Grand Union Canal Transfer

Chapter 3: The Proposed Development

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3.1 Introduction

3.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides a description of the Proposed Development that has been used to undertake the preliminary environmental assessment. It is structured as follows:

a. Section 3.2 provides a summary of the Proposed Development;

b. Section 3.3 identifies which Parts of the Proposed Development are located within each of the host planning authorities' administrative areas;

c. Section 3.4 describes how the 'Rochdale Envelope' approach to design and assessments has been incorporated into the Environmental Impact Assessment (EIA) and the Proposed Development;

d. Sections 3.5-3.10 present an overview of each Part of the Proposed Development; and

e. Sections 3.11, 3.12 and 3.13 present overarching construction information and details of maintenance requirements and decommissioning, respectively.

3.1.2 The need for the Proposed Development and alternatives considered to date are described within **Chapter 4: Consideration of Alternatives** in PEI Report **Volume 2**.

3.1.3 This chapter is supported by the following figures within **Volume 3** of this PEI Report:

a. **Figure 3-P1A-1: Part 1a AWTP Indicative Layout of Temporary Works**;

b. **Figure 3-P1A-2: Part 1a AWTP Indicative Layout of Permanent Works**;

c. **Figure 3-P1B-1: Part 1b Minworth to Atherstone Pipeline Indicative Layout Plan – Temporary and Permanent Works**;

d. **Figure 3-P2&3-1: Parts 2 & 3 Canal and Reservoir Works Indicative Layout Plans**;

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f. **Figure 3-P4A-1: Part 4a Galley WTW Indicative Layout of Temporary Works**;

g. **Figure 3-P4A-2: Part 4a Galley WTW Indicative Layout of Permanent Works**; and

h. **Figure 3-P4B-1: Part 1b Pipeline to an Underground Reservoir near Luton Indicative Layout Plan – Temporary and Permanent Works**.

3.1.4 This chapter is also supported by **Appendix 3-PD-1: Proposed Assessment Assumptions** in PEI Report **Volume 4**, which provides further indicative details of the Proposed Development that are specific to preliminary assessments in **Chapter 19: Noise and Vibration** and **Chapter 21: Traffic and Transport** in PEI Report **Volume 2**. The information provided in the appendix will be reviewed and updated for the ES.

3.1.5 The Applicants have prepared a series of visualisations for the various proposed above ground buildings and structures. These are presented in the Consultation Brochure that accompanies Phase Two Public Consultation and are not repeated in this chapter.

3.1.6 For the purposes of undertaking the preliminary assessments and the reporting of preliminary assessment findings in the topic chapters of this PEI Report, a ‘design freeze’ was adopted. This design freeze reflected the status of design development at that point in time and allowed for a consistent assessment of the Proposed Development across all the environmental topics. At the point of the design freeze there were some areas of design uncertainty, including some areas of remaining optionality, that have been further investigated and resolved. This includes the following:

a. The location of the Break Pressure Tank on the Minworth to Atherstone Pipeline;

b. The location of the Transfer Lock required to reduce bank raising on the Coventry Canal;

c. The inclusion of modifications to the Iron Trunk Aqueduct or a fourth Transfer Lock and the location of that Transfer Lock; and

d. Whether works would be required to a bridge (Bridge 88, Peartree Bridge), on the Grand Union Canal.

3.1.7 The options assessed and the outcome of the further assessment are described in the relevant sections of this chapter. Further information on the optioneering process is described in **Chapter 4: Consideration of Alternatives** in PEI Report **Volume 2** and the Scheme Development and Options Report that is included with the Phase Two Public Consultation material.

3.2 Summary of the Proposed Development

3.2.1 The Proposed Development will transfer water from Severn Trent’s supply area via up to approximately 120 kilometres (km) of canal to areas of forecast deficit in Affinity Water’s (AfW) supply area.

3.2.2 A proportion of the highly treated, recycled water from the existing Minworth Wastewater Recycling Centre (WwRC), which would usually be discharged into the adjacent River Tame will be diverted to a new Advanced Water Treatment Plant (AWTP) within the Minworth site. The proposed AWTP uses the required standards of technology to treat water to an even higher standard to protect the quality of the water in the canal.

3.2.3 Once the recycled water is further treated in the new 'Minworth AWTP', an approximately 15 km long buried pipeline will transfer the treated water from the AWTP to a new outfall in the Coventry Canal near Atherstone. The Coventry, Oxford and Grand Union Canals will then convey water to a location near Great Brickhill, south-east of Milton Keynes, where it will be abstracted, stored and further treated at a new drinking water treatment plant (named the 'Galley Water Treatment Works' [WTW]). It will then be transferred via a new approximately 28 km long buried pipeline to an underground reservoir (an existing AfW asset) near Luton and then distributed to AfW customers.

3.2.4 To manage flow velocities and water level changes within the canal network resulting from the water transfer, a range of new infrastructure developments, along with modifications to existing infrastructure, will be required. The new infrastructure will include new pumping stations at locks (uphill), weir bypasses around locks (downhill) and some sections of bank raising. Three new locks, referred to as 'transfer locks', are also proposed to reduce some of the lengths of bank raising that would otherwise be required.

3.2.5 The existing Daventry and Drayton Reservoirs will be utilised to provide storage to ensure water supply is maintained during periods when there may be less water in the canal network. This is in addition to their current purpose of supplying water to the canal for navigation. This will require some additional infrastructure and improvements to existing infrastructure at the reservoirs.

3.2.6 The Proposed Development is split into the following main elements, described north to south, as shown on **Figure 1-PD-1** in **Volume 3** of this PEI Report:

a. Part 1: Minworth to Atherstone:
    i. Part 1a: Minworth AWTP;
    ii. Part 1b: Minworth to Atherstone pipeline;
b. Part 2: Works to the Coventry, Oxford and Grand Union canals;
c. Part 3: Works to Daventry and Drayton Reservoirs;
d. Part 4: Abstraction, storage and treatment and pipeline to an existing underground reservoir near Luton:
    i. Part 4a: Abstraction, storage and treatment; and

ii. Part 4b: Pipeline to an existing underground reservoir near Luton.

Preliminary Order Limits

3.2.7 A red line boundary, referred to as the 'Preliminary Order Limits', has been adopted for the purposes of this PEI Report to define the potential maximum extent of land within which it is currently envisaged all works (both temporary and permanent) and associated activities for the Proposed Development will take place. The Preliminary Order Limits shown in this PEI Report are therefore draft and may be subject to change due to ongoing design development, surveys, stakeholder engagement and feedback from the Phase Two Public Consultation. Updated and final Order Limits will be published as part of the Development Consent Order (DCO) application and assessed in the Environmental Statement (ES).

3.2.8 Where the area within the Preliminary Order Limits contains existing buildings or other known environmental constraints, ongoing design development will look to avoid any works occurring to these features, where practicable (although some monitoring or protective works may be required). Development offsets from these features will be defined as appropriate as part of ongoing design activities.

3.2.9 For Parts 2 and 3 of the Proposed Development, the Preliminary Order Limits has been divided into an Indicative Work Area and an Indicative Non-Work Area:

a. **Indicative Work Area**: includes areas anticipated for temporary and/or permanent works associated with the Proposed Development; and

b. **Indicative Non-Work Area**: includes areas where no temporary or permanent works are proposed, however, these are required to operate the Proposed Development (i.e. the transfer of water from outfall to abstraction point).

3.2.10 The Preliminary Order Limits for each Part of the Proposed Development are shown on **Figure 1-PD-1** in **Volume 3** of this PEI Report.

3.2.11 The Preliminary Order Limits have been drawn to provide flexibility, where the Proposed Development's design details are not yet confirmed or where flexibility is to be retained in the DCO. As such, the Preliminary Order Limits are subject to change as the Proposed Development design progresses, taking into account the findings of the ongoing environmental and technical assessments and ongoing engagement and consultation. It is however considered to provide a robust basis for the purpose of identifying likely significant environmental effects. The final Order Limits will be refined as design of the Proposed Development continues up to submission of the DCO application.

3.2.12 The geographical extent of the study areas used within the EIA are generally greater than the Preliminary Order Limits and vary depending on the

environmental aspect and specific receptors or resources under consideration for that aspect. For each aspect, the study area proposed is of sufficient size to encompass the spatial extent over which impacts and effects on receptors or resources might occur. Each of the technical methodologies (**Chapters 7-22** in PEI Report **Volume 2**) describes the study area considered, providing a clear explanation as to why the study area has been adopted. Further information on the spatial scope is also provided within **Chapter 6: Environmental Impact Assessment Methodology** in PEI Report **Volume 2**.

Operating Philosophy

3.2.13 The Proposed Development has been designed to allow for a maximum flow of 115 megalitres per day (Ml/d) to be transferred, as identified within the AfW's Water Resources Management Plan 2024 (WRMP24) (Ref. 1). The flow requirement (i.e. total amount of water transferred) will vary over the year with it tending to run at lower rates during the October to April period, then ramping up to higher flows over the summer.

3.2.14 The 115 Ml/d design capacity is sufficient to meet the requirements set out in AfW's Water Resources Management Plan 2024, where the benefit provided to their customers can support an average of 100 Ml/d of demand.

3.2.15 The operating philosophy of the Proposed Development comprises two general operating regimes, although these will vary according to operational requirements at the time:

a. Business as Usual (BAU) operation separated into:
    i. A low off season operation at circa 23 Ml/d abstraction and treatment during October to April;
    ii. Transitional periods of planned increase, rising to circa 60-80 Ml/d by the end of May and falling back down again in September; and
    iii. Summer operation to meet increased demand, with the Proposed Development operating at 60-80 Ml/d continuously throughout the summer.
b. Severe drought operations or during prolonged emergencies affecting AfW's other supplies, where rates are increased to between 80 and 115 Ml/d depending on conditions.

3.2.16 Although flows will vary for the Proposed Development as described above, any increase or decrease will be planned and gradual over a number of weeks, i.e. there will not be a sudden increase in flows. Detailed controls over the volume and quality of discharges and abstractions under the Proposed Development will be agreed with and monitored by the Environment Agency through an Environmental Permit / Licence, where required.

Design Principles

3.2.17 The Applicants have adopted draft Design Principles across five themes: Safe and Well, Climate, People, Place, and Value. These overarching principles will guide the preparation of more specific Project-wide and Site-specific principles as the design of the Proposed Development progresses. The Draft Design Principles are presented in a stand-alone document and form part of the Phase Two Public Consultation material.

3.2.18 Included with the draft Design Principles is a Canalside Design Principles document which sets out design principles for all above ground buildings and structures required along the canal for the water transfer under three principal headings: Heritage & Cultural Value, Community Value and Environmental Value. The principles, which are framed as a series of questions, are intended to inform appropriate designs to the local context, and serve as a quality assessment and decision-making framework. In each location where visible buildings and structures are required, it is likely that a bespoke solution, balancing these principles against the particularities of place as well as technical requirements, will be needed. The Canalside Design Principles will be used as the framework within which detailed design of all above ground structures required along the canal (layout, scale, appearance and landscaping) will be undertaken.

3.2.19 The DCO application will be based on a design with appropriate flexibility within appropriate parameters. This approach is described further in section 3.4 ‘Rochdale Envelope’.

3.3 Parts of the Proposed Development by Local Authority

3.3.1 The Proposed Development crosses the administrative areas of ten local authorities: Birmingham City Council, North Warwickshire Borough Council, Nuneaton and Bedworth Borough Council, Coventry City Council, Rugby Borough Council, Warwickshire County Council, West Northamptonshire Council, Milton Keynes City Council, Buckinghamshire Council and Central Bedfordshire Council.

3.3.2 **Table 3-1** summarises the parts of the Proposed Development that fall within each local authority. All parts of the Proposed Development are then described individually in section 3.5 to 3.10 of this chapter.

Table 3-1: Summary of Parts of the Proposed Development by Local Authority

Local Authority	Part of the Proposed Development	Elements
Birmingham City Council	1a	Minworth AWTP.
North Warwickshire Borough Council / Warwickshire County Council	1a	Minworth AWTP – access route onto the A4097 only.
	1b	Minworth to Atherstone pipeline and Break Pressure Tank (BPT).
	2	Coventry Canal, from outfall structure at Atherstone to Nuneaton Road, Hartshill: possible bank raising works, works to weirs, Springwood Transfer Lock (northern option), construction compounds and access.
Nuneaton and Bedworth Borough Council / Warwickshire County Council	2	Coventry Canal, Yaxley Lane, Nuneaton to Hawkesbury: possible bank raising works, works to weirs, Springwood Transfer Lock (southern option), Hawkesbury Pumped Bypass, construction compounds and access.
Coventry City Council	2	Oxford Canal, Hawkesbury to Sowe Common, Coventry: possible bank raising works, construction compounds and access.
Rugby Borough Council / Warwickshire County Council	2	Oxford Canal, Ansty to Hillmorton, Rugby: Grimes Bridge Transfer Lock, possible bank raising works, works to weirs, construction compounds and access, Hillmorton Pumped Bypass.
West Northamptonshire Council	2	Grand Union Canal, Braunston to Cosgrove: Braunston Pumped Bypass, Long Buckby gravity bypasses (Locks 7, 8 and 9), Whilton Locks, Stoke Bruerne Locks and Cosgrove Lock gravity bypasses, works to weirs, construction compounds and access, possible bank raising works, Dodford Road Transfer Lock, potential modifications to Iron Trunk Aqueduct Scheduled Monument.
	3	Works associated with Daventry and Drayton Reservoirs, i.e. a new pumping station upstream (west) of the Braunston tunnel, new pipeline to energy dissipating discharge structures at the head of each reservoir, upgrade works to the outlet channels from each reservoir and upgrades to the discharge structures back into the

Local Authority	Part of the Proposed Development	Elements
		canal downstream (south) of Braunston tunnel.
Milton Keynes City Council	2	Grand Union Canal, potential modifications to Iron Trunk Aqueduct Scheduled Monument, transfer lock options south of Cosgrove (as an alternative to modifications to the Iron Trunk Aqueduct), Fenny Stratford Pumped Bypass, potential Bridge 88 modifications, construction compounds and access.
	4a	Abstraction point on Grand Union Canal near Great Brickhill – access route onto the A4146 only.
	4b	Pipeline to an existing underground reservoir near Luton (drinking water).
Buckinghamshire Council	4a	Abstraction point on Grand Union Canal near Great Brickhill, pumping station and pipeline (raw water) to water storage site, and the Galley WTW.
	4b	Pipeline to an existing underground reservoir near Luton (drinking water).
Central Bedfordshire Council	4b	Pipeline to an existing underground reservoir near Luton (drinking water).

3.4 The Rochdale Envelope

3.4.1 The Planning Inspectorate's (PINS) Advice Note Nine: 'Using the 'Rochdale Envelope' ('Advice Note Nine') (Ref. 2) provides guidance on how to approach development flexibility within environmental assessments for proposed developments seeking development consent under the Planning Act 2008 (Ref. 3). Advice Note Nine acknowledges that there may be aspects of a proposed development's design that are not yet fixed, and therefore, it will be necessary for the EIA to assess likely 'worst-case' parameters to ensure that all foreseeable significant environmental effects of a proposed development are assessed. Paragraph 4.9 of Advice Note Nine states:

"If, in the course of preparing an ES, it becomes clear that it will not be possible to specify all the details of the Proposed Development, the ES must explain why and how this has been addressed. The ES will need to establish the relevant parameters for the purposes of the assessment. Where this approach is adopted the assessments in the ES should be undertaken on the basis of the relevant design

parameters applicable to the characteristics of the Proposed Development included within the DCO. The assessment should establish those parameters likely to result in the maximum adverse effect (the worst case scenario) and be undertaken accordingly to determine significance."

3.4.2 There will be flexibility in the design of the Proposed Development at DCO application stage. The final detail design of the Proposed Development will be informed by matters such as ongoing environmental and technical considerations and innovation occurring after the granting of the DCO.

3.4.3 It is therefore necessary for the technical assessments to assess an 'envelope' within which the works will take place. Therefore, the DCO Application and EIA are be based on maximum and, if relevant, minimum parameters. To remain in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') (Ref. 4), it will be essential that the parameters are as 'limited' as possible to ensure that the 'likely significant effects' are identified, rather than unrealistically amplified effects, which could be deemed to be unlikely. These parameters are set out, where necessary, in each technical chapter of the PEI Report (**Chapters 7-22** in PEI Report **Volume 2**) to ensure the realistic worst-case effects of the Proposed Development are assessed for each topic area.

3.4.4 The subsequent sections of this chapter provide a description of the Proposed Development within each part and, where known, set out the maximum parameters that have been assessed within the topic assessments in this PEI Report and will be further refined and confirmed within the ES.

3.4.5 In general terms, the parameters cover:

a. The area within which above ground infrastructure will be constructed. For example, where precise locations of buildings / structures are not yet known, an indicative area within which it will be constructed is shown on the figures that accompany this chapter. This approach applies to all new above ground infrastructure across the whole of the Proposed Development;

b. Maximum building / structure dimensions. To ensure that a worst-case assessment is undertaken and to allow for further design development, maximum dimensions have been adopted;

c. Maximum width of pipeline route. A maximum width for where pipelines will be routed (typically 200 m) has been adopted for the purposes of the PEI Report. For the purposes of PEI, a maximum working width within this corridor of 50 m has been assumed; and

d. The work areas for temporary compounds and laydown areas, like those for permanent above ground infrastructure, are drawn more

broadly within the Preliminary Order Limits than may ultimately be needed. This is to allow the appointed Contractor a degree of flexibility in the precise location.

3.5 Part 1a: Minworth AWTP

Summary

3.5.1 The Minworth AWTP will take highly treated, recycled water from the existing Minworth WwRC, which would usually be discharged into the adjacent River Tame, and treat the water to further higher standards, so that it can be discharged into the Coventry Canal at an outfall in Atherstone. The Minworth AWTP will be located on land owned by Severn Trent, and parts of the proposed infrastructure will be located immediately adjacent to existing structures within the Minworth WwRC.

3.5.2 Part 1a is anticipated to include the following buildings and infrastructure:

a. Moving Bed Biofilm Reactor (MBBR) tanks and associated chemical compound;
b. Pumping stations for the MBBR feed, sludge return, Surplus Activated Sludge (SAS), and site transfer and return;
c. Flocculation tanks and chemical compound;
d. High Rate Clarifiers;
e. Filter building with office accommodation;
f. Electrical buildings and control buildings for new power supply;
g. Other associated above and below ground works, including pipework, channels, chemical compounds and control buildings; and
h. Access roads and car parking.

Permanent Works

3.5.3 **Figure 3-P1A-2** in **Volume 3** of this PEI Report provides an indicative layout plan for Minworth AWTP and illustrates the Part 1a Preliminary Order Limits.

3.5.4 The Minworth AWTP permanent works are generally split between two locations, both within land owned and operated by Severn Trent. The Filter building area is located to the east, close to the M42 / M6 Toll, and south of Curdworth Village on an area of redundant operational land known as Curdworth Beds. The remainder of the assets are located in the south of the existing Minworth WwRC and is known as the flocculation and sedimentation area. Between the two sets of assets, there would be an access route for vehicles and underground pipelines linking the two sets of assets.

3.5.5 The Filter building area would have a maximum footprint of 19,000 m^2 (square metres). The Filter building would be the largest single structure

within the Minworth AWTP and would have a maximum height of 18 m. The building would have an 8 m deep basement situated below ground level.

3.5.6 The flocculation and sedimentation area would contain a number of assets, totalling a maximum footprint of this area of 25,000 m^2 and maximum height of the assets within this area of 10 m.

3.5.7 Access to the Minworth AWTP would be from the A4079 Kingsbury Road, where a permanent access would be established. The access route would utilise an existing track, which would need to be upgraded. Currently, there is a facility for left and right turns onto Kingsbury Road, which is dual carriageway at this location, with the eastbound lane diverging to one lane immediately east of the access track.

3.5.8 It is anticipated that the majority of structures will be constructed from concrete and steel. The Filter building will have cladding on external facing walls, and a pitched roof.

Treatment Regime

3.5.9 The Minworth AWTP will receive up to 115 Ml/d of recycled water from the Minworth WwRC that would have otherwise been discharged to the River Tame and will further treat it. The AWTP will be designed to treat bulk organics, nutrients, and priority contaminants. The treatment process is likely to include the following steps:

a. Nitrate Removal: Nitrate will be removed by microorganisms within the MBBR tanks;

b. Flocculation and sedimentation: this will reduce total suspended solids, total phosphorus and turbidity and prepares the water for effective filtration;

c. Ozonation: The ozonation process would be used to degrade organic matter into smaller molecules by breaking chemical bonds making some of them easier to treat;

d. Biological Activated Carbon (BAC) Filtration: This is a multi-media filtration bed consisting of sand and granular activated carbon. The activated carbon is used to develop a biological community to biodegrade organic material, and the sand filters out suspended solids; and

e. Granular Activated Carbon (GAC) / Enhanced Media Adsorption: Bulk and trace organics will be removed through adsorption and a modified clay material will aid performance.

3.5.10 A process diagram for the treatment train of the recycled water is provided within **Plate 3-1**.

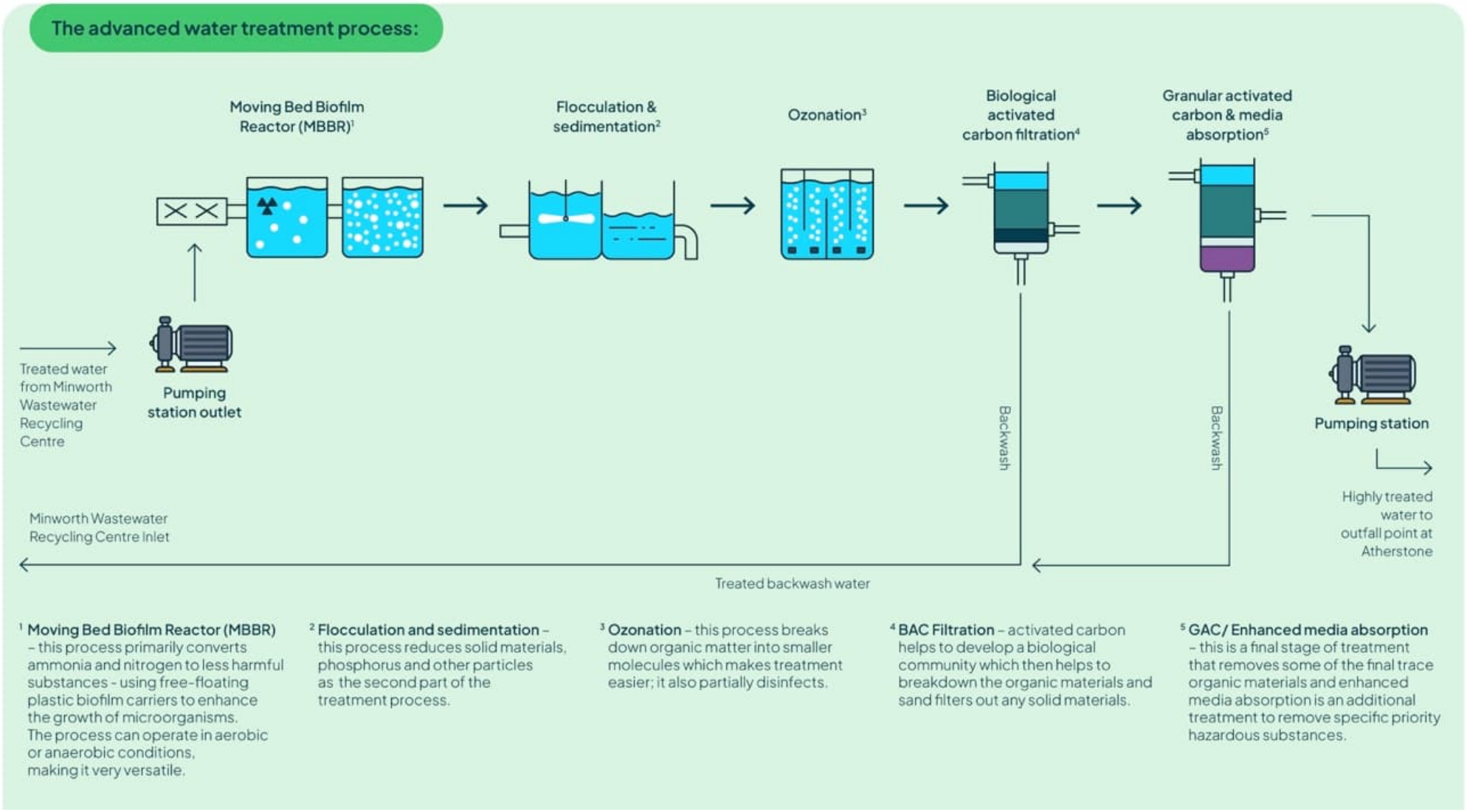

Plate 3-1: Advanced Water Treatment Process

3.5.11 A pumping station located within the Filter building area would pump highly treated recycled water into the proposed Minworth to Atherstone Pipeline. This will be designed so that the pumping of water can be stopped at any point if there are any issues detected, or if the quality of treated water drops below the required standards. In this scenario, the water will be returned to the treatment plant and retreated.

Hazardous and Non-Hazardous Chemicals

3.5.12 The Minworth AWTP will use hazardous and non-hazardous chemicals in the different stages of the treatment of water from the Minworth WwRC. Some of these chemicals are by-products of the treatment process and will be reused within treatment process, but most will be delivered to the Minworth AWTP via road, and will be stored on site.

3.5.13 Chemicals would be stored in bunded structures in accordance with manufacturer's recommendations.

3.5.14 None of these chemicals will be present in the highly treated recycled water that that would be pumped away from the Minworth AWTP towards the Atherstone outfall to the Coventry Canal.

Initial Commissioning

3.5.15 A multi-phased commissioning process will be undertaken prior to first operation of the Minworth AWTP. Any waste from this process will be recirculated back into the Minworth WwRC for treatment.

Operational Lighting

3.5.16 It is currently anticipated that perimeter local task and emergency lighting would be required around the AWTP. It is likely that a range of illuminance levels will be used from 20 to 300 lux, depending on the use. It is also likely that the perimeter lighting could be on columns up to 7 m in height.

3.5.17 This external lighting will generally be operated using motion and light sensors and would be in use for a short duration during personnel site presence and during low-light conditions (e.g. winter and night-time working) and would otherwise as default be unlit / turned off. The lighting will be designed, positioned and directed away from any surrounding properties and habitats, where possible.

Operational Employees

3.5.18 It is expected that the AWTP will be staffed at all times with three 8-hour shifts per day. It is expected that 11 Full-Time Equivalent (FTE) employees will be required.

Temporary Works and Construction Methodology

3.5.19 **Figure 3-P1A-1** in **Volume 3** of this PEI Report shows that the area of land that could be used as a working area during construction.

3.5.20 Vegetation clearance teams will clear the site of vegetation using hand tools (for example, strimmer and chainsaw). An excavator will remove any obstructions if required. Temporary fencing suitable for the location will be installed.

3.5.21 Temporary access points and access roads would be constructed to provide access from the public highways to haul routes, working areas and site compounds. This will involve utilising and upgrading existing access points and creating new accesses. To construct the access points temporary traffic management will be used to manage the flow of traffic, where required. Access points for the construction of Minworth AWTP include:

a. Access from the A4079 Kingsbury Road: this would be used for construction traffic, but will remain as a permanent access to the Minworth AWTP; and

b. Access from Water Orton Lane: this would be used during construction only. An existing track would be utilised and would need to be cleared of vegetation as it is currently not in active use.

3.5.22 Internal temporary haul roads would be created. To create these, the existing site would be cleared and the surface layer of topsoil removed. A suitable sub-base and surfacing material will then be laid and compacted to create a suitable running surface.

3.5.23 Site compounds will be required for the construction of the Minworth AWTP, these will typically provide offices, welfare, parking, storage areas and workshop space for the duration of the project. The site will be cleared and topsoil will be removed which will be stored on site. A compacted sub-base will be laid to create a suitable working area. The office and welfare facilities will be a modular building sized to suit the workforce size and needs. Suitable drainage will be installed to manage surface water in the compound. Temporary fencing panels will be set up around the compound perimeter to secure the site. Suitable lighting will be installed along with a remote-controlled security system to provide continuous site security monitoring. The compounds will have utility connections for electricity, potable water, foul water and communications. Gas connections may also be required.

3.5.24 The above ground structures of the Minworth AWTP will mainly consist of off-site fabricated components with minimal site connections and site preparation works required. Larger components will be brought to site either partially or fully assembled and lifted into position or cast in-situ as required. Pipework will then be installed to connect the process units together.

3.5.25 New buried pipework is to be installed and existing pipework diverted. Some existing utilities will also require diversion as part of the works.

3.6 Part 1b: Minworth to Atherstone Pipeline

Summary

3.6.1 Part 1b of the Proposed Development comprises the transfer of highly treated recycled water through a new approximately 15 km long buried pipeline from the Minworth AWTP to the Atherstone outfall to the Coventry Canal. The pipeline will have the capacity to transfer the maximum of 115 Ml/d of water from the Minworth AWTP. Part 1b includes the construction, operation and maintenance of the following infrastructure:

a. Pipeline to transfer water;

b. A Break Pressure Tank (BPT), with below and above ground elements; and

c. Cathodic protection, air valves and washouts.

Permanent Works

Pipeline

3.6.2 Highly treated recycled water will be pumped through the pipeline to a high point approximately 12 km from the Minworth AWTP at a site south-east of Baxterley, where water flow will transition from pumped to gravity fed. This transition will be managed by the BPT. Beyond the BPT, water in the pipeline will flow by gravity to the Atherstone outfall to the Coventry Canal.

3.6.3 The Part 1b Preliminary Order Limits for the pipeline are shown on **Figure 3-P1B-1** in **Volume 3** of this PEI Report. It provides the widest possible area within which the pipeline could be constructed. Efforts have been made to narrow down the Preliminary Order Limits associated with the pipeline corridor to avoid, where possible, environmental constraints such as ancient woodland, priority habitats and Local Wildlife Sites. The Preliminary Order Limits located between Hams Hall Substation and Lea Marston are wider than other areas associated with the pipeline corridor, due to the presence of conflicting constraints, which include priority habitats, waterbodies, extant planning permissions, planning applications under determination and known minerals deposits. Further consideration will be given to the pipeline corridor in this area as the design and the impact assessment progresses.

3.6.4 The maximum and minimum depths for the pipeline are expected to be as follows:

a. Indicative minimum pipe depth of 1.2 m to the top of the pipe, in open cut scenarios; and

b. Indicative pipe depth of approximately 10.5 m to the top of the pipe at the major trenchless crossings, subject to refinement following further design development.

3.6.5 The pipeline is expected to have an internal diameter of approximately 1,000 millimetres (mm) and at this stage, it is expected to be made from steel and have internal and external protective coatings. In addition, works may be required for the installation of pipeline markers, air valves and washout chambers and cathodic protection.

3.6.6 Currently two cathodic protection units are envisaged, one near to the western end of the pipeline and one at the eastern end of the pipeline, around the BPT. Cathodic protection is a means of preventing corrosion of a metal pipeline. This is achieved either by connecting the pipeline to a more active sacrificial metal that corrodes instead, or by using an external power source to supply current to the pipeline.

3.6.7 Air valves manage entrapped air or vacuums by automatically releasing air as the pipeline fills or intakes air to prevent damaging pressure surges, the proposed location of these air valves is yet to be determined, however, they would be located within the Preliminary Order Limits and along the pipeline corridor.

3.6.8 Washout chambers would provide access for pipeline maintenance (including enabling pipeline discharge where required), the number and location of these is not known at this time, however, these would also be located within the Preliminary Order Limits and along the pipeline corridor.

Break Pressure Tank

3.6.9 The BPT is required to manage the water pressure that will be generated in the pumped rising main and the transition from a pumped flow to a gravity flow within the pipeline. The BPT is also used to ensure that a surge from the starting and stopping of the pumps at the AWTP does not affect the pipeline. Whilst the BPT would have the capacity to store water, the purpose of the BPT is not for water storage. Highly treated recycled water would flow under gravity from the BPT to the Atherstone outfall to the Coventry Canal.

3.6.10 At the point of the design freeze for the preliminary assessments, the precise location of the BPT was still under investigation. The Preliminary Order Limits as shown on **Figure 3-P1B-1** in **Volume 3** of this PEI Report were therefore drawn more widely for this part of the Proposed Development. That work has now concluded and the preferred location for the BPT is a site located approximately 1 km to the south-east of Baxterley, within an agricultural field, bounded by Twenty Oaks Road to the west and Coleshill Road to the south. Access to the BPT is likely to be provided from Coleshill Road.

3.6.11 The BPT would comprise a concrete tank, with additional chambers, hardstanding areas and security fencing, typically 2.5 m high palisade or weldmesh fencing around the perimeter. The BPT would have a footprint of approximately 550 m^2 and would have a maximum height of 6 m above ground; parts of BPT and associated equipment would be below ground. An internal access road, equipment associated with the BPT and security fencing would extend around all sides of the BPT.

3.6.12 The BPT would provide temporary water storage facilitating a change from the pumped pipeline to a gravity fed pipeline. The BPT would also include retention ponds to allow additional water storage in the unlikely event that water cannot be discharged into the Coventry Canal. The retention ponds will be connected to a nearby watercourse if water needs to be discharged.

3.6.13 Operational waste would be limited to replacement and maintenance of equipment within the BPT, this would create very limited amounts of waste.

3.6.14 Equipment within the BPT is unlikely to produce significant noise and vibration as they would be below ground level, contained within a surrounding concrete structure.

3.6.15 Lighting will be required for security purposes and for worker visibility during darker hours. This is likely to include perimeter, local task and emergency lighting, which has a range of illuminance levels from 20 to 300 lux, depending on the use.

3.6.16 The BPT would be unmanned except for planned and reactive maintenance (mainly inspection and possible repairs).

Temporary Works and Construction Methodology

3.6.17 **Figure 3-P1B-1** in **Volume 3** of this PEI Report illustrates the likely temporary works for Part 1b of the Proposed Development and the Part 1b Preliminary Order Limits.

Pipeline Installation

3.6.18 The majority of the pipeline will be installed using open cut methods, following the establishment of a working area (for example, site clearance and topsoil stripping). The following works will occur simultaneously in a staggered sequence, so only a short length of excavation will be open at any one time.

a. Trench Excavation: Excavators will be used to dig out the trench to a suitable depth and width. The depth of excavation required below ground level will vary according to ground conditions. The sides of the excavation will be battered back to a suitable angle and excavated material will be stockpiled to the side of the trench. A haul road will provide access for plant and vehicles along the length of the working

corridor; these haul roads will connect to temporary access points along the pipeline corridor. In locations where the working area is constrained, temporary works, such as sheet piles or trench boxes may be needed to support the sides of the excavation;

b. Pipeline Installation: Using an excavator or small crane, lengths of pipe will be lifted into position at the bottom of the trench. Where possible, pipe lengths will be welded together at the side of the trench before being lifted into place, otherwise they will be welded together in-situ; and

c. Trench Backfill and Reinstatement: Once the pipe is installed and tested, excavators will be used to place suitable bedding material around it. The trench will then be backfilled using the stockpiled material and any temporary works used to support the excavation will be removed. Any excess or unsuitable material will be loaded into Heavy Goods Vehicles (HGV) and removed for disposal on or off site. The backfilled area would then be reinstated to its previous use, with any vegetation reinstatement undertaken during the next planting season.

3.6.19 A working area is required to support construction and would include temporary construction compounds, with associated temporary access roads, launch and reception sites for trenchless crossings, and a working width in which to construct the pipeline. The working width would include areas required to install the pipeline, including digging trenches, storing the pipe and other equipment alongside the trench before installation, and storing excavated soil during installation. The working width would also include temporary construction traffic haul routes. Temporary working areas, such as compounds and access routes, are shown on **Figure 3-P1B-1** in **Volume 3** of this PEI Report.

3.6.20 An indicative pipe laying arrangement is shown in **Plate 3-2**. It is anticipated that the maximum working width for laying the pipeline would be 50 m.

3.6.21 Some sections of the pipeline would employ a reduced working width due to constraints such as the crossing of hedgerows, linear tree belts, ordinary watercourses, and roads. In these instances, a reduced working width of 20 m open cut working would be targeted. There are also instances where pinch points are created by environmental constraints and man-made development, resulting in a reduced width of the Preliminary Order Limits below the anticipated working width of 50 m. In these instances, construction methods will be reviewed, and alternative measures will be explored, such as the trench will not have battered sides and material laydown area will be reduced.

3.6.22 Temporary access roads would be required in some cases to access compound areas, along the pipeline route. These would make use of existing

tracks where possible; in some cases, this would require hedgerow and tree removal to facilitate an access route that is wide enough. Where there are no existing tracks, existing field accesses would be used and may need to be widened. Access roads would be routed to use existing gaps in hedgerows and trees that form the boundary of fields, where possible, to reduce vegetation loss.

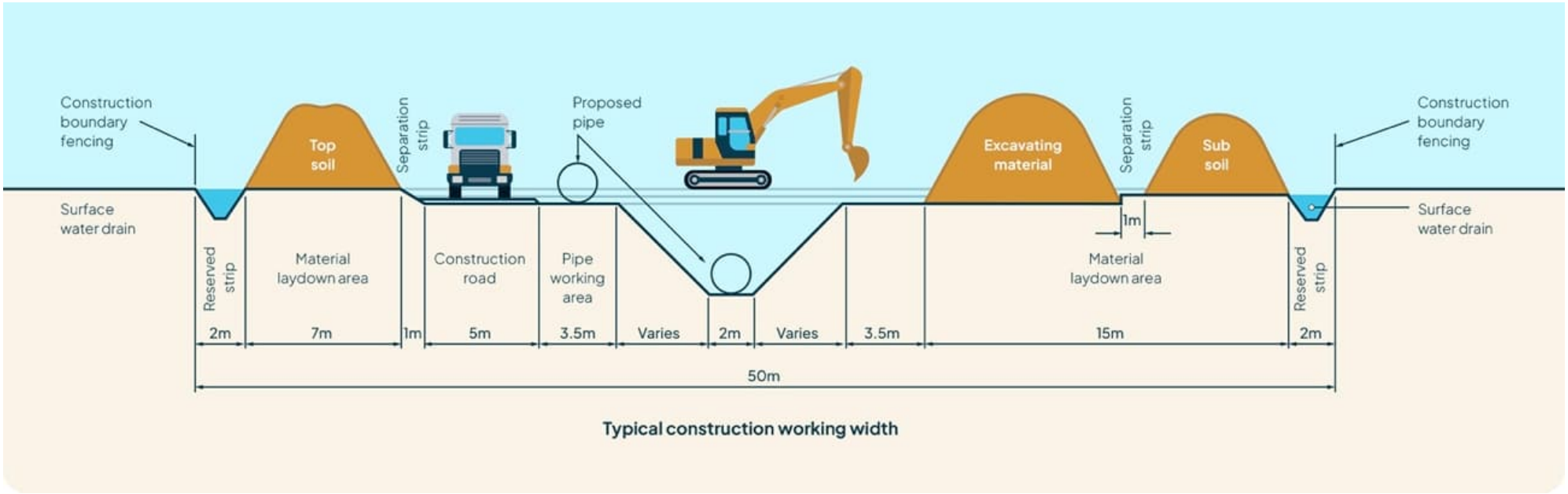

Plate 3-2: Typical Pipeline Construction Working Width

Trenchless crossings

3.6.23 Where existing features such as A-roads, main rivers, and railways prevent the use of open cut methods, trenchless techniques will be adopted.

3.6.24 The pipeline will include several key trenchless crossings as indicated on **Figure 3-P1B-1** in **Volume 3** of this PEI Report and listed in **Table 3-2**.

Table 3-2: Part 1b Minworth to Atherstone pipeline – Indicative list of trenchless crossings

Crossing No.	Location	Crossing
1	M42 / M6 Toll, South of Dunton Interchange	M42 / M6 Toll
2	Lichfield Road / A446, North of Hams Hall Roundabout	A446
3	West of Hams Hall Substation	High Speed 2
4	North of Lea Marston	Lea Marston Historic Landfill
5	North east of Lea Marston	River Tame (a main river), Local Wildlife Site, a railway line (Kingsbury Junction to Whitacre Junction), and a flood defence earth bund
6	North of Whitacre Heath	Railway (Derby to Birmingham Railway Line)
7	South-east of Baxterley	B4116 Bentley Common, Twenty One Oaks Road, and land in between these two roads

[Note: The number and location of trenchless crossings may change as the design develops.]

3.6.25 Where the pipeline intersects with B-roads and ordinary watercourses, the likely method of construction is expected to be open cut, but this may change as the design and impact assessment progresses. Smaller roads may be temporarily closed while open cut works are progressed.

Break Pressure Tank Construction

3.6.26 It is currently envisaged that temporary access to the BPT area will be gained from Twenty One Oaks Road and Coleshill Road. A working area will be required for the construction of the BPT, to allow for material and soils storage, storage of pre-cast elements and working space.

3.6.27 The footprint of the BPT will be excavated down to formation and a reinforced concrete foundation would be created to form the footprint of the BPT.

3.6.28 The tank would be constructed from pre-cast concrete sections. These would be brought to site by Heavy Goods Vehicle (HGV) and lifted into position using a mobile crane.

3.6.29 Following construction of the BPT, the final landform surrounding the BPT would be created using an excavator.

3.7 Part 2: Works to the Coventry, Oxford and Grand Union Canals

Summary

3.7.1 Part 2 of the Proposed Development comprises works to the Coventry, Oxford and Grand Union canals.

3.7.2 Part 2 of the Proposed Development will comprise:

a. An outfall structure at Atherstone to control the discharge of the recycled water transferred from the Minworth AWTP;

b. Construction of pumped (requiring new pumping stations) and gravity bypasses to bypass locks, as not all existing locks and bypass weirs will be able to pass maximum transfer flows while maintaining safe navigation;

c. Raising of sections of canal bank levels where required to maintain a minimum freeboard (the vertical distance from the top of the canal bank to the water surface) – required to prevent potential overtopping, and prevent water loss;

d. Construction of transfer locks located in selected pounds to reduce the extent of bank raising by breaking up the hydraulic gradient along the pound;

e. Potential modification of one existing canal bridge (Milton Keynes – Bridge 88, Peartree Bridge) to ensure safe navigation and headroom clearance, where water levels are predicted to increase during peak transfer;

f. Modification of existing control and waste weirs to prevent water loss and premature discharge to adjacent connected watercourses;

g. Potential modification to the Iron Trunk Aqueduct or introduction of a fourth transfer lock; and

h. Works to selected infrastructure assets along the canals to ensure that they are sufficiently resilient for the water transfer.

3.7.3 Each of the above works may also require:

a. Construction and on-going maintenance works to facilitate temporary and permanent access;

b. Temporary construction working areas and compounds;

c. Utilities connections; and

d. Other associated above and below ground works relating to the canal network (e.g. works to towpaths and to improve local towpath access points, facilities for boaters, such as mooring sites, rings etc., potential works to existing vacant / surplus canal side buildings / re-use, installation of signage, site reinstatement and habitat establishment, landscaping).

3.7.4 Indicative layout plans and canal pounds subject to bank raising for Part 2 of the Proposed Development are provided within **Figure 3-P2&3-1** and **Figure 3-P2&3-2** respectively in **Volume 3** of this PEI Report.

3.7.5 Although as a result of the Proposed Development, additional water will be transferred into the canal network, the flow of water running through the canals will be managed so that it will not increase substantially. Water velocity through existing and proposed structures on the canals would be maintained at or below a maximum of 0.3 m per second and would only approach this maximum flow rates at certain points where the canal width is very restricted (e.g. some bridges). The flow rates would be much lower than 0.3 m per second (m/s) under most flow conditions in most areas of the canal. The 0.3 m/s maximum flow velocity has been used as it is known from other existing transfers that safe navigation can continue at such rate.

3.7.6 All compound area locations will be carefully considered with respect to canal margins / fringes, canal towpaths and property boundaries, wherever possible.

3.7.7 Throughout Part 2 works, towpaths and Public Rights of Way (PRoW) will either be kept open where possible (for example through the use of temporary railed, and, if required, floating walkways that are installed in the canal as works progress) or diverted. However, although there may be some lengths of the canal where this will not be possible and landside diversions or temporary closures will be required. Towpaths that will be affected by the construction will be reinstated. The design of the reinstated towpath will be site specific and in accordance with the Trust’s policy "Towpaths for Everyone" (Ref. 5), and to be agreed by the Trust.

3.7.8 In addition, existing mooring sites may require temporary closure during construction or permanent closure as part of the Proposed Development. Where this is needed, lost mooring spaces will be replaced with temporary sites until the original moorings can be re-instated and will be upgraded to improve moorings, where possible. The aim will be to ensure no overall net loss of moorings. Where permanent relocation of any moorings is required, alternative sites will be found.

3.7.9 Options for some works along the canal, such as bank raising, to be undertaken from work boats on the canal side of the bank are being explored. Transportation of materials and equipment via work boats will also be undertaken, where possible.

Atherstone outfall structure

Permanent Works

3.7.10 The outfall to the Coventry Canal is located on the western bank of the canal, on the north-east side of the Atherstone Golf Course. The location of the outfall is shown on **Figure 3-P2&3-1** in **Volume 3** of this PEI Report.

3.7.11 The outfall structure will provide a controlled discharge of water into the canal at a maximum volumetric flow of 1.35 m^3/s (cubic metres per second) and will not adversely impact navigation or disturb the canal bank or bed. It will be designed to provide oxygenation of the discharge water to meet a standard of 7 mg/l (milligrams per litre) dissolved oxygen. The outfall will be designed such that fish cannot enter.

3.7.12 The outfall structure will be designed to provide micro hydro power recovery, which will be used to power site operations and potentially nearby canal moorings, subject to feasibility. The turbine has the dual purpose of reducing the velocity of the discharge and converting this dynamic energy into electricity.

3.7.13 The above ground turbine element of the outfall structure will be housed in a building that will include a basement with a depth of approximately 5 m. The maximum envelope of the building is 7 m in height, 9 m in width and 16 m in length.

3.7.14 The permanent site will not be publicly accessible and mooring will not be feasible against the outfall structure. Security requirements will be designed in accordance with the Canalside Design Principles. Lighting to the outside of the building will be passive infra-red activated at the door only, for security and operator safety at night.

3.7.15 Site access for maintenance will be provided through Atherstone Golf Course.

Temporary Works

3.7.16 The construction sequence of the outfall structure will comprise:

a. Site preparation works;
b. Foundation and base construction, including dewatering of groundwater, if required;
c. Wall construction;
d. Construction of the inlet system;
e. Construction of internal energy dissipation features;
f. Construction of the outlet system;
g. Construction of ground cover and access; and
h. Testing and commissioning.

3.7.17 It is estimated that at peak, less than 3 HGV trips per day (6 movements) will be required for the construction works. Estimated duration for construction is 15 weeks. The estimated peak number of construction staff is 10 FTE.

3.7.18 It is not expected that canal closures will be required for the construction of the outfall structure. However, it is anticipated that a sheet pile cofferdam will be required to isolate and drain the section of the canal where dry working conditions will need to be provided for the duration of the works. The cofferdam structure would likely require restrictions to be placed on canal traffic and allow for single boat passage.

Pumped bypasses

3.7.19 Pumping stations and associated bypass works are required to bypass existing lock structures along the canal to allow the water to flow around the locks, where it is going ‘uphill’ along the canal. These are collectively referred to as ‘pumped bypasses’.

3.7.20 Pumped bypasses will be required at the following locations, as shown on **Figure 3-P2&3-1** in **Volume 3** of this PEI Report:

a. Hawkesbury;
b. Hillmorton;
c. Braunston; and
d. Fenny Stratford.

3.7.21 A general description of the works is presented below, with site specific considerations detailed subsequently.

Permanent Works – General

3.7.22 Each pumped bypass will incorporate flow measuring equipment and will have the capacity to transfer a maximum flow in the canal of 115 MI/d during peak periods but also have the ability to facilitate transfers purely to support navigation as required. The process for operating the pumped bypasses includes the following:

a. Water from the canal enters a weir, known as an inlet. This helps maintain water levels upstream in the canal, diverting water safely into a pump chamber;
b. Pumps will adjust their power to match the level of incoming flow;
c. Water will then be pumped into an underground pipeline (typically 700 mm in diameter) and will travel from the pumping station adjacent to the canal uphill around a lock, before it enters a weir outlet chamber; and
d. Water is put back into the canal at a weir outlet. This will limit the turbulence and speed of the water as it re-enters the canal, to ensure safety of boat users and reduce the risk of sediment disturbance.

3.7.23 The inlet and outlet weirs are expected to measure up to 24 m in length and 4 m in width. A building with a maximum height of 2.5 m and footprint of 25 m^2 will be provided at the inlet weirs to provide power. Flow velocities at the weirs will be low enough for juvenile fish to be able to escape, and as such, no screening for fish is required. This is with the exception of the Braunston Pumped Bypass, where screening is proposed.

3.7.24 Pumping stations will comprise a wet well and a control building. They will require permanent power, access and a limited amount of parking. Security requirements around the pumping station sites will be developed during structural and architectural design. Where possible, pumping station structures have been proposed in the vicinity of the locks in locations that could be accessed via the existing road network.

3.7.25 The dimensions of pumping station wet wells will vary, with the diameter of the wet well ranging between 4-9 m depending on the site, and the maximum construction depth estimated at 5 m. The new pumping station controls will be housed in new buildings, or within existing buildings. If a new pumping station control building is required, its likely footprint is 7 m in width, 8 m in length and 5 m in height. Lighting to the outside of the building will be passive infra-red activated at the door only, for security and operator safety at night.

The design and appearance of the pumping stations will be informed by the Canalside Design Principles.

Temporary Works – General

3.7.26 The construction of the pumped bypasses will comprise:

a. Construction of the pipelines: works will be similar to those described for Parts 1b and 4b of the Proposed Development within section 3.6 and section 3.10 of this chapter. The majority of pipelines will be constructed in open cut trenches, whilst in some areas, as described in the site-specific sections below, trenchless crossing techniques are proposed;

b. Construction of the inlet and outlet weirs: temporary sheet pile cofferdams will be constructed at the inlet and outlet weir locations to provide dry working conditions. It is not expected that canal closures will be required for these works, however, restrictions on canal use may be imposed to allow single boat passage. Where access from land is restricted, floating platforms may be used for plant and material deployment. Settlement tanks and filtration units will be provided for treating any pumped water from the cofferdams prior to discharge back into the canal;

c. Construction of the pumping station wet well: it is assumed that the area adjacent to the canal where pumping stations are to be constructed will be saturated ground (i.e. water table will be at or near

the surface). A typical working area of 50 m by 50 m has been assumed to be required;

d. Construction of the pumping station control building: this will require site preparation and earthworks, sub-structure and foundation works, superstructure and roof construction, fitting out the building and external hard and soft landscaping works; and

e. Testing and commissioning.

3.7.27 It is estimated that at peak, less than 5 HGV trips per day (10 movements) will be required for the construction at each site. Estimated duration for construction is between 7-9 months per site (with the exception of Braunston Pumped Bypass, where the overall duration of works is likely to be 12 months). The estimated peak number of construction staff at each site is 10 FTE. Indicative construction compound locations have been identified for each site, as shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**.

Hawkesbury Pumped Bypass

3.7.28 An indicative layout plan for Hawkesbury Pumped Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. It will require the bypass of a single lock. Subject to further design development and environmental assessments, there is a potential to refurbish and bring back to use the currently disused grade II listed Engine House (NHLE: 1365077), which could house the controls of the pumping station. In order to provide power to the grade II listed Engine House (NHLE: 1365077) and the new pumping station, trenchless crossing under the Coventry Canal is proposed. Bank raising, including raising of the existing hard landscaping around the lock approach and top gates area to the south of the site, is also likely to be required without affecting the associated grade II listed Roving Bridge over the Oxford Canal (NHLE: 1365056).

3.7.29 A permanent access is likely to be provided off B4109 Parrotts Grove, with two potential route options included within the Preliminary Order Limits.

Hillmorton Pumped Bypass

3.7.30 An indicative layout plan for Hillmorton Pumped Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. It will require the provision of a rising main to bypass three locks.

3.7.31 Permanent access is proposed to be provided via Brindley Road. An alternative access for power connection has been identified from The Locks road to the north of the Hillmorton Lock, which would require trenchless crossing-tunnelling to bring cables under the canal to the new pumping station.

Braunston Pumped Bypass

3.7.32 An indicative layout plan for Braunston Pumped Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The Braunston pumping station will have a dual purpose: i) pumping water into the pipeline bypassing the Braunston tunnel and the existing locks prior to the tunnel; and ii) pumping water into the transfer pipeline to the Daventry and Drayton Reservoirs (see section 3.8 of this chapter for a description of the works at the Daventry and Drayton Reservoirs). The pumped transfer main is split into two pipes. One pipe (700 mm) will feed the reservoirs and one pipe (700 mm) will be used to bypass the reservoirs. The bypass is required to maintain flows during any work to the reservoirs.

3.7.33 The inlet weir structure will be linked to the pumping station via a short connection channel passing under the towpath.

3.7.34 Permanent access to the new pumping station is proposed via a new access road, heading east off the A45 through agricultural land. A temporary construction compound will be adjacent to the access road. Access to the outlet weir for the bypass pipeline has been identified via an existing access track off Welton Lane. A temporary construction compound will be located along the bypass pipeline route to the north of Drayton Reservoir, with access off the A361.

Fenny Stratford Pumped Bypass

3.7.35 An indicative layout plan for the Fenny Stratford Pumped Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. It will require the bypass of a single lock. Whilst the inlet weir is proposed to be of a standard form, space is constrained for the outlet weir by the lock landing area and the adjacent railway embankment to the south. It is therefore proposed that a stilling basin with a shorter outfall structure is created into the side of the canal under the towpath.

3.7.36 Access to the site will be provided via existing access off Simpson Road, which runs in parallel with the towpath. A temporary construction compound is located at the southern end of the site, adjacent to the West Midland Railway line.

Gravity bypasses

3.7.37 Gravity bypasses will be required to allow the water to flow downhill past individual locks or lock flights (groups of locks close together). These will be built within the canal bank and will be largely underground and have minimal visual impact.

3.7.38 Gravity bypasses are likely to be required at the following locks or lock flights, as shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**:

a. Long Buckby – Lock 7;

b. Long Buckby – Lock 8;

c. Long Buckby – Lock 9;

d. Whilton Locks (Locks 10 to 13);

e. Stoke Bruerne Locks (Locks 14 to 20); and

f. Cosgrove Lock (Lock 21).

3.7.39 A general description of the works is presented below, with site specific considerations detailed subsequently.

Permanent Works – General

3.7.40 The process for operating the gravity bypasses includes the following:

a. Water flows down the canal until it reaches a location, where it needs to flow downhill past a lock or flight of locks;

b. Water will enter the bypass via a weir structure built into the canal bank, flow through a pipe (typically 700 mm in diameter) and bypass the lock, or flight of locks; and

c. Water re-enters the canal further down, via a similar weir structure to the entry point.

3.7.41 Gravity bypasses do not require a pumping station or power provision other than a standard supply to allow for the control of weir height. No above ground structures are proposed, with the exception of a small control building at Stoke Bruerne. The inlet and outlet weirs, which will be designed in accordance with the Canalside Design Principles, are of similar construction as described for pumped bypasses.

Temporary Works – General

3.7.42 The construction of the gravity bypasses will comprise the construction of pipelines and weirs, as described for pumped bypasses. Indicative construction compound locations have been identified for each site, as shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**.

3.7.43 It is estimated that at peak, less than 3 HGV trips per day (6 movements) will be required for the construction of each site. Alternatives for transporting construction materials such as using canal boats on the canal are being examined. Estimated duration for construction is 4-6 months (with the exception of Stoke Bruerne Gravity Bypass, where the overall duration of works is likely to be 8 months). The estimated peak number of construction staff at each site is 5 FTE.

Long Buckby – Lock 7

3.7.44 An indicative layout plan for Lock 7 Gravity Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The works include tunnelling under the A5 Watling Street. It is anticipated that the tunnelling method would comprise

pipe jacking or auger boring. Access to the site will be provided off A5 Watling Street. Access to the outlet weir will require works to an existing access track off the Old Watling Street. An alternative access route off A5 Watling Street to the outlet weir from the eastern side of the canal has also been included within the Preliminary Order Limits. This alternative will require craning material from the eastern side of the canal to the western side.

Long Buckby – Lock 8

3.7.45 An indicative layout plan for Lock 8 Gravity Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The works will require a slight widening of the existing towpath embankment to safely accommodate the width of the new weirs and pipelines. Access to the site will be provided off Three Bridges Road.

Long Buckby – Lock 9

3.7.46 An indicative layout plan for Lock 9 Gravity Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The pipeline will be routed to avoid the ponds shown next to the working areas. The trench for the pipeline going down to the outlet weir is on a steep slope and would likely require a 20 m wide 2 m deep trench to be excavated, which would then contain the 700 mm pipe in the bottom. All materials would be reinstated following the works. Access to the site will be provided off A5 Watling Street.

Whilton Locks (Locks 10 to 13)

3.7.47 An indicative layout plan for Whilton Locks (Locks 10 to 13) is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. It will require the bypass of three locks. It may be necessary to use trenchless techniques to cross beneath the gardens of some properties due to the unsuitability of the narrow road for pipeline construction. The approximate locations of the launching and landing pits are shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**. Access to the site is proposed off Roman Road. Options for alternative access routes off Spotted Cow Lane are considered.

Stoke Bruerne Locks (Locks 14 to 15)

3.7.48 An indicative layout plan for Stoke Bruerne is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The works at Stoke Bruerne include re-flooding the part of the grade II listed Lock 14 which is currently a dry lock. Water will be directed from the dry lock via a pipeline along the towpath to a location just downstream of Lock 15.

3.7.49 Works around the Grade II listed Lock Number 14 Stoke Top Lock (NHLE 1040947) will require careful management of the heritage asset. The detailed design will be developed in collaboration with the relevant stakeholders, but it is anticipated that this may include:

a. Like for like replacement of the wall between the dry lock and the canal. This will be carried out using a cofferdam with appropriate brickwork used to form the wall. A sympathetically designed motorised penstock will be used to control the flow into the lock;

b. Moving the narrow boat that is currently in the dock to a new location as an exhibit;

c. Refurbishing the walls and base of the lock to ensure they are waterproof;

d. Constructing a new wall on the side of the lock with the iron gates, using suitable materials. Some of the heritage assets on this site (gates, winding gear) were taken from the Montgomery Canal. These may be relocated back to Montgomery Canal or left in-situ; and

e. Constructing a below water offtake into the concrete at the bottom of the lock, using ‘no dig’ construction techniques to connect this to a pipeline that runs through the bridge arch to the south.

3.7.50 A new control building, comprising a small control building, will need to be sympathetic to the setting of the Grade II listed Lock Number 14 Stoke Top Lock (NHLE 1040947).

3.7.51 Works will be required within the Stoke Bruerne Brickpits Local Wildlife Site (LWS) to construct the pipeline and the outlet weir. The outlet weir is proposed to be located to the south of the historic entrance to the brickwork canal basin. It is anticipated that these works will require the temporary removal and storage of some of the historic brickwork. This will be stored in the compound and used for reinstatement once the works have been completed.

3.7.52 Access to the works will be provided off Bridge Road.

3.7.53 Due to the bespoke nature of the works in this location, it is estimated that a longer construction period of up to 8 months will be required.

Stoke Bruerne Locks (Locks 16 to 20)

3.7.54 An indicative layout plan for Stoke Bruerne Locks Gravity Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. The pipeline will provide a bypass for three locks and has been routed through adjacent fields. Access to the works will be provided off the A508. Access to the outlet weir will follow the existing access track off the A508, which runs in parallel to the towpath. The Preliminary Order Limits include space for alternative options for locating the construction compound.

Cosgrove Lock (Lock 21)

3.7.55 An indicative layout plan for Cosgrove Lock Gravity Bypass is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**. It will be a short bypass taking water from the branch arm above the Cosgrove Lock through to the

winding pool just below the lock. The outlet weir may be of standard construction or incorporate an open channel weir, with a stepped cascade arrangement. If a standard outlet weir is to be used, an extended embankment will need to be constructed to allow sufficient flat surface to accommodate the discharge weir.

3.7.56 If a stepped open channel is used, then this would be in the order of 25 m wide and could be made from a variety of materials. If this option is implemented, then a footbridge over the channel is likely to be required to allow mooring access to the south of the winding pool. An alternative option is to adopt a standard gravity bypass with two weir structures and an interconnecting pipe. These options will be further explored in the design development.

3.7.57 Access to the Cosgrove Lock Gravity Bypass has been identified off Stratford Road, which largely follows an existing track. The access would also require crossing the disused Grand Union Canal Old Stratford Cut and works to the existing crossing. This navigation is currently under restoration so any crossing (likely to be a fixed or moving bridge) will be designed to facilitate the passage of boats, and also to accommodate pedestrian towpath access.

Canal bank raising

Permanent Works

3.7.58 Along sections of the canals, impermeable lining of the canal banks may need to be raised by 100 mm to 250 mm to accommodate the increase in water level within the canals. This may include the raising of the following features (collectively referred to as ‘bank raising’ hereafter):

a. The top of piling or other hard engineered lining that forms the vertical side of the canal;

b. The impermeable clay liner for soft banks;

c. The re-instatement of canal sides where there has been erosion or failing of hard vertical lining, which forms an effective ‘low spot’ in that section of canal; or

d. Other bespoke works.

3.7.59 Sections of the canal that may require bank raising have been identified through hydraulic modelling. **Figure 3-P2&3-1** in PEI Report **Volume 3** shows the anticipated extent of the canal banks which may be subject to bank raising and splits the works into four pounds (as shown on **Figure 3-P2&3-2** in PEI Report **Volume 3**):

a. Atherstone to Hawkesbury Pound;

b. Hawkesbury to Hillmorton Pound;

c. Whilton to Stoke Bruerne Pound; and

d. Cosgrove to Fenny Stratford Pound.

3.7.60 Works may also be required in adjacent marinas, as indicated on **Figure 3-P2&3-1** in PEI Report **Volume 3**, to accommodate the increase in water levels. Whilst marinas which may be subject to works have been identified, the nature of the works requires further engagement with the marina operators.

3.7.61 Where the towpath is impacted by canal bank raising it will be designed to be appropriate to the location and the re-establishment and/or mitigation of any impacts will be informed by the Trust's “Towpaths for Everyone” policy (Ref. 5).

3.7.62 The technique used to raise the level of the canal bank to accommodate the increased water levels would depend on the following factors:

a. Existing canal edge detail (e.g. sheet pile, brick edging, grass bank);

b. Towpath or non-towpath side;

c. Location (e.g. rural, urban);

d. Special requirements (e.g. heritage, moorings); and

e. Existing canal edge condition (e.g. overgrown, requiring repair).

3.7.63 Bank raising would generally be undertaken on a like-for-like basis with the existing canal bank (i.e. the raised impermeable lining within the canal bank would be of same construction as the existing feature), and in engagement with the Trust and/or any other relevant landowners.

3.7.64 There are also some sections of canal bank that may require repair works rather than raising to accommodate the water level increases. This generally includes sections of the bank that are currently in need of repair, and where there are potential issues such as leakage from the canal that might affect third parties. These repairs are the same sort of work that the Trust themselves would do in due course (e.g. replacing sheet piling in the side of the canal), but the Proposed Development means that these need to be accelerated for risk mitigation.

3.7.65 There are also a number of existing features that may require remedial works due to their current condition or criticality, including some culverts, cuttings and embankments. These are works that would be required even without the Proposed Development but for which there is currently no programme of repair, or minor risk mitigation works such as the installation of active monitoring in embankments and cuttings. For that reason, they will need to form part of the Proposed Development.

3.7.66 The requirements for repair and remedial works are the subject of ongoing hydraulic modelling, site survey and inspection. Once these are known, an

assessment of likely significant environmental effects will be undertaken and reported in the ES.

3.7.67 These features include the following but further assets may be added during ongoing design development:

a. Ashby Canal, Culvert 11, Sketchley Brook;
b. Grand Union Canal, Culvert New Bradwell;
c. Grand Union Canal, Cutting 18D, Linsdale;
d. Oxford Canal, Cutting 8, Stretton Stop offside;
e. Oxford Canal, Cutting 9A, Easenhall;
f. Oxford Canal, Cutting 9B, Easenhall;
g. Grand Union Canal, Embankment 3, Weedon;
h. Grand Union Canal, Embankment 4, Weedon;
i. Grand Union Canal, Embankment 3, Bugbrooke;
j. Grand Union Canal, Embankment 18, Iron Trunk;
k. Grand Union Canal, Embankment 33, Simpson; and
l. Grand Union Canal, Embankment 35, Fenny Stratford.

Temporary Works

3.7.68 Where possible, compounds and access routes used for other works described in section 3.8 of this chapter will be utilised for bank raising. **Figure 3-P2&3-1** in PEI Report **Volume 3** indicates where additional access and compound locations may be required specifically for bank raising works, if the works are to be carried out from landside. Where sheet piling is required for sections of hard bank construction, these works would be undertaken from a work boat. It is possible to also undertake other works from a work boat. However, for a worst-case assumption with regards to land-take and disturbance, works from landside have been assumed within this PEI Report.

3.7.69 In general, bank raising works are estimated to progress at a rate of approximately 50 m per day once plant and materials are in position. Where more substantial works have been identified above, these works are likely to require one to two months per site to complete.

3.7.70 No canal closures are anticipated to be required to complete the bank raising works. However, where dry working conditions are required, cofferdams may be installed, requiring restrictions to be placed on canal traffic to allow for single boat passage.

3.7.71 Each landside access is likely to require less than 3 HGVs (6 movements) per day at peak period. A construction team, comprising 5 workers, has been assumed per site, with four construction teams working along the canal at

the same time. As such, an estimated 20 FTEs has been assumed to be required to complete the works.

Works to Designated Heritage Assets

Grade II listed Coventry Canal, Atherstone Top Lock and Basin Below to North West (NHLE 1034782) and Britannia Works (NHLE 1184912)

3.7.72 If bank raising works are required within the Atherstone to Nuneaton Pound then works at the grade II listed Atherstone Top Lock (NHLE 1034782) and the raising of the levels of the lock structure around the top gates will be required. The installation of extension panels or lock gate replacement may potentially require the addition of a bar to raise the height of the existing gates and brickwork on the paths on the eastern side will need to be raised along with the banks.

3.7.73 Furthermore, works may also be required for waterproofing walls of the derelict grade II listed Britannia Works (NHLE 1184912) (millinery works and factory), as a side of the building makes up the canal wall. Works may require the sealing of air bricks and the use of impermeable coating on the canal side of the wall, administered via a work boat on the canal.

3.7.74 Due to the bespoke nature of the works required in this location, it is estimated that the works will require a longer duration, up to 2 months of construction works in total.

Hawkesbury Pumped Bypass

3.7.75 Bank raising, including raising of the existing hard landscaping around the lock approach and the top gates area associated with the grade II listed Roving Bridge over Oxford Canal (NHLE 1365056) will also be required at Hawkesbury Pumped Bypass, as described within paragraph 3.7.28.

Wolverton Iron Trunk Aqueduct Scheduled Monument (NHLE 1006934)

3.7.76 Due to potential water level changes within the Milton Keynes Trough Pound, modifications may be required to the Wolverton Iron Trunk Aqueduct Scheduled Monument. This may comprise the reversible addition of a 100-150 mm high, removable bar fixed on top of the existing trough wall on the offside of the structure, subject to further detailed assessment and consultation with statutory stakeholders. In order to carry out works to the Scheduled Monument, it is likely that the structure would need to be closed for navigation and emptied during the off-season. The closure would be done by the construction of cofferdams, set away from either end of the structure.

3.7.77 An alternative to modifications to the Iron Trunk Aqueduct would involve the introduction of a fourth transfer lock. This is described in the following section on Transfer Locks. The Applicants' preferred solution is the reversible modification to the Iron Trunk Aqueduct.

3.7.78 **Figure 11-P2-1** and **Figure 11-P2-2** in PEI Report **Volume 3** show the heritage assets discussed above.

Transfer Locks

Permanent Works

3.7.79 In order to minimise the extent of bank raising required in the longer pounds resulting from the water transfer, there are three new transfer locks proposed at the following locations, as shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**, with site-specific details for each of these locations provided within sections below:

a. Springwood Transfer Lock (the Atherstone to Hawkesbury pound);

b. Grimes Bridge Transfer Lock (the Hawkesbury to Hillmorton pound); and

c. Dodford Road Transfer Lock (the Whilton to Stoke Bruerne Pound).

3.7.80 The transfer locks are designed to provide a small change in water levels from the upstream to the downstream side. This effectively breaks up the hydraulic gradient across a long pound during high flows and significantly reduces bank raising requirements in the upstream end of the pound. To allow water levels to be kept within the agreed operational parameters, typically the locks will remain open to canal traffic and will only be operated during periods of higher transfer flows. These are expected to occur mainly during prolonged drought conditions or during exceptional operational events.

3.7.81 Each transfer lock will comprise:

a. A lock structure similar to the locks currently found along the canal;

b. Automated lock gates, such as sector gates or guillotine gates; and

c. A pumped bypass.

3.7.82 The transfer locks will normally remain open for all flows up to 80 Ml/d. When higher transfer flows are required (i.e. 80-115 Ml/d, which will only be used in severe drought or exceptional operational conditions, estimated once every 10-20 years), then the lock gates will shut and bypass pumping will start. This will act to lower the water level on the upstream side down to the lower end of normal operating levels in the canal and increase the downstream side towards the upper end of normal operating levels. Typically, this difference will be in the order of 150-200 mm and levels will remain within normal operating levels on both sides of the lock.

3.7.83 When closed, the lock will act as existing locks on the canals, allowing passage of a single boat at a time. It is proposed that the lock gates will be automated (although operated by users) to reduce impacts on canal users.

3.7.84 The parameters for the pumping station, inlet and outlet weirs and bypass pipelines are the same as described for the pumped bypasses.

Temporary Works

3.7.85 Construction of transfer locks will require canal closure and therefore, works are anticipated to be undertaken during the off-season periods across two years with the canal re-opening during the boating season. This will be undertaken in line with the Trust's winter works and stoppage protocols. The winter period is generally when the Trust undertakes works that require navigations to be restricted or closed, this is because fewer boats are using the waterways in the winter. Any closures required outside the winter period may be agreed by the Trust in exceptional circumstances. Closures for all transfer locks may take place in the same off season or could be staggered.

3.7.86 Construction activities across the two years, including the through routes protocol, designed to ensure that there is always one route open to boaters between the Midlands and London, may comprise the following:

a. Year 1 off season, over a period of approximately 6 months:
    i. Site establishment, including setting up construction compounds and access;
    ii. Full closure of the canal section by constructing cofferdams to create dry working conditions; and
    iii. Construction of the new lock structure, including concrete walls, floor and gate footings and sills, and earthworks to narrow the canal.
b. Year 2 off season, over a period of approximately 6 months:
    i. Installation of the mechanical and electrical engineering works; and
    ii. Construction of the pumping station, pipeline and inlet and outlet weirs, as described for pumped bypasses.

3.7.87 It is estimated that less than 5 HGVs per day per site would be required to undertake the works. Each site will require up to 10 FTE construction staff.

Springwood Transfer Lock (Atherstone to Hawkesbury Pound)

3.7.88 Two options (a north option and a south option) for locating the Springwood Transfer Lock (Atherstone to Hawkesbury Pound) are being explored, including to investigate compatibility with emerging third-party developments. The Applicants' preferred solution is the south option. Indicative layout plans for the two options are shown on **Figure 3-P2&3-2** in PEI Report **Volume 3**. Access to the northern option would be provided off B4111 Nuneaton Road. Access to the southern option would be routed from B4114 Tuttle Hill via Common Lane and Yamley Lane.

Grimes Bridge Transfer Lock (Hawkesbury to Hillmorton pound)

3.7.89 An indicative layout plan for the Grimes Bridge Transfer Lock (Hawkesbury to Hillmorton pound) has been provided within **Figure 3-P2&3-2** in PEI Report **Volume 3**. Access for the site has been provided from Smeaton Lane.

Dodford Road Transfer Lock (Whilton to Stoke Bruerne pound)

3.7.90 An indicative layout plan for the Dodford Road Transfer Lock (Whilton to Stoke Bruerne pound) has been provided within **Figure 3-P2&3-2** in PEI Report **Volume 3**. Access for the site would be provided from Dodford Road.

Transfer Lock south of Cosgrove

3.7.91 An alternative to undertaking modifications to the Iron Trunk Aqueduct would be to construct a fourth transfer lock south of Cosgrove. There are two options to where the transfer lock could be located, as shown on **Figure 3-P2&3-2** in PEI Report **Volume 3**. Option 1 is located at Stanton Low Country Park and Option 2 is located at Great Linford Manor Park.

Bridge 88, Peartree Bridge Modifications

Permanent Works

3.7.92 Hydraulic modelling currently shows that only one bridge (Bridge 88, Peartree Bridge) along the canal network may require modification to accommodate the increase in water level. Bridge 88 is shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**.

3.7.93 Further modelling, assessment and design development is required to determine the extent of any works that might be required to the bridge. A potential solution is to raise the bridge height, which would require the reconstruction of the bridge. The solution required is a matter that will be explored further as part of the ongoing design development. However, raising of the bridge height through the reconstruction of the bridge has been assessed in the PEI Report as it is the solution being considered at this time.

Temporary Works

3.7.94 Temporary works to increase the height of the bridge span would comprise the following:

a. Site establishment, including any signage for pedestrian diversions, and the construction of temporary supports for the bridge structure;
b. Parapet and deck removal;
c. New deck build-up;
d. Adjust the road approaches to match the new deck height;
e. Parapet reconstruction and finishing; and
f. Completion and removal of temporary works.

3.7.95 Materials and construction techniques compatible with the original bridge would be used where possible to maintain aesthetics and durability.

3.7.96 If there is a need to raise the height of the bridge span, for safety, it is likely that the canal will need to be closed during the demolition of the existing arch and rebuilding of the new. This would require closures across two off seasons, one for the demolition and one for the construction. A temporary bridge across the canal would need to be installed during the summer in this scenario.

3.7.97 Some temporary works may be required within the adjacent 'Moated site and fishpond at Old Rectory Farm' and 'Shrunken Medieval Village, Woughton on the Green' Scheduled Monuments. This is described further in **Chapter 11: Cultural Heritage** in PEI Report **Volume 2**.

3.7.98 The temporary works would take approximately 5-8 months to complete the bridge modifications. It is estimated that at peak, less than 5 HGV trips per day (10 movements) will be required for the works. The estimated peak number of construction staff is 5 FTE.

Modification of control and waste weirs

Permanent Works

3.7.99 There are currently existing control and waste weirs, inlet weirs and bypass weirs on the canal network which control the amount of water in the canals. When the Proposed Development is in operation, the canal water levels will rise and adjustments may be needed for existing weirs to avoid the additional water being wasted.

3.7.100 It is expected that for the majority of the affected weirs, a new fixed weir plate could be fitted to allow flow control when the canal water level is raised, comprising minor works. However, there are 17 weirs that will require >100 mm increase in weir level and therefore, require more substantial works. The locations of these weirs are shown on **Figure 3-P2&3-1** in PEI Report **Volume 3**.

3.7.101 A number of these weirs will need to be amended, so that they can be level controlled. This will mean that the existing fixed weir will need to be replaced with a tilting weir or weir with a variable penstock. The appearance of these will be similar to the existing structure, but there will be a small above ground panel kiosk (c. 1 m high) and standard voltage electricity will need to be routed to the weir from the public highway. Where fixed weirs need to be replaced with remotely adjustable weirs, the Preliminary Order Limits include the provision of a permanent access track. The power cable will be run parallel to this track.

3.7.102 None of these weirs are designated heritage assets, however some may have heritage value that could require more bespoke solutions, which will be subject to further design development.

Temporary Works

3.7.103 Where minor works to weirs are required for fitting a new fixed weir plate, these works have been assumed to be completed within a week and require a single vehicle to access the Site.

3.7.104 For the weirs requiring more substantive works, an approximate construction period of 7 weeks per weir has been assumed. Piling will likely be required in these locations, and a cofferdam may need to be constructed. It is proposed that works on the weirs themselves are carried out using work boats and any bespoke works away from the weir structure to prevent impacts on heritage assets will be carried out using existing access and small diggers / dumper trucks.

3.7.105 It is estimated that at peak, less than 3 HGV trips per day (6 movements) will be required for the construction of each site. The estimated peak number of construction staff at each site is 5 FTE.

Dredging operations

3.7.106 It is not anticipated at this stage that the Proposed Development would result in more dredging requirements than what is currently undertaken during general canal maintenance operations. However, this will be further investigated as the design develops.

3.8 Part 3: Daventry and Drayton Reservoirs

Summary

3.8.1 The existing Daventry and Drayton Reservoirs are currently used for water storage and to supply water to the canal for navigation.

3.8.2 Initial water resource modelling for the Proposed Development has confirmed that there are risks associated with continuous supply from Minworth WwRC when it is needed during extended droughts. This includes risk of unplanned asset outage[1], periods of higher demand and the requirement to support river flows in the River Trent.

[1] An unplanned outage is an unforeseen or unavoidable event that can affect part or all of the source works that contributes to maximum supply capacity, or the transfer works along the canal.

3.8.3 There is a “hands off flow”[2] requirement in the River Trent to which the Minworth WwRC recycled water is a significant contribution via the River Tame. In order to ensure operation of the Proposed Development does not change the frequency of the hands off flow being triggered, the transfer of recycled water out of the River Tame catchment may be reduced or stopped for periods of up to 8 days.

3.8.4 Both Daventry and Drayton Reservoirs are therefore proposed to provide the water storage required to support the Proposed Development, whereby water in the reservoirs can be drawn down to augment the transfer in the Grand Union Canal during periods when outage, higher demand or the requirement to manage the River Trent hands off flow are triggered. The reservoirs will also still operate as existing to ensure a supply of water for navigation to the canal.

3.8.5 At the proposed Braunston Pumping Station (see section 3.7) the pumped transfer main is split into two pipes: one pipe (approximately 450 mm diameter) will feed the reservoirs and the other pipe (approximately 700 mm diameter) will be used to bypass the Braunston Tunnel.

3.8.6 The proposed works at Daventry Reservoir will comprise:

a. Replacement of the existing inlet structure with a new structure and connecting it to an existing large culvert using pre-cast culvert sections;

b. Construction of an additional outlet structure;

c. Bank raising along the existing channel leading from the reservoir to the Grand Union Canal; and

d. Replacement of the existing culvert discharging to the Grand Union Canal with a larger structure.

3.8.7 The proposed works at Drayton Reservoir will comprise:

a. Provision of a discharge structure to the existing inlet to the south-west of the reservoir; and

b. Works to the existing overflow structure to the north of the reservoir through the provision of an additional siphon and siphon discharge chamber.

3.8.8 There will be flow monitoring and level controls at the intake to the pumping station and monitoring for the delivery into the new pipeline and for delivery from the pipeline into each reservoir at the new discharge structures. There

[2] A “hands off flow” is a flow rate at which water abstraction must stop or be reduced. It is a threshold that protects low river flows from abstraction and ensures a minimum flow for in-river ecology.

will also be flow monitoring and level sensors at the discharge structures back into the canal.

3.8.9 Given the diversion of the canal water into the reservoirs and back out to the canal, and the inevitable mixing of waters in the reservoirs, there will be a need for monitoring water quality and Invasive and Non-Native Species (INNS) at the inlet weir to the pumping station and near the outlet from the reservoirs.

3.8.10 An indicative layout plan for Part 3 of the Proposed Development is provided within **Figure 3-P2&3-1** in PEI Report **Volume 3**.

Daventry Reservoir

3.8.11 The proposed location of inlet of the Daventry Reservoir is at the same location as the existing Northern Way highway drainage discharge structure. A proposed new structure would be constructed in the same location to improve the retention and collection of any waste flushed into the system.

3.8.12 The proposal would also be to improve the downstream channel by introducing sustainable drainage systems (SuDS) type arrangements (e.g. reed beds etc.) to improve water quality. These SuDS arrangements and the dilution of flows with the discharge of water from the Proposed Development will improve water quality over time.

3.8.13 A new discharge structure will be installed on the right bank of the reservoir upstream of the embankment and the existing overflow. This will normally be closed as the existing overflow is capable of passing lower flows. Two penstock valves will be used to control flows. Whilst one is sufficient for the Proposed Development, a second valve will also be provided to allow for future enhancement to reservoir safety and drawdown capability. When discharge is required, the overflow gates will be remotely operated and flows will pass into the existing overflow culvert and then into the open channel which leads to the outfall to the Grand Union Canal.

3.8.14 In terms of conveyance of flows to the canal, the existing culvert and channel feeding the canal have sufficient capacity for the transfer of flows from the Proposed Development but will need some minor work, including precautionary bank raising and replacement of the existing 800 mm diameter discharge pipe with an outfall structure to provide a controlled discharge of water into the canal.

Drayton Reservoir

3.8.15 The inlet to the Drayton Reservoir will be via a pipeline (circa 450 mm diameter) branch off the delivery pipeline south-west of Daventry Reservoir, discharging through an existing headwall carrying the culvert for the catchment flow and into a shallow intermediate ponded area before entering the main reservoir.

3.8.16 The existing overflow structure, located near the northeast corner of the dam wall, will be modified to accommodate flows from both the Proposed Development and the flows from the reservoir. In normal operation the existing overflow has sufficient capacity. An additional siphon (approximately 350 mm in diameter) will be laid over the embankment, located to the northeast corner of the reservoir, to increase the outlet flows, when needed.

Temporary Works

3.8.17 Construction compound and temporary access locations have been shown on the indicative layout plan in **Figure 3-P2&3-1** in PEI Report **Volume 3**.

3.8.18 Construction works required at the Daventry and Drayton Reservoirs comprise the following:

a. Works to the inlet and outlet structures at Daventry and Drayton Reservoirs will require excavation to the depth of the existing structures, placement and alignment of pre-cast structures for the inlets and outlets and any associated culverts, concrete works, backfilling and compaction;

b. Bank raising along the existing channel (Daventry only) which will be similar to the works described under Canal Bank Raising;

c. Replacement of the existing culvert discharging to the Grand Union Canal with a larger structure which will require works similar to those described for the construction of weirs under Pumped Bypasses; and

d. 18 temporary watercourse crossings are proposed, nine of which are via trenchless techniques to facilitate pipe crossings and nine via culverts to facilitate compound and construction areas.

3.8.19 Construction works at the Daventry and Drayton Reservoirs are expected to take place over the course of 12 months.

3.9 Part 4a: Abstraction, Storage and Treatment

Summary

3.9.1 Part 4a of the Proposed Development comprises the following infrastructure:

a. Weir to abstract water from Grand Union Canal;

b. Pumping stations;

c. Water storage;

d. Water treatment works (WTW);

e. Electrical buildings and control buildings for new power supply (if required);

f. Clean water storage tank;

g. Other associated above and below ground works, including pipework and landscaping;

h. Access roads and car parking; and

i. Temporary construction working areas and compounds.

Permanent Works

3.9.2 **Figure 3-P4A-2** in PEI Report **Volume 3** illustrates the likely layout for the permanent works of Part 4a of the Proposed Development.

Abstraction point near Great Brickhill

3.9.3 A weir will be constructed to abstract water out of the Grand Union Canal, located near Great Brickhill, south-east of Milton Keynes, to transfer canal water to the proposed Galley WTW site via a new water main pipeline.

3.9.4 The structure would consist of an intake at the canal side to abstract water from the canal in a controlled way and at a low flow rate.

3.9.5 It is currently proposed for screens to the inlet structure to be set back from the canal to allow the towpath to be maintained and prevent fish and eels becoming stranded next to the inlet screens.

3.9.6 Fish and eel returns will be back to the Grand Union Canal via a pond or direct channel. The transfer from the canal to the screen chamber will likely be via a short open channel, if required. The status of the fishery, particularly in relation to eels is not currently known within the Grand Union Canal, but it is intended that the final design will be in compliance with an appropriately designed Fish Recovery and Return (FRR) system that is compliant to The Eels (England and Wales) Regulations 2009 (Ref. 7).

3.9.7 A new pumping station would be constructed inland, at the same location as the fish screens, from the eastern side of the canal to transfer the raw abstracted water to the new water storage at the proposed Galley WTW site. As described for Part 2 of the Proposed Development, a new pumping station building would likely be a single storey building, with an indicative maximum footprint of 7 m by 8 m, and 5 m high. If required, the associated wet well to the pumping station would have a likely dimension ranging from 4-9 m and 6 m deep. The design and appearance of the pumping station will be informed by Canalside Design Principles.

3.9.8 The indicative maximum footprint (approximately 5,000 m^2) for the abstraction point permanent works is shown in **Figure 3-P4A-2** in PEI Report **Volume 3**.

Access

3.9.9 The proposed access point to the abstraction point site will be from an existing access track off the A4146, located in the north-western corner of Part 4a.

Security

3.9.10 The security for the abstraction infrastructure will be designed sympathetically to the canal in accordance with the project Design Principles. The fish screens and pumping station do fall within the Security and Emergency Measures Direction (SEMD) 2024[3] (Ref. 6) and exceed the classification as a 'Critical National Infrastructure (CNI) asset'. Therefore, the infrastructure and buildings that are set away from the canal will need to incorporate more stringent security measures, including (but not limited to) a 2.4 m minimum security perimeter fencing, CCTV, intruder detection and lighting (white light or infrared floodlighting along perimeter and sensitive points, Passive Infrared sensor (PIR) activated or dusk-to-dawn).

3.9.11 The abstraction inlet weir and channel do not fall within the SEMD, so can be designed sympathetically to the canal in accordance with the project Design Principles.

Abstraction point to Galley Water Treatment Works pipeline (raw)

3.9.12 A new underground water main pipeline is proposed to transfer the raw (i.e. untreated) canal water from the abstraction point to the proposed Galley WTW site via the water storage. Following the same approach as the Part 1b pipeline, the Part 4a pipeline is expected to have an internal diameter of approximately 1,000 mm and at this stage, it is expected to be made from steel and have internal and external protective coatings. The pipeline will be installed primarily through open cut to an indicative depth of 2.5 m below ground level – dependent upon further topographic and ground investigations, and further design development. There is a point where the pipeline crosses the River Ouzel, where a trenchless technique will be used to install the pipeline.

3.9.13 The raw water from the intake will be pumped from within the screening compound via the underground pipeline to the top of the raw water storage site along its northern side. There will be an offtake near the treatment works to allow direct supply if the storage facility is not operational.

3.9.14 The indicative length of raw water pipeline from abstraction to the storage facility is approximately 800 m, although this is dependent upon further topographic and ground investigations which will be confirmed through further design development.

[3] To ensure water companies have robust security and emergency plans to safeguard against threats and maintain water supply during civil emergencies.

Galley Water Treatment Works

Raw water storage

3.9.15 At the new water storage site, the abstracted raw water would be stored before it is treated at the new WTW. Storage will be provided for five days' worth of water for peak flow (575 Ml/d) to allow the transfer to be more resilient and allow an additional buffer between water in the canal and the water reaching the new WTW. This equates to an estimated 575,000 cubic metres (m^3) capacity for the water storage.

3.9.16 The water storage site will be located in the south-eastern portion of Part 4a where the topography is highest, with a likely surface area ranging from 7-11 ha. Due to the sloping topography, the water storage will require an earth embankment (up to 8 m) to the lowest existing ground level to the west to contain the water storage. Furthermore, the earth embankment will be constructed all around the water storage to a height of around 1-2 m above the highest water storage level. However, the actual footprint will depend on further topography and ground investigation works, and through further design development.

3.9.17 As part of the water storage, there will be a facility building and structure (including bridge across the open-air water) in the middle of the water storage, whereby the water levels are controlled. As part of the installation, a clay borrow pit will be excavated in the middle of the water storage, for use of material elsewhere on-site. Although the facility building and structure will protrude above the maximum water storage level, this will unlikely exceed the height of the surrounding earth embankment.

Water Treatment Works

3.9.18 A new WTW will be located in the central-western portion of Part 4a and will take water from the storage site (gravity-fed) and treat it to drinking water standards. The treated water will be stored in an underground clean water storage tank, from which a pumping station will deliver the water into the new potable water pipeline to an existing underground reservoir near Luton (Part 4b of the Proposed Development).

3.9.19 Further design development will be undertaken to confirm the proposed layout of the Galley WTW site; however, at this stage, it is expected that the entire footprint of the WTW will be approximately 200 m by 110 m (indicative maximum footprint of 22,000 m^2). This area will include site buildings, storage tanks, process units, pipelines and storage equipment.

3.9.20 The indicative maximum building / structure height for the new Galley WTW site is 15 m above ground level, in relation to the carbon dioxide (CO_2) storage tanks. The remainder of the WTW buildings and structures have an indicative maximum height of 12 m above ground level.

Appearance

3.9.21 At this stage, it is anticipated that the main process buildings will be of a profiled steel cladding exterior (finished to a suitable colour), with other buildings of a normal operational site design. However, further design development is ongoing and will be informed by stakeholder consultation.

3.9.22 The Galley WTW site will be screened by new tree planting on both the southern and northern side of the site. The eastern side will be screened by the storage facility (due to its higher topography) and there is existing screening (i.e. trees and hedge line) on the western floodplain side.

Security

3.9.23 The Galley WTW will fall under the SEMD 2024[4] (Ref. 6) and exceeds the thresholds for classification as a CNI asset. Therefore, the Galley WTW site will have more stringent security measures than the abstraction point, including (but not limited to) a 2.4 m minimum security perimeter fencing, CCTV, intruder detection and lighting (white light or infrared floodlighting along perimeter and sensitive points, PIR activated or dusk-to-dawn).

Access

3.9.24 The proposed permanent access point to the Galley WTW site will be from a new access track off the A4146, located to the north. This will be prior to the roundabout with a slip road on and off the A4146, enabling safe entry and exit to and from the A-road.

3.9.25 It is likely that vegetation and/or tree removal would be required to facilitate this access point.

Treatment process and operations

3.9.26 The indicative stages for the water treatment process, subject to further design development, are illustrated on **Plate 3-3**.

[4] To ensure water companies have robust security and emergency plans to safeguard against threats and maintain water supply during civil emergencies.

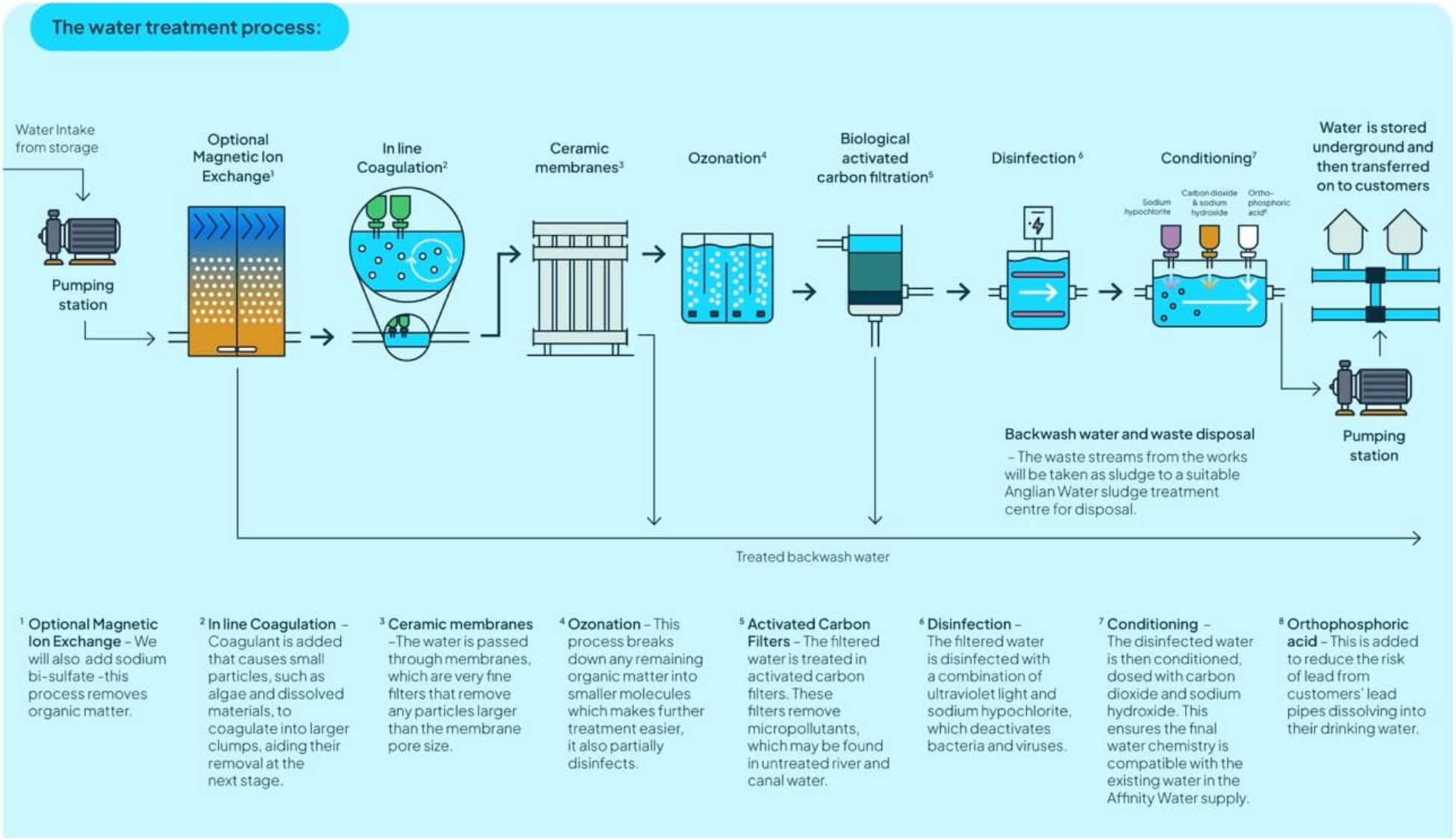

Plate 3-3: Indicative water treatment process

Waste Disposal

3.9.27 The waste streams from the WTW will be taken as dewatered sludge to a suitable Anglian Water sludge treatment centre for disposal. Liquid waste will also be disposed of via a sewer to a suitable sewage treatment works. Recovered water is pumped to the head of the WTW, increasing the overall plant recovery rate.

3.9.28 The introduction of an ion exchange plant has been allowed for in the design of the Proposed Development, pending pilot plant results. This treatment process has a minor footprint in comparison to the other major processes but will require a connection to the existing Anglian Water sewer system within the Preliminary Order Limits. Initial discussions with Anglian Water indicate that the Milton Keynes treatment works will be able to handle the proposed waste stream caused by periodic backwashing of the ion exchange plant.

3.9.29 Waste management for the WTW operation will comply with the relevant legislation and relevant measures and controls incorporated into the Outline Operational Environmental Management Plan (OEMP), which will be submitted with the DCO application.

On-site chemical storage

3.9.30 The water treatment process requires several chemicals and substances to be stored for use on-site, such as orthophosphoric acid, aluminium chloride, sodium hypochlorite, sodium bisulphite, sodium hydroxide and CO_2. Requirements for diesel storage are also yet to be determined and will depend on whether a backup generator is required on-site.

3.9.31 Storage management for the WTW operation will comply with the relevant legislation (e.g. The Control of Major Accident Hazards Regulations 2015; (Ref. 8) and relevant measures and controls incorporated into the OEMP.

3.9.32 Any accidental spillage will be managed as per training and OEMP and any great volumes of spillage will be disposed of as per a professional bodies safe working practice.

Diversion of drainage stream

3.9.33 To accommodate the new WTW and water storage, an existing drainage stream that bisects the proposed location of the water storage will require diverting around the site. The diversion route will be confirmed following detailed design but will be constrained by the existing height and topography of the point at which the drainage enters Part 4a to the east.

Operational staff and vehicle movements

3.9.34 The new WTW and storage site will have operational personnel based onsite and at this stage it is anticipated that vehicle movements will be less than 5 per day.

3.9.35 Operational HGV movements will primarily relate to sludge disposal and chemical deliveries. For the maximum rate (115 Ml/d) operation, aggregate indicative maximum vehicle movements will be 2-3 HGVs per day; however, typically the rate will be lower than this, at 1-2 HGV movements per day.

Temporary and Construction Works

3.9.36 **Figure 3-P4A-1** in PEI Report **Volume 3** illustrates the likely layout for the temporary works of Part 4a of the Proposed Development.

Construction of the abstraction point

3.9.37 The abstraction point will follow the same approach as Part 2 for the construction of weirs and pumping stations.

Construction of the water storage

3.9.38 The below sub-sections outline the indicative methodology for construction of the storage site.

Site Setup

3.9.39 The indicative approach for the site set up is as follows:

a. Survey and marking: Conduct a detailed topographic and geotechnical survey to understand the clay strata and delineate the water storage, borrow pit, and embankment locations;
b. Site access: Construct or upgrade access roads for plant and personnel, with turning circles for large equipment;
c. Site clearance: Remove vegetation, topsoil, and unsuitable material from the designated construction areas. Store topsoil separately for later use in landscaping or embankment capping;
d. Temporary facilities: Set up site offices, welfare units, material storage areas, fuel storage, refuelling points, and plant maintenance areas;
e. Drainage and erosion control: Install temporary drainage ditches, silt fences, and settlement ponds to manage surface water and prevent sediment runoff during works;
f. Utilities and services: Establish temporary water, power, lighting, and communication services for site operations; and
g. Health, safety and environmental controls: Erect fencing, signage, safety barriers, and dust suppression systems as required by regulations.

Storage of Excavation Materials

3.9.40 The indicative approach for the excavation and storage of excavated materials is as follows:

a. Borrow pit excavation: Excavate the clay borrow pit in planned stages. Use excavators and articulated dump trucks (ADT) to remove material and transport it to temporary stockpiles or directly to the embankment area;

b. Material quality control: Monitor and control the moisture content and particle size of excavated clay. Remove unsuitable material and store separately for later disposal or reprocessing;

c. Material stockpiling: Create temporary material stockpiles near the embankment footprint, ensuring clear separation of different material grades, and maintaining safe slope angles to prevent instability; and

d. Excavation sequencing: Sequence excavation to maintain a balance between cut (borrow pit) and fill (embankment), maximising efficiency and minimising double handling of material.

3.9.41 Waste management for the WTW construction will comply with the relevant legislation and relevant measures and controls incorporated into the Outline Construction Environmental Management Plan (Outline CEMP), which will be submitted with the DCO application.

Material Management

3.9.42 Material management for the WTW construction will comply with the relevant legislation and relevant measures and controls incorporated into the Outline CEMP, which will be submitted with the DCO application.

Construction of the water treatment works

3.9.43 The below presents an indicative construction sequence for the WTW:

a. Site setup: includes clearing vegetation, levelling the ground, fencing the area, providing access roads for deliveries, installation of temporary power, water, and sanitary facilities. Laydown areas for material storage and fabrication, as well as site offices, would be demarcated and set up accordingly;

b. Foundations: includes excavation to necessary depth for foundation footings or base slabs. Where groundwater is encountered, dewatering may be necessary. Formwork and reinforcement are installed for concrete works, followed by the pouring and curing of concrete. Anchor bolts and embedded plates for future steelwork are precisely positioned within the foundations;

c. Building erection: structural steel columns, beams, and trusses are delivered and assembled using cranes and elevated work platforms. The building envelope is completed with the installation of cladding, roofing panels, and weatherproofing membranes. Openings for process units, services, and access are incorporated as specified. Overhead travelling cranes, ventilation systems, and fire protection are installed as required for the industrial nature of the facility; and

d. Process unit installation: heavy process vessels, filtration units, pumps, and pipework are brought in and positioned using mobile cranes, skates, or gantry systems. Equipment is anchored to pre-set foundation bolts or mounting plates. Mechanical, electrical, and instrumentation connections are made. Alignment, levelling, and integration testing are performed prior to commissioning. Final fit-out includes access platforms, safety guards, internal pipework, and finishing works.

Construction compounds and working areas

3.9.44 At this stage, the indicative size of compounds and construction working areas for Part 4a are as follows, although these are dependent upon further topographic and ground investigations, and further design development:

a. Storage and WTW compound: approximately 22,000 m^2;
b. WTW Construction Area: approximately 29,000 m^2;
c. Potential spoil storage area: approximately 47,000 m^2; and
d. Storage construction area: approximately 182,000 m^2.

3.9.45 The indicative locations of these areas are displayed on **Figure 3-P4A-1** in PEI Report **Volume 3**.

Trenchless Crossings

3.9.46 For Part 4a, there is only one major crossing point which is associated with the pipeline crossing of the River Ouzel (illustrated on **Figure 3-P4A-1** in PEI Report **Volume 3**), which will require a trenchless technique.

Construction staff and vehicle movements

3.9.47 The estimated peak number of construction staff is 50 FTE, with associated small vehicle movements.

3.9.48 Although the WTW siting has been selected so that a cut and fill balance can be achieved for the construction of the water storage, this will not be certain until the ongoing ground investigation results have been analysed and the final design for the storage facility has been completed. It is likely that some specialist materials (e.g. gravel for drainage) will need to be imported even if a complete cut and fill balance could be achieved. It is estimated that a total of approximately 5,100 HGV movements, or 33 movements per week, will arise over the course of the construction period.

3.10 Part 4b: Pipeline to an Underground Reservoir near Luton

Summary

3.10.1 Part 4b of the Proposed Development comprises the transfer of the treated water from the new WTW (Part 4a) to an existing covered underground reservoir near Luton via a new underground pipeline (approximately 28 km in length). The distribution of the clean drinking water from the underground reservoir through the AfW water supply network does not form part of the Proposed Development as this infrastructure already exists.

3.10.2 In summary, Part 4b includes the construction, operation and maintenance of the following infrastructure:

a. New underground pipeline to transfer treated water;
b. Works to facilitate temporary and permanent access;
c. Temporary construction working areas and compounds;
d. Connection point for the pipeline to the AfW underground reservoir; and
e. Other associated above and below ground works relating to the pipeline, including the following above ground assets:
    i. Air valve access manholes in the field to the east of the Dunstable Downs crossing, and at one or two high points to the west of Eaton Bray;
    ii. A non-return valve access manhole located immediately to the west of the Dunstable Downs crossing; and
    iii. An access manhole to a washout chamber located near a minor water course, either at the A505 crossing, or between the Eastern Way and the A4012.

3.10.3 Furthermore, a new booster station would likely be required to maintain the pipe pressure and transfer rates. At this stage, and following further hydraulic testing, it has not been determined whether the station would be located immediately west of the Dunstable Downs or incorporated into the proposed Galley WTW buildings (Part 4a). If the former, then the building would be similar in size to the proposed pumping stations as described for Part 1b.

Permanent Works

Pipeline

3.10.4 The drinking water will be pumped through the pipeline to the existing covered underground reservoir near Luton.

3.10.5 The Part 4b Preliminary Order Limits for the pipeline corridor are shown on **Figure 3-P4B-2** in PEI Report **Volume 3**. It provides the widest possible area within which the pipeline could be constructed. Following the same

approach as Part 1b, efforts have been made to narrow down the Preliminary Order Limits associated with the pipeline corridor to avoid environmental constraints, where possible, such as ancient woodland, priority habitats and Local Wildlife Sites (LWS). Where there are wider areas, this is broadly due to extending the Part 4b Preliminary Order Limits to match field boundaries. Further consideration will be given to the pipeline corridor in these areas as the design and the impact assessment progresses.

3.10.6 The maximum and minimum depths for the pipeline are expected to be as follows:

a. Indicative minimum pipe depth of 1.2 m to the top of the pipe, in open cut scenarios; and

b. Indicative pipe depth of approximately 10.5 m to the top of the pipe at the major trenchless crossings, subject to refinement following further design development.

3.10.7 The pipeline is expected to have an internal diameter of approximately 1,000 millimetres (mm) and at this stage, it is expected to be made from steel and have internal and external protective coatings.

3.10.8 Following further hydraulic testing and analysis of the proposed pipeline as part of the ongoing design development, the pipe could comprise either a single or smaller twin / dual pipe for the water transfer.

Temporary Works and Construction Methodology

Pipeline installation

3.10.9 The installation process of the Part 4b pipeline is the same in approach to the Part 1b pipeline (as described in paragraphs 3.6.18-3.6.25 and illustrated in **Plate 3-3**).

Trenchless crossings

3.10.10 An indicative list of trenchless crossings is provided in **Table 3-3**, which are illustrated on **Figure 3-P4B-1** in **Volume 3** of this PEI Report.

Table 3-3: Part 4b – Indicative list of trenchless crossings

Crossing No.	Location	Crossing
1	Start of Part 4b, adjoining Part 4a	Galley Lane
2	South-west of Little Brickhill	Unnamed, classified ‘Main River’ watercourse
3	South-east of Little Brickhill	A5 (Roman Road) and Watling Street
4	East of A5 (Roman Road)	Sheep Lane and private gardens

Crossing No.	Location	Crossing
5	Junction of Eastern Way and A5 (Roman Road)	A5 (Roman Road)
6	West of A5 (Roman Road)	Unnamed, classified 'Main River' watercourse
7	South of Grange Farm, Church End	Clipstone Brook, classified 'Main River' watercourse
8	South-west of Hockcliffe	A4012 (Leighton Road)
9	South-east of Eggington	Mill Road
10	South-west of Stanbridge	A505
11	South of A505	Ouzel Brook, classified 'Main River' watercourse
12	East of Moor End	Watercourse
13	West and within Dunstable Downs	Dunstable Downs
14	East of Dunstable Downs	B4541
15	South of Manshead Church of England Academy	A5183 (Watling Street)
16	East of Chaul End	Bush Wood (woodland)

[Note: The number and location of trenchless crossings may change as the design develops]

3.10.11 Operations may require entry and exit pits alongside working areas for equipment such as drill rigs, fluid recycling systems, and pipe staging.

Initial Commissioning

3.10.12 Once the pipeline is fully installed, it will be commissioned in sections via an agreed staged process. This includes swabbing, pressure testing, chlorination and sampling prior to moving onto the next section of the pipeline route. During this process there will be a large volume of chlorinated water, and as such moving forward the scheme will define locations whereby suitable temporary lagoons will be dug or an inflatable bladder type lagoon will be adopted to allow for the holding of said excess water and thus the dichlorination via the use of Sodium Bisulphate before it can be discharged to the sewer.

Construction within Dunstable Downs

3.10.13 The pipeline corridor runs through Dunstable Downs, which is part of the Chilterns National Landscape and National Trust land. Therefore, further consideration has been given to the construction methodology within this area.

3.10.14 The pipeline will be installed via trenchless techniques to minimise surface level disturbance. Temporary micro-tunnel pits will be required to continue the trenchless instalment.

3.10.15 Access to the pit within the Dunstable Downs area will be via temporary track, either from the existing car park or the visitors centre.

3.10.16 Following the construction phase, there will be no permanent above ground structures left within Dunstable Downs, as the air valve can be located in the landing / launching pit area within the field to the east of Isle of Wight Lane.

Underground Reservoir near Luton Connection

3.10.17 A dedicated connection into each of the existing reservoir cells (10-15 in total) is proposed for managing abstraction reductions in the rest of the system and Affinity Water's business needs. To achieve this, the cells will have to be taken out one at a time and re-filled, chlorinated and sampled, with a set of valves to balance the flows into the reservoir and manage and operational cleaning or reactive outages.

3.10.18 These works are located entirely within AfW owned land.

Construction compounds and working areas

3.10.19 The current proposal is to have the main offices and deliveries located at either end of the route, i.e. at Galley WTW site and the site of the underground reservoir near Luton, with mobile welfare traveling up the working width along with localised plant and materials.

Construction staff and vehicle movements

3.10.20 At this stage, it is anticipated that an average of no more than 1 HGV delivery per day would be required for the construction of Part 4b.

3.10.21 Each site will only require circa 5 workers with mobile welfare facilities within the laydown compounds. It should be noted that multiple gangs may work concurrently on separate pipe sections.

3.11 Overarching Construction Information

Construction Programme and Sequencing

3.11.1 Construction and commissioning are estimated to require approximately 4 years. It is likely that the construction of the various Parts of the Proposed Development will be undertaken largely in parallel rather than sequentially. A more detailed construction programme will be presented in the ES.

Construction Hours of Works

3.11.2 The indicative core working hours are proposed to be:

a. Monday to Friday 08:00 to 18:00;

b. Saturday 08:00 to 13:00; and

c. No Sunday or Bank Holiday working unless crucial to construction (e.g. delivery of large plant and trenchless installation of pipeline) or in an emergency.

3.11.3 It is likely that workers will arrive to and depart from construction sites within each hour either side of the hours stated above.

3.11.4 Emergency working may extend beyond the times quoted above.

3.11.5 Trenchless pipeline installation will require continuous 24-hour working (which is likely to be over a number of days – dependent upon the length and complexity of crossing) and some highway works may need to be undertaken overnight or at weekends for traffic management reasons.

Construction Employment

3.11.6 It is anticipated that an Outline Skills, Supply Chain and Employment Plan would be prepared for submission with the DCO application. This will set out the Applicants' strategy for maximising and pro-actively expanding the local benefits of the Proposed Development through local employment opportunities and upskilling local workforce.

Overarching Strategies and Management

3.11.7 Outline strategies for the management of construction works are proposed to be prepared for submission with the DCO application. These include (but are not limited to):

a. Outline Construction Environmental Management Plan (Outline CEMP);

b. Outline Construction Traffic Management Plan (CTMP); and

c. Outline Landscape and Ecology Management Plan (LEMP) (including reinstatement plans).

Outline Construction Environmental Management Plan

3.11.8 An Outline CEMP will accompany the DCO application, which will describe the mitigation measures identified in the ES to be followed and to be carried forward to a Detailed CEMP(s) prior to construction, and would need to be approved with the relevant discharging authority(ies) prior to the commencement of construction. The CEMP describes the commitments that the undertaker and its contractors are required to follow during the construction phase. The aim of the CEMP is to reduce impacts from construction activities, including (but not limited to):

a. Use of land for (e.g.) temporary laydown areas, accommodation;

b. Vegetation clearance;

c. Noise and vibration;

d. Dust generation (through a Dust Management Plan [DMP]);

e. Soil removal and storage (through a Soil Management Plan [SMP]); and

e. Waste generation and management (through a Site Waste Management Plan [SWMP]).

Outline Construction Traffic Management Plan

3.11.9 An Outline CTMP will be developed (likely to be multiple bespoke CTMPs for particular elements of the Proposed Development) and submitted with the DCO application. The Outline CTMP alongside the ES will set out the peak construction vehicle movements per day. The Outline CTMP and ES will also confirm construction access requirements to the different parts of the Proposed Development.

3.11.10 The need for road upgrades, widening and new road construction, e.g. to ensure visibility splays at site access / egress points, will be determined as the Proposed Development design develops, and will be assessed as appropriate.

3.11.11 The Detailed CTMP(s) would need to be approved with the relevant discharging authority(ies) prior to the commencement of construction.

Outline Landscape and Ecology Management Plan

3.11.12 An Outline LEMP will be developed (likely to be multiple bespoke LEMPs for particular elements of the Proposed Development) and submitted as part of the DCO application. The Outline LEMP will outline the landscape, biodiversity and heritage impact avoidance measures that would be implemented prior to, and during, construction of the Proposed Development as well as the habitat removal and restoration, enhancement, management, and monitoring measures to be implemented once the Proposed Development is operational.

3.11.13 A Detailed LEMP(s) would be produced following grant of the DCO and would need to be approved with the relevant discharging authority(ies) prior to the commencement of construction.

3.11.14 In addition to the Outline LEMP, a Biodiversity Net Gain (BNG) Report and Environmental Net Gain (ENG) Report will be produced for submission with the DCO application, as described within **Chapter 6: Environmental Impact Assessment Methodology** in PEI Report **Volume 2**.

3.12 Maintenance Activities

3.12.1 The principal maintenance requirements for each part of the Proposed Development comprise:

a. Part 1a – It is anticipated that the proposed AWTP would have a design life of approximately 80 years for buildings, process units and below

ground structures. Steelwork, mechanical plant and electrical plant would have a shorter design life, of around 20 to 25 years. During these periods, routine maintenance would be required comprising monitoring, testing and the replacement of equipment;

b. Part 1b – It is anticipated that the proposed pipeline and BPT would have a design life of 100 years. It is anticipated that the maintenance cycle for washout valves, isolation valves and air valves would be yearly to check the valves are operational. Permanent access roads would not be required to facilitate access to the washout vales, isolation vales and air vales. However, the specific activities that would be permitted relating to their maintenance will be discussed with relevant landowners as part of the ongoing engagement on the Proposed Development;

c. Parts 2 and 3:

   i. The design life for Parts 2 and 3 would be similar to Part 1a;

   ii. For the outfall at Atherstone, bypass structures, pumping stations and transfer locks, all elements have been designed so that there are no deliveries required and minimal maintenance, with no permanent on-site staff. Access has been included to allow day to day maintenance, for example maintenance of mechanical and electrical equipment and clearance of debris etc from screens, plus repairs and replacement works. This would be very intermittent, and regular access would be less than once per month, or as a result of operational incidents or exceptional weather events; and

   iii. No other maintenance activities are required specifically for the Proposed Development, beyond the Trust's day-to-day maintenance regime for the canal network.

c. Part 4a – as for Part 1a; and

d. Part 4b – as for Part 1b.

Pipeline Land Rights

3.12.2 It is anticipated that for a single pipe, a 6 m strip of land either side of pipelines (total 13 m width, including the 1 m pipeline width) would be required to restrict certain activities that could adversely affect the infrastructure and allow access for maintenance. This is referred to as an 'easement'. For a dual / twin pipe, up to a 5 m space between the two pipes would be further required, resulting in a total easement width of 17 m. Where the pipeline crosses Dunstable Downs and is being directionally drilled then there is the potential that this easement width will need to be increased just in this section.

3.12.3 The specific activities that would be permitted within this land will be discussed with relevant landowners as part of the ongoing engagement on the Proposed Development. Most agricultural activities will be allowed.

3.13 Operational Management

3.13.1 The main outline strategy for the management of operational activities is the OEMP. An Outline OEMP will be submitted with the DCO application.

Outline Operational Environmental Management Plan

3.13.2 An Outline OEMP will be developed (likely to be multiple bespoke OEMPs for particular elements of the Proposed Development) and submitted with the DCO Application, this will set out the operational parameters for the Proposed Development, and how any environmental effects will be controlled, either through specific mitigation measures or through established licencing or permitting processes.

3.13.3 A Detailed OEMP(s) would be produced following grant of the DCO and prior to the start of operation (e.g. as part of a requirement attached to the DCO).

3.14 Decommissioning

3.14.1 Although it is assumed that the Proposed Development will operate indefinitely, it is acknowledged that the principal components have a maximum design life of 100 years and, therefore, there may be the requirement for a complete staged replacement of these components at the end of their design life.

3.14.2 It is anticipated that the programme for decommissioning the components of the Proposed Development would be the same as the construction programme. It is anticipated that no additional land outside of the Preliminary Order Limits would be required for decommissioning of the Proposed Development.

3.14.3 The specific method of decommissioning is uncertain given the significant passage of time and prospect that alternative construction methods may emerge over that period. It is assumed that all work would be undertaken using good industry practice and taking account of any relevant obligations to landowners under the relevant land agreements, the environmental conditions at the time, and in accordance with all relevant statutory requirements applicable at the time. Furthermore, any decommissioning works would take place in the context of the regulatory framework in place at that time, which may include a requirement to seek additional consents, permits or licences.

3.15 References

Ref. 1 Affinity Water (2024) Water Resources Management Plan October 2024.

Ref. 2 Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope, (Version 3), July 2018. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope [Accessed 29/01/2026].

Ref. 3 Planning Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents [Accessed 29/01/2026].

Ref. 4 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available at: https://www.legislation.gov.uk/uksi/2017/572/contents [Accessed 29/01/2026].

Ref. 5 Canal & River Trust (2024) Towpaths for Everyone. January 2024.

Ref. 6 Water Industry Act 1991: Section 208 The Security And Emergency Measures (Water And Sewerage Undertakers And Water Supply Licensees) (Amendment And Revocation) Direction 2024. Available at: https://assets.publishing.service.gov.uk/media/675180992086e98fae35111a/SEMD_2024.pdf [Accessed 29/01/2026].

Ref. 7 The Eels (England and Wales) Regulations 2009. Available at: https://www.legislation.gov.uk/uksi/2009/3344/contents [Accessed 29/01/2026].

Ref. 8 The Control of Major Accident Hazards Regulations 2015. Available at: https://www.legislation.gov.uk/uksi/2015/483/contents [Accessed 29/01/2026].