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PEACOCK'S GD
Comments to Peer Review

Hamilton City Council

Wastewater Management Comments, Peacocke's Growth Cell, Hamilton



ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



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June 2007

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1 Overview

1.1 Background

In August 2006 and at the request of Hamilton City Council, MWH prepared a peer review of previous investigations, discussions and studies related to the wastewater services for the Peakcocke Development Area (PDA) to the south of the Hamilton City CBD. Specifically, the MWH review related to the proposal to install a water reclamation plant (WRP) within the growth cell.

The purpose of this report, prepared at the request of Hamilton City Council (5.10.2006), is to provide a review and comment on the August 2006 MWH report. Whilst this report provides some additional information and clarification for matters raised by MWH, it does not purport to provide a comprehensive design and assessment of the Peacocke's WRP proposal.

1.2 Information Considered

The following documentation was considered as part of this review and process.

1. MWH (2006, August) Peakcocke Area Wastewater Treatment Review of Biojet Treatment Proposal by RML.
2. MWG (2006, January) Peakcocke Area Wastewater Review
3. Aqualink (2005, April) Pre-feasibility Investigation of Options for Land-based Waste Treatment of Domestic Effluent from the Peacocke Growth Cell (Phase 4)
4. Fraser Thomas Ltd (2005, February) Wastewater Services for the Peacocke Growth Area
5. Aqualink (2004, September) Pre-feasibility Investigation of Options for Land-based Waste Treatment of Domestic Effluent from the Peacocke Growth Cell (Phase 1)
6. Beca Planning (2002, October) Peacocke Area Scoping Study
7. Comments provided by Hamilton City Council on draft report no. P0601579JR01-V1 dated 13.4.2007.

1.3 Terms

The following terms are used throughout this report:

IDEA	Intermittently Decanted Extended Aeration – A type of WRP with the treatment process using activated sludge for solids and nutrients removal. The facility uses activated sludge processing with sequenced periods of aeration and settlement. This permits the use of a single vessel to accomplish both biological degradation reactions and solid-liquid separation.
EP	Equivalent persons or equivalent population.
PTP	Packaged Treatment Plants.
PDA	Peacocke's Development Area
RML	Riverside Management Limited
SBR	Sequenced Batch Reactor – A type of WRP with the treatment process using activated sludge for solids and nutrients removal. The facility uses batch activated sludge processing with sequenced periods of aeration. This permits the use of a single vessel to accomplish both biological degradation reactions and solid-liquid separation.
SPS	Sewage Pumping Station – Vessel that collects raw sewage and pumps it through a SRM.
SRM	Sewage Rising Main – Pipeline that receives sewage from a SPS.
WRP	Water Reclamation Plant – Treats raw sewage to a nominated level. Level of treatment can range from primary (minimal treatment), through to secondary (suitable for agricultural irrigation), to high grade tertiary (suitable for non-potable re-use such as toilet flushing, garden watering and community landscape irrigation). Various treatment processes can be used.

2 Comment and Review

2.1 Primary Issues Considered

On the basis of our review, several key issues are identified. These are listed below and discussed in the following sections.

1. Use of the term packaged treatment plants (PTP)
2. Understanding of the proposed wastewater scheme
3. Centralisation
4. Availability of discharge point
5. Ownership and operation
6. Sewage treatment process chosen
7. Appropriate reclaimed water standards
8. Sludge management
9. Odour
10. Wet-weather flows
11. Resource consents required
12. Power and electrical control
13. Costs of treatment and on-going management
14. Acceptance within the international engineering community
15. Acceptance by the community
16. Existing systems – nb. Soils and landscapes irrelevant

2.2 Packaged Treatment Plants (PTP)

MWH refer to PTP's servicing numerous small communities in New Zealand. However, the MWH document did not provide a useful or rigorous explanation of the PTP term. This is unfortunate as there are countless types, treatment processes used and sizes of PTP's. In the climate of the current wastewater treatment industry, using a single

term to describe all 'small scale' sewage treatment systems is probably unrealistic.

The term is perhaps even misleading as it suggests that PTP are 'off-the-shelf' products which are simply purchased from a manufacturer and installed 'ready-to-go'. Notwithstanding the great variety in PTP's available, 'packaged' products are generally only available and utilised for very small developments or flow rates. A 'packaged' system would not be used for the PDA, and rather a purpose designed and built WRP would be required.

Further to the above, in Section 2.1 of the MWH report, MWH suggest *"installing several modules in parallel for a larger population is not cost effective and will be extremely difficult to reliably operate and maintain"*. Clearly the comment arises out of the inappropriate use of the term PTP. At the PDA, we understand that the population will ultimately be 21,600 EP (say 8,000 Sections with 2.7 EP/Section). This is considerably more than even the 1000 EP limit suggested for PTP's by MWH. Clearly a purpose built and centralised WRP will be required.

2.3 Understanding of the Proposed Scheme

Our review of the MWH report suggests that Council does not have a full understanding of the proposal for wastewater management at the PDA. This may have come about due to the length of time and number people previously involved in the project to date. To assist, we provide our understanding for clarification which has been based on our discussions with RML.

1. RML is requesting that Council consider in more detail the environmental and economic benefits of allowing a local WRP to be built within the PDA rather than the present alternative of constructing a sewage pumping station (SPS, with ancillary temporary sewage holding structure) and sewage rising main (SRM) to the existing WRP located to the north of Hamilton.
2. The proposed WRP at the PDA would be a centralised facility built and operated to meet stringent environmental standards and criteria. This is in complete agreement with the comments of the MWH comments in Section 2.2. At this stage, a likely location for the WRP would be in the NW sector of the PDA. Our estimate of land area required for the WRP and associated infrastructure would be approximately 0.8 ha on the basis of about 8,000 Sections.

It should be noted that no detailed engineering assessments have been undertaken at this stage. However, we would

expect that the WRP would be build in perhaps 2 or more stages (as has been the experience in Australian 'greenfields' communities) to improve performance efficiency during start-up conditions and assist in project funding.

3. Sewage would be collected from the PDA in a series of SPS to the centralised WRP. Depending on further engineering analyses and site specific topographic constraints, some 10 -20 SPS's may be required to lift sewage to the centralised WRP.
4. The WRP would treat sewage to a high grade tertiary standard with nutrient reduction (as directed by Environment Waikato). This will allow re-use of reclaimed water for a variety of purposes such as toilet flushing, garden irrigation, communal landscape irrigation and so on.
5. Following treatment, reclaimed water would be delivered to say 1-4 storage reservoirs located at the sites highest levels to allow reclaimed water to be gravity fed through a dual reticulation system to individual dwellings. There is not likely to be any need for any site specific reclaimed water irrigation areas (ie. no dedicated irrigation area on each Section). Excess reclaimed water, should there be any at all, could be returned to the Waikato River, to the ground through a rapid infiltration system (depending on local soil conditions) or to a number of dedicated irrigation fields.

Our preliminary water budget assessment is that demand for reclaimed water in the PDA would generally outstrip supply and on that basis there is unlikely to be any requirement for direct dedicated discharge to the receiving environment.

Further to the above, we note that on the basis of our site inspections and review of available documentation that local soils in the PDA are of sufficient capacity to ensure good permeability and drainage. We have also discussed the matter of land disposal of reclaimed water or occasional river discharge with the local Iwi representatives who indicated support for the proposal on the basis that the reclaimed water is of the highest standard. There does not therefore appear, on the basis of our initial discussions, a cultural opposition to the proposal WRP and reclaimed water proposal for the PDA.

6. RML consider that the scheme would have the following benefits:

- a. Cost of building all required infrastructure, including the WRP, reclaimed water storage reservoir(s) and reticulation systems would be borne by the developer.
- b. All works could be undertaken within the PDA land. This means that residents of Hamilton would not be disturbed by construction works associated with the alternative SPS and pipeline works through Hamilton.
- c. The scheme would be considerably more cost effective than construction of the alternative SPS and SRM to the existing Hamilton WRP.
- d. No upgrade works would be required at the Hamilton WRP.
- e. Existing effluent discharge point(s) at the Hamilton WRP would not receive additional effluent.
- f. The reclaimed water supplied by the WRP would reduce the demand on existing potable water supply in the area in the event that a reclaimed water re-use scheme is adopted.

We understand that in the recent year there have been water restrictions in place for the Hamilton area. A reclaimed water re-use scheme would directly result in capital expenditure savings to Council and ultimately home owners through reduced immediate water resource demand in the PDA and / or increased available water resource capacity within other Hamilton growth cells.

- g. The implementation of a recycled water re-use scheme within the PDA fundamentally removes the issue of effluent disposal which is typically one of the key concerns in any wastewater management strategy.
- h. The proposal is for a centralised WRP facility at the PDA which would only require a single operator. This could be either Hamilton City Council or another consortium. The single operator ensures that maintenance and management activities are undertaken in accordance with approvals and are economically viable.

2.4 Centralisation

Our view is that the comments regarding the economic benefits of centralisation provided by MWH in Section 2.2 are generally very broad sweeping and unsubstantiated. It has been our experience that the contrary is also true. Generally, the costs of centralisation versus decentralisation need to be considered against a range of factors such as distance to WRP, costs of pipelines, sensitivity of local environment, and capability of environment (either soils or water courses) to accept treated wastewater.

Notwithstanding the above comments, the proposal is indeed one for a centralised facility servicing a significantly large population of 21,600 EP. A facility of such a size brings with it many economies of scale in terms of construction costs, operating costs and environmental footprint.

2.5 Availability of Discharge Point

Under the proposed scheme concept, the need for a discharge point is essentially removed as reclaimed water is re-used within the development. At times when there is an excess (under say exceptional circumstances), high grade reclaimed water could be discharged: to a local left bank tributary of the Waikato River (this would be downstream of the water treatment plant uptake point); to the ground through a rapid infiltration system (depending on local soil conditions); or to a number of dedicated irrigation fields. A suitable method and choice of location would obviously need to be determined in further discussions with Council and Environment Waikato and is clearly to be the subject of additional investigations.

2.6 Ownership and Operation

Ownership and operation of the WRP and associated infrastructure could be either Hamilton City Council or another consortium. We envisage that this would be a matter for further discussion. We note that a 'build-own-operate-transfer' or 'BOOT' option would also exist whereby the developer builds, owns and operates the system until it is ultimately transferred to the public authority (ie. Council) for on-going operation and management. In the case of private ownership, any private operator would need to be legally responsible for meeting approved performance criteria.

2.7 Sewage Treatment Process Chosen

At this stage, there has been no detailed engineering analysis and design undertaken for the PDA. However, we understand that RML has had on-going discussions with several companies that are capable of delivering suitable WRP technology.

Our view is that whilst the sewage treatment process chosen will be important in terms of operational requirements and running costs, that this is ultimately a secondary matter of consideration. More important, would be achieving agreement on the overall merit of the scheme as an alternative to the SPS and SRM to the existing Hamilton WRP.

Notwithstanding the above comments, the SBR process in our view does have merit and is very popular both in Australia and internationally. It is a very compact process allowing construction footprints to be considerably reduced over older treatment technologies. We note however, that the SBR process is in fact not new, but has been in successfully utilised around the world for many decades.

Contrary to the comments of MWH, the SBR process is frequently considerably simpler to operate than older technologies as it relies on fewer infrastructure items, fewer pumps and fewer moving parts. Following SBR treatment, tertiary filtration (eg. micro- or ultra-filtration) and disinfection (eg. chlorination, ultraviolet etc) can (and would be as part of the PDA development,) be provided to deliver a high grade tertiary effluent suitable for non-potable re-use. The SBR process is centrally computer controlled, as with any other modern WRP. The process can provide for near complete nutrient removal (ie. nitrogen and phosphorous) should these matters be of concern to either Council or Environment Waikato.

Several matters raised by MWH on pages 3-4 of their report in relation to the SBR process are commented upon below:

1. MWH indicate that *'reliable and effective control systems'* are installed to ensure the SBR will function in accordance with approved standards.

Given the large scale of the WRP, it goes without saying that reliable systems will need to be installed. This would be standard engineering practice and we would hope that similar reliable systems would be installed at the currently operating Hamilton WRP.

2. MWH indicate that *'one drawback of the proposal is that there is no backup aeration system if the surface aerator fails'*.

We agree that back-up systems would be required as a matter of standard engineering practice. Typically either multiple aerators would be employed with some built-in redundancy so

that if one were to fail, sufficient air could be delivered by the remaining aerators whilst the failed aerator is either repaired or replaced. We suggest that the issue has arisen at this stage given that no detailed engineering plans have yet been developed and that the proposal is only in a concept or scoping phase.

3. MWH suggest that noise may be an issue and that the WRP would need to be housed in a building.

In our experience with similar systems, noise from surface aerators does not provide a nuisance. SBR WRPs of this scale are generally not built within a building. We note however, that noise emissions for any WRP should meet relevant regulatory standards. We do agree that determination of set-back distances to dwellings and suitable aeration motor capacities are all matters that will need to be addressed at a later stage should the concept be permitted to progress.

4. MWH indicate that the WRP will be an above ground structure and that this may be contrary to public wishes.

This may not be the case. If visual impact is ultimately a valid public concern, then the WRP can be constructed at either near ground level or can be 'backfilled' to ensure that civil structures are obscured. Further to this, landscape planting would typically be undertaken around the WRP complex to further reduce any potential visual impact.

2.8 Reclaimed Water Treatment Standards

At this stage, reclaimed water treatment standards have not been finalised given that the scheme is only at a concept stage. However, we note that for similar schemes in NSW, which have been operating for several years, standards are generally in accordance with the NSW Department of Health and the NSW Recycled Water Committee (1993) guidelines. These are summarised Table 1 and permit generally uncontrolled use of reclaimed water (eg. toilet flushing, garden irrigation etc).

We note that in all circumstances that dual disinfection (eg. chlorination with residual and UV disinfection) with a range of safety controls, continuous monitoring and alarm system would be standard engineering practice.

Table 1: NSW Recycled Water Committee (1993) reclaimed water standards.

Parameter	Compliance Value
Faecal coliforms	< 1 in 100 ml
Coliforms	< 10 in 100 ml
Viruses	< 2 in 50 L
Parasites	< 1 in 50 L
Turbidity	< 2 NTU
pH	6.5 – 8
Free Chlorine Residual	< 0.5 mg/L
BOD ₅	< 10 mg/L
Suspended Solids	< 10 mg/L
Total Nitrogen	< 10 mg/L ¹
Total Phosphorus	< 0.5 mg/L ¹

¹ Based on site specific local environmental constraints rather than health criteria.

MWH suggest that California Title 22 regulations for reclaimed water be adopted. Data provided in Table 1 generally comply with this guideline, however, we suggest current Australian standards are in fact more stringent than the Californian guidelines. We note that in Australia, most states have adopted similar standards for reclaimed water to those presented in Table 1. For example, the Queensland EPA (2005) guideline provides very similar effluent standards criteria to the NSW guidelines.

We note also that both the NSW and Queensland guidelines provide additional information covering system management, compliance period assessment and on-going monitoring requirements of reclaimed water. At this stage, we suggest that such monitoring requirements should be adopted.

MWH refer to the risk of uncontrolled runoff of reclaimed water into local streams during wet-weather if the 'water does not carry a chlorine residual'. We agree that a chlorine residual will be required and this has been discussed above. Further we understand from RML and from data in Aqualink (2004) that the proposed reclaimed water quality described above is in fact of a considerably higher grade than that currently approved for discharge to the Waikato River from the existing Hamilton WRP.

Finally it is worth noting that Australia and New Zealand already share a range of standards in relation to sewage management (eg. AS/NZS 1547). Given that much technical information and performance standards are already being shared across the Tasman, we believe

that adopting current Australian State standards for the use of reclaimed water would not be unreasonable.

2.9 Sludge Management

Reference is made on page 3 of the MWH report that insufficient detail has been provided in relation to sludge management. This comes about as the proposal is as yet in a concept phase. Clearly there are several mechanisms by which sludge can be effectively dealt with and these will need to be determined at a later stage as the proposal is further developed.

Our view is that sludge dewatering would probably occur at the WRP site and that this would occur within sealed anaerobic digesters and sludge thickeners. Ultimately, treated biosolids products can either be utilised for application to land as fertiliser (ie. sold as a commercial product), or be taken off-site to a suitable location. Clearly, an assessment of sludge management options and associated costs will need to be made at a later stage in the development process.

The issue of sludge management is not a 'show stopper' in that would similarly be an issue if raw sewage were pumped to the existing Hamilton WRP.

2.10 Odour

All wastewater treatment systems generate odour and it is accepted that odour generation rates vary with treatment process selected. MWH have raised odour generation as a possible concern. We agree that this is a valid consideration and should be considered as part of the process for determining a suitable position for the WRP as well as determining the required odour controls.

It is worth noting that the SBR process discussed in the MWH report is an aerobic process and not known for high odour generation rates. A range of odour control mechanisms, as well as management controls, can be (and are typically) incorporated as part of the design process. We see that such measures would be investigated further along the consent process for a WRP at the PDA. In our experience, the issue of local odour management is not likely to be a 'show stopper' for the PDA WRP proposal.

2.11 Wet-weather Flows

We agree with MWH that wet-weather flows will need to be accommodated as part of the WRP design. Management of wet-weather flows for larger WRPs such as that proposed for the PDA is standard engineering practice. This is a matter that should be

addressed at a later stage of the development. It is worth noting that several modern SBR and the similar IDEA process WRPs installed by the Sydney Water Corporation are all capable of managing wet-weather flows.

Notwithstanding the above comments, given that this is a 'greenfields' site, considerable reduction in wet-weather ingress to the sewer system can be achieved using modern sewer reticulation design methods and products.

2.12 Resource Consents

We agree that should the proposal for a PDA WRP be pursued, then new resource consents will need to be obtained. However, we do not see this as a significant reason for refuting the value of the proposal concept. In our preliminary discussions, Environment Waikato indicated support for the proposal on the basis of the high grade reclaimed water produced, reduced discharge to the receiving environment, reduced demand on potable water resources and opportunities for large scale water recycling.

In terms of gaining resource consent, this is a matter that we suggest would need to be further investigated and discussed with the relevant authorities. We acknowledge that community consultation (eg. Iwi) will be required and we understand from RML that the consultation process has already begun.

2.13 Power and Electrical Control

Power and electrical control requirements for the WRP at the PDA have at this stage not been determined. These are more appropriately be considered further along the consent process and are not considered a limitation to achieving the proposal. At this concept stage, such matters a secondary to a general approval to proceed with the wastewater management proposal.

Further to the above, the matter of a power and electrical are detailed design considerations which are referred to at several points in the MWH report. We consider it unusual that MWH have made negative comments on a range of detailed design matters at such an early stage in the concept design phase where detailed designs are clearly not available.

2.14 Costs of Treatment and On-going Management

Concerns made by MWH in relation to costs arise from the fact that a detailed cost analysis and comparison with alternative wastewater management options has not been prepared at this stage. We do

note that MWH's comment that the concept proposal "*far outweighs the cost of transferring the wastewater to the existing treatment facility at Pukete*" is not substantiated with a detailed cost analysis. The matter of cost, both upfront and on-going operational costs (including effluent monitoring requirements), can be resolved by further economic assessment of the proposal.

Further to the above comments, the matter of cost can only be fully resolved once the likely parameters of consent are determined. For example, should the preferred path of consent be a WRP at the PDA, with high grade tertiary treated reclaimed water discharged to the river rather than being re-used within the community, then the costs of dual reticulation and reclaimed water supply would be discounted.

To assist with the review process, we have undertaken a preliminary costing assessment and determined that a total capital outlay of say \$8-9 million would be required to construct the WRP and associated ancillary items. This could be further reduced through a competitive tender process once a detailed design is available. Should construction of the WRP be separated into say 3 stages, then the initial stage servicing say 2,666 Sections would cost of the order of \$3.4 million, with Stages 2 and 3 costing of the order of \$2.55 million per stage (with each stage servicing an additional 2,666 Sections).

The reclaimed water reticulation system, including water storages would be in addition to these costs. Our preliminary estimate at this concept stage is that these would be of the order of \$3-4 million. This is based on say 2 small reclaimed water storages, gravity supply to the PDA, and the installation of the reclaimed delivery mains at the same time as the potable supply services (thereby providing considerable cost savings on labour and earthworks etc). Should construction of the reclaimed water delivery scheme be separated into say 3 stages, then the initial stage servicing say 2,666 Sections would cost of the order of \$1.5 million, with Stages 2 and 3 costing of the order of \$1 million per stage (with each stage servicing an additional 2,666 Sections).

On this basis, total cost for the scheme would be around \$12 million. Net cost per Section would be approximately \$1500 for the fully developed scheme. Development in three stages (funded by the developer) would be approximately Stage 1 \$4.9million, Stage 2 \$3.55 million and Stage 3 \$3.55 million.

We understand from RML that Council has allocated some \$9.7 million for the initial 500 Sections and ultimately some \$47 million has been estimated by Council as required to service the entire PDA should all raw wastewater be transferred to the existing WRP at Pukete. Clearly

an on-site WRP and reclaimed water re-use scheme for the PDA is significantly cheaper and has the benefit of being directly and immediately funded by the developer. This can be undertaken in smaller manageable stages.

Our estimates of total annual operating costs are of the order of \$550,000 at project completion (ie. 8000 Sections) or say approximately \$70/Section/year.

2.15 Acceptance by Engineering Community

Whilst MWH acknowledge that the SBR process is a '*recognised treatment process*', our view is that the MWH report is overly negative and refers to a range of detailed design matters which are clearly not available at the present time nor relevant at the concept stage.

The proposal for wastewater management described in this document covers both: a) a WRP capable of delivering a high grade tertiary effluent suitable for a range of non-potable re-use opportunities; and b) a reclaimed water re-use scheme for the PDA. Both of these concepts are widely accepted in the European, United States and Australian engineering community. Both components of the proposal are proven technical alternatives to older methods of wastewater management.

2.16 Acceptance by the Community

Our experience in Australia is that there has been great acceptance by the community regarding the use of reclaimed water for non-potable uses. Given that the reclaimed water would be of an extremely high standard and would only used for non-potable practices, we cannot see any reason why there would be significant public resistance to such a scheme. We accept that the use of reclaimed water for potable uses is however a more contentious issue and presently only proposed in Queensland.

2.17 Existing Systems

We are familiar with several similar systems in Australia where high grade tertiary effluent is produced by a WRP. Some examples include:

1. Coastal caravan parks and resort complexes for populations say up to 2000 EP.
2. Island resorts such as Queensland's Fraser Island and Magnetic Island where discharge is to a marine World Heritage Area and National Park.

3. Towns such as Rouse Hill and Newington (both in NSW) where many billions of litres of reclaimed water are returned to residential dwellings through a dual reticulation system.

At present, Australia's largest residential recycled water scheme is in the Rouse Hill area in Sydney's north west. The scheme currently has over 16,000 homes are using 1.7 billion litres of recycled water per year for flushing toilets, watering gardens, washing cars and other outdoor uses. On average the scheme has reduced demand for drinking water by 35 per cent. Ultimately, the scheme has been designed to accomodate 35,000 houses.

2.18 Summary

We make the following points to summarise our review:

1. We note that at this stage, the wastewater management proposal of RML is not fully developed and that it is suggested that further information be sought by Council or RML to investigate the proposal. In our review of the documentation supplied, it seems that the proposal described in this report has not been previously adequately investigated. The proposal is substantially different from the '200 dwelling cluster' option reviewed by Fraser Thomas (2005).
2. Detailed design considerations are referred to at several points in the MWH report (eg. type and level of disinfection, back-up power arrangements, sludge dewatering method etc). Whilst we do not fundamentally disagree that these matters are generally relevant at detailed site planning and design stages, we consider it unusual that MWH have made negative comments on a range of detailed design matters at such an early stage in the concept design phase.
3. The matter of cost, both upfront and on-going of a WRP at the PDA should be further investigated. This will need to be made within the context of the likely consent conditions imposed on the WRP and reclaimed water re-use scheme. Many of the comments made by MWH with respect to cost are unsubstantiated given that a more detailed design and cost analysis of the full system has not at this stage been provided to Council.
4. The proposal described in this report is for a new centralised WRP located at the PDA. This has a number of advantages, benefits and presents a range of opportunities for re-use of high grade reclaimed water. Reclaimed water quality would be

considerably better than that currently achieved by the existing Hamilton WRP. RML consider that the scheme would have the following benefits:

- a. Cost of building all required infrastructure, including the WRP, reclaimed water storage reservoir(s) and reticulation systems would be borne by the developer.
- b. All works could be undertaken within the PDA land. This means that residents of Hamilton would not be disturbed by construction works associated with the alternative SPS and pipeline works through Hamilton.
- c. The scheme would be considerably more cost effective than construction of the alternative SPS and SRM to the existing Hamilton WRP.
- d. No upgrade works would be required at the Hamilton WRP.
- e. Existing effluent discharge point(s) at the Hamilton WRP would not receive additional effluent.
- f. The reclaimed water supplied by the WRP would reduce the demand on existing potable water supply in the area in the event that a reclaimed water re-use scheme is adopted.

We understand that in the recent year there have been water restrictions in place for the Hamilton area. A reclaimed water re-use scheme would directly result in capital expenditure savings through reduced immediate water resource demand at the Peacocke's area and / or increased available water resource capacity at other Hamilton growth cells.

- g. The implementation of a recycled water re-use scheme within the PDA fundamentally removes the issue of effluent disposal which is typically one of the key concerns in any wastewater management strategy.
- h. The proposal is for a centralised WRP facility at the PDA which would only require a single operator. This could be either Hamilton City Council or another consortium. The single operator ensures that maintenance and management activities are undertaken in accordance

with approvals and are economically viable.

5. We strongly disagree with the MWH view that a new centralised WRP located at the PDA is '*fraught with issues that are not sustainable*'. The concept proposal outlined in this report is clearly sustainable, represents accepted engineering practice within the international engineering community and will provide considerable benefit to the community and environment.
6. We do agree with MWH that a more detailed and comprehensively documented proposal should be prepared. We suggest that such a study be undertaken to resolve some of the matters of outstanding difference between MA and MWH.

Should Council require further information or require a more detailed analysis of any of the above matters, we would be available to provide such advice.

3 References

Australian / New Zealand Standard 1547 (2000), *On-site domestic wastewater management*.

Department of Local Government, NSW Environment Protection Authority, NSW Health Department, NSW Department of Land and Water Conservation and the NSW Department of Urban Affairs and Planning (1998), *Environment and Health Protection Guidelines, On-site Sewage Management for Single Households*.

NSW Recycled Water Committee (1993) NSW Guidelines for the Urban and Residential Use of Reclaimed Water

QLD Environment Protection Agency (2005) Queensland Water Recycling Guidelines