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Stormwater Management Plan

Beaudesert & Boonah Cranes – Proposed Transport Depot

Prepared for: Beaudesert & Boonah Cranes

149 Sandy Creek Road, Bromelton QLD 4285

Lot 3 RP40309

ACS Engineers

9 November 2023

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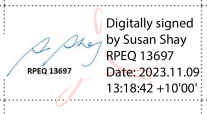
2	Matthew Westphal	Susan Shay RPEQ 13697	Susan Shay RPEQ 13697	 Digitally signed by Susan Shay RPEQ 13697 Date: 2023.11.09 13:18:42 +10'00'	Final	09/11/2023

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Revision 1 Draft for client comment
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Contents

1. Introduction

This site-based stormwater management plan has been developed to identify the potential stormwater related impacts from the proposed development on Lot 3 RP40309 at 149 Sandy Creek Road, Bromelton QLD 4285.

The following report details the stormwater management requirements for the development in order to achieve compliance with the *Bromelton State Development Area Development Scheme*, *Scenic Rim Regional Council Planning Scheme, Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments, QUDM* and the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*, specifically the necessary mitigation measures to ensure that there is:

- no worsening of the stormwater discharges from the site into downstream properties,
- no worsening of flood plain extents, and
- no increased risk of contamination of downstream surface waters.

2. Site Details / Description of Development

The subject land comprises of one allotment, Lot 3 RP40309 (4.017 ha), as shown in Figure 1. The site is located approximately 5.2km west of the township of Beaudesert and lies within the Scenic Rim Regional Council (SRRC) Local Government Area as well as the Bromelton State Development Area (BSDA). The subject lot is zoned within the Transition Precinct of the BSDA, as shown below in Figure 2.

Figure 1: Subject Site (QLD Globe, 2023).

Figure 2: BSDA Precinct of Subject Site (BSDA Planning Scheme, 2023).

The site has access via Sandy Creek Road, a local council-controlled road, constructed to a bitumen standard, and is not burdened by any easements.

As seen in Figure 2 above, the subject site is surrounded by rural properties zoned within both the Transition Precinct and the Medium-High Impact Precinct within the BSDA. The subject lot is partially developed with an existing dwelling and stables.

The proposed development includes:

- Retention of existing Dwelling House as office/caretakers residence,
- Multiple sheds ancillary to proposed transport depot use
- Hardstand areas,
- Property Access, and
- Internal driveway and parking areas.

The overall layout of the proposed development is detailed in the drawing set ACS-230068-GEN.

3. Stormwater Quantity

The proposed development including an office/caretakers residence, sheds, transport depot, hardstand areas and internal road will contribute to an increase in the overall impervious area of the site. The extent of this increase and the proposed mitigation measures to ensure no worsening of the stormwater discharges from the site into downstream properties, and no worsening of flood plain extents is detailed in the subsequent sections of this report.

3.1. Catchment Description

For the purpose of the site-based stormwater management plan, the defined catchment is limited to the external boundaries of the development site. The development site is relatively flat but can be generally described as falling to the east, towards Corcoran Road and Swan Creek, stream order 2 to 3, as seen in Figure 3.

Figure 3: Site Topography (QLD Globe, 2023).

The catchment has good grass cover and is moderately vegetated. A low soil permeability has been assumed for the stormwater runoff calculations due to the soil on site being predominantly hard pedal, red duplex soils.

3.2. Runoff Modelling

Runoff estimates have been calculated using the rational method and the project model which includes the property surface sourced from LiDAR data. The following results are to be read in conjunction with the project drawing set ACS-230068-GEN.

3.2.1. Methodology

The rational method has been used to determine the peak runoff volumes generated from the site both pre and post development. The rainfall data for the site has been sourced from the Bureau of Meteorology design rainfall data system (2016). Slopes, stream lengths, sheet flow lengths and other characteristics have all been derived from the project model, created in Civil 3D.

3.2.2. Inputs

The following catchment data is required to calculate the expected peak flows:

- Catchment area and stream lengths,
- Catchment fraction of impervious area,
- Time of Concentration (TOC), and
- IFD Data

Table 1 below details the catchment information in the pre- and post-development peak flow calculations. Time of concentration values were calculated in accordance with Friend's equation.

Table 1: Catchment Characteristics

Scenario	Catchment Area	Fraction Impervious	Time of Concentration
Pre Development	4.017 ha	0%	31 minutes
Post Development	4.017 ha	33%	20 minutes

3.2.3. Analysis Results

Table 2 below details the pre- and post-developed peak discharge rates and volumes from the site using the Rational Method. Rational method calculations and results for other AEP's are provided in Appendix E).

Table 2: Peak Discharge Rates

Scenario	Peak Discharge 1% AEP
Pre Development	1.16 m^3/s
Post Development	1.49 m^3/s

The increase in impervious area and shortening of the time of concentration due to the formalisation of the site drainage is expected to result in a minor increase in peak flows generated from the site. Appropriate mitigation measures must be proposed to ensure discharges rates are limited to the pre development levels and to ensure compliance with *QUDM* and the relevant development and planning schemes.

4. Stormwater Management

The following stormwater controls are proposed to appropriately manage stormwater through the site and maintain pre developed regimes.

- Overland flow directed perimeter bio-swale drains;
- Roof water directed to rainwater tanks with overflows directed to perimeter swale drains;
- Perimeter swale drains directed to detention basin (including bioretention cell).

The stormwater detention is proposed to be constructed within the southeast corner of the lot to ensure pre developed peak discharges are maintained. Using the Hydraulic Toolbox calculator developed by the US Federal Highways Administration and basin sizing guidance in QUDM it has been determined that the detention basin (encompassing permanent storage) must have a base area of 600m^2 and depth to lowest outlet of 0.65m to account for the reduction in initial loss and resulting changes to the runoff hydrograph. The detention outlet structure (weir and low flow pipes) has been sized to convey pre developed flow rates and return flows to pre developed regimes. Refer to Appendix F) for flow hydrograph details. It should be noted that the detention basin sizing has been based on the assumption that shed rainwater tanks (potable uses) are all full at the commencement of the rainfall event.

Stormwater on site and discharging from the site will be managed in accordance with this report and project drawing ACS-230068-GEN.

It is expected that the existing lawful point of discharge will be maintained should these controls be implemented as part of the development works.

5. Stormwater Quality

5.1. Potential Impacts

On site operations have the potential to impact on surface runoff water quality if inadequately managed. These activities may include:

- Initial construction phase development (e.g. groundcover/topsoil stripping, road and hardstand construction);
- Increased oils, greases, fuels and other chemicals due to increased traffic activity;
- Spillage during handling and transport of materials; and
- Effluent disposal.

Urbanisation has the potential to increase the quantity of stormwater pollutants that are discharged to receiving waters. This can have a detrimental effect on those receiving environments and potentially impact the natural water cycle, ecological health and drinking water supplies.

5.2. Proposed Stormwater Quality Management

The potential impacts of on site operations for the subject site prompt the requirement of a stormwater quality treatment train. The treatment train consists of the following:

1. Stormwater runoff from roof to be directed into rainwater tanks;
2. Tank overflows and hardstand areas directed to vegetated swale drains;
3. Swale drains to be directed to detention basin with bioretention cell; and
4. Captured water in rainwater tanks and detention basin to be reused on site for potable and irrigation uses.

The stormwater quality treatment train is shown on drawing ACS-230068-GEN-08 and in Figure 4 below.

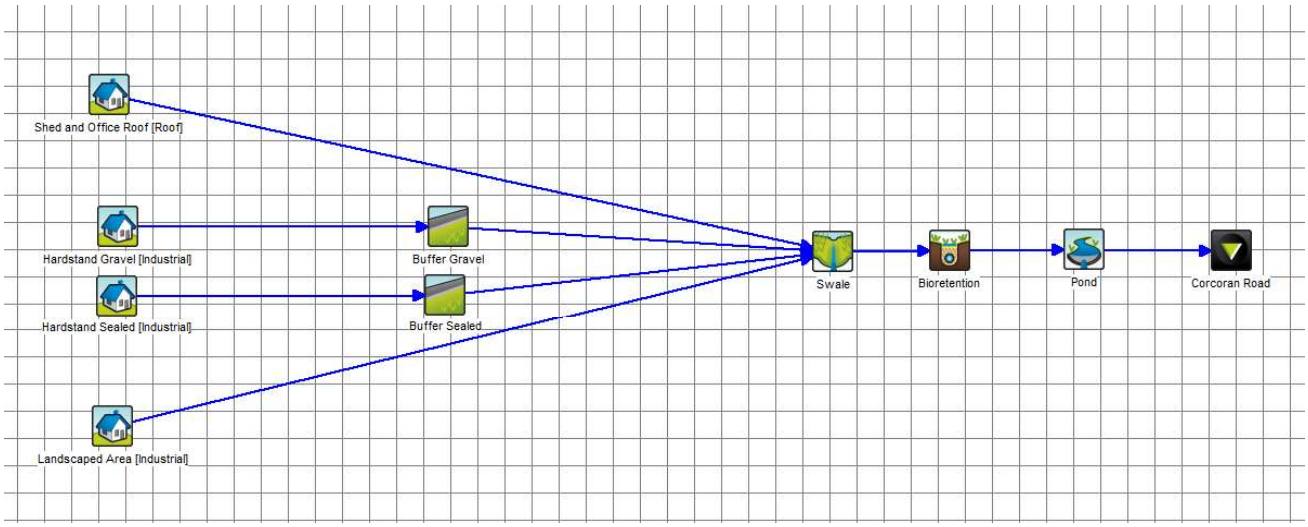

Figure 4 - MUSIC Treatment Train

Effluent disposal from the existing building and proposed new sheds will be undertaken in accordance with the Site and Soil Evaluation Report (Stavs Hydraulic Services, 13th October 2023). Refer to Appendix C).

5.3. Compliance

The established controls have been assessed to ensure the achievement of reductions in mean annual nutrient loads from an unmitigated development.

The existing and developed drainage path characteristics, along with source contaminant characteristics, were modelled using the MUSIC software in accordance with MUSIC Modelling Guidelines (Water By Design, 2018). The reduction targets are outlined in Table 3 below along with the modelled train effectiveness, demonstrating compliance with the reduction targets. The MUSIC Modelling Report can be provided upon request for model input and results information.

Table 3: Nutrient Removal Targets and Model Results

Nutrient Parameter	Reductions in mean annual load from unmitigated development (Seqwater Development Guidelines)	Modelled Treatment Train Effectiveness
Total Suspended Soils (kg/yr)	85% Reduction	90.6%
Total Phosphorous (kg/yr)	65% Reduction	76.2%
Total Nitrogen (kg/yr)	45% Reduction	45.1%
Gross Pollutants (kg/yr)	95% Reduction	100%

If best practice management is followed, along with the proposed stormwater quality management controls, the quality of the stormwater discharging from the site is expected to remain at or below pre-development quality. Runoff from all disturbed areas of the site will be directed to the detention basin for sediment capture and nutrient removal.

The proposed development will also achieve the requirements of the *Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments*. Refer to Appendix B), Appendix C), Appendix D) and Appendix G).

6. Erosion and Sediment Control

Sediment will be generated as a result of the proposed development works. While the potential exists for sediment to be generated during the construction phase, the potential sediment volume is dependent upon rainfall, site topography, the material type exposed, flow characteristics, and the construction practices and program.

The potential sediment yield during construction will vary with the extent of site exposed during the construction programme. It is recommended that the following measures be adopted along with the whole of site and construction stage specific erosion and sediment control plans detailed on drawings ACS-230068-GEN-10 to 14 to ensure that the water quality of the receiving waters is not adversely impacted by the proposed development works.

Potential erosion and sediment generation and risk assessment is undertaken using the Revised Universal Soil Loss Equation (RUSLE).

RUSLE calculates annual erosion rates based on:

A = R x K x LS x C x P

Where:

A = annual soil loss due to erosion (t/ha/yr)
R = rainfall erosivity factor
K = soil erodibility factor
LS = topographic factor derived from slope length and gradient
C = cover and management factor
P = erosion control practice factor

Table 4 below shows the factors used for the erosion risk assessment.

Table 4: RUSLE Factors Used for Assessment

Factor	Reference	Value
R	Calculated from Table E1 from the IECA Best Practice Erosion and Sediment Control, Book 2, Appendix E.	2231.901
K	Table E4 from the IECA Best Practice Erosion and Sediment Control, Book 2, Appendix E.	0.025
LS	Table E3 from the IECA Best Practice Erosion and Sediment Control, Book 2, Appendix E.	0.58
C	Table E9 from the IECA Best Practice Erosion and Sediment Control, Book 2, Appendix E.	1
P	Table E11 from the IECA Best Practice Erosion and Sediment Control, Book 2, Appendix E.	1.3

Figure 5 and Figure 6 below show the calculated annual soil loss and associated risk assessment, varied by the LS factor.

Slope Ratio	Slope Gradient (%)	Slope Length (m)							
		10	20	30	40	50	60	70	80
1 in 100	1	7	8	9	11	12	12	13	14
1 in 50	2	10	13	17	20	22	25	26	28
1 in 33	3	12	17	25	30	34	38	41	44
1 in 25	4	15	22	32	39	46	52	57	62
1 in 20	5	17	26	39	49	58	66	73	80
1 in 16.6	6	20	30	46	59	70	81	90	99
1 in 12.5	8	25	38	58	78	95	110	123	122
1 in 10	10	30	49	79	104	127	148	168	186
1 in 8.3	12	38	62	101	134	165	193	219	244
1 in 7.1	14	45	74	123	164	202	238	271	303
1 in 6.3	16	52	86	144	194	240	283	324	363
1 in 5.5	18	58	98	165	223	277	327	375	421
1 in 5	20	65	109	185	252	313	371	427	479
1 in 4	25	79	136	234	321	402	478	551	622
1 in 3.3	30	93	162	280	386	485	580	670	
1 in 2.5	40	117	205	361	502	634			
1 in 2	50	136	242	427	596				

Figure 5 - Annual Soil Loss and Erosion Risk Ratings for Various Slopes

Soil Loss Class	Soil Loss Rate (t/ha/yr)	Soil Erosion Risk Rating
1	0 to 150	Very Low
2	151 to 225	Low
3	226 to 350	Low-moderate
4	351 to 500	Moderate
5 to 6	501 to 1500	High
7	above 1500	Extremely High

Figure 6: Erosion Risk Rating Definitions

Table 5: Annual Soil Loss Estimate and Control Type Recommended

Result	Rate	Value
A	t/ha/yr	42
A	t/yr	169
Control		Type 3

The subject site has a very low soil erosion risk rating. However, erosion and sediment controls are required to mitigate against any potential risks.

Erosion and sediment control measures are to be adopted in accordance with IECA Best Practice Erosion and Sediment Control, and drawings ACS-230068-GEN-10 to 14, and the measures are outlined below.

6.1. Construction Phase

a) Construct stabilised shake down area at the site access;

b) Construct diversion drains and direct to existing detention basin as detailed on the engineering plans;

c) Erect sediment controls including mulch bunds as detailed on the engineering plans;

d) Strip topsoil and stockpile within the controlled area on site;

e) Carry out bulk earthworks involving cut to fill;

f) Exposed soils and stockpiles are to be watered, as required, to minimise soil losses as a result of wind;

g) Finalised earthworks to be top soiled and seeded or landscaped as directed;

h) Maintain all sediment devices and other interim controls regularly; and

i) Remove sediment controls after the establishment of the landscaping and grass cover.

6.2. Operation Phase

a) Drains to be turfed, or grass seeded with turf reinforcing matting overlain. Water collected within the detention basin may be used for watering grass seed;

b) Basin in/outflow areas to be lined with geotextile, overlain by 50mm rock and allowed to grass over for velocity and scour control; and

c) All embankments post construction to be turfed, grass seeded, or stabilised with plants and heavy mulching.

6.3. Maintenance of Controls

Table 6: Maintenance of Controls

Type of Maintenance Control	Measures
General	These notes must be read in conjunction with the erosion and sediment control site plan and associated notes. Should there be a discrepancy in notes between documents, this document takes precedence. The Owner is responsible for the installation and maintenance of the erosion and sediment control measures during the construction phase. In the event that site conditions change considerably from those considered within this management plan, a revised erosion and sediment control plan must be designed and implemented. All erosion and sediment control measures, including drainage control, must be maintained in proper working order at all times during their operational lives. Sediment removed from sediment traps and places of sediment deposition must be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm.
Land Clearing	Land clearing should not occur unless preceded by the installation of all necessary drainage and sediment control structures. The exemption would be any land clearing necessary to allow installation of these control measures. Land clearing is to be staged according to the relevant staging plans. If vegetation clearing required, it must be carried out well in advance of earthworks, this clearing should be limited to the removal of woody vegetation only. Clearing and grubbing and removal of existing ground cover should not occur until immediately prior to earthworks occurring in that stage of works.
Construction Staging	Where possible, the bulk of the earth works should occur when rainfall totals are typically at the lowest for the year. Construction staging to occur in accordance with the approved construction staging plans. All new erosion and sediment controls are to be constructed, and existing controls cleaned, prior to the construction of the next stage of the project.
Site Access	Site entry/exit points shall be appropriately managed to minimise the risk of sediment being tracked onto sealed, public roadways.
Soil Stockpiling	If any soils are to be stockpiled on site, stockpiles must be: • Appropriately protected from wind, concentrated surface flow and excessive up-slope stormwater surface flows,

	• Located at least 2m away from any hazardous area, retained vegetation, or drainage area, • Located up-slope of an appropriate sediment control system (correctly installed sediment fence), and • Provided with an appropriate protective cover (synthetic, mulch or vegetative) if soil is to be stockpiled for more than 28 days.
Site Monitoring	Erosion and sediment control measures to be inspected daily by the site manager (or nominated representative) during periods of runoff-producing rainfall, and de-silted, repaired and amended as appropriate. **Daily site inspections**, during periods of runoff-producing rainfall must include: • All drainage, erosion and sediment control measures; • Occurrences of excessive sediment deposition (whether on site or off site); and • All site discharge points. Weekly site inspections must include: • All drainage, erosion and sediment control measures; • Occurrences of excessive sediment deposition (whether on site or off site); • Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements; • Litter and waste receptors; and • Oil, fuel and chemical storage facilities. Site inspections immediately prior to **anticipated runoff-producing rainfall** must include: • All drainage, erosion and sediment control measures. Site inspections immediately **following runoff-producing rainfall** must include: • Treatment and de-watering requirements of sediment basins; • Sediment deposition within sediment basins and the need for its removal; • All drainage, erosion and sediment control measures; • Occurrences of excessive sediment deposition (whether on site or off site);

	• Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements; and • Occurrences of excessive erosion, sedimentation, or mud generation around the site office, car park and material storage areas. In addition to the above, **monthly site inspections** must include: • Surface coverage of finished surfaces (both area and percentage cover); • Health of recently established vegetation; and • Proposed staging of future site clearing, earthworks and site/soil stabilisation.
Drainage Management **Control**	Inspect all drainage lines for erosion around the edges of the drain prior to forecast rainfall, and after significant runoff producing storm events, and repair if required. Check for movement of, or damage to, the drain and immediately repair as necessary. During construction, all reasonable and practicable measures must be implemented to control flow velocities in such a manner that prevents soil erosion along drainage paths and at the entrance/exit point of all drains and drainage structures. All temporary earth banks, flow diversion systems, and sediment basin embankments must be machine compacted, seeded and mulched within 10 days of formation for the purpose of establishing a vegetative cover, unless otherwise stated in an approved Vegetation Management Plan. Remove all sediment form the drains prior to and after rainfall events to ensure the sediment pond capacity is maintained.
Sediment Management **Control**	Inspect coarse sediment traps prior to forecast rain events and after runoff producing storm events. All necessary repairs are to be made immediately. When making repairs, restore the system to the original configuration, unless an amended layout is required or specified. If the fabric is sagging at any point, install additional support posts/stakes. Remove any accumulated sediment in sediment traps or catch drains if the sediment deposit exceeds a depth of 100mm. All detention basins are to be inspected after each runoff event. If damage has occurred at inlet and outlet weir locations, make the necessary repairs. Clean out accumulated sediment once basin storage has been decreased by 20%. Water within the detention basin is to be reused on site only and can be used for dust suppression and vegetation watering.

	Reuse of water from the detention basin is to be undertaken in a manner which does not cause erosion in the applied area.
Site Rehabilitation/Revegetation Management	Site revegetation must occur in accordance with the approved vegetation plan. A minimum 70% ground cover must be achieved on all non-completed earthworks if further construction activities or soil disturbances are likely to be suspended for more than 30 days. No completed earthworks surface shall remain denuded for longer than 60 days. All cut and fill earth batters must be topsoiled and grassed/seeded within 10 days of completion of grading. Maintenance responsibility for the establishment of vegetation, that is the requirement to irrigate the plants and grass used to generate ground cover, lies with the Owner.
Responses to Complaints	Complaints during this type of construction usually relate to noise and dust. Generally, the complaint is made known to the Contractor, the Principal, the Superintendent and/or the Council. The Contractor shall keep a record of all complaints identifying the nature of the complaint and any remedial action taken to address such complaint. The Contractor shall act as soon as possible to remedy the problem, if the complaint is considered valid and reasonable. A complaints record shall be made available by the Contractor for regular inspection by the Superintendent. For the purpose of direction by others, the Contractor's details are to be supplied to Council prior to commencement of the works. Complaints relating to dust shall require the Contractor to immediately water the exposed earth surfaces and any soil stockpile areas as well as haul roads to control dust. Such watering shall occur immediately when the complaint is registered with the Contractor. Watering should continue periodically until conditions suit, or the works are completed to a state that prevents dust transport.

7. Conclusion

The Stormwater Management Plan Report has demonstrated that the potential stormwater impacts associated with the proposed development are within acceptable and manageable limits. The proposed development is unlikely to have any adverse impacts on neighbouring properties and the surrounding environment, with respect to stormwater quantity and quality.

If best practice management is followed, along with the proposed stormwater quantity and quality management controls, the site will achieve compliance with the *BSDA Development Scheme*, the *Scenic Rim Regional Council Planning Scheme*, the *Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments* and the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* and the likelihood of environmental harm will be low.

This report is to be read and implemented in conjunction with the stormwater management and general layout plans ACS-230068-GEN.

Appendix A) Drawing List

Sheet Number	Sheet Title	Revision
01	COVER SHEET	1
02	GNERAL NOTES	1
03	TYPICAL DETAILS	1
04	OVERALL LAYOUT PLAN	1
05	TURNING TEMPLATES	1
06	PROPERTY ACCESS LAYOUT PLAN	1
07	SIGT DISANCE ASSESSMENT	1
08	STORMWATER LAYOUT PLAN	1
09	BIO-DETENTION BASIN DETAILS	1
10	ESC NOTES- SHEET 01	1
11	ESC NOTES- SHEET 02	1
12	ESC NOTES- SHEET 03	1
13	ESC NOTES- SHEET 04	1
14	ESC LAYOUT PLAN	1

Appendix B) Seqwater Development Guidelines Assessment Benchmarks for Assessable Development – Performance Outcomes

Performance Outcomes	Acceptable Outcomes	Compliance
Separation distances		
PO1 **Development maintains an adequate separation distance and avoids areas of potential flood inundation to protect waterways or water supply sources.**	AO1.1 Development complies with the separation distances and other locational criteria specified in Table 5. **Note:** Where another setback distance or locational criteria is identified within this code, the higher standard applies.	**Complies:** The proposed development is located more than 50m from the nearest waterway Swan Creek (stream order 3) and the 1% AEP flood extent. Refer to drawing set ACS-230068-GEN for details.
Wastewater (other than domestic wastewater)		
PO2 **Development does not discharge wastewater unless demonstrated to not comprise the drinking water supply environmental values.** **Note: Drinking water supply environmental values are referenced within Schedule 1 of the *Environmental Protection Policy (Water) 2009.***	AO2.1 Development does not generate wastewater. OR AO2.2 If development generates wastewater, the wastewater is collected and contained on-site, and is: a. lawfully disposed to sewer; b. transferred off-site for treatment/disposal to an appropriately licensed facility; c. reused on-site in a closed-cycle irrigation scheme, industrial processes, washing/cleaning or other purpose; or	**Complies:** The proposed development does not generate wastewater other than domestic wastewater.

Performance Outcomes	Acceptable Outcomes	Compliance
	d. treated to meet the drinking water supply environmental values prior to release. **Note:** Where development involves the release of wastewater, a Wastewater Management Plan (WWMP) is to be prepared by a suitably qualified person. Plans are to provide an assessment of all risks and associated mitigation strategies for preventing adverse impact on the quality of drinking water and may require a water quality monitoring program.	
PO3 **Where treated wastewater is irrigated to land, it will:** **a. be confined to a dedicated area of land on-site;** **b. be suitably located and sized; and** **c. use irrigation practices that will not harm groundwater and on-site surface water quality.** **Note: Developments involving the irrigation of wastewater will need to provide a MEDLI Modelling Report demonstrating the nominated land area for wastewater irrigation is suitably located and sized to accommodate design wastewater loads, storages are suitably sized to accommodate design wastewater loads, and proposed irrigation practices will not damage water quality. It is recommended the modelling exercise incorporate scenarios**	No acceptable outcome is nominated.	**Complies:** The proposed development does not generate wastewater other than domestic wastewater.

Performance Outcomes	Acceptable Outcomes	Compliance
based on both a 10-year and 20-year planning horizon.		
Solid waste		
PO4 **Solid wastes generated by the development must be managed, stored and disposed in a manner that does not adversely impact on the quality of any surface water or groundwater.**	The following acceptable outcomes are applicable to intensive animal industry only. For all other development, no acceptable outcome is nominated. AO4.1 The stockpiling of waste litter, manure and other organics is undertaken as follows: a. on surfaces constructed with permanent impervious underlay to prevent leaching (groundsheets will only be accepted where stockpiling is temporary); b. located outside of an effluent irrigation area; c. located 3m above the seasonal high-water table and away from recharge areas; d. sized to accommodate the proposed disposal timeframes; e. designed with run-off diversion drainage upstream to prevent uncontaminated stormwater movement into the area; f. bunded to capture contaminated run-off for appropriate treatment and disposal; and	**Complies:** The proposed development site is located within SRRC's domestic waste collection zone. Any commercial waste/non-standard domestic waste is able to be transported by the residents/operators to Council's nearest waste disposal facility at Bromelton. The proposed development is not expected to generate any additional waste loads than those typical of a low impact industry.

Performance Outcomes	Acceptable Outcomes	Compliance
	g. covered, desirably within a shed but otherwise with weatherproof material. AND AO4.2 The reuse of waste litter, manure and other organics as soil conditioners or fertilizers is not undertaken on-site. AND AO4.3 Composting activities are not undertaken on-site. AND AO4.4 Carcasses are not buried on-site except as required in accordance with any emergency animal disease directive by a biosecurity agency.	
Wastewater		
PO5 **Wastewater treatment systems are designed, constructed and managed in ways that do not compromise the drinking water supply environmental values.**	AO5.1 Development does not involve an on-site wastewater facility. OR AO5.2	**Complies:** The on site wastewater treatment and effluent disposal system achieves a 'very low' risk classification in accordance with Seqwater's Land Use Risk Tool for on-site sewage facilities. Refer to Site and Soil Evaluation Report by Stav's Hydraulic Services and LURT Output in Appendix C and D respectively. The design capacity is less than 21 EP.

Performance Outcomes	Acceptable Outcomes	Compliance
Note: water supply environmental values are referenced within Schedule 1 of the Environmental Protection Policy (Water) 2009.	Where the combined total peak design capacity of wastewater treatment is less than 21 Equivalent Persons (EP), the design of the system achieves a Low or Medium Risk classification in accordance with Seqwater's *Land Use Risk Tool for on-site sewage facilities*. OR AO5.3 Where the combined total peak design capacity of wastewater treatment is 21EP or greater, the system is located and designed in the following manner: a. achieves a minimum secondary treatment standard with nutrient removal and disinfection; b. on land at or above the 0.5% AEP flood event; c. the hydraulic capacity of the system is five times the average dry weather flow (ADWF); d. no direct discharge of sewage to a waterway or water supply source occurs, unless during a bypass event that exceeds peak hydraulic capacity and sewage is screened and disinfected before release; e. where treated effluent will be used in irrigation, application is:	

Performance Outcomes	Acceptable Outcomes	Compliance
	i. confined to a dedicated area of land suitably located and sized, and using irrigation practices that will not adversely affect groundwater and surface water quality; and ii. located on land at or above the 0.5% AEP flood event; and f. where the combined total peak design capacity of wastewater treatment is 1500EP or greater, and direct discharge to a waterway is the only reasonably practical disposal option, the contribution of flow from the system must be modelled over the range of reasonably expected flow events. If the proportion of flow is: i. <10% of the total flow, 3-log reduction bacteria and virus, and 4-log reduction protozoa, minimum pathogen log-reduction values apply; or ii. >10% of the total flow, it must demonstrate compliance with the Australian guidelines for water recycling (Phase 2): Augmentation of drinking water supply (to be undertaken in consultation with Seqwater). **Note:** Developments involving the irrigation of wastewater will need to provide a MEDLI Modelling Report demonstrating the nominated land area for irrigation is suitably located and sized to	

Performance Outcomes	Acceptable Outcomes	Compliance
	accommodate design wastewater loads, storages are suitably sized to accommodate design wastewater loads and proposed irrigation practices will not result in any adverse impact on water quality. It is recommended the modelling exercise incorporate scenarios based on both a 10-year and 20-year planning horizon and incorporate a minimum of three irrigation concepts.	
Vegetation management		
PO6 **Maintain the current extent of any vegetation located adjacent, or connected, to any waterway or water supply source.**	AO6.1 Clearing complies with the following locational criteria: a) 25m setback to a stream order 1-3; b) 50m setback to a stream order 4 or greater; c) 200m setback to a full supply level of a dam, lake or reservoir or watercourse that serves as a potable water supply; d) is not undertaken on land within the 1% AEP flood event; and e) is not undertaken on a slope greater than 15%.	**Complies:** No clearing is proposed within the waterways or 50m setback of the waterways. The proposed development is not undertaken within the 1% AEP flood extent and is not undertaken on land with a slope greater than 15%.
Stormwater quality and hydrology		
PO7 **Manage stormwater at the construction phase to protect drinking water supply environmental**	AO7.1 At the construction stage, an erosion and sediment control program (ESCP) demonstrates that	**Complies:** A construction stage erosion and sediment control plans have been developed as part of this site based stormwater management

Performance Outcomes	Acceptable Outcomes	Compliance
values and facilitate the achievement of water quality objectives for receiving waters. **Note: Drinking water supply environmental values are referenced within Schedule 1 of the *Environmental Protection Policy (Water) 2009.*** **PO8** **Manage stormwater during operational (post-construction) stages to protect drinking water supply environmental values and facilitate the achievement of water quality objectives for receiving waters.** **Note: Drinking water supply environmental values are referenced within Schedule 1 of the *Environmental Protection Policy (Water) 2009.***	stormwater achieves the design objectives listed in Table A of the SPP (appendix 2): *Construction Phase – Stormwater management design objectives* (all parts). OR AO7.2 An ESCP demonstrates how stormwater quality will be managed at the construction stage in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to Table A of the SPP (all parts). OR AO7.3 Stormwater run-off generated during construction is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site. AO8.1 Development does not involve an impervious area greater than 1,000m^2. OR AO8.2 Development is for reconfiguring a lot that:	plan. Refer to section 6 of this report and the proposal plans ACS-230068-GEN. **Complies:** The proposed stormwater quality treatment train achieves the minimum reduction in mean annual loads (AO8.3) from the unmitigated development. Refer to section 5 of this report.

Performance Outcomes	Acceptable Outcomes	Compliance
	a) will not create more than two additional lots; or b) involves a land area less than 1000m^2. OR AO8.3 Stormwater run-off generated during operation (post-construction) demonstrates a minimum reduction in mean annual load from unmitigated development that achieves the following stormwater management design objectives: • 85% reduction in total suspended soilds; • 65% reduction in total phosphorus; • 45% reduction in total nitrogen; and • 95% reduction in gross pollutants. OR AO8.4 Stormwater run-off generated during operation is captured and transferred off-site or captured and treated to any applicable re-use standards and reused on-site. **Note:** A Site Stormwater Quality Management Plan is to be prepared by a suitably qualified individual such as a Civil Engineer or an Environmental Professional and is to be certified by a Registered Professional Engineer (RPEQ)	

Performance Outcomes	Acceptable Outcomes	Compliance
	(Civil or Environmental) to demonstrate compliance with the stormwater design objectives.	
PO9 **Development maintains or improves the quality of surface water by adopting measures that exclude livestock from entering a water body where a site is being used for animal husbandry or animal-keeping activities.**	No acceptable outcome is nominated.	**N/A:** The proposed development does not include livestock.
PO10 **Development avoids and minimises changes to the existing surface water natural hydrological regime so that:** **a. there is no change to the reference high-flow and low-flow duration frequency curves, low-flow spells frequency curve and mean annual flow to and from waterways as a result of the development;** **b. any relevant flows into waterways comply with the relevant flow objectives of the applicable water plan for the area; and** **c. the collection and re-use of stormwater occurs so there is no increase to the velocity or volume of stormwater flows entering a waterway.**	No acceptable outcome is nominated.	**Complies:** As demonstrated in this report there is not expected to be any change to existing surface water natural hydrological regimes as a result of the proposed development. Existing flows will be maintained.
PO11	No acceptable outcome is nominated.	**N/A:** No artificial waterways are proposed.

Performance Outcomes	Acceptable Outcomes	Compliance
The design and location of artificial waterways: **a. use natural channel design principles to minimise erosion, flooding and maintenance while maximising ecological and aesthetic values of waterways;** **b. are compatible with any existing natural waterways; and** **c. are designed to ensure surface water hydrological regimes are maintained.**	**Note:** The Ipswich City Council Waterway and Channel Rehabilitation Guidelines or Brisbane City Council Natural Channel Design Guidelines demonstrate suitable natural channel design works.	
PO12 **Development maintains the existing groundwater hydrological regime.**	AO12.1 Development does not change the existing groundwater hydrological regime by lowering or raising the water table and hydrostatic pressure outside the bounds or variability of existing predevelopment conditions. AND AO12.2 Development does not result in the ingress of saline water into freshwater aquifers. **Note:** Where development is likely to impact on the water table, a hydrological assessment undertaken by a suitably qualified professional may be required to demonstrate no adverse impact on the groundwater hydrological regime.	**Complies:** The proposed development is not expected to change existing groundwater hydrological regimes.
Excavation and filling		

Performance Outcomes	Acceptable Outcomes	Compliance
PO13 **The siting and design of earthworks minimises impacts on the natural landform that may cause contamination or interfere with the flow of a waterway or water supply source.**	AO13.1 Earthworks comply with the following locational criteria: a. 25m setback to a stream 1-3; b. 50m setback to a stream order 4 or greater; c. 200m setback to a full supply level of a dam, lake or reservoir or watercourse which serves as a potable water supply; d. is not undertaken on land at or below the 1% AEP; and; e. is not undertaken on a slope greater than 15%.	**Complies:** Earthworks comply with the locational criteria and further an erosion and sediment control plan has been prepared in accordance with best practice which if followed will minimise movement of sediment off site.
PO14 **Any earthworks minimise erosion and the movement of sediment off-site.** **Note: A Sediment and Erosion Control Plan is to be prepared by a suitably qualified and experienced professional in accordance with best practice such as IECA 2008, Best Practice Erosion and Sediment Control.**	No acceptable outcome is nominated.	**Complies:** An erosion and sediment control plan has been prepared in accordance with best practice which if followed will minimise movement of sediment off site.
Dangerous goods, hazardous substances or environmentally hazardous materials		
PO15 **Dangerous goods, hazardous substances or environmentally hazardous materials are**	AO15.1 The storage or handling of dangerous goods, hazardous substances or environmentally	**Complies:** Dangerous goods, hazardous substances or environmentally hazardous materials greater than a 200L or 200kg quantity may be stored or handled on site. All dangerous

Performance Outcomes	Acceptable Outcomes	Compliance
stored and handled in a manner that minimises the potential for contamination of surface and groundwater in the event of a leak or spill.	hazardous materials involves an aggregate quantity less than 200L or 200kg. OR AO15.2 The storage or handling of dangerous goods, hazardous substances or environmentally hazardous materials with an aggregate quantity greater than 200L or 200kg and less than 1000L or 1000kg maintains the following separation distances: a. 100m to a minor waterway; b. 100m to a stream order 4 or greater; and c. 800m to a full supply level of a dam, lake or reservoir or watercourse that serves as a potable water supply. AND AO15.3 Dangerous goods, hazardous substances or environmentally hazardous materials are located and stored in the following manner: a. is not undertaken on land within the 1% AEP flood event; b. undercover in a building or similar structure;	goods, hazardous substances or environmentally hazardous materials will be appropriately stored within the heavy machinery shed located more than 100m from any waterways, above the 1% AEP and bunded via secondary containment to recover spills and in accordance with in accordance with Australian Standard AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. The storage of petroleum products in bulk (greater than 1000L) will be aboveground in self-bunded vessels that meet *Australian Standard AS 1692 Steel Tanks for Flammable and Combustible Liquids.*

Performance Outcomes	Acceptable Outcomes	Compliance
	c. in or on a dedicated impervious secondary containment store or device that permits full recovery of spills; d. in a manner that prevents the movement of packages/containers from their place of storage during a flood event; and e. in accordance with Australian Standard AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. OR AO15.4 The storage of dangerous goods, hazardous substances or environmentally hazardous materials (other than petroleum products) in aggregate quantities greater than 1000L or 1000kg is not undertaken unless a site-specific risk assessment presents minimal risk to drinking water quality. For petroleum products only: AO15.5 The storage of petroleum products in bulk (greater than 1000L) aboveground uses self-bunded vessels that meet *Australian Standard AS 1692 Steel Tanks for Flammable and Combustible Liquids*. OR	

Performance Outcomes	Acceptable Outcomes	Compliance
	AO15.6 The storage of petroleum products in bulk (greater than 1000L) aboveground uses single-skin vessels installed within a bunded compound that: a. is sufficiently impervious (permeability should be <10-9 m/s) to retain and recover spillage; and b. has a net capacity of at least 100% of the bunded vessel or aggregate quantity of vessels where operated as a single unit. OR AO15.7 Petroleum products belowground (greater than 200L) are stored in vessels that are non-corrodible, double walled with an interstitial space between, and meet the requirements of Australian Standard AS 1692: *Steel Tanks for Flammable and Combustible Liquids* and/or UL 1316 *Glass fibre reinforced plastic underground storage tanks for petroleum products, alcohols and alcohol gasoline mixture.*	
Material change of use for extractive industry only		
PO16 **Extraction activities do not impact on erosion, natural fluvial processes, river bank stability or the storage capacity volume of a floodplain.**	No acceptable outcome is nominated.	**N/A:** The proposed development does not involve an extractive industry.

Performance Outcomes	Acceptable Outcomes	Compliance
For reconfiguring a lot only		
PO17 **When reconfiguring a lot, all resultant lots requiring an on-site wastewater treatment system do not compromise the environmental values of drinking water supply.** **Note: Drinking water supply environmental values are referenced within Schedule 1 of the *Environmental Protection Policy (Water) 2009.*** **Note: Drinking water supply environmental values are referenced within Schedule 1 of the *Environmental Protection Policy (Water) 2009.***	AO17.1 Any new lot can accommodate an area for on-site wastewater treatment and disposal complying with the following: a. 50m setback to a stream order 1-3; b. 100m setback to a stream order 4 or greater; and c. 400m setback to a full supply level of a dam, lake or reservoir or watercourse that serves as a potable water supply. AND AO17.2 Any new lot can accommodate an area for on-site wastewater treatment and disposal on land that is not within the 1% AEP flood event and on a slope at or less than 10%. AND AO17.3 Any proposed lots that are to accommodate a future on-site wastewater system, maintain an average lot size of at least 2.5 ha.	**N/A:** The proposed development does not involve the reconfiguration of any lots.

Performance Outcomes	Acceptable Outcomes	Compliance
	Note: A wastewater site analysis is to be prepared by a suitably qualified professional demonstrating the above.	

Appendix C) Effluent Disposal Report

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SITE & SOIL EVALUATION REPORT
149 SANDY CREEK ROAD, BROMELTON

Prepared for:	Beaudesert & Boonah Cranes
Prepared by:	Stav's Hydraulic Services
Purpose:	Site & Soil Evaluation Report
Issue No:	A
Date Issued:	13-Oct-23
Author:	Stephen Stavrinou

1. Contents

2. Intro

Stav's Hydraulic Services have carried out a Site and Soil Evaluation for the On-Site waste water treatment and the effluent disposal at Lot 3 on RP40309 - 149 Sandy Creek Road Bromelton, Qld.

The following report has been prepared in accordance with AS/NZS1547:2012, On-Site Domestic Waste Water Management and the Queensland Plumbing and Waste Water Code.

3. Executive summary

The recommendation and comments:

1. Use an Advanced Secondary all-waste sewage system such as the Envirocycle 10EP advanced Secondary Wastewater treatment system for the prosped sheds 1-4

2. Reuse the existing greywater pump out and black water septic systems for the existing residence

3. The peak daily design volume for the entire site is 9.2 Equivalent persons – 1,380l/day – loads from existing residence & proposed sheds 1 – 4.

4. Soil is a densely structured category 5 – Clayey Sand, Low Plasticity, Fine Grained, yellow - Design Irrigation Rate (DIR) = 21 mm / week

5. Total land application to be comprised of a land application area of 418m2 spread across 5 systems.

6. Have warning signs, complying with AS1319 at the boundaries of the designated area in two places and clearly visible to property users with wording such as "Recycled Water – Avoid Contact – DO NOT DRINK"

7. On-site sewage systems are not designed to cope with the flow from garbage grinders, fats, oils or chemicals and household cleaning products are to be used in accordance with their labels.

8. The land application area is an important area and has to be maintained e.g. regularly mowed, do not drive vehicles over the area or allow livestock to access the land application area Follow the maintenance requirements specified by the manufacturer and authorised service agent.

4. Site Investigation

Site Investigation	
Date of Investigation	20.09.2023
Address	149 Sandy Creek Road Bromelton
Area of Site	40,170m2
Property Description	Lot 3 on RP40309
Local Council	Scenic Rim Regional Council
Weather	Fine
Ground Cover	Grass
Well/Bores	1
Waterways	Nill
Water Table	Nill
Embankments	Nill
Buildings	Existing Residence and sheds to western corner
Site Exposure	Full Sunlight
Boundaries	Sufficient
Landscape Description	Waxing Divergent
Diversion / Retention Mound	Nill
Ground Water Cut off drains	Nill
Intended Water Supply	Rain Water

Soil Characteristics	
Depth	0-600mm
Texture - structure - Colour	Silty Sand Loam in the top layers that increase in clay content with depth
Soil Category	5
Indicative permeability (Ksat) m/day	0.06
Design Irrigation Rate (DIR) mm/week	21
Design Loading Rate (DLR) mm/week	30

5. Effluent Quality and Control Parameters

Effluent Quality Parameters			
Parameter	**Primary**	**Secondary**	**Advanced Secondary**
Bod_5	120-240	20	10
Total Suspended Solids (mg/L)	65-180	30	10
Thermotolerant Coliforms (org/100mL)	N/A	200	10

6. Design Calculations

Design Loadings - Existing Residence	
No. of Bedrooms	2
Equivalent Persons (EP)	3
Desing Flow L/day	60 Black Water only
Daily flow / Weekly Flow	180 / 1260
Design Loading Rate (DLR) mm/week	30
Trench Area required (m²)	18 m²
Trench Sizing	Adopt 2 trenches @ 15m long x 0.6m wide
Design Loadings - Shed 1	
No. of Staff	10
Desing Flow L/day	30 Tank Water Supply
Daily flow / Weekly Flow	300 / 2100
Design Loading Rate (DIR) mm/week	21
Land Application Area (m²)	100 m² Adopt 100 m²
Design Loadings - Shed 2	
No. of Staff	10
Desing Flow L/day	30 Tank Water Supply
Daily flow / Weekly Flow	300 / 2100
Design Loading Rate (DIR) mm/week	21
Land Application Area (m²)	100 m² Adopt 100 m²
Design Loadings - Shed 3	
No. of Staff	10
Desing Flow L/day	30 Tank Water Supply
Daily flow / Weekly Flow	300 / 2100
Design Loading Rate (DIR) mm/week	21
Land Application Area (m²)	100 m² Adopt 100 m²
Design Loadings - Shed 4	
No. of Staff	10
Desing Flow L/day	30 Tank Water Supply
Daily flow / Weekly Flow	300 / 2100
Design Loading Rate (DIR) mm/week	21
Land Application Area (m²)	100 m² Adopt 100 m²

TOTAL DESIGN LOADINGS FOR SITE	
Daily flow / Weekly Flow	1380 / 9660
Equivalent population	9.2

Bod5 Applied - Total Site		
Bod_5 Applied 10mg / litre/ day	5.037	kg/year
Soil Absorption Only	0.05kg / m² / year	
Minimum land Application Area	100.74	m²

The proposed wastewater system utilises an Advanced Secondary all-waste sewage treatment plant - Envirocycle 10EP advanced Secondary Wastewater treatment system for proposed sheds 1 -4

The Proposed systems will discharge to separate sprinklers as per below calculations.

Sprinkler Calculations - Sheds 1 - 4				
Sprinkler Zones Area	100	50	m² / sprinkler head	
No. Sprinklers	2.0	Sprinkler heads		
Sprinkler radius	3.99	m		
Flow Rate Per Sprinkler Head	360	l/hour		
Pressure @ Sprinkler Head	68	kpa		
Effluent Flow Rate	720	L/hour		
Effluent Transfers	4	transfers @	7	minutes each

The existing residence currently discharges to separate greywater pump out and and black water septic systems. These systems are proposed to remain as is with the exception of the black water trenches to be replaced with new in new location. 2

AS1547 states that:

a. The effluent is required to be evenly distributed within the designated area.

b. Have warning, complying with AS1319 at the boundaries of the designated area in two places and clearly visible to property users with wording such as “Recycled Water – Avoid Contact – DO NOT DRINK”

c. Ensure that the effluent does not come into contact with people, domestic animals, fruit or vegetables for human consumption

7. Operation and Maintenance

Maintenance requirements specified by the manufacturer and authorized service agent are to be implemented. These include:

- Use low sodium biodegradable soaps and detergents
- No paints, solvents, chemicals, food scraps, fats, oils or any other solids are not to be disposed of ”down the drain”
- On-site sewage systems are not designed to cope with the flow from garbage grinders
- The land application area is an important area and has to be maintained e.g. regularly mowed or pruned also ensuring that there is no ponding of effluent in the disposal area
- Vehicles, livestock or general access is to be generally restricted with warning signs erected

8. **Appendix A - Land application area plan**

EFFLUENT DISPOSAL

149 SANDY CREEK ROAD
BROMELTON, QLD

DRAWING LIST

H101 - COVER SHEET & LOCATION PLAN
H102 - LEGEND, NOTES & DETAILS
H103 - SITE PLAN EFFLUENT DISPOSAL LAYOUT

LOCATION PLAN
NOT TO SCALE

2m 0 2m 4m 6m 8m 10m

ISSUE	AMENDMENT	DATE
A	APPROVAL ISSUE	13.10.2023

DESIGNER: STEPHEN STAVRINOU QBCC 15061807

CLIENT:
BEAUDESERT &
BOONAH CRANES

CONSULTANT:
SHS
STAV'S HYDRAULIC SERVICES
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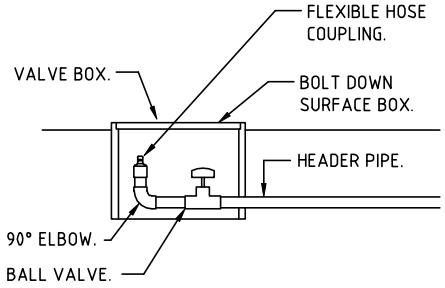
PO Box 529,
Jimboomba, Qld

PROJECT:
LOT 3 ON RP40309
149 SANDY CREEK ROAD
BROMELTON, QLD

TITLE:
HYDRAULIC SERVICES
COVER SHEET & LOCATION PLAN

PROJECT No.	BBC1	DRAWING No.	ISSUE No.
SCALE / SIZE:	N.T.S @ A3	H101	A



FLUSHING VALVE DETAIL

SCALE: NTS

GENERAL

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF AS3500, THE BUILDING CODE OF AUSTRALIA, RELEVANT AUSTRALIAN STANDARDS AND THE LOCAL AUTHORITY REQUIREMENTS.

2. THESE PLANS SHALL BE READ IN CONJUNCTION WITH THE APPROVED ARCHITECTURAL AND RELEVANT SERVICES PLANS AND SPECIFICATIONS

3. LOCATION OF EXISTING SERVICES HAS BEEN DETERMINED FROM SITE VISITS AND EXISTING RECORD PLANS. NO PROVING OF SERVICES HAS BEEN UNDERTAKEN. THE CONTRACTOR SHALL PROVE ALL SERVICES PRIOR TO COMMENCING CONSTRUCTION AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCIES BEFORE PROCEEDING. THIS CONTRACTOR MUST CO-ORDINATE WITH ALL OTHER SERVICES. PIPEWORK SHOWN ON THIS DRAWING IS DIAGRAMMATIC ONLY. FINAL LOCATION OF SERVICES SHALL BE DETERMINED ON SITE.

4. ARRANGE & APPLY TO THE LOCAL AUTHORITY FOR ALL NECESSARY PERMITS. PAY ALL PLUMBING INSPECTION FEES AND CHARGES, OBTAIN COMPLETION CERTIFICATE AND SUBMIT TO SUPERVISOR.

5. THE ENTIRE HYDRAULIC SERVICES INSTALLATION AND EQUIPMENT SHALL BE MAINTAINED UNDER WARRANTY FOR A PERIOD OF TWELVE (12) MONTHS AFTER PRACTICAL COMPLETION HAS BEEN ACHIEVED.

6. PROVIDE INSTRUCTIONS MANUALS AT PRACTICAL COMPLETION. CONTAINING THE FOLLOWING:

- GENERAL DESCRIPTION OF PROJECT

- LISTING OF EQUIPMENT, MANUFACTURERS NAMES, AGENTS ETC.

- OPERATING AND MAINTENANCE INSTRUCTIONS AND WARRANTY INFORMATION FOR EACH ITEM OF EQUIPMENT.

- "AS CONSTRUCTED" DRAWINGS.

- COUNCIL INSPECTION REPORTS AND FINAL COMPLETION CERTIFICATES FROM RELEVANT AUTHORITIES.

WATER

1. ALL EXPOSED HW & CW PIPEWORK SHALL BE COPPER TUBE TYPE "B" TO AS1432. CONNECT COPPER PIPE WITH BRAZED JOINTS IN AS1645 OR COMPRESSION JOINTS AS1585. USE PRE-INSULATED PIPEWORK FOR HOT WATER SERVICES OR INSULATE WITH 'ARMAFLEX' INSULATION OR SIMILAR. DENSO WRAP ALL CW PIPEWORK IN-GROUND. PROVIDE INSULATION TO ALL HOT WATER PIPEWORK. PROVIDE ALL NECESSARY ALLOWANCES FOR THERMAL MOVEMENT OF PIPES.

2. WATER SUPPLY PIPEWORK CONCEALED IN WALLS AND EXTERNAL TO BUILDING IN-GROUND MAY BE POLYETHYLENE PIPE OF MIN. CLASS 12, AND SHALL COMPLY WITH AS 1159. INSTALLATION OF POLYETHYLENE PIPES SHALL BE IN ACCORDANCE WITH AS 2033 AND THE MANUFACTURERS SPECIFICATIONS.

3. TAKE ALL NECESSARY PRECAUTIONS TO PREVENT WATER HAMMER AND RECTIFY SHOULD IT OCCUR.

4. EXTERNAL AND INTERNAL HOSE COCKS SHALL BE FITTED WITH HOSE TYPE VACUUM BREAKERS.

5. PROVIDE HW & CW STOPCOCKS TO ALL HW & CW FIXTURES.

6. ALL PIPEWORK TO BE IDENTIFIED IN ACCORDANCE WITH AS1345.

7. ALL PIPE DIAMETERS NOMINATED ARE NOMINAL BORE DIAMETERS UNLESS NOTED OTHERWISE.

ON SITE DISPOSAL NOTES

1. IRRIGATION SYSTEM TO COMPLY WITH AS1547, QLD PLUMBING WASTE WATER CODE, ASSOCIATED DOCUMENTATION AND MANUFACTURERS SPECIFICATIONS.

2. MINIMUM COVER OVER RISING MAIN 450mm. RISING MAINS TO BE 32ø PIPES TO AS/NZS 1477. PIPE TO BE LILAC COLORED AND/OR INSTALLED WITH TAPE IDENTIFYING THE PIPES CONTENTS AS SEWAGE EFFLUENT.

3. IRRIGATION SYSTEMS DISTRIBUTE EFFLUENT INTO THE TOPSOIL LAYERS TO PROVIDE IN-SOIL TREATMENT OF THE REMAINING EFFLUENT RESIDUALS AS WELL AS PROVIDE NUTRIENT UPTAKE AND EVAPOTRANSPIRATION BY GRASS, SHRUBS OR PLANTINGS. THE CHOSEN GRASS, SHRUBS OR PLANTINGS SHALL BE PLANTED/SEEDED PRIOR TO THE COMMISSIONING OF THE SYSTEM TO ALLOW FOR PROPER EFFLUENT DISPOSAL.

DRAINAGE

1. SANITARY DRAINAGE & VENT PIPEWORK IN UPVC IN ACCORDANCE WITH AS1260 AND THE MANUFACTURERS SPECIFICATIONS.

2. ALL PIPEWORK TO BE IDENTIFIED IN ACCORDANCE WITH AS1345.

3. ALL PIPE DIAMETERS NOMINATED ARE NOMINAL BORE DIAMETERS UNLESS NOTED OTHERWISE.

LEGEND

——R——R——	PUMPED EFFLUENT
———————	SANITARY DRAINAGE PIPEWORK
– – – – – –	VENT PIPEWORK
— — — — —	STORMWATER PIPEWORK
—·—·—·—·—	COLD WATER PIPEWORK
—··—··—··—	HOT WATER PIPEWORK
⋈	VALVE

AFFL	ABOVE FINISHED FLOOR LEVEL
AHD	AUSTRALIAN HEIGHT DATUM
B	BASIN
CD	CONDENSATE DRAIN
COS	CLEAR OUT TO SURFACE
Cu	COPPER PIPE
CW	COLD WATER
CV	CONTROL VALVE
DP	DOWN PIPE
DW	DISHWASHER
e	EXISTING TO REMAIN
FFL	FINISHED FLOOR LEVEL
FW	FLOOR WASTE GULLY (c/w REMOVABLE CHROME GRATE)
H/L	HIGH LEVEL
HC	HOSE COCK c/w KEY OPERATED HANDLE
HW	HOT WATER
HWH	HOT WATER HEATER
IC	INSPECTION CHAMBER
IO	INSPECTION OPENING
L/L	LOW LEVEL
ORG	OVERFLOW RELIEF GULLY
SHR	SHOWER
SK	SINK
WC	WATER CLOSET
VB	VACUUM BREAKER

2m 0 2m 4m 6m 8m 10m

ISSUE	AMENDMENT	DATE
A	APPROVAL ISSUE	13.10.2023

DESIGNER: STEPHEN STAVRINOU QBCC 15061807

CLIENT:

BEAUDESERT & BOONAH CRANES

CONSULTANT:

SHS STAV'S HYDRAULIC SERVICES
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PO Box 529,
Jimboomba, Qld

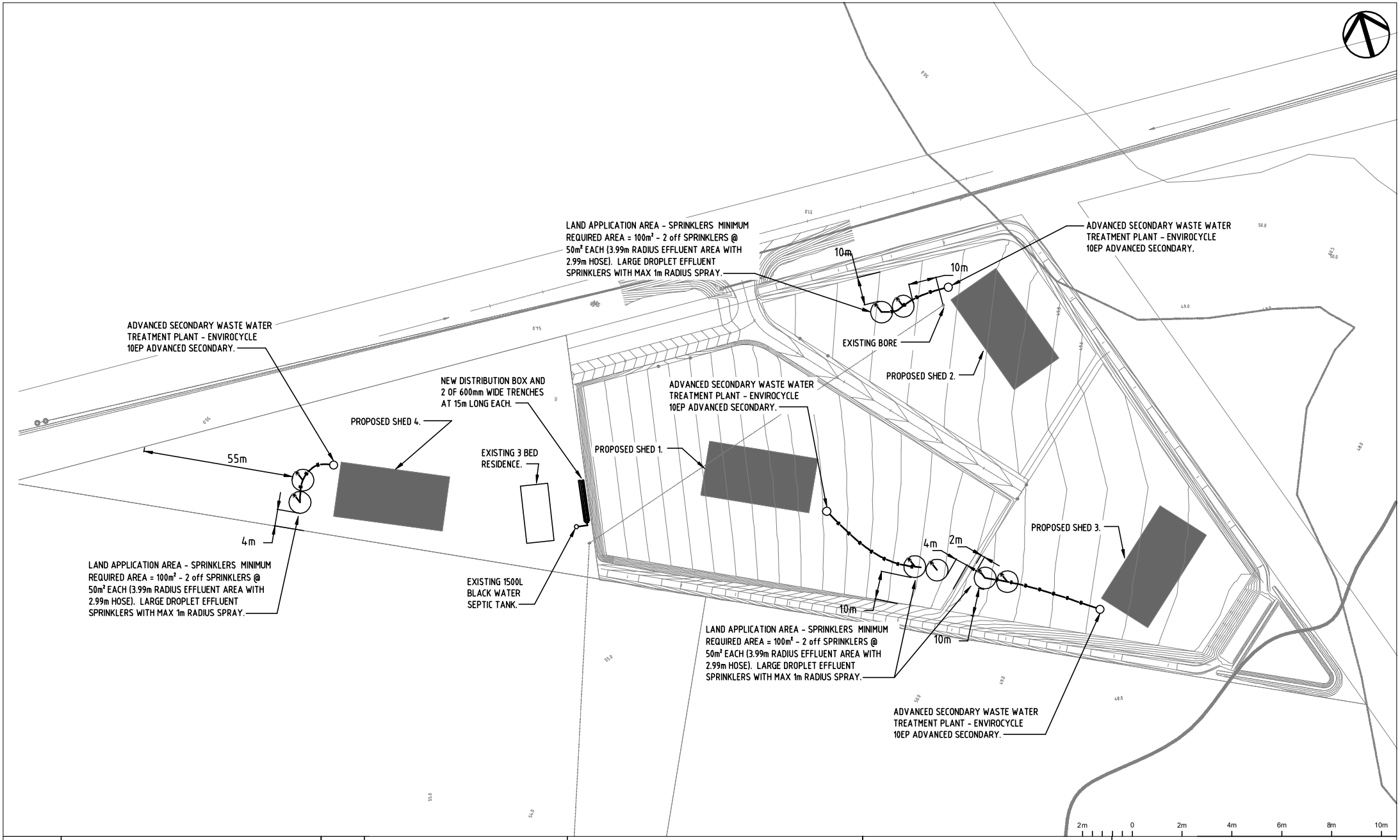
PROJECT:

LOT 3 ON RP40309
149 SANDY CREEK ROAD
BROMELTON, QLD

TITLE:

HYDRAULIC SERVICES
LEGEND, NOTES & DETAILS

PROJECT No.	BBC1	DRAWING No.	ISSUE No.
SCALE / SIZE:	NTS @ A3	H102	A



ISSUE	AMENDMENT	DATE
A	APPROVAL ISSUE	13.10.2023

DESIGNER: STEPHEN STAVRINOU QBCC 15061807

CLIENT:

BEAUDESERT & BOONAH CRANES

CONSULTANT:

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PROJECT:

LOT 3 ON RP40309
149 SANDY CREEK ROAD
BROMELTON, QLD

TITLE:

HYDRAULIC SERVICES
SITE PLAN
EFFLUENT DISPOSAL LAYOUT

PROJECT No.	BBC1	DRAWING No.	ISSUE No.
SCALE / SIZE:	1:1250 @ A3	H103	A

Appendix D) LURT Output

Rating Details

Property Owner Details				
Property Owner:	"Beaudesert & Boonah Cranes C/- ACS Engineers (Aust) Pty Ltd"			
Postal Address:	"PO Box 554"	"Beaudesert"	"QLD"	"4285"
Phone Number:	"07 5541 3500"	**Mobile Number:**	""	
Email:	"sara@acsengineers.com.au"			
Property Details				
Street Address:	"149 Sandy Creek Road"	"Bromelton"	"QLD"	"4285"
Latitude:	""	**Longitude:**	""	
Lot Number:	""	**Plan Number:**	""	
Area (m2):	"40,170"	**Local Government:**	"Scenic Rim Regional Council"	

Rating Risk Rating Questionnaire

Unimitigated Score 4	No further mitigation required	Mitigated Score 0
	VERY LOW	
	Calculating Unmitigated Risk	
1	Does the disposal area and wastewater treatment system maintain the following separation distances (AND): • At least 100m to the nearest watercourse (permanent and non-permanent)? • At least 400m from the full supply level of a potable water supply? Please note: Potable water supply includes any dam, bore, reservoir or conduit used for direct extraction of water for drinking water purposes.	Yes
2	Is the disposal area or the wastewater treatment system (OR): • Less than 50m to the nearest watercourse (permanent and non-permanent)? • Less than 200m from the nearest full supply level of a potable water supply? Please note: Potable water supply includes any dam, bore, reservoir or conduit used for direct extraction of water for drinking water purposes.	N/A
3	Is the disposal area of wastewater treatment system located inside of a defined flood event (Council or State mapping), at a minimum being 1% Annual Exceedance Probability (AEP)?	No
4	What is the maximum slope of the disposal area or wastewater treatment system location?	<5%
5	How many bedrooms are serviced by the proposed wastewater treatment system?	3 or more bedrooms
6	Is the indicative permeability range higher than 1m/day?	No
7	Is the separation distance to the water table/bedrock as specific for the type of system and at a minimum 1m below the disposal depth?	Yes
8	Is the dwelling a permanent or holiday residence?	Permanent Residence
9	Is the indicative drainage class either poorly drained (Soil Category 5) or very poorly drained (Soil Category 6), as defined in Australian Standard AS1547?	Yes
10	Does the proposal involve composting?	No composting
11	Please select an irrigation method.	Subsurface
12	Please select the proposed treatment method.	Aerated
13	Does the system propose the diversion or re-use of greywater?	No
	Mitigation Reduction:	**4**

Model Conditions

Here are your draft conditions!

1	The poor drainage of the soil necessitates an appropriate depth of topsoil over the proposed effluent disposal area. Either soil remediation (gypsum / scarification) or clean imported topsoil must be provided to a depth of 150mm – 250mm over the disposal area and scarified into soils over the entire disposal area to ensure adequate drainage and reduction of nutrients.
2	The wastewater treatment system must be an advanced secondary wastewater treatment system with Chief Executive approval from the Department of Energy and Public Works and incorporate chlorination. The wastewater treatment system and disposal area must be designed operated and maintained in accordance with manufacturers specifications and the submitted Wastewater Design Report.
3	The disposal area must be planted with kikuyu grass or other native vegetation which provides a high uptake of nitrogen and phosphorus and prevents erosion.
4	The disposal area must incorporate appropriate diversion drainage above the disposal area (to prevent stormwater inundation) and bunds below the disposal area to reduce the risk of waterway contamination.
5	To minimise the risk of failure or inefficiency, the wastewater treatment system and disposal area must be inspected and serviced by an appropriately qualified professional in accordance with the manufacturer's recommendations and at least annually.
6	Ensure that larger deep-rooting plants and trees which may block sunlight are not planted near the disposal area to reduce the chance of root intrusion and clogging and maximise sun exposure.
7	A 100% reserve area is reserved and maintained on-site to allow for an alternative disposal location in case of land application area failure, malfunction or loss of soil uptake capacity. The reserve area must be kept clear of buildings, structures, vehicular movement paths or other activities which may otherwise affect its use for effluent disposal in the future.
8	No vehicular, machinery or domestic animal traffic movement is to occur over the disposal area, to maintain the integrity and function of sub-surface pipelines. Barriers such as fencing or shrubs are to be used when necessary.
9	The design must incorporate a warning system to notify of pump failure and/or high water level comprising of a highly visible strobe warning light at the tank and an internal alarm mounted in the house comprising of an audible and visual. A licenced plumber/service provider must be contacted as soon as practical after an alarm activates to rectify the issue.

Appendix E) Rational Method Calculations

Name	Pre-Developed	Post-Developed
Catchment Area (ha)	4.02	4.02
Stream Length (m)		196
Sheet flow length (m)	285	165
Slope (%)	2	2
Hortons N Value	0.05	0.03
Tc Sheet flow	30.59	15.30
Tc channel flow	0.0	4.7
Total time of conc. (tc)	**31.0**	**20.0**

Rainfall Intensities

63%	45.9	59.1
50%#	52.0	67.0
20%*	71.0	91.5
10%	83.9	108.0
5%	96.5	124.0
2%	113.1	144.8
1%	125.9	160.6

Rainfall Depth

63%	23.7	19.7
50%#	26.9	22.3
20%*	36.7	30.5
10%	43.3	36.0
5%	49.8	41.3
2%	58.5	48.3
1%	65.1	53.5
Fraction impervious	0.00	0.33
C10 runoff coefficient	0.69	0.69

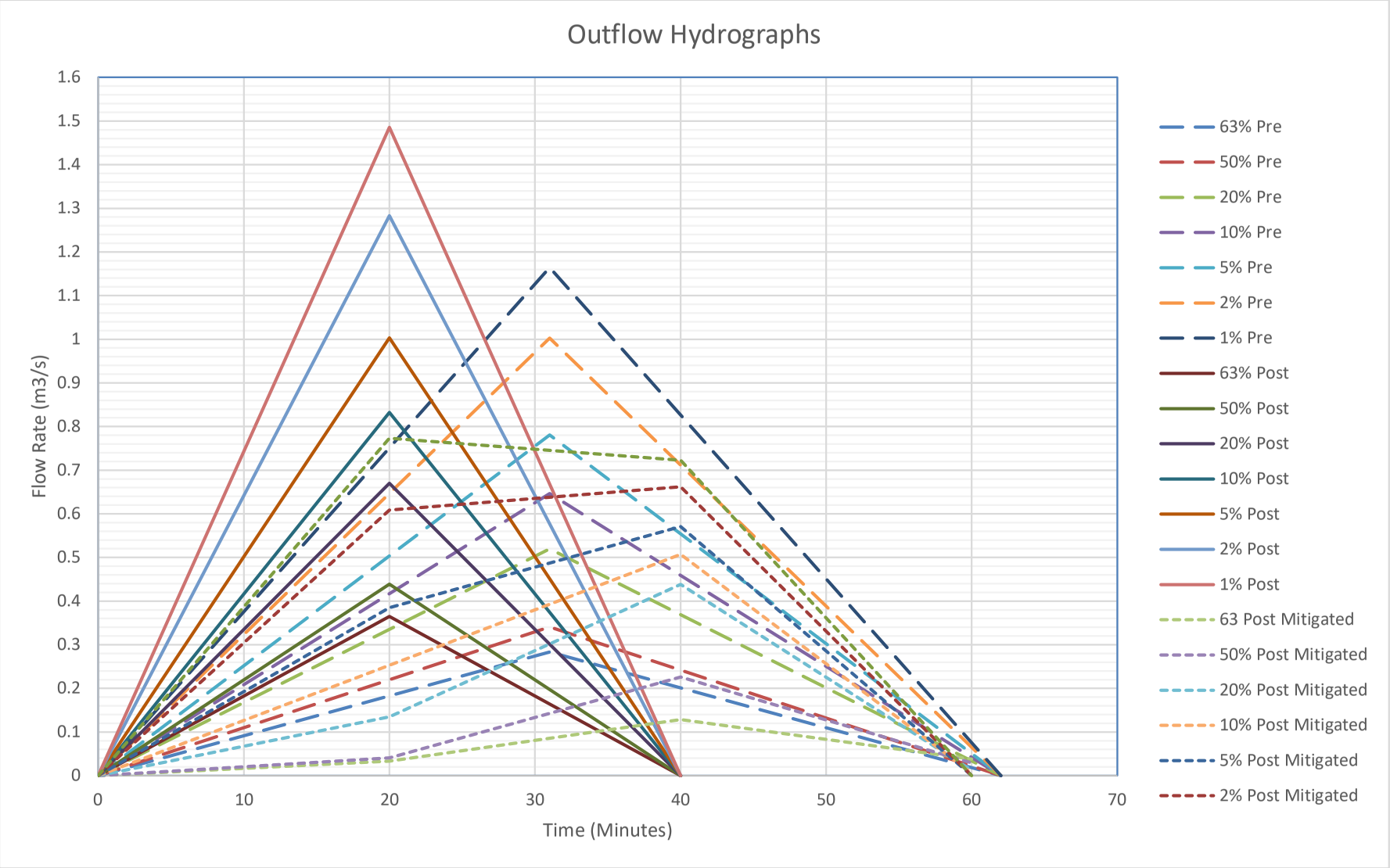
Frequency Factors

FF, 1-year	0.8	0.8
FF, 2-year	0.85	0.85
FF, 5-year	0.95	0.95
FF, 10-year	1	1
FF, 20-year	1.05	1.05
FF, 50-year	1.15	1.15
FF, 100-year	1.2	1.2

Flow Calculations

63.2% (m^3/s)	0.283	0.365
50% (m^3/s)	0.341	0.439
20% (m^3/s)	0.520	0.670
10% (m^3/s)	0.646	0.832
5% (m^3/s)	0.781	1.003
2% (m^3/s)	1.003	1.283
1% (m^3/s)	1.164	1.485

Appendix F) Outflow Hydrographs



Appendix G) MUSIC Modelling Report

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Source nodes
Location,Shed and Office Roof,Hardstand Gravel,Hardstand Sealed,Landscaped
Area
ID,2,3,4,7
Node Type,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode
Zoning Surface Type,Roof,Industrial,Industrial,Industrial
Total Area (ha),0.344,0.51,0.6,2.566
Area Impervious (ha),0.344,0.456183582089552,0.597738805970149,0
Area Pervious (ha),0,0.0538164179104478,0.0022611940298507,2.566
Field Capacity (mm),80,80,80,80
Pervious Area Infiltration Capacity coefficient - a,243,243,243,243
Pervious Area Infiltration Capacity exponent - b,0.6,0.6,0.6,0.6
Impervious Area Rainfall Threshold (mm/day),1,1,1,1
Pervious Area Soil Storage Capacity (mm),48,18,18,18
Pervious Area Soil Initial Storage (% of Capacity),10,10,10,10
Groundwater Initial Depth (mm),50,50,50,50
Groundwater Daily Recharge Rate (%),0,0,0,0
Groundwater Daily Baseflow Rate (%),31,31,31,31
Groundwater Daily Deep Seepage Rate (%),0,0,0,0
Stormflow Total Suspended Solids Mean (log mg/L),1.3,2.43,2.43,1.92
Stormflow Total Suspended Solids Standard Deviation (log
mg/L),0.44,0.44,0.44,0.44
Stormflow Total Suspended Solids Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Suspended Solids Serial Correlation,0,0,0,0
Stormflow Total Phosphorus Mean (log mg/L),-0.89,-0.3,-0.3,-0.59
Stormflow Total Phosphorus Standard Deviation (log mg/L),0.36,0.36,0.36,0.36
Stormflow Total Phosphorus Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Phosphorus Serial Correlation,0,0,0,0
Stormflow Total Nitrogen Mean (log mg/L),0.25,0.25,0.25,0.25
Stormflow Total Nitrogen Standard Deviation (log mg/L),0.32,0.32,0.32,0.32
Stormflow Total Nitrogen Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Nitrogen Serial Correlation,0,0,0,0
Baseflow Total Suspended Solids Mean (log mg/L),1.1,0.78,0.78,0.78
Baseflow Total Suspended Solids Standard Deviation (log
mg/L),0.17,0.45,0.45,0.45
Baseflow Total Suspended Solids Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Suspended Solids Serial Correlation,0,0,0,0
Baseflow Total Phosphorus Mean (log mg/L),-0.82,-1.11,-1.11,-1.11
Baseflow Total Phosphorus Standard Deviation (log mg/L),0.19,0.48,0.48,0.48
Baseflow Total Phosphorus Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Phosphorus Serial Correlation,0,0,0,0
Baseflow Total Nitrogen Mean (log mg/L),0.32,0.14,0.14,0.14
Baseflow Total Nitrogen Standard Deviation (log mg/L),0.12,0.2,0.2,0.2
Baseflow Total Nitrogen Estimation
Method,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Nitrogen Serial Correlation,0,0,0,0
Flow based constituent generation - enabled,Off,Off,Off,Off
Flow based constituent generation - flow file, , , ,
Flow based constituent generation - base flow column, , , ,
Flow based constituent generation - pervious flow column, , , ,
Flow based constituent generation - impervious flow column, , , ,
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Flow based constituent generation - unit, , , ,
OUT - Mean Annual Flow (ML/yr),2.07,2.87,3.60,6.57
OUT - TSS Mean Annual Load (kg/yr),65.9,1.32E3,1.54E3,843
OUT - TP Mean Annual Load (kg/yr),0.379,2.06,2.62,2.46
OUT - TN Mean Annual Load (kg/yr),4.84,6.56,8.27,15.2
OUT - Gross Pollutant Mean Annual Load (kg/yr),57.8,81.2,101,0.00
Rain In (ML/yr),2.31881,3.43777,4.04444,17.2967
ET Loss (ML/yr),0.252606,0.567758,0.440598,10.7236
Deep Seepage Loss (ML/yr),0,0,0,0
Baseflow Out (ML/yr),0,0,0,0
Imp. Stormflow Out (ML/yr),2.06621,2.72631,3.60385,0
Perv. Stormflow Out (ML/yr),0,0.143729,0,6.57412
Total Stormflow Out (ML/yr),2.06621,2.87004,3.60385,6.57412
Total Outflow (ML/yr),2.06621,2.87004,3.60385,6.57412
Change in Soil Storage (ML/yr),0,-2.06173E-5,0,-0.000944641
TSS Baseflow Out (kg/yr),0,0,0,0
TSS Total Stormflow Out (kg/yr),65.9288,1320.5,1543.61,843.374
TSS Total Outflow (kg/yr),65.9288,1320.5,1543.61,843.374
TP Baseflow Out (kg/yr),0,0,0,0
TP Total Stormflow Out (kg/yr),0.379142,2.05917,2.61548,2.46474
TP Total Outflow (kg/yr),0.379142,2.05917,2.61548,2.46474
TN Baseflow Out (kg/yr),0,0,0,0
TN Total Stormflow Out (kg/yr),4.84117,6.56417,8.27004,15.2057
TN Total Outflow (kg/yr),4.84117,6.56417,8.27004,15.2057
GP Total Outflow (kg/yr),57.8183,81.2363,100.846,0

No Imported Data Source nodes

USTM treatment nodes
Location,Swale,Pond,Buffer Gravel,Buffer Sealed,Bioretention
ID,5,6,8,9,10
Node Type,SwaleNode,PondNode,BufferNode,BufferNode,BioRetentionNodeV4
Lo-flow bypass rate (cum/sec),0,0, , ,0
Hi-flow bypass rate (cum/sec), ,100, , ,100
Inlet pond volume, ,0, , ,
Area (sqm), ,450,2280.91791044776,2988.69402985075,100
Initial Volume (m^3), ,135, , ,
Extended detention depth (m),0.4,0.4, , ,0.15
Number of Rainwater tanks, , , , ,
Permanent Pool Volume (cubic metres), ,135, , ,
Proportion vegetated, ,0.1, , ,
Equivalent Pipe Diameter (mm), ,300, , ,
Overflow weir width (m), ,2, , ,1
Notional Detention Time (hrs), ,0.377, , ,
Orifice Discharge Coefficient, ,0.6, , ,
Weir Coefficient, ,1.7, , ,1.7
Number of CSTR Cells,10,2, , ,3
Total Suspended Solids - k (m/yr),8000,400, , ,8000
Total Suspended Solids - C* (mg/L),20,12, , ,20
Total Suspended Solids - C** (mg/L),14,12, , ,
Total Phosphorus - k (m/yr),6000,300, , ,6000
Total Phosphorus - C* (mg/L),0.13,0.09, , ,0.13
Total Phosphorus - C** (mg/L),0.13,0.09, , ,
Total Nitrogen - k (m/yr),500,40, , ,500
Total Nitrogen - C* (mg/L),1.4,1, , ,1.4
Total Nitrogen - C** (mg/L),1.4,1, , ,
Threshold Hydraulic Loading for C** (m/yr),3500,3500, , ,
Horizontal Flow Coefficient, , , , ,3
```

```
Reuse Enabled,Off,On,Off,Off,Off
Max drawdown height (m), ,0.3, , ,
Annual Demand Enabled,Off,On,Off,Off,Off
Annual Demand Value (ML/year), ,5.475, , ,
Annual Demand Distribution, ,PETSubRain, , ,
Annual Demand Monthly Distribution: Jan, , , , ,
Annual Demand Monthly Distribution: Feb, , , , ,
Annual Demand Monthly Distribution: Mar, , , , ,
Annual Demand Monthly Distribution: Apr, , , , ,
Annual Demand Monthly Distribution: May, , , , ,
Annual Demand Monthly Distribution: Jun, , , , ,
Annual Demand Monthly Distribution: Jul, , , , ,
Annual Demand Monthly Distribution: Aug, , , , ,
Annual Demand Monthly Distribution: Sep, , , , ,
Annual Demand Monthly Distribution: Oct, , , , ,
Annual Demand Monthly Distribution: Nov, , , , ,
Annual Demand Monthly Distribution: Dec, , , , ,
Daily Demand Enabled,Off,Off,Off,Off,Off
Daily Demand Value (ML/day), , , , ,
Custom Demand Enabled,Off,Off,Off,Off,Off
Custom Demand Time Series File, , , , ,
Custom Demand Time Series Units, , , , ,
Filter area (sqm), , , , ,80
Filter perimeter (m), , , , ,102
Filter depth (m), , , , ,0.4
Filter Median Particle Diameter (mm), , , , ,
Saturated Hydraulic Conductivity (mm/hr), , , , ,200
Infiltration Media Porosity, , , , ,0.35
Length (m),150, , , ,
Bed slope,0.01, , , ,
Base Width (m),2, , , ,
Top width (m),6, , , ,
Vegetation height (m),0.1, , , ,
Vegetation Type, , , , ,Vegetated with Effective Nutrient Removal Plants
Total Nitrogen Content in Filter (mg/kg), , , , ,400
Orthophosphate Content in Filter (mg/kg), , , , ,30
Is Base Lined?, , , , ,No
Is Underdrain Present?, , , , ,Yes
Is Submerged Zone Present?, , , , ,No
Submerged Zone Depth (m), , , , ,
B for Media Soil Texture,-9999,-9999,-9999,-9999,13
Proportion of upstream impervious area treated, , ,1,1,
Exfiltration Rate (mm/hr),0.2,0.2,0.2,0.2,0.2
Evaporative Loss as % of PET, ,100, , ,100
Depth in metres below the drain pipe, , , , ,
TSS A Coefficient, , , , ,
TSS B Coefficient, , , , ,
TP A Coefficient, , , , ,
TP B Coefficient, , , , ,
TN A Coefficient, , , , ,
TN B Coefficient, , , , ,
Sfc, , , , ,0.61
S*, , , , ,0.37
Sw, , , , ,0.11
Sh, , , , ,0.05
Emax (m/day), , , , ,0.008
Ew (m/day), , , , ,0.001
IN - Mean Annual Flow (ML/yr),14.8,14.6,2.87,3.60,14.8
```

```
IN - TSS Mean Annual Load (kg/yr),1.67E3,388,1.32E3,1.54E3,507
IN - TP Mean Annual Load (kg/yr),5.23,1.99,2.06,2.62,2.72
IN - TN Mean Annual Load (kg/yr),30.9,21.9,6.56,8.27,27.8
IN - Gross Pollutant Mean Annual Load (kg/yr),228,0.00,81.2,101,0.00
OUT - Mean Annual Flow (ML/yr),14.8,12.0,2.74,3.43,14.6
OUT - TSS Mean Annual Load (kg/yr),507,346,351,406,388
OUT - TP Mean Annual Load (kg/yr),2.72,1.81,1.05,1.34,1.99
OUT - TN Mean Annual Load (kg/yr),27.8,19.2,4.82,6.06,21.9
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00,76.1,94.4,0.00
Flow In (ML/yr),14.809,14.57,2.87042,3.60383,14.7571
ET Loss (ML/yr),0,0.273472,0,0,0.150425
Infiltration Loss (ML/yr),0.0739918,0.333992,0.131902,0.172487,0.0337664
Low Flow Bypass Out (ML/yr),0,0,0,0,0
High Flow Bypass Out (ML/yr),0,0,0,0,0
Orifice / Filter Out (ML/yr),14.6549,10.336,2.73822,3.43156,5.12584
Weir Out (ML/yr),0.102268,1.70398,0,0,9.44752
Transfer Function Out (ML/yr),0,0,0,0,0
Reuse Supplied (ML/yr),0,1.93925,0,0,0
Reuse Requested (ML/yr),0,5.48133,0,0,0
% Reuse Demand Met,0,35.3792,0,0,0
% Load Reduction,0.350598,17.3641,4.60539,4.78025,1.24522
TSS Flow In (kg/yr),1666.42,388.227,1320.5,1543.61,507.256
TSS ET Loss (kg/yr),0,0,0,0,0
TSS Infiltration Loss (kg/yr),1.17401,4.12748,0,0,0.138426
TSS Low Flow Bypass Out (kg/yr),0,0,0,0,0
TSS High Flow Bypass Out (kg/yr),0,0,0,0,0
TSS Orifice / Filter Out (kg/yr),493.922,257.749,350.97,406.143,15.3
TSS Weir Out (kg/yr),13.408,87.7664,0,0,372.924
TSS Transfer Function Out (kg/yr),0,0,0,0,0
TSS Reuse Supplied (kg/yr),0,23.4847,0,0,0
TSS Reuse Requested (kg/yr),0,0,0,0,0
TSS % Reuse Demand Met,0,0,0,0,0
TSS % Load Reduction,69.5556,11.0015,73.4215,73.6887,23.4659
TP Flow In (kg/yr),5.23199,1.98591,2.05918,2.61548,2.72415
TP ET Loss (kg/yr),0,0,0,0,0
TP Infiltration Loss (kg/yr),0.0100738,0.0305113,0,0,0.00108638
TP Low Flow Bypass Out (kg/yr),0,0,0,0,0
TP High Flow Bypass Out (kg/yr),0,0,0,0,0
TP Orifice / Filter Out (kg/yr),2.68311,1.41606,1.05221,1.33589,0.135205
TP Weir Out (kg/yr),0.0413352,0.390371,0,0,1.85068
TP Transfer Function Out (kg/yr),0,0,0,0,0
TP Reuse Supplied (kg/yr),0,0.175717,0,0,0
TP Reuse Requested (kg/yr),0,0,0,0,0
TP % Reuse Demand Met,0,0,0,0,0
TP % Load Reduction,47.9272,9.0375,48.9013,48.9237,27.1005
TN Flow In (kg/yr),30.9316,21.8959,6.56417,8.27004,27.7598
TN ET Loss (kg/yr),0,0,0,0,0
TN Infiltration Loss (kg/yr),0.112372,0.34697,0,0,0.0232906
TN Low Flow Bypass Out (kg/yr),0,0,0,0,0
TN High Flow Bypass Out (kg/yr),0,0,0,0,0
TN Orifice / Filter Out (kg/yr),27.582,15.9614,4.81981,6.06489,3.40855
TN Weir Out (kg/yr),0.181537,3.20427,0,0,18.4866
TN Transfer Function Out (kg/yr),0,0,0,0,0
TN Reuse Supplied (kg/yr),0,2.0278,0,0,0
TN Reuse Requested (kg/yr),0,0,0,0,0
TN % Reuse Demand Met,0,0,0,0,0
TN % Load Reduction,10.2421,12.469,26.5739,26.6644,21.1263
GP Flow In (kg/yr),228.379,0,81.2366,100.846,0
```

```
GP ET Loss (kg/yr),0,0,0,0,0
GP Infiltration Loss (kg/yr),0,0,0,0,0
GP Low Flow Bypass Out (kg/yr),0,0,0,0,0
GP High Flow Bypass Out (kg/yr),0,0,0,0,0
GP Orifice / Filter Out (kg/yr),0,0,0,0,0
GP Weir Out (kg/yr),0,0,0,0,0
GP Transfer Function Out (kg/yr),0,0,0,0,0
GP Reuse Supplied (kg/yr),0,0,0,0,0
GP Reuse Requested (kg/yr),0,0,0,0,0
GP % Reuse Demand Met,0,0,0,0,0
GP % Load Reduction,100,100,100,100,100
PET Scaling Factor, , , , ,2.1

No Generic treatment nodes

Other nodes
Location,Corcoran Road
ID,1
Node Type,ReceivingNode
IN - Mean Annual Flow (ML/yr),12.0
IN - TSS Mean Annual Load (kg/yr),346
IN - TP Mean Annual Load (kg/yr),1.81
IN - TN Mean Annual Load (kg/yr),19.2
IN - Gross Pollutant Mean Annual Load (kg/yr),0.00
OUT - Mean Annual Flow (ML/yr),12.0
OUT - TSS Mean Annual Load (kg/yr),346
OUT - TP Mean Annual Load (kg/yr),1.81
OUT - TN Mean Annual Load (kg/yr),19.2
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00
% Load Reduction,20.3
TSS % Load Reduction,90.8
TN % Load Reduction,45.1
TP % Load Reduction,76.0
GP % Load Reduction,100

Links
Location,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage
Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link
Source node ID,6,3,4,2,7,9,8,5,10
Target node ID,1,8,9,5,5,5,5,10,6
Muskingum-Cunge Routing,Not Routed,Not Routed,Not Routed,Not Routed,Not
Routed,Not Routed,Not Routed,Not Routed,Not Routed
Muskingum K, , , , , , , , ,
Muskingum theta, , , , , , , , ,
IN - Mean Annual Flow (ML/yr),12.0,2.87,3.60,2.07,6.57,3.43,2.74,14.8,14.6
IN - TSS Mean Annual Load (kg/yr),346,1.32E3,1.54E3,65.9,843,406,351,507,388
IN - TP Mean Annual Load
(kg/yr),1.81,2.06,2.62,0.379,2.46,1.34,1.05,2.72,1.99
IN - TN Mean Annual Load (kg/yr),19.2,6.56,8.27,4.84,15.2,6.06,4.82,27.8,21.9
IN - Gross Pollutant Mean Annual Load
(kg/yr),0.00,81.2,101,57.8,0.00,94.4,76.1,0.00,0.00
OUT - Mean Annual Flow (ML/yr),12.0,2.87,3.60,2.07,6.57,3.43,2.74,14.8,14.6
OUT - TSS Mean Annual Load (kg/yr),346,1.32E3,1.54E3,65.9,843,406,351,507,388
OUT - TP Mean Annual Load
(kg/yr),1.81,2.06,2.62,0.379,2.46,1.34,1.05,2.72,1.99
OUT - TN Mean Annual Load
(kg/yr),19.2,6.56,8.27,4.84,15.2,6.06,4.82,27.8,21.9
```

```
OUT - Gross Pollutant Mean Annual Load
(kg/yr),0.00,81.2,101,57.8,0.00,94.4,76.1,0.00,0.00

Catchment Details
Catchment Name,Boonah Cranes Sandy Ck
Timestep,6 Minutes
Start Date,1/01/1997
End Date,31/07/2010 11:54:00 PM
Rainfall Station, 40659 GREENBANK
ET Station,User-defined monthly PET
Mean Annual Rainfall (mm), 674
Mean Annual ET (mm), 1443
```