Engineering Summary Report

12 December 2024

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From	Klaudyna Narozna	**Project No.**	12648517
Project Name	Rivervale Midgley St PS Emergency Storage		
Subject	CS21653 – Engineering Summary Report for Rivervale Midgley Street Emergency Storage		

Dear Anju,

1. Introduction

Rivervale PS No2 Midgley Street is a dry well pump station that was constructed in 1979.

Water Corporation has engaged GHD to provide detailed design and Bid Ready Documents for the construction of emergency storage facilities adjacent to the existing pump station site. The additional storage will increase the time to overflow, catering for anticipated growth in the catchment due to subdivision of existing residential lots.

1.1 Current situation

The existing emergency storage capacity comprises 75 m^3 of "system storage" in the wet well, sewers and access chambers. This provides a minimum time to overflow (TTO) of 1.5 hours. The required TTO is 2.8 hours.

An existing trapped emergency overflow connects the inlet bifurcation access chamber to an adjacent stormwater compensating basin, as shown in as-constructed drawings 17446-3-1A and 17446-3-2A.

1.2 Project purpose

This project aims to provide detailed design for the construction of emergency storage in two stages. The initial target volume of 88 m^3 is forecast to provide the required TTO until 2040. An additional 88 m^3 will be constructed in the future to meet the ultimate forecast development.

As described in GHD's Basis of Design Report, the emergency storage is to be designed within the existing storage envelope between the high level alarm and overflow to environment. No change is proposed to the existing pump station, sewer network or overflow facility.

1.3 Design input references

Listed below are documents, correspondence and other data used as input to the design work.

Document Title	Nexus Ref
Design Brief	https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/178371876
Plan set 17446	https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/185387827
Arboricultural Assessment	

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(Classic Tree Services, April 2023)	
Site Feature Survey (GE Surveys, August 2023)	https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/185394348
Basis of Design Report (GHD, October 2024)	https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/185398247
AMOSS Data Sheet	https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/185393398

2. Scope and limitations

2.1 Scope of design

The scope of the design services is defined by Water Corporation's Design Brief, GHD's Proposal and the service agreement under which these documents have been issued.

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 2.1 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 in this report (refer section(s) 5.1 of 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.

2.3 Key Performance Attributes

Key Performance Attribute	Measure
Self-draining effective storage capacity of 88 m^3	As-constructed survey to confirm: – 15 lengths of DN1800 RC pipe – Maximum soffit below RL 12.95 – Minimum invert above RL 10.05 – Storage and connecting pipes grade towards access chamber M6780A
Site restored to Town of Victoria Park's satisfaction	Written acknowledgement from Town representative to Water Corporation representative.

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3. Project risks

The project site is located in public open space in a built up residential area. Risks to Water Corporation's reputation arising from the proposed construction of emergency storage are offset by the increase in the risk of overflow of wastewater to the stormwater system if the project does not proceed.

3.1 Release of wastewater during tie-in works

During tie-in works, from the time a hole is cored through the wall of access chamber M6780A until the time the pipe connection has been sealed, storage of wastewater more than approximately 300 mm above the high level alarm would cause wastewater to escape via the tie-in to the excavation.

Environmentally, this would be equivalent to overflow via the existing emergency overflow to the unlined stormwater compensating basin.

If it is considered to be necessary, this risk could be reduced by providing a portable power source on standby during the tie-in connection works.

3.2 Disruption to organised sporting events

The current playing field extent is indicated on site by perimeter line marking. The design allows for excavation and fencing to remain outside the playing field, but the construction will be close to the playing field.

Vehicle movements to access the construction site may also affect the playing field.

Consultation between the contractor and the operator of JA Lee Reserve will be necessary to coordinate potential conflicts over the use of the available space.

3.3 Restoration of grassed open space

To enable continued safe use of the grassed open space of JA Lee Reserve for warm-up and informal recreation, it will be important that the site restoration matches pre-construction levels and surface treatments.

Detailed pre-construction condition assessment and consultation with Town of Victoria Park would help to achieve this goal.

4. Field investigations

4.1 Arboricultural assessment

Water Corporation engaged Classic Tree Services to prepare an assessment report to identify constraints for the design. GHD's design aims to comply with Classic Tree Services' requirement that no excavation take place within the identified structural root zones.

The contractor will require the services of an arboriculturist to manage the effect of construction on mature trees, including the approval and control of branch pruning and root trimming to facilitate construction.

4.2 Feature survey

Water Corporation engaged GE Surveys to provide a feature survey of the site. GHD has used this survey as the base for its site plan and detailed design.

Although the feature survey does not cover the whole of the proposed construction area, this does not affect the design. The remaining site area is flat and clear of surface features.

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4.3 Site inspections

Prior to engaging GHD, Water Corporation conducted a site inspection with representatives of the Town of Victoria Park to achieve agreement in principle for the proposed use of part of JA Lee Reserve adjacent to the existing pump station site for construction of emergency storage.

Water Corporation and GHD inspected the site on 26 September 2024. Based on review of the arboricultural assessment report, the project team agreed to locate the emergency storage closer to the sports field than the area targeted in the feature survey, in order to mitigate the effect of construction on mature trees.

During the site inspection, access chamber covers were opened to confirm the materials and configuration of the tie-in access chamber (square brick chamber) and the existing overflow to environment.

4.4 Location of buried services

The proposed construction site does not intersect road reserves or utility service corridors.

There are existing buried irrigation and low voltage lighting services within the construction area that will require temporary modification for excavation, followed by reinstatement during the backfill process. Indicative plans of these services have been provided by Town of Victoria Park.

4.5 Geotechnical investigation

GHD has carried out a geotechnical investigation of the proposed construction site. The detailed findings will be reported separately. Preliminary results that have been taken into account in the design include:

– Existing soils are sand, in situ density 17 kN/m^3, to the depth of the proposed storage pipes.
– Existing soils are sand of greater density beyond the proposed depth of excavation.
– Groundwater is not expected to reach the level of excavation if constructed in late summer, but may be above this level in late winter.

Based on these findings, it is expected that pipe bedding and backfill will be completed using excavated material.

5. Basis of design

The basis of design has been detailed in GHD's Basis of Design report, issued on 9 October 2024.

5.1 Assumptions

Design constraints and data have been taken from existing as-constructed drawings, direct observation and reports commissioned for the purpose of this project. Apart from the assumption of completeness inherent in relying on such investigations, the design has not relied on untested assumptions.

5.2 Stakeholder consultation

Water Corporation will present the design layout to Town of Victoria Park for review prior to formal issue of the Notice of Proposal.

6. Emergency storage tank design

The proposed design is shown on preliminary drawings 17446-1-1, 17446-3-3 and 17446-3-4 (refer Appendix 1).

Three strings of five pipe lengths each are proposed, providing a storage capacity of 96 m^3. With the proposed Class 2 pipes, the target storage capacity of 88 m^3 could be achieved with 14 pipe lengths, but a change to Class 4 would require the fifteenth pipe. Class 4 pipes would provide 92 m^3 of storage.

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With three strings better suiting the available site than two longer strings, the design includes the fifteenth pipe length in the first stage of construction. This provides a consistent arrangement of access points on the ground, and allows for a potential late decision to increase the pipe load rating without having to change the design.

The anticipated excavation extents are shown on the drawing to provide context for the design setout in relation to the surveyed vegetation.

6.1 Functional description

The proposed emergency storage will be self-draining and comply with Design Standard 51.

6.2 Storage envelope

The storage envelope is defined by the existing overflow to environment level (RL 12.98) and the existing high level alarm (RL 9.87). To keep the connecting pipework dry under normal operating conditions, the bottom of the envelope has been taken as the top of the existing sewer, RL 10.02.

6.3 Design levels

The highest part of the emergency storage pipes will be in the future stage, because the future pipes will be constructed further from the tie-in connection. The design invert at the highest point in the future storage pipes has been set at RL 10.90, giving a soffit level of RL 12.73. The margin between this design soffit and the overflow to environment level has been included to allow for potential adjustment of the position of the future storage pipes.

The resulting design tie-in level at access chamber M6780A is RL 10.26, providing a margin above the existing sewer to accommodate any adjustment required during construction.

6.4 Resistance to flotation

Although groundwater levels are not expected to reach the top of the storage pipes, the calculation for flotation resistance allows for the groundwater level to flood the site above the ground surface level.

Calculated in accordance with DS51 Section 4.4.3 c), the proposed DN1800 Class 2 RC pipes require at least 1.4 m cover of the native soil at 17 kN/m^3. The density of backfill is expected to increase slightly with compaction, improving the margin of safety against flotation.

Greater cover is required to remain within the storage envelope, so flotation does not control the design levels.

6.5 Surface loads

Using the Concrete Pipe Association of Australasia's calculation software, the proposed DN1800 Class 2 RC pipes would be able to withstand live loads exceeding heavy platform highway loads at the design depth of installation. The storage pipes are therefore not at risk due to the surface loads that would be imposed by vehicles maintaining the JA Lee Reserve and Water Corporation assets.

The grassed surface, to which the site will be restored, would not be able to support such wheel loads without surface damage that would impede the operation of the heavy vehicle. Therefore, future use of heavy construction equipment on the site would require a dedicated access plan.

6.6 Site layout

The proposed arrangement of storage pipes has been designed to provide the following characteristics:

– Efficient excavation footprint.
– Simple connecting pipework layout.
– Clearance between excavation and sports field.
– Clearance to construct the future storage.
– Opportunity to adjust the future storage quantity if needed.

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The position of the storage pipes has been designed as close to the pump station site and road as possible while respecting the recommendations of the arboricultural assessment.

The alternative option of arranging 14 pipes in two strings of 7 pipes each has been rejected because:

– The arrangement would have to be rotated 90 degrees to maintain clearance to the sports field.
– The connecting pipe layout would be more complicated.
– The ultimate site would extend across the full width of the reserve.
– The less efficient geometry would require greater excavation volume and increased disruption.

6.7 Connecting pipework

The connecting pipework has been selected as DN225 SN8 sewer pipe to match the size of the existing DN225 VC sewers that drain to the pump station.

Two changes of direction are required to align the connecting pipework with the available corridor between the tree structural root zones. To enable the pipework to be visually inspected, and to avoid damage during potential rodding to clear the pipes, two maintenance shafts have been included in the connecting pipework.

The design grade of 1:100 and the pipe fittings details are consistent with Water Corporation standard drawing CA01-5-1.

6.8 Tie-in to existing sewer

To facilitate coring through the existing access chamber M6780A wall, the tie-in connection has been designed to be perpendicular to the access chamber wall and located centrally along its western face.

Adjacent to the access chamber, the connecting pipe must pass beneath the existing DN230 RC overflow to environment drain. The connecting pipe alignment has been kept straight for this crossing, perpendicular to the overflow alignment, to minimise excavation around the existing assets.

Water Corporation's waterproofing treatment has been adapted from another recent project to help seal the connection against potential groundwater ingress under high water table conditions.

7. Risk assessment

The anticipated construction work and site conditions are within the range of "normal" activities for a suitably experienced contractor. No specific deviation has been required from Water Corporations standard drawings to mitigate identified construction or operation hazards.

A safety in design risk register is included in Appendix 2.

8. Operability and constructability assessment

A constructability and operability assessment workshop was held on 5 November 2024. The outcomes of the workshop are summarised below.

8.1 Construction

– Construction of DN225 connecting pipework in the 2.8 m wide corridor between two tree structural root zones appears to be feasible. If this turns out not to be possible then an alternative design could be developed with the connecting pipe passing to the south of the pump station. This would increase the distance to the structural root zone but would introduce many additional complexities and increase site disturbance.
– The space identified on the design drawing for excavation management appears to be sufficient.
– Additional laydown and movement area is available to the contractor to the north of the proposed excavation.

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– It is expected that the whole of the storage pipe footprint will be one open excavation, without the need for staged backfill of partial excavations.
– Water Corporation advised that it will carry out the tie-in connection without needing to isolate the sewer. This will be confirmed during the clearance to works process.
– Existing vehicle access points to the site are limited (one gate at the western end of Midgley St and the existing pump station access gate at the eastern end of Midgley St). The contractor may need to negotiate temporary access points to minimise surface damage by movement of heavy vehicles.
– Water Corporation will supply construction water via the existing pump station service connection in order to minimise the requirement for water tankers to access the site.

8.2 Operation and maintenance

– Two maintenance shafts have been included in the connecting pipework to provide a means of visual inspection at both sides of any bend or tee fitting.
– The project will provide conduit for Water Corporation to install a new Flow to Storage alarm float switch. The tie in locations for the conduit and the capacity for the existing switchboard to accommodate the new alarm will be confirmed by Water Corporation.
– The design for increased storage capacity does not involve modification of any existing operational asset and will not compromise the existing system storage capacity.
– Water Corporation may need to adjust the existing half storage alarm level.

9. Timeline

Water Corporation intends to deliver the project in the 2025/26 financial year, with construction planned to take place in late summer when weather and groundwater levels are likely to be favourable.

The following are the assumed key project milestones and due dates:

Project Milestone	**Due Date**
Invitation to tender	*August 2025*
Project award	*November 2025*
Construction	*February 2026*
Project practical completion	*April 2026*

10. Appendices

Appendix 1 – Drawings

Appendix 2 – Safety in Design Report

Appendix 3 – Review Response Table

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