline Transfer from Site B (water storage and WTW) to Chaul End:

- Corridor Option SP2 (including potential sub-options SP2A, SP2B), combined with Option SP10 (including potential sub-options SP10A, SP10B, SP10C).

Pipeline Transfer from Site H (water storage and WTW) to Chaul End:

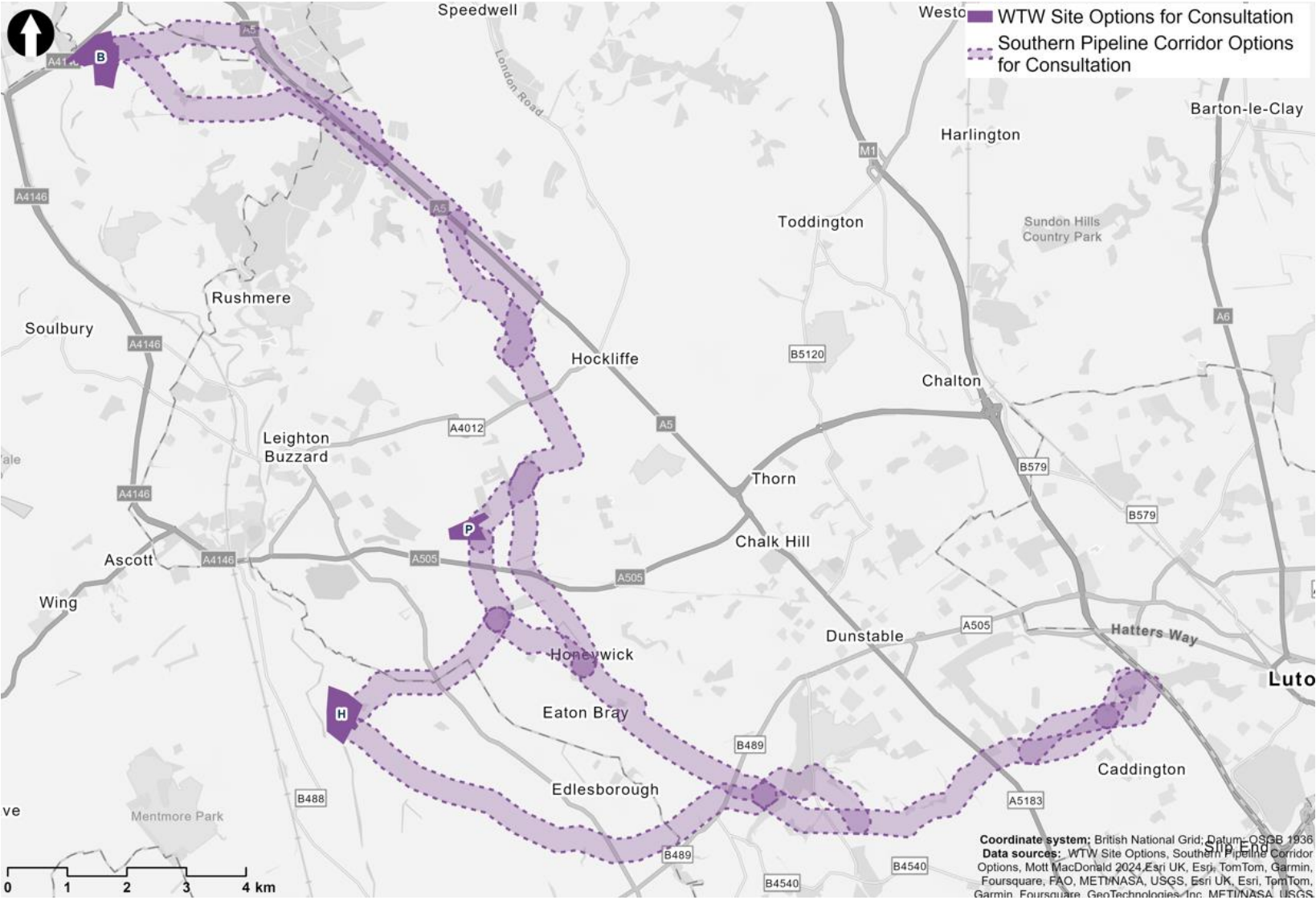
- Corridor Option SP2 combined with SP6, SP7, SP10 (including potential sub-options SP10A, SP10B, SP10C)
- Corridor Option SP5 combined with SP10 (including potential sub-options SP10A, SP10B, SP10C)

Pipeline Transfer from Site H (water storage) to Site P (WTW) and to Chaul End:

- Corridor option SP6 combined with SP4 for the raw water transfer from Site H to Site P
- Corridor option SP4, SP7, SP10 (including potential sub-options SP10A, SP10B, SP10C) for the drinking water transfer from Site P to Chaul End

These conclusions reflect the information on the potential pipeline transfer routes and their development known at this time, and are reached in advance of the non-statutory consultation process and planned site surveys and investigations. The outcomes from the non-statutory consultation and additional surveys and assessments will be considered prior to confirming selection of preferred option(s) for the future progression of the Project.

Figure 7.5: Southern Pipeline Corridor Options for Consultation



8 Summary and Conclusion

This report has been prepared to provide an overview of the site and pipeline assessment process for the various elements of the GUC Transfer Project. It sets out the work undertaken to identify and assess suitable routes and locations for infrastructure needed to deliver the GUC Transfer Project.

The work to date has identified those route and site options that are considered, through engineering, environmental, planning and land assessment, to have the most potential. These are:

Scheme Element	Scheme Elements for Consultation
Advanced Water Treatment Plant	• Curdworth Beds Site
Minworth to Grand Union Canal Transfer	• Minworth to Atherstone Pipeline Corridor • Outfall Location – Coleshill Road or Atherstone Golf Course
Abstraction, Water Treatment Works and Storage	• Bletchley Option (Site B) – WTW and storage • West of Slapton Option (Site H) – WTW and storage • West of Slapton Option (Site H) – Storage only with WTW on a site east of Leighton Buzzard (Site P)
Transfer to Chaul End	Pipeline Transfer from Site B (water storage and WTW) to Chaul End: • Corridor Option SP2 (including potential sub-options SP2A, SP2B), combined with Option SP10 (including potential sub-options SP10A, SP10B, SP10C).
	Pipeline Transfer from Site H (water storage and WTW) to Chaul End: • Corridor Option SP2 combined with SP6, SP7, SP10 (including potential sub-options SP10A, SP10B, SP10C) • Corridor Option SP5 combined with SP10 (including potential sub-options SP10A, SP10B, SP10C)
	Pipeline Transfer from Site H (water storage) to Site P (WTW) and to Chaul End: • Corridor option SP6 combined with SP4 for the raw water transfer from Site H to Site P • Corridor option SP4, SP7, SP10 (including potential sub-options SP10A, SP10B, SP10C) for the drinking water transfer from Site P to Chaul End

These options reflect the information available at the time of optioneering, in advance of the non-statutory consultation process. It should be noted that the assessment outcomes reported are predominantly based on desk-based assessments. At the time of this report, field based ecological, and engineering site-based surveys have not yet been completed for site options and corridors, nor has engagement with potentially affected landowners been completed across the site options and corridors.

The outcomes from the non-statutory consultation and additional surveys and assessments will be considered prior to confirming the selection of preferred option(s) for the future progression of the Project.

Detailed engineering design work, environmental and technical assessments, and engagement will be undertaken, which will enable the identification of preferred designs for the sites and pipeline corridors, as well as construction working areas relating to their proposed construction.

Further Statutory Consultation will be undertaken on those proposals before associated assessments and the application for development consent are completed.

Glossary

Term	Definition
AfW	Affinity Water
AWTP	Advanced Water Treatment Plant
Central Region	The water resource zones (WRZs) in the central part of Affinity Waters supply area – it includes Wey (WRZ6), Pinn (WRZ4), Colne (WRZ2), Misbourne (WRZ1), Lee (WRZ3) and Stort. (WRSZ5)
DCO	Development Consent Order - a DCO is a statutory instrument that grants consent in accordance with the provisions in the Planning Act 2008 for Nationally Significant Infrastructure Projects or projects of national significance brought into the DCO regime by a section 35 direction. A DCO can combine consent to develop, operate and maintain a project, alongside a range of other approvals that would normally have to be obtained separately such as listed building consent, a marine licence and certain environmental consents. A DCO can also contain powers for the compulsory acquisition and temporary possession of land
Drinking Water Inspectorate	Regulator for public water supplies in England and Wales.
Environment Agency	The leading public body for protecting and improving the environment in England and Wales
GUC	Grand Union Canal
HS2	High Speed 2
National Landscape	Previously known as an Area of Outstanding Natural Beauty – an area of countryside which has been designated under the Countryside and Rights of Way Act 2000 to protect, conserve and enhance its natural beauty
Non-Statutory Consultation	A type of consultation that can take place before a Development Consent Order (DCO) application is made, and is used to engage with people who are likely to be interested in a proposed development
Ofwat	The economic regulator of the water sector in England and Wales
RAPID	Regulators' Alliance for Progressing Infrastructure Development - Made up of the three water regulators: Ofwat, the Environment Agency and the Drinking Water Inspectorate. Formed to help accelerate the development of new water infrastructure and design future regulatory frameworks
SRO	Strategic Resource Option - national water resource projects that are being developed to address the challenges of water resource scarcity due to climate change and population growth
ST	Severn Trent Water
The Trust	Canal & River Trust
Water Framework Directive	A European Union directive which commits EU member states to achieve 'good' qualitative and quantitative status of all water bodies by 2027
WRMP	Water Resources Management Plan – 25-year plan which water companies use to plan ahead and manage their water resources
WSR	Water Supply Reservoir
WTW	Water Treatment Works
WwRC	Wastewater Recycling Centre

A. Advanced Water Treatment Works – Site Assessment Summary

Table A.1: AWTP Assessment Site Summaries

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Minworth South	The construction and operational costs of this option are moderate, as developing the route would encompass a pipe diversion, possible additional pumping and longer site returns. Embedded and operational carbon is estimated to be moderate due to the requirement for extra pipelines. This route has moderate flexibility but is constrained by unknown ground conditions, a small area that would require substantial spatial reconfiguration and restricted temporary working and compound areas, amongst other things. It is considered that another main compound may be needed at a separate location to support this site.	Areas of the site are of local ecological importance as Local Wildlife Sites (LWSs) and Habitats of Principal Importance are encompassed within and around the site. There are no landscape or historical designations on the site that would pose a major environmental constraint. Significant environmental risks associated with this site relate to soils and flood risk, as the Minworth Landfill abuts the site boundary and as areas of the site fall within Flood Zone 3, which has a high risk of flooding. These risks impact the preferability of this option.	The main planning constraint is that the site partially falls within a Site of Importance for Nature Conservation and is within the Green Belt. It is noted however that the site appears to have been previously developed and is within the operational boundary of the existing Minworth site. Due to this, development on this land would likely have a limited impact on the openness of the Green Belt and purposes of the Green Belt designation than other sites. Therefore, though the Green Belt allocation poses a constraint, this may be overcome if it could be demonstrated that the development would preserve openness and would not conflict with the purposes of including land within the Green Belt.	There are no constraints concerning land ownership and there are no land acquisition risks, as the statutory undertaker for the site is Severn Trent Water.
Minworth East	The construction and operational costs of this option are the least expensive of the options. Embedded and operational carbon is estimated to be the least of all options due to shorter pipe lengths. This site is considered to be the most flexible as it would require the least degree of changes to the existing layout, there is a good site area for compound facilities and though some areas are in Flood Zones 2 and 3, the site can accommodate this as development can move to other site areas.	Areas of the site are of local ecological importance as Local Wildlife Sites (LWSs) and Habitats of Principal Importance are encompassed within and around the site. There are no landscape or historical designations on the site that would pose a major environmental constraint. There are no significant environmental risks associated with this site, with the only moderate risk relating to some areas of the site falling under Flood Zone 2. Construction in this area may require some degree of mitigation via flood	A major planning constraint associated with this route is that the entirety of the site consists of undeveloped land within the Green Belt, located outside the operational boundary of the Minworth site. Furthermore, the development of the site would be close to Curdworth village and extend outside of the current operational boundary of the land. The site overall would not be preferable from a planning perspective.	There are no constraints concerning land ownership and there are no land acquisition risks, as the statutory undertaken for the site is Severn Trent Water.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
		compensation storage to overcome this constraint.		
Coleshill	The construction and operational costs of this option are the most expensive of the options, owing to factors such as the need for additional pumping and design constraints. Embedded and operational carbon is estimated to be the highest of all options. This option is considered as the most inflexible and the largest amount of site reconfiguration would be required, due to tight site size and constraints within the site such as land in Flood Zone 3 and potential land contamination. Current land take does not appear wide enough for pipeline construction and development at this site would require an extra-long section to/from the existing GUC pipeline route.	Areas of the site are of local ecological importance however as Local Wildlife Sites (LWSSs) and Habitats of Principal Importance are encompassed within and around the site. There are no landscape or historical designations on the site that would pose a major environmental constraint. Potential environmental risks associated with this option relate to soils and flood risk, as there are three landfill sites within 500m of the site and as the entirety of the site is within Flood Zone 2, which may require flood mitigation measures in some areas. Risks associated with soils and flooding are not as significant as in the Minworth South option.	This site is subject to a number of moderate planning constraints. The land has multiple uses and also falls under HS2 safeguarded land which could constrain development. As with the Minworth South site, the land within this site is within the Green Belt, however most of the site appears to have been previously developed and is within the operational boundary of the existing Coleshill site. Due to this, development on this land would likely have a limited impact on the openness of the Green Belt and purposes of the Green Belt designation than other sites. Therefore, though the Green Belt allocation poses a constraint, this may be overcome if it could be demonstrated that the development would preserve openness and would not conflict with the purposes of including land within the Green Belt. The site is less favourable from a planning perspective than the Minworth South site overall however, due to existing land uses and safeguarded land.	There are no constraints concerning land ownership and there are no land acquisition risks, as the statutory undertaken for the site is Severn Trent Water.
Curdworth Beds	Costs associated with this option may arise from site constraints including the presence of contaminated water, owing to its previous use as a former sludge drying beds site, and potential utilities diversions. The Curdworth Beds site has similar challenges as the Coleshill Beds and Water Orton Beds locations; however, this option is	Areas of the site are of local ecological importance as Local Wildlife Sites (LWSSs) and Habitats of Principal Importance are encompassed within and around the site. There are no landscape or historical designations on the site that would pose a major environmental constraint. An environmental constraint associated	The land within this site comprises undeveloped land in the Green Belt, though the land lies within an existing operational boundary. Due to this, development on this land would likely have a limited impact on the openness of the Green Belt and purposes than other sites. Therefore, though the Green Belt allocation poses a	There are no constraints concerning land ownership and there are no land acquisition risks, as the statutory undertaken for the site is Severn Trent Water.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	preferable from an engineering perspective as it requires less additional pipes and pumping. The option is considered as more flexible as it can facilitate the flow required as part of the GUC Transfer Project, whilst providing the opportunity to develop further streams in the future.	with this site is that land within the site, specifically the wetlands, falls within Flood Zone 3 which is therefore subject to high risk of flooding. However, the majority of the land within this site is in Flood Zone 2. This may impact the preferability of this site. There is also an Authorised Landfill site within the site.	constraint, this may be overcome if it could be demonstrated that the development would preserve openness and would not conflict with the purposes of including land within the Green Belt.	
Water Orton Beds	Medium costs are associated with the required pipeline construction and operational costs of this option. This area is anticipated to involve the increased costs for removal and off-site disposal of contaminated sludge/soil/groundwater, though this is anticipated to be relatively lower than the Coleshill Beds option. This option does require more extensive crossings and pipelines than Coleshill Beds.	As with the Curdworth Beds site, the main environmental constraint is that land within the site falls within Flood Zone 3, which has a high risk of flooding. Mitigation and further assessment would be required to overcome this risk if this route, or any other option with higher flood risk, is selected.	The land within this site comprises undeveloped land in the Green Belt, though the land lies within an existing operational boundary. Due to this, development on this land would likely have a limited impact on the openness of the Green Belt and purposes of the Green Belt designation than other sites. Therefore, though the Green Belt allocation poses a constraint, this may be overcome if it could be demonstrated that the development would preserve openness and would not conflict with the purposes of including land within the Green Belt.	There are no constraints concerning land ownership and there are no land acquisition risks, as the statutory undertaken for the site is Severn Trent Water.

B. Minworth to Grand Union Canal – Transfer Options Assessment Summary

Table B.1: Transfer Option Assessment Summary

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Sub-Route 1	Sub-route 1 utilises existing canal infrastructure. This would minimise the need for modification to existing infrastructure to facilitate the pipeline along this route, however the presence of existing infrastructure may make the route design less flexible than other options. This option has the highest operational carbon cost of all of the sub route options, as this route would require significant pumping.	There are 4 Local Nature Reserves (LNRs), 2 Sites of Special Scientific Interest (SSSIs) and 2 Ancient Woodland sites. 5 authorised landfill sites and 24 historic landfill sites located along the route may constrain the scheme design where contamination is present. Parts of the route cover flood zone 2 or flood zone 3 with land therefore subject to a high risk of flooding. As such development may not be favourable in these areas. Heritage designations present an issue, as the route covers 3 conservation areas, 8 Grade II* listed assets, 62 Grade II listed assets and 4 scheduled monuments. The route crosses the M42 and encompasses multiple property and community assets, further adding to environmental risks associated with this option.	The site is located along the Birmingham & Fazeley Canal (Minworth - Fazeley) and the Coventry Canal (Fazeley - Atherstone), which is designated for continued canal use, and therefore current site uses will not constrain development opportunities. The first half of the route (Minworth to Fazeley) is located within the Green Belt, which could pose a risk to obtaining planning permission. There are no allocated/preferred mineral extraction sites within the proposed pipeline area, however the pipeline would pass through Warwickshire County Council Mineral Safeguarding Area. Neighbouring land uses vary and may constrain the scheme design in some areas.	No special category land risks, direct residential land impact risks or acquisition cost risks have been identified as the sub-route design is within the canal.
Sub-route 2	Sub-route 2 relies on a natural system and therefore this option is considered to be the least flexible as the route could be severely affected by environmental changes. This option would have slightly higher operational and embedded carbon than the other options. Significant works would be required in the flood plain to lift the flow out of the river and up to the canal. The River Tame has a significant flood zone extent and locating the extraction and transfer point on the River Tame could cause a potential	From an environmental perspective, this route has the most constraints and is the least favourable of all of the sub-routes. There are 6 LNRs, 4 SSSIs and 2 Ancient Woodlands along the proposed route, as well as 5 authorised landfill sites. Parts of the route cover flood zone 2 or flood zone 3 and the route covers several heritage designations including: 9 conservation areas, 13 Grade II* listed assets, 103 Grade II listed assets and 6 scheduled monuments.	The site is located on undeveloped greenfield land. The land encompassed within the site is subject to a number of designations, such as the Hams Hall Distribution Park development site, RSPB Middleton Lakes and a housing allocation site. The first half of the route (Minworth to Fazeley) is located within the Green Belt, which could pose risk to obtaining planning permission for certain works. There are no allocated/preferred mineral extraction sites within the proposed route area, however; it would pass through	There are no special category land risks, direct residential land impact risks or acquisition cost risk.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	deterioration of the water source quality.		Warwickshire County Council Mineral Safeguarding Area. Neighbouring land uses vary and may constrain the scheme design in some areas.	
Sub-route 3	Sub-route 3 is almost wholly rural and, compared to most urban sub-routes, it is assumed to be less vulnerable to external influence. The construction and embedded carbon costs associated with this option is estimated to be the least of all other options. The sub-route involves less work to locks, fewer and easier to construct pumping stations and avoids the difficult canal section from Minworth to Atherstone. Pipeline routes provide most flexibility as they reduce the amount of canal infrastructure requiring modification. Sub-route 3 is considered the most flexible as it is largely rural and less vulnerable to interfacing projects. Sub-route is considered to have the shortest overall programme and shorter and easier to construct.	Significant environmental constraints are present within this sub-route though they are not as extensive as in sub-routes 1 and moreover, 2. There are 2 SSSIs located within 500m of the route and the route encompasses 2 Ancient Woodland sites. There are 3 authorised landfill sites and 9 historic landfill sites located along the route, which may constrain the scheme design in areas where contamination is present. Part of the route cover flood zone 2 or 3 (around Lea Marston purification lakes). The route covers 34 Grade II listed assets, 1 Grade II registered park and garden and 2 scheduled monuments. These heritage assets may constrain the scheme design. Noting the sub-route is a pipeline option there is potentially greater flexibility to avoid and minimise environmental impacts.	Land within the site boundary is subject to a number of uses including agricultural greenfield, motorway infrastructure, HS2 land and rail infrastructure corridors, amongst others. Land at Atherstone, by the Coventry Canal, is allocated for housing development. Around 75% of the route falls within land designated as Green Belt, posing a potential planning constraint, though it is noted that the works are below ground. There are no allocated/preferred mineral extraction sites within the proposed pipeline area, however the pipeline would pass through Warwickshire County Council Mineral Safeguarding Area. Neighbouring land uses vary and may constrain the scheme design in some areas.	Network Rail crossings have been identified as being within the sub-route design that will require consideration.
Sub-route 4	Sub-route 4 utilises existing canal infrastructure and is not considered as flexible as the pipeline sub-routes. The construction and embedded carbon have the potential to become the least costly of the sub-route options and could be the least demanding from a cost/programme perspective. The upgrade to the canal system within the Birmingham and Fazeley Canal approach to Gravelly Hill in	There are 2 LNRs and an Ancient Woodland site along the route, which may constrain the scheme design and require it to include appropriate mitigation measures. There are 3 authorised landfill sites along the route. Parts of the route covers flood zone 2 or flood zone 3. There are significant heritage constraints associated with this sub-route, as the route encompasses 4 conservation	This sub-route spans a range of watercourses, encompassing sections of the Birmingham and Fazeley Canal, the Digbeth Branch Canal, and the Grand Union Canal. Land within the sub-route area is subject to an array of allocations, including designated Growth Areas, Core Employment Areas, mixed-use allocations and industrial areas. Around 10% of the land within the route is designated as	No special category land risks, direct residential land impact risks or acquisition cost risks have been identified as the sub-route. The route is significantly more urbanised and potentially more complex from a land perspective.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	Birmingham, and around Birmingham up to the connection with the GUC, would require works to be undertaken within the heavily built-up area of Birmingham, therefore increasing the complexity of this option. The sub-route would potentially require the upgrade of the whole lock section and significant amounts of canal structures (such as bridges and aqueducts) to enable the water transfer in this direction of the Birmingham and Fazeley Canal from Minworth.	areas, 1 Grade I listed asset, 12 Grade II* listed assets and 84 Grade II listed assets.	Green Belt, posing a potential planning constraint. This is however the lowest percentage of Green Belt land of all the sub-route options. There is a committed development on land within the site, namely a hybrid application for Curzon Wharf (2021/03125/PA) which may affect the ability to use the canal to facilitate the sub-route in this location. Neighbouring land uses vary and may constrain the scheme design in some areas. The route is significantly more urbanised and potentially more complex from a planning perspective.	
Sub-route 5	Sub-route 5 has to pass close to the congested area around Birmingham International Airport and HS2 Interchange, which presents additional risks. Sub-route 5 is considered more flexible than utilising existing infrastructure but less flexible than sub-route 3. Sub-route 5 offers benefits in relation to sub-route 4 as it bypasses the urban area and corresponding works to the Birmingham and Fazeley Canal. However, the proposed discharge location is situated upstream and potentially involves more upgrades to the canal infrastructure than other sub-options that were assessed.	There are fewer environmental constraints than other sub-route options though constraints remain significant. There route covers 3 LNRs, 2 SSSI sites and 3 Ancient Woodland sites. There is 1 authorised landfill site and 15 historic landfill sites located along the route. Parts of the route cover flood zone 2 or flood zone 3. Development may not be favourable in areas in Flood Zone 3. Located along the route are a number of heritage assets including 2 conservation areas, 2 Grade II* listed assets and 17 Grade II listed assets.	Land within the site boundary is subject to a number of uses including undeveloped greenfield land, undeveloped woodland, rail and road infrastructure, amongst others. Land within the sub-route area is subject to an array of allocations including Birmingham Business Park, Allocated Employment Land (Prologis Park), NEC Designation, UK C Hub Area and Birmingham Airport. Around 66% of the land within the route is designated as Green Belt, posing a potential planning constraint. The pipeline would pass through Warwickshire County Council Mineral Safeguarding Area. There are two notable committed developments along the route, constituting the construction of an automated people mover at Birmingham International Rail Station (PL/2022/00206/HS2DIS) and the	There is a high special category land risk for this sub-route as it encompasses areas of open space, allotments and National Rail land. There are also residential land impact risks and acquisition cost risks relating to the HS2 line, Birmingham Airport, residential properties and community assets.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
			construction of a Battery Energy Storage System (BESS) (PL/2023/01954/PPFL) which could constrain development in specific areas. Neighbouring land uses vary and may significantly constrain the scheme design in some areas. These land uses include the NEC and Birmingham Airport.	
Sub-route 6	Sub-route 6 has to pass close to the congested area around Birmingham International Airport and HS2 Interchange, which presents considerable risks. Sub-route 6 is considered more flexible than utilising existing infrastructure but less flexible than sub-route 3 Sub-route 6 would require the most material for the construction and the additional pumping requirement results in much higher carbon costs that cannot be mitigated sufficiently in comparison to other options. Operationally, the option also has more points of failure and would generally be more difficult to operate to minimise negative fluctuations and adapt to long-term trends.	There are 4 LNRs, 1 SSSI and 5 Ancient Woodland sites located along the route. 1 authorised landfill site and 8 historic landfill sites located along the route may constrain the design. Parts of the route cover flood zone 2 or flood zone 3. There are significant heritage constraints associated with this sub-route, as the route encompasses 3 conservation areas, 1 Grade I listed asset, 4 Grade II* listed assets, 61 Grade II listed assets, 1 Grade II* registered park and garden, 1 Grade II registered park and garden and 3 scheduled monuments. In addition, the route crosses the M42 and encompasses a number of property and community assets.	Land within the site boundary is subject to a number of uses including undeveloped greenfield land, undeveloped woodland, rail and road infrastructure, amongst others. Land within the sub-route area is subject to an array of allocations including Birmingham Business Park, Allocated Employment Land (Prologis Park) and the NEC Designation. Around 85% of the land within the route is designated as Green Belt, posing a potential planning constraint. There are no allocated/preferred mineral extraction sites within the proposed pipeline area, however the pipeline would pass through Warwickshire County Council Mineral Safeguarding Area. There are no relevant emerging allocations within the site, however the construction and operation of a renewable energy park (PL/2023/01952/PPFL) may constrain development. Neighbouring land uses vary and may significantly constrain the scheme design in some areas.	There is a high special category land risk for this sub-route design encompasses areas of open space, allotments and National Rail land. There are also residential land impact risks and acquisition cost risks relating to the HS2 line, residential properties and community assets.

Table B.2: Transfer Option Assessment Summary

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Atherstone Golf Course	This option avoids diversion of the large sewer main in south Atherstone as well as the sectional closures of Coleshill Road past Atherstone Golf Course. The outfall is located downstream of the bridge structure and thus is in a 'more optimal' location hydraulically. Further engineering work is required to determine how the option would be constructed as the option would result in temporary disruption to Atherstone Golf Course.	This option has the potential for potential significant impacts on natural environmental assessment criteria as it is routed within areas of high ecological potential, is adjacent to or crossing Ancient Woodland and there is a presence of a veteran tree and several Category A and B trees. Impacts to Ancient Woodland and veteran trees could potentially affect the ability of the scheme to achieve BNG as these are considered irreplaceable habitats. Further work would be required environmentally to understand the extent of impact on the woodland and further consideration of biodiversity net gain. As this option is routed through the golf course, disturbance effects to the local community would be significantly reduced.	No significant land use risks were identified. The main land use associated with the pipeline corridor is associated with 'common land' and Atherstone Golf Club, and it would appear there would be some temporary impact on the operation of the golf course through the construction of the pipeline. There are also several dispersed properties in the vicinity, but the route does reduce impacts on the residents of Atherstone in comparison to the Coleshill Road option.	Crossing the golf course and having the outfall located within Common Land does present additional risk. However, there are no major constraints provided that the outfall location and infrastructure within the Common Land stays under the threshold for special parliamentary procedure (that is temporary use or footprint under 200m²).
Coleshill Road	The pipeline option within the highway along Coleshill Road would require the diversion of significant utilities in the area, including the large sewer main in south Atherstone. Coleshill Road has properties either side through Atherstone, and as a result there would be a much-reduced construction area and access arrangements, with significant	Environmental impacts would not be as significant as the Atherstone Golf Course option, though the Ancient Woodland and veteran trees are within the potential working area. This route contains two A Category Trees, Group, Hedge, or Woodland with five B Category Tree, Group, Hedge, or Woodland also intersecting the route. Impacts would largely be avoided as	The Coleshill Road option would involve work primarily within the highway boundary, and no significant impacts were identified in relation to planning. However, the option would result in significant disruption to residents of Atherstone that would need to be further considered.	This option is considered as more favourable from a land and property perspective as the golf course option presents an additional risk due to the additional complications of works within Common Land. No major land impacts are noted at this stage due to works predominantly taking place within the highway boundary.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	disruption to the local population and businesses over an extended construction programme. The discharge location being adjacent a series of locks, upstream of an existing road bridge where the canal narrows, means there is a potential hydraulic restriction. Therefore, the option is not considered optimal when compared with the Atherstone Golf Course option.	the works would predominantly be within the highway boundary. Although a small area of grassland was noted adjacent to the proposed outflow into the GUC. The main impact is the proximity of the works to residential, commercial properties and community assets which is an important consideration. The option would require extensive traffic management implementation and the works would take a considerable time to complete, which would have a significant local amenity impact.		

C. Abstraction, Treatment and Storage – Site Assessment Summary

Table C.1: Site Assessment Summary

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Bletchley Site Option - Site B	Energy costs and embedded carbon costs are likely to be higher than for the other sites but the location is likely to provide resilience for longer term use. Better recorded water quality at this abstraction location as further south on the canal there are inputs from local streams and drains that potentially result in poorer water quality. This could mean that less treatment processes would be required at this location. Abstracting water on this part of the GUC would reduce the amount of development that would be needed further south on the canal but would involve a longer pipeline transfer to the existing underground reservoir near Luton. Option offers good road access via the A4146/A5 for both construction and operational activities, with the need for a new access/entrance noted. The need for further topographical and ground condition information is identified, although the potential to encounter contaminated land is considered to be low. The site is relatively flat but has sufficient slope to allow for the construction of the water storage (subject to more detailed investigation of ground conditions). Interstage pumping would be required across the WTW. Gas main running through the site that will need to be considered in the siting of any	Site is mainly low quality grassland habitats and arable fields (with groups of tree stands), with a parcel of woodland. Includes hedgerow boundaries and hedgerows with trees present. Surveys required to determine if hedgerows are protected and if veteran trees are present. Woodland is of high distinctiveness in BNG terms. No designated or non-designated biodiversity sites within the option boundary but does fall within several SSSI impact risk zones. There is no priority habitat within the site. There is a Local Wildlife Site within 400m of the site (Water Hall Park). Protected species records have been examined and presence of common species of bats and Great Crested Newts indicated adjacent to the site. Proximity of residential properties and businesses to the option boundary is noted. No designated heritage assets within the site. Potential for a single non-designated heritage asset to be present (linear/trackway identified from aerial photographs). Site topography is typically flat, gently falling from the eastern boundary to the western boundary along the River Ouzel. A mature dense barrier along the A4146 restricts views. The local road network is well vegetated, and has been managed into a well-maintained low hedgerow, allowing	Within the countryside where there is a policy presumption against development that would compromise the character of the countryside between settlements or communities leading to coalescence. Designated as an area of attractive landscape where there is a need to have regard to the character of the landscape and provide mitigation to overcome any adverse impact. Located within the Greensand Ridge Nature Improvement Area where there is an onus on developing biodiversity, minimising visual impact and protecting local amenity. Proximity to residential areas and consented residential development in the Bletchley area where there is the opportunity to promote recreational benefit of the storage. Site is within Minerals Safeguarding Area for Sand and Gravel. Northern parts of the site are known to be being promoted by landowner/developer for potential future residential development through the Buckinghamshire Council Housing and Economic Land Availability Assessment, as part of the preparation of a new Local Plan.	No Special Category Land identified within the site option boundary. Several landowners across site option and could involve changes to access arrangements across land parcels. It is noted there is a gas easement that crosses the site.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	development. The site is adjacent to the canal but beyond flood plain extents.	views across the open countryside. There are no protected or designated views that could be affected, although some potential visual impacts to recreational users of footpaths and the River Ouzel corridor. The nearest residential receptors are along Galley Lane to the east. Desktop analysis indicates Grade 3A and 3B agricultural land and further work required to confirm classification. This site option includes areas of Flood Zone 3 and Flood Zone 2 in the west side derived from fluvial risk from the River Ouzel that runs along the west boundary.		
Slapton Site Option – Site H	Site likely to have lower embedded and current operating costs than other options. There is potentially poorer water quality abstracting from this location which may require additional treatment processes/ energy to treat. Additional development, including pumping stations, on the GUC would be required south from Leighton Buzzard but the transfer pipeline to the service reservoir near Luton would be shorter. Access to the site is limited to B roads with potential height and weight restrictions for construction and operational access. The suitability of the existing bridge on Horton Road over the GUC for construction traffic access requires further consideration. Site is also within Buckinghamshire's Freight Strategy Zone and restrictions need to be fully explored. The need for	The site is generally open agricultural or woodland planting land intersected and bordered by hedgerows and relatively recent woodland plantation. Surveys required to determine if hedgerows are protected and if veteran trees are present. There is an important wildlife corridor (Green Lane) that bisects the centre of the site. It is designated as a local wildlife site due to its hedges and ditches. The site is located within a SSSI risk zone but all SSSIs are more than 2km from the site. Protected species records have been examined and presence of common bats identified adjacent to the site and otters to the north of the site. The site is approximately 3km from the Chilterns National Landscape and potential effects on the setting would need to be explored. The site is	Within the the countryside where there is a policy presumption against development that would compromise the character of the countryside between settlements or communities leading to coalescence. Close proximity to Bury Farm Equestrian Centre, Grand Union Canal, Lock Keeper's cottage, Hill Farm and village of Slapton noted. To the northwest of the site planning permission was granted in 2022 for the construction of a solar farm but to date the development does not appear to have been implemented. Public Rights of Way running through the site providing access to the canal. Potential to develop recreational benefit of storage. Potential impact on neighbouring land uses during construction, in particular amenity and	No Special Category Land identified within the site option boundary. Development could involve changes to access arrangements across land parcels.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	further topographical and ground condition information is identified, although the potential to encounter contaminated land is considered to be low. Flat site meaning unlikely that all excavated material can be reused on site and will need to be exported off site (subject to more detailed investigation of ground conditions this is considered to be greater than at the Bletchley site). Two power lines currently transect the sites and would require diverting, although these do indicate a power supply close to the site.	on the western edge of the village of Slapton. There are some intermittent belts of vegetation to the village edge that will help screen the proposed works. There are a number of residential, commercial and community properties and facilities within close proximity to the site, including an equestrian centre and sports playing field and park. There are two public rights of way running through the site and recreational use of the canal adjacent to the option boundary. Approximately 50m east of the site are residential receptors along Horton Road, Bury Farm and Mill Road. During construction, nearby sensitive receptors may experience increased noise and vibration levels from construction activities, construction traffic, excavations, groundworks and interior work activities. Construction traffic would need to travel circa. 1.5 miles on local roads with some sections of single carriageway/ kerbside parking pinch points. No heritage sites within the boundary although there is a recorded single non-designated heritage asset located within this site boundary which requires further investigation. Further work required to determine the agricultural land classification. This site does not include fluvial flood areas (Flood Zone 3 or 2).	highway impacts that would need to be addressed were this site to be taken forward. Site is within Minerals Safeguarding Area for Sand and Gravel.	
East of Leighton Buzzard – Site P – WTW Only	Site considered only suitable for accommodating the WTW. Access from the A505 to the site for construction and operation is good.	Generally open agricultural land bordered by well-maintained mature native deciduous trees and shrub hedgerows. Surveys required to	The main constraint is that the site is located within the Green Belt and would be considered inappropriate development. It would be necessary to	No Special Category Land identified within the site option boundary. One landowner across site option.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	There are high voltage power lines adjacent to the site. Ground conditions appear to indicate a low risk for construction but the need for further investigation of ground conditions is noted. As the site has no raw water storage it requires a raw water pipeline to the site and a way to return excess flows to a drainage channel or river/canal. Considered to offer good resilience to future flood risk.	determine if hedgerows are protected and if veteran trees are present. Small copse of scrub and likely relatively immature woodland to northeast of site boundary. No designated nature conservation sites or heritage sites within the site option boundary but site is within a SSSI impact risk zone. Protected species records have been examined and presence of common bats, badgers, otters and notable plant species are identified within the vicinity of the site. There are no priority habitats within the site boundary. Proximity of residential properties along Leighton Road, Billington Road, Leighton Buzzard Rugby Club and playing fields noted. Potential impact on residential and recreational views. The site is located within the Green Belt and within 5km of the Chilterns National Landscape and potential effects on the setting would need to be explored. Further work required to determine the agricultural land classification. This site does not include fluvial flood areas (Flood Zone 3 or 2).	demonstrate very special circumstances to outweigh any harm as required by planning policy including that set out in the Water Resource Infrastructure National Policy Statement. Located within the Greensand Ridge Nature Improvement Area where there is an onus on developing biodiversity, minimising visual impact and protecting local amenity. Planning permission has been granted (April 2024) for an energy park (wind turbine, solar array, battery energy storage, EV charging including new access) to the west of the proposed site. In terms of land use, to the south of the site is the A505, with residential/commercial areas of Leighton Buzzard to the north and west and Billington Road to the east. To the north is a site allocated for Outdoor Sport Leisure and Open Space. Site was previously identified within Central Bedfordshire Council's call for housing development sites but was rejected citing impact to the wider landscape that could not be outweighed by the benefits of the proposed development.	
East of Leighton Buzzard – Site Q – WTW Only	Site considered only suitable for accommodating the WTW. Access from the A505/A5 to the site for construction and operation is good. There are high voltage power lines adjacent to the site. Ground conditions appear to indicate a low risk for construction but the need for further investigation of ground conditions is	Generally open agricultural land bordered by well-maintained mature native deciduous trees and shrub hedgerows. Woodland plantation to north and south beyond boundary. Scattered individual trees within hedgerow along eastern and north western boundary are likely semi mature to mature. Noted there are	The main constraint is that the site is within the Green Belt and would be considered inappropriate development. It would be necessary to demonstrate very special circumstances to outweigh any harm as required by planning policy including that set out in the Water Resource Infrastructure National	No Special Category Land identified within the site option boundary. Could involve changes to access arrangements across land parcels.

Site Name	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	noted. As the site has no raw water storage it requires a raw water pipeline to the site and a way to return excess flows to a drainage channel or river/canal. Considered to be good resilience to future flood risk.	smaller field sizes closer to village of Stanbridge which is east of the site option. No designated nature conservation sites or heritage sites within the site option boundary. Site falls within a SSSI impact risk zone. Protected species records have been examined and presence of common bats, badgers, otters and notable plant species are identified within the vicinity of the site. Directly surrounding the site are agricultural fields. Proximity of residential and commercial properties along Leighton Road, Billington Road and Station Road noted. Potential to directly impact two public rights of way. Potential impact on residential and recreational views. The site is located within the Green Belt and within 5km of the Chilterns National Landscape and potential effects on the setting would need to be explored. Further work required to determine the agricultural land classification. This site does not include fluvial flood areas (Flood Zone 3 or 2).	Policy Statement. In terms of land use, to the south of the site is the A505 with the site predominantly surrounded by agricultural land. To the northeast of the site is the village of Stanbridge, which along with residential properties includes a school and amenity spaces.	

D. Transfer to Chaul End - Transfer Options Assessment Summary

Table D.1: Transfer Option Assessment Summary

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Alternative Pipeline Corridors from the Bletchley Site (Site B) to Chaul End				
Corridor SP1	This section of the pipeline corridor option extends to approximately 15km in length and the route requires the drinking water transfer pipeline to cross the River Ouzel, the GUC itself, together with the mainline railway, A4146 and A418. These constraints represent additional environmental and engineering risks and complexity, and the trenchless crossings of these features would be likely to increase the overall cost of this option compared to options with less complex crossings. The routing of the pipeline below the GUC and railway represent ongoing operational risks due to constraints on future maintenance of those sections of pipeline.	The corridor encroaches partly into an SSSI to the west of the A4146 and part of a Registered Park and Garden south of the A418 (both of which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain (Flood Zone 3), and county and local level environmental designations which may require routeing refinement and/or mitigation. The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. Land within the corridor includes grade 2 and 3 agricultural land. The pipeline routes to the north and west of Stoke Hammond, north and east of Soulbury and to the north of Slapton. There is the potential for parts of these settlements and other properties to experience some disruption during construction.	Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor. Some areas of land close to Milton Keynes are being promoted by landowners/developers as potential future development sites through the emerging local plan. Applications for solar farms affect parts of the pipeline corridor.	Engagement with landowners and land referencing has not yet been undertaken for this pipeline route option and there may be potential for special category land within the pipeline corridor.
Corridor Sub-option SP1A	Sub-option 1A is an alternative routeing for the northernmost section of corridor Option 1. Sub-option SP1A	The corridor intersects with areas of floodplain (Flood Zone 3 and WFD Impact Zone), and county and local	Parts of the sub-option route are designated as an Area of Attractive Landscape, Green Belt and Minerals	Engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	involves approximately 1km shorter overall length than Option SP1, however the route (in common with SP1) requires the drinking water transfer pipeline to cross the River Ouzel, the GUC itself, together with the mainline railway, and A4146. These constraints represent additional environmental and engineering risks and complexity, and the trenchless crossings of these features would be likely to increase the overall cost of this option compared to options with less complex crossings. The routeing of the pipeline below the GUC and railway represent ongoing operational risks due to constraints on future maintenance of those sections of pipeline.	level environmental designations which may require routeing refinement and/or mitigation. Like option SP1, the majority of this pipeline corridor option passes through open countryside, with sections of the pipeline routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties as well as a golf course. Land within the corridor includes grade 2 and 3 agricultural land. The pipeline routes to the south of Great Brickhill, and to the west of Bragenham and Linslade before rejoining Option SP1. There is the potential for parts of these settlements to experience some disruption during construction.	Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor.	sub-option but there is special category land within the pipeline corridor.
Corridor Option SP2	This section of the pipeline corridor option extends to approximately 16km in length and the routeing to the east from Site B avoids crossings of the River Ouzel and the GUC itself associated with Option SP1/1A. Option SP2 requires a number of major road crossings including the A5 (twice), A2012 and A505, which would require trenchless crossings of these features.	The corridor intersects with areas of floodplain (Flood Zone 3), county and local level environmental designations (including wildlife sites) and a former landfill site which may require routeing refinement and/or mitigation. There is an area of Ancient Woodland within 15m of the corridor. The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. Land within the corridor includes grade 2 and 3 agricultural land. The pipeline routes to the south of Little Brickhill, between	Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. There are conservation areas and other local planning designations near to or affecting parts of the corridor, and a playing field south of Eggington lies within the corridor. Some areas of land close to Milton Keynes are being promoted by landowners/developers as potential future development sites through the emerging local plan.	Engagement with landowners and land referencing has not yet been undertaken for this pipeline route option but there is special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
		Hockliffe and Eggington, to the west of Stanbridge and north of Eaton Bray. There is the potential for parts of these settlements and other properties to experience some disruption during construction.		
Corridor Sub-option SP2A	Sub-option 2A is a potential alternative route corridor for the northernmost section of Option SP2. The pipeline corridor follows a route further south than Option SP2 and the sub-option is approximately 200m shorter route than Option SP2. Like Option SP2, this corridor route would avoid the need for a drinking water pipeline trenchless crossing of the River Ouzel, the GUC itself and the mainline railway. The sub-option would require a trenchless crossing under the A5 (as for Option SP2).	The corridor intersects with a small part of an SSSI, and with county and local level environmental designations (including wildlife sites), a Grade II listed building, and a former landfill site which may require routeing refinement and/or mitigation. The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. Land within the corridor includes grade 2 and 3 agricultural land. The sub-option routes to the north of Great Brickhill before routeing east to follow alongside and then cross the A5 where it rejoins Option SP2. There is the potential for parts of the settlement and other properties to experience some disruption during construction.	Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. Some areas of land close to Milton Keynes are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	Engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor sub-option and there may be potential for special category land within the pipeline corridor.
Corridor Sub-option SP2B	Sub-option 2B is a potential alternative route corridor for an approximately 3km section of Option SP2, to the north of Church End. The pipeline corridor follows a route closer to the A5, before routeing south and then west of Church End to rejoin Option SP2. The route is the same approximate length as the related	The corridor intersects with a small part of a registered park and garden (which could potentially be avoided by narrowing the corridor) and with part of a county level environmental designation (wildlife site) which may require routeing refinement and/or mitigation.	Parts of the route are designated as an Area of Attractive Landscape or as Green Belt, and Minerals Safeguarding Areas. Some areas of land close to Milton Keynes are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and	Engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor sub-option and there may be potential for special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	section of Option SP2. The sub-option would require a trenchless crossing under the A5 (as for Option SP2).	The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline routeing close to isolated residential, agricultural and other properties. There is the potential for properties to experience some disruption during construction. Land within the corridor includes grade 2 and 3 agricultural land.	permissions for development within parts of the corridor.	
Alternative Pipeline Corridors from the Slapton Site (Site H) to Chaul End				
Corridor Option SP6, SP7 and SP10	This section of the pipeline corridor option extends to approximately 16km in length and the route requires the drinking water transfer pipeline to cross the A5183, and potentially also the River Ouzel, which would require trenchless crossings of these features. There is a need for use of a trenchless technique to construct a section of the pipeline through and below the Dunstable Downs, which represents some engineering risk and additional cost. This would require sensitive routeing and consideration of trenchless construction technique to minimise impacts on Dunstable Downs during construction.	The corridor intersects with areas of floodplain, a former landfill site and county and local level environmental designations (including wildlife sites), and two areas of Ancient Woodland which may require routeing refinement and/or mitigation. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor. The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties, as well as areas of open space, and part of a gliding club. Land within the corridor includes predominately grade 2, 3 and 4 agricultural land, but with a small area	Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. The corridor encroaches partly into an SSSI north of Church End (which could potentially be avoided by narrowing the corridor). There are other local planning designations near to or affecting parts of the corridor, including conservation areas.	Part of the corridor passes through National Trust land at Dunstable Downs and intersects with an area of potential Common Land. Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, this is a potentially significant land constraint, and there are areas of land including public open space that will be special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
		of grade 1. The pipeline routes to the west and north of Slapton, to the north of Eaton Bray, to the north of Whipsnade and Church End, and to the south of Chaul End. There is the potential for parts of these settlements and other properties to experience some disruption during construction.		
Corridor Sub-option SP10A	Sub-option 10A is a potential alternative route corridor for an approximately 2km central section of Option SP10 where the pipeline corridor routes through the Dunstable Downs. The pipeline corridor sub-option follows a route further to the north than Option SP10. The route is approximately 300m longer than Option SP10 and (like Option SP10) would require sensitive routeing and consideration of trenchless construction technique to minimise impacts on Dunstable Downs during construction.	The corridor intersects with part of an SSSI, and with county and local level environmental designations (including wildlife sites), a listed building, and lies close to Ancient Woodland and a former landfill site which may require routeing refinement and/or mitigation. The environmental constraints are potentially significant. Land within the corridor includes grade 2 and 3 agricultural land. This pipeline corridor sub-option passes through open countryside routeing to the north of the National Trust visitor centre and then south east to rejoin option SP10. There is the potential for properties to experience some disruption during construction.	The whole of the sub-option lies within the Chilterns National Landscape, and within the Green Belt. Parts of the route are within a Minerals Safeguarding Area.	Part of the sub-option pass through National Trust land and could intersect Common Land. Whilst engagement with landowners and land referencing has not yet been undertaken for this sub-option, these are potentially significant land constraints and there is special category land within the sub-option corridor.
Corridor Sub-option SP10B	Sub-option 10B is a potential alternative route corridor for an approximately 1.5km eastern section of Option SP10 where the pipeline corridor routes to the north of Caddington. The sub-option route is the same approximate length to Option SP10. The pipeline corridor sub-option follows a route further to the north than Option SP10, and then rejoining Option SP10.	The corridor lies within 100m of Ancient Woodland and land within the corridor includes grade 2 and 3 agricultural land. The corridor passes through open countryside and there is the potential for isolated properties to experience some disruption during construction.	The whole of the sub-option lies within the Chilterns National Landscape, and within the Green Belt.	Whilst engagement with landowners and land referencing has not yet been undertaken for this sub-option, there is unlikely to be special category land within the sub-option corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Corridor Sub-option SP10C	Sub-option 10C is a potential alternative route corridor for the approximately 800m final section of Option SP10 where the pipeline corridor routes to Chaul End. The pipeline corridor sub-option follows a route further to the east than Option SP10 and is approximately 500m longer than Option SP10.	Land within the corridor includes grade 2 and 3 agricultural land and the corridor passes through open countryside around an area of woodland. The area of woodland lying adjacent to the sub-option includes parts of Ancient Woodland and a County Wildlife Site.	An initial small section of the sub-option lies within the Chilterns National Landscape, and the whole sub-option lies within the Green Belt.	Whilst engagement with landowners and land referencing has not yet been undertaken for this sub-option, there is unlikely to be special category land within the sub-option corridor.
Corridor Option SP5 and SP10	This section of the pipeline corridor option extends to approximately 15km in length. The majority of this pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties and part of a gliding club. The route requires the drinking water transfer pipeline to cross the A5183 which would require a trenchless crossing but avoids the River Ouzel. There is a need for use of a trenchless technique to construct a section of the pipeline through and below the Dunstable Downs, which represents some engineering risk and additional cost. This would require sensitive routeing and consideration of trenchless construction technique to minimise impacts on Dunstable Downs during construction. The corridor also crosses high voltage electricity lines.	The corridor encroaches partly into an SSSI north of Church End (which could potentially be avoided by narrowing the corridor). There are other local planning designations near to or affecting parts of the corridor, including conservation areas. The corridor also intersects with areas of floodplain, county and local level environmental designations (including wildlife sites), and two areas of Ancient Woodland which may require routeing refinement and/or mitigation. It also lies close to a former landfill site. Land within the corridor includes predominantly grade 2, 3 and 4 agricultural land, but with a small area of grade 1. The pipeline corridor routes to the south of Slapton and Edlesborough, to the north of Whipsnade and Church End, and to the south of Chaul End. There is the potential for parts of these settlements and other properties to experience some disruption during construction.	Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, Minerals Safeguarding Areas and an Area of Attractive Landscape. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	Part of the corridor passes through National Trust land at Dunstable Downs and may involve Common Land. Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, this is a potentially significant land constraint, and there are areas of land including public open space that will be special category land within the pipeline corridor.
Corridor Option SP6 and SP8	This section of the pipeline corridor option extends to approximately 17km in length. The first half of this corridor	Land in the rural sections of the corridor includes predominately grade 2, 3 and 4 agricultural land, but with a	Parts of the route corridor are designated within the Chilterns National Landscape, and also	Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. The pipeline routes to the west and north of Slapton, and to the south of Billington to reach the A505 road corridor, where the corridor follows the A505 east to the junction with the A5 and then would comprise in road construction along the A505 southwards through Chalk Hill, turning north east along the B5120 through Houghton Regis, and then south along Park Road North and Poynters Road, crossing the A505 and then in the A5065 road corridor before routeing south to Chaul End. The route requires the drinking water transfer pipeline to cross the River Ouzel, which would require trenchless crossing. There is a significant length of in road pipeline construction proposed, which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.	small area of grade 1. The corridor partially encroaches into an SSSI at Chalk Hill (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations (including wildlife sites) which may require routeing refinement and/or mitigation. The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.	intersect with Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor, including conservation areas and public open space. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	option, there are areas of land including public open space that will be special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
Corridor Option SP6 and SP9	Approximately the first half of this 15km pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. The pipeline routes to the west and north of Slapton, and to the south of Billington to reach the A505 road corridor, where the corridor follows the A505 east to a point north of Lower End, where the corridor then follows the former railway line corridor eastwards towards Dunstable. In Dunstable, the pipeline corridor crosses the A505 and is then routed along the Luton Dunstable guided busway corridor through the Dunstable and Houghton Regis urban area, crossing the A505 and then in the A5065 road corridor before routeing south to Chaul End. The route requires the drinking water transfer pipeline to cross the River Ouzel, which would require trenchless crossing. There is a significant length of pipeline construction proposed either in road, within the guided busway corridor, or within the disused railway line, each of which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local	Land in the rural sections of the corridor includes predominantly grade 2 and 3 agricultural land. The corridor partially encroaches into an SSSI south of the Luton Road (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, and county and local level environmental designations (including wildlife sites) which may require routeing refinement and/or mitigation. A significant length of the former railway line is a county wildlife site. The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction, and construction along the guided busway corridor through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.	Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor, including conservation areas and public open space. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, there are areas of land including public open space that will be special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	communities. The availability of land for temporary construction compounds within the urban area is a further constraint.			
Alternative Pipeline Corridors from the Slapton Site (water storage- Site H) to site east of Leighton Buzzard (water treatment works – Site P)				
Corridor Option SP6 and SP4	This section of the pipeline corridor option extends to approximately 4.5km in length. The raw water transfer pipeline routes to the west and north of Slapton, and to the south and east of Billington before crossing the A505. The route requires the raw water transfer pipeline to cross the A505 and the River Ouzel, which would require trenchless crossings of these features.	The corridor intersects with areas of floodplain including Flood Zone 3 and county and local level environmental designations which may require routeing refinement and/or mitigation. Land within the corridor includes predominantly grade 2, 3 and 4 agricultural land. The pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties, as well as areas of open space. There is the potential for parts of these settlements and other properties to experience some disruption during construction.	Parts of the route are designated as Green Belt, Minerals Safeguarding Areas and an Area of Attractive Landscape. There are other local planning designations near to or affecting parts of the corridor, including conservation area and open space. There are planning applications and permissions for development within parts of the corridor.	Whilst engagement with landowners and land referencing has not yet been undertaken for this option, there are areas of land including public open space that will be special category land within the pipeline corridor.
Alternative Pipeline Corridors from the Site east of Leighton Buzzard (water treatment works – Site P) to Chaul End				
Corridor Option SP4, SP7 and SP10	This section of the pipeline corridor option extends to approximately 14.5km in length. The drinking water transfer pipeline routes south to cross the A505 and then routes to the north of Eaton Bray, to the north of Whipsnade and Church End, and to the south of Chaul End. The route requires the drinking water transfer pipeline to cross the A505 and A5183, which would require trenchless	The corridor encroaches partly into an SSSI north of Church End (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations (including wildlife sites), and two areas of Ancient Woodland which may require routeing refinement and/or mitigation.	Parts of the route are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor, including conservation areas. Some areas of land south of Dunstable and Houghton Regis are being promoted by	Part of the corridor passes through National Trust land at Dunstable Downs and may involve common land. Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, this is a potentially significant land constraint, and there are areas of land including public open space that will be special

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	crossings of these features. There is a need for use of a trenchless technique to construct a section of the pipeline through and below the Dunstable Downs, which represents some engineering risk and additional cost. This would require sensitive routeing and consideration of trenchless construction technique to minimise impacts on Dunstable Downs during construction.	Land within the corridor includes predominantly grade 2, 3 and 4 agricultural land, but with a small area of grade 1. The majority of this drinking water transfer pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties, as well as areas of open space, and part of a gliding club. There is the potential for parts of these settlements and other properties to experience some disruption during construction.	landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	category land within the pipeline corridor.
Corridor Option SP4, and SP8	The first half of this approximately 14.5km drinking water transfer pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. The drinking water transfer pipeline routes south to cross the A505 road corridor and then to follow the A505 east to the junction with the A5 and then would comprise in road construction along the A505 southwards through Chalk Hill, turning north east along the B5120 through Houghton Regis, and then south along Park Road North and Poynters Road,	The corridor partially encroaches into an SSSI at Chalk Hill (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, a former landfill site and county and local level environmental designations (including wildlife sites) which may require routeing refinement and/or mitigation. Land in the rural sections of the corridor includes grade 2 and 3 agricultural land. The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction through Dunstable and Houghton Regis would lead to significant traffic and other impacts on the local communities, with a very significant	Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor, including conservation areas and public open space. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, there are areas of land including public open space that will be special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	crossing the A505 and then in the A5065 road corridor before routing south to Chaul End. The route requires the drinking water transfer pipeline to cross the A505 and other major roads which may require trenchless crossing. There is a significant length of in road pipeline construction proposed, which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.	number of residential and community receptors potentially affected.		
Corridor Option SP4, and SP9	Approximately the first half of this 12.5km pipeline corridor option passes through open countryside, with sections of the pipeline corridor routeing close to neighbouring villages and isolated residential, agricultural, equestrian and other properties. The second half of this pipeline corridor option routes through the built up areas comprising parts of Dunstable and Houghton Regis. From Site P, the drinking water transfer pipeline routes south from Site P to cross the A505 road corridor and then to follow the A505 east to a point north of Lower End, where the corridor then follows the former railway line corridor eastwards towards Dunstable. In Dunstable, the pipeline corridor crosses the A505 and is then routed along the Luton Dunstable guided busway corridor	The corridor partially encroaches into an SSSI south of the Luton Road (which could potentially be avoided by narrowing the corridor). The corridor also intersects with areas of floodplain, and county and local level environmental designations (including wildlife sites) which may require routeing refinement and/or mitigation. A significant length of the former railway line is a county wildlife site. Land in the rural sections of the corridor includes predominantly grade 2 and 3 agricultural land. The sections of pipeline constructed close to rural communities and properties have the potential to cause some disruption during construction. The sections of in road construction, and construction along the guided busway corridor through Dunstable and Houghton Regis would lead to	Parts of the route corridor are designated within the Chilterns National Landscape, and also intersect with Green Belt, and Minerals Safeguarding Areas. There are other local planning designations near to or affecting parts of the corridor, including conservation areas and public open space. Some areas of land south of Dunstable and Houghton Regis are being promoted by landowners/developers as potential future development sites through the emerging local plan, and there are planning applications and permissions for development within parts of the corridor.	Whilst engagement with landowners and land referencing has not yet been undertaken for this pipeline corridor option, there are areas of land including public open space that will be special category land within the pipeline corridor.

Transfer Option	Engineering Assessment Summary	Environment Assessment Summary	Planning Assessment Summary	Land Assessment Summary
	through the Dunstable and Houghton Regis urban area, crossing the A505 and then in the A5065 road corridor before routeing south to Chaul End. The route requires a significant length of pipeline construction proposed either in road, within the guided busway corridor, or within the disused railway line, each of which represents engineering risks and challenges relating to existing buried services and traffic and associated impacts on local communities. The availability of land for temporary construction compounds within the urban area is a further constraint.	significant traffic and other impacts on the local communities, with a very significant number of residential and community receptors potentially affected.		



Grand Union
Canal Transfer