Approval

1. The Envirocycle Model 10NR Advanced Secondary Quality Wastewater Treatment System with Nutrient Reduction ("the system") described in the Specifications and Drawings in the attached Schedule and manufactured by AWTS Maintenance Services Pty Ltd (ABN 88 073 578 195) ("the manufacturer") has been assessed in accordance with the (previous) Queensland Plumbing and Wastewater Code (QPW Code) dated 26 October 2017.

2. Approval is granted for the advanced secondary quality wastewater treatment system with nutrient reduction, subject to compliance by the manufacturer with the requirements of the Plumbing and Drainage Act 2018, part 4 and the conditions of approval detailed below.

3. This approval, the conditions of approval and the Schedule comprise the entire Chief Executive Approval document.

4. Any modification by the manufacturer to the design, drawings or specifications scheduled to this approval must be approved by the Chief Executive.

Conditions of approval

1. The manufacture, installation, operation, service and maintenance of the systems must be in conformity with the conditions of this Treatment Plant Approval.

2. The advanced secondary quality wastewater treatment system with nutrient reduction, which is an example of the approved systems, may only be used on premises that generate per day

   (a) a maximum hydraulic loading of 1,500 litres; and

   (b) a maximum organic loading of 700 grams BOD5.

3. The system must continue to meet the requirements of advanced secondary quality wastewater treatment system with nutrient reduction, producing the following effluent quality —

   (a) 90% of the samples taken must have a BOD5 less than or equal to 10 g/m³ with no sample greater than 20 g/m³.

   (b) 90% of the samples taken must have total suspended solids less than or equal to 10g/m³ with no sample greater than 20g/m³.

   (c) 90% of the samples taken must have a thermotolerant coliform count not exceeding 10 organisms per 100 mL with no sample exceeding 200 organisms per 100mL.

   (d) The manufacturer has included nitrogen and phosphorus reduction in the treatment process, the effluent compliance criteria must continue to meet, in addition to the above, the following nutrient criteria:

      a. 90% of the samples taken, with 95% confidence limits shall have a total nitrogen concentration less than or equal to 13 mg/L; and

4. Each system must be serviced in accordance with the details supplied in the owner’s service and maintenance manuals.
5. Each system must be supplied with —
   (a) a copy of this Treatment Plant Approval document;
   (b) details of the system;
   (c) instructions for authorised persons for its installation;
   (d) a copy of the owner's manual to be given to the owner at the time of installation; and
   (e) detailed instructions for authorised service personal for its operation and maintenance.

6. This approval does not extend, apply to, or include the land application system used in conjunction with an approved system installed on premises.

7. At each anniversary of the Treatment Plant Approval date, the manufacturer must submit to the Chief Executive a list of all systems installed in Queensland that they have received an installation and commissioning certificate during the previous 12 months.

8. Where the Chief Executive is notified of any system failures that they believe are a result of poor design or faulty manufacture, the Chief Executive may randomly select a number of installed systems for audit. The Chief Executive will notify the National Association of Testing Agencies (NATA) accredited laboratory nominated by the manufacturer, which systems are to be audited for Biochemical Oxygen Demand (BODs) and Total Suspended Solids (TSS). The sampling and testing of the selected systems, if required, is to be done at the manufacturer’s expense. The following results must be reported to the Chief Executive;
   (a) Address of premises.
   (b) Date inspected and sampled.
   (c) Sample identification number.
   (d) Biochemical Oxygen Demand (BODs).
   (e) Total Suspended Solids (TSS).

9. The Chief Executive may, by written notice, cancel this approval if the manufacturer fails —to comply with one or more of the conditions of approval; or within 30 days, to remedy a breach, for which a written notice been given by the Chief Executive.

10. This approval may only be assigned with the prior written consent of the Chief Executive.

11. The Chief Executive may, by written notice, cancel this approval if the manufacturer fails —
   (a) to comply with one or more of the conditions of approval; or
   (b) within 30 days, to remedy a breach, for which a written notice been given by the Chief Executive.

12. This approval may only be assigned with the prior written consent of the Chief Executive.

13. This approval expires on 1 January 2024 unless cancelled earlier in accordance with paragraph 9 above.

Lindsay Walker
Director
Plumbing, Drainage and Special Projects
Building Legislation and Policy
Date approved: 1 September 2019
TREATMENT PLANT APPROVAL No. 07/2019
Plumbing and Drainage Act 2018, part 4

SCHEDULE

Attachment 1

Specifications & Drawings for the

Envirocycle Model 10NR Advanced Secondary Quality Wastewater Treatment System
with Nutrient Reduction
General Description- Envirocycle 10NR

The Envirocycle 10NR Aerated Wastewater Treatment System (AWTS) is designed to treat the wastewater from a residential dwelling occupied by a maximum of 10 persons.

The Envirocycle 10NR AWTS is contained in one vertical axis type cylindrical precast concrete collection well with a design capacity of 7000 litres. The operational water level in the system varies from 1300 mm at LWL to 1560 mm at HWL.

The system consists of:
1. A primary sedimentation chamber with a capacity at LWL of 1320 litres;
2. A anaerobic filtration chamber with a capacity at LWL of 1430 litres and containing four (4) rows of Bio Cord filter media measuring 1000 mm long x 420 mm wide x 1000 mm high with a surface area of 32.5 m²;
3. A contact aeration chamber with a capacity at LWL of 1695 litres and containing 10 individual sections of Bio Cord filter media made up in five (5) rows measuring 2000 mm long x 420 mm wide x 1000 mm high with a surface area of 65 m².

In both chambers the Bio Cord media is held in place in a rigid frame;
4. A secondary sedimentation chamber with a capacity at LWL of 515 litres;
5. An irrigation pump chamber with a capacity at LWL of 340 litres;
6. An UV disinfection unit is installed in the outlet pipe from the irrigation pump to the land application system. The UV unit's peak flow rate is 500 litres/hour. The UV lamp has an operating total wattage of a minimum of 38 Watts or greater and has a life of 8500 hours before replacement;
7. Air is supplied to the contact aeration chamber by an air blower with an output of 80 litres/minute;
8. A submersible irrigation pump with a 9 metre head or greater is installed in the irrigation pump well.

The UV disinfection unit operates at its optimum when the flow rate is restricted to 6 litres/minute or less (38 watt lamp). A PVC ball valve may be installed on the pump line inside the tank to ensure that the flow rate is not exceeded if the irrigation system exceeds the given flow.
Envirocycle Model 10NR
A product of AWTS Maintenance Services Pty Ltd
Aerated wastewater Treatment System
Non Conventional Type

1: Design Condition
1) Hydraulic and Organic Loading
Hydraulic Loading – Average 180 lit/p.d. x 10 EP =1800 lit/d
Max. 250lit/p.d. x 10EP = 2500 lit/d
Inflow ; 16 hr/d

<table>
<thead>
<tr>
<th>Daily average flow</th>
<th>lit/d</th>
<th>lit/hr</th>
<th>lit/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum hourly Peak flow</td>
<td>834</td>
<td>13.90</td>
<td></td>
</tr>
<tr>
<td>Maximum peak flow</td>
<td>1250</td>
<td>20.84</td>
<td></td>
</tr>
</tbody>
</table>

1.2 Organic Loading (Dailey Average)
BOD: \[ 70\text{g/p.d. x 10EP = 700 g/d} \]
SS: \[ 70\text{g/p.d. x 10EP = 700 g/d} \]
T – N : \[ 15\text{ g/ p.d. x 10EP = 150 g/d} \]
T – P : \[ 2.5\text{ g/ p.d. x 10EP =25 g/d} \]

1: 3 Effluent (Dailey Average)
BOD: \(< 10\text{mg/ l}\)
SS: \(< 10\text{mg/ l}\)
T – N \(< 10\text{mg/ l}\)
T – P \(< 5\text{mg/ l}\)

2: Design Specification
1) Treatment method; Anaerobic filter contact aeration & flow regulation process.
2) Chamber capacities (minimum)
Each chamber has a capacity equal to or greater than the values calculated by formula.

2) 1 Primary Sedimentation Chamber Volume (VPS)
Min. VPS > Q x 2/3 (m3) where Q = Daily Average Flow
Min. VPS > 1.8 (m3/d) x 2/3 =1.2m3

2) – Anaerobic Filtration Chamber Volume (VAF)
Min. VAF > Q x 2/3 (m3)
Min. VAF > 1.8 (m3/d) x 2/3 = 1.2m3
Anaerobic Filter volume ratio >25%
Minimum Volume 1.2m3 x 25% =0.3m3
Anaerobic filter surface area - 45m2/m3
Min. Filter Surface area needed = 0.3m3 x 45m2/m3 = 13.5m2

\[ W \]
2) - 3 Contact Aeration Chamber Volume (VCA)
By Hydraulic loading
Min. VCA = Q x 3 / 4 (m³)
Contact Filter volume ratio > 50%
Minimum volume of Contact Filter = 1.35 m³ x 50% = 0.675 m³
Contact Filter surface area = 45 m² / m³
Min. Surface area of Contact filter = 0.675 m³ x 45 m² / m³ = 30.38 m²
Air supply (AV) by Air Blower
Min. AV needed = Aeration Chamber volume x 2.4/60min

2) - 4 Secondary Sedimentation Chamber Volume (VSS)
Min. VSS = Q x 6 / 24hr (m³)
= 1.8 m³ x 6 / 24 hr = 0.45 m³
Minimum depth > 1.2 m
Sludge hopper slope > 60°
Minimum surface area > 0.52 m²
Maximum surface loading < 14.0 m³/m².d
Maximum rise velocity < 0.6 m/hr
Maximum weirs flow < 7.2 m³/m.d

2) - 5 Pump Chamber Volume (VPu)
Min. VPU = Q x 3 / 24 hr (m³)
= 1.8 x 3 / 24 hr = 0.225 m³

2) - 6 Flow Regulation Volume (VFR)
Min. VFR = Q x 12 / 24 hr (m³)
= 1.8 m³ x 12 / 24 hr = 0.9 m³

2) - 7 Disinfection System
UV disinfection - Maximum flow = 300lit/hr
Outflow Thermotolerant Coliform < 30 cfu/100ml

3: Operation

3) - 1 Aeration:
Interruption aeration

3) - 2 Aerobic to Anaerobic process circulation:
Circulation rate Q x 1.5 - 4.0 (where Q = Daily hydraulic loading)

3) - 3 Irrigation:
By submersible pump > 180 lit/cycle

3) - 4 Flow Regulation
By Pump operating intermittently
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inflow Junction</td>
<td>PVC</td>
<td>Ø100 Sewer pipe Ø100 sewer Junction 90°</td>
</tr>
<tr>
<td>2</td>
<td>Outflow Junction</td>
<td>PVC</td>
<td>Ø100 Sewer pipe Ø100 sewer Junction 90°</td>
</tr>
<tr>
<td>3</td>
<td>Outflow Junction</td>
<td>PVC</td>
<td>Ø100 Sewer pipe Ø100 sewer Junction 90°</td>
</tr>
<tr>
<td>4</td>
<td>Weir</td>
<td>PVC</td>
<td>Ø100 Sewer pipe Ø100 End Cap Ø100 sewer Tee 90°</td>
</tr>
<tr>
<td>5</td>
<td>Circulation Pipe</td>
<td>PVC</td>
<td>Ø 32 Pressure pipe</td>
</tr>
<tr>
<td>6</td>
<td>Air Pipe</td>
<td>PVC</td>
<td>Ø 15 Pressure pipe</td>
</tr>
<tr>
<td>7</td>
<td>Airlift Pump</td>
<td>PVC</td>
<td>Ø 32 Pressure pipe</td>
</tr>
<tr>
<td>8</td>
<td>Irrigation Pump</td>
<td>PVC</td>
<td>Ø 25 Pressure pipe</td>
</tr>
<tr>
<td>9</td>
<td>UV Outflow Pipe</td>
<td>PVC</td>
<td>Ø 25 Pressure pipe</td>
</tr>
<tr>
<td>10</td>
<td>Diffuser</td>
<td>PVC</td>
<td>Ø 15 Pressure pipe</td>
</tr>
<tr>
<td>11</td>
<td>Diffuser Holder</td>
<td>PVC</td>
<td>Ø 15 Pressure pipe</td>
</tr>
<tr>
<td>12</td>
<td>Union</td>
<td>PVC</td>
<td>Ø 15 Pressure</td>
</tr>
<tr>
<td>13</td>
<td>Union</td>
<td>PVC</td>
<td>Ø 25 Pressure</td>
</tr>
<tr>
<td>14</td>
<td>Circulation Weir</td>
<td>PVC</td>
<td>Ø 32 End Cap</td>
</tr>
<tr>
<td>15</td>
<td>Circulation Weir</td>
<td>PVC</td>
<td>Ø 32 End Cap</td>
</tr>
<tr>
<td>16</td>
<td>Air Valve</td>
<td>PVC</td>
<td>Ø 15 valve</td>
</tr>
<tr>
<td>17</td>
<td>Air Valve</td>
<td>PVC</td>
<td>Ø 15 valve</td>
</tr>
<tr>
<td>18</td>
<td>Air Valve</td>
<td>PVC</td>
<td>Ø 15 valve</td>
</tr>
<tr>
<td>19A</td>
<td>Filter Holder</td>
<td>GAL</td>
<td>Ø 11 mm</td>
</tr>
<tr>
<td>19B</td>
<td>Filter Holder</td>
<td>GAL</td>
<td>Ø 11 mm</td>
</tr>
<tr>
<td>20A</td>
<td>Filter Holder</td>
<td>GAL</td>
<td>Ø 11 mm</td>
</tr>
<tr>
<td>20B</td>
<td>Filter Holder</td>
<td>GAL</td>
<td>Ø 11 mm</td>
</tr>
<tr>
<td>20C</td>
<td>Filter Holder</td>
<td>GAL</td>
<td>Ø 11 mm</td>
</tr>
<tr>
<td>21</td>
<td>Diffuser</td>
<td>PE</td>
<td>Ø 30</td>
</tr>
<tr>
<td>22</td>
<td>Anaerobic Filter</td>
<td>PP</td>
<td>-</td>
</tr>
<tr>
<td>23</td>
<td>Aerobic Filter</td>
<td>PP</td>
<td>-</td>
</tr>
<tr>
<td>24</td>
<td>Sensor</td>
<td>PVC</td>
<td>Ø 76 mm</td>
</tr>
<tr>
<td>25</td>
<td>High Water Level</td>
<td>PVC</td>
<td>Ø 15mm</td>
</tr>
<tr>
<td></td>
<td>Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Filter</td>
<td>PE</td>
<td>25mm</td>
</tr>
<tr>
<td>27</td>
<td>UV Filter</td>
<td>SS</td>
<td>Ø 63mm</td>
</tr>
<tr>
<td>28</td>
<td>Electric Panel</td>
<td>-</td>
<td>See Wiring diagram for model 10NR</td>
</tr>
<tr>
<td>29</td>
<td>Irrigation Pump</td>
<td>-</td>
<td>≥0.1KW</td>
</tr>
<tr>
<td>30</td>
<td>Air Blower</td>
<td>Air Pump</td>
<td>100lit/min</td>
</tr>
<tr>
<td>31</td>
<td>Blower Cover</td>
<td>Concrete</td>
<td>Reinforced concrete</td>
</tr>
<tr>
<td>32</td>
<td>Baffle</td>
<td>FRP or PVC</td>
<td>≥2.0 mm</td>
</tr>
<tr>
<td>33</td>
<td>Baffle</td>
<td>Concrete</td>
<td>Reinforced concrete</td>
</tr>
</tbody>
</table>

PS: Primary Sedimentation Chamber
AF: Anaerobic Filtration Chamber
CA: Contact Aeration Chamber
SS: Secondary Sedimentation Chamber
PU: Pump Chamber

Name: ENVIROCYCLE® - MODEL 10NR
A product of CRS Technologies Pty Ltd

Drawing: Plan/Elevation Aerated Wastewater Treatment System

Drawn By: A. Chiba | Drawing No: 990215-1

Scale: 1:25

Date: 15 February 1999

This drawing remains the property of CRS Technologies Pty Ltd and is issued on the understanding that it will not be copied, reproduced, produced from or used in any way contrary to the confidentiality of CRS Technologies Pty Ltd.

Patent Pending