Wexford County Council

Wexford Water Conservation
Demand Management Study - Gorey Community School

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EXECUTIVE SUMMARY

This Study assessed the application of water saving devices to reduce water demand in the Gorey Community School.

The devices used were:

1. Urinal Controls to reduce flushing frequency
2. Self closing "Push Taps"
3. Cistern Dams to reduce the effective size of the toilet cistern

These devices were fitted throughout the school and the benefit was to reduce daily water consumption from 24m^3/day to 15m^3/day on weekdays. This equates to a saving of some 3200m^3 per year. The reduction in water consumption saves the school some €3,650 per year on its water charges. This saving will be increased to €6,750 per year when wastewater charges are introduced in 2006. The capital cost of the fittings and installation was €9,076.29, thus giving a payback period of 16 months. The project has therefore been a financial success as well as delivering benefits to the environment.

CONTENTS

1 INTRODUCTION

The County Wexford Water Conservation Project commenced in January 2003. The project was undertaken by a combined project team staffed by Wexford County Council and consultants, Ryan Hanley Carl Bro. The objective of the project is to promote the more effective utilisation of existing water resources reducing the volume of potable water lost or wasted in the distribution system.

Part of this brief involves promoting the better management of water use by consumers, to reduce the volume of water unintentionally wasted by consumers. The approach taken to achieve this was to undertake a Demand Management Study which would demonstrate the economic benefit of reducing water consumption on the part of the consumer.

A Demand Management Study involves selecting a building with a high water use, analysing the consumption profile of the building, installing water management devices and comparing the reduced consumption figures to the previous figures. The reduced consumption should lead to reduction in the annual water charge, providing an economic benefit to the study.

2 PRE STUDY APPRAISAL OF WATER USE IN GOREY COMMUNITY SCHOOL

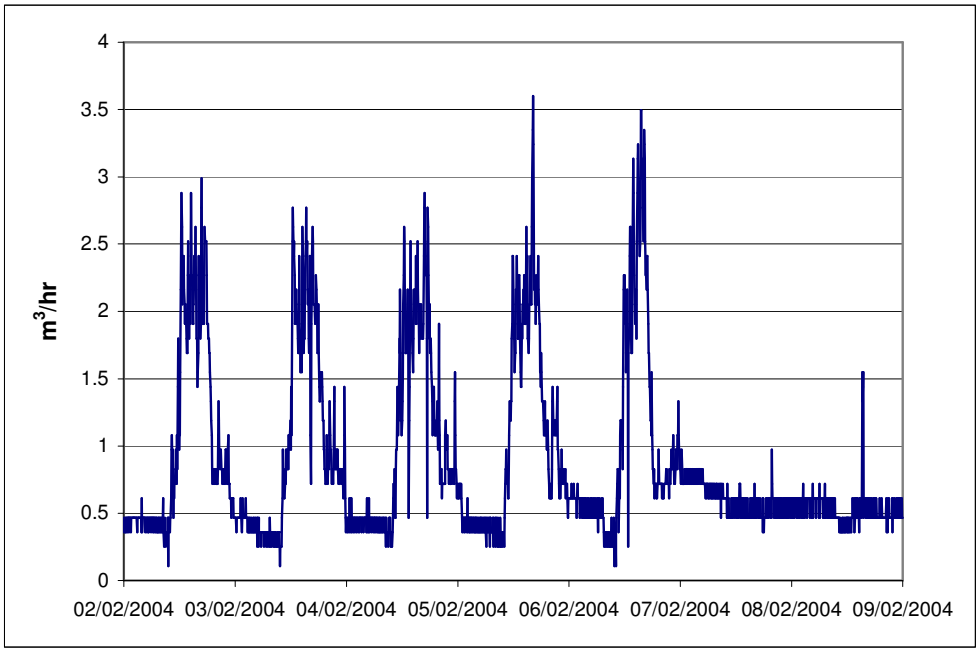
Gorey Community School was selected as the subject for the Demand Management Study. This school was built eleven years ago to amalgamate 3 existing schools and currently caters for 1,570 pupils with 120 teachers and 22 other staff. The school has green flag status which signifies the school's efforts to promote environmental awareness. The management of the school supported this study, as it would enhance the school's green flag status.

The first stage of the study was to assess the water usage of the school. A data logger was installed on the supply meter for the school to record the volume of water used.

The logger data was analysed to assess the consumption profile for the school. As would be expected, the daily water usage by the school varied depending on whether the school was in use. During this pre works analysis, the average daily weekday consumption was 24.33 m^3/d. The average daily weekend consumption was 13.87 m^3/d. The maximum average hourly flowrate recorded during this period was 2.94 m^3/hr and the minimum average hourly flowrate recorded was 0.28 m^3/hr.

The consumption per pupil calculates at 15.5 litres per pupil per day. This figure can be used to monitor future performance of the demand management.

The graph below shows the consumption profile for the pre works period.



The minimum flowrate recorded indicates that the building continously uses water even when empty of staff and pupils. This use is a result of the operational mechanism of the urinals and possible leaks. This nighttime flow indicates that there is potential for savings by installing water management devices.

A survey of the school was undertaken in October 2003 to find out the number and type of plumbing fixtures and fittings. The school was built 11 years ago, but due to the development in the area it has been expanded twice to cater for increasing student population. This has led to a variety of different types of fittings being used at different stages of the school's development.

The survey identified the following water using devices:

Toilets

There are 75 toilets in the various school buildings. The majority of these, in the original building have cisterns with a volume of approximately 12 litres. The toilets (20 no.) in the newer buildings have hidden cisterns but the one accessed for the survey indicates these toilets are low flow toilets.

Urinals

There are 8 sets of urinals in the school.

The urinal configuration is the same throughout the school. Each toilet has a storage tank for the urinals with a volume of 105 litres. This operates on a 'fill and flush' basis, ie when the storage tanks fill, the urinals flush emptying the tank and the cycle begins again. The school caretaker estimates that it takes 15 minutes for the tanks to fill.

Taps

There are 91 wash hand basins throughout the school. Of these, 12 have mixer taps. Of the remaining 79 wash hand basins, 79 basins have only a single tap but one wash hand basin per room (16 no.) have both hot and cold taps. This totals to 107 taps in the school. Again there is a difference in type between the original building and the extensions to the school. The taps in the original building are screw type which account for 90 of the taps. The remaining 17 are push operated.

Showers

There are 22 showers in the school, all of which are push operated.

The full list of fittings in the school are contained in the spreadsheet in Appendix A.

3 WATER CONSERVATION MEASURES

Following analysis of the fittings survey, the following water management devices would provide a reduction in the school's water use.

Cistern Dams
Cistern dams operate by reducing the capacity of toilet cistern, thus reducing the volume of water used in flushing the toilet. The cistern dam reduces the capacity of the cistern by 6 litres. A total of 75 cistern dams were installed in the toilets in the original building. They were not installed in the toilets of the extensions, as these toilets were low flow type.

Self Closing Push Taps
As the name suggests, these taps operate using a spring mechanism to close the tap after it has been opened. This only allows a fixed volume of water to be used for each tap opening. This considerably reduces the volume of water used for hand washing, compared to a conventional screw tap left open while hand washing. Self-closing taps also prevent taps from being left open after the person has left the room. A total of 67 self-closing taps were retro fitted in place of the original screw type taps. In a further 17 locations, where self-closing taps were already in place, the taps were adjusted to reduce the flow rate.

Motion Sensor Urinal Controls
This device operates by restricting the urinal flushing to the use of the urinal. The motion sensor detects usage of the urinal, allows the urinal to flush a set time period after usage has stopped. In this case the time was set to allow flushing 15 minutes after the room has emptied. This prevents multiple flushing of the urinals after busy times such as break times. The control is also set, so that when the school is empty, the urinals will flush once every 24 hours for hygiene purposes. This controller considerably reduced the water consumption of the school, as under the previous fill and flush cycle of the urinals there was a constant consumption of 1 l/s, whereas there is now zero consumption when the building is empty. A total of 8 sensor controls were installed in the school.

To supply these devices, tenders were received from 4 companies; Flow Control, K Environmental Products Ltd., Flowsave and Dublin Providers Ltd. Based on these tenders, Flow Control were contracted to supply the water management devices at a cost of €3,628.29.

As the school had a retained contractor for plumbing work in the school, this contractor, Ballygarrett Plumbing and Heating Ltd., was contracted to install the devices at a cost of €2,724.

This gives a total capital cost of introducing Demand Management to Gorey Community School of €9,076.29.

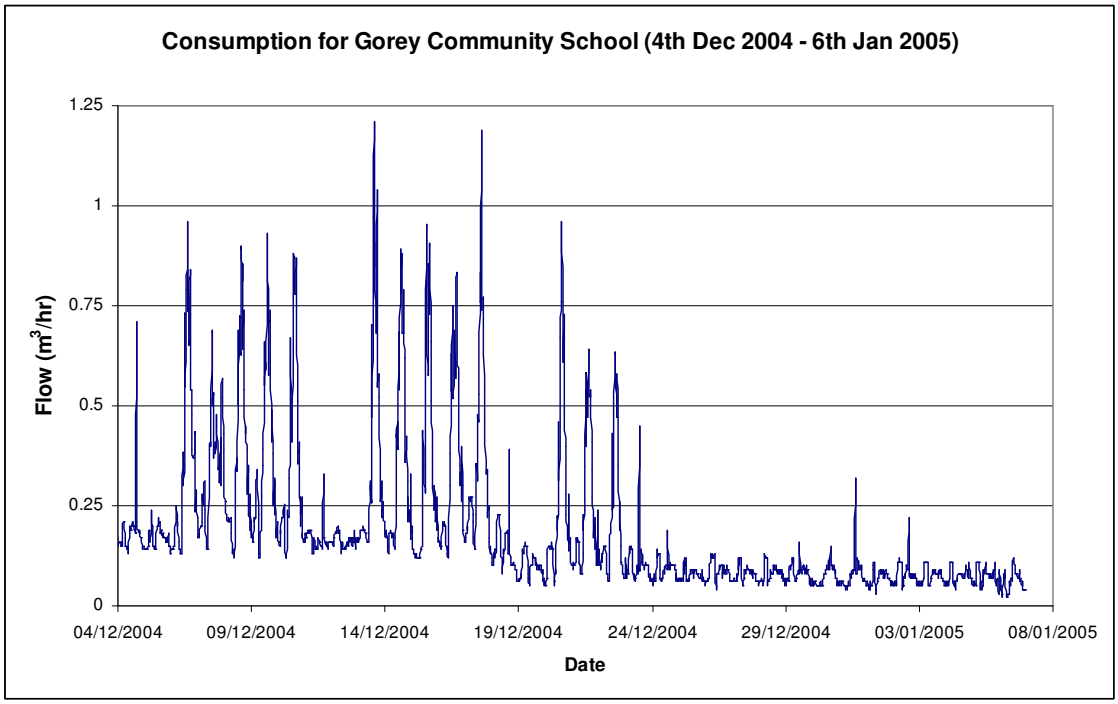
The devices were installed between February and April 2004, at times which minimised disruption to the school. While this work was being carried out, two leaks were discovered and repaired. These repairs will have contributed to the overall reduction in water consumption.

4 POST STUDY APPRAISAL OF WATER USE

After the water management devices were installed, the logger data was analysed to assess the impact of the works. The consumption profile showed a significant reduction in comparison to the pre works profile. Since the meter recorded a zero flow, however, it was decided to replace it with a meter capable of registering extremely low flows. This meter was installed in early December 2004. The flow recorded from this meter also showed a significant reduction in consumption compared to the pre works profile. During this analysis, the average daily weekday consumption has reduced from 24.33 to 15.48 m^3/d. The average daily weekend consumption has reduced from 13.87 to 4.89 m^3/d. The maximum average hourly flowrate recorded during this period was 0.77 m^3/hr and the minimum average hourly flowrate recorded was 0.13 m^3/hr.

Based on these figures, the consumption per pupil is now 9.9 litres per pupil per day. This figure could be used as a benchmark for monitoring future water consumption.

The graph below indicates the consumption profile after the works were completed.



5 CONCLUSIONS

This study indicates the potential reduction in water use that can be achieved by installing water management devices. This is demonstrated by the reduction in average weekday flow from 24.33 m^3/d to 15.48 m^3/hr and reduction in weekend flow from 13.87 m^3/d to 4.89 m^3/hr.

Extrapolating these figures, the water use should be reduced by approximately 3,200 m^3 per annum. Based on the Wexford County Council water charge, effective from January 2005, of €1.14 per 1 m^3, there is a potential saving in water rates of €3,650. To this must be added the saving from wastewater charges given that a wastewater charge of €0.97 /m^3 is also to be levied on all non-domestic properties in Wexford from January 2005. A saving of 3,200 m^3 per annum would save the school €3,100 from the wastewater charge. Therefore the total saving to the school is €6,750 per annum.

Based on the capital cost of €9,076.29, if this saving is realised, it gives a payback period of 16 months. However, realising this level of demand reduction will depend on ongoing maintenance and monitoring of water consumption in the building.

Given the payback period calculated above it is clear that there is a real economic benefit to managing and reducing the volume of water used in public buildings.

Using the following steps demand management can be implemented in any building:

- Monitor the meter supplying the building and assess the consumption profile of the building to determine if savings can be achieved by implementing demand management measures.
- Survey of all water fittings in the building. This will highlight where any repairs might be made (dripping taps, leaky ball valves) and indicate where water managing devices could be installed.
- Install the appropriate demand management devices.
- Finally, monitor the water consumption on a continuous basis to ensure it remains consistent with the building occupancy.

6 WHAT NEXT?

Based on the results of this study, the County should begin a campaign to undertake audits of its own buildings to identify the needs for water saving devices. The device that has the most significant benefit is the urinal control. Typically this will save up to 2m^3/day on an uncontrolled tank, thus giving a very quick payback. The County should also look to informing its commercial customers of the benefits of installing water saving devices. Literature can be sent out with the current bills to customers listing the devices and the potential benefits. The larger commercial and industrial customers could be individually visited and local traders associations contacted and provided with details.

These devices have very limited impact on domestic properties. The commercial customers and public buildings will see the greatest benefit.

Although this may be seen as reducing revenue to the County, it should mean that less water is used and hence current supply problems should improve in certain areas. It is also a very environmentally friendly approach to take to conserve natural resources.

This should be presented as part of a global approach by the County to better manage it's water infrastructure and should be linked to the investment that is being granted by the DoEHLG to assist the County. A series of articles in the local press may also be considered to keep the local population informed about the issues with regard to water use, pricing and control.

All these devices will have a limited life as they are mechanical and electronic and it needs to be stressed that the benefits will only be accrued if the equipment is maintained and replaced by the owners.

Appendix A - Gorey CS Surveyed Fittings

Appendix B - Costs

No of units		Suppliers											
		Flow Control			K. Environmental Products Ltd.			FlowSave			Dublin Providers Ltd.		
		Demand Management Proposal	Unit Price	Total Price	Demand Management Proposal	Unit Price	Total Price	Demand Management Proposal	Unit Price	Total Price	Demand Management Proposal	Unit Price	Total Price
Taps	67	Fit/Convert to non-concussive self-closing push taps	£17.58	£1,177.86	Self-closing push taps	€ 45.00	€ 3,015.00	Does not supply these items			Self-closing push taps	€ 15.00	€ 1,005.00
	17	Reduce Flow rate on some existing push taps	£8.50	£144.50	Does not supply these items						Does not supply these items		
Toilets	75	Cistern Dams	£3.42	£256.50	Cisterns Open Loop	€ 40.00	€ 3,000.00						
Urinals	8	Sensor occupancy activated urinal controls	£105.00	£840.00	Waterless Urinal Control (=€1.75 per bowl per week + €17 setup cost)	€ 108.00	€ 2,700.00	Sensor occupancy activated urinal controls	€ 275.00	€ 2,200.00			
Totals				£2,418.86			€ 8,715.00			€ 2,200.00			€ 1,005.00

€ equivalent = € 3,628.29

Survey of Toilets/Showers in Gorey Community School

carried out on Tuesday 21 Oct 2003 by Elaine Shields and Danny Bourke

	Room Details		Toilets				Urinals					Taps								Showers				
	Name	Location	No	Cistern (Hidden/ Visible)	Leaks Yes/No	Photo No	No	Control	Storage Tan Volume (litres)	Leaks Yes/No	Photo No	No of sinks	Type Mixer	Type Separate	Operation Turn	Operation Push	Leaks Yes/No	Comments	Photo No	No	Operation Turn	Operation Push	Leaks Yes/No	Photo No
1	Senior Girls toilet	Ground floor - Corridor A	3	V	N	Toilet 1&2	0					3	0	3	3	0	N	2 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
2	Senior Boys toilet	Ground floor - Corridor A	1	V	N	Toilet 1&2	3	timer - 15 mins		N	Urinals 1,2&3	2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
3	2nd/3rd year Boys toilets	Ground floor - Corridor A	2	V	N	Toilet 1&2	3	timer - 15 mins	105	N	Urinals 1,2&3	3	0	3	3	0	N	2 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
4	Disabled Toilet	Ground floor - Corridor A	1	V	N	Disabled 1	0					1	1	0	1	0	N		Disabled 2&3	0				
5	Staff Toilet	Ground floor - Corridor A	1	V	N	Toilet 1&2	0					1	0	1	1	0	N		Sink 6&7	0				
6	Cleaning Room	Ground floor - Corridor A	0				0					1	0	1	1	0	N	cleaners need this type of tap and sink		0				
7	2nd/3rd year Girls toilets	Ground floor - Corridor A	3	V	N	Toilet 1&2	0					6	0	6	6	0	N	5 sinks have cold tap only, 1 has hot and cold tap	Sink 5,6&7	0				
8	Staff Toilet	1st floor - Corridor B	1	V	N	Toilet 1&2	0					1	0	1	1	0	N		Sink 5,6&7	0				
9	Staff Toilet	1st floor - Corridor B	1	V	N	Toilet 1&2	0					1	0	1	1	0	N		Sink 5,6&7	0				
10	2nd/3rd year Girls toilets	1st floor - Corridor B	2	V	N	Toilet 1&2	0					3	0	3	3	0	N	2 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
11	Senior Boys toilet	1st floor - Corridor B	2	V	N	Toilet 1&2	4	timer - 15 mins	105	N	Urinals 1,2&3	3	0	3	3	0	N	2 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
12	Senior Girls toilet	1st floor - Corridor B	4	V	N	Toilet 1&2	0					4	0	4	4	0	N	3 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
13	Senior Girls toilet	Ground floor - Corridor C	3	V	N	Toilet 1&2	0					5	0	5	5	0	N	4 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
14	Staff Toilet	Ground floor - Corridor C	1	V	N	Toilet 1&2	0					1	0	1	1	0	N		Sink 5,6&7	0				
15	1st year Girls toilet	Ground floor - Corridor C	3	V	N	Toilet 1&2	0					5	0	5	5	0	N	4 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
16	Disabled Toilet	Ground floor - Corridor C	1	V	N	Disabled 1	0					1	1	0	0	1	N	tap faulty - needs replacement	Disabled 2&3	0				
17	1st year Boys toilet	Ground floor - Corridor C	3	V	N	Toilet 1&2	3	timer - 15 mins	105	N	Urinals 1,2&3	2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
18	Staff Toilet	Ground floor - Corridor C	1	V	N	Toilet 1&2	0					1	0	1	1	0	N		Sink 5,6&7	0				
19	Senior Boys toilet	Ground floor - Corridor C	3	V	N	Toilet 1&2	3	timer - 15 mins	105	N	Urinals 1,2&3	2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
20	Senior Girls toilet	1st floor - Corridor D	2	V	N	Toilet 1&2	0					2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
21	Disabled Toilet	1st floor - Corridor D	1	V	N	Disabled 1	0					1	1	0	0	1	N		Disabled 2&3	0				
22	Staff Toilet	1st floor - Corridor D	1	V	N	Toilet 1&2	0					2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
23	Senior Boys toilet	1st floor - Corridor D	2	V	N	Toilet 1&2	3	timer - 15 mins	105	N	Urinals 1,2&3	4	0	4	4	0	N	3 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
24	Senior Girls toilet	1st floor - Corridor D	3	V	N	Toilet 1&2	0					8	0	8	8	0	N	7 sinks have cold taps only + 1 sink with hot and cold tap	Sink 5,6&7	0				
25	Girls Toilets	Ground floor - Corridor E	9	H	N	Toilet 4	0					7	6	1	1	6	N		Sink 8&9	0				
26	Boys Toilets	Ground floor - Corridor E	3	H	N	Toilet 4	6	timer - 15 mins	2x105	N	Urinals 1,2&3	6	0	6	0	6	N		Sink 8&9	0				
27	Disabled Toilet	Ground floor - Corridor E	1	V	N	Disabled 1	0					1	1	0	1	0	N		Disabled 2&3	0				
28	Staff Toilet	Ground floor - Corridor F	2	H	N	Toilet 1&2	0					2	0	2	2	0	N		Sink 8&9	0				
29	Staff Toilet Men	Staff Corridor	2	V	N	Toilet 1&2	0					2	0	2	2	0	N		Sink 8&9	0				
30	Away dressing room	Hurling changing rooms	1	V	N	Toilet 1&2	0					1	0	1	0	1	N		Sink 5,6&7	0				
31	Home dressing room	Hurling changing rooms	1	V	N	Toilet 1&2	0					1	0	1	0	1	N		Sink 5,6&7	12	0	12	N	Shower 1
32	Gym Girls Toilets	Gym	2	V	N	Toilet 1&2	0					2	0	2	2	0	N	1 sink has cold tap only + 1 sink with hot and cold tap	Sink 5,6&7	0				
33	Staff Toilet 1	Gym	1	H	N	Toilet 4	0					1	1	0	1	0	N		Sink 10	1	0	1	N	Shower 1
34	Staff Toilet 2	Gym	1	H	N	Toilet 4	0					1	1	0	1	0	N		Sink 10	1	0	1	N	Shower 1
35	Gym Boys Changing rooms	Gym	2	H	N	Toilet 4	0					1	0	1	1	0	Y	1 tap running	Sink 5,6&7	4	0	4	N	Shower 1
36	Gym Girls Changing rooms	Gym	2	H	N	Toilet 4	0					1	0	1	1	0	N		Sink 5,6&7	4	0	4	N	Shower 1
37	Staff Office	Mary Ward School	1	V	N	Toilet 1&2	0					1	0	1	1	0	N	cold water tap only	Sink 5,6&7	0				
38	Staff Office	Mary Ward School	2	V	N	Toilet 1&2	0					1	0	1	0	1	N		Sink 5,6&7	0				
Totals			**75**				**25**					**91**	**12**	**79**	**74**	**17**				**22**				