WASTE WATER STRATEGY

COMMENTS ON AECOM PEER REVIEW

1.0 Executive Summary

(i) Existing Sewers & Treatment Condition, pgs 1 & 2

- **2nd Paragraph** - It is accepted that further survey work is required to fully identify the extent of issues on the sewerage network, particularly the Category A & B sewers, and that further analysis of the results to identify any trends would be useful.

Some of this work is already underway in connection with the surveys currently being carried out as part of the infiltration survey and rehabilitation projects, which currently have to take priority. These surveys and the follow up rehabilitation works are identifying and addressing infiltration and structural issues at the same time.

Currently, the % of Category A & B sewers surveyed is now approximately 50% and approximately 50 – 60km of sewer are being surveyed annually.

- **3rd Paragraph**- Pumping stations – report refers to poor condition (Grades 1 & 2). This should refer to Grades 4 & 5.

- **3rd Paragraph** – Odour control systems are in place at stations where hydrogen sulphide is an issue, particularly at Pontac, Le Hocq, Le Bourg, St Ouen, First Tower and Fauvic. These units keep the plants under negative pressure and remove H2S before venting to atmosphere. Chemical dosing has been tried historically but did not achieve significant results. Where this is known to be an issue, staff only enter when absolutely necessary and strict confined space entry procedures are in place and followed when entry is unavoidable.

- **4th Paragraph** - Additional works and associated costs in connection with more stringent EU standards (e.g. Total Nitrogen – UWWTD), should they be introduced, have been recognised, identified and highlighted in the proposals for the new STW although the additional costs are not included in the Strategy figures.

(ii) Sewer Network Options, pgs 2 & 3

- **2nd Paragraph** - Comprehensive infiltration surveys and rehabilitation works are currently ongoing (and have been for two years) to address sewer infiltration and capacity issues.

- **3rd Paragraph** - Retrofitting SuDS systems falls outside the remit of TTS but could form part of a Planning initiative in conjunction with greywater re-use etc.

- **5th Paragraph** - It is accepted that further analyses of the sewerage network is required to fully prioritise future work and determine associated costs although some elements of this work have already been carried out, e.g.,

  Rising main replacement – At least 7.5km of Class B uPVC rising main identified and prioritised for replacement. Estimated costs prepared.

  Resolving infiltration issues on the foul sewer network – priority areas have been identified and have been based on modelling and flow verification work carried out by Grontmij as a result of the building of a new sewer network model, and feedback from pumping station 'operations personnel' on areas adversely affected by inclement weather. Work carried out and costs to date can be used as a guide to project potential future cost.

  Priority area for extending surface water separation schemes is the eastern area of St Helier following completion of the Phillips St Shaft project. Some estimates completed but requires finalising.

  Category 4 & 5 ranked sewers identified to date have been collated into suitable work packages and are currently being programmed and estimates prepared.

(iii) Treatment Options, pg 3

- **3rd Paragraph** – SBR's can be considered as a secondary option if proposed by a Design and Build contractor, however, there would need to be compelling reasons to accept this process in place of a conventional activated sludge process. As the Aecom report recognises, energy consumption is higher, as are maintenance costs. In addition, whilst SBR's have a good track record for carbonaceous treatment, they offer less flexibility for extension to achieve nitrification or Total N limit in the future, should this be required. It is believed that there are very few that have been built to achieve a nitrification standard and none are known of that have been built or enhanced to achieve a Total N standard.

(iv) Sustainability, pg 3

- **1st Paragraph** - Water minimisation does not come under TTS remit but would be supported if Planning pursued. With regard to effluent re-use, Jersey Water has looked at this previously and is not believed to be in favour. It is some distance from the STW to the storage catchments so significant pumping would be required and it is understood that they do not have a need for it. In addition, the final effluent would need further

treatment to remove nitrates, phosphates and trace organic compounds before it could be used as a raw water to be pumped into a raw water reservoir. The capital costs of this further treatment and pumping mains would be high.

(v) Risks, pg 4

- **1st Bullet Point** – It has been agreed with the Environment Department that St Aubins Bay is not currently considered to be 'sensitive' but monitoring will continue. Design and construction of a new STW is proceeding on this basis, again with the agreement of the Environment Department. Required additional treatment, should the bay be classified as 'sensitive' in the future has been identified, allowed for in the outline design and costs highlighted although not included in the Strategy figures.

- **2nd Bullet Point** – It is recognised that further CCTV surveys are required to increase the confidence in the assumptions made with regard to the overall condition of the network. Surveys of sewers are ongoing (approximately 50 - 60km per year), mainly in conjunction with addressing infiltration issues although structural and condition issues are also being identified and addressed at the same time. Initial results from sewers surveyed as part of this process indicate that the majority of the sewers are in a condition that currently gives no reason to suspect that the assumption made with respect to the overall condition of the sewers is a significant risk.

- **3rd Bullet Point** – See Comment in (ii) 5th Paragraph above.

- **4th Bullet Point** - With regard to the proposed STW layout, significant work has been carried out as part of the Feasibility Study to identify the treatment capacities required to accommodate the projected future population plus an allowance for an additional 20%. The risk that a conventional activated sludge process cannot be accommodated on the site is therefore considered to be minimal.

- **5th Bullet Point** – Whilst climate change has not been specifically addressed in the Strategy document, separate sewer modelling work has been carried out to assess the impact of climate change on the network using a 7% increase in rainfall and a future date of 2040. As a general comment, predictions are that no new problem areas arise.

Additional capacities in sewers will be released as a result of surface water separation schemes in St Helier and resolving infiltration and seawater and surface water ingress on the foul network. However, it is accepted that further work in this area is required.

The treatment works is unlikely to be inundated as most of the inflow is pumped and the STW is located away from any major watercourses.

- **6th Bullet Point** – As alluded to in Bullet Point 1, agreement with the Environment Department has been reached on the likely consent standards to be met for the new works

and as a result, a 'staged' approach to treatment provision is to be implemented and provision made in the layout for future treatment capacity should consent standards change at some point in the future. The Environment Department are supportive of this approach.

- **7th Bullet Point** – Final effluent flows are not to be increased under the new proposals. However, the existing outfall is being surveyed and modelled to determine its capacity and future suitability for the STW proposals and stream flows.

(vi) Recommendations, pg 5

- **Bullet Point 1** – Current classification of St Aubins Bay already agreed with the Environment Department.
- **Bullet Point 2** – A 'staged approach' to level of treatment required has been agreed with the Environment Department and provision made in the layout for any enhanced treatment that may be required in the future.
- **Bullet Point 3** - Sewer surveys are ongoing. Results to date suggest that the assumptions made are appropriate but assessments will be ongoing.
- **Bullet Point 4** - Sewer network analysis – see comment in (ii) 5th Paragraph above.
- **Bullet Point 5** – It is not currently intended that a screen be fitted to the Weighbridge CSO. This is due to lack of space to retro-fit, difficulties of access to maintain and due to the fact that the CSO only spills to sea when the 25,000m3 Cavern is full. As a result, most, if not all detritus etc., will have spilt to the Cavern and spills to sea will be very dilute.

  Upstream of Fauvic SPS is still to be reviewed but it is believed that this is a result of significant infiltration in to the foul network which is currently being addressed in the infiltration programme.
- **Bullet Point 6** – Odour control systems are in place at stations where hydrogen sulphide is an issue, particularly at Pontac, Le Hocq, Le Bourg, St Ouen, First Tower and Fauvic. These units keep the plants under negative pressure and remove H2S before venting to atmosphere. Chemical dosing has been tried historically but did not achieve significant results. Where this is known to be an issue, staff only enter when absolutely necessary and strict confined space entry procedures are in place and followed when entry is unavoidable.
- **Bullet Point 7** – Whilst discussions on exact discharge consent figures have not been finalised, the principle of a 'staged' approach to treatment has been agreed with the Environment Department who are supportive of the current STW proposal.
- **Bullet Point 8** – Whilst the Strategy is supportive of SuDS and water minimisation etc., these need to be considered separately as they are Planning driven initiatives.
- **Bullet Point 9** - Climate Change. See (v) Risks – 5th Bullet Point above.

2.0 Legislation

(i) Section 2.1 BWD

- **2nd Paragraph** - New Bellozanne STW design will consider the new parameters under this Directive.

(ii) Section 2.2 UWWTD

- **2nd Paragraph** - With regard to effluent re-use, Jersey Water has looked at this previously and is not believed to be in favour. It is some distance from the STW to the storage catchments so significant pumping would be required and it is understood that they do not have a need for it. In addition, the final effluent would need further treatment to remove nitrates, phosphates and trace organic compounds before it could be used as a raw water to be pumped into a raw water reservoir. The capital costs of this further treatment and pumping mains would be high.

- **4th Paragraph** – In agreement with the Environment Department, St Aubins Bay is not considered 'sensitive' at this time.

(iii) Section 2.3 Shellfish Directive

- **2nd Paragraph** – New Bellozanne STW design will consider the requirements of this Directive.

(iv) Section 2.4 Freshwater Fish Directive

- The discharge from the main STW at Bellozanne is into a freshwater stream but then discharges to sea. There is no impact on freshwater fish.

(v) Section 2.5 WFD

- **Final Paragraph** – Keeping of a register under this Directive comes under the Environment Department remit.

(vi) Section 2.6 Sludge Legislation

- Advice, analysis and farmer liaison is carried out by an independent consultant (4R group) in conjunction with a local contractor. Facilities are currently being built to pasturise the sludge prior to digestion at 550C for 4 hours. Currently the sludge is limed to meet enhanced treated status. The sludge recycling does comply with the ADAS matrix as many crops are exported.
  Sludge treatment also meets the requirements of the following;
  The UK 'Sludge Use in Agriculture regulations 1989, SI No. 1263' as amended which comes from;

EU Sewage Sludge Directive 86/278/EEC which occurs because of;
EU Urban Waste Water Treatment Directive 91/676/EEC.

All of the above is included in Jersey in the 'Water Pollution (Code of Good Agricultural Practice) Order 2009.

3.0 <u>Existing Systems</u>

(i) Section 3.1.1 Condition of Sewerage Network Assets

- **2nd Paragraph** – See previous comment under 1.0 (i) 2nd Paragraph and 1.0 (v) 2nd Bullet point.

(ii) Section 3.1.2 Current Sewerage Network Position & Issues

- **1st Bullet Point** – Of the nineteen areas at risk of flooding (foul/combined), most are isolated manholes located in fields and therefore the risk of flooding of properties is small. Surcharging in these sewers is caused by surface water infiltration and connections, and these areas are gradually being addressed through the infiltration programme.
- **2nd Bullet Point** – Seawater infiltration is also being addressed as part of the infiltration programme.
- **3rd Bullet Point** – The department is aware of most of the problem areas in respect of silt build up and these areas are regularly jetted and cleaned. There is no intention to redesign and replace these sewers.

(iii) Section 3.1.3 CSO's

- **2nd Paragraph** – The Weighbridge CSO discharges to sea on average once or twice a year. However, this is only after a 25,000m3 Cavern storage tank has been filled. Therefore most detritus has spilled to the Cavern and the 'spill' to sea is very dilute. Fitting a screen at the Weighbridge CSO is probably not practicable due to a lack of space to retro-fit and difficulties of access to maintain. Given the above, it is not currently intended that a screen be fitted to the Weighbridge CSO.
  3rd Paragraph - Upstream of Fauvic SPS is still to be reviewed but it is believed that this is a result of significant infiltration in to the foul network which is currently being addressed in the infiltration programme.

(iv) Section 3.1.4 Surface Water System

- Flooding at St Aubin/St Brelade is predominantly as a result of tidal overtopping and few problems if any are caused by high surcharge levels in sewers as a result of high tides. The flooding issues associated with the watercourses at Millbrook and St Peters Valley are predominantly private issues and it is not intended that the Strategy will address these.

The three areas identified as being at risk of surface water flooding at St Saviour are believed to be minor but are to be investigated and measures taken if required, as part of the Strategy.

(v) Section 3.1.5 Pumping Stations

- **1st Paragraph** - Poor Condition should be Grades 4 & 5
- **3rd Paragraph** – Should not storage capacity be 2 hours at 3 x Dry Weather Flow, not 24 hours at 3 x DWF?
  Of the 39 pumping stations that are not considered to meet the UK design standards in terms of passing forward Formula A flows or providing the requisite storage, many have identified infiltration flows of between 50% and 90% of Dry Weather Flow. This high infiltration percentage is resulting in high Formula A flows and storage volumes which would not be representative if infiltration is addressed.
  Most stations have 24 hour storage at 1 x DWF with some key stations having 36 hours but these have been based on an allowance for infiltration lower than what is actually being received. This further emphasises the need to address infiltration into the network.
- **4th Paragraph** - Odour control systems are in place at stations where hydrogen sulphide is an issue, particularly at Pontac, Le Hocq, Le Bourg, St Ouen, First Tower and Fauvic. These units keep the plants under negative pressure and remove H2S before venting to atmosphere. Chemical dosing has been tried historically but did not achieve significant results. Where this is known to be an issue, staff only enter when absolutely necessary and strict confined space entry procedures are in place and followed when entry is unavoidable.
  H2S concentrations cause odour and toxicity risks long before they become an explosive risk at 40,000ppm.

(vi) Section 3.2.3 Septic Tanks and Tight Tanks

- Tankers being impeded by floods is not an issue in Jersey.

5.0 <u>Sewerage Network Options Review</u>

(i) Section 5.1 Sewer Network

- **4th Paragraph** - Phillip St Shaft has been funded separately so does not form part of the funding for the Strategy.
- **5th Paragraph** – Lining with CIPP is the main method being used to resolve infiltration issues with repairs being undertaken where necessary.

- **7th Paragraph** - Surface water separation will not mitigate flooding issues highlighted in Section 3.1.4 of the Peer Report. These will be addressed separately as highlighted in 3.0 (iv) above.
- **8th Paragraph** – HDPE and MDPE is being used for Rising Main replacement.
-

(ii) Section 5.3 CSO's

- The inclusion of a screen at the Weighbridge CSO is not included in the Strategy for the reasons given above. As stated in 3.0 (iii) 3rd Paragraph, the issues at Fauvic are likely to be resolved by the infiltration works currently taking place in that area.

6.0 <u>Wastewater Treatment Options Review</u>

(i) 5th Bullet Point pg 17

– Whilst flow to full treatment is to be increased to 830l/s and storm tanks are to be constructed, storm overflow events cannot be eliminated but they will be significantly reduced.

(ii) Section 6.2.3 SBR's

- **3rd Paragraph** – SBR's can be considered as a secondary option if proposed by a Design and Build contractor, however, there would need to be compelling reasons to accept this process in place of a conventional activated sludge process. As the Aecom report recognises, energy consumption is higher, as are maintenance costs. In addition, whilst SBR's have a good track record for carbonaceous treatment, they offer less flexibility for extension to achieve nitrification or Total N limit in the future, should this be required. It is believed that there are very few that have been built to achieve a nitrification standard and none are known of that have been built or enhanced to achieve a Total N standard.

(iii) Section 6.2.5 Deep Shaft Process

- **Final Paragraph** – TTs do not consider the preparation of a high level cost estimate worthwhile given the issues that a Deep Shaft process at Bellozanne would present.

(iv) Section 6.2.10 Appropriate Technologies

- **2nd Paragraph -** SBR's can be considered as a secondary option if proposed by a Design and Build contractor, however, there would need to be compelling reasons to accept this process in place of a conventional activated sludge process. As the Aecom report recognises, energy consumption is higher, as are maintenance costs. In addition, whilst

SBR's have a good track record for carbonaceous treatment, they offer less flexibility for extension to achieve nitrification or Total N limit in the future, should this be required. It is believed that there are very few that have been built to achieve a nitrification standard and none are known of that have been built or enhanced to achieve a Total N standard.

(v) Section 6.5 Effluent Outfall

- **1st Paragraph** - Hydraulic checks and modelling of outfall are currently being carried out.
- **2nd Paragraph** - Agreement on a new STW discharge consent is ongoing but the overall 'staged' approach to treatment as outlined above has been agreed with the Environment Department and allowance made for additional processes in the proposed layout.

7.0 <u>Sustainability</u>

(i) Section 7.1 Effluent Reuse

- **Final Sentence** – With regard to effluent re-use, Jersey Water has looked at this previously and is not believed to be in favour. It is some distance from the STW to the storage catchments so significant pumping would be required and it is understood that they do not have a need for it. In addition, the final effluent would need further treatment to remove nitrates, phosphates and trace organic compounds before it could be used as a raw water to be pumped into a raw water reservoir. The capital costs of this further treatment and pumping mains would be high.

(ii) Section 7.2 SuDS

- **3rd Paragraph** - Retrofitting SuDS systems falls outside the remit of TTS but could form part of a Planning initiative in conjunction with greywater re-use etc.

(iii) Section 7.3 Water Minimisation Initiatives

- Whilst TTS support water minimisation initiatives, these come under the remit of Planning.

(iv) Section 7.4 Climate Change

- **4th Paragraph** - See 1.0 (v) 5th Bullet Point regarding Climate Change checks carried out to date.
- **Bullet Point 1** - Increased sewer flooding – No new areas predicted to flood during 1 in 30 year event using climate change rainfall but accepted that further work required.
- **Bullet Point 2** - Inundation of Works – Not really applicable to Jersey. STW has pumped flows and there are no major watercourses to affect works. Some pump stations are adjacent to streams but control housings are not considered to be at significant risk.

- **Bullet Point 3** - Change in sea conditions etc – WFD adoption allows for change in consent standards if required and layout can accommodate additional treatment process as a result. The hydraulics of the outfall is being modelled and will include a rise in sea levels.

8.0 <u>Conclusion</u>

(i) Bullet Points

- **Bullet Point 1** - No screen is currently being considered for the Weighbridge for the reasons given.
- **Bullet Point 2 –** The overflow upstream of Fauvic is being addressed as part of the infiltration works currently underway.
- **Bullet Point 3 –** See previous comments on hydrogen sulphide.

(ii) 5th Paragraph

- Deep Shaft – There appears to be little value in preparing a cost estimate for Deep Shaft when the process is considered to be unsuitable for Bellozanne.

(iii) **6th Paragraph**

- SuDS and water minimisation are under the remit of Planning. For effluent reuse, see previous comments.

<u>Malcolm Orbell Comments on e-mail</u>

- **Sludge – use on land, constraints, regulations** - Advice, analysis and farmer liaison is carried out by an independent consultant (4R group) in conjunction with a local contractor. Facilities are currently being built to pasturise the sludge prior to digestion at 550C for 4 hours. Currently the sludge is limed to meet enhanced treated status. The sludge recycling does comply with the ADAS matrix as many crops are exported.
  Sludge treatment also meets the requirements of the following;
  The UK 'Sludge Use in Agriculture regulations 1989, SI No. 1263' as amended which comes from;
  EU Sewage Sludge Directive 86/278/EEC which occurs because of;
  EU Urban Waste Water Treatment Directive 91/676/EEC.

  All of the above is included in Jersey in the 'Water Pollution (Code of Good Agricultural Practice) Order 2009.

- **Possible mitigation for 'risks' identified** – See 1.0 (v) above

- **Clarification of what is included within sums budgeted for the Strategy** – Aside from the information given above, the Phillips St project is funded separately so is not in the Strategy. Neither are additional works required to the STW should consent standards change in the future, e.g., nitrification/de-nitrification required. Whilst allowance has been made for the provision of these processes in the provisional layout of the new Works, the funding has not. As a result of ongoing monitoring in the Bay, should nitrification be required in the coming years, an additional £16m is likely to be required and if de-nitrification is required, a further £15m will be required i.e., approximately £31m in total.

- **Nitrate history and denitrification requirements – what is planned?** In the late 1990's/early 2000's the Urban Waste Water Treatment Directive was used by the Environment Department to set a Total nitrogen limit on the discharge permit on the then upgraded STW as it was believed at the time that St Aubin's Bay had characteristics that had the potential for eutrophication if nutrient levels, particularly nitrogen, were elevated within the Bay, i.e, that the Bay was 'sensitive'. Eutrophication is a condition where elevated nutrients result in proliferation of certain algae and consequential de-oxygenation of the water to the extent that fish and other biota may no longer survive. Under the UWWTD, an annual average Total nitrogen limit of 10mg/l was set.

  At the time, the classification of St Aubin's Bay as 'sensitive' under the UWWTD was based on a study of the bay carried out by the Centre for Research into Environment and Health (CREH) in 1997. The report also noted that nutrient removal from the Bellozanne STW effluent would be a prudent precautionary step at that time.

  However, the survey was only carried out over one extended summer period (that excluded a November-January winter period). It is now accepted that these surveys need to be carried out over several years to provide a more robust understanding, especially when used as the basis for major expenditure decisions.

  More recent studies carried out by Cascade Consulting on behalf of the Transport and Technical Services and Environment Departments looked at all data between 2009 and 2013 and updated data sets for the winter period and has found that whilst there was some elevation of nitrogen levels within St Aubin's Bay, conditions were such that they are not likely to lead to eutrophication.

  Cascade also identified that supply of nitrogen in the bay is from a number of sources, with the wider marine influence being a significant contribution, as well as smaller inputs from seasonally fluctuating STW and land based sources.

More specifically, the studies have indicated that, on an annual average basis, the STW currently contributes approximately 6.4% of nutrients to the nutrient levels in St Aubin's Bay, with approximately 92.1% originating from the wider tidal environment. Current understanding would also suggest that St Aubin's Bay is not eutrophic, or 'sensitive' as prescribed under the UWWTD, and, as such, the indication at this time is that the current data and understanding does not support or justify the significant additional expenditure of approximately £31m required for a nutrient removal plant in the new STW (this is over and above the £75m currently proposed).

As a result it is proposed that a conventional activated sludge plant be constructed at Bellozanne that will not contain a nutrient removal process. However, in line with the Water Framework Directive approach, it is proposed that levels of nutrients within St Aubin's Bay will continue to be monitored to ensure that the ecology of the bay remains protected. Should it subsequently be demonstrated that there is a need for nutrient control at the works in the years ahead as this data becomes available, then space will be available within the proposed layout to incorporate these processes, which have been estimated at £31m at 2012 prices. This limits unnecessary expenditure at this time whilst ensuring a sustainable and fit for purpose long-term solution.

- **Discharge Consents – clarification of what will be needed.** The actual discharge consent to be applied to the proposed works is still being discussed with the Environment Department but the main principle of progressing with a conventional activated sludge plant, and the effluent quality that such a process is likely to produce, in conjunction with ongoing monitoring of St Aubins Bay, has been agreed with the Regulator.

- **Housing Developments** – New Housing developments will increase flows to the foul system (surface water will be dealt with on site in accordance with SuDS). The programme of works to address infiltration issues will free up capacity to cater for this additional flow.

SJF

24th April 2014