BACKLOG PRESSURE SEWER SCHEMES - PRACTICAL ACHIEVEMENTS AND "LESSONS LEARNED" FROM SEWERING LAWRENCE

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4th Annual WIOA NSW Water Industry Engineers & Operators Conference
St Stanislaus' College, Bathurst
20 to 22 April, 2010

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ABSTRACT

Lawrence was the first Clarence Valley Council (CVC) scheme using a pressure sewer system. This paper outlines "lessons learned" from the Lawrence project, with a focus on planning and administrative issues rather than technical or operational outcomes. Key lessons were to ensure clear definition of scheme boundaries, involve pump manufacturers throughout the whole project from design to commissioning, create a central database for administrative ease, and ensure adequate community consultation throughout the project.

1.0 INTRODUCTION

Lawrence is a small village of approximately 280 properties located on the banks of the Clarence River about 25 kilometres north of Grafton in northern NSW. Its population is approximately 400, with a quarter aged over 65, and incomes are well below the Australian median (ABS Census, 2006). Lawrence initially developed as a port serving the Upper Richmond and New England regions, and when the town was originally surveyed it was expected that it would grow into a major Clarence River port. However, an alternative trade route from the New England region to Grafton was subsequently developed, with the result that Lawrence was largely bypassed by development and its population has barely changed over the last 100 years.

Initial investigations into providing reticulated sewerage to Lawrence began in the early 1990s. The combination of failing on-site systems, and an environmentally sensitive location meant reticulated sewerage was desirable, but the spread out nature of development was one reason sewerage had not been provided early and made finding a cost effective solution challenging. After undertaking detailed concept designs and net present value analyses for gravity, vacuum and pressure sewer systems, Council adopted "pressure sewerage" as the preferred Lawrence sewerage option in early 2006.

In late 2008 a "design and construct" contract was awarded for the Lawrence scheme, and practical completion was achieved in late 2009. The project included 12.975km of pressure sewer mains and installation of 287 property pump units, which were Council supplied items under a separate contract between Council and the pump manufacturer. Following initial community consultation after contract award, sections of the community requested that Council's contractor undertake property drainage connections to the system and decommissioning of on-site systems. This was undertaken as a variation to the contract, with the contractor providing quotations through Council, which were accepted by over 60% of property owners.

Lawrence was the first CVC pressure sewerage scheme. This meant that Council staff were inexperienced in many planning aspects, and therefore throughout the project were on a steep learning curve. This paper outlines "lessons learned" from the Lawrence project, with a focus on planning and administrative issues rather than technical or operational outcomes. While this paper focuses on "lessons learned", it should be noted that Council, its Project Manager (NSW Public Works), Contractors and much of the Lawrence community are generally satisfied with the project delivery and outcomes.

2.0 LESSONS LEARNED – IDEAS FOR NEXT TIME!

One famous definition of insanity is "doing the same thing over and over again and expecting different results". CVC has several other unsewered villages where installation of a pressure sewer system is likely. It would therefore be insane for CVC to undertake its next pressure sewer project without incorporating the lessons from Lawrence, because the same failings would reoccur. Even though "not all pressure sewer systems are created equal" (Farrell & Kreitzmann, 2010), there are some common experiences that apply across many pressure sewer schemes. The lessons from the Lawrence experience, in no particular order, are:

Lesson 1: ***Background Research before Commencing***

Australian pressure sewer schemes are becoming more common, and some "lessons learned" from schemes have previously been published. It is essential to undertake basic research on pressure sewer schemes to learn as much as one can about possible pitfalls prior to embarking on a project. Farrell and Kreitzmann (2010) noted several keys to a successful pressure sewer project. The abridged list from their paper is provided below with an indication of CVC's achievement in each of the key areas:

Sound engineering plan and design
- | ✓ | Experienced contractor
- | ? | Proper hydraulic design - balance friction loss and velocity
- | ? | Consideration of special factors (e.g. future growth, down hill runs)

Community participation and support
- | ? | Real communication between Council and community
- | ✓ | Live demonstrations of equipment
- | ✖ | Visits to neighbouring pressure sewer systems
- | ✖ | Advance discussion of costs, financing options, and budget

Equity in cost sharing by users
- | ✓ | Connect to house electricity - avoid separate power service to pump
- | ✓ | One pump per house - preferable to "sharing" a common unit

Reliable equipment
- | ? | Constant flow over wide head range
- | ✓ | Factory assembled and tested as complete unit

Installation and Start Up
- | ✓ | Pre-bid conference with all contractors
- | ✓ | Training of winning contractor's personnel by pump manufacturers reps
- | ✖ | On-site inspection by manufacturer's reps
- | ✖ | Start-up against check list under supervision of manufacturer's reps

Figure 1: ***CVC's performance, left, alongside the abridged list of "Keys to a Successful Pressure Sewer Project" (Farrell and Kreitzmann, 2010)***

The ultimate projected growth of Lawrence was a particular issue. Detailed discussion with Council's strategic planners was not undertaken until after Contract award, which resulted in an increase in ultimate lot yield about 20 percent higher than previously advised to the Contractor. This resulted in a Contract variation to ensure the system could serve the ultimate development.

A significant community participation issue was the delay between completing detailed concept design (which included extensive community consultation) in early 2006 and the contract commencement in late 2008. Based on information from other schemes, the average property connection cost initially conveyed to the community in 2006 was $500 per property.

It was later determined that this did not include decommissioning of on-site systems. There was thus considerable community angst when average connection and decommissioning cost were closer to $2000 per property.

Lesson 2: ***Defining the Pressure Sewer Scheme Boundaries***

Council does not provide reticulated sewerage to properties zoned rural. The boundaries between residential and agricultural zonings in Lawrence are very irregular, as shown in Figure 2, and there are several situations where adjacent dwellings only meters apart are zoned differently. Subsequent to Contract award, Council's rating staff undertook a "health check" of properties paying the Lawrence sewer investigation charge and determined that six properties were incorrectly included in the scheme as they were in agricultural zonings. These properties had to be told that they were no longer eligible to connect to the scheme. To exacerbate the issue, the change in property status was not clearly communicated to the Contractors, resulting in three properties receiving contradictory messages from Council and its Contractor regarding their inclusion in the scheme. The lessons learned from this experience are to undertake a "health check" of eligible properties prior to awarding the contract, and then to ensure that all parties involved are aware which properties are included (and not included) in the scheme.

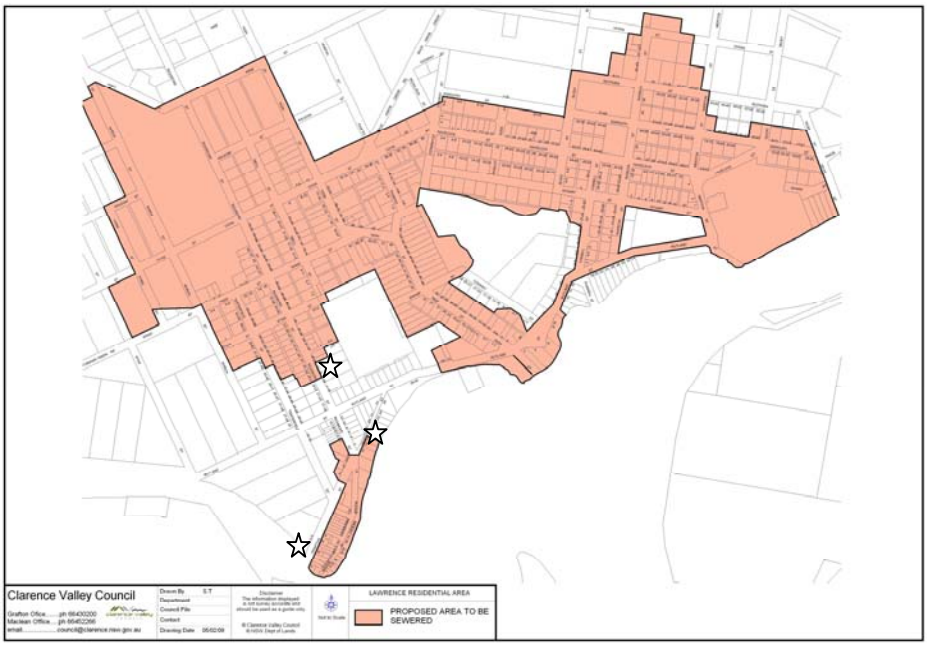

Figure 2: ***Lawrence sewer area, the ☆ represents the 3 rural properties without connection***

Lesson 3: ***Clear Council-Contractor Communication***

The requirement for clear communication between Council and its Contractor was the most important lesson learned during the Lawrence project. As outlined in Section 2.0, the growth originally envisaged for Lawrence didn't eventuate. Many parts of the village are therefore undeveloped, with a significant number of "paper roads" and an extremely complicated addressing system.

The majority of Lawrence properties are known by more than one address, some official addresses are in streets that have never existed, and some properties have changed their letterbox numbers to reflect what they believe their address should be rather than their official street number!

This resulted in an administrative nightmare for both Council and its Contractor. It is estimated that Council staff spent several hundred working hours dealing with problems caused by this issue. It was a constant challenge for both Council and its Contractor to correctly identify a property, with significant time investment frequently required.

The problems were magnified during certain stages in the project, i.e. on-property audits, sewer connection phases, property invoicing, and Council inspections. The "lesson learned" is that where a village has a complicated layout or addressing system, it is essential that a central shared database is created to store multiple pieces of information on each property. It is essential that this shared database store all project specific information in one location and is used for the project duration. CVC has given some preliminary thought to setting up such a central database. It would need to be sent to Contractors prior to on-property audits with uneditable property information set up by Council. A list of possible information in such a database is shown below.

Generic Information	CVC Specific Information
Property: Lot and DP, property no., official address, AKA address 1, AKA address 2	***Contractor Quotes***: Connection, Electrical, Decommissioning and accepted status
Owner: Owner as at start date, postal address, phone numbers;	***On-property Works Completed***: Electrical, Connection and Decommissioning
New owners: date of new exchange, postal address, phone numbers;	***On-property Finance***: accept $2000 loan? Date invoices sent and invoice no., date paid.
Occupancy: Tenants name, phone number	***On-property technical faults***:
	Correspondences: Property owner or resident incoming and outgoing

Figure 3: ***Potential information contained in central database***

Lesson 4: ***Property Electrical Upgrades***

During the project design phase, switchboards on all properties were audited to ensure that the pressure sewer units could be electrically connected. CVC's Pressure Sewerage Policy requires property owners to undertake any required upgrading of property switchboards to current standards at their cost. It is understood that some Councils undertake electrical upgrading works as part of the scheme cost, but this approach may create equity issues, – e.g. a property has recently completed an upgrade to their switchboard (at their cost), and Council is now undertaking similar works on other properties. The majority of electrical upgrades required were minor such as fitting earth stakes or adding neutral bars. It has been suggested that to improve both customer relationships and project efficiency, Council consider amending its policy to include such minor works at Council's cost, as there is a direct nexus with the scheme (Slade, 2010). This policy change would have a cost, but property owners would still be responsible for any major electrical upgrades required.

During the Lawrence project Council's contractors faced difficulties with some property owners not undertaking the necessary electrical upgrades. Under the NSW *Local Government Act* (LGA) 1993, Council can direct properties to connect to sewerage, which Council's Governance section considers includes any electrical upgrade works required for pressure sewer systems.

While no orders were issued for the Lawrence scheme, this was a testament to the negotiation skills of Council's Contractors. The process for issuing Orders, as outlined under Sections 129 to 148 of the LGA takes considerable time, and Councils need to be mindful of this, particularly where major property electrical upgrading work is required.

If Councils choose to follow this path it is recommended the process begin immediately following property electrical audits.

Lesson 5: ***Pump Manufacturer Involvement***

As the project progressed, it became more important to involve the pump manufacturer during various stages. There would have been benefit in having the pump manufacturer involved from the beginning on a monthly basis. Specific involvement could have also been:

- During the design phase, especially to comment on design report and drawings.
- On pump unit delivery to site, to inspect the condition of equipment on arrival.
- On pump commissioning.

Lesson 6: ***Community Consultation and Communication***

As noted in Section 3.1, there was a two year delay between initial community consultation and contract award. Following award, Council consulted with the community through direct mail, information nights and the local media. The scale of community consultation and communication required for pressure sewer projects cannot be underestimated. Councils must be aware that this is a very large part of the project, and advance preparation for this process is essential.

At the first public information session Council staff were repeatedly asked the following questions by property owners:

- How soon will I have to connect to the sewerage?
- What if I cannot afford the cost of connecting to sewerage?
- How do I decommission my on-site system?
- Can I use the decommissioned on-site system for rainwater storage?

Council staff were unable to respond to the first two questions as they involved policy issues and required a subsequent report to Council to set its policy. The staff attending the information session did not know the answer to the other two questions as these are areas dealt with by other sections of Council. The "lesson learned" was one of preparation – it is essential prior to public information sessions to anticipate property owner's questions and have answers available.

Other fairly minor communication lessons discovered during the project included that benefits that would be gained through using alternative communication channels to convey information such as community noticeboards and community email bulletins. A focal point in Lawrence is its General Store, and the owner was amenable to Council displaying information on the project.

A suggestion from the subcontractor undertaking "on property" works (Slade, 2010) was that future projects would benefit from a joint community consultation team being established in the early stages of the project. This team would comprise representatives from both Council and Contractors, and all correspondence would be handled through this team. Such an approach needs further investigation, but it is considered there is merit in this way of streamlining community communication.

Lesson 7: ***Contractor undertaking Property Connections***

The original intention for the Lawrence scheme was that property connections be undertaken by private plumbers once construction was complete but, as outlined in Section 2.0, after contract award Council's contractor was requested to provide quotations for undertaking property sewer connection and on-site system

decommissioning.
The Contractor was agreeable to undertaking this work as a variation, but as they did not want to potentially invoice 287 properties, it was agreed that Council would pay for the work and recover the cost from property owners. Because this was not part of the original contract it created much work for both Council staff and the Contractor, and was largely undertaken "on the run" due to the tight timeframes involved. The main "lesson learned" is that if Council wishes its Contractor to include an option for property connection then this should be included in the original contract (desirably as schedule of rates items for the various connection components) and definitely not added on as a variation.

Quotations were sent out by Council in a mass mail-out. Lessons learned from this process are:

- The quotes included up to three components – electrical upgrading (if required), property connection (including any plumbing upgrading required by the property audit) and on-site system decommissioning. Quotes need to be clear as to whether the components are inclusive or separable,
- Estimated costs should be provided during on-site discussions to reduce some owner's shock at the quotation, and
- The quote should have listed the specific items covered in laymen's terms, again to ease initial owner's confusion.

3.0 PRACTICAL ACHIEVEMENTS

In addition to the "lessons learned", the Lawrence project also included some practical achievements which are worthwhile noting:

- Successful completion on time without significant variations,
- Using predominantly trenchless technology for reticulation mains and on-property works, which minimised the environmental footprint of the project and significantly reduced reinstatement, and
- To assist property owners connect to the scheme, Council resolved to offer property owners a $2000 interest free loan, and for properties which connect within nine months of sewerage being available, a $200 rebate and waiving of septage disposal for decommissioned on-site systems. These decisions have been praised by the community and assisted in early connection of the many properties.

4.0 CONCLUSION

George Santayana (1905) wrote *Those who cannot remember the past are condemned to repeat it*. Normally "lessons learned" from projects like Lawrence are merely listed in the conclusion to a paper, rather than being the entire focus. This paper was specifically written so that "lessons learned" are remembered by CVC staff for its future schemes, and also hopefully assist other Councils undertaking pressure sewer projects.

5.0 REFERENCES

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