MERRIJIG SEWAGE PUMP STATION REPLACEMENT DUE TO ODOUR PROBLEMS

Paper Presented by:

Phillip Powell

Author:

Phillip Powell, *Technical Officer,*

Goulburn Valley Water

75th Annual Water Industry Engineers and Operators' Conference
Bendigo Exhibition Centre
4 to 6 September, 2012

MERRIJIG SEWAGE PUMP STATION REPLACEMENT DUE TO ODOUR PROBLEMS

Phillip Powell, *Technical Officer,* Goulburn Valley Water

ABSTRACT

In 2009, Goulburn Valley Water (GVW) introduced a Sewer Network Odour Management Strategy. As a result of the strategy, priority odour and complaint sites where identified for measurement logging of hydrogen sulphide gas (H_2S). These sites are monitored over the summer period where their risk priority is monitored on an annual basis. Sites with the high risk of odour problems are investigated in order to reduce the potential of emitting odours. The potential of odour emissions is reduced by odour control units, sewer vent stacks, ventilation fans, sewer rising main alterations, manhole alterations and the improvement of existing odour control.

The Merrijig sewage pump station was a high potential odour risk and was rated high on GVW's Annual Sewer Odour Network Management Program report in 2010/2011. This pump station was replaced in 2002 with in situ concrete and epoxy lining. Due to the high odour risk rating, the poor structural condition of the wet well, the rapid deterioration and imminent failure, the wet well not only required replacement but the new material type required investigation.

1.0 INTRODUCTION

GVW provides urban water and wastewater services to a population of over 121,000 persons and over 55,400 properties in 54 towns and cities in Victoria extending from the outskirts of Melbourne in the south to the Murray River in the north. GVW manages the following infrastructure:

- 1,100 kilometres of pressure and gravity sewers
- 260 sewage pumping stations; and
- 26 wastewater management facilities

Goulburn Valley water operations districts are divided into four sections;

- Northern
- Central
- South West
- South East

The Upper Delatite (Sawmill Settlement and Merrijig) is part of the South East operations district. In 1987, the Merrijig Sewage Pump Station 02 was installed for the Upper Delatite community to have access to a sewage reticulation system. In 2002, a report highlighted that the wet well was in need of replacement due to corrosion of the walls and thus its poor structural condition. The corrosion occurred due to the gaseous environment. As a result, a new concrete pump station with an epoxy grout seal was installed adjacent to the existing pump station. The existing wet well was retained and converted for additional emergency storage. The installation in 2002, of a new concrete pump station with the inclusion of the epoxy grout seal was thought to be the best option to stop the corrosion. It was found that in early 2011, the replacement sewer pump station installed in 2002 had severe H_2S gas corrosion and was in poor structural condition. Refer to Figure 1.

Figure 1: *Merrijig Sewage Pump Station – Note side walls of Wet Well*

2.0 DISCUSSION

Various options to replace the existing wet well have been considered. Due to the existing problems of gas attack on the concrete walls, concrete was not considered an option for the replacement of the wet well.

2.1 Option 1

Build a fibre glass pump station inside the private property adjacent to the exiting pump station. This option was not considered for the following reasons;

- Cost of access pathway to the pump station;
- Rain water drainage would create an infiltration problem into the pump station due to the station being in a paddock (a diversion of storm water would be costly);
- Cost to excavate new pump station;
- Cost and time to acquire land;
- Cost and time of installation of the gravity and rising main;
- Relocation of the non returns, sluice valve and concrete pit; and
- Cost of decommissioning of old pump station and backfill.

2.2 Option 2

Remove existing concrete pump station and install fibreglass pump station. This option was not considered due to the following reasons;

- Cost involved in excavating, breaking out old concrete and installing new well; and
- Cost and time of installing a temporary pump station.

2.3 Option 3

Install a new pump station adjacent to existing wet well. This option was not considered due to the following reasons;

- Above head power lines and power pole close to existing pump station;
- Cost to excavate new pump station;
- Cost to divert existing gravity and rising main; and
- Relocation of non-returns valves, sluice valves and concrete pit.

2.4 Option 4

Reline or resurface the existing wet well. This option was not considered for the following reasons;

- The current concrete well had an epoxy coat applied to the walls which had corroded within 9 years; and
- Structural failure of the wet well was imminent

2.5 Option 5

Install a fibre glass pump station inside existing wet well. This option was adopted for the following reasons;

- Emergency storage and rising main by pass could be utilised during works. This was installed in 2002 due to the previous pump station installation;
- Y2K point could be utilised;
- Major excavation for new wet well installation was not required;
- Minimal cost involved in decommissioning existing wet well; and
- No diversion of the existing gravity and rising main.

This option was chosen as it was the most cost effective and least disruptive to supply. The works undertaken for this option are discussed further in Section 3.

3.0 DISSCUSION

An existing emergency storage was utilised as a temporary pump station while the works were undertaken. A temporary submersible pump was installed with auto level control including high level alarm connected to the SCADA monitoring system. The temporary pump discharged to the Y2K point. The Y2K point was installed prior to the year 2000 as it was unknown if the power supply would be interrupted with change of the millennium. The Y2K point is directly connected to the Merrijig wastewater management facility. A diesel powered pump was on standby during the works, should the installed temporary pump fail.

The contractor disconnected the existing rising main, gravity main from the wet well. Both the pumps, pump stools, guide rails, electrical cables and any other object attached to the wet well were taken out. The cleaning process of the wet well walls was done delicately due to the poor condition of the concrete. The concrete walls were in such poor condition, the pressure from the cleaning hose could blast a 50 mm hole into the concrete. After cleaning the well it was found that the floor was uneven and it needed to be level for the correct installation of the new tank. Levelling the floor with concrete helped with the installation of the tank. The concrete base held the tank in place when the concrete slurry was poured and ensured that the fiberglass pump station didn't float.

The slurry was required to fill the void between the existing and new pump station. Measurements were taken of the existing pipe work so the tank could be manufactured with these holes in the right position. The manufacturer was required to core the holes so that the structural condition of the tank and the warranty was not jeopardised.

To improve the atmospheric conditions inside the wet well and the surrounding area, a higher vent stack, ventilation fan and a variable speed drive (VSD) to run the fan was installed. The ventilation fan was installed to educt the odours from the wet well and emergency storage and was manufactured from 316 Stainless Steel to stop any corrosion. Due to the high H_2S readings and previous corrosive environment from this pump station, a fibreglass 12 high vent stack was installed. The height of this vent stack and fan ensured a high dispersion rate of odour, which will reduce any potential odour complaints. By using a fibreglass pump station and vent stack this eliminated the risk of corrosion. A VSD was installed to the ventilation fan so adjustments could be made to suit the environmental conditions. eg. higher flows during the summer period when odours are highly concentrated.

4.0 CONCLUSION

The aim of this project was to improve the structural condition, eliminate possible odour complaints, improve ventilation and investigate other alternatives to eliminate gas attack on GVW infrastructure. Option 5 was used to replace the existing pump station. With the assistance of our Odour Consultant, various improvements were included in our tender document for the replacement of the Merrijig sewage pump station. These improvements included the installation of a new vent stack, ventilation fan, larger liquid mixer and a sealed fibreglass wet well. This improved the wet wells environment by having approximately 6 air changes per hour. The mixer will eliminate the crusting on the liquid surface.

4.1 Problems / Lessons Learnt

- While undertaking the cleaning of the well to install the fibreglass tank, the contractor noted that the concrete was in such poor condition it kept breaking off. The installation of the fibreglass tank was definitely the right decision.

- Coring holes in the tank had to be done pre delivery from the supplier, as the warranty would then be void if done by others. The pipe work had to be carefully measured for the tank hole to be cut.

- To stop the fibreglass tank from floating, concrete slurry was put in between the existing old concrete well and the new tank. Also, while installing the tank lugs were put on the bottom of the tank and a 150 mm concrete base was put in place to stop floating while putting in the slurry.

- Fibreglass vent stacks and pump station will be considered for other GVW projects.

For the past month the new pump station has been running very effectively and has eliminated the H_2S gas from the pump station and surrounding area.

Figure 2: *Merrijig Sewage Pump Station – New fibreglass tank*

5.0 ACKNOWLEDGEMENTS

Thanks to Julie Saunders (GVW Engineer), Steven Nash (GVW Senior Engineer), Ray Russell (GVW project supervisor), Brian Pollard (GVW Operator) and Active Services Pty Ltd.