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Garden Lake, Western Arm Embankment

Geotechnical Design Report

Final

Prepared for
National Trust

Date
04/03/2026



**National
Trust**

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Contract

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1 Introduction

JBA Consulting (JBA) has been commissioned by the National Trust to undertake the design of a piled solution to resolve seepage issues of the existing embankment dam for Garden Lake reservoir, located at the National Trust Stourhead site located approximately 800m west of Stourton, Warminster.

This Geotechnical Design Report (GDR) covers the geotechnical assessments undertaken as part of the design of the piles (i.e., the seepage and durability analyses). This report should be read in conjunction with the Ground Investigation Report (Ref. FSL-JBAU-XX-XX-RP-GT-0003-S3-P01-Ground_Investigation_Report).

The GDR covers the sheet pile cut-off wall design, sink-hole repair earthworks design and pavement design works. The sheet pile cut-off wall design is provided in Section 2 and the sink-hole repair earthworks design is provided in Section 4 of the GDR. Where the sheet pile wall affects the existing footpath, the pavement design works are provided in section 5 of the GDR. The Designer's Risk Assessment is provided in Section 6 of the GDR.

1.1 Site Overview

The embankment dam is formed of two components, the main dam and the western arm embankment. The western arm embankment has a long history of seepage issues and has undergone several phases of remedial works, as noted within the various Section 10 Reservoir reports completed over the years.

Despite these works, ongoing seepage is evident at the site. The western arm embankment lies within the formal gardens. In the Stantec. 2019 S10 report (Ref. Report of an inspection under Section 10 of the Reservoirs Act 1975, Garden Lake Reservoir) the Inspecting Engineer included a Matter in the Interest of Safety (MIOS) related to seepage observed at the Western Arm Embankment. The MIOS reads:

'Measures shall be taken to reduce seepage through the western arm embankment between the Main Dam and the Iron Bridge.'

An initial options review was completed by Stantec UK Ltd (Stantec) in October 2019 (Ref. Stantec. 2019. Western Arm Seepage Remedial Options Report); the report considered sheet piling and re-puddling of the clay core as options, concluding that the sheet pile cutoff was the preferred option. This option was not implemented.

Mr Martin Airey, in the capacity of Qualified Civil Engineer overseeing the implementation of the MIOS recommendations wrote to the Enforcement Authority on 8th September 2022 advising that, due to uncertainty as to the location of the seepage a two phased approach was to be adopted:

- Phase 1 comprised installation of a new improved drainage network for the downstream face and downstream toe area of the embankment to capture and measure the seepage in an attempt to define the source of the leak and inform the decision on the remedial works.

- Phase 2 comprised the implementation of the remedial works.

The Phase 1 works were completed in July 2022, and a six-month monitoring period was initiated.

A further Section 10 reservoir report was completed following an inspection undertaken in 2023, which included a revised MIOS with a deadline of (July 2026);

‘Re-puddle the clay core over the length of the main embankment between the iron bridge and the location of the outlet chamber of the new toe drain. This should be done with 36 months of the date of this report.’

JBA reviewed the data following the installation of the new drainage network and the older ground investigation report and provided the National Trust with an optioneering report outlining the various solutions considered feasible to remediate the dam and reduce further seepage in May 2024.

The National Trust reviewed the options report and confirmed a piled solution along the crestline of the dam as their preferred option.

1.2 Site Location

The centre of the site is located at National Grid Reference ST 771 339, and the nearest postcode is BA12 6QB. The site is owned by the National Trust, and the site includes various 18th century landmarks. The site location is presented in Figure 1-1.

The MIOS concerns a section of embankment to the east of the Grade II Iron Bridge which is hereafter referred to as ‘the site’. The site covers the full width of the embankment and is approximately 60m in length. The topographical survey undertaken by Grantham Coates Surveys Ltd in June 2021 indicates that the embankment varies between 0.6m and 3.0m in height from crest to footpath level. Within the study area the embankment crest is approximately 2m wide.



Figure 1-1. Site Location Plan

1.3 Site History

Seepage has been a historic issue along the western arm embankment; several phases of remedial works have been undertaken to mitigate the seepage. The previous remedial include the following:

- In 1987 the core was re-puddled to a depth of 1.40m over a 35m length along the western bank.
- In 1988 an additional 20m section of the clay core was re-puddled along the western arm of the embankment. Counterfort and toe drains were also installed.
- In 1994, the 25m embankment section east of the Iron Bridge was re-puddled to a depth of 0.80mbgl.
- The Iron Bridge bank seat was reconstructed in 1995/6.
- In 2001 the clay core west of the iron bridge was re-puddled (last remaining section of the western arm embankment – all embankment sections have been repaired since 1984).
- In 2007, a section approximately 30m northeast of the Iron Bridge was re-puddled. While the location of the defect which was the driver of these works is known, the extent of the repairs is unknown. Stantec (2019) state that there is anecdotal evidence that the 2007 works extended away from the section of the embankment re-puddled in 1994.
- In c. 2010 a drain was installed at the toe of the upper bank to intercept seepage flows and discharge them onto China Road. Little is known about the condition of this drainage system. Discharge from the outfall is currently monitored daily. The flow is minimal, ranging from 0.001 to 0.069l/s.

While the 2007 works appear to have been largely successful, seepage has continued within the area remediated in 1994 (Figure 1-2).

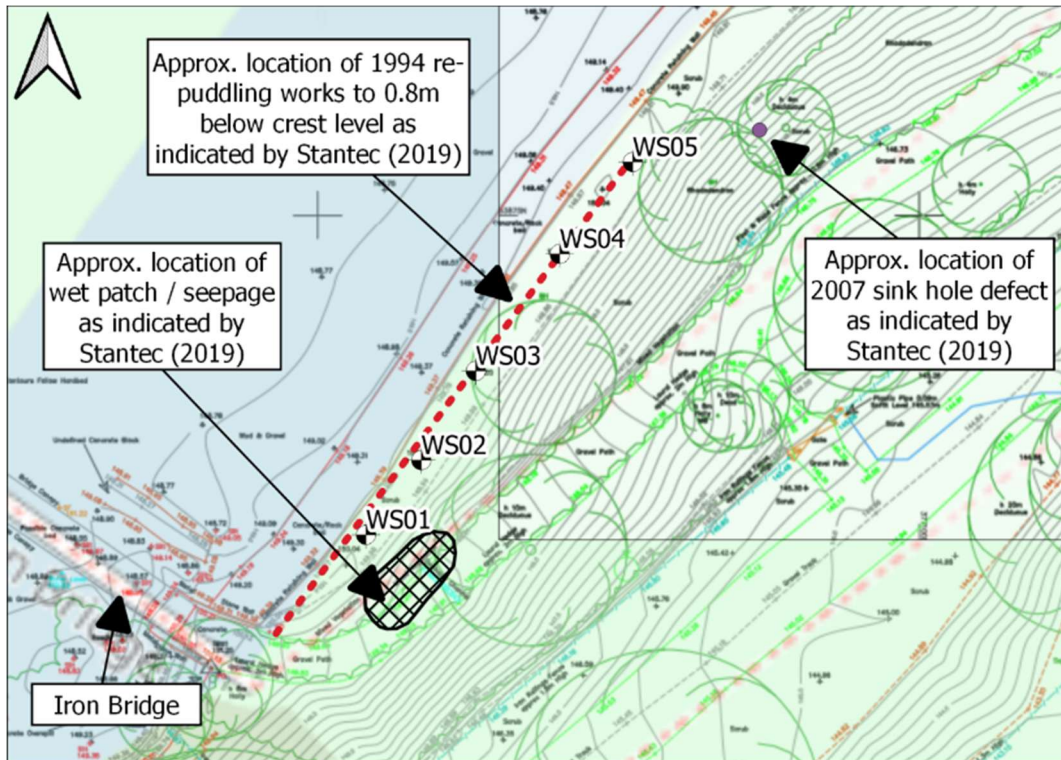


Figure 1-2. Location of defects

1.4 Existing Defects

The main area of concern comprises a wet patch on the embankment from which water discharges from several points onto the footpath approximately 11m northeast of the Iron Bridge (see Fig. 1-2). This water flows down the path to a low point and then discharges onto China Road. Stantec (2019) and the 2020 S12 report refer to an area of potential seepage close to the 2007 works which resulted in persistent standing water forming on the downstream side of the footpath. The depression on the footpath has been infilled during re-grading of the footpath, but seepage may still be occurring in this area.

In 2014 the reservoir was drawn down and the seepage issues ceased suggesting that they are in good hydraulic connection with the reservoir. When drawn down in 2014 the upstream side of the crest was observed to be covered in stone pitching topped by a small concrete wall which was observed to be in generally good condition. The reservoir level was reduced by c. 100mm in 2021, and this was found to be sufficient to significantly reduce seepage observed at the site.

Several sinkholes were noted along the embankment crest and during investigatory works an obvious seepage entry point was noted in the stone pitching. A temporary repair comprising the placement of a geosynthetic clay liner across the stone pitching and up the wave wall with a covering of stone was completed in April 2024.

In 2025, a new manifestation of the seepage defect presented itself as a sinkhole, down slope from borehole WS04, which formed a collapse entry to a significant pipe with significant flow. The lake is currently drawn down to the point where the flow through the sinkhole has ceased.

1.5 Ground Investigation

A ground investigation (GI) has been undertaken by Tetra Tech comprising of five (5No.) boreholes. The findings from the GI have been summarised within the Ground Investigation Report (Ref. FSL-JBAU-XX-XX-RP-GT-0003-Geotechnical_Investigation_Report)

It should be noted that the stratum descriptions assigned by the GI contractor in their factual report are considered erroneous, the reference to the Cann Sand Member is considered more likely to represent the Gault Clay Formation based on the lab testing data, soil descriptions and photographs.

Given the above the resultant ground model is presented as Figure 1-3.

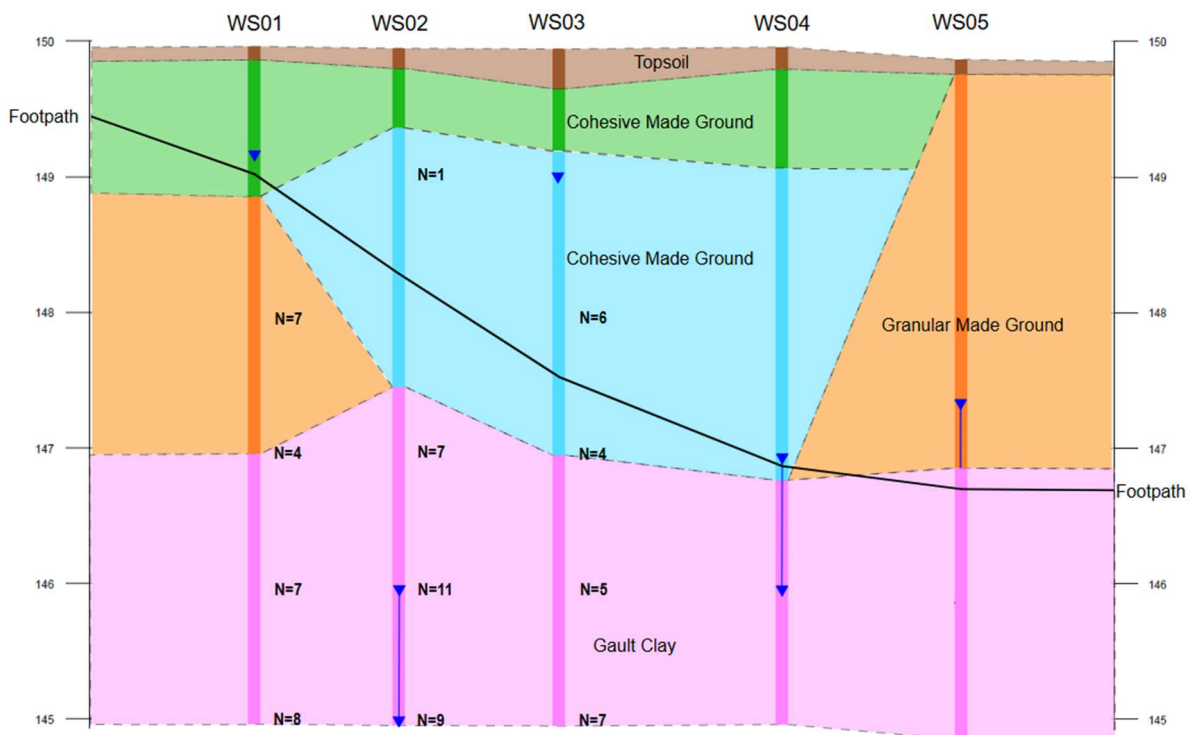


Figure 1-3. Ground model

2 Sheet Pile Design

2.1 Sheet Pile Wall Selection

As part of the works to assess the seepage problem at Garden Lake subsequent to the MIOS (See Section 1.1), JBA were instructed to provide an optioneering presentation for remedial works to the Client (Ref: 2021s0541 - Garden Lake Optioneering Report, dated August 2024).

The optioneering highlighted two main methodologies for reducing the seepage risk comprising excavating and re-puddle the clay core over a length of 40m or installation of a sheet piled wall. Several variations of the sheet piled wall remedial solution were presented generally varying the length and position of the sheet piled wall in order to address the immediate seepage issue and/or potential long term seepage issues.

The Client reviewed the optioneering report and through a subsequent internal assessment process selected Option 2 – Construction of a sheet pile wall over an approximate length of 40m along the western arm of the Garden Lake Reservoir within the centre of the crest.

2.2 Sheet Pile Design

The sheet pile design is purely considered as a seepage cut-off wall, the sheet piles will not be subject to differential lateral loading at any stage of their life, should this ever be considered then a full design review would be required which is beyond the remit of this phase of works. Given the design requirement, the main criteria for the design is the proposed sheet pile length.

The sheet pile wall is to be installed within the embankment dam crest of the western arm. Given the geological model presented in Section 1.5 the sheet pile length is required to be sufficient to embed the toe within the underlying Gault Clay considered to represent a low permeability soil unit. The embankment in the area of the proposed sheet wall has a ground surface level ranging from approximately 149.80m AOD to 150.10m AOD whilst the surface of the Gault Clay ranged from approximately 146.70m AOD to 147.40m AOD. This results in a required sheet pile length of between 3.40m to 3.10m.

In order to ensure embedment within the Gault Clay sheet piles with a length of 4m are proposed which should result in an embedment of greater than 0.5m. A sheet pile section of AZ12-700, steel grade S355 GP, as produced by Arcelor Mittal (or similar approved).

The Sheet Piles are detailed within the Piling Specification, Ref: PXG-JBA-00-GL-SP-GT-5001, presented as Appendix A and Drawings PXG-JBA-00-GL-DR-Z-5000, PXG-JBA-00-GL-DR-Z-5001 and PXG-JBA-00-GL-DR-Z-5002, presented as Appendix B.

2.3 Sheet Pile Durability Loss

A durability loss analysis was undertaken on the sheet pile section size (AZ-12 770). The aim of the analysis was to determine whether the AZ-12 770 sheet pile could still withstand the maximum bending moment and shear forces, considering a 100-year design life. The

results of the analysis indicate that AZ-12 770 have sufficient thickness to sustain 100 years of corrosion loss.

3 Seepage Analysis

3.1 Method

The results from the Tetra Tech Ground Investigation have been used to develop a ground model and inform the seepage analysis. The objective of the seepage modelling is to understand the required piling depth to minimise current observed seepage rates through the embankment. The seepage analysis has been carried out on one (1No.) cross-section using Seep/W 2023.1.2 version 23.1.2.11.

The analysis assesses the seepage rates on the dry side of the flood defence to understand the level of mitigation each provide, leading to an optimal design pile length. Two scenarios have been modelled simulating a 0.1% Annual Exceedance Probability (AEP) (1:10,000) and Probable Maximum Flood (PMF).

3.2 Model Set Up

3.2.1 Geometry

One (1No.) section through the embankment has been analysed which represents the shortest seepage pathway from the wet to the dry-side of the embankment (see Figure 3-1). It should be noted that at the time of writing no bathymetry information was available, the western arm channel profile has been extrapolated/assumed from the available topographical data.

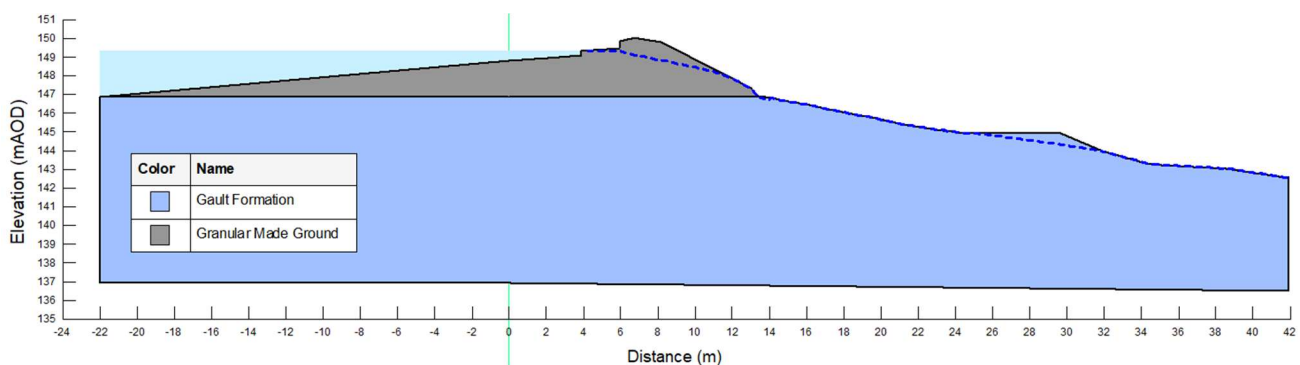


Figure 3-1. Geometry used during analysis

3.2.2 Ground Model and Material Parameters

The ground investigation indicates both spatial and vertical variance and the data set as a whole does not credibly support zoning of the site based on individual exploratory records. WS05 is a valid representation of a characteristic ground model which captures the soil conditions most likely to affect the design as per Eurocode 7 (i.e., the worst condition for seepage).

Further to the characteristic material parameters presented within the Ground Investigation Report (Ref. FSL-JBAU-XX-XX-RP-GT-0003-Geotechnical_Investigation_Report), additional representative geotechnical parameters have been adopted for the analysis, see

Table 3-1. These have been estimated using typical values from published literature and borehole descriptions.

Table 3-1. Additional hydraulic material parameters

Strata	Residual Water Content (%) ¹	Saturated Water Content (%) ¹	Hydraulic Conductivity (m/sec) ²	Soil Structure Compressibility (kPa) ³
Made Ground (Granular)	0.043	0.43	1×10^{-4}	1×10^{-4}
Gault Formation	0.068	0.38	1×10^{-7}	1×10^{-4}

1 Leij, et al. The UNSODA-Unsaturated Soil Hydraulic Database. User's manual Version 1.0. Report EPA/600/R-96/095.

2 R. F. Craig. Craig's Soil Mechanics. Seventh Edition

3 Stark, et al. Soil Compressibility in Transient Unsaturated Seepage Analyses

3.2.3 Flood Hydrographs

Two (2No.) flood hydrographs have been developed by JBA. The modelling considers a flood event during a 0.1% AEP (1:10,000) 7-hour flood event and a PMF 9-hour flood event, as shown in Figure 3-2.

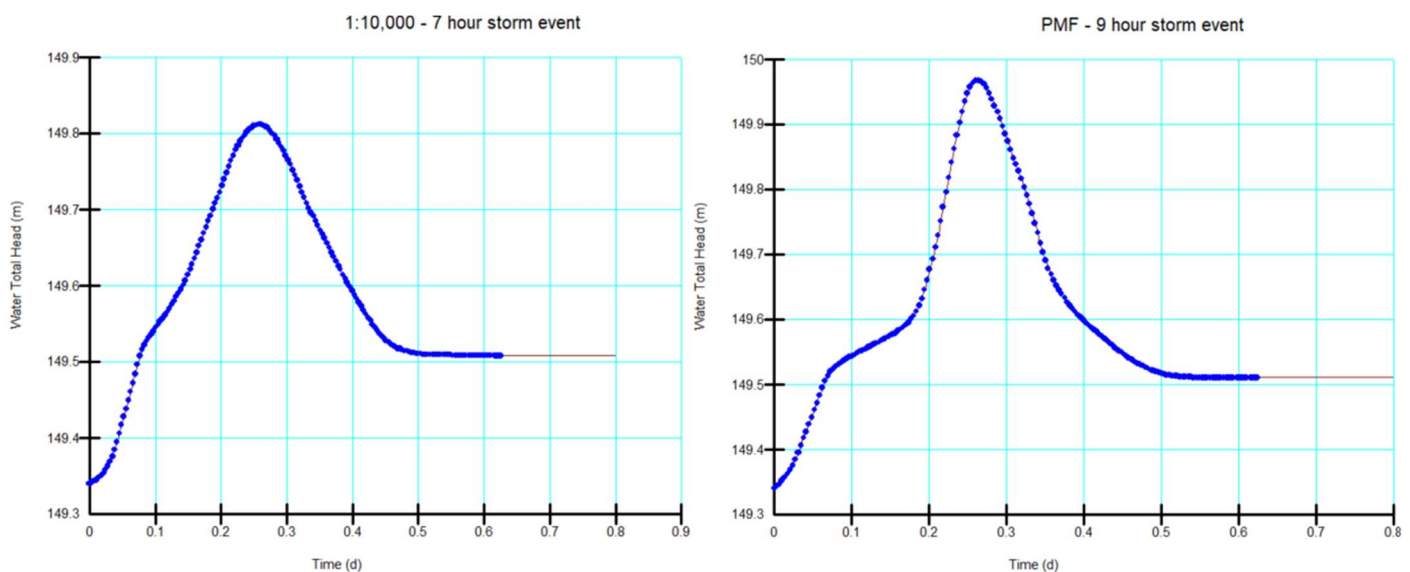


Figure 3-2. Flood hydrographs used in analysis

3.2.4 Boundary Conditions

Two boundary conditions have been used in this analysis:

1. A potential seepage face boundary was applied to the dry face where the phreatic surface could potentially break out [Transient Analysis].
2. A total head boundary condition corresponding to the water level on the wet-side for the transient analysis.

3.2.5 Assumptions

In addition to those assumptions inherent in limit equilibrium calculations, the following assumptions have been made for the seepage analysis:

1. The ground conditions are generally consistent longitudinally across the embankment.
2. Seepage rates are recorded in l/hr per meter run of the proposed structure.
3. The groundwater levels on the dry-side are influenced only by seepage in a flood event i.e., there is no increase in dry-side groundwater in response to rainfall.
4. The ratio of horizontal to vertical hydraulic conductivity is assumed to be 1:1 ($k_x/k_y = 1$). This is considered reasonable for the ground conditions encountered.
5. Potential existing seepage conditions such as animal burrows and piping channels are not considered in this analysis.

3.3 Results and Conclusions

Based on the analysis conducted, a minimum pile length of 4.00m (toe level of 146mAOD) is recommended to effectively reduce seepage risk. Figure 3-3 illustrates the seepage pathway associated with a 4m length pile. The maximum predicted seepage through a 1m section of the embankment is approximately 1 litre per hour for both flood events modelled. Given the site geometry, it is not feasible to completely eliminate seepage, however, this very low rate indicates that the residual risk is minimal and within acceptable limits.

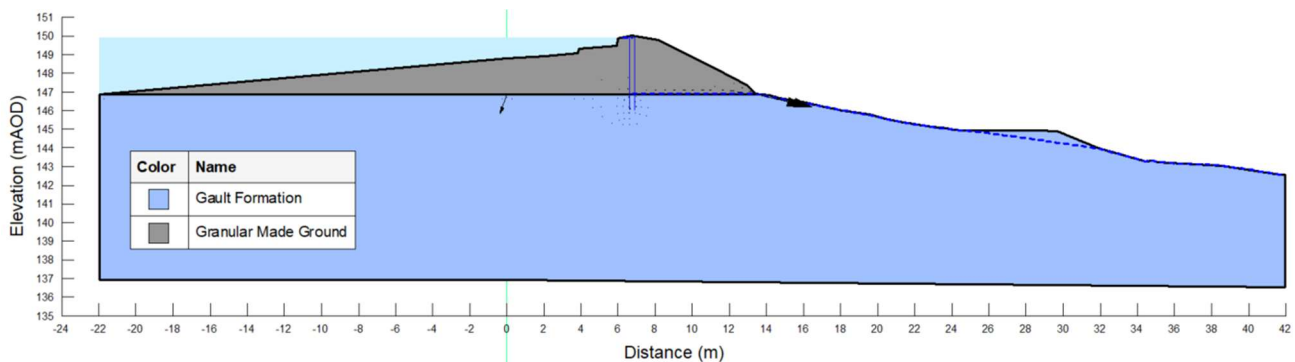


Figure 3-3. Seepage results

4 Sinkhole Repair

4.1 Sinkhole

The sinkhole which was observed in 2025, see Section 1.4, will be repaired through the works. Given the sheet pile wall will resolve the seepage issues it is not intended to completely excavate and chase the pipe downstream of the existing public footpath to the south. It is proposed to excavate the sinkhole with suitable benching to the base of the pipe before backfilling in layers as per the Specification for Highway Works with Class 2A – wet cohesive fill suitable compacted to return the slope profile to the existing.

The Class 2A will be brought up to existing level -150mm to allow for a 150mm layer of Topsoil to be placed to match existing ground levels.

The material requirements are stipulated within the Works Specification, Ref: PXG-JBA-00-GL-SP-Z-5001, presented as Appendix A and is shown on Drawing PXG-JBA-00-GL-DR-Z-5001, presented as Appendix B.

5 Pavement Works

5.1 Pathway

As part of the works the sheet pile wall will be installed across the existing footpath. In order to enable this the footpath will be excavated in a trench of approximate width 500mm. Following installation of the sheet pile wall the path will be resurfaced as per the existing surfacing. This was determined through the Client providing the previous construction requirements.

The material requirements are stipulated within the Works Specification, Ref: PXG-JBA-00-GL-SP-Z-5001, presented as Appendix A and is shown on Drawing PXG-JBA-00-GL-DR-Z-5001, presented as Appendix B.

6 Designers Risk Assessment

The Designers Risk Assessment, Ref: PXG-JBA-00-GL-RR-Z-5001, is provided within Appendix C.

7 Specification Appendices

See Appendix A for the Works Specification Ref: PXG-JBA-00-GL-SP-Z-5001.

Works Specification includes:

- Series 000 - Introduction

- Series 0100 – Preliminaries

- Series 0200 – Site Clearance

- Series 0300 - Fencing

- Series 600 – Earthworks

- Series 1600 – Piling and Embedded Retaining Walls

- Series 3000 – Landscape and ecology

A Works Specification

PXG-JBA-00-GL-SP-Z-5001-A3-C03-Garden_Lake_Works_Specification

Garden Lake Works Specification

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PURPOSE OF THE WORKS

The Specification defines the requirements for the Garden Lake remediation project, including site clearance, sheet piling through the crest of the embankment, trenching and reinstatement of an existing pathway to allow for sheet piling. The works also comprise remediation of an existing sinkhole that includes excavations with earthworks reinstatement and compaction, and landscaping to restore the site to its original condition.

PREAMBLE TO THE SPECIFICATION

The Specification referred to in the Tender shall be the 'Specification for Highway Works', published by The Stationary Office (formerly HMSO) as Volume 1 of the Manual of Contract Documents for Highway Works, as modified and extended by the following:

- The Numbered Appendices listed in Appendix 0/3;
- Appendix 0/4 contains a list of the scheme Drawings.

The relevant publication date of each page of the Specification for Highway Works is given in the Schedule of Pages and Relevant Publication Dates.

Insofar as any of the contract specific Numbered Appendices may conflict or be inconsistent with any provision of the Specification for Highway Works the Numbered Appendices shall always prevail.

Any Appendix referred to in the Specification which is not used shall be deemed not to apply.

The Overseeing Organisation is the National Trust, the roles and functions of the Overseeing Organisation may be delegated.

Where Standards and other documents are incorporated into the Contract by reference the respective edition used shall be that which is current on the Contract Reference Document Date 31/10/2025 unless otherwise stated in the Specification.

0 Series 000 - INTRODUCTION

The provisions of Series 000 of the Specification for Highway Works (SHW) shall apply. No amendments are made to this Series as part of this Works Specification.

Table 0/1: SCHEDULE OF PAGES AND RELEVANT PUBLICATIONS

Series / Appendix	Page Number	
000	1 to 3	May 2014
000	6 to 7F	February 2016
000	4 to 5	October 2022
100	2, W1F, N2 to N11F	May 2014
100	N1	December 2014
100	1, 3 to 30F	April 2022
200	1 to 3F	February 2016
300	1	May 2001
	4	November 2002
	2 to 3, 5 to 6F	May 2008
600	1 to 68, 70 to 77F, S1 to S4F, W1 to W4F, N1 to N5F	February 2016
600	69	February 2017
1600	1, 4 to 5, 9, 15, 17 to 18, 24 to 26, 29 to 31, 35,38.49F	March 1998
1600	2, 6 to 8, 10 to 14, 16, 19, 27 to 28, 32 to 34, 36 to 37, 39 to 42, 44 to 48	November 2003
1600	3, 20 to 23, 43	November 2005
3000	4 to 7, 10, 12 to 17, 19, 22, to 27F	May 2001
3000	20	November 2004
3000	2 to 3	May 2006
3000	8 to 9, 11, 18, 21	May 2008

Appendix 0/3: list of Contract Specific Numbered Appendices Referred to In The Specification and Included in the Contract

Appendix 0/3 is comprised of two lists, A and B of numbered appendices as follows

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

SHW Series No.	Completed by	Appx No.	Title
000	Not Used	0/1	INTRODUCTION Contract specific Additional, Substitute and Cancelled Clauses, Tables and Figures Included in the Contract
	Not Used	0/2	Contract specific Minor Alterations to Existing Clauses, Tables and Figures Included in the Contract
	(Co)	0/3	List of contract specific Numbered Appendices Referred to in the Specification and Included in the Contract
	(Co)	0/4	List of Drawings Included in the Contract
	Not Used	0/5	Special National Alterations of the Overseeing Organisations of Scotland/Wales/Northern Ireland
100	Not Used	1/1	PRELIMINARIES Temporary Accommodation and Equipment for the Overseeing Organisation
	Not Used	1/2	Vehicles for Overseeing Organisation
	Not Used	1/3	Radio communications system for the Overseeing Organisation
	Not Used	1/4	Working and Fabrication Drawings
	(Co)	1/5	Testing to be carried out by the Contractor
	Not Used	1/6	Supply and Delivery of Samples to the Overseeing Organisation
	(Co)	1/7	Site Extent and Limitations on Use
	Not Used	1/8	Operatives for the Overseeing Organisation
	(Co)	1/9	Control of Noise and Vibration
	Not Used	1/10	Permanent Works to be Designed by the Contractor
	(Co)	1/11	Temporary Works Design

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

	(Co)	1/12	Setting Out and Existing Ground Levels
	(Co)	1/13	Programme of Works
	(Co)	1/14	Payment Application
	Not Used	1/15	Accommodation Works
	Not Used	1/16	Privately and Publicly Owned Services and Supplies
	(Co)	1/17	Traffic Safety & Management
	Not Used	1/18	Temporary Diversions for Traffic
	(Co)	1/19	Routeing of Vehicles
	Not Used	1/20	Recovery Vehicles for Breakdowns
	(Co)	1/21	Information Boards
	(Co)	1/22	Progress Photographs
	(Co)	1/23	Risk to Health and Safety from Materials of Substances
	(Co)	1/24	Quality Management Systems
	Not Used	1/25	Temporary Closed-Circuit Television (CCTV) System for the Monitoring of Traffic
	Not Used	1/27	Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Roadworks (TASCAR)
200			SITE CLEARANCE
	(Co)	2/1	List of Building, etc, to be Demolished or Partially Demolished
	Not Used	2/2	Filling of Trenches and Pipes
	(Co)	2/3	Retention of Material Arising from Site Clearance
	Not Used	2/4	Explosives and Blasting
	Not Used	2/5	Hazardous Materials
300			FENCING
	(Co)	1	General Requirements for fencing works
	(Co)	2	Temporary fencing works
	Not Used	3	Permanent fencing works

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

	Not Used	4	Timber quality for fencing works
	Not Used	5	Fittings for fencing works
	Not Used	6	Gates, gateposts, post and stiles for fencing works
	(Co)	7	Removal, repair and re-erection of existing fences and gates
		8	Normative references
400	Not Used		ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN)
500	Not Used		DRAINAGE AND SERVICE DUCTS
600			EARTHWORKS
	(Co)	6/1	Requirements for Acceptability and Testing etc. of Earthworks Materials
	(Co)	6/2	Requirements for Dealing with Class U1B and Class U2 Unacceptable Materials (11/04).
	(Co)	6/3	Requirements for Excavation, Deposition, Compaction (Other than Dynamic Compaction)
	Not Used	6/4	Requirements for Class 3 Material
	Not Used	6/5	Geotextiles Used to Separate Earthworks Materials
	Not Used	6/6	Fill to Structures and Fill Above Structural Foundations
	Not used	6/7	Sub-formation and Capping and Preparation and Surface Treatment of Formation
	(Co)	6/8	Topsoiling
	Not Used	6/9	Earthwork Environmental Bunds, Landscape Areas, Strengthened Embankments
	Not Used	6/10	Ground Anchorages, Crib Walling and Gabions
	Not Used	6/11	Swallow Holes and Other Naturally Occurring Cavities and Disused Mine Workings
	Not Used	6/12	Instrumentation and Monitoring
	Not Used	6/13	Ground Improvement
	Not Used	6/14	Limiting Values for Pollution of Controlled Waters (11/06)

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

	Not Used	6/15	Limiting Values for Harm to Human Health and the Environment (11/04)
700	Not Used		ROAD PAVEMENTS – GENERAL
800	Not Used		ROAD PAVEMENTS – UNBOUND, CEMENT AND OTHER HYDRAULICALLY BOUND MATERIALS
900	Not Used		ROAD PAVEMENTS – BITUMINOUS BOUND MATERIAL
1000	Not Used		ROAD PAVEMENTS – CONCRETE AND CEMENT BOUND MATERIALS
1100	Not Used		KERBS, FOOTWAYS AND PAVED AREAS
1200	Not Used		TRAFFIC SIGNS
1300	Not Used		ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS
1400	Not Used		ELECTRIAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
1500	Not Used		MOTORWAY COMMUNICATIONS
1600	(Co)	16/1	General Requirement for Piling and Embedded Retaining Walls
	Not Used	16/2	Precast Reinforced and Prestressed Concrete Piles and Precast Reinforced Concrete Segmental Piles
	Not Used	16/3	Bored Cast-in Place Piles
	Not Used	16/4	Bored Piles Constructed using Continuous Flight Augers and Concrete or Grout Injection through Hollow Auger Stems
	Not Used	16/5	Driven Cast-in-Place Piles
	Not Used	16/6	Steel Bearing Piles
	Not Used	16/7	Reduction of Friction on Piles
	Not Used	16/8	Non-Destructive Methods for Testing Piles
	Not Used	16/9	Static Load Testing of Piles
	Not Used	16/10	Diaphragm Walls

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

	Not Used	16/11	Hard/Hard Secant Pile Walls
	Not Used	16/12	Hard/Soft Secant Pile Walls
	Not Used	16/13	Contiguous Bored Pile Walls
	Not Used	16/14	King Post Walls
	(Co)	16/15	Steel Sheet Piles
	Not Used	16/16	Integrity Testing of Wall Elements
	Not Used	16/17	Instrumentation for Piles and Embedded Walls
	Not Used	16/18	Support Fluid
1700	Not Used		STRUTURAL CONCRETE
1800	Not Used		STRUCTURAL STEELWORK
1900	Not Used		PROTECTION OF STEELWORK AGAINST CORROSION
2000	Not Used		WATERPROOFNG FOR CONCRETE STRUCTURES
2100	Not Used		BRIDGE BEARINGS
2300	Not Used		BRIDGE EXPANSION JOUNTS AND SEALING OF GAPS
2400	Not Used		BRICKWORK, BLOCKWORK AND STONWORK
2500	Not Used		SPECIAL STRUCTURES
2600	Not Used		MISCELLANEOUS
3000			LANDSCAPE AND ECOLOGY
	(Co)	30/1	General
	(Co)	30/2	Weed Control
	Not Used	30/3	Control of Rabbits and Deer
	(Co)	30/4	Ground Preparation
	(Co)	30/5	Grass Seeding, Wildflower Seeding and Turfing
	(Co)	30/6	Planting, sheets 1 and 2
	(Co)	30/7	Grass, Bulbs and Wildflower Maintenance
	(Co)	30/8	Watering
	(Co)	30/9	Established Maintenance for Planting

List 'A' is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'. Those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

	(Co)	30/10	Maintenance of Established Trees and Shrubs
	Not Used	30/11	Maintenance of Waterbodies
	Not Used	30/12	Special Ecological Measures
5000	Not Used		MAINTENANCE PAINTING OF STEELWORK
5700	Not Used		CONCRETE REPAIRS

Note: Works identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

Symbol	
(Co)	Compiler compiles
(Co/C)	Compiler partially compiles and Contractor completes and returns to Overseeing Organisation.
(Co/T)	Compiler partially compiles and Tenderer completes and returns with Tender.
C	Contractor completes and returns to Overseeing Organisation
I	For Contractor's information only
P	This indicates the Appendix is a national proforma and format must not be altered.

There is no List 'B' Contract Specific Numbered Appendices devised for the Contract.

Appendix 0/4: List of Drawings Included in the Contract

Drawing No.	Title
PXG-JBA-00-GL-DR-Z-5000	Garden Lake Red Line Boundary
PXG-JBA-00-GL-DR-Z-5001	Garden Lake General Arrangement
PXG-JBA-00-GL-DR-Z-5002	Garden Lake Sections
PXG-JBA-00-GL-DR-EN-4003	Tree Protection Plan
PXG-JBA-00-GL-DR-L-4002	Landscape Drawings
PXG-JBA-00-GL-DR-L-4003	

1 Series 0100 – PRELIMINARIES

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works Series 0100 and relevant Notes for Guidance Series NG 0100.

Appendix 1/5:

Clause No.	Work, Goods or Material	Test	Frequency of testing	Test Certificate	Comments
601,631 to 637, 640	Class 2A material – wet cohesive fill	Grading, and mc	3 per day	Required	

Notes:

1. Unless otherwise stated above, all sampling and testing in this Appendix shall be by the Contractor.
2. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor
3. (N) indicates that a UKAS or equivalent accredited laboratory sampling and test report or certificate is required.
4. Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
5. Cube strength tests are not required for concrete complying with Clause 2602.
6. Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

Appendix 1/7: Site Extent and Limitations on Use

- 1.7.1. The extent of the site is shown on DRG. PXG-JBA-00-GL-DR-Z-5000- Garden Lake Red Line Boundary. See Appendix 0/4 for list of other contract drawings.
- 1.7.2. Limitations on the Use of the Site:
 - a. No equipment, plant, materials or other items will be permitted to remain or to be placed on areas which are not part of the Site as defined in this Appendix with the exception of items needed to control traffic which have been placed in positions agreed by the Project Manager.
 - b. The Contractor shall take all due care to avoid damage to the grass verges, footways and the drainage system, providing sleeper or other appropriate protection whenever they require plant or vehicles to cross these features. Any damaged areas or verge shall be reinstated with topsoil and seeded in accordance with the specification. Any damaged or

disturbance to drains shall be reinstated by the Contractor within 24 hours or such other time as the Project Manager may agree in writing. Works to check adjacent lengths of drains possibly damaged by Contractor's plant shall be carried out concurrently if the Project Manager so directs. Other areas of the Site, including the Contractor's accesses shall be reinstated to the original condition on completion of the Works.

- c. The Contractor shall undertake a precondition survey of the entire site within the redline boundary and the highway running through the estate. Note that the entire Estate is a Grade I Registered Park and Garden. In addition, precondition & post-condition surveys of the following Heritage assets including:
 - i. Stone archway (Grade I listed), labelled on DRG. PXG-JBA-00-GL-DR-Z-5000- Garden Lake Red Line Boundary has width and height restrictions - a pre-condition survey (i.e. dimensions) needs to be recorded before any site works.
 - ii. Horse Trough (Grade II listed), located along China Road, labelled on DRG. PXG-JBA-00-GL-DR-Z-5000- Garden Lake Red Line Boundary
 - iii. Iron Bridge (Grade II listed) labelled on DRG. PXG-JBA-00-GL-DR-Z-5001-Garden Lake General Arrangement
 - iv. The surveys shall be issued to the Overseeing Organisation.
- d. All advertisements, contractors and sub-contractors name-boards to be erected within the Site shall be approved by the Overseeing Organisation. Advertisements and nameboards will not be allowed in the vicinity of traffic lanes where in the opinion of the Overseeing Organisation or such would distract drivers or conflict with statutory traffic signs. All advertisements and nameboards within the site shall be removed within two weeks of the date of the Certificate of Completion of the Works. Nameboards providing directional information erected beyond the Site and within the highway shall only be erected with the consent of the Highway Authority.
- e. The Contractor shall take all necessary precautions within the Site, and land temporarily occupied for purposes of the Contract, against the growth of weed injurious to agriculture until the defects date.
- f. The Contractor shall afford all reasonable facilities and services for any other contractors employed by the Employer and their workmen and of any properly authorised authorities or statutory bodies who may be employed in the execution on or near the Site and Working Areas of any work not in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works. In this context services shall include for the setting out of the Works and the checking thereof necessary for the Others to carry out their works compatibly with the Works described in the Contract.

- g. Deliveries to site are permitted between 06:00 and 16:00, Monday to Friday. Heavy plant deliveries to site are permitted between 06:00 and 08:00 to minimise disruption to the property.

Appendix 1/9: Control of Noise and Vibration

- 1.9.1. The Local Authority having responsibility for the area is Wiltshire Council, Public Protection, County Hall, Bythesea Road, Trowbridge, Wiltshire, BA14 8JB.
Telephone: 0300 456 0107
Email: publicprotectionwest@wiltshire.gov.uk
- 1.9.2. The measures given in this appendix are given as a guide; however, it is for the Contractor to decide whether to seek the Local Authority's formal consent to his proposed methods of work and to the steps they propose in order to minimise noise after liaison with the National Trust. The Contractor shall consult with the National Trust in the first instance.
- 1.9.3. Data/Local Authority information/requirements shall be determined by the Contractor after deciding whether to seek the Local Authority's formal consent after liaison with the National Trust. The Contractor shall consult with the National Trust in the first instance.
- 1.9.4. Monitoring Requirements are dependent on the outcome of 1.9.2 and 1.9.3.
- 1.9.5. The normal working hours within the Site shall be Monday to Friday between 0800 and 1700 hours, with no working on Saturdays, Sundays or public holidays. Exceptionally, consent for work outside these hours may be given by the Overseeing Organisation after any necessary consultation. 7 days' notice is required from the Contractor when seeking such consent.
- 1.9.6. The noise limits are to be determined using Method 2, and the Local Authority Noise Limit is to be determined by the Contractor from liaison with the Local Authority. The Contractor shall consult with the National Trust in the first instance – see 1.9.2
- 1.9.7. Method 2 - The ambient noise level, L_{Aeq} from all sources when measured 2.0 m above the ground at noise control stations to be determined from liaison between the Contractor and National Trust and shall not exceed the appropriate level given in the Noise Limit. The Contractor shall consult with the National Trust in the first instance.
- 1.9.8. Noise Reduction methods to be considered by the Contractor. The Contractor shall consult with the National Trust in the first instance.
- 1.9.9. Where it is not possible to reduce noise levels to within the pre-construction ambient noise (L_{Aeq} , Period) plus 5dB, despite extensive mitigation, consent to undertake noisy works will be made to the local authority in consultation with neighbouring noise sensitive premises. The Contractor shall consult with the National Trust in the first instance – see 1.9.2

Vibration

- 1.9.10. The use of explosives is not permitted.
- 1.9.11. Limits on vibration levels arising from site activities for the embankment face are detailed below, it should be noted that these limits are based on JBA's understanding that the dam has already been assessed as satisfactory under seismic induced loading up to the design value, though JBA have not had sight of any reporting or calculations. Assuming it was pseudostatic analysis using BRE 1991/1998 then a design Peak Ground Acceleration (PGA) for a category III dam in zone C would be 0.15g. This can be equated to an approximate vibration limit of 3mm/s. It is worth noting that the areas of movement are vastly different but with no other data available to provide limits this is considered as a reasonable starting point. Site observations and assessment should be undertaken through the works to enable review of the limits set, any revised limits would be set in conjunction with the Supervising / All Reservoir Panel Engineer and Overseeing Organisation:

Limit	Status	Action
≥ 1mm/s on embankment face	Green to Amber	Notify the Site Supervisor Check that readings are correct / consistent Increase frequency of visual checks of crest and slopes for cracking, distortion
≥ 2mm/s on embankment face	Amber to Red	Pause Piling, review data and construction method. Inspect embankment (crest, upstream and downstream slopes, toe, spillways, outlet conduits), Consider reduction in drive amplitude, shorter drive durations, or alternative installation method. Only resume if agreed by the Supervising / All Reservoir Panel Engineer with possible revised limits or mitigation
≥ 3mm/s on embankment face	Red	Immediate cessation of vibratory piling Detailed inspection and, if necessary, survey / level checks All Reservoir Panel Engineer review before resuming
Rapidly increasing trend		
Visible new cracking / settlement		
Any sign of seepage changes		

Limits on vibration levels for the Iron Bridge are not specified, however, monitoring requirements for the Iron Bridge are specified in Appendix 16/1 clause 16.1.1.c.

- 1.9.12. Vibration Control Stations are to be located on the embankment downstream face, location to be agreed between the Contractor and Overseeing Organisation and periodically moved as the piling progresses. In addition there will be a station located on the crest of the Iron Bridge and on the footpath immediately adjacent to the Iron Bridge on the bank opposite the works. The Contractor shall consult with the Overseeing Organisation in the first instance.
- 1.9.13. See 1.9.11 & 1.9.12 for requirements for instrumentation and monitoring. Monitoring stations will have to be in place and recording for a period of time prior to construction to establish a baseline for the piling works. The complete record of the vibration monitoring results are to be transmitted to the Overseeing Organisation at the completion of the piling works.
- 1.9.14. No known arrangements for Contractor to monitor vibration in property off-site. The Contractor shall consult with the National Trust in the first instance.
- 1.9.15. Vibration reduction methods to be explored by the Contractor. The Contractor shall consult with the National Trust in the first instance.

Appendix 1/11: Temporary Works Design

Requirements for temporary works designed by the contractor		
Structure	Location	Design Specification
The contractor shall be responsible for the design of all temporary works that are required to facilitate the construction of the permanent works. This includes maintaining the integrity and performance of the existing embankment whilst the works are being constructed. The Contractor Temporary Works Designer shall coordinate with the Principal Designer.		

Appendix 1/12: Setting Out and Existing Ground Levels

- 1.12.1. The contractor shall at the outset of the works that they have sufficient information for reinstatement through confirmation of existing topographic line and levels.
- 1.12.2. Specific requirements for setting out:
- All setting out points and dimensions provided on the contract drawings shall be adhered to by the Contractor within the limits of accuracy required.
 - The Contractor shall agree their proposed setting out method with the Overseeing Organisation and agree the setting out on site with the Supervisor prior to the construction of a particular element.
 - The Contractor shall determine the Sheet Pile Wall setting out information in accordance with the following sub-clauses:
 - The sheet pile wall be set out using the setting out points on the Employer's drawings.
 - The new works shall be set-out to give an even line and level.

- iii. The line of the Sheet pile wall works shall generally be kept as close to the centre line of the crest of the embankment.
 - iv. The Contractor shall generally adhere to the chainage system provided in the Employer's drawings. See Appendix 0/4 for list of contract drawings.
 - d. The Contractor, in accordance with the information included in the Contract, set out, mark and maintain until they are no longer required, all reference lines, templates, bench marks and markers, permanent or temporary, necessary for the setting out and checking of the Works. The Contractor shall keep updated schedules and drawings of such information.
 - e. Where setting out markers are likely to be disturbed during the Works, the contractor shall, transfer such markers to an adjacent point after consultations with the Overseeing Organisation.
 - f. The Contractor shall not commence either general site clearance or fencing before the established benchmarks and the setting out of the site boundaries have been agreed with the Project Manager.
 - g. The colour White shall be used for all paint markings for setting out purposes put down by the Contractor and all site staff.
- 1.12.3. Existing ground levels are taken from a topographic survey undertaken in 2021. Variations in levels or information in addition to the survey information provided shall not constitute a change in the information provided.
- 1.12.4. The Contractor shall **undertake a Level 1 building survey of the dwarf/wave wall** and record existing details of items which he is required to remove and subsequently replace (i.e. wall removal and reconstruction due to the temporary working platform).

THE CONTRACTOR SHALL SET OUT THE WORKS IN STAGES PRIOR TO EXCAVATION OR DELIVERY OF PLANT TO SITE, FOR THE AGREEMENT OF THE SUPERVISOR.

THE CONTRACTOR SHALL SET OUT SUFFICIENT MARKERS/TARGETS TO ENABLE MONITORING THROUGHOUT THE WORKS. FREQUENCY OF MONITORING INITIALLY WEEKLY, SUBJECT TO REVIEW BY THE PRINCIPAL DESIGNER.

Appendix 1/13: Programme of Works

- 1.13.1. The Contractor shall provide the Programme of Works in a form of a Gantt chart produced by a critical path analysis and must abide by the constraints below. It shall show an appropriate level of detail to allow the contractor to complete their works but as a minimum shall have a level of detail appropriate

for each main activity. All events shall be numbered and annotated with earliest and latest event dates.

1.13.2. No requirements for mass-haul diagram or earthworks details.

1.13.3. The following is a list of applicable programming constraints. Schedule of Constraint

a. Traffic Safety and Management

i. The Contractor must maintain access for the residents of Beech Cottage & the Convent at all times for the duration of the Works (as described in Appendix 1/17). If the Contractor needs to temporarily close access for delivery then this should be agreed with the Overseeing Organisation.

i. The Contractor must comply with restrictions arising from Traffic Safety and Management including notice requirements (see Appendix 1/17).

h. Provision of environmental protection prior to the main construction operations (environmental barriers, Tree protection etc):

i. The Contractor shall confine any single working areas to within the Red Line Boundary – see contract drawings in Appendix 0/4.

1.13.4. The Programme of Works shall at least show the following level of detail:

a. The programme shall contain, approvals & consents, licences, site clearance and set up, sheet piling, concrete pathway and earthworks remediation, demobilisation, site inspection by ARPE, works sign off by ARPE.

b. The Contractor shall ensure that any computerised model of his Programme of Works used by his site management team is of a form which is compatible with that used by the Overseeing Organisation (Microsoft Project).

c. Within 7 days of supplying the Overseeing Organisation with the critical path programme the Contractor shall attend such meetings arranged by the Overseeing Organisation, as are necessary to ensure that mutual agreement exists concerning the validity of the Contractor's programme of works which will be used by the Overseeing Organisation. All changes, re-scheduling and re-resourcing which the Contractor imposes on his programme of works shall be notified to the Overseeing Organisation as soon as is practicable after the imposition of such changes. If, by the time of any meeting immediately following these changes to consider progress the Contractor has not supplied the necessary detailed information to the Overseeing Organisation, the Contractor shall notify the Overseeing Organisation at such meeting of the general nature of the changes before the next scheduled meeting. Subsequently, the Contractor shall attend meetings, arranged by the Overseeing Organisation, to ensure that the revised programme in use by the Overseeing Organisation conforms to the Contractor's current programme. In all cases, mutual agreement shall be confirmed in writing.

Appendix 1/14: Payment Applications

Assessment and payment shall be made in accordance with the Conditions of Contract.

Appendix 1/17: Traffic Safety & Management

- 1.17.1. Traffic Management Plan to show proposed signage and locations of signage.
The plan shall also show proposed routes for general deliveries and large plant.
- 1.17.2. Site Specific requirements and constraints include the following:
 - a. The Stone Archway
 - b. Horse trough
 - c. Deliveries to site are permitted between 06:00 and 16:00, Monday to Friday. Heavy Plant deliveries to site is permitted between 06:00 and 08:00, Monday to Friday (see 1.7.2).
 - d. Transportation of chippings to be undertaken with liaison with Overseeing Organisation.
 - e. China Road has a temporary closure on the Public Right of Way (PRoW), however access need to be maintained for residents of Beech Cottage and the Convent.
 - f. Dump trucks, tracked machines and the like will not be allowed to traverse the existing road network without suitable protection measures. These types of machines will only be allowed within the site.
 - g. Any vehicles that leave site must be inspected and cleaned before entering the public highway to keep the road network clean and safe for other road users.
 - h. The Contractor shall take measures to prevent vehicular damage to Highways.
- 1.17.3. A Traffic Safety and Control Officer is not required. However, vehicle marshal(s) will be required.
- 1.17.4. Temporary Traffic Regulation Orders has been applied and approved for the closure of the Footpath Public Right of Way along China Road – see Pre-Construction Information Ref. PXG-JBA-00-GL-RP-Z-5003.
- 1.17.5. No Crossovers are required.
- 1.17.6. Driver information signs are required, these shall include diversions if needed, safety signage, China Road closure sign at either end of China Road (i.e. at the intersection of Tower Road and also at the intersection of the High Street) and to be included in the Traffic Management Plan
- 1.17.7. No temporary speed limit cameras are required.

Appendix 1/19: Routeing of Vehicles

- 1.19.1. Permitted Access Routes to and From the Site are shown on Drg.PXG-JBA-00-GL-DR-Z-5010-GardenLakeHazardsAndConstraintsPlan.
- 1.19.2. The Use of the Permanent Works by Construction Traffic:
 - a. If the Contractor intends to use any part or section of the permanent works prior to those times detailed in any other Clause or Appendix or intends to use machinery or plant that is heavier than the designed loads for the carriageway and structures, then the Contractor will submit details of his proposals to prevent any damage being incurred to the structures to the Overseeing Organisation for approval.
- 1.19.3. There shall be no movement of machinery and plant across public roads
- 1.19.4. There is no requirement for temporary structures for construction traffic spanning areas used by the public.

Appendix 1/21: Information boards

Locations and details of information boards to be determined from liaison with the Contractor and the Overseeing Organisation.

Appendix 1/22: Progress Photographs

- 1.22.1. Digital photographs of the whole of the works shall be taken from the ground. Photographs shall be taken before, during and upon completion of each activity from the same viewpoint.
- 1.22.2. See 1.22.1.
- 1.22.3. The photographs are to be supplied in digital format with the date and time clearly shown on the photograph. The photos shall be delivered to the Overseeing Organisation in JPEG format.
- 1.22.4. The photographer is to be the Contractor.
- 1.22.5. The photographer is not required to be a professional photographer.

Appendix 1/23: Risks to Health & Safety

- 1.23.1. The Hazard Data Sheets as included in SA 8/94 (Substances Hazardous to Health in Highway Construction [Incorporating Amendment No. 1 dated October 1994 published by the Department of Transport) give a list of certain materials for which risks exist and the Contractor shall take all measures necessary to ensure that no risk is presented to members of the public from those substances or any other substance hazardous to health. The Contractor shall also ensure that all Site staff are aware of the potential Health risks associated with all substances listed in the Annexes and any other substances which may be employed in the execution of the Contract.

- 1.23.2. During operations involving the spraying of waterproof membranes silane for the impregnation of concrete, coatings of paint or the like, and anti-graffiti protection systems, the spraying of any other hazardous material or an operation which generates dust, the following measures shall be undertaken:
- d. Air quality monitoring in accordance with published Health and Safety Executive guidance shall be undertaken during the operation involving the substance hazardous to health in any location that the general public has access to during the operation. The exposure limits shall be as follows, and measured over both the 8-hour Time Weighted Average (TWA) and 10 minute reference periods, except that where no limit is given for one of the reference periods then the Contractor shall not be required to monitor the air quality over the period:
 - i. where there is exposure to a substance for which a Maximum Exposure Limit (MEL) is specified in schedule 1 of the COSHH Regulations, then the level of exposure shall not be greater than one hundredth of the exposure limit.
 - ii. where there is exposure to a substance for which an Occupational Exposure Standard (OES) has been approved then the level of exposure shall not be greater than one fortieth of the Occupational Exposure Standard given for the substance listed in EH40/2002 (occupational Exposure Limits 2002) & 2003 supplement published by the Health and Safety Executive.
 - e. The Contractor shall assess whether the following hazard abatement and control procedures are required to reduce the exposure of the general public so that the limits specified above are satisfied.
 - i. the operation involving the hazardous substance shall be controlled to reduce the dispersion of the substances (e.g. Wetting of dust producing operations, or adjusting of spraying equipment);
 - ii. areas of access to the general public shall be controlled using signed diversions, footpath closures, carriageway lane closures, etc. Adequate barriers shall be provided to ensure that unauthorised access cannot be made into the restricted buffer zone. Any measures taken shall be in accordance with the requirements for traffic and pedestrians etc set out elsewhere in the Contract;
 - iii. the provision of barriers or enclosures to control or prevent the dispersion of substances hazardous to health.
 - f. Notwithstanding the exposure limits above, none of the operations involving 'high risk' hazardous substances listed in this Appendix shall be undertaken if the wind speed is greater than 20 mph. In addition, if the speed of the traffic, which is within 10m of the operation, shall fall below 20 mph for a period of 5 minutes, or more, then the operation shall be suspended.

- g. The following list is not exhaustive is intended to assist the Contractor in making an evaluation of the risks to his workforce and the public in deciding the need for limitations, mitigatory controls and working practice.
 - i. 'Low Risk' Substances
 - 1. Sand, natural aggregates, treated timber, dust from cutting softwoods, macadams and asphalts, water-based admixtures.
 - ii. 'Moderate Risk' Substances
 - 1. Coated road stone, line marking paints, bitumen joint sealing compounds, cement, cementitious mortars and grouts, concrete, bitumen sprays, dust from cement, silica dust, herbicides, curing agents.
 - iii. 'High Risk' Substances
 - 1. Protective paintwork systems, polysulphide sealants, epoxy adhesives and mortars, bituminous primers and coatings, 'silane' waterproofing agent, welding and cutting fumes.
- 1.23.3. Alongside statutory notification requirements, the Contractor shall also be required to notify the Overseeing Organisation in the following events:
 - a. All accidents
 - b. All near misses and positive interventions
 - c. Any pollution incident or near miss
 - d. Any environmental positive intervention
 - e. Identification of any unidentified buried service
 - f. Discovery of any hazardous, deleterious or contaminated material
- 1.23.4. Alongside statutory monitoring requirements, the Contractor shall also be required to provide the Overseeing Organisation with the following information:
 - a. A summary of site attendance
 - b. Information pertinent to ongoing health and safety of the works

Appendix 1/24: Quality Management Systems

- 1.24.1. The Contractor shall institute and operate a quality management system complying with BS EN ISO 9001 and Clause 104. The quality management system shall be described in a Quality Plan that shall be submitted to the Overseeing Organisation for his acceptance not later than 10 days after award of contract.
- 1.24.2. The Quality Plan shall cover the following items:
 - a. Contractor's organisation and management
 - b. Contractor's method statements and construction procedures
 - c. Contractor's construction quality control
 - d. Contractor's Document Control
 - e. Suppliers' Quality Plans
- 1.24.3. The Quality Plan shall identify procedures (which may be a part of the Contractor's general procedures) that cover the topics listed below. Copies of

these procedures shall be made available to the Overseeing Organisation on request.

- a. The quality plans for sub-contractors and suppliers of work, goods and materials which are the subject of quality management schemes.
- b. Procedure for the preparation, review and adjustment of programmes for the effective progression of the Works and the recording of this.
- c. Control and approval of purchases of materials.
- d. Control of off-site activities (where appropriate).
- e. Procedures for the regular review and recording by the Contractor of the quality of the Works.
- f. Control of personnel selection, based on care, skill and experience.
- g. Management review/audits to monitor and exercise adequate control over the implementation of the quality plan.
- h. Any other relevant item.

2 SERIES 0200: SITE CLEARANCE

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works Series 0200 and relevant Notes for Guidance Series NG 0200.

Appendix 2/1: List of Budlings, etc. to be demolished or Partially demolished.

The following table does not include superficial elements that would be considered reasonable to remove as part of the Contractor's normal site clearance.

Descriptions	Drawing No.	Requirements
Partial removal of iron rail fence to facilitate temporary works (to be reinstated)	PXG-JBA-00-GL-DR-Z-5001	Demolition methodology to be agree with the Overseeing Organisation. Demolition methodology requires Contractor to take all reasonable skill, due care and attention as the railings will be reinstated.
Partial Removal of concrete pathway	PXG-JBA-00-GL-DR-Z-5001	Demolition methodology to be agreed with the Overseeing Organisation. To include precautions to minimise dust generation by wet-cutting and no damage to the Iron Bridge.
Removal of temporary Geosynthetic Clay Liner (GCL) and associated gravel.	PXG-JBA-00-GL-DR-Z-5001	Demolition methodology to be agreed with the Overseeing Organisation. Contractor to take all reasonable skill, due care and attention to not damage the existing concrete apron

Appendix 2/3: Retention of materials arising from site clearance

Description	Location	Storage Locations	Delivered to:	Requirements
Excavated Topsoil	Across Site	Within site boundary. Contractor to arrange suitable storage areas	Not applicable	See Appendix 6/8.
Trees and shrubs – marked for removal	Across Site	To be determined from liaison between Contractor and National Trust.	To be determined from liaison between Contractor and National Trust.	Branches over 100mm initially removed to site compound and offered to National Trust Estate. Branches under 100mm in diameter to be chipped. Arisings to be retained on site for use by the National Trust Estate.
Iron Railing Fence	Site Area	Site Compound	Not applicable	To be stored and refurbished prior to being reinstated. As per Appendix 3/1.
Excavated concrete from pathway	Site Area	Sent off site for recycling	To be determined from liaison between Contractor and the Overseeing Organisation	Transportation to recycling compound
Geosynthetic Clay Liner	Site Area	Sent off site for recycling	To be determined from liaison between Contractor and the Overseeing Organisation	Transportation to recycling compound

Description	Location	Storage Locations	Delivered to:	Requirements
Gravel associated with the Geosynthetic Clay Liner	Site Area	Site Compound.	To be determined from liaison between Contractor and National Trust.	To be stored for reuse by the National Trust Estate.

Appendix 2/6: Site Clearance Environmental Requirements.

2.6.1. Ecological site clearance restrictions or measures:

- a. The Tree Protection Plan Drg. PXG-JBA-00-GL-DR-EN-4002 states the trees required to be removed and protected. The Arboricultural Impact Assessment details suitable methodology Ref. PXG-JBA-00-GL-RP-EN-4002.
- b. Trees and vegetation to be cleared shall be cut down to ground level. No uprooting or stump grinding to take place unless otherwise agreed with the Overseeing Organisation if required to facilitate work.
- c. See series 3000 Clauses.

2.6.2. No site Heritage or Archaeological site clearance is required. Any Heritage constraints are detailed in the Designers Risk Assessment (Ref. PXG-JBA-00-GL-RR-Z-5001), Pre-Construction Information (REF. QRC-JBA-XX-00-RP-Z-5003) Works Specification (Ref. PXG-JBA-00-GL-SP-Z-5001) and drawings (Ref. PXG-JBA-00-GL-DR-Z-5001; PXG-JBA-00-GL-DR-Z-5010).

2.6.3. No other measures or restrictions are required.

3 SERIES 0300 FENCING

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works Series 0300 and relevant Notes for Guidance Series NG 0300.

Appendix 3/1: Fencing, Gates and Stiles

- 3.1.1. The site shall be meet the minimum of 2m high Heras (or similar) style fencing around the compound area and working area. In addition, 2.4m Timber Hoardings to be placed as per Drg. PXG-JBA-00-GL-DR-Z-5010-GardenLakeHazardsAndConstraintsPlan, exact location to be agreed with the Overseeing Organisation.

6 SERIES 0600 - EARTHWORKS

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works Series 0600 and relevant Notes for Guidance Series NG 0600.

Appendix 6/1: Requirements for Acceptability and Testing etc. of Earthwork Materials

- 6.1.1. Acceptability limits and permitted Classes for earthwork materials are given in Table 6/1.
- 6.1.2. The minimum requirements for earthworks material testing are indicated in Specification Appendix 1/5.
 - a. The Supervisor may instruct further testing to check the results obtained by the Contractor.
 - b. The Contractor shall be responsible for monitoring the continuing acceptability of the earthworks materials in accordance with the frequency of testing given in Appendix 1/5 of the Specification, Earthworks: Frequency of Acceptability Testing. Where the quantity of material used in the Works is less than that stated in the frequency schedule the Contractor shall perform a minimum of two number tests of each type required on the quantity used.
 - c. The Contractor shall submit two copies of all material classification test results to the Supervisor at least five working days before the intended use of such material unless agreed otherwise by the Project Manager. The copies shall be signed by the Contractor's responsible engineer/technician.
 - d. All material imported shall be tested at source for contaminants.
 - e. Material excavated and determined as potentially Class U1 or Class U2 shall be stored with the site compound or with the works area and tested in accordance with Appendix 1/5 and if defined as Class U1 or U2 the Contractor shall consult with the Overseeing Organisation for either:
 - i. removal off site in accordance with Clause 602.3 and 602.5
 - ii. re-use for the National Trust with an appropriate Materials Management Plan.
 - f. All disposal of material off Site shall be undertaken by the Principal Contractor in accordance with the requirements of the Waste Management Licensing Regulations 2005.
- 6.1.3. No Class 3 material has been identified within the Scheme and Class 3 material shall not be used
- 6.1.4. Processing to render unacceptable material acceptable: Not required.
- 6.1.5. Temporary groundwater lowering is not expected to be required as the Garden Lake water level will be drawn down so that the embankment is not impounding water at this location.

6.1.16. Tree roots are expected to be present during the earthwork remediation. These shall be severed within the footprint of the excavation.

Table 6/1 Acceptable Earthwork Materials: classifications and compaction requirements

Class	General Material Description	Typical Use	Permitted Constituents (All subject to Requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties required for Acceptability (In addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612
				Property (See Expectations on previous column)	Defined and tested in Accordance with	Acceptable Limits Within		
						Lower	Upper	
1A	Well graded Granular Material	General Fill		Grading	BS1377:Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	Tab 6/4 Method 2
				Uniformity coefficient	-	10	-	
1A1	Well graded Granular Material	General Fill	Natural Non-argillaceous Colour - Golden Amber Limestone	Grading	BS1377:Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	Tab 6/4 Method 3
				Uniformity coefficient	-	70	-	
2A	Wet Cohesive Material	General Fill	Any Material or combination of materials other than chalk	Grading	BS1377-Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 1 except for materials with liquid limit greater than 50, determined by BS1377: Part 2, only deadweight
				(ii) Plastic Limit (PL)	BS1377-Part 2	14	65	

Class	General Material Description	Typical Use	Permitted Constituents (All subject to Requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties required for Acceptability (In addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612
				Property (See Expectations on previous column)	Defined and tested in Accordance with	Acceptable Limits Within		
						Lower	Upper	
				(iii) mc	BS1377-Part 2	PL-4%	1.1*PL	tamping or vibratory tamping rollers or grid rollers shall be used
5A	Topsoil, or turf, existing on site	Topsoiling	Topsoil or turf designated as Class 5A in the Contract	Grading	Clause 618	-	Clause 618	
5B	Imported topsoil	Topsoiling	General purpose grade complying with BS3882	-	-	-	-	

Tab = Table

Table 6/2: Grading requirements for acceptable earthworks materials other than Classes 6F4, 6F5 and 6S

Percentage by Mass Passing the Size Shown																				
Class	Size (mm)		Size (mm) BS Series													Size (microns) BS Series				Size Microns
	500	300	125	90	75	37.5	28	20	14	8	6.3	4	2.8	2	1	500	250	125	63	2
1A		100	95-100																<15	
1A1									100	96	86	63	54	46	33	25	19	15	<11.2	
2A			100											80-100					15-100	

Appendix 6/2: Requirements for Dealing with Class U1B and Class U2 Unacceptable Materials

- 6.2.1. No known contamination is recorded for the site.
 - a. If any visual or olfactory evidence of previously unidentified contamination is identified during the construction phase, work to stop immediately, the contaminated materials to be stockpiled separately and a qualified Environmental Consultant contacted.
 - b. Prior to reuse of any made ground excavated from the site, chemical testing will be undertaken and the results compared against thresholds relevant to the land use (e.g. Generic Assessment Criteria for “greenspace”). Where material is proven to be unsuitable for use, the material should be removed from site to a suitably permitted waste management facility and replaced by certified, clean imported fill.

Appendix 6/3: Requirements for Excavations, Deposition, Compaction (Other than Dynamic Compaction)

- 6.3.1. Drawing PXG-JBA-00-GL-DR-Z-5001-GardenLakeGeneralArrangement states the earthworks requirements and existing topographic levels. Earthwork remediation is to be constructed to the line and level of the existing slope. The Footpath is to be reinstated to the line and level of the existing path, see Drawing. PXG-JBA-00-GL-DR-Z-5001-GardenLakeGeneralArrangement for details.
- 6.3.2. Blasting is not permitted
- 6.3.3. Cutting faces:
 - a. There are no special requirements for measures to prepare cutting faces prior to topsoiling, except that the method described in 603.7 (ii) may be used at the discretion of the Contractor (e.g. due to wet weather or project experience) or at the request of the Overseeing Organisation.
- 6.3.4. Watercourses:
 - a. No watercourses are to be made redundant as part of the scheme
- 6.3.5. Embankment construction: Not required
- 6.3.6. Compaction as per Clause 612.1 and Table 6/1.
- 6.3.7. Limiting distance for deposition of materials: Not required.
- 6.3.8. Excavations shall be formed as batters they shall be benched appropriately considering the plant used to excavate and backfill.
- 6.3.9. Excavation supports: Not required.
- 6.3.10. Where Topsoil fill is placed against existing slopes at an angle exceeding 1(v):2(H) benches shall be formed at the interface.
- 6.3.11. Class 6M fill is not required
- 6.3.12. Protection layer over corrugated steel structures: Not Required
- 6.3.13. Mixing of acceptable and unacceptable materials is not permitted.
- 6.3.14. Fill to natural or excavated voids: Not required

- 6.3.15. Additional requirements for corrugated steel structures: Not required.

Appendix 6/8: Topsoiling

- 6.8.1. Topsoil is required for landscaping as detailed by the landscape architect and in accordance with Appendix 30/1, 30/4 and 30/5; topsoil shall be classified at Class 5 (either site re-use or imported) in accordance with Table 6/1 and shall be placed as per the landscape architect drawings.
- 6.8.2. Topsoil is to be stripped to enable the remediation of the sinkhole – see drawing PXG-JBA-00-GL-DR-Z-5001-GardenLakeGeneralArrangement.
- 6.8.3. The depth to **which** the topsoil is to be stripped is minimum 150mm.
- 6.8.4. Topsoil stockpiles heights to be limited to 2m
- 6.8.5. Reference period of time for when topsoil can be stockpiled: as 602.10
- 6.8.6. Topsoil which is surplus to requirements is to be agreed with the Overseeing organisation for reuse elsewhere on the site or for disposal.
- 6.8.7. Not required.
- 6.8.8. The use of Class 5B is permitted should it be necessary.
- 6.8.9. Not required.
- 6.8.10. The requirements of Clause 618.3 are applicable, except 618.3 (ii) and (iii).
- 6.8.11. The requirements of Clause 618.4 are applicable.
- 6.8.12. Standard proposed topsoil thickness is shown on the landscape architect drawings, for particular landscaping requirements see the Series 3000 numbered appendices.

7 SERIES 1600 – PILING AND EMBEDDED RETAINING WALLS

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works Series 1600 and relevant Notes for Guidance Series NG 1600.

Appendix 16/1: General Requirements for Piling and Embedded Retaining Walls

- 16.1.1. The requirements for the steel sheet piles can be found on drawing PXG-JBA-00-GL-DR-Z-5001-GardenLakeGeneralArrangement.
- The sheet piles are to be **GU13N**, steel grade S355 GP, as produced by Arcelor Mittal (or similar approved) and shall be installed in conventional arrangement as shown on the contract drawings.
 - The contractor is required to engage with a Vibration Specialist this must include but not be limited to installation of vibration monitoring equipment, timescale over which baseline data is recorded to be able to compare to the piling works vibration and assessment of risk.
 - No damage is permitted to the adjacent Iron Bridge (Grade II) listed structure. A pre-condition & post-condition survey is specified in Section 1.7.2. In addition, a visual assessment is to be conducted after each pile is installed within 5m of the Iron Bridge. Photos of the Iron Bridge are required to be transmitted to the Overseeing Organisation at the end of each day. If at any point damage **or movement** is seen, all works must stop and the Overseeing Organisation notified. **Recommendation of works shall only commence following consultation and Approval by the Overseeing Organisation.** See Appendix 1/9 for further Vibration requirements.
- 16.1.2. Contractor designed structures – Not Required
- 16.1.3. Prior to the commencement of the sheet piling, the Contractor shall provide specific details of methodology and all plant that will be used in the piling operations, as well as any monitoring equipment that will be used.
- 16.1.4. Piling records shall be kept and provided to the Overseeing Organisation on a daily basis throughout the duration of the sheet piling works. The following information shall be recorded:
- Pile location (referencing shall be as determined by the Contractor).
 - Pile type and grade of steel.
 - Pile length (m) and installed head level (m AOD)
 - Driving method.
 - Date of driving.
 - Commencing surface level.
 - Depth driven,
 - Length of offcuts

- i. All information regarding interruptions, unexpected changes in driving characteristics, obstructions and times taken in overcoming them
- 16.1.5. See Appendix 1/9 for Noise and Vibration.
- 16.1.6. The Contractor's Method Statement his planned sequence and timing for pile installation having regard to the avoidance of damage to adjacent sheet piles and shall include:
 - a. Site staff and organisation
 - b. The details of piling plant should be sufficient to demonstrate its suitability for achieving the required penetration and to work within any noise and vibration limits where these are restricted
 - c. The sequence of piling which may affect uplift and lateral displacement of driven piles or affect the integrity of nearby cast-in-situ piles.
 - d. Setting out and means of achieving specified tolerances.
 - e. Procedures for dealing with emergency situations such as sudden loss of support fluid, obstructions and piles that are out of tolerance.
 - f. Typical record sheets.

Appendix 16/15: Steel Sheet Piles

- 16.15.1. The requirements for the steel sheet piles are:
 - g. The sheet piles are to be installed from a temporary working platform on the lake side with a toe level for the sheet piles at 145.7mAOD and a head of pile level at 149.7mAOD (and no higher). The installed sheet pile lengths shall be no shorter than 4m.
 - h. The sheet piles are to be installed following a topsoil strip. There shall be no surface expression of the installed sheet piles post topsoil reinstatement.
 - i. The sheet piles are to form a seepage cut-off. In view of this a temporary guide wall shall be used to ensure the **wall alignment orientation is correct**. All piles should have full clutch connection.
 - j. The plan construction tolerance shall be:
 - i. 75mm for the plan position of sheet piled wall
 - ii. 1 in 75 for the maximum permitted deviation of the finished wall from the vertical at any level
 - iii. -0mm+20mm for the toe and head levels
 - k. The Contractor shall undertake a 'watching brief' during piling operations and if installation conditions vary, this shall be brought to the attention of the Overseeing Organisation immediately.
 - l. The Contractor shall undertake all works necessary in advance of piling to ensure that no damage is caused to adjacent structures or utilities. All damage caused to adjacent structures or utilities by piling works shall be made good by the Contractor.
 - m. The Contractor shall submit the following information to the Overseeing Organisation, within the timescales indicated:

- i. Details of piles and clutch sealant to be used: 3 week prior to installation.
 - ii. The methods for access, handling, pitching, and installing the piles, together with details of proposals to guide the piles to ensure verticality: 3 weeks prior to installation.
 - iii. Test certificates for sheet piles: 2 week prior to installation.
 - iv. Details of declutching, damage, or separation of sheet piles: within 12 hours.
 - v. Pile refusal or pile damage: within 12 hours.
 - vi. Variations in length compared to design length: within 12 hours.
- 16.1.2. All the sheet pile clutches shall be sealed with low permeability Beltan® Plus sealant produced by Arcelor Mittal, (or similar approved) prior to delivery to the site, for water-tightness purposes.
- 16.1.2. No requirements for a vibrationless jacking system.

8 SERIES 3000 – LANDSCAPE AND ECOLOGY

The following Appendices shall be read in conjunction with Manual of Contract Documents for Highway Works Volume 2 Specification for Highway Works Series 3000 and relevant Notes for Guidance Series NG 3000. It should also be read in conjunction with drawings PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2 which provide planting schedules and additional specification information. In addition, it should also be read in conjunction with PXG-JBA-00-GL-RP-EN-4003-Invasive_NonNative_Species_Management_Plan.

Appendix 30/1: General

- 30.2.1 The works consist of soft landscape proposals including the preparation and cultivation of soils, the supply and planting of mixed shrub planting and grassland reinstatement.
- 30.2.2 The proposals are shown on drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Working Area Planting Plan Sheets 1 and 2.
- 30.2.3 All planting has 12 months landscape aftercare which will also include the cutting back of vegetation and all arisings to be dealt with in liaison with the Stourhead National Trust Estate Team.
- 30.2.4 The contractor is to give the Overseeing Organisation notice before carrying out the following:
 - i. Spreading topsoil
 - ii. If evidence of soil contamination is discovered in any topsoil or planting medium imported
 - iii. Delivery of plants
 - iv. Application of herbicide
 - v. Defective, diseased, unsafe or weak parts of trees are identified in addition to those scheduled for works
 - vi. Works outside of the site boundary
 - vii. Each site maintenance visit
- 30.2.5 Products containing peat are not permitted.
- 30.2.6 The bird nesting season is from March to August. Should it be required for work to be undertaken during this time, advice from a Suitably Qualified Ecologist (SQE) should be sought prior to any site clearance.
- 30.2.7 The contractor is to carry out inspections of all landscape works during the establishment period and maintain basic records to provide to the Overseeing Organisation. Records shall be proportionate to the scale of the works and at a minimum provide the following detail:
 - i. Date of inspection
 - ii. Areas inspected

- iii. Brief notes of general condition of establishing planted and seeded areas
- iv. Details of any remediation works undertaken or required.

Appendix 30/2: Weed Control

- 30.2.1 Prior to the preparation of the planting bed for the mixed shrub; a total weed control by non-residual herbicide shall be applied. The weed control is to be applied. The timing of the treatment shall be carried out to ensure all vegetation has been killed prior to the excavation of the planting pit. The area is shown on Drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Planting Plan Sheets 1 and 2.
- 30.2.2 Prior to the preparation of reinstated grassland areas, total weed control by non-residual herbicide shall be applied to the entire area. The timing of the treatment shall be carried out to ensure all vegetation has been killed prior to cultivation of the area. To be repeated as necessary to ensure the seed bed is clean prior to seeding. The areas are shown on Drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Planting Plan Sheets 1 and 2.
- 30.2.3 Selective weed control of broadleaved weeds, either by hand weeding or spot treatment, shall be carried out to all reinstated grassland areas as shown on Drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Planting Plan Sheets 1 and 2.
- 30.2.4 Selective weed control of broadleaved weeds, either by hand weeding or spot treatment, shall be carried out as and when necessary to ensure weeds are controlled and to allow the establishment of the proposed planting and grass seed mixes.
- 30.2.5 Selective weed control, either by hand weeding or spot treatment, shall be carried out to all topsoil storage areas to ensure weeds are controlled to an acceptable level. Unless agreed with the Overseeing Organisation, weed species should not be allowed to set seed on topsoil storage areas.
- 30.2.6 Hand weeding shall be carried out to weeds growing within all individual shrub shelters, within mixed shrub planting areas. Hand weeding shall be carried out regularly to ensure that any weeds that are present do not interfere with the establishment and continued survival of the plant and that the design aesthetics of the planting areas are not compromised.
- 30.2.7 In the event of Japanese Knotweed (*Fallopia japonica*) and other injurious weeds being found within the site boundary during the construction and the establishment / maintenance period for planting, they shall be brought to the attention of the Overseeing Organisation and treated in accordance with legislation and an agreed method statement if encountered.
- 30.2.8 All arisings associated with weed control shall be removed and delivered to the Stourhead National Trust Team to be processed. Arisings from all grass areas shall be removed and delivered to the Stourhead National Trust Team to be processed. The hand pulled arisings shall be removed immediately. The removal of dead weeds, after herbicide application, shall be carried out during the site visit immediately after the herbicide has taken effect and the weeds have been killed.

- 30.2.9 All injurious weed arisings shall be removed and delivered to the Stourhead National Trust Team be processed. This shall be carried out during the site visit immediately after the herbicide has taken effect and the weeds have been killed.
- 30.2.10 Weed control by herbicide and pesticides to be agreed in writing by the Overseeing Organisation using suitable products approved for use near water to avoid leaching of chemicals into the water.

Appendix 30/4: Ground Preparation

- 30.4.1 Vegetation clearance should be undertaken in line with the approved Arboricultural Impact Assessment (PXG-JBA-00-GL-RP-EN-4002-) and Tree Protection Plans, Drawing PXG-JBA-00-GL-DR-EN-4003 sheets 1 and 2.
- 30.4.2 Grade subsoils and topsoils to smooth flowing contours to achieve required finished levels.
- 30.4.3 Where compacted, subsoils to all grassland reinstatement areas shall be loosened by ripping or tining to a depth of up to 450 mm, as necessary to relieve compaction. Loosening shall be undertaken only in suitable ground conditions to avoid further compaction.
- 30.4.4 All arisings from the final preparation of planting areas shall be delivered to the Stourhead National Trust Estate team.
- 30.4.5 Do not mix topsoil with subsoils, hardcore, rubbish, materials from demolition and other grades of topsoil.
- 30.4.6 The top 300mm of compacted topsoil in planting beds is to be broken up prior to planting. No digging or soil cultivation shall be carried out within the root spread of trees and shrubs to be retained (including those adjacent to the site boundary).
- 30.4.7 All planting stations to be cleared of grass, weed growth and other herbaceous vegetation, to establish a vegetation control zone of minimum 1m diameter or pit size whichever is larger.
- 30.4.8 Arisings shall be collected up and removed from all landscape areas.
- 30.4.9 Locations for application of herbicide to areas to be planted are identified in appendix 30/2.
- 30.4.10 Comply with BS3882: 2015 when handling soil.
- 30.4.11 Topsoil depths for planted and seeded areas shall be as per Drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Planting Plan Sheets 1 and 2.
- 30.4.12 Following ground preparation, shrubs shall be planted within pits aligning to their size and location as per Drawing PXG-JBA-00-GL-DR-L-4003, Garden Lake Planting Plan Sheets 1 and 2.
 - i. Transplants to have pit wide enough to accommodate roots when fully spread and 75mm deeper than root system.
 - ii. Where stock is in containers (Ilex aquifolium) pit to accommodate the size/ height of the pot.

Appendix 30/5: Grass Seeding, Wildflower Seeding and Turfing

- 30.5.1 Meadow grass seeding is to take place in line with supplier's guidance in calm weather in autumn or spring. Sowing can also take place at other times in the year if there is sufficient warmth (i.e. minimal risk of frost & ground not frozen) and moisture (i.e. not during extended dry periods).
- 30.5.2 Following ground preparation, cultivate the upper 50mm of soils, to be reduced to a fine tilth where grassland reinstatement is to take place, areas as shown on Drawing PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2.
- 30.5.3 Seed mix is to be EG8 Meadow Mix for Wet Soils as supplied by Emorsgate Seeds or similar approved.
- 30.5.4 Seeding is to be distributed in line with supplier guidance at a rate of 5g/m².
- 30.5.5 Hydraulic seeding is not permitted.
- 30.5.6 Grassland reinstatement areas shall be mown regularly to 40-60mm throughout the first growing season to prevent weeds smothering slower growing grasses. Cut 3-6 times over spring and summer for establishment, subject to growth and vigorous weeds.
- 30.5.7 Where mowing is undertaken adjacent to the reservoir, the selection and operation of mowing plant shall comply with the Overseeing Organisation's health and safety requirements for working adjacent to open water.
- 30.5.8 Remove grass cuttings if dense and deliver to the Stourhead National Trust Estate Team for processing. If frequent mowing is undertaken minimal cuttings can be left in situ to disperse.

Appendix 30/6: Planting

- 30.6.1 All planting to be as per the schedules as shown on Drawing PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2.
- 30.6.2 Grafted stock is not acceptable.
- 30.6.3 Native shrub species to be of local provenance.
- 30.6.4 There is no requirement for the Overseeing Organisation to individually select shrub species at the nursery.
- 30.6.5 To all mixed shrub planting areas; 50:50 mix of imported topsoil (to BS3882:2015) to peat free compost to PAS100.
- 30.6.6 Bareroot and Root-balled shrubs are to be planted in the dormant season, November – March.
- 30.6.7 Plants shall be planted at the depth of the nursery soil mark, firmed, and watered immediately after planting.
- 30.6.8 Mixed shrub planting to be planted in pits within a prepared planting bed to the location as shown on Drawing PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2.

- 30.6.9 To all mixed shrub areas, NexGen Biodegradable shrub shelters, or similar approved, 0.6m high. Shelters shall be fixed with releasable pre-fitted ratchet ties to softwood stakes, 25 mm x 25 mm in cross section, minimum 0.9m long for 0.6m high shelters.
- 30.6.10 All plant material is to be thoroughly watered before packaging for delivery, before planting and immediately following. Water shall be applied until the ground reaches its saturation point.
- 30.6.11 After planting of all mixed shrubs, 50mm layer of compost mulch is to be applied to the planting location as shown on Drawing PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2. Mulch shall have a natural appearance and shall not deplete the nitrogen content of the soil.
- 30.6.12 The contractor shall replace all dead, or in the opinion of the Overseeing Organisation, defective planting for the duration of the 12-month maintenance period. The contractor should seek prior approval from the Overseeing Organisation of any variation to the original specification of any replacement plants. Replacement plants are to be maintained for the remainder of the maintenance period.
- 30.6.13 All plants are to be watered-in immediately after replacement. Water shall be applied until the ground reaches its saturation point. Replacement planting should be carried out at the appropriate time throughout the year. Where container stock may be replaced in summer, it should be noted that watering additional to that needed for winter-planted stock may be necessary to ensure establishment.
- 30.6.14 The Contractor is to maintain new planting areas for 12 months in line with the agreed maintenance period.

Appendix 30/8: Watering

- 30.8.1 The Contractor is responsible for watering to ensure the establishment and survival of plants and grassland during the course of the 12-month maintenance period.
- 30.8.2 All plant material is to be thoroughly watered before packaging for delivery, before planting and immediately following. Water shall be applied until the ground reaches its saturation point.
- 30.8.3 In times of dry weather, shrubs shall be watered until soil is saturated and in accordance with good horticultural practice.

Appendix 30/9: Establishment Maintenance for Planting

- 30.9.1 The Contractor shall maintain all mixed shrub planting areas, as shown on Drawing PXG-JBA-00-GL-DR-L-4003-Garden_Lake_Working_Area_Planting_Plan sheets 1 and 2, for a period of 12 months.
- 30.9.2 All planting areas within the site boundary are to be kept in a clean and tidy condition. All litter, debris and other deleterious material is to be delivered to the Stourhead National Trust Team for processing.

- 30.9.3 Compost mulch to the mixed shrub area is to be kept topped up as required.
- 30.9.4 Mixed shrub areas are to be managed to a height of 1200mm. Pruning should be undertaken October to February as required.
- 30.9.5 Once shrubs are well rooted and stable, with growth of shoots well above the top of the shrub shelter (typically 18-36 months following planting), shelters and supporting stakes are to be removed. This should be monitored during maintenance visits and notice given to the Overseeing Organisation prior to removal.

Appendix 30/10: Maintenance of Established Trees and Shrubs

- 30.10.1 Works to existing trees are detailed within the Arboricultural Impact Assessment (Document PXG-JBA-00-GL-RP-EN-4002) and on the Tree Protection Plans (Drawing PXG-JBA-00-GL-DR-EN-4003).
- 30.10.2 All other existing trees within the site boundary, except for those identified by the Contract Drawings to be removed or pruned to facilitate the works, are to remain under the maintenance operations of the Overseeing Organisation.
- 30.10.3 As per the Arboricultural Impact Assessment (Document PXG-JBA-00-GL-RP-EN-4002), the site lies within Stourton Conservation Area. The contractor is required to give 6 weeks' notice to the Local Planning Authority prior to undertaking removals and pruning works to existing trees within the site boundary.
- 30.10.4 The Arboricultural Impact Assessment (Document PXG-JBA-00-GL-RP-EN-4002) identifies 7 individual trees and 1 group to be removed to facilitate the works. The contractor should refer to the Tree Works Schedule located within Appendix F of the Arboricultural Impact Assessment to determine the size of the trees to be removed.
- 30.10.5 Crown lifting to approximately 5m has been identified for tree T033 and G004 to facilitate vehicle and plant clearance along the access route south of Garden Lake. This should be as per the Tree Works Schedule located within Appendix F of the Arboricultural Impact Assessment and as shown on the Tree Protection Plans (Drawing PXG-JBA-00-GL-DR-EN-4003).
- 30.10.6 Pruning back of branching by approximately 1.5m has been identified for tree T019 and G002 to facilitate vehicle and plant clearance. This should be as per the Tree Works Schedule located within Appendix F of the Arboricultural Impact Assessment and as shown on the Tree Protection Plans (Drawing PXG-JBA-00-GL-DR-EN-4003).
- 30.10.7 All works to trees should be carried out by a suitably qualified and competent arborist and shall be undertaken in accordance with BS3998:2010 Tree Work – Recommendations.

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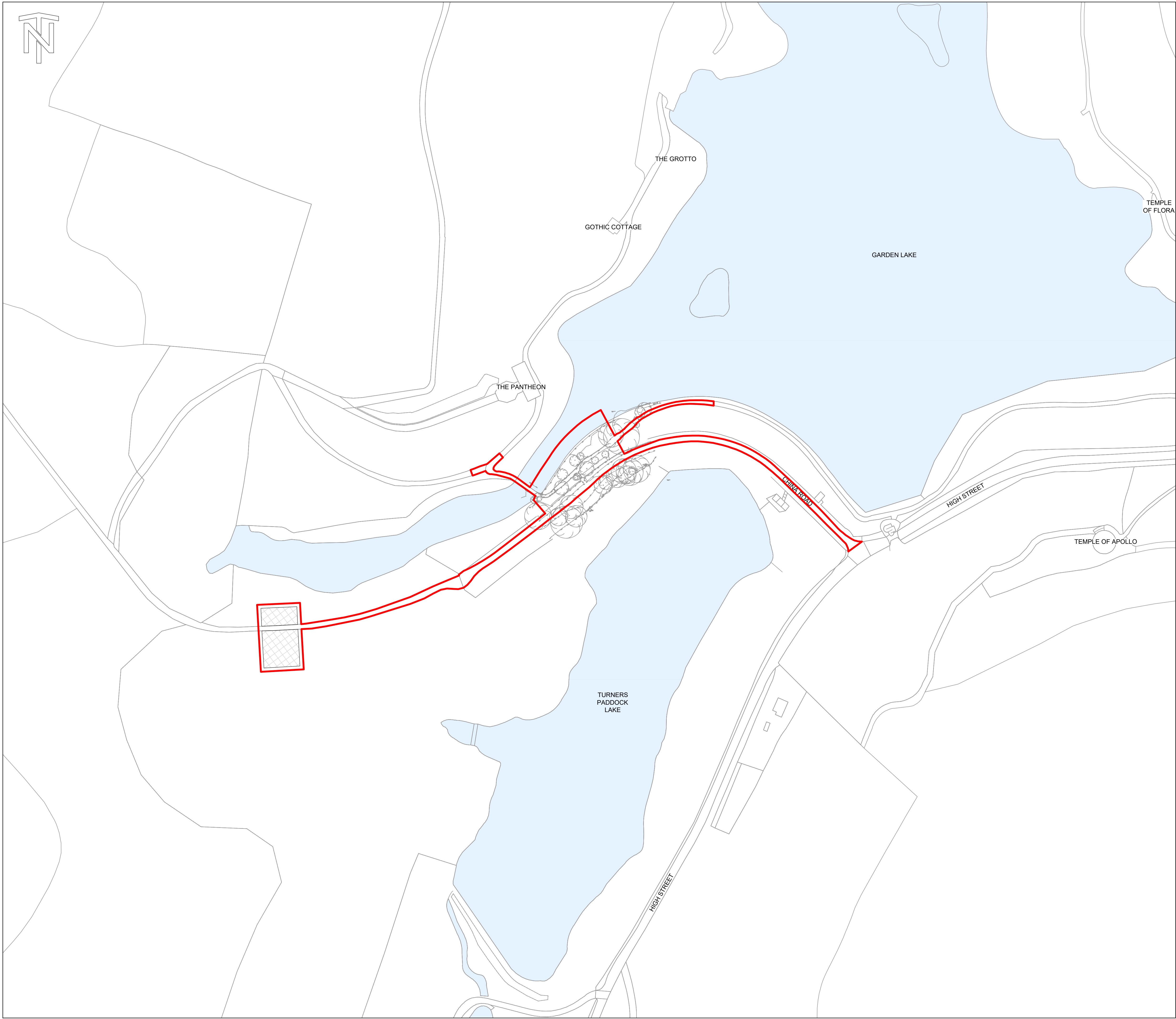
B Drawings

PXG-JBA-00-GL-DR-Z-5000-GardenLakeRedLineBoundary

PXG-JBA-00-GL-DR-Z-5001-GardenLakeGeneralArrangement

PXG-JBA-00-GL-DR-Z-5002-GardenLakeSections

PXG-JBA-00-GL-DR-Z-5010-GardenLakeHazardsAndConstraintsPlan



GENERAL NOTES

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- ALL COORDINATES ARE IN METRES RELATIVE TO ORDNANCE SURVEY NATIONAL GRID.
- DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
- PILING SHALL BE UNDERTAKEN ACCORDING TO THE WORKS SPECIFICATION REF. PXG-JBA-00-GL-SP-Z-5001.

LEGEND

RED LINE BOUNDARY

COMPOUND AND LAY DOWN AREAS

50403020100204060

SCALE 1:1000 (m)

C02	PUBLISHED DESIGN - UPDATED RED LINE BOUNDARY	27/11/25	OK	SW	PM	JB
C01	PUBLISHED DESIGN	28/10/25	OK	SW	PM	JB
P01	FOR REVIEW AND COMMENT	26/09/25	OK	SW	PM	MC
Rev.	Description	Date	Author	Designer	Checker	Approver

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consulting

Project Title

STOURHEAD MIOS DETAILED DESIGN

Drawing Title

GARDEN LAKE
RED LINE BOUNDARY

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National
Trust

Parent Model

NOT FROM MODEL

Security Classification

OFFICIAL

Scale

1:1000

Author

O. KNOTT

Designer

S. WATKINS

Checker

P. MASON

Approver

M. CROSS

Suitability

PUBLISHED DESIGN

Status

A3

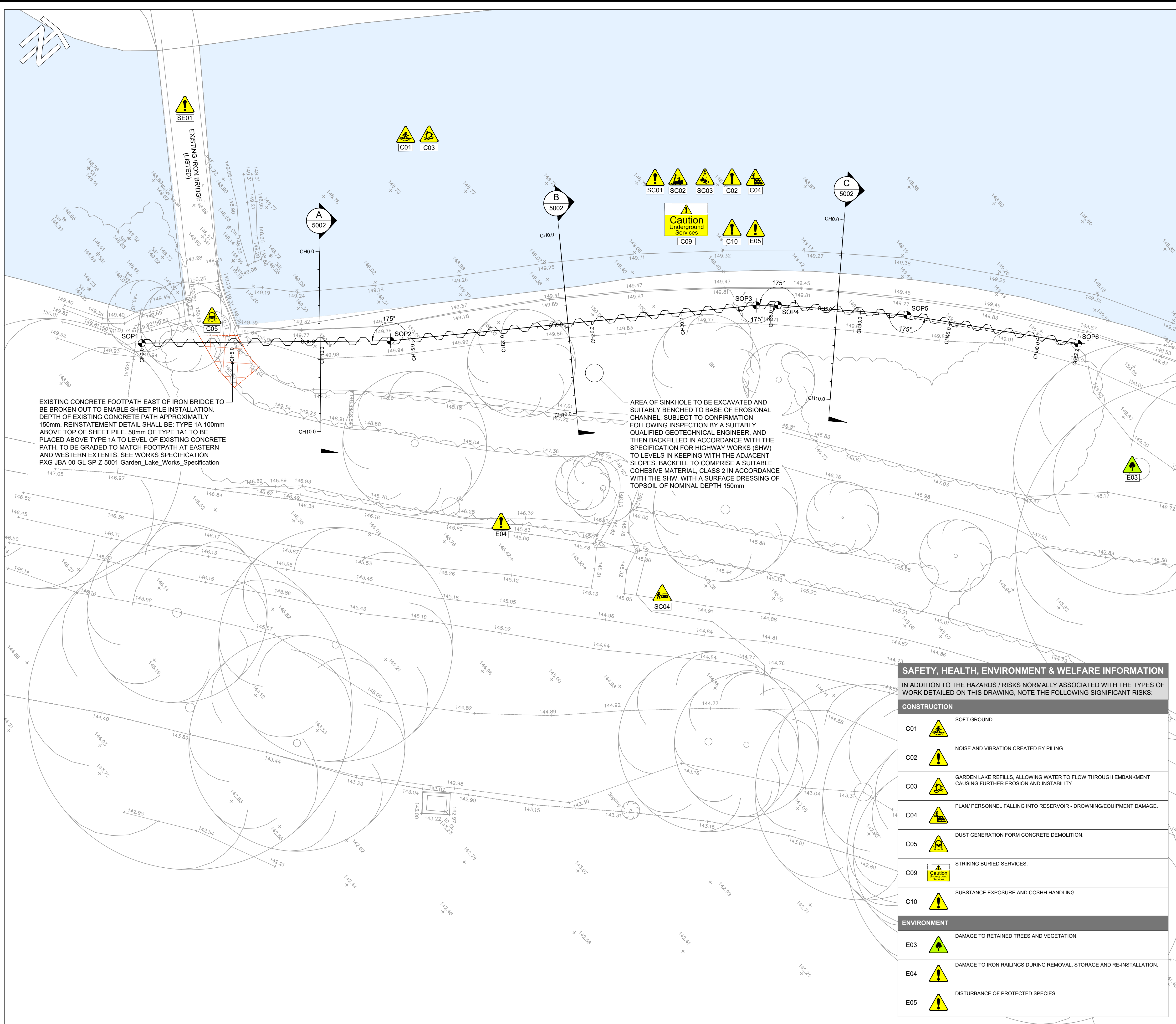
Revision

C02

Information Container

PXG-JBA-00-GL-DR-Z-5000.dwg

A1 Sheet Size



SETTING OUT INFORMATION		
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SOP2	377078.687	133863.803
SOP3	377090.525	133880.416
SOP4	377091.304	133881.329
SOP5	377096.437	133886.378
SOP6	377103.842	133892.488

SAFETY, HEALTH, ENVIRONMENT & WELFARE INFORMATION

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS:

CONSTRUCTION (MOST SIGNIFICANT RISKS)	
SC01	SITE CONSTRAINTS, SMALL WORKING AREA.
SC02	EMBANKMENT FAILURE THROUGH LOADING DURING CONSTRUCTION.
SC03	LIFTING OPERATIONS.
SC04	PLANT/PUBLIC INTERFACE RESULTING IN COLLISION/DEATH/INJURY/DAMAGE TO PUBLIC/SITE VEHICLES/PLANT.

ENVIRONMENT (MOST SIGNIFICANT RISKS)	
SE01	DAMAGE TO IRON BRIDGE (GRADE II LISTED)

UTILITY SERVICES INVESTIGATION GAUGE TO PAS 128	
TYPE D: DESK STUDY	
TYPE C: DESK STUDY WITH SITE RECONNAISSANCE	
TYPE B: DESK STUDY, SITE RECONNAISSANCE AND DETECTION SURVEY	
TYPE A: DESK STUDY, SITE RECON, DETECTION SURVEY AND TRIAL HOLES	

TYPE D	TYPE C	TYPE B	TYPE A
14/10/25	-	-	-
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5 4 3 2 1 0 2 4 6 SCALE 1:100 (m)			

C02	PUBLISHED DESIGN - UPDATED FOR PATH REINSTATEMENT DETAIL & PILE SECTION	27/11/25	OK	SW	PM	JB
C01	PUBLISHED DESIGN	28/10/25	OK	SW	PM	JB
P01	FOR REVIEW AND COMMENT	26/09/25	OK	SW	PM	MC
Rev.	Description	Date	Author	Designer	Checker	Approver
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Project Title

STOURHEAD MIOS DETAILED DESIGN

Drawing Title

GARDEN LAKE
GENERAL ARRANGEMENT

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Parent Model

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Security Classification

OFFICIAL

Author

O. KNOTT

Designer

S. WATKINS

Checker

P. MASON

Approver

M. CROSS

Suitability

PUBLISHED DESIGN

Status

A3

Revision

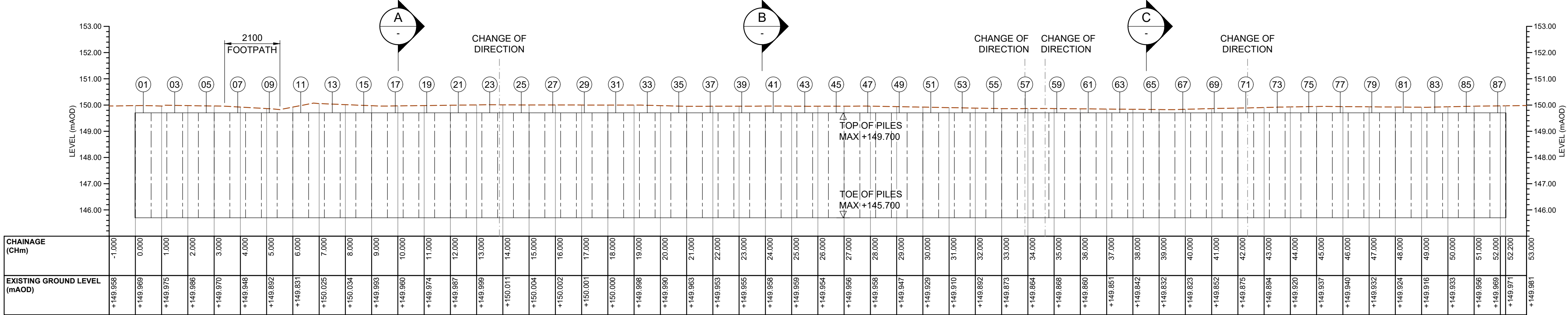
C02

Information Container

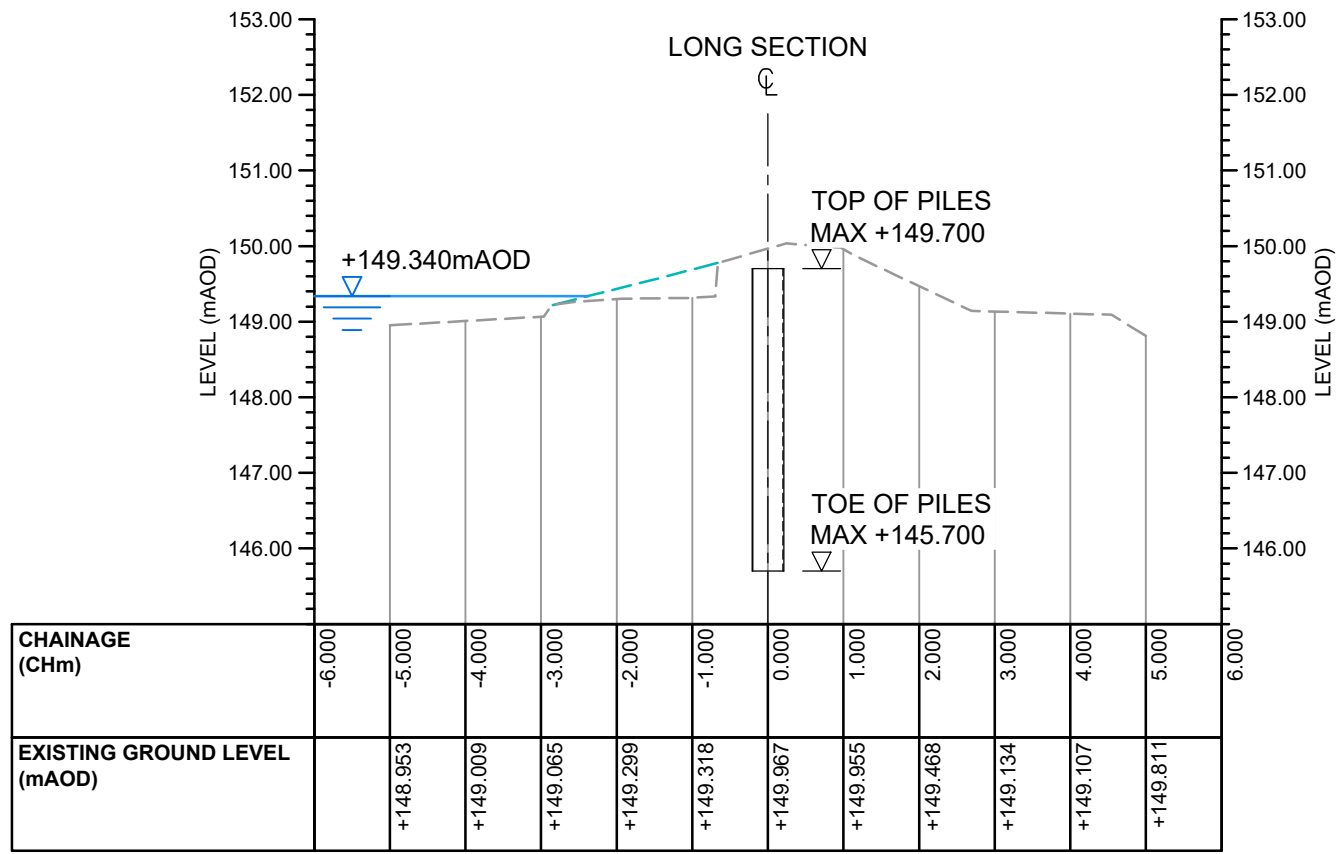
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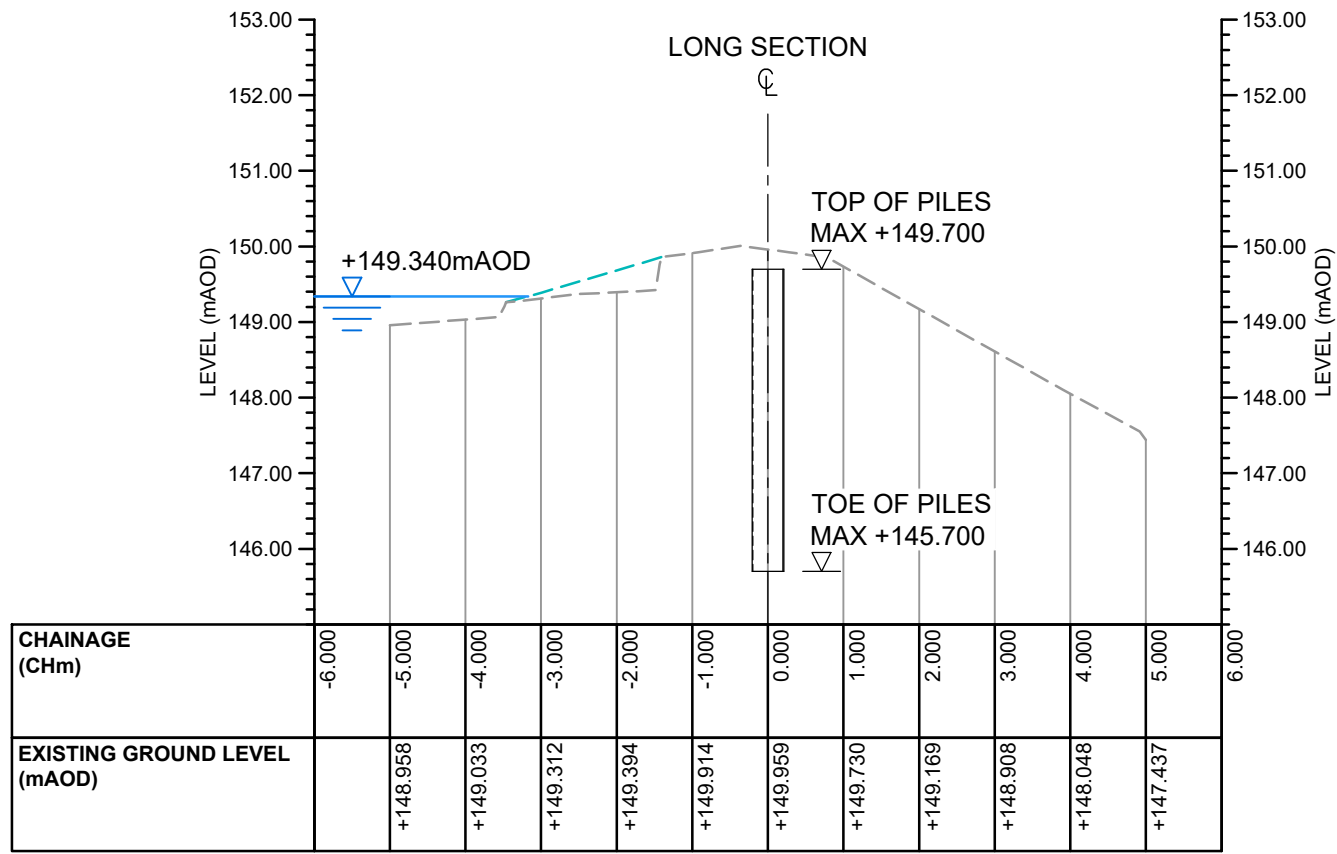
National Trust



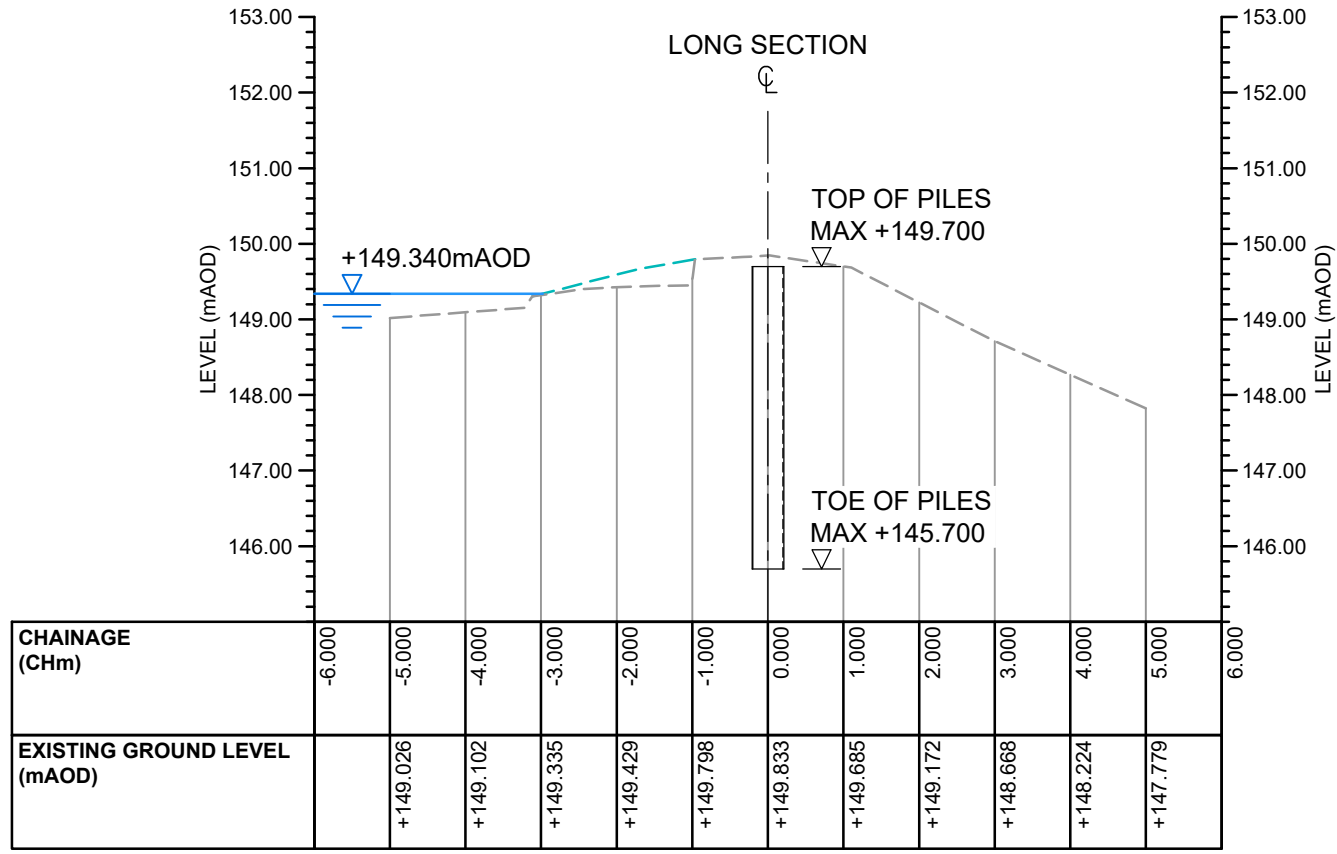
LONG SECTION
SCALE 1:100



SECTION A
SCALE 1:100



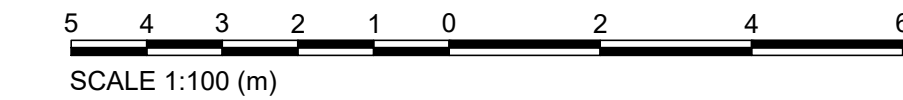
SECTION B
SCALE 1:100



SECTION C
SCALE 1:100

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- TOP WATER LEVEL IS 149.34 AS DEFINED IN 2023 S10 REPORT.
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C02	PUBLISHED DESIGN - AMENDED FOOTPATH WIDTH & PILE SECTION	27/11/25	OK	SW	PM	JB
C01	PUBLISHED DESIGN	28/10/25	OK	SW	PM	JB
P01	FOR REVIEW AND COMMENT	26/09/25	OK	SW	PM	MC
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Project Title

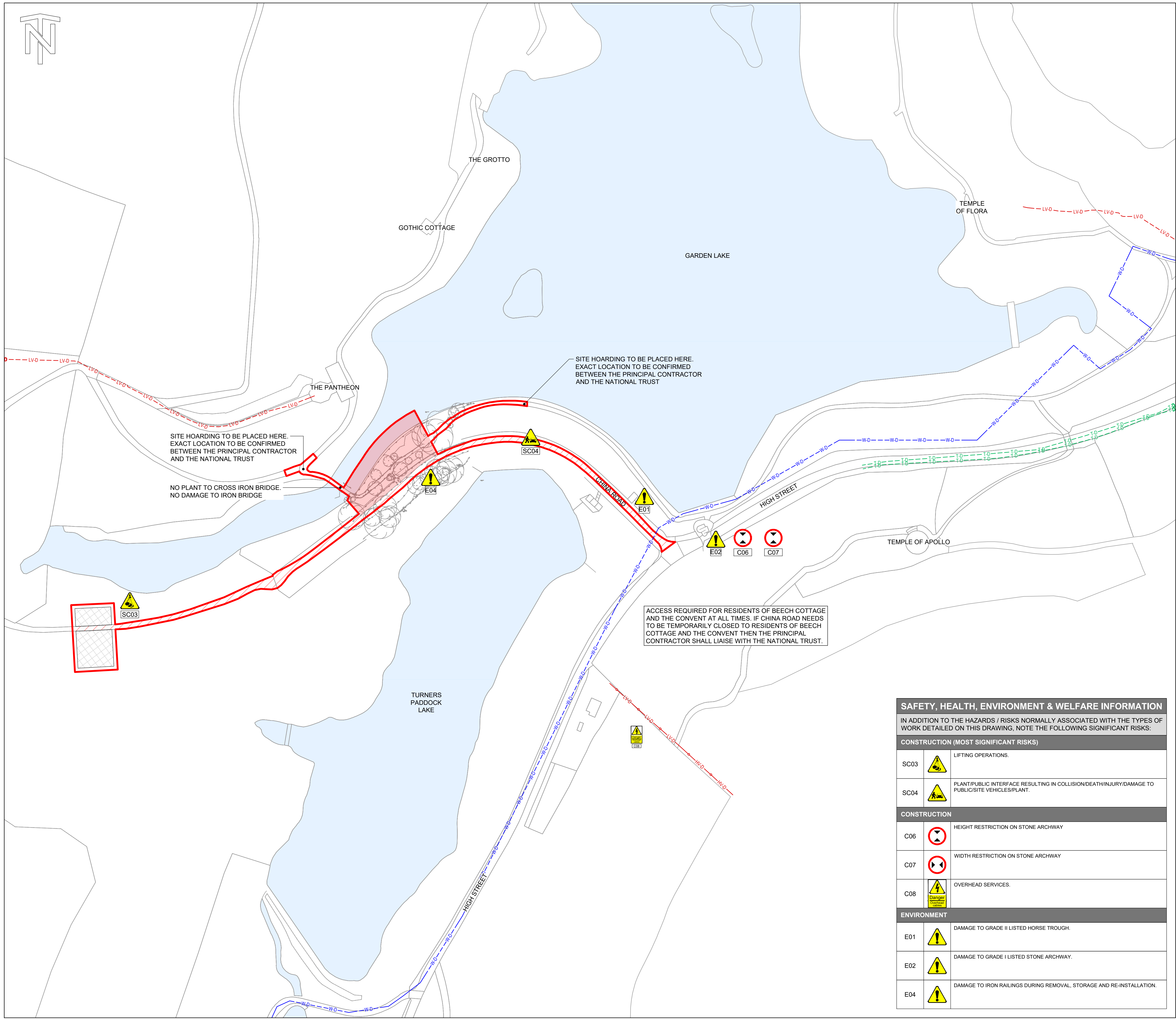
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Drawing Title

GARDEN LAKE SECTIONS



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Security Classification	Scale	AS SHOWN
OFFICIAL	Author	Designer
O. KNOTT	S. WATKINS	Checker
P. MASON	Approver	M. CROSS
Suitability	Status	Revision
PUBLISHED DESIGN	A3	C02
Information Container	PXG-JBA-00-GL-DR-Z-5002.dwg	A1 Sheet Size



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LEGEND

- RED LINE BOUNDARY
- WORKING AREA
- SHARED ACCESS ALONG CHINA ROAD
- COMPOUND AND LAY DOWN AREAS

EXISTING UTILITY SERVICES

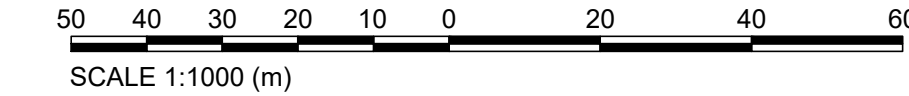
- W-D - MAINS WATER - UNDERGROUND
- FD-D - FOUL WASTE WATER - UNDERGROUND
- HV-D - HV ELECTRICITY - OVERHEAD
- HV-D - HV ELECTRICITY - UNDERGROUND
- LV-D - LV ELECTRICITY - OVERHEAD
- LV-D - LV ELECTRICITY - UNDERGROUND
- T-D - TELECOMMUNICATIONS - UNDERGROUND

UTILITY SERVICES INVESTIGATION GAUGE TO PAS 128

- TYPE D: DESK STUDY
- TYPE C: DESK STUDY WITH SITE RECONNAISSANCE
- TYPE B: DESK STUDY, SITE RECONNAISSANCE AND DETECTION SURVEY
- TYPE A: DESK STUDY, SITE RECON, DETECTION SURVEY AND TRIAL HOLES

TYPE D	TYPE C	TYPE B	TYPE A
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Rev.	Description	Date	Author	Designer	Checker	Approver
C02	PUBLISHED DESIGN - UPDATED RED LINE BOUNDARY	27/11/25	OK	SW	PM	JB
C01	PUBLISHED DESIGN	28/10/25	OK	SW	PM	JB

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STOURHEAD MIOS DETAILED DESIGN

GARDEN LAKE
HAZARDS & CONSTRAINTS PLAN

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Security Classification		Scale	
OFFICIAL		1:1000	
Author	Designer	Checker	Approver
O. KNOTT	S. WATKINS	P. MASON	J. BENN
Suitability			Status
PUBLISHED DESIGN			A3
Information Container			Revision
PXG-JBA-00-GL-DR-Z-5010.dwg			C02
			A1 Sheet Size

C Designers Risk Assessment

Client:	National Trust
BIM Reference:	PXG-JBA-00-GL-RR-Z-5001-Garden_Lake_Designers_Risk_Assessment
Project Name:	Stourhead MIOS Detailed Design
Project Code	2025s0768
Project Stage	Detailed

Each revision must be approved by a Project Director or Technical Reviewer with appropriate competence, as stated in the Project Quality Plan (PQP).

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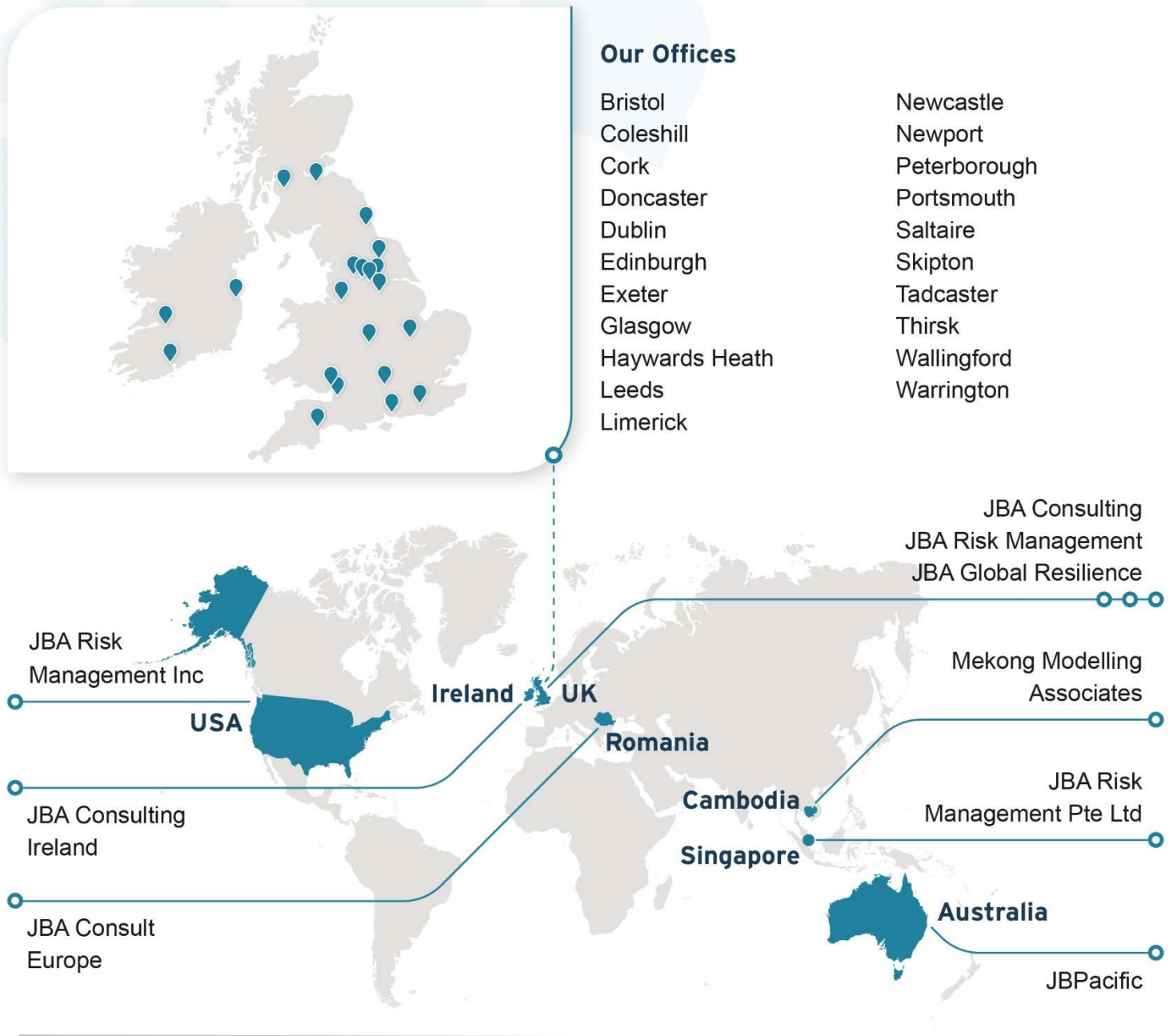
AS THE DESIGNER, HAVE YOU CONSIDERED ALL REASONABLY FORESEEABLE HAZARDS/RISKS ASSOCIATED WITH THIS DESIGN DURING CONSTRUCTION, USE, OPERATION, MAINTENANCE AND FUTURE DECOMMISSIONING? IF YES PROCEED WITH APPROVAL.

Stage 1					Stage 2		Stage 3			Stage 4	
Identify					Eliminate / Reduce		Inform			Control	
Ref. no.	Location	Project element, material or activity	Identified significant health, safety, security, welfare, and environmental hazards and possible effects	People or environment at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Residual hazards and risks	Communication method	Drawing Numbers	Warning Triangle Type	Risk owner(s)	Recommended control measures
LIMITATION IN DESIGNS											
CONSTRUCTION (MOST SIGNIFICANT RISKS)											
SC01		Constrained Site	Constrained Site, people-plant interface. Risk: Serious Injury / death	Site Team	Site size cannot be changed. ECI involvement with contractor visits to site to assess site areas/methodologies etc to ensure they are suitable for the site given the constraints in size.	Site constraints, small working area.	Drawings	Z-5001	General hazard	Contractor	A construction management plan and Contractor RAMS are required detailing working methodologies. Daily site briefings required to ensure working areas are suitable with no clashes. Safe system of works for approaching plant to be incorporated into RAMS. Exclusions zones to be applied during certain working tasks/around plant. Plant manoeuvre with banksmen. High vis PPE.
SC02		Access/Working Area – Plant loading	Embankment failure through loading during construction.	Site Team	Ground investigation undertaken.	Embankment failure through loading during construction.	Drawings	Z-5001	Construction Plant	Contractor	Contractor to ensure safe and stable working platform to carry out works. Any work to follow the Contractor's Safe System of Work. Temporary Works Design required utilising known information and select appropriate plant.
SC03		Lifting operations (e.g. sheet piling, railings, tree removal)	Risk of injury or death to personnel from lifting operations. Damage to plant.	Construction team, Equipment	Piles types specified.	Lifting Operations	Drawings	Z-5001, Z-5000	Lifting operations	Contractor	All works to be undertaken in accordance with contractor lift plan and RAMS. All machinery certificates and staff competencies to be checked and confirmed prior to works.
SC04		China Road	Plant/public interface resulting in collision/death/injury/damage to public/site vehicles/plant	Construction Team, Equipment, Public	China Road to be kept open for residents of Beech Cottage and the Convent as per Client instruction. PROW closure applied and approved for the footpath element NT to provide sufficient early warnings to neighbours/road users and signage to be installed to highlight risks	Plant/public interface resulting in collision/death/injury/damage to public/site vehicles/plant	Drawings	Z-5001, Z-5000	Public Interface	Contractor	Signage and traffic management plans
ENVIRONMENT (MOST SIGNIFICANT RISKS)											
SE01		Grade II Listed Iron Bridge	Risk to damage Grade II listed iron bridge that is adjacent to piling operations	Environment	Iron Bridge to be highlighted as a Grade II listed structure at risk due to proximity to the works. HIA to be completed regarding the asset and any mitigation/monitoring measures during the works. GI undertaken to investigate foundations and piling will not clash with foundations.	Damage to Iron Bridge (Grade II listed)	Drawings, Heritage Impact Assessment, Works Specification	Z-5001	General hazard	Contractor	A pre-condition survey is required before construction works with a subsequent post construction survey. HIA to be complied with.
OPERATION AND MAINTENANCE / CLEANING (MOST SIGNIFICANT RISKS)											
DECOMMISSIONING / DEMOLITION (MOST SIGNIFICANT RISKS)											
CONSTRUCTION											
C01		Western Arm of Garden Lake	Western Arm dried through water level lowering to enable the works resulting in soft ground. Damage to plant.	Construction team, Equipment	Working area to be dried through water level lowering of Garden Lake to reduce impounded area. ECI involvement to enable access and working area to be assessed for any required temporary works in creation of working platform etc	Soft Ground	Drawings	Z-5001	Soft ground	Contractor	Contractor to assess access and working areas with regards to temporary works.
C02		Sheet piling - Noise & Vibration	Disruption to local environment caused by piling hammer.	Construction team / Public	Piling selected as preferred option from Optioneering Project. ECI to advise on methodologies. Design to attempt driven rather than percussion to install piles. Where percussive/vibration need to be utilised then mitigation measures to be considered.	Noise and vibration created by piling.	Drawings	Z-5001	General hazard	Contractor	Noise and vibration levels to be monitored against allowable levels in HIA with works to stop if allowable limits are exceeded. Piling works only to occur between 08:00 and 17:00 on weekdays.
C03		Flooding/Extreme Weather	Garden Lake refills, allowing water to flow through embankment causing further erosion and instability	Construction Team	The lake will be drawn down to create a dry working area. The lake will need to be drawn down sufficiently to allow for a 1 in 10 year flood event to not impact working area. Contractor to be added to Emergency Response Site Plan by Client.	Garden Lake refills, allowing water to flow through embankment causing further erosion and instability	Drawings	Z-5001	Flood risk	Contractor / Client	Works to be undertaken with flooding considered, weather and flooding to be monitored through the works with any periods of risk marked as non-working times with the worksite secured to prevent any material loss/damage through flooding.
C04		Construction activities adjacent to a lake	Plant and people working on the edge of a reservoir embankment dam. Risk: Drowning	Site Team	Lake top water level will be lowered to reduce the site area adjacent to a water body, this will then be limited to the eastern end of the works. Edge and exclusion zones to be demarcated with physical barriers to identify limits of working area.	Plan/personnel falling into Reservoir - drowning/equipment damage	Drawings	Z-5001	Adjacent to watercourse	Contractor	Edge demarcation/exclusion zones to be identified
C05		Concrete Pathway removal	Dust generation during demolition activities of the existing concrete pathway leading to harm	Construction Team	Works to be undertaken using mitigation measures to manage dust.	Dust Generation from Concrete Demolition	Drawings	Z-5001	Toxic	Contractor	Dust suppression through damping down and appropriate working methods. Contractor RAMS to be prepared and utilised.
C06		Large vehicles accessing site	Striking and damaging Grade I listed Stone Archway.	Construction team/Public/Assets	Highlighted in the Works Specification.	Height Restriction on Stone Archway	Drawings	Z-5000	Height restriction	Contractor	Traffic Management Plan, RAMS to be followed. Contractor to highlight risks and signpost with height limits. Measurements of structure undertaken to identify restrictions.
C07		Large vehicles accessing site	Striking and damaging Grade I listed Stone Archway.	Construction team/Public/Assets	Highlighted in the Works Specification.	Width restriction on Stone Archway	Drawings	Z-5000	Width restriction	Contractor	Traffic Management Plan, RAMS to be followed. Contractor to highlight risks and signpost with width limits. Measurements of structure undertaken to identify restrictions.
C08		Overhead services near site	Risk of a cable strike, fire and explosions and related injuries, burns, personal injury, death. Site down time	Construction team	PAS Type D service search undertaken and known services are on drawings	Overhead Services	Drawings	Z-5000	Overhead Cables	Contractor	Traffic Management Plan, RAMS to be followed. Contractor to highlight risks and demarcate/identify with goal posts any overhead services if identified on site.
C09		Breaking Ground - Striking Buried services	Risk of damaging the service during excavation. Death/injury/damage to plant and equipment.	Site Team	No excavation works designed over or close to the underground services. No known services in the main working area - PAS128 Type D service search undertaken and on drawings.	Striking Buried Services	Drawings	Z-5001	Underground services	Contractor	Contractor to review service plans and follow RAMS.
C10		Exposure to COSHH materials (i.e. concrete & pile sealant)	Health risks, skin irritation/burns/respiratory problems	Site Team	Materials utilised are standard products and as such should have COSHH certificates detailing appropriate use and methodologies for use.	Substance exposure and COSHH Handling	Drawings	Z-5001	General hazard	Contractor	Comply with product instructions, ensure COSHH certificates are available on site, tool box talks to ensure site team area aware of the risks and understand the correct usage and methodologies for usage.
ENVIRONMENT											
E01		Damage to Grade II Listed Horse Trough	Risk of damage to structure	Environment	A Heritage Impact Assessment has been undertaken to inform the project of the Heritage features	Damage to Grade II listed Horse Trough	Drawings, Heritage Impact Assessment, Works Specification	Z-5000	General hazard	Contractor	A pre- and post-condition assessment is required before works and a condition assessment required after. Any incidences to be reported to the Client.
E02		Damage to Stone Archway	Risk of damage to structure	Environment	A Heritage Impact Assessment has been undertaken to inform the project of the Heritage features	Damaged to Grade 1 listed Stone Archway	Drawings, Heritage Impact Assessment, Works Specification	Z-5000	General hazard	Contractor	A pre- and post-condition assessment is required before works and a condition assessment required after. Any incidences to be reported to the Client.
E03		Damage to retained trees	Risk of damage to trees via compression of root zone or plant catching trees	Environment	An Arboricultural Impact Assessment (AIA) has been completed with a Tree Protection Plan has been produced identifying the root protection zones and classification of trees that are remaining.	Damage to Retained Trees and Vegetation	Drawings, Arboricultural Impact Assessment	Z-5001	Important tree/hedgerow	Contractor	Contractor to avoid works in exclusion zones, comply with AIA.
E04		Damage to Iron Railings during removal	Risk of damage to structure	Environment	Structure location identified and discussed with Client and Contractor, Contractor to provide a method statement detailing the removal works for the Client and Heritage Advisor to approve	Damage to Iron Railings during removal, storage and re-installation	Drawings, Heritage Impact Assessment, Works Specification	Z-5001, Z-5000	General hazard	Contractor	Specific methodology for removal to be prepared and agreed with the Client and Heritage Advisor prior to the works. A pre- and post-condition assessment is required before works and a condition assessment required after. Any incidences to be reported to the Client.
E05		Ecological disturbance	Disturbance of Ecology	Environment	A Great Crested Newt Method Statement has been produced and the risk of encountering GCN is low at the time of year construction works is occurring and in the environment that is being affected.	Disturbance of Protected Species	Drawings, Great Crested Newt Precautionary Method Statement	Z-5001	General hazard	Contractor	Undertake regular inspections of working area, stop works if any GCN are encountered and advise Client and Designer.
OPERATION AND MAINTENANCE / CLEANING											
DECOMMISSIONING / DEMOLITION											

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