Basis of Design

9 October 2024

To	Anju Devkota	**Contact No.**	08 9420 2169
Copy to	Raphael Crea	**Email**	Anju.Devkota@watercorporation.com.au
From	Klaudyna Narozna	**Project No.**	12648517
Project Name	Rivervale Midgley St PS Emergency Storage		
Subject	CS21653 – Basis of Design for Rivervale Midgley Street Emergency Storage		

Dear Anju

1. Introduction

The purpose of this document is to define the basis of design for the Rivervale Midgley Street emergency storage Engineering/Detailed Design Project. The basis of design seeks stakeholder endorsement *prior* to commencement of the Engineering Design, to help ensure the project does not incur design delays and is delivered on schedule.

Information presented in the Basis of Design has been collated from:

- The Design Brief for CS21653
- Existing Midgley Street pump station and sewer details presented in Esinet / MyWorld.
- AMOSS data sheet (extracted 11/09/2024)
- Arboricultural Assessment report (Classic Tree Services, 04/04/2023)
- Site Feature Survey (GE Surveys, 28/08/2023)
- Kick-off meeting (11/09/2024)
- Site Visit (26/09/2024)

2. Scope and limitations

2.1 Scope of work

The scope of this project is to deliver engineering and detailed design for emergency storage pipes at Rivervale Midgley Street pump station.

2.2 Limitations

This report has been prepared by GHD for Water Corporation and may only be used and relied on by Water Corporation for the purpose agreed between GHD and Water Corporation as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Water Corporation arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

3. Current Scenario

Midgley St Sewer Pump Station (SPS) has an existing pump rate of 23.3 L/s and discharges into the Rivervale Main Sewer via a DN200 Pressure Main. There is 75.47 m^3 of Emergency Storage at Midgley St SPS (12.7 m^3 in the wet well and 62.7 m^3 in the reticulation). There is currently 1.5 hours of Time to Overflow at the site, which is insufficient to meet the Emergency Storage requirement of 2.8 hours.

4. Project Requirements

1. A total of 175 m^3 of additional storage capacity is required in the long term. This project will deliver 88 m^3 of emergency storage pipes and make provision for future construction of another 88 m^3.
2. The emergency storage is to be constructed in JA Lee Reserve adjacent to the pump station site. Easement requirements will be managed by Water Corporation following approval of the detailed design.
3. The emergency storage design will comply with DS51 (section 4.10.2 and standard drawings CA01-5-1G and CA01-5-6E) unless specific exemptions are approved by Water Corporation.
4. This project will not make any change to the existing trapped emergency overflow facility. This means that the project will not affect the existing system storage capacity (wet well and reticulation).
5. An Approved Requirements Baseline document is not available for this project.

5. Available Storage Envelope

The existing trapped emergency overflow and the proposed emergency storage are both located at the pump station site. Therefore, the storage envelope is not affected by hydraulic gradients in the sewer network.

1. The maximum level contributing to the required emergency storage volume is the overflow to environment control level, defined in the AMOSS data sheet at 12.95 mAHD.
2. The minimum level for the proposed connection to access chamber M6780A is 10.02 mAHD, to keep the emergency storage pipework above the top of the existing sewer (invert 9.79 mAHD + diameter 0.23 m). This level is above the existing High Level alarm (9.87 mAHD per AMOSS data sheet) and is therefore within the available emergency storage envelope.

These levels provide a design envelope depth of 2.93 m, which will allow standard DN1800 storage pipes to be used with a maximum flow path of 110 m length at the standard 1:100 gradient.

6. Existing Site Levels

The supplied feature survey shows that the ground level is uniformly 14.9 mAHD throughout the surveyed part of the proposed construction site. During the site visit the remainder of the target site appeared to be flat and at the

same level as the surveyed part, consistent with its use as a sports field. The design will be based on a uniform ground level of 14.9 mAHD and no additional feature survey is recommended.

7. Proposed Pipe Materials

The proposed emergency storage will consist of DN1800 x 2.44 m long RRJ Class 2 RC pipes, subject to:

- Design check of flotation resistance after the existing soil properties have been established by the geotechnical investigation.
- Design check of potential surface loading. The site is not generally trafficable but may bear construction vehicle loads during the future emergency storage construction.

In addition to confirming the pipe class selection, these design checks will determine the final selection of storage pipe levels within the available envelope to minimise the excavation depth.

The proposed connecting pipework is DN225 SN8 DWV PVC sewer pipe with SCJ fittings to manage the peak inflow in accordance with Table 4.4 of DS50. This matches the size of the existing inlet sewer.

To enable visual inspection and rodding of the connecting pipework, a maintenance shaft will be provided at every second change in direction, as has been requested by operators for recent previous storage projects.

8. Site Spatial Constraints

The target area for construction is constrained to the west by the soccer pitch (Perth Royals Football Club) that is permanently marked out by painted boundaries on the grass surface. It is assumed that access covers will not disrupt the use of the soccer pitch if they are located outside the marked boundary, but the design will aim to maximise the clearance on this side of the construction footprint.

The target area is bound to the north, east and south by existing vegetation. The trees to the north and south have not been assessed by Classic Tree Services, whose investigation was focused closer to the pump station. To avoid the need for additional arboricultural survey, the design intent is to keep the proposed excavation clear of the drip line of the existing tree canopy, as indicated by aerial photography.

Light poles for field lighting are located among the trees along the southern edge of the site, outside the area covered by the supplied feature survey. Keeping clear of the drip line also provides clearance to the light poles, so no additional feature survey is recommended.

Another existing light pole is located to the north-east, adjacent to the stormwater basin. The design intent is to keep the proposed excavation clear of the light pole to avoid undermining its foundation.

Construction is not expected to impede public access to the reserve or operational access to the pump station.

9. Existing Buried Services

The feature survey and site visit have identified that sports ground irrigation and lighting services are present within the target construction area. There is no alternative space available to avoid disrupting these services.

The proposed emergency storage construction will require temporary isolation, removal and reinstatement of the buried irrigation and lighting infrastructure. This will not affect the design but will be addressed in the specification.

GHD will request any available plans for existing lighting pole connections and irrigation networks from the Town of Victoria Park to assist the contractor in locating and reinstating the affected services.

10. Site Environmental Constraints

The arboricultural assessment report advises that the pump station is surrounded by trees of good health and high retention value, and that excavation within a structural root zone is likely to threaten the tree's survival.

Any excavation within the wider tree protection zone requires the attendance of an arborist to carry out any required root pruning. The design will minimise excavation within the tree protection zone to avoid the potential time and cost impacts of managing root pruning during excavation.

As described below, the proposed route for the connecting pipework passes between two trees with approximately three metres of clearance between the adjacent structural root zones. This may provide sufficient space for excavation within a trench box, with the potential for terracing from a 2.4 m wide box at the surface to a 1.2 m wide box at the base of the excavation, without encroaching on the structural root zones. Significant impacts on the trees would still be required. At the minimum:

- Installation of trench boxes to support the excavation would require cutting of all roots of both trees within the excavation footprint.
- A large branch that fills the space between the trees, that is currently maintained above head height, would have to be removed to enable equipment access for excavation and lifting of trench boxes.

Water Corporation will present GHD's preliminary design to the arboricultural consultant and to the Town of Victoria Park for assessment of the estimated construction impacts on the existing trees. If these impacts are unacceptable to the Town, then a feasible alternative pipe route exists that would avoid the structural root zones but would interfere with Water Corporation's operational access to the pump station.

In addition to the established trees, it was noted on site that two small trees have recently been planted near the south-east corner of the target construction area. For design purposes, it is assumed that protection of these two trees is not critical as it is anticipated that the Town of Victoria Park would allow Water Corporation to replace them as part of the site restoration after construction.

11. Proposed Emergency Storage Layout

The proposed emergency storage layout, addressing the constraints described above, is shown in the attached preliminary site plan (drawing 17446-2-3A1). Features of the proposed layout include:

- Connection to existing access chamber M6780A. This location allows operational access to be maintained during construction and gives operators flexibility when isolating the pump station for maintenance while keeping the emergency storage operational.
- The proposed connection is perpendicular to the wall of the existing square access chamber to facilitate coring through the brick chamber wall.
- Perpendicular crossing under the existing overflow to environment / stormwater drain pipe with approximately 2 m vertical clearance between the pipes.
- A 45-degree bend and 45-degree maintenance shaft to align the connecting pipe centrally between two structural root zones.
- Three strings of five pipe segments for each stage, providing 96 m^3 (Class 2) or 92 m^3 (Class 4) against the minimum requirement of 88 m^3 for each stage.
- Three metres horizontal separation between the initial and future pipe groups to facilitate future excavation.

12. Attachments

- 17446-2-3A1 Preliminary Site Plan

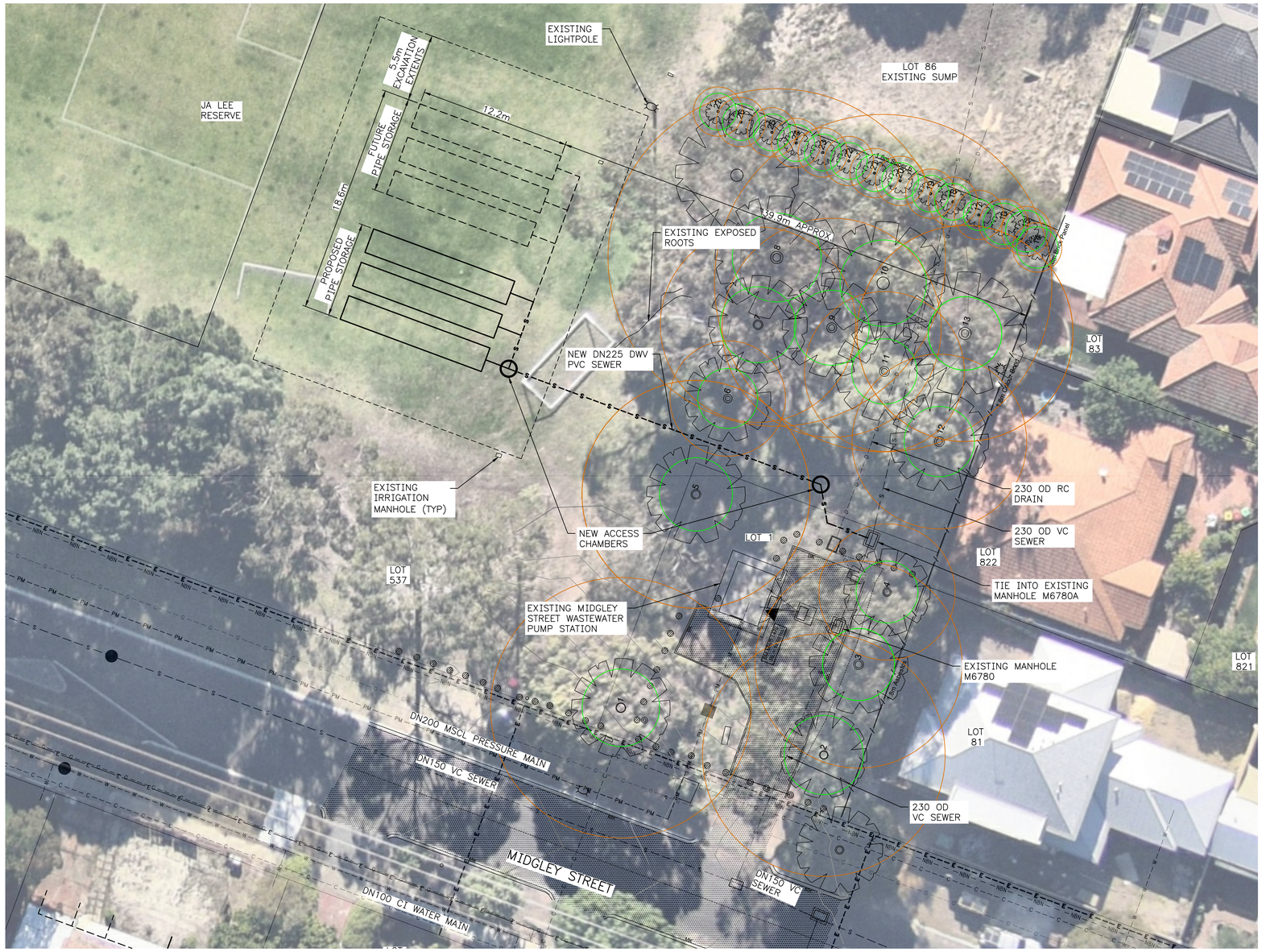
Project name		Rivervale Midgley St PS Emergency Storage					
Document title		Basis of Design | Rivervale Midgley St PS Emergency Storage					
Project number		12648517					
File name		12648517-BOD-001_Basis of Design					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	Abhishek Sheshegowda	Graeme Harris	Graeme Harris Digitally signed by Graeme Harris Date: 2024.10.09 14:01:20 +08'00'	James Marshall	James Marshall Digitally signed by James Marshall Date: 2024.10.09 17:00:55 +08'00'	9/10/2024

GHD Pty Ltd ABN 39 008 488 373
Contact: Klaudyna Narozna, Project Manager | GHD
999 Hay St, Level 10
Perth, Western Australia 6000, Australia
T +61 8 6222 8222 | **F** +61 8 6222 8555 | **E** permail@ghd.com | **ghd.com**

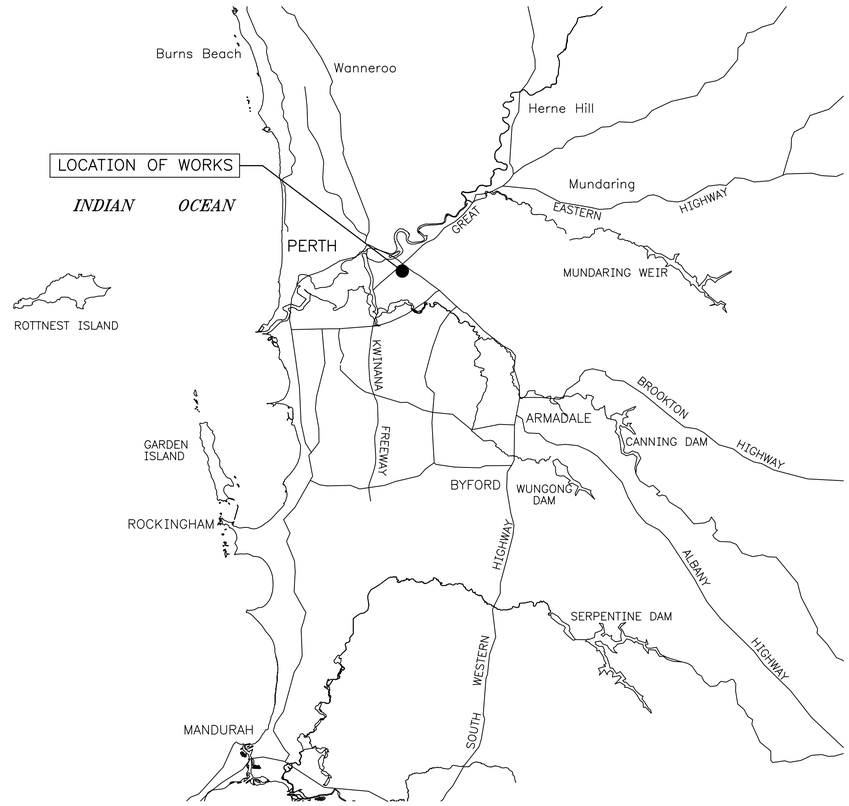
© GHD 2024
This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

PRELIMINARY - NOT FOR CONSTRUCTION

DATE : 3-Oct-2024



SITE PLAN
SCALE 1:200



LOCALITY PLAN
DIAGRAMMATIC

LEGEND

—S—S—S—	NEW SEWER
—S—S—S—	EXISTING SEWER
–PM–PM–PM–	EXISTING PRESSURE MAIN
—W—W—W—	EXISTING WATER MAIN
—D—D—D—	EXISTING DRAINAGE
—E—E—E—	EXISTING O/H POWER
—/—/—/—	EXISTING FENCE
	CADASTRAL BOUNDARY
STRUCTURAL ROOT ZONE / TREE PROTECTION ZONE	EXISTING TREE

BEFORE YOU DIG www.byda.com.au

NOTE:
THE LOCATION OF OTHER UTILITIES HAS NOT NECESSARILY BEEN ESTABLISHED BY SURVEY, BUT IS BASED ON DIGITAL SERVICE DATA PROVIDED BY THE ASSET OWNERS AND IS INDICATIVE ONLY. SERVICES MUST BE LOCATED AND VERIFIED ON SITE.

5 4 3 2 1 0 5 10 m (1:200)

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD
A1	10/2024		ISSUED FOR INFORMATION	JOv		

DESIGN SURVEY GE SURVEYS | VERTICAL DATUM AHD | COORDINATE SYS MGA94–50 | DES CALC | DES CHD
ASCON SURVEY NONE | DES REF GHD 12648517 | DRN J. OVERHEU | Q.C. CHD

NORTH POINT

GHD
Level 10, 999 Hay Street Perth WA 6000
PO Box 3106 Perth WA 6832 Australia
T 61 8 6222 8222 F 61 8 6222 8555
E permail@ghd.com W www.ghd.com

RECOMMENDED
CONSULTANT PROJECT MANAGER
APPROVED
CONSULTANT PROJECT DIRECTOR

WATER CORPORATION

METROPOLITAN WASTEWATER
RIVERVALE PUMPING STATION NO.062–02 – MIDGLEY STREET & PM
SITE PLAN

FILE PROJECT CS21653 | PLAN 17446–2–3 | CAD | ISSUE A1 | ORIGINAL SHEET SIZE A1 | MF

566
810

© THIS DRAWING IS THE PROPERTY OF THE WATER CORPORATION. IT SHALL NOT BE COPIED WITHOUT PERMISSION.

CAD\COLLABORATIONCACHE\12648517–RIVERVALE MIDGLEY ST PS STORAGE_2\ORTHOS\DWGS\DRAWINGS\17446\17446–002–003–01A1 20/09/2024