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WHANGAREI DISTRICT COUNCIL

Memorandum

To Cr. Halse - Chairman Hikurangi Swamp Working party

From Andrew Carvell - Waste and Drainage Manger

Copies Working Committee

Subject **Hikurangi Swamp Pump Replacement Programme**

Date 4 March 2013

Ref

Background

When the scheme was constructed in the 60's and 70's Pleuger pumps were used extensively within the 7 pocket pump stations. The Pleuger pumps are simple in operation and robust and have generally provided good service, however they have three main disadvantages:

- Rewinding is costly and time consuming;
- Insitu windings that are susceptible to leakage, and faulting of the pump
- Historically cannot be removed during a flood, meaning repairs during service are difficult;

To overcome the disadvantages of the Pleuger the scheme has moved to vertical shaft lift pumps when replacements have been required. This has included Flygt pumps at Otonga and Te Mata and recently KSB pumps in Te Mata and Mountain.

Allowance for continued pump replacement was provided for in the 2012/22 LTP to a total of $2.79M, including:

- $153k in year 13/14
- $948k in year 15/16
- $1,464k in year 18/19
- $228k in year 21/22

This capital line has a considerable impact on the rates for the scheme and as such any deferral of expenditure or savings has a large impact on the financial position of the scheme.

As such WDC staff have reviewed pump replacement and offer a number of options for the consideration of the working group.

Pump Replacement Programme - LTP

The pump replacement programme developed for the 2012/22 LTP was based on a condition assessment, age, and criticality of the pumps. The pump replacement programme including year planned for works and installed year (if replaced recently) is summarised in Table 1.

Table 1 also indicates the relative proportion of a particular pump at a given station. This indicates an aspect of criticality. For example if a 1.1 m^3/s pump faults in Tanekaha, the Tankekaha station loses 50% of pumping capacity. If the same sized pump fails in Ngararatunua the station loses 10% of its capacity.

Based on this aspect of criticality, the following stations are vulnerable to failure of a single pump:

- Junction (100% loss of service if 1.1m^3/s Pleuger lost)
- Otonga (65% loss of service if 4.1 m^3/s Pleuger lost)
- Mountain and Tanekaha (50% loss of service if 1.1m^3/s Pleuger lost)
- Ngararatunua (39% loss of service if 4.1 m^3/s Pleuger lost)
- Okarika (35% loss of service if 4.1 m^3/s Pleuger lost)

Table: 1 Pump Replacement Programme

*(year of planned replacement in **bold,** % of flow pumped by a particular pump in brackets)*

Station	~1.1 m^3/s Pumps			~ 4.1 m^3/s Pumps		Station Capacity (m^3/s)
	A	B	C	D	E	
Otonga	Flygt (17%)	Flygt (17%)		Pleuger (65%) **(2018)**		6.3
Te Mata	Pleuger (17%) **(2018)**	Flygt (17%)		KSB (65%) (New 2012)		6.3
Mountain	Pleuger (50%) **(2015)**	KSB (50%) (New 2013)				2.2
Tanekaha	McKewen (50%) **(2022)**	Pleuger (50%) **(2015)**				2.2
Junction	Pleuger (100%) **(2015)**					1.1
Ngararatunua	Pleuger (11%) **(2018)**	Pleuger (11%) **(2018)**		Pleuger (39%) **(2018)**	Pleuger (39%) **(2015)**	10.4
Okarika	Pleuger (10%) **(2022)**	Pleuger (10%) **(2022)**	Pleuger (10%) **(2021)**	Pleuger (35%) **(2015)**	Pleuger (35%) **(2018)**	11.5

In addition to the criticality based on flow proportion 1.1 m^3/s Pleugers at Okarika, Ngaratunua, and Mountain pumps stations have shown indications that they may fail sometime soon.

Pleuger Maintenance

As set out above all stations have some vulnerability to a Pleuger failure and the planned replacement period does not mitigate against this risk for some time.

Due to low run times on the Pleuger pumps most are mechanically in reasonable condition. If the disadvantage of the pumps could be addressed the continued use of the Pleugers offer significant cost savings.

Repair - rewinding

Pleuger pumps have traditionally been serviced by Flowserve out of Christchurch. WDC (through both its Water and Waste and Drainage departments) have found the service less than ideal, with high costs, long turn around on pumps, and difficulty in making contact and agreements with staff a common experience. Motor rewinding of Pleugers is a specialist service and alternatives to Flowserve have been difficult to find.

Andy Keith contacted SAAW (South Auckland Armiture Winders) to see if they could offer a competitive service to Flowserve. Details of the SAAW company are appended.

SAAW have offered to rewind the 1.1 m3/s Pleuger for an estimated $30,000 plus GST. There would be additional costs from removal, freight and installation.

SAAW advise that the PVC wire is available in stock ex Germany with approximately 3 week delivery to NZ. They propose to hold another reel of PVC wire for the pump, this will eliminate lengthy time delays if

manufacturer needs to have wire made. (8-10 weeks delay). They also advise that the first pump should be the longest to repair approximately 30-35 days.

Service during flood conditions

During a flood event last year the 80hp Pleuger was removed from Mountain pump by Pumps Northland.

This is hazardous work and requires OSH notification, however it may offer a solution to maintaining operation of the Pleuger pumps during a event, provided that appropriate heath and safety mitigation measures are in place.

There are some low cost modifications that could be made to make the job much more efficient, such as changing to the bolts so that only one crescent is needed.

A large pump has not yet been replaced in this manner, however it may be possible provided adequate access is available to use a crane.

Deferral of Pump Replacements

One option of deferring pump replacements is to have two operational Pleugers available as spares. These would replace faulty pumps in the event a pump fails. At the time of removal we would review either permanent replacement or repair of the faulted pump.

The proposed funding plan is provided in table 2 below. The key issues are

- Rewind one of the 1.1m^3/s Pleuger this financial year as an operating back-up;
- Rewind/ Renew a 4.1 m^3/s Pleuger next financial year as an operating back-up;
- When one of the 1.1m^3/s now in service fails rewind a further 1.1m/s pump to retain one on the shelf.

Table 2: Overview of proposed Pleuger maintenance

Pump	Cost	Paid from	Comment
Pleuger 80 hp (1.1. m^3/s)	$30k rewind + cartage and handling	2012/13 Operational budget.	Pump ex Okarika or Ngaratunua
Pleuger 240 hp (4.1 m^3/s)	Price tbc for rewind + cartage and handling Estimate approx $90k	2013/14 Capex budget.	Ex Te Mata pump
Pleuger 80 hp (1.1. m^3/s)	$30k rewind + cartage and handling	2013/14 Capex budget.	Ex Mountain, Ngaratuna, or Okarika

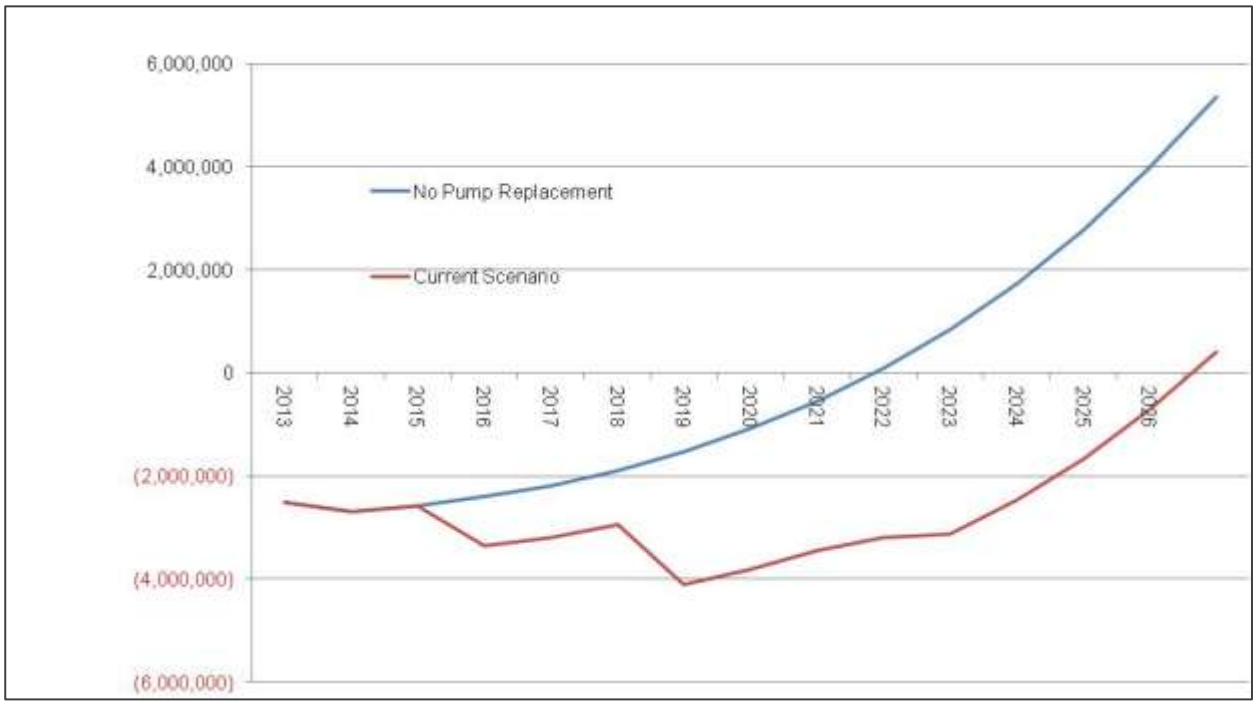
Cost savings

There are significant cost savings possible in deferring pump replacements.

Work on Te Mata and Mountain have highlighted the significant engineering, civil and mechanical works needed to replace the horizontal mounted Pleuger pumps with vertical mounted KSB's. This cost is not needed if the Pleuger pumps are renewed rather than replaced.

The impact on deferral of the pump upgrades on debt position is provided in Figure 1. As can be seen if the pump replacements can be deferred past 2021, the scheme, given current rates, will return to surplus in 2022. This would reduce the interest paid on the debt by $650k (at 5.74%) up to 2022.

Figure 1: Imapct on debt position of deferring pump replacments



Recommendation

That the Hikurangi Swamp Working group support the following changes to the pump replacement programme:

1. That an 80hp pleuger be sent to SAAW and be rewound as a spare this financial year and funded from the Opex budget.
2. That pump stations are modified to assist removal underwater
3. That a price to rewind a 240hp Pleuger be obtained from SAAW, with the work programmed for July 2013 and funded from the Pump Renewal Capex Budget
4. That an 80hp pleuger be sent to SAAW next financial year and be rewound as a further spare. This work to be funded from the Pump Renewal Capex budget.