

Permit

Environmental Protection Act 1994

Environmental Authority EPPR00521513

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental Authority number: EPPR00521513

Environmental authority takes effect on the day of approval.

The anniversary day of this environmental authority remains **11 April** each year. Payment of the annual fee will be due each year on this day.

Environmental authority holder

Name	Registered address
Central SEQ Distributor - Retailer Authority T/A Queensland Urban Utilities	Level 2 15, Green Square Close FORTITUDE VALLEY QLD 4006

Environmentally relevant activity and location details

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Esk Sewage Treatment Plant Brisbane Valley Highway, ESK, QLD 4312 Lot 1 RP156580. Helidon Sewage Treatment Plant Back Flagstone Road, HELIDON QLD 4344 Lot 1 RP32742. Kooralbyn Sewage Treatment Plant 8-22 Etruscan Road, KOORALBYN QLD 4285 Lot 371 SP238312 and Lot 173 SP238312. Toogoolawah Sewage Treatment Plant Lot 1 RP135864. Kalbar Sewage Treatment Plant 29 Heit Road KALBAR QLD 4309 Lot 2 RP127542.

Environmentally relevant activity	Locations
	Aratula Sewage Treatment Plant Cunningham Highway ARATULA QLD 4309 Lot 4 SP121584.
ERA 63 Sewage treatment (1)(b)(i) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of more than 100 but not more than 1,500EP if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme	Forest Hill Sewage Treatment Plant Dodt Road FOREST HILL QLD 4342 Lot 1 RP114066.
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Canungra Sewage Treatment Plant Finch Road, CANUNGRA QLD 4275 Lot 2 RP150199 and Lot 2 RP204982. Karana Downs Sewage Treatment Plant Nalya Crescent, KARANA DOWNS QLD 4306 Lot 2 RP180342. Kilcoy Sewage Treatment Plant William Street, KILCOY QLD 4515 Lot 3 RP118370. Rosewood Sewage Treatment Plant 55-69 Rosewood-Warrill View Road ROSEWOOD QLD 4340 Lot 1 RP12983. Boonah Sewage Treatment Plant, Gorkow Road BOONAH QLD 4310 Lot 10 SP237223, Lot 11 SP237223, Lot 12 SP237223, Lot 13 SP237223, Lot 1 RP113490, Lot 2 RP113490.
ERA Sewage treatment 63 (1)(d) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 4,000 but not more than 10,000EP	Beaudesert Sewage Treatment Plant Drumley Street, BEAUDESERT QLD 4285 Lot 4 RP111345 and Lot 7 RP904224. Gatton Sewage Treatment Plant Treatment Plant Road GATTON QLD 4343 Lot 3 SP235464, and Lot 4 SP235464, and Lot 4 RP96384. Laidley Sewage Treatment Plant Cnr East and Braham Roads off Boundary Road

Environmentally relevant activity	Locations
	LAIDLEY NORTH QLD 4341 Lot 2 RP107816. Lowood Sewage Treatment Plant Forest Hill - Fernvale Road LOWOOD QLD 4311 Lot 1 SP295901.
ERA 63 Sewage treatment (1)(e) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 10,000 but not more than 50,000EP	Carole Park Sewage Treatment Plant Boundary Road, CAROLE PARK QLD 4300 Lot 119 CP907852. Fairfield Sewage Treatment Plant Brisbane Corso FAIRFIELD QLD 4103 Lot 3 RP806359. Wynnum Sewage Treatment Plant Tanker St, LYTTON QLD 4178 Lot 3 RP162446.
ERA 63 Sewage treatment (1)(f) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 50,000 but not more than 100,000EP	Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551. Wacol Sewage Treatment Plant Grindle Road, WACOL QLD 4076 Lot 906 SP220999 and Lot 1 SP220999.
ERA 63 Sewage treatment (1)(g) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100,000EP	Bundamba Sewage Treatment Plant 5 Hanlon Street, BUNDAMBA QLD 4304 Lot 1 SP230116. Gibson Island Sewage Treatment Plant, Paringa Road, MURARRIE QLD 4172 Lot 41 SP227024 and Lot 43 SP227024. Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008 Lot 1 & 2 SP230688. Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.

Environmentally relevant activity	Locations
	Sandgate Sewage Treatment Plant Bicentennial Road, BOONDALL QLD 4034 Lot 1 RP63707.
ERA 57 Regulated Waste Transport Transporting regulated waste other than end-of-life tyres (5).	Mobile and Temporary.
ERA 61 Thermal waste reprocessing and treatment (1)(a) thermally reprocessing or treating, in a year, the following quantity of general waste — 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (2)(a) thermally reprocessing or treating, in a year, the following quantity of category 2 regulated waste— 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (3)(a) thermally reprocessing or treating, in a year, the following quantity of category 1 regulated waste— (a) 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 62 Resource recovery and transfer facility operation: 1 operating a facility for receiving and sorting, dismantling, baling or temporarily storing—(c) category 2 regulated waste	Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008 Lot 1 & 2 SP230688. Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551.

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- (a) the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- (b) a change in the condition of the contaminated land (notice must be given within 24 hours); or
- (c) a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

- a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or
- b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
- c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Planning Act 2016* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.



Signature

Rebecca Griffiths
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

19/10/2023

Date

Enquiries:
Utilities and Government Organisations
Assessment
Department of Environment and Science
Phone: 1300 130 372
Email: palm@des.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Other permits required

This permit only provides an approval under the *Environmental Protection Act 1994*. In order to lawfully operate you may also require permits / approvals from your local government authority, other business units within the department and other State Government agencies prior to commencing any activity at the site.

Development Approval

This permit is not a development approval under the *Planning Act 2016*. The conditions of this environmental authority are separate, and in addition to, any conditions that may be on the development approval. If a copy of this environmental authority is attached to a development approval, it is for information only, and may not be current. Please contact the Department of Environment and Science to ensure that you have the most current version of the environmental authority relating to this site.

Conditions of environmental authority

Part 1: Code Compliant Sites

The conditions for the environmentally relevant activity at the location as described below, are standard conditions contained within the *Environmentally relevant activity standard - Regulated waste transport (ERA 57)* – Version 2.

Environmentally relevant activity	Location
ERA 57 Regulated Waste Transport Transporting regulated waste other than end-of-life tyres (5 vehicles only).	Mobile and Temporary

The environmentally relevant activity conducted at the location as described above must be conducted in accordance with the eligibility criteria and following conditions of approval.

Part 2: General Conditions

Part 2(A): General Conditions - Beaudesert, Canungra and Kooralbyn STPs

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Kooralbyn Sewage Treatment Plant 8-22 Etruscan Road, KOORALBYN QLD 4285 Lot 371 SP238312 and Lot 173 SP238312.
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Canungra Sewage Treatment Plant Finch Road, CANUNGRA QLD 4275 Lot 2 RP150199 and Lot 2 RP204982.
ERA Sewage treatment 63 (1)(d) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 4,000 but not more than 10,000EP	Beaudesert Sewage Treatment Plant Drumley Street, BEAUDESERT QLD 4285 Lot 4 RP111345 and Lot 7 RP904224.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following general conditions of approval.

Agency interest: General	
Condition number	Condition
GA1	All reasonable and practicable measures must be taken to prevent the likelihood of environmental harm being caused.
GA2	Any breach of a condition of this environmental authority, with the exception of breaches described in Part 2(A) condition GA3, must be reported to the administering authority as soon as practicable, or at most, within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
GA3	The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.
GA4	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and 4. ensure plant, equipment and measures are operated in a proper and effective manner; and 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental</i>

	<i>Protection Act 1994</i> ensure that reviews of environmental performance are undertaken at least annually; and 6. ensure that reviews of environmental performance are undertaken at least annually.
GA5	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
GA6	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
GA7	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for <i>in situ</i> monitoring of pH, Dissolved Oxygen and Free Chlorine.
GA8	A receiving environment monitoring program must be designed and implemented by appropriately qualified persons to monitor the effects of the activity on waters .
GA9	The receiving environment monitoring program required by Part 2(A) condition GA8, must include at least the following: (a) a description of potentially effected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and (b) description of applicable environmental values and water quality objectives to be achieved; and (c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the Receiving Environment Monitoring Program is proposed; and (d) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the monitoring program⁴. ⁴ The monitoring program should be developed using the Department's Receiving Environment Monitoring Program Guideline (EM1260), 2014 or later version.
GA10	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.
GA11	You must record the following details for all environmental complaints received: (a) date and time complaint was received; and (b) name and contact details of the complainant; and (c) nature of the complaint; and (d) investigations undertaken; and (e) conclusions formed; and (f) actions taken.
GA12	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority , to investigate a complaint not considered by the administering authority to be frivolous or vexatious, of environmental nuisance arising from

	the activity . The monitoring results must be provided to the administering authority upon request.
GA13	Chemicals and fuels in containers of greater than 15 litres must be stored within a secondary containment system .
Agency interest: Air	
Condition number	Condition
AA1	Odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .
Agency interest: Water	
Condition number	Condition
WTA1	In addition to Part 3(D) – WT3D1 and Part 3(E) - WT3E1, the release to waters must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter excluding bypass releases covered by water conditions Part 2(A) WTA2 - Part 2(A) WTA4.
WTA2	Bypass releases must be screened prior to being released.
WTA3	The administering authority must be notified within 24 hours of any bypass release ceasing.
WTA4	The following details must be recorded in relation to each bypass release: (a) the start time, date and duration of the release; and (b) the estimated volume of the bypass release; and (c) the level of treatment at the sewage treatment plant prior to discharge; and (d) the cause of the release; and any monitoring of the water quality released.
WTA5	The holder of this environmental authority must take all reasonable and practicable measures to minimise the occurrence of bypass events.
WTA6	The volume of effluent release to waters must be determined or estimated by an appropriate method with an accuracy of +/-5%, for example, a calibrated flow metre, and records kept of such determinations and estimates.
Agency interest: Noise	
Condition number	Condition
NA1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .
Agency interest: Land	
Condition number	Condition
LA1	Other than as permitted within this environmental authority, contaminants must not be released to land .

LA2	Other than permitted in condition Part 2(A) - LA5 the only places to which the irrigation of treated effluent is authorised are defined as: (a) land within the boundaries of the site for the following uses: i. service water; and ii. landscaped areas.
LA3	Treated effluent released to land must be done in accordance with documentation that ensures: 1. drainage to groundwater and subsurface flows of contaminants to surface waters are prevented; and 2. surface pondage and run-off of effluent is prevented; and 3. degradation of soil structure is minimised; and 4. soil sodicity and the build-up of nutrients and heavy metals in the soil and subsoil are minimised; and 5. spray drift or overspray does not carry beyond effluent disposal areas; and 6. effluent disposal areas are maintained with an appropriate crop in a viable state for transpiration and nutrient uptake; and 7. sufficient buffer zones are maintained between irrigation sites and sensitive environmental receptors.
LA4	When weather conditions or soil conditions preclude the release of treated sewage effluent to land , effluent must not be irrigated to land .
LA5	Treated sewage effluent may be removed from the site and used for an alternate purpose, with the written consent of any third party involved.
Agency interest: Waste	
Condition number	Condition
WA1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

Part 2 (B) General Conditions - Luggage Point, Fairfield, Goodna, Gibson Island, Karana Downs, Oxley, Carole Park, Goodna, Bundamba, Wacol, Sandgate and Wynnum STPs

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Karana Downs Sewage Treatment Plant Nalya Crescent, KARANA DOWNS LD 4306 Lot 2 RP180342.
ERA 63 Sewage treatment (1)(e) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 10,000 but not more than 50,000EP	Carole Park Sewage Treatment Plant Boundary Road, CAROLE PARK QLD 4300 Lot 119 CP907852. Fairfield Sewage Treatment Plant Brisbane Corso, FAIRFIELD QLD, 4103 Lot 3 RP806359.

	Wynnum Sewage Treatment Plant Tanker St, LYTTON QLD 4178 Lot 3 RP162446.
ERA 63 Sewage treatment (1)(f) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 50,000 but not more than 100,000EP	Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551. Wacol Sewage Treatment Plant Grindle Road, WACOL QLD 4076 Lot 906 SP220999 and Lot 1 SP220999.
ERA 63 Sewage treatment (1)(g) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100,000EP	Bundamba Sewage Treatment Plant 5 Hanlon Street, BUNDAMBA QLD 4304 Lot 1 SP230116. Gibson Island Sewage Treatment Plant (EP Limit – 365,000) Paringa Road, MURARRIE QLD 4172 Lot 41 SP227024, Lot 43 SP227024. Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008 Lot 1 & 2 SP230688. Oxley Sewage Treatment Plant (EP Limit – 975,000) 240 Donaldson Rd, ROCKLEA QLD 4106 Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 RP37416, Lot 2 RP99640, Lot 100 SP1622583. Sandgate Sewage Treatment Plant Bicentennial Road, BOONDALL QLD 4034 Lot 1 RP63707.
ERA 62 Resource recovery and transfer facility operation: 1 operating a facility for receiving and sorting, dismantling, baling or temporarily storing—(c) category 2 regulated waste	Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008 Lot 1 & 2 SP230688. Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551.
ERA 61 Thermal waste reprocessing and treatment (1)(a) thermally reprocessing or treating, in a year, the following quantity of general waste — 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.

ERA 61 Thermal waste reprocessing and treatment (2)(a) thermally reprocessing or treating, in a year, the following quantity of category 2 regulated waste— 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (3)(a) thermally reprocessing or treating, in a year, the following quantity of category 1 regulated waste— (a) 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following general conditions of approval.

Agency interest: General	
Condition number	Condition
GB1	All reasonable and practicable measures must be taken to prevent the likelihood of environmental harm being caused.
GB2	Any breach of a condition of this environmental authority, with the exception of breaches described in Part 2(B) condition GB3, must be reported to the administering authority as soon as practicable, or at most, within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
GB3	You must notify the administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.
GB4	Other than as permitted by this environmental authority, the release of a contaminant into the environment must not occur.
GB5	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
GB6	An appropriately qualified person(s) must monitor record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
GB7	A receiving environment monitoring program (REMP) must be designed and implemented by appropriately qualified persons to monitor the effects of the activities on the aquatic values on waters .
GB8	The receiving environment monitoring program required by Part 2(B) condition GB7, must include at least the following:

	(a) description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and (b) description of applicable environmental values and water quality objectives to be achieved; and (c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the receiving environment monitoring program is proposed; and (d) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the monitoring program¹. Alternatively, receiving environment monitoring program compliance may be achieved by the holder of this environmental authority becoming and remaining a “contributing member” in regional studies of water quality and ecosystem health which are endorsed by the administering authority. ¹The monitoring program should be developed using the Departments' Receiving Environment Monitoring Program Guideline (EM1260) 2014 or later version.
GB9	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for <i>in situ</i> monitoring of pH, dissolved oxygen, conductivity, temperature and free/total chlorine.
GB10	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.
GB11	You must record the following details for all environmental complaints received: (a) date and time complaint was received; and (b) name and contact details of the complainant; and (c) nature of the complaint; and (d) investigations undertaken; and (e) conclusions formed; and (f) actions taken.
GB12	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority , to investigate a complaint not considered by the administering authority to be frivolous or vexatious, of environmental nuisance arising from the activity . The monitoring results must be provided to the administering authority upon request.
GB13	The activity must be undertaken in accordance with written procedures that: (a) identify potential risks to the environment from the activity during routine operations, closure and an emergency; and (b) establish and maintain control measures that minimise the potential for environmental harm; and (c) ensure plant, equipment and measures are maintained in a proper and effective condition; and (d) ensure plant, equipment and measures are operated in a proper and effective manner; (e) ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and (f) ensure that reviews of environmental performance are undertaken at least annually.

Agency interest: Air					
Condition number	Condition				
AB1	Subject to Part 2(B) condition AB2, odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .				
AB2	Odours or airborne contaminants may cause environmental nuisance at the Brisbane International Cruise Terminal for such time as an Infrastructure Agreement between Queensland Urban Utilities and Port of Brisbane Pty Ltd or their successors at law is in place.				
Agency interest: Water					
Condition number	Condition				
WTB1	The only contaminants to be released to surface waters, excluding bypass releases, are treated effluent from the release points described in <i>Part 2(B) Table 1 – Sewage Treatment Plant Sampling and Release locations</i> . These releases are to be in accordance with the release limits and the associated requirements listed as applicable in <i>Part 2(B) Table 1 – Sewage Treatment Plant Sampling and Release Locations</i> .				
	Part 2(B) Table 1 – Sewage Treatment Plant Sampling and Release Locations				
	ERA Location	Release Point Name	Release Point Location	Sampling Location	Applicable Effluent release limits – Effluent Release Limits
	Luggage Point Sewage Treatment Plant	W1	W1 - To waters described as Brisbane River at 0.0km AMTD	Downstream of stage 1 and 2 discharges	Column 3, Column 4, Column 6 and Column 8
	Wynnum Sewage Treatment Plant	W1	W1 - To waters described as Moreton Bay at Wynnum WWTP	Final effluent channel, downstream of disinfection	Column 3, Column 4, Column 5, Column 6, Column 7 and Column 8
	Gibson Island Sewage Treatment Plant	W1	W1 - To waters described as Brisbane River at 8.0km AMTD	Effluent well	Column 3, Column 4, Column 6 and Column 8
Sandgate Sewage Treatment Plant	W1	W1 – To waters described as Cabbage Tree Creek at 1.22km AMTD	Outlet from disinfection process	Column 3, Column 4, Column 5, Column 6, Column 7 and Column 8	

		W2	W2 – To waters described as Cabbage Tree Creek at 1.20km AMTD	-	-
	Fairfield Sewage Treatment Plant	W1	W1 - To waters described as Brisbane River at 33.7km AMTD	Outlet of Chlorine Contact Tank	Column 3, Column 4, Column 5, Column 6, Column 7 and Column 8
	Oxley Sewage Treatment Plant	W1	W1 - To waters described as Brisbane River at 46.5km AMTD	Outlet from disinfection process	Column 3, Column 4, Column 6, and Column 8
				Maintenance Hole, Teesdale Street, Corinda.	Column 5 and Column 7
		W2 (only sample when discharges occurring on date of routine sample)	W2 – To waters described as Oxley Creek at 8.0km AMTD	Outlet from disinfection process	Column 5, Column 7
	Wacol Sewage Treatment Plant	W1	W1 – To waters described as Brisbane River at 60.0km AMTD	Outlet from disinfection process	Column 3, Column 4, Column 5, Column 6, Column 7 and Column 8
	Carole Park Sewage Treatment Plant	W1	W1 - To waters described as Brisbane River at 63.7km AMTD	Sampling pit at the outlet of the chlorine contact tanks	Column 3, Column 4, Column 5, Column 6 and Column 7
	Goodna Sewage Treatment Plant	W1	W1 – To waters described as Brisbane River at 66.2km AMTD	At the effluent standpipe located on the outfall pipeline treated wastewater flow to the permeate flow splitter tank	Column 3, Column 4, Column 5, Column 6 and Column 8
		W2	W2 – To waters described as Goodna Creek at 0.6km AMTD	-	-

Karana Downs Sewage Treatment Plant	W1	W1 - To an unnamed gully that joins the Brisbane River at approximately 81km AMTD	Outlet from disinfection process	Column 3, Column 4, Column 5, Column 6 and Column 7
Bundamba Sewage Treatment Plant	W1	W1 – To waters described as Bremer River at 5.7km AMTD	Open channel post chlorination	Column 3, Column 4, Column 5, Column 6, Column 7 and Column 8

Part 2(B) Table 2 – Effluent Release Limits

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Quality Characteristic (units)	Sampling frequency	Minimum	Long Term 80th Percentile	Short term median	Maximum	Maximum	Long Term Median
BOD5 (mg/L)	Weekly	-	20	-	60	-	-
Suspended Solids (mg/L)	Weekly	-	30	-	90	-	-
pH (pH units)	Weekly	6.5	-	-	8.5	-	-
Dissolved Oxygen (mg/L)	Weekly	2.0	-	-	-	-	-
Enterococci (cfu/100mL)	Weekly	-	-	260	-	-	-
Free chlorine (mg/L)	Weekly	-	-	-	-	0.7	-
Total Nitrogen (mg/L)	Weekly	-	-	-	-	-	-
Total Phosphorus (mg/L)	Weekly	-	-	-	-	-	-
Ammonia (mg/L)	Weekly	-	-	-	-	-	4

Associated requirements:

- (a) Sampling must be in accordance with the administering authority's Water Quality Sampling Manual and any additional relevant guidelines if necessary or alternatively must be undertaken by a laboratory NATA certified for sampling. All monitoring devices must be effectively calibrated and maintained.
- (b) Release points/sampling locations must be in accordance with the descriptions in *Part 2(B) Table 1-sewage treatment sampling and release locations* of this approval. Sewage Treatment Plants where there is no bypass facility or the sample location includes bypass flows, the effluent release limits detailed in *Part 2(B) Table 2-Effluent release limits* applies to a dry weather day only.

WTB2

In addition to Part 2(B) condition WTB1, the release to **waters** must not produce any slick or

	other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter excluding bypass releases.
WTB3	Inflows that are in excess of the hydraulic capacity of the plant may bypass the standard treatment processes of the plant.
WTB4	Bypass releases must be screened prior to being released.
WTB5	The following details must be recorded in relation to each bypass release: (a) the start time, date and duration of the release; and (b) the estimated volume of the bypass release; and (c) the level of treatment at the sewage treatment plant prior to discharge; and (d) the cause of the release; and (e) any monitoring of the water quality released.
WTB6	The administering authority must be notified within 24 hours of any bypass release ceasing.
WTB7	Treated sewage effluent may be removed from the site and used for an alternate purpose ² , with the written consent of any third party involved. ² Any reuse proposed must comply with all other legal requirements including those relating to public health.
Agency interest: Noise	
Condition number	Condition
NB1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .
Agency interest: Land	
Condition number	Condition
LB1	Other than as permitted within this environmental authority, contaminants must not be released to land.
LB2	Treated sewage effluent may be released to land within the boundaries of the site for the use of any of the following: (a) service water; or (b) watering of landscaped areas; or (c) research and development projects relating to biomass production.
LB3	Treated effluent released to land must be done in accordance with documentation that ensures: (a) drainage to groundwater and subsurface flows of contaminants to surface waters are prevented. (b) surface pondage and run-off of effluent is prevented. (c) degradation of soil structure is minimised. (d) soil sodicity and the build-up of nutrients and heavy metals in the soil and subsoil are minimised. (e) spray drift or overspray does not carry beyond effluent disposal areas. (f) effluent disposal areas are maintained with an appropriate crop in a viable state for

	transpiration and nutrient uptake. (g) sufficient buffer zones are maintained between irrigation sites and sensitive environmental receptors.
LB4	When weather conditions or soil conditions preclude the release of treated sewage effluent to land, effluent must not be irrigated to land.
Agency interest: Waste	
Condition number	Condition
W1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

Part 2(C): General Conditions – Esk, , Toogoolawah and Kilcoy STPs

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Esk Sewage Treatment Plant Lot 1 RP156580. Toogoolawah Sewage Treatment Plant Lot 1 RPI35864.
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Kilcoy Sewage Treatment Plant William Street, KILCOY QLD 4515 Lot 3 RP118370

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following general conditions of approval.

Agency interest: General	
Condition number	Condition
AC1	Display of environmental authority A copy of this environmental authority must be kept in a location readily accessible to the personnel that are carrying out the environmentally relevant activities.
AC2	Records All records or documents that are required to be kept by a condition of this environmental authority must be kept at the premises approved for the activity for a period of at least five years and be available for examination by an authorised person. The record retention requirements of this condition will be satisfied if any daily and weekly records are kept for a period of at least three (3) years and these records are then kept in the form of annual summaries after that period.
AC3	Alterations No change, replacement or operation of any plant or equipment is permitted if the change,

	replacement or operation of the plant or equipment increases, or is likely to substantially increase, the risk of environmental harm above that expressly provided by this environmental authority. An example of a substantial increase in the risk of environmental harm is an increase of 10% or more in the quantity of the contaminant to be released into the environment.
AC4	Calibration All instruments and devices used for measuring or monitoring to determine compliance with a condition(s) of this environmental authority must be calibrated, and appropriately operated and maintained.
AC5	Site-Based Environmental Management Plan Implement a Site-Based Environmental Management Plan that address the management of the actual and potential environmental impacts resulting from the carrying out of the environmentally relevant activity/activities (ERAs) - (including issue-specific environmental management plans required to be developed and implemented under the conditions of this environmental authority).
AC6	An up to date copy of the Site-Based Environmental Management Plan (including issue-specific environmental management plans required to be developed and implemented under the conditions of this environmental authority) must be kept at a location readily accessible to the personnel that are carrying out the environmentally relevant activities and be available for examination by an authorised person on request.
AC7	Maintenance of Plant and Equipment The holder of this environmental authority must: (a) install all plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and (b) maintain all plant and equipment in a proper and efficient condition; and (c) operate all plant and equipment in a proper and efficient manner. In this condition, "plant and equipment" includes: (a) plant and equipment used to prevent and/or minimise the likelihood of environmental harm being caused; and (b) devices and structures to contain foreseeable escapes of contaminants and waste; and (c) vehicles used to transport waste; and (d) device or structure used to store, handle, treat or dispose of waste; monitoring equipment and associated alarms; and (e) backup systems that act in the event of failure of a primary system.
AC8	Trained operators All persons engaged in the conduct of the activity, including but not limited to employees and contract staff, must be: (a) trained in the procedures and practices necessary to: i. comply with the conditions of this environmental authority, and ii. (prevent environmental harm during normal operation and emergencies; or (b) under the close supervision of such a trained person.
AC9	If the holder of this environmental authority gives or transfers ownership of the treated sewage effluent to another person(s), the holder of this environmental authority must: (a) prior to giving such effluent or transferring ownership of such effluent to that person(s), obtain from that person details of how that person intends to comply with the general

	environmental duty in respect of the use and disposal of such effluent, particularly in relation to environmental sustainability of any effluent disposal, protection of public health and protection of environmental values of waters; and		
	(b) only give or transfer ownership of such effluent in accordance with a written agreement between the holder of this environmental authority and that person(s); and		
	(c) upon becoming aware that the person is not or is not likely to comply with the general environmental duty, cease the giving and transferring ownership of such effluent, as the case may be.		
Agency interest: Air			
Condition number	Condition		
BC1	Noxious or Offensive Odour Notwithstanding any other condition of this environmental authority, no release of contaminants from the approved place is to cause a noxious or offensive odour beyond the boundaries of the approved place at any odour sensitive place.		
Agency interest: Water			
Condition number	Condition		
WTC1	Release of contaminants to waters Contaminants must not be directly or indirectly released to any waters or the bed and banks of any waters unless: (a) the release complies with the limits and other requirements stated in Part 2(C) Agency interest: Water; and (b) the release occurs only from the designated discharge point for each approved place; and (c) the release complied with other requirements stated for the relevant approved place.		
WTC2	Release of contaminants to waters Notwithstanding the specified effluent quality characteristic limits for each approved place, the release of contaminants to waters must comply with the following qualitative characteristics: (a) the release must not have any properties nor contain any organisms or other contaminants which are capable of causing environmental harm; and (b) the release must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other objectionable matter.		
WTC3	Quality Characteristics of Release to Waters The release of contaminants to waters must comply, at the sampling and in-situ measurement points specified for each approved place, with each of the limits specified in Part 2(C)Table 1 for each quality characteristic.		
	Part 2(C)Table 1 - Release Quality Characteristic Limits		
	QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE
	5-day Biochemical Oxygen Demand (uninhibited)	20 mg/L	Short-term 80th percentile compliance

		40 mg/L	maximum
	Suspended Solids	30 mg/L	Short-term 80th percentile compliance
		60mg/L	maximum
	pH	6.5 to 8.5	range
	Dissolved Oxygen	2.0 mg/L	minimum
	Free Chlorine Residual	0.7 mg/L	maximum
	Faecal Coliforms	1000 organisms per 100 mL as a median value (minimum of 5 samples taken at not less than half-hourly intervals in any one day, with 4 out of the 5 samples containing less than 4000 organisms per 100 mL).	
WTC4	All contaminated wastewater generated from washing or degreasing of all vehicles, plant and equipment must be collected and: (a) treated and disposed of to sewer with the approval of the relevant authority in accordance with a trade waste permit; or (b) transported for disposal, recycled, reprocessed or treated at a facility that can lawfully accept such waste.		
WTC5	Receiving Environment Monitoring Program The holder of this environmental authority must implement a Receiving Waters Monitoring Program to monitor the effects of the release of contaminants on the receiving waters, which provides for the following functions: (a) monitoring for appropriate contaminants which may be released to such waters; and (b) description of potentially affected environment including key communities and ambient water quality; and (c) description of water quality objectives and biological objectives to be achieved; and (d) description of selected physio-chemical and biological indicators and reasons for their inclusion; the locations of monitoring stations as well as any control locations; the proposed sampling depths; and (e) the water quality characteristics of receiving waters to be determined; and (f) the frequency of sampling and analysis; any historical data sets to be relied upon; and (g) description of the statistical basis on which conclusions are drawn.		
WTC6	The Receiving Waters Monitoring Program must also consider, but not be limited to, the following: (a) water quality criteria specified in the Australian & New Zealand Environment & Conservation Council's "Australian Water Quality Guidelines for Fresh and Marine Waters", 2000; and (b) relevant Environmental Protection Policies enacted under Queensland's <i>Environmental Protection Act 1994</i> concerning water quality and ecosystems; and (c) relevant reports produced with respect to the administering authority's water quality monitoring programs if applicable.		
WTC7	The holder of this environmental authority must submit a report of the results of the Receiving Waters Monitoring Program including an assessment of the impact of the discharge upon the receiving environment with respect to water quality criteria and the areas of consideration in Part 2(C) condition WTC5 with each annual monitoring report, and the suitability of the existing discharge location with reference to the environmental values (e.g. maintenance of aquatic		

	ecosystems) of the receiving water body.
Agency interest: Stormwater Management	
Condition number	Condition
SMC1	Contaminant Releases Caused by Rainfall Except as otherwise provided by the conditions of the stormwater management schedule and the water schedule of this environmental authority, the environmentally relevant activity must be carried out by such practicable means necessary to prevent and/or minimise the release or likelihood of release of contaminated runoff to any stormwater drain or waters or the bed or banks of any such waters. "Contaminated runoff" for the purposes of this condition means stormwater and/or stormwater runoff that contain contaminants that may cause environmental harm.
SMC2	Cleaning and spillages The maintenance and cleaning of all vehicles, plant and equipment must be carried out in areas where contaminants cannot be released into any waters, roadside gutter or stormwater drain.
SMC3	Spillage of waste, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must not be cleaned up by hosing, sweeping or otherwise releasing such waste, contaminants or material to any stormwater drainage system, roadside gutter or waters.
SMC4	Pond conditions All ponds used for the storage or treatment of contaminants or wastes must be constructed and maintained to ensure the stability of the pond's construction.
SMC5	Suitable banks and or diversion drains must be installed and maintained to exclude stormwater runoff from any ponds or other structures used for the storage or treatment of contaminants or wastes.
SMC6	Bunding All liquid chemical tank storages must be bunded so as to effectively contain a volume equivalent to at least that of 100% of the largest storage tank plus 10% of the second largest tank within the bund.
SMC7	All chemical drum storages, must be bunded so as to effectively contain a volume equivalent to at least 25% of the maximum design storage volume within the bund.
SMC8	All bunded areas must be roofed where practicable.
SMC9	Where it is impractical to completely roof a bunded area the holder of this environmental authority must ensure that stormwater captured within the bund is free from contaminants or wastes prior to being released.
SMC10	Minimise infiltration The holder of this environmental authority must take all reasonable and practicable measures to minimise infiltration of stormwater to the sewerage system.

Agency interest: Land Application	
Condition number	Condition
LC1	Release of contaminants The only contaminants allowed to be released to land from the environmental relevant activity are treated effluents and sewage sludges.
LC2	Contaminant release location Treated effluents and sewage sludges may only be released to the sludge drying beds or, for treated effluents, to designated irrigation areas within an approved place or to a third party.
LC3	Contaminant release quality Treated sewage effluent used for irrigation purposes, or given to another party for irrigation purposes or other use, must comply with the quality characteristics specified in Part 2(C) Agency interest: Water.
LC4	Contaminant release precautions The contaminant release areas within an approved place must not be used for grazing, recreational activities or as a traffic thoroughfare.
LC5	The release of contaminants to land within an approved place must not be carried out within 50 metres of any watercourse.
LC6	The release of contaminants to land within an approved place must not be carried out if soil moisture conditions are such that surface runoff or ponding is likely to occur.
LC7	Spray from any release of contaminants to land must not drift beyond the boundaries of an approved place.
LC8	Public access to any contaminant release area within an approved place must be denied during the release of contaminants to land and until the release area has dried.
LC9	Pipelines and fittings for the release of contaminants to land must be clearly identified. Standard water taps, hoses and cocks must not be fitted to contaminants release pipelines, and the contaminant release system must not be connected to other service pipelines. Lockable valves or removable handles must be fitted to the contaminant release pipelines where there is public access to the contaminant release areas.
Agency interest: Noise	
Condition number	Condition
NC1	Emission of noise The environmentally relevant activity must be carried out by such reasonable and practicable means necessary to prevent the emission or likelihood of emission of noise that constitutes an unreasonable intrusive noise.
NC2	In the event of a complaint about noise that constitutes an unreasonable intrusive noise being made to the administering authority, that the administering authority considers is not frivolous or vexatious, then the emission of noise must not result in levels greater than those specified in Part 2(C)Table 2 — Noise Emission Limits.

Part 2(C) Table 2 — Noise Emission Limits	
NOISE LIMITS AT A NOISE SENSITIVE PLACE	
Period	Noise Level at a Noise Sensitive Place Measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, Adj, T}$
7 am - 6 pm	Background noise level plus 5 dB(A)
6 pm - 10 pm	Background noise level plus 5 dB(A)
10 pm - 7 am	Background noise level plus 3 dB(A)
NOISE LIMITS AT A COMMERCIAL PLACE	
Period	Noise Level at a Commercial Place measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, adj T}$
7 am - 6 pm	Background noise level plus 10 dB(A)
6 pm - 10 pm	Background noise level plus 10 dB(A)
10 pm - 7 am	Background noise level plus 8 dB(A)
Agency interest: Waste Management	
Condition number	Condition
GC1	General Except as otherwise provided by the conditions of this environmental authority, the holder of this environmental authority must not: (a) allow waste to burn or be burned; nor (b) remove waste and burn such waste elsewhere.
GC2	Off-site movement Where regulated waste is removed from the premises (other than by a release as permitted under another schedule of this environmental authority), the holder of this environmental authority must monitor and keep records of the following: (a) the date, quantity and type of waste removed; and (b) name of the waste transporter and/or disposal operator that removed the waste; and (c) the intended treatment/disposal destination of the waste. (NOTE: Records of documents maintained in compliance with a waste tracking system established under the <i>Environmental Protection Act 1994</i> or any other law for regulated waste will be deemed to satisfy this condition).
GC3	The holder of this environmental authority must keep records required to be kept in relation to removal of regulated waste from the premises for a period of at least 5 years.
GC4	Regulated waste must not be released to the environment, stored, transferred or disposed of contrary to any condition of this environmental authority.
GC5	Notification of improper disposal of regulated waste If the holder of this environmental authority becomes aware that a person has removed regulated waste from the premises (or any approved vehicles) and disposed of the regulated waste in a manner that is not authorised by this environmental authority or is improper or unlawful, then the holder of this environmental authority must, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the

	disposal.
GC6	Specific Waste Management Plan Associated With Site-Based Management Plans Incorporate a Waste Management Plan in the Site-Based Management Plans that addresses at least the following matters: (a) the quantity and nature of each waste produced; and (b) the current method of disposal of waste; and (c) proposed methods of pre-treatment or disposal; and (d) expected reduction in quantity of waste produced through waste minimisation and cleaner production; and (e) investigation and evaluation of alternative treatment options which shall include at least the following: i. cleaner production technologies including nutrient removal; ii. disposal or reuse of effluent and sludge; and iii. reporting the results of any investigation and evaluation to the administering authority.
Agency interest: Monitoring and Reporting	
Condition number	Condition
MPC1	Complaint recording All complaints received by the holder of this environmental authority relating to releases of contaminants must be recorded and kept with the following details: (a) time, date and nature of complaint; and (b) type of communication (telephone, letter, personal etc.); and (c) name, contact address and contact telephone number of complainant (Note: if the complainant does not wish to be identified then "Not identified" is to be recorded); and (d) response and investigation undertaken as a result of the complaint; and (e) name of person responsible for investigating complaint; and (f) action taken as a result of the complaint investigation and signature of responsible person.
MPC2	Notification of emergencies and incidents As soon as practicable after becoming aware of any emergency or incident that results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, the holder of this environmental authority must notify the administering authority of the release by telephone or email.
MPC3	The notification of emergencies or incidents as required by Part 2(C) condition MPC2 must include but not be limited to the following: (a) the name of the holder of the environmental authority; and (b) the location of the emergency or incident; and (c) the number of the environmental authority; and (d) the name and telephone number of the designated contact person; and (e) the time of the release; and (f) the time of the holder of the environmental authority become aware of the release; and (g) the suspected cause of the release; and (h) the environmental harm caused, threatened, or suspected to be cause by the release; and

	(i) actions taken to prevent any further release and mitigate any environmental harm caused by the release. (NOTE: Any relevant notification given under the duty to notify of environmental harm provisions of the <i>Environmental Protection Act 1994</i> that contains the information specified in Part 2(C) condition MPC3 is also notification under Part 2(C) condition MPC2.)																														
MPC4	Not more than 14 days following the initial notification of an emergency or incident, the holder of the environmental authority must provide written advice of the information supplied in accordance with Part 2(C) condition MPC3 in addition to. (a) proposed actions to prevent a recurrence of the emergency or incident; and (b) outcomes of actions taken at the time to prevent or minimise environmental harm.																														
MPC5	As soon as practicable, but not more than six weeks following the conduct of any environmental monitoring performed in relation to the emergency or incident that results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, the holder of the environmental authority must provide written advice of the results of any such monitoring performed to the administering authority.																														
MPC6	Exception Reporting The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.																														
MPC7	The written notification required by condition number MPC6 above must include: (a) the full analysis results; and (b) details of investigation or corrective actions taken; and (c) details of any proposed subsequent analysis.																														
MPC8	Monitoring of Contaminant Releases to Waters The holder of this environmental authority must monitor the physio-chemical properties of treated effluent at the release point WI for each approved place at the frequency, and for the parameters, specified in Part 2(C) Table 3 — Monitoring Parameters and Frequency. Part 2 (C) Table 3 — Monitoring Parameters and Frequency <table><tr><th>Quality Characteristic</th><th>Units</th><th>Frequency</th></tr><tr><td>5-day uninhibited Biochemical Oxygen Demand (BOD₅)</td><td>mg/L</td><td>Monthly</td></tr><tr><td>Suspended Solids</td><td>mg/L</td><td>Monthly</td></tr><tr><td>pH</td><td>pH scale</td><td>Monthly</td></tr><tr><td>Dissolved Oxygen</td><td>mg/L</td><td>Monthly</td></tr><tr><td>Free Chlorine Residual</td><td>mg/L</td><td>Monthly</td></tr><tr><td>Faecal Coliforms</td><td>cfu/100 mL</td><td>Monthly</td></tr><tr><td>Ammonia (as Nitrogen)</td><td>mg/L</td><td>Monthly</td></tr><tr><td>Total Nitrogen (as Nitrogen)</td><td>mg/L</td><td>Monthly</td></tr><tr><td>Total Phosphorus (as Phosphorus)</td><td>mg/L</td><td>Monthly</td></tr></table>	Quality Characteristic	Units	Frequency	5-day uninhibited Biochemical Oxygen Demand (BOD ₅)	mg/L	Monthly	Suspended Solids	mg/L	Monthly	pH	pH scale	Monthly	Dissolved Oxygen	mg/L	Monthly	Free Chlorine Residual	mg/L	Monthly	Faecal Coliforms	cfu/100 mL	Monthly	Ammonia (as Nitrogen)	mg/L	Monthly	Total Nitrogen (as Nitrogen)	mg/L	Monthly	Total Phosphorus (as Phosphorus)	mg/L	Monthly
Quality Characteristic	Units	Frequency																													
5-day uninhibited Biochemical Oxygen Demand (BOD ₅)	mg/L	Monthly																													
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Ammonia (as Nitrogen)	mg/L	Monthly																													
Total Nitrogen (as Nitrogen)	mg/L	Monthly																													
Total Phosphorus (as Phosphorus)	mg/L	Monthly																													
MPC9	Water quality determinations All monitoring of the physio-chemical properties of contaminants released to waters and the quality of surface waters and groundwater must be made in accordance with methods																														

	prescribed in the latest edition of the Administering Authority's Monitoring and Sampling Manual or supplements to that document as such become available.
MPC10	All determinations of the quality of contaminants released to waters and the quality of surface waters and groundwater must be performed by a person or body possessing appropriate experience and qualifications to perform the required measurements.
MPC11	The results of all monitoring and other determinations made under this environmental authority must be kept for a period of not less than 5 years, and produced to an authorised person upon request.
MPC12	Noise monitoring For the purposes of checking compliance with Part 2(C) condition NC2, monitoring and recording of the noise levels from the activity/activities must be undertaken for the following descriptors, characteristics and conditions: (a) $L_{Amax, Adj T}$; (b) $L_{A90, T}$; (c) $L_{AN, T}$ (where N equals statistical levels of 1, 10, 50, 90 and 99); (d) $L_{pA T}$; (e) $L_{Aeq, T}$; (f) the level and frequency of occurrence of impulsive or tonal noise; (g) atmospheric conditions including temperature, relative humidity and wind speed and direction; and (h) effects due to extraneous factors such as traffic noise.
MPC13	In conjunction with the measurement and recording of noise, the sampling location, date of sample and time of sampling must be recorded.
MPC14	In the event of a complaint about noise that constitutes an unreasonable intrusive noise being made to the administering authority that the administering authority considers is not frivolous or vexatious, the holder of this environmental authority must undertake monitoring to investigate such a complaint upon written request from the administering authority.
MPC15	The method of measurement and reporting of noise levels must comply with the most recent edition of the Administering Authority's Noise Measurement Manual or supplements to that document as they become available.
MPC16	The measurement and reporting of noise levels must be undertaken by a person or body possessing appropriate experience and qualifications to perform the required measurements.
MPC17	Incident recording A record must be maintained of at least the following events: (a) the time, date and duration of equipment malfunctions where the failure of the equipment resulted in the release of contaminants reasonably likely to cause environmental harm; and (b) any uncontrolled release of contaminants reasonably likely to cause environmental harm; and (c) any emergency involving the release of contaminants reasonably likely to cause material or serious environmental harm requiring the use of firefighting equipment.
MPC18	All bypasses of sewage shall be monitored and recorded in terms of event date, duration, cause of bypass, and actions taken in reporting and averting the bypass.

MPC19	Monitoring Of Volume of Release The daily quantity of contaminants released must be determined or estimated by an appropriate method, for example, a flow meter.
MPC20	Monitoring reporting The holder of this environmental authority must ensure that the results of all monitoring performed in accordance with this environmental authority for the period covered by each annual return period are submitted with the annual monitoring report.
MPC21	Contaminant release quality pertaining to the yearly period, compiled, collected or recorded in accordance with Part 2(C) Agency interest: Water Table 1 conditions must be presented in a tabular format, showing: (a) date, times, and day of week sampled; i. all raw data; ii. any exceedance of levels of all parameters specified in the relevant Part 2(C) Agency interest: Water Table 1; and iii. maximum and minimum values for parameters specified in the relevant Part 2(C) Agency interest: Water Table 1; and (b) graphically showing data referred to in part (i) of this condition vs time.

Part 3: Site Specific Conditions

Part 3 (A): Bubble Licence: Lower Brisbane River Catchment Conditions

Part 3(A) Table 1 – Lower Brisbane River Catchment sewage treatment plants

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Karana Downs Sewage Treatment Plant Nalya Crescent, KARANA DOWNS QLD 4306 Lot 2 RP180342.
ERA 63 Sewage treatment (1)(e) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 10,000 but not more than 50,000EP	Carole Park Sewage Treatment Plant Boundary Road, CAROLE PARK QLD 4300 Lot 119 CP907852. Fairfield Sewage Treatment Plant Corner of Brisbane Corso and Cansdale Street Qld, 4103 Lot 3 RP806359.
ERA 63 Sewage treatment (1)(f) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 50,000 but not more than 100,000EP	Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551. Wacol Sewage Treatment Plant Grindle Road, WACOL QLD 4076 Lot 906 SP220999 and Lot 1 SP220999.
ERA 63 Sewage treatment (1)(g) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100,000EP	Bundamba Sewage Treatment Plant 5 Hanlon Street, BUNDAMBA QLD 4304. Lot 1 on Plan SP230116. Gibson Island Sewage Treatment Plant (EP Limit – 365,000), PARINGA ROAD, MURARRIE QLD 4172 Lot 41 SP227024, Lot 43 SP227024. Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008 Lot 1 & 2 SP230688. Oxley Sewage Treatment Plant (EP Limit – 975,000) 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 RP37416, Lot 2 RP99640, Lot 100 SP1622583.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: General												
Condition number	Water											
WT3A1	For each annual monitoring report period, the total mass load of Total Nitrogen and Total Phosphorus released to waters must not exceed the limits specified in <i>Part 3(A)Table 2 – Annual bubble licence Load Limits for Total Nitrogen and Total Phosphorus</i>. Releases are to be calculated as a combined total from all environmentally relevant activities listed in <i>Part 3(A)Table 1-Lower Brisbane River Catchment sewage treatment plants</i> of this environmental authority. Part 3(A) Table 2 – Annual bubble licence Load Limits for Total Nitrogen and Total Phosphorus <table> <tr> <td rowspan="2">Effective up to and including 30 June 2022</td><td>Total Nitrogen Mass Load Release Limit</td><td>610 T/yr</td></tr> <tr> <td>Total Phosphorus Mass Load Release Limit</td><td>580 T/yr</td></tr> <tr> <td rowspan="2">Effective from 1 July 2022</td><td>Total Nitrogen Mass Load Release Limit</td><td>605 T/yr</td></tr> <tr> <td>Total Phosphorus Mass Load Release Limit</td><td>530 T/yr</td></tr> </table> Associated requirements Total nitrogen and total phosphorus annual mass loads are to be calculated as follows: - Catchment Annual TN Mass Load (T) = Sum of all individual site TN mass Loads(kg)/1000 - Individual Site Annual TN Mass Load (kg) = Yearly sum of Daily Release Volume (ML) for all dry weather days/ the number of dry weather days x 365 x Yearly Median dry weather TN Concentration (mg/L) - Catchment Annual TP Mass Load (T) = Sum of all individual site TP mass Loads (kg)/1000 - Individual Site Annual TP Mass Load (kg) = Yearly sum of Daily Release Volume (ML) for all dry weather days/ the number of dry weather days x 365 x Yearly Median dry weather TP Concentration (mg/L)		Effective up to and including 30 June 2022	Total Nitrogen Mass Load Release Limit	610 T/yr	Total Phosphorus Mass Load Release Limit	580 T/yr	Effective from 1 July 2022	Total Nitrogen Mass Load Release Limit	605 T/yr	Total Phosphorus Mass Load Release Limit	530 T/yr
Effective up to and including 30 June 2022	Total Nitrogen Mass Load Release Limit	610 T/yr										
	Total Phosphorus Mass Load Release Limit	580 T/yr										
Effective from 1 July 2022	Total Nitrogen Mass Load Release Limit	605 T/yr										
	Total Phosphorus Mass Load Release Limit	530 T/yr										
WT3A2	By 30 November 2017, and every five (5) years thereafter, the holder of this environmental authority shall develop, with written agreement from the administering authority, the following: - A pollutant release reduction target for Total Nitrogen and Total Phosphorus for the activities identified in <i>Part 3(A) Table 1-Lower Brisbane river catchment sewage treatment plants</i> of this environmental authority. - A nutrient pollutant abatement program of works to achieve the target specified in <i>Part 3(A) WT2 (1)</i>.											
WT3A3	By 30 November 2017, the holder of this environmental authority must - Conduct a mixing zone study for the activities in <i>Part 3(A) Table 1- Lower Brisbane river catchment sewage treatment plants</i> of this environmental authority, to assess localised impacts from releases and submit the final written report to the administering authority. - With written agreement from the administering authority, and within a reasonable timeframe, implement recommendations (if any) from above mentioned mixing zone study.											

WT3A4	Within five (5) years from the take effect date of this environmental authority and every five (5) year period thereafter, the holder of this environmental authority shall provide the administering authority with a pollutant release reduction progress report stating: 1. The actual total load for each pollutant released during the preceding five (5) years; and 2. The pollutant abatement actions undertaken during the preceding five (5) years, and 3. The actual total pollutant load abated by the actions in paragraph 2.
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Part 3(B): Aratula, Boonah and Kalbar STPs

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Boonah Sewage Treatment Plant, Gorkow Road BOONAH QLD 4310. Lot 10 SP237223, Lot 11 SP237223, Lot 12 SP237223, Lot 13 SP237223, Lot 1 RP113490, Lot 2 RP113490.
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Aratula Sewage Treatment Plant Cunningham Highway ARATULA QLD 4309 Lot 4 SP121584.
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Kalbar Sewage Treatment Plant 29 Heit Road KALBAR QLD 4309 Lot 2 RP127542.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: General	
Condition number	Condition
G3B1	All reasonable and practicable measures must be taken to prevent the likelihood of environmental harm being caused.
G3B2	Any breach of a condition of this environmental authority, with the exception of breaches described in Part 3(B) condition G3B3, must be reported to the administering authority as soon as practicable, or at most, within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
G3B3	The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedance of or a non-compliance with any condition limit within 28 days of completion of analysis.
G3B4	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering

	authority upon request and in the format requested.
G3B5	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
G3B6	A receiving environment monitoring program must be designed and implemented by appropriately qualified persons to monitor the effects of the activity on the aquatic values of waters.
G3B7	The receiving environment monitoring program required by Part 3(B) condition G3B6, must include at least the following: (a) description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and (b) description of applicable environmental values and sediment and water quality objectives to be achieved; and (c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the Receiving Environment Monitoring Program is proposed; and (d) water and sediment quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the monitoring program. Alternatively, receiving environment monitoring compliance may be achieved by the holder of this environmental authority becoming and remaining a "contributing member" in regional studies of water quality and are endorsed by the administering ecosystem health which authority.
G3B8	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for field sampling or online monitoring of pH, Dissolved Oxygen and Free Chlorine.
G3B9	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.
G3B10	You must record the following details for all environmental complaints received: (a) date and time complaint was received; and (b) name and contact details of the complainant; and (c) nature of the complaint; and (d) investigations undertaken; and (e) conclusions formed; and (f) actions taken.
G3B11	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority , to investigate a complaint not considered by the administering authority to be frivolous or vexatious, of environmental nuisance arising from the activity . The monitoring results must be provided to the administering authority upon request.
G3B12	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental

	harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and 4. ensure plant, equipment and measures are operated in a proper and effective manner; and 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and 6. ensure that reviews of environmental performance are undertaken at least annually.																															
Agency interest: Air																																
Condition number	Condition																															
A3B1	Odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .																															
Agency interest: Water																																
Condition number	Condition																															
WT3B1	The only contaminants to be released to surface waters are treated effluent from the release points described in <i>Part 3(B) Table 1 – Sewage Treatment Plant Sampling and Release Locations</i>. These releases are to be in accordance with the release strategy listed in <i>Part 3(B) Table 2 Sewage Treatment Plant Release Strategy</i> and the limits and the associated requirements listed as applicable in <i>Part 3(B) Table 5 –Effluent Release Limits</i>. Part 3(B) Table 1 – Sewage Treatment Plant Sampling and Release Locations <table><tr><th>ERA location</th><th>Release point name</th><th>Release Point location</th><th>Source of Effluent</th><th>Sampling location</th><th>Sampling frequency</th><th>Applicable Effluent release limits - Table 5 Effluent Release Limits</th></tr><tr><td>Aratula Sewage Treatment Plant</td><td>LW1</td><td>Washpool Gully into Warrill Creek at approximately 55 km AMTD</td><td>Wetlands</td><td>Final outlet of the treatment works</td><td>Monthly in the event of a release</td><td>Columns 1, 2, 4, 5 where 'Aratula' or 'All Sites' are listed in Column 3</td></tr><tr><td rowspan="3">Boonah Sewage Treatment Plant</td><td rowspan="2">RP1</td><td rowspan="2">At the end of the open drain on QUU land leading to Teviot Brook at 52km AMTD</td><td>Effluent Storage Lagoon</td><td>Effluent Storage Lagoon outlet</td><td>Monthly in the event of a release</td><td>Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3</td></tr><tr><td>MF Storage Tank</td><td>Final outlet of the treatment works</td><td>Monthly</td><td>Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3</td></tr><tr><td>RP2</td><td>Piped outlet to Teviot Brook at 52km AMTD</td><td>Effluent Storage Lagoon</td><td>Effluent Storage Lagoon</td><td>Monthly in the event of a release</td><td>Columns 1, 2, 4, 5 where 'Boonah RP2' or 'All Sites'</td></tr></table>	ERA location	Release point name	Release Point location	Source of Effluent	Sampling location	Sampling frequency	Applicable Effluent release limits - Table 5 Effluent Release Limits	Aratula Sewage Treatment Plant	LW1	Washpool Gully into Warrill Creek at approximately 55 km AMTD	Wetlands	Final outlet of the treatment works	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Aratula' or 'All Sites' are listed in Column 3	Boonah Sewage Treatment Plant	RP1	At the end of the open drain on QUU land leading to Teviot Brook at 52km AMTD	Effluent Storage Lagoon	Effluent Storage Lagoon outlet	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3	MF Storage Tank	Final outlet of the treatment works	Monthly	Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3	RP2	Piped outlet to Teviot Brook at 52km AMTD	Effluent Storage Lagoon	Effluent Storage Lagoon	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Boonah RP2' or 'All Sites'
ERA location	Release point name	Release Point location	Source of Effluent	Sampling location	Sampling frequency	Applicable Effluent release limits - Table 5 Effluent Release Limits																										
Aratula Sewage Treatment Plant	LW1	Washpool Gully into Warrill Creek at approximately 55 km AMTD	Wetlands	Final outlet of the treatment works	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Aratula' or 'All Sites' are listed in Column 3																										
Boonah Sewage Treatment Plant	RP1	At the end of the open drain on QUU land leading to Teviot Brook at 52km AMTD	Effluent Storage Lagoon	Effluent Storage Lagoon outlet	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3																										
			MF Storage Tank	Final outlet of the treatment works	Monthly	Columns 1, 2, 4, 5 where 'Boonah RP1' or 'All Sites' are listed in Column 3																										
	RP2	Piped outlet to Teviot Brook at 52km AMTD	Effluent Storage Lagoon	Effluent Storage Lagoon	Monthly in the event of a release	Columns 1, 2, 4, 5 where 'Boonah RP2' or 'All Sites'																										

				outlet		are listed in Column 3
Kalbar Sewage Treatment Plant	LW1	Via piped outlets to Kents Lagoon diversion channel	Wet weather storage lagoon or Chlorine contact tank	Final outlet of the treatment works	Monthly	Columns 1, 2, 4, 5 where 'Kalbar' or 'All Sites' are listed in Column 3
Associated requirements						
1. Sampling must be in accordance with the Monitoring and Sampling Manual and all monitoring devices must be effectively calibrated and maintained.						
2. The daily quantity of contaminants released must be determined or estimated by an appropriate method, for example, a flow meter.						
3. A map of release points at Aratula, Boonah, and Kalbar STPs is attached in ATTACHMENT F :						
Part 3(B) Table 2 – Sewage Treatment Plant Effluent Release Strategy						
ERA location	Effluent Release Strategy					
Aratula Sewage Treatment Plant	The total quantity of effluent released from release point Part 3(B) LW1 must not exceed 19,850 kilolitres per year.					
Boonah Sewage Treatment Plant	Effluent release strategy applies from 1 July 2020 Treated effluent may be released from Boonah Sewage Treatment plant under the following conditions: 1. Treated effluent release is triggered only when the following conditions are met: a) i. When flow in Teviot Brook is greater than 2 cubic meters/second as measured at the Coulson Gauge 145031A or; ii. When flow in Teviot Brook is greater than 1.78 cubic meters/second as measured by a flow meter installed at a Boonah STP release point or nearby location. b) The combined maximum release flow rate must not exceed 44 litres/second, consisting of maximums of 30 litres/second from the Effluent Storage Lagoon and 14 litres/second from the membrane filtration Storage Tank 2. Treated effluent release must cease when: a) the Effluent Storage Lagoon has been drained down to the minimum RL of 80.8 metres (or a level equivalent to 30% of its total volume) or; b) within 24 hours of flow in Teviot Brook dropping below i. 2 cubic meters/second as measured at the Coulson Gauge 145031A or; ii. 1.78 cubic metres/second as measured by a flow meter installed at a Boonah STP release point or nearby location. 3. Treated effluent release must only occur from RP2 and/or RP2 For the annual reporting period, contaminants released under effluent release strategy must meet the requirements of <i>Part 3(B) Table 3 – Maximum quantity of release</i> and associated requirements.					
Part 3(B) Table 3 – Maximum quantity of release						

		<table><tr><th>Parameter</th><th>Annual Mass Load limit (kg/year)</th></tr><tr><td>Total Nitrogen (as N)</td><td>2,900</td></tr><tr><td>Total Phosphorus (as P)</td><td>860</td></tr></table> Associated Requirements 1. The Annual Mass Load of Total Nitrogen in kgs/year must be calculated as the Sum of all TN Mass Loads as calculated under associated requirement 2 for the annual reporting period. 2. The TN Mass Load of each release event is calculated as the most recent TN concentration x the total volume of effluent released to Teviot Brook from both RP1 and RP2. 3. The Annual Mass Load of Total Phosphorus in kgs/year must be calculated as the Sum of all TP Mass Loads as calculated under associated requirement 4 for the annual reporting period. 4. The TP Mass Load of each release event is calculated as the most recent TP concentration x the Total volume of effluent released to Teviot Brook from both RP1 and RP2. 5. The Annual Mass Load Limits as detailed in Table 3 do not apply in any year where the annual rainfall volume is greater than 1020 mm (equivalent to greater than a 1 in 10 wet year). Effluent release strategy applies from 1 July 2020 Treated effluent may be released from Boonah Sewage Treatment plant under the following conditions: 4. Treated effluent release is triggered only when the following conditions are met: a) When water level in the Effluent Storage Lagoon is above RL of 81.1 metres (or a level greater than or equal to 50% of lagoon volume); and b) i. When flow in Teviot Brook is greater than 2 cubic meters/second as measured at the Coulson Gauge 145031A or; ii. When flow in Teviot Brook is greater than 1.78 cubic meters/second as measured by a flow meter installed at a Boonah STP release point or nearby location. c) At release point RP2, a maximum release flow rate of 30 litres/second via a submerged outlet in Teviot Brook. 5. Treated effluent release must cease when: a) the Effluent Storage Lagoon has been drained down to the minimum RL of 80.8 metres (or a level equivalent to 30% of its total volume) or; b) when flow in Teviot Brook drops below i. 2 cubic meters/second as measured at the Coulson Gauge 145031A or; ii. 1.78 cubic metres/second as measured by a flow meter installed at a Boonah STP release point or nearby location. 6. Treated effluent release must only occur from RP2. For the annual reporting period, contaminants released under effluent release strategy must meet the requirements of <i>Part 3(B) Table 4 – Maximum quantity of release</i> and associated requirements. Part 3(B) Table 4 – Maximum quantity of release <table><tr><th>Parameter</th><th>Annual Mass Load limit (kg/year)</th></tr></table>	Parameter	Annual Mass Load limit (kg/year)	Total Nitrogen (as N)	2,900	Total Phosphorus (as P)	860	Parameter	Annual Mass Load limit (kg/year)
Parameter	Annual Mass Load limit (kg/year)									
Total Nitrogen (as N)	2,900									
Total Phosphorus (as P)	860									
Parameter	Annual Mass Load limit (kg/year)									

		Total Nitrogen (as N)	2,000
		Total Phosphorus (as P)	600
	Associated Requirements 1. The Annual Mass Load of Total Nitrogen in kgs/year must be calculated as the Sum of all TN Mass Loads as calculated under associated requirement 2 for the annual reporting period. 2. The TN Mass Load of each release event is calculated as the most recent TN concentration x the Total volume of effluent released to Teviot Brook from RP2. 3. The Annual Mass Load of Total Phosphorus in kgs/year must be calculated as the Sum of all TP Mass Loads as calculated under associated requirement 2 for the annual reporting period. 4. The TP Mass Load of each release event is calculated as the most recent TP concentration x the Total volume of effluent released to Teviot Brook from RP2. 5. The Annual Mass Load Limits as detailed in Table 3 do not apply in any year where the annual rainfall volume is greater than 1020 mm (equivalent to greater than a 1 in 10 wet year).		
Kalbar Sewage Treatment Plant	The total quantity of effluent released from release point LW1 during any dry weather day must not exceed 250 cubic metres and in any day must not exceed 1000 cubic metres.		

Part 3(B) Table 5 – Effluent Release Limits				
Column 1	Column 2	Column 3	Column 4	Column 5
Quality Characteristic	Units	Site	Minimum	Maximum
BOD 5 day (inhibited)	mg/L	Aratula	NA	20
		Kalbar	NA	20
BOD 5 day	mg/L	Boonah RP1	NA	110
		Boonah RP2	NA	110
Suspended Solids	mg/L	Aratula	NA	30
		Kalbar	NA	30
		Boonah RP1	NA	220
		Boonah RP2	NA	220
pH	scale	All sites	6.5	9
Dissolved Oxygen	mg/L	All sites	2.0	NA
Faecal Coliforms	cfu/100mL	All sites	NA	1000
Free chlorine	mg/L	All sites	NA	0.7
Ammonia (as N)	mg/L	All sites (except Boonah)	NA	NA
		Boonah RP1 (before 1 Jul 2020)	NA	NA
		Boonah RP2 (before 1 Jul 2020)	NA	NA
		Boonah RP2 (from 1 July 2020)	NA	33
Total Nitrogen	mg/L	All sites	NA	NA

	<table><tr><td>Total Phosphorus</td><td>mg/L</td><td>All sites</td><td>NA</td><td>NA</td></tr></table>	Total Phosphorus	mg/L	All sites	NA	NA
Total Phosphorus	mg/L	All sites	NA	NA		
	Associated requirements 1. Release limit only applies when a release occurs. 2. The most recent sample taken from the sample location in Table 1 is used to assess compliance against effluent release limit. 3. Effluent release limits apply to Boonah for releases under effluent release strategy. 4. Effluent release limits apply to Aratula and Kalbar for all releases.					
WT3B2	In addition to Part 3(B) WT3B1, the release to waters must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter.					
WT3B3	The holder of this environmental authority must implement an effective and appropriate plan for the Management of Blue-Green Algae in the effluent storage lagoons, which details how the holder of this environmental authority will manage the actual and potential environmental impacts resulting from any occurrence of blue-green algae outbreaks.					
Agency interest: Noise						
Condition number	Condition					
N3B1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place.					
Agency interest: Land						
Condition number	Condition					
L3B1	Other than as permitted within this environmental authority, contaminants must not be released to land.					
L3B2	Treated sewage effluent may be released to land within the boundaries of the site for the following uses: 1. service water; 2. watering of constructed wetland or landscaped areas; 3. research and development projects relating to biomass production.					
L3B3	Treated sewage effluent may be removed from the site and used for alternate purpose, with the written consent of any third party involved.					
Agency interest: Waste						
Condition number	Condition					
W3B1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.					

Part 3(C): Laidley and Forest Hill STPs

Environmentally relevant activity	Locations
ERA Sewage treatment 63 (1)(d) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 4,000 but not more than 10,000EP	Laidley Sewage Treatment Plant Cnr East and Braham Roads off Boundary Road LAIDLEY NORTH QLD 4341, Lot 2 RP107816.
ERA 63 Sewage treatment (1)(b)(i) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme - IT or IR	Forest Hill Sewage Treatment Plant Dodt Road FOREST HILL QLD 4342. Lot 1 RP114066.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: General	
Condition number	Condition
G3C1	All reasonable and practicable measures must be taken to prevent the likelihood of environmental harm being caused.
G3C2	Any breach of a condition of this environmental authority, with the exception of breaches described in Part 3(C) condition G3C3, must be reported to the administering authority as soon as practicable, or at most, within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
G3C3	The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.
G3C4	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
G3C5	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
G3C6	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for in situ monitoring of pH, Dissolved Oxygen and Free Chlorine.
G3C7	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.

G3C8	You must record the following details for all environmental complaints received: a) date and time complaint was received (a) name and contact details of the complainant; and (b) nature of the complaint; and (c) investigations undertaken; and (d) conclusions formed; and (e) actions taken.										
G3C9	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority , to investigate a complaint not considered by the administering authority to be frivolous or vexatious, of environmental nuisance arising from the activity . The monitoring results must be provided to the administering authority upon request.										
G3C10	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and 4. ensure plant, equipment and measures are operated in a proper and effective manner 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and 6. ensure that reviews of environmental performance are undertaken at least annually.										
Agency interest: Air											
Condition number	Condition										
A3C1	Odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .										
Agency interest: Water											
Condition number	Condition										
WT3C1	The only contaminants to be released to surface waters from the release points described in <i>Part 3(C) Table 1 - Sewage Treatment Plant Sampling and Release Location</i> must be in accordance with <i>Part 3(C) Table 2 - Surface Water Release Limits</i> and the associated requirements. Part 3(C) Table 1 - Sewage Treatment Plant Sampling and Release Location<table><tr><th>ERA Location</th><th>Release Point Name</th><th>Release Point Location</th><th>Sampling Location</th></tr><tr><td>Laidley STP</td><td>W1</td><td>Open channel as shown in ATTACHMENT C: Figure 1 – Laidley STP - W1 - Release</td><td>Final outlet of the treatment works</td></tr></table>			ERA Location	Release Point Name	Release Point Location	Sampling Location	Laidley STP	W1	Open channel as shown in ATTACHMENT C: Figure 1 – Laidley STP - W1 - Release	Final outlet of the treatment works
ERA Location	Release Point Name	Release Point Location	Sampling Location								
Laidley STP	W1	Open channel as shown in ATTACHMENT C: Figure 1 – Laidley STP - W1 - Release	Final outlet of the treatment works								

			Point		
	Forest Hill STP	W1	Open channel as shown in ATTACHMENT D: Figure 2 – Forest Hill STP - W1 - Release Point	Final outlet of the treatment works	
	Part 3(C) Table 2 - Surface Water Release Limits				
	Quality Characteristic (units)	Minimum	80th percentile*	Maximum	Sampling
	BOD5 (mg/L)		20	40	Fortnightly
	pH (pH units)	6.5		9.0	Fortnightly
	Dissolved Oxygen (mg/L)	2.0			Fortnightly
	Total Suspended Solids (mg/L)		30	60	Fortnightly
	Total Nitrogen (mg/L)				Fortnightly
	Total Phosphorous (mg/L)				Fortnightly
	Free Chlorine (mg/L)			0.7	Fortnightly
	Faecal Coliforms (cfu/100ml)			1,000	Fortnightly
	* These limits apply only when dry weather effluent releases to surface waters occur. Sampling to occur as per prescribed sampling frequency only when dry weather effluent releases to surface water are occurring. Associated monitoring requirements 1. Sampling must be in accordance with the current edition of the Department's Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained. 2. Monitoring must be undertaken during a release and at the frequency stated.				
WT3C2	In addition to Part 3(C) condition WT3C1, the release to waters must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter.				
WT3C3	The daily quantity of contaminants released must be determined or estimated by an appropriate method, for example, a flow meter.				
Agency interest: Noise					
Condition number	Condition				
N3C1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .				

Agency interest: Land	
Condition number	Condition
L3C1	Treated sewage effluent may be removed from the site and used for an alternate purpose, with the written consent of any third party involved.
L3C2	Treated sewage effluent may be released to land within the boundaries of the site for the use of any of the following: (a) service water; or (b) watering of landscaped areas; or (c) research and development projects relating to biomass production.
L3C3	Treated effluent released to land within the boundaries of the site must be done in accordance with documentation that ensures: (a) drainage to groundwater and subsurface flows of contaminants to surface waters are prevented; and (b) surface pondage and run-off of effluent is prevented; and (c) degradation of soil structure is minimised; and (d) soil sodicity and the build-up of nutrients and heavy metals in the soil and subsoil are minimised; and (e) spray drift or overspray does not carry beyond effluent disposal areas; and (f) effluent disposal areas are maintained with an appropriate crop in a viable state for transpiration and nutrient uptake; and (g) sufficient buffer zones are maintained between irrigation sites and sensitive environmental receptors.
L3C4	When weather conditions or soil conditions preclude the release of treated sewage effluent to land, effluent must not be irrigated to land.
Agency interest: Waste	
Condition number	Condition
W3C1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.
Offsite Nutrient Reduction Action Conditions	
Condition number	Condition
O3C1	The holder of this environmental authority must: 1. carry out an offsite nutrient reduction action via streambank stabilisation works within the catchment of Laidley Creek, in accordance with <i>Queensland Urban Utilities, Laidley Creek Sewage Treatment Plant Nutrient Offset Project Delivery Proposal</i>, dated 15th October 2016, included in Attachment L of this environmental authority, excluding sections 5.3.3, 5.3.4 and 6; and 2. before 1 July 2021, establish a sustainable irrigation scheme.

O3C2	The offsite nutrient reduction action referred to in Part 3(C) condition O3C1 must generate pollution credits for total nitrogen and total phosphorus specified in <i>Part 3(C) Table 5 - Pollution Credit Requirement</i>. Part 3(C) Table 5 - Pollution Credit Requirement <table><tr><th>Pollutant</th><th>Pollution Credit (Tonnes/Year)</th></tr><tr><td>Total Nitrogen</td><td>5.0</td></tr><tr><td>Total Phosphorus</td><td>10.0</td></tr></table> Associated Requirements 1. The Pollution Credits generated by the offsite nutrient reduction action referred to in Part 3(C) condition O1 commence 1 July 2021 and continue for a period of ten (10) years.	Pollutant	Pollution Credit (Tonnes/Year)	Total Nitrogen	5.0	Total Phosphorus	10.0	
Pollutant	Pollution Credit (Tonnes/Year)							
Total Nitrogen	5.0							
Total Phosphorus	10.0							
O3C3	For the annual reporting period, after 1 July 2021, the Net Combined Annual Mass Load released to waters under condition WT3C1 must not exceed limits for each parameter specified in <i>Part 3(C) Table 6 - Net Combined Annual Mass Load Release Limits</i> and associated requirements. Part 3(C) Table 6 – Net Annual Combined Mass Load Release Limits <table><tr><th rowspan="3">Net Combined Annual Mass Load (Tonnes/Year)</th><th colspan="2">Pollutant</th></tr><tr><th>Total Nitrogen</th><th>Total Phosphorus</th></tr><tr><td>7.5</td><td>0</td></tr></table> Associated Requirements 1. The <i>Net Combined Annual Mass Load Release Limits</i> take effect on 1 July 2021 and continue to have effect for a period of ten (10) years. 2. The <i>Net Combined Annual Mass Load</i> of Total Nitrogen is the Combined Annual Mass Load of Total Nitrogen, as calculated under Associated Requirement 4, less the Pollution Credit generated for Total Nitrogen under Part 3(C) condition O3C2. 3. The <i>Net Combined Annual Mass Load</i> of Total Phosphorus is the Combined <i>Annual Mass Load</i> of Total Phosphorus, as calculated under Associated Requirement 5, less the Pollution Credit generated for Total Phosphorus under Part 3(C) condition O3C2. 4. The Combined <i>Annual Mass Load</i> of Total Nitrogen is the sum of the Annual Mass Loads of Total Nitrogen, as calculated under Associated Requirement 6, released to water from Laidley and Forest Hill STPs under Part 3(C) condition WT3C1. 5. The Combined <i>Annual Mass Load</i> of Total Phosphorous is the sum of the Annual Mass Loads of Total Phosphorus, as calculated under Associated Requirement 7, released to water from Laidley and Forest Hill STPs under Part 3(C) condition WT3C1. 6. The Annual Mass Load of Total Nitrogen in tonnes/year for both Laidley and Forest Hill STPs must be calculated as the [(Yearly sum of Daily Release Volume (ML) for all dry weather days) x (Yearly Dry Weather Day Median Concentration (mg/L) of Total Nitrogen) divided by 1000] multiplied by [365/(number of dry weather days + number of wet weather days when Daily Release Volume < Average Daily Dry Weather Flow)]. 7. The Annual Mass Load of Total Phosphorus in tonnes/year for both Laidley and Forest Hill STPs must be calculated as the [(Yearly sum of Daily Release Volume (ML) for all dry weather days) x (Yearly Dry Weather Day Median Concentration (mg/L) of Total Phosphorus) divided by 1000] multiplied by [365/(number of dry weather days+ number of wet weather days when Daily Release Volume < Average Daily Dry Weather Flow)].	Net Combined Annual Mass Load (Tonnes/Year)	Pollutant		Total Nitrogen	Total Phosphorus	7.5	0
Net Combined Annual Mass Load (Tonnes/Year)	Pollutant							
	Total Nitrogen		Total Phosphorus					
	7.5	0						
O3C4	The holder of this environmental authority must appropriately maintain, monitor and report the offsite nutrient reduction action from 1 July 2021 until the cessation of the Pollution Credits specified in Part 3(C) condition O3C2.							

Part 3(D): Beaudesert STP

Environmentally relevant activity	Locations
ERA Sewage treatment 63 (1)(d) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 4,000 but not more than 10,000EP	Beaudesert Sewage Treatment Plant Drumley Street, BEAUDESERT QLD 4285. Lot 4 RP111345 and Lot 7 RP904224.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: General					
Condition number	Condition				
G3D1	The holder of this environmental authority must continue to implement the Beaudesert Offset Monitoring Program described in Attachment B, Beaudesert Sewage Treatment Plant Nutrient Offset Project Proposal Version 1 print date 13 December 2013 of this environmental authority.				
G3D2	The offsite nutrient reduction action referred to in condition Part 3(D)G1 must generate pollution credits for total nitrogen specified in <i>Part 3(D)Table 1 — Pollution Credit Requirement</i> .				
	Part 3(D)Table 1 — Pollution Credit Requirement				
	Pollutant	Pollution Credit (Tonnes/Year)	Offset expiry date		
	Total Nitrogen	5 (pro-rata for part years)	1 March 2024 (Date of practical completion of the project (1 March 2014) plus 10 years ¹)		
	¹ The maximum 10 year period will be split into two five year periods. A strategic review of the offset project outcomes will occur after the initial 5 year period by the project control group (PCG). The PCG will subsequently determine whether any additional offset works and/or amendments to offset conditions are needed prior to approving that the offset can be applied for the second 5 year period (to make up to the maximum 10 year period).				
Agency interest: Water					
Condition number	Condition				
WT3D1	The only contaminants to be released to surface waters 'excluding bypass releases covered by water conditions Part 2(A) - WTA2 — Part 2(A) - WTA4 are from the sewage treatment plant to waters described in Part 3(D) <i>Table 2 — Sewage Treatment Plant Sampling and Release locations</i> and in accordance with Part 3(D) <i>Table 3 —Surface water release limits and the associated requirements (dry weather only)</i> .				
	Part 3(D) Table 2 - Sewage Treatment Plant Sampling and Release locations				
	ERA Location	Release Point Name	Release Point Location	Release Sampling Frequency	Release Sampling Location
	Beaudesert	W1 shown in	Logan River at	Weekly	Final outlet of

	Sewage Treatment Plant	attachment A	approximately 105 kilometres		the treatment works
	Part 3(D) Table 3 —Surface water release limits and the associated requirements (dry weather only)				
	Quality Characteristics	Minimum	Median	Maximum	
	BOD 5 day (mg/L)	-	-	30	
	Suspended Solids (mg/L)	-	-	30	
	Total Phosphorus (mg/L)	-	-	16	
	pH (scale)	6.5	-	8.5	
	Dissolved Oxygen (mg/L)	2	-	-	
	Faecal coliforms (cfu/100ml)	-	150	600	
	Free Chlorine (mg/L as Cl ₂)	-	-	0.7	
	Associated requirements				
	1. Indicators for TN and TP must be done as 24 hour composite samples.				
	2. Sampling must be in accordance with the Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained.				
	3. No release limits applicable on wet weather days.				
WT3D2	The total quantity of contaminants released via W1, must not exceed the respective quantities stated in Part 3(D) Table 4				
	Part 3(D) Table 4 — Maximum quantity of release				
		Maximum permitted quantity of release			
	Release Point	Parameter	Maximum Annual release volume (ML) (dry weather)	Maximum release volume (ML) on any one day (other than during a bypass)	Net Mass Load release limit dry weather (tonnes/year)
	W1	Flow	162	5.450	-
	W1	Total Nitrogen	-	-	9
	W1	Total Phosphorus (as P)	-	-	3.5
	Associated Requirements				
	1. The <i>Net Annual Mass Load</i> of Total Nitrogen is the <i>Annual Mass Load</i> of Total Nitrogen, as calculated under Associated Requirement 2, less the Pollution Credit generated for Total Nitrogen under condition Part 3(D) condition G3D2.				
	2. The <i>Annual Mass Load</i> of Total Nitrogen is the Annual Mass load of Total Nitrogen as calculated under Associated				

	Requirement 3, released to water from Beaudesert STP under Part 3(D) condition WT3D1. 3. The Annual Mass Load of Total Nitrogen in tonnes/year for Beaudesert must be calculated as the [(Yearly sum of Daily Release Volume (ML) for all dry weather days) x (Yearly Dry Weather Day Median Concentration (mg/L) of Total Nitrogen) divided by 1000]. 4. The Net Annual Mass Load of Total Phosphorus is the Annual Mass Load of Total Phosphorus as calculated under Associated Requirement 5, released to water from Beaudesert STP under Part 3(D) condition WT3D1. 5. The Annual Mass Load of Total Phosphorus in tonnes/year for Beaudesert must be calculated as the [Yearly sum of Daily Release Volume (ML) for all dry weather days x Yearly Dry Weather Median Concentration (mg/L) of Total Phosphorus and divide by 1000].
WT3D3	The holder of this environmental authority must implement: 1. Actions to achieve 100% dry weather effluent reuse and zero (0) dry weather release into the Logan River by 31 December 2018 as discussed in the <i>Queensland Urban Utilities Beaudesert STP Western reuse Scheme Management Plan</i> prepared by Bligh Tanner in conjunction with Psi Delta dated 12 April 2013; or 2. Investigate additional cost effective effluent reuse measures and/or treatment technologies to further reduce the release of contaminants to waters.
WT3D4	The REMP required by Part 2(A) Conditions GA8 and GA9, must be conducted at locations that include those shown in Attachment A

Part 3 (E): Canungra STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Canungra Sewage Treatment Plant Finch Road, CANUNGRA QLD 4275 Lot 2 RP150199 and Lot 2 RP204982.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: Water														
Condition number	Condition													
WT3E1	The only contaminants to be released to surface waters 'excluding bypass releases covered by water conditions Part 2(A) - WTA2 — Part 2(A) - WTA4' are from the sewage treatment plant to waters described in <i>Part 3(E) Table 1 — Sewage Treatment Plant Sampling and Release locations</i> and in accordance with <i>Part 3(E) Table 2 — Surface water release limits and the associated requirements (dry weather only)</i>. Part 3(E) Table 1 - Sewage Treatment Plant Sampling and Release locations <table> <tr> <th>ERA Location</th><th>Release Point Name</th><th>Release Point Location</th><th>Release Sampling Frequency</th><th>Release Sampling Location</th></tr> <tr> <td>Canungra Sewage Treatment</td><td>RP1</td><td>(-28.012594; 153.163957) Canungra Creek</td><td>Fortnightly</td><td>Final outlet of the treatment works</td></tr> </table>				ERA Location	Release Point Name	Release Point Location	Release Sampling Frequency	Release Sampling Location	Canungra Sewage Treatment	RP1	(-28.012594; 153.163957) Canungra Creek	Fortnightly	Final outlet of the treatment works
ERA Location	Release Point Name	Release Point Location	Release Sampling Frequency	Release Sampling Location										
Canungra Sewage Treatment	RP1	(-28.012594; 153.163957) Canungra Creek	Fortnightly	Final outlet of the treatment works										

	Plant		at approximately 23 kilometres AMTD		S1 - Maintenance manhole downstream of the permeate tank and upstream of the bypass interconnection point (see Attachment M: Canungra STP General (Process Flow Diagram) PF24).		
Part 3(E) Table 2 —Surface water release limits and the associated requirements (dry weather only)							
	Quality Characteristics	Minimum	50th %ile (long term)	50th %ile (short term)	80th %ile (long term)	80th %ile (short term)	Maximum
	BOD 5 day (mg/L)	-	-	-	10	15	20
	Suspended Solids (mg/L)	-	-	-	15	23	30
	Dissolved Oxygen (mg/L)	2	-	-	-	-	-
	Ammonia Nitrogen (mg/L as N)	-	-	-	1	2	4
	Total Nitrogen (mg/L as N)	-	5	10	-	-	15
	Total Phosphorus (mg/L as P)	-	1	2	-	-	3
	pH (scale)	6.5	-	-	-	-	8.5
	Faecal coliforms (cfu/100ml)	-	-	150	-	600	-
	Enterococci (cfu/100ml)	-	-	40	-	-	200
Associated requirements 1. Indicators for TN and TP must be done as 24 hour composite samples. 2. Sampling must be in accordance with the Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained							
WT3E2	The mass load of nutrients (Total Nitrogen and Total Phosphorus) released from release point RPI must not exceed the specified limit in Part 3(E) Table 3. Part 3(E) Table 3 — Release Mass Load Limits for Nutrients (Total Nitrogen and Total Phosphorus)						
	Contaminant	Release Point	Release Limit		Limit Type		
	Total Nitrogen (t/yr)	RP1	0.607		Maximum		

	<table><tr><td>Total Phosphorus (t/yr)</td><td>RP1</td><td>0.122</td><td>Maximum</td></tr></table> The above release limit was determined based on design average dry weather flow multiplied by design long term median concentration multiplied by 110% to account for wet weather effects on annual mean daily flow. Annual Mass Load of Total Nitrogen in tonnes/year must be calculated as the Yearly sum of Daily Release Volume (ML) for all dry weather days x Yearly Dry Weather Median Concentration (mg/L) of Total Nitrogen and divide by 1000. Annual Mass Load of Total Phosphorus in tonnes/year must be calculated as the Yearly sum of Daily Release Volume (ML) for all dry weather days x Yearly Dry Weather Median Concentration (mg/L) of Total Phosphorus and divide by 1000.	Total Phosphorus (t/yr)	RP1	0.122	Maximum				
Total Phosphorus (t/yr)	RP1	0.122	Maximum						
WT3E3	Disinfection shall occur by ultra violet radiation and or membrane technology for discharges to Canungra Creek.								
WT3E4	The total quantity of treated sewage wastes released to waters via the release point RPI defined in condition Part 3(E) WT3E1 must not exceed the quantities stated in Part 3(E) Table 4. Part 3(E) Table 4 — Permitted Quantities of Release <table><tr><th>Release Point</th><th>Average Dry Weather Flow</th><th>Maximum Release on any Dry Weather Day</th><th>Maximum Release on any Day</th></tr><tr><td>RP1</td><td>0.3ML</td><td>0.48ML</td><td>1.5ML</td></tr></table>	Release Point	Average Dry Weather Flow	Maximum Release on any Dry Weather Day	Maximum Release on any Day	RP1	0.3ML	0.48ML	1.5ML
Release Point	Average Dry Weather Flow	Maximum Release on any Dry Weather Day	Maximum Release on any Day						
RP1	0.3ML	0.48ML	1.5ML						
WT3E5	Bypass flow events must only occur for flows in excess of the hydraulic capacity of the plant which is 10.5 L/s.								
WT3E6	The bypass release must flow directly to Canungra Creek.								
Agency interest: Land									
Condition number	Condition								
L3E1	The only contaminants to be released to land are treated effluent in accordance with Part 3(E) Table 1 and Part 3(E) Table 2 of condition Part 3(E) - WT3E1 and the associated requirements.								

Part 3(F): Esk STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Esk Sewage Treatment Plant Lot 1 RP156580.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: Water	
Condition number	Condition
WT3F1	Only treated effluent to be released to waters The only contaminant permitted to be released from Lot 1 RP156580 to waters is treated effluent that has passed through the sewage treatment process.
WT3F2	Release point to waters The only location from which a contaminant may be released to waters from the Lot 1 RP156580 is from release point W1 located at Sandy Creek at approximately 1.5 km AMTD.
WT3F3	Maximum quantity of treated effluent released to waters The total quantity of contaminants released from release point W1 from Lot 1 RP156580 during any dry weather day must not exceed 600 cubic metres and in any day must not exceed 1500 cubic metres.
WT3F4	Sampling and In-situ Monitoring Point Details Determinations of the quality of contaminants released to waters to check conformity with the release quality characteristics specified in Part 2(C) Agency interest: Water of this environmental authority must be undertaken at the sampling and in-situ measurement point described as at the outlet of the chlorine contact tank.

Part 3(H): Gatton STP

Environmentally relevant activity	Locations
ERA 63 - Sewage Treatment 1: Operating sewage treatment works, other than no-release works, with a total daily peak design capacity of (d) more than 4000 but not more than 10,000EP	Gatton Sewage Treatment Plant Treatment Plant Road GATTON QLD 4343 Lot 3 SP235464, Lot 4 SP235464, and Lot 4 RP96384.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: General	
Condition number	Condition
G3H1	Activities conducted under this environmental authority must not be conducted contrary to any of the following limitations: 1. Treated effluent must only be released to land inside the land application area identified in ATTACHMENT K Gatton Irrigation Area.

G3H2	All reasonable and practicable measures must be taken to prevent or minimise environmental harm caused by the activities .
G3H3	Any breach of a condition of this environmental authority must be reported to the administering authority as soon as practicable within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions taken.
G3H4	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
G3H5	You must record the following details for all environmental complaints received: 1. date and time complaint was received; and 2. name and contact details of the complainant; and 3. nature of the complaint; and 4. investigations undertaken; and 5. conclusions formed; and 6. actions taken.
G3H6	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority to investigate any alleged environmental harm arising from the activity .
G3H7	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and 4. ensure plant, equipment and measures are operated in a proper and effective manner; and 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and 6. ensure that reviews of environmental performance are undertaken at least annually.
Agency interest: Air	
Condition number	Condition
A3H1	Odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .

Agency interest: Water	
Condition number	Condition
WT3H1	Contaminants must not be released from the site to waters .
WT3H2	Treated sewage effluent may be removed from the site and used for an alternate purpose, with the written consent of any third party involved.
Agency interest: Noise	
Condition number	Condition
N3H1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .
Agency interest: Land	
Condition number	Condition
L3H1	Other than as permitted within this environmental authority, contaminants must not be released to land.
L3H2	The only contaminants allowed to be released to land are treated effluents to the designated irrigation areas at the site, depicted in ATTACHMENT K Gatton Irrigation Area .
L3H3	When weather conditions or soil conditions preclude the release of treated sewage effluent to land, effluent must not be irrigated to land.
L3H4	Treated wastewater released to land must be done in accordance with documentation that ensures: 1. drainage to groundwater and subsurface flows of contaminants to surface waters are prevented; and 2. the treated wastewater must be distributed evenly within the land application area; and 3. surface pondage and run-off of wastewater is prevented; and 4. degradation of soil structure is minimised; and 5. effluent disposal areas are maintained with an appropriate crop in a viable state for transpiration and nutrient uptake; and 6. sufficient buffer zones are maintained between irrigation sites and sensitive environmental receptors; and 7. biomass removed from plants growing on irrigated land must be transported and disposed of other than the irrigated land.

Agency interest: Waste	
Condition number	Condition
W3H1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

Part 3 (I) Goodna STP

Subsection (a) – ERA 62

Environmentally relevant activity	Locations
ERA 62 Resource recovery and transfer facility operation: 1 operating a facility for receiving and sorting, dismantling, baling or temporarily storing—(c) category 2 regulated waste	Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: Waste	
Condition number	Condition
W3I1	The activity must only accept sewage sludge and residues generated by the environmental authority holder for storage, consolidation and/or transfer.
W3I2	The activity must not store more than 13,735m ³ of sewage sludge and residues at any time.
W3I3	All waste received for the activity must be stored within concrete tanks.
Agency interest: Air	
Condition number	Condition
A3I1	When an odour complaint is received, the holder of this environmental authority must undertake an odour monitoring program. The program must include, but is not limited to: a) an evaluation of the performance of the odour mitigation and management measures of the plant operations, including: i. an inspection of potential odour sources; and ii. associated emission control systems; and iii. a review of monitoring data.
A3I2	If monitoring required under condition A3I1 indicates that environmental nuisance is caused by odour release from the activity , the environmental authority holder must take all reasonable and practicable measures to abate odour emissions.

Subsection (b) – ERA 63

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(f) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 50,000 but not more than 100,000EP	Goodna Sewage Treatment Plant Lower Cross Street, GOODNA QLD 4300 Lot 1 RP887551.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: Water	
Condition number	Condition
WT3I1	Effluent must only be released from release point W2 (Part 2(B) Table 1) when the hydraulic capacity of W1 is exceeded or when effluent cannot otherwise be discharged through W1 (Part 2(B) Table 1).

Part 3(J): Helidon STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Helidon Sewage Treatment Plant Back Flagstone Road, HELIDON QLD 4344 Lot 1 RP32742.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: General	
Condition number	Condition
A3J1	Contaminants must not be released to the environment other than in accordance with this environmental authority.
A3J2	The registered operator of this environmental authority must: (a) install and operate all works and control equipment, and take all measures, perform all acts and do all things, (b) necessary to ensure compliance with the conditions of this environmental authority.
A3J3	Display of Environmental Authority A copy of this environmental authority must be kept in a location readily accessible to personnel carrying out the activity.
A3J4	A copy of this environmental authority shall be provided, on request, to any authorised person.

A3J5	Trained Operators All persons engaged in the conduct of the activity, including but not limited to employees and contract staff, must be: (a) trained in the procedures and practices necessary to: (i) comply with the conditions of this environmental authority, and (ii) prevent environmental harm and or environmental nuisance during normal operation and emergencies; or (b) under the close supervision of such a trained person.
A3J6	Inspections by Authorised Persons . At all reasonable times, and to the satisfaction of an authorised person, the following must be provided to enable an authorised person to check compliance with the conditions of this environmental authority: (i) monitoring facilities, and (ii) access to such facilities, and (iii) any reasonable assistance which the authorised person deems necessary.
A3J7	Records Any record required to be kept by a condition of this environmental authority must be kept at the approved place and be available for examination by an authorised person. .
A3J8	Copies of any record required to be kept by a condition of this environmental authority must be . provided to any authorised person or the administering authority on request.
A3J9	Alterations No change, replacement or operation of any plant or equipment is permitted if the change, alteration or operation of the plant or equipment increases, or is likely to substantially increase, the risk of environmental harm or environmental nuisance.
A3J10	Calibration All instruments and measuring devices used for the measurement or monitoring of any parameter under any condition of this environmental authority must be calibrated, and appropriately operated and maintained. The calibration, operation and maintenance of such instruments and measurement devices in accordance with a protocol, which has been approved in writing by the administering authority, is deemed to demonstrate compliance with this condition.
A3J11	Site-Based Management Plan By twelve months after completion of process testing the registered operator of this environmental authority must submit an Environmental Management and Operating Procedure (EMOP) which is acceptable to the administering authority.
A3J12	The EMOP must contain detailed proposals for the management of environmental impacts resulting from the carrying out of the activities under this environmental authority including: (a) Operating procedures to prevent or minimise environmental harm and environmental nuisance, however occasioned or caused; and (b) Maintenance practices and procedures; and (c) Contingency plans to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including site rehabilitation); and (d) Emergency procedures; and (e) Communication of procedures, plans, incidents, potential environmental problems and results; and

	(f) Handling of environmental complaints; and (g) Keeping and production of environmental records and reports; and (h) Monitoring of the release of contaminants into the environment including procedures, methods, record keeping and notification of results; and (i) Assessment of the environmental impact of any releases of contaminants into the environment; and (j) Staff training and awareness of environmental issues related to the operation of the environmentally relevant activities.
A3J13	The EMOP must be implemented by the registered operator of this environmental authority following its approval in writing by the administering authority.
A3J14	The registered operator of this environmental authority must submit details of any amendment to the approved EMOP to the administering authority with the Annual Return which immediately follows the enactment of any such amendment.
Agency interest: Air	
Condition number	Condition
B3J1	Release of Contaminants to the Atmosphere Except as otherwise provided by the conditions of Part 3(J) Agency interest: Air of this environmental authority the environmentally relevant activity must be carried out by such practicable means necessary to prevent or minimise the release or likelihood of release of contaminants to the atmosphere.
B3J2	Noxious or Offensive Odour Notwithstanding any other condition of this environmental authority, no release of contaminants from the approved place is to cause a noxious or offensive odour beyond the boundaries of the approved place.
B3J3	Nuisance No release of contaminants, including but not limited to odour, dust, smoke, fume, particulate and aerosols is to cause or be likely to cause an environmental nuisance beyond the boundaries of the approved place.
Agency interest: Water	
Condition number	Condition
C3J1	Release of Contaminants to Waters Except as otherwise provided by the conditions of Part 3(J) Agency interest: Water of this environmental authority the environmentally relevant activity must be carried out by such practicable means necessary to prevent or minimise the release or likelihood of release of contaminants to waters.
C3J2	Contaminants must not be directly or indirectly released from the approved place to any waters or the bed and banks of any waters except as permitted under the water schedule or the stormwater management schedule.
C3J3	Contaminants must not be directly or indirectly released from any source on the approved place to any waters at any location other than at the locations listed below:

	Release Point W1	Sewage Treatment Plan outfall pipe located in waters described as “the adjacent 120 ML farm dam”.																											
	Emergency Overflow from Secondary Lagoon	See document No.13, in the table in ATTACHMENT E.																											
	Other Release Points	Sewage pump station overflows as provided for in this environmental authority.																											
C3J4	Description of Release The only contaminants permitted to be released from the approved place at the Release Point W1 are secondary treated sewage effluents.																												
C3J5	Sampling Point Details The determinations of the quality of contaminants released to check conformity with Part 3(J) condition number C3J7 shall be undertaken prior to the outfall.																												
C3J6	Quantity of Contaminants Released The total quantity of contaminants released from Release Point Number W1 must not exceed an annually calculated average of 161 kL/d. during dry weather days and in any day must not exceed 1 ,607 kL/d. .																												
C3J7	Quality Characteristics of Release to Waters The release of contaminants to waters must comply with each of the limits specified in Part 3(J) Table 1 for each quality characteristic. Part 3(J) TABLE 1 - RELEASE QUALITY CHARACTERISTIC LIMITS <table border="1"> <thead> <tr> <th>QUALITY CHARACTERISTICS</th><th>RELEASE LIMIT</th><th>LIMIT TYPE</th></tr> </thead> <tbody> <tr> <td>5-day Biochemical Oxygen Demand</td><td>20 mg/L</td><td>80th percentile</td></tr> <tr> <td>5-day Biochemical Oxygen Demand</td><td>60 mg/L</td><td>maximum</td></tr> <tr> <td>Suspended Solids</td><td>60 mg/L</td><td>80th percentile</td></tr> <tr> <td>Suspended Solids</td><td>180 mg/L</td><td>maximum</td></tr> <tr> <td>pH</td><td>Not less than 6.5 greater than 8.5</td><td>range</td></tr> <tr> <td>Dissolved Oxygen</td><td>2 mg/L</td><td>minimum</td></tr> <tr> <td>Faecal Coliforms, based on a minimum of five samples collected at not less than half-hourly intervals</td><td>1,000 organisms per 100 millilitres</td><td>median</td></tr> <tr> <td>Faecal Coliforms, based on a minimum of five samples collected at not less than half-hourly intervals, with four out of five samples containing less than the</td><td>4,000 organisms per 100 millilitres</td><td>maximum</td></tr> </tbody> </table>		QUALITY CHARACTERISTICS	RELEASE LIMIT	LIMIT TYPE	5-day Biochemical Oxygen Demand	20 mg/L	80 th percentile	5-day Biochemical Oxygen Demand	60 mg/L	maximum	Suspended Solids	60 mg/L	80 th percentile	Suspended Solids	180 mg/L	maximum	pH	Not less than 6.5 greater than 8.5	range	Dissolved Oxygen	2 mg/L	minimum	Faecal Coliforms, based on a minimum of five samples collected at not less than half-hourly intervals	1,000 organisms per 100 millilitres	median	Faecal Coliforms, based on a minimum of five samples collected at not less than half-hourly intervals, with four out of five samples containing less than the	4,000 organisms per 100 millilitres	maximum
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C3J8	Notwithstanding the quality characteristic limits specified in Part 3(J) Table- 1, the release of contaminants to waters must comply with the following qualitative characteristics: (a) The release must not have any properties nor contain any organisms or other contaminants which, in the opinion of the administering authority, are capable of causing environmental harm or an environmental nuisance. (b) The release must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other objectionable matter.														
C3J9	Pump Stations The only pump stations permitted to release contaminants to any waters are those listed below at the corresponding overflow locations: <table><tr><th>Pump Station Description</th><th>Location</th><th>Overflow Locations</th></tr><tr><td>1</td><td>Road Reserve, North of Lot 1 RP188516 and; South West of Lot 2 RP135503 Parish of Helidon, County of Cavendish</td><td>See Document No. 12, in the table in Attachment E</td></tr><tr><td>2</td><td>Lot 1 Plan H1268, Parish of Helidon, County of Cavendish</td><td>As above</td></tr><tr><td>3</td><td>Lot 19 Plan CA313, Reserve 640, Parish of Helidon, County of Cavendish</td><td>As above</td></tr></table>			Pump Station Description	Location	Overflow Locations	1	Road Reserve, North of Lot 1 RP188516 and; South West of Lot 2 RP135503 Parish of Helidon, County of Cavendish	See Document No. 12, in the table in Attachment E	2	Lot 1 Plan H1268, Parish of Helidon, County of Cavendish	As above	3	Lot 19 Plan CA313, Reserve 640, Parish of Helidon, County of Cavendish	As above
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C3J10	Pump stations whose failure will result in a direct or indirect release of contaminants to waters must be fitted with stand-by pumps and pump-failure alarms. Pump failure alarms must be able to operate without mains power if such power failure occurs.														
C3J11	An Emergency Response/Contingency Plan shall include, but not be limited to, the following for those pump stations which have or likely to have an overflow to waters associated with the approved place: (a) the response procedures to stop (whenever possible), control or reduce the overflow; and (b) methods used to ameliorate environmental impact of an overflow in both wet and dry conditions; and (c) a description of the resources used in response to an overflow event; and (d) the training of staff that will be called upon to respond to an overflow; and (e) the availability of documented response procedures to staff attending an overflow event; and (f) incident reporting to the administering authority; and (g) procedures to investigate the cause, and implement changes where necessary, to reduce the likelihood of a similar event recurring during dry and wet weather; and (h) catchment population serviced by the pump station to which the overflow is connected; and (i) the daily dry weather flow of the pump station; and (j) the need for screening to prevent the release of gross solids.														
C3J12	The Emergency Response/Contingency Plan referred to in Part 3(J) condition number C3J11 shall be furnished to the administering authority within twelve (12) months of the date of issue of this environmental authority and shall be to the satisfaction of the administering authority.														
C3J13	No release of contaminants from any pump station shall occur except as a result of power														

	failure, excessive rainfall, accidental damage or other emergency.
C3J14	An updated list of connected pump stations shall be forwarded to the administering authority at the annual renewal date of this environmental authority.
Agency interest: Stormwater Management	
Condition number	Condition
D3J1	Contaminant Releases Caused by Rainfall Except as otherwise provided by the conditions of the stormwater management schedule and the water schedule of this environmental authority, the environmentally relevant activities must be carried out by such practicable means necessary to prevent or minimise the contact of incident rainfall and stormwater runoff with wastes or other contaminants, and prevent or minimise the release or likelihood of release of any such contaminated runoff from the approved place.
D3J2	Stormwater Management Plan Part A - During Construction Within three months after acceptance of the tender for the construction of works at the approved place the registered operator of this environmental authority must prepare and submit a Stormwater Management Plan associated with the construction works which is acceptable to the administering authority. .
D3J3	The Stormwater Management Plan referred to in Part 3(J) condition number D3J2 must provide detail on the works to be implemented and the timetable proposed to address at least the following issues: (a) minimisation of the amount of soil to be exposed or disturbed by staging works, and (b) revegetation of exposed or disturbed areas, and (c) installation of sediment control measures such as settling basins, and (d) diversion of upstream runoff from exposed or disturbed areas.
D3J4	Part B - Upon Completion Upon completion of process testing for the Sewage Treatment Plant the registered operator of this environmental authority must prepare and submit a Stormwater Management Plan associated with the operation of the approved place which is acceptable to the administering authority.
D3J5	The Stormwater Management Plan referred to in Part 3(J) condition number D3J4 must provide detail on the works to be implemented and the timetable proposed to address at least the following issues: (a) prevention of incident stormwater and stormwater runoff from contacting wastes or contaminants, and (b) diversion of upstream runoff away from areas containing wastes or contaminants, and (c) minimisation of the size of contaminated areas, and (d) cleaning of contaminated areas without the use of water, and (e) installation of silt and rubbish traps, and (f) stormwater diversion systems, and (g) paving and roofing of contaminated areas.
D3J6	The Stormwater Management Plan must be implemented by the registered operator of this environmental authority following its approval in writing by the administering authority.

D3J7	The registered operator of this environmental authority must submit details of any amendment to the approved Stormwater Management Plan to the administering authority with the Annual Return which immediately follows the enactment of any such amendment.																				
D3J8	The maintenance and cleaning of vehicles and any other equipment or plant must be carried out in areas from where contaminants cannot be released into any waters, roadside gutter or stormwater drainage system.																				
D3J9	Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable. Such spillages must not be cleaned up by hosing, sweeping or otherwise releasing such wastes, contaminants or material to any stormwater drainage system, roadside gutter or waters.																				
Agency interest: Noise																					
Condition number	Condition																				
E3J1	Except as otherwise provided by the conditions of the noise schedule of this environmental authority the environmentally relevant activities and the associated ancillary facilities must be carried out by such practicable means necessary to prevent or minimise the emission or likelihood of emission of noise.																				
E3J2	The emission of noise from the approved place must not result in levels greater than those specified in Part 3(J) Table 1 of Agency interest: Noise. Part 3(J) Agency interest: Noise TABLE 1 <table border="1"> <thead> <tr> <th colspan="2">NOISE LIMITS AT A NOISE SENSITIVE PLACE</th></tr> </thead> <tbody> <tr> <td>Period</td><td>Noise Level at a Noise Sensitive Place Measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, adj, T}$</td></tr> <tr> <td>7 am - 6 pm</td><td>Background noise level plus 5 dB(A)</td></tr> <tr> <td>6 pm - 10 pm</td><td>Background noise level plus 5 dB(A)</td></tr> <tr> <td>10 pm - 7 am</td><td>Background noise level plus 3 dB(A)</td></tr> <tr> <th colspan="2">NOISE LIMITS AT A COMMERCIAL PLACE</th></tr> <tr> <td>Period</td><td>Noise Level at a Commercial Place Measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, adj, T}$</td></tr> <tr> <td>7 am - 6 pm</td><td>Background noise level plus 10 dB(A)</td></tr> <tr> <td>6 pm - 10 pm</td><td>Background noise level plus 10 dB(A)</td></tr> <tr> <td>10 pm - 7 am</td><td>Background noise level plus 8 dB(A)</td></tr> </tbody> </table>	NOISE LIMITS AT A NOISE SENSITIVE PLACE		Period	Noise Level at a Noise Sensitive Place Measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, adj, T}$	7 am - 6 pm	Background noise level plus 5 dB(A)	6 pm - 10 pm	Background noise level plus 5 dB(A)	10 pm - 7 am	Background noise level plus 3 dB(A)	NOISE LIMITS AT A COMMERCIAL PLACE		Period	Noise Level at a Commercial Place Measured as the Adjusted Maximum Sound Pressure Level $L_{Amax, adj, T}$	7 am - 6 pm	Background noise level plus 10 dB(A)	6 pm - 10 pm	Background noise level plus 10 dB(A)	10 pm - 7 am	Background noise level plus 8 dB(A)
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Agency interest: Waste Management																					
Condition number	Condition																				
F3J1	Waste must not be released to the environment, stored, transferred or disposed of contrary to any condition of this environmental authority.																				
F3J2	Waste shall not be burnt, apart from off-gases from anaerobic digestors, or allowed to burn on																				

	the approved place or removed and burnt elsewhere unless specifically permitted by a environmental authority
F3J3	Records of trade waste agreements must be made available for inspection on request.
F3J4	Waste Management Plan (WMP) Upon completion of process testing the registered operator of this environmental authority must prepare and submit a Waste Management Plan which is acceptable to the administering authority.
F3J5	The Waste Management Plan must be implemented by the registered operator of this environmental authority following its approval in writing.
F3J6	The registered operator of this environmental authority must submit details of any amendment to the approved Waste Management Plan to the administering authority with the Annual Return which immediately follows the enactment of any such amendment.
F3J7	Off Site Movement Regulated waste must not be sent for disposal at any facility without the written approval of the person operating that facility.
F3J8	Records Records must be maintained for a period of five (5) years for all wastes mentioned in this schedule
F3J9	Notification of Improper Disposal of Regulated Waste If the registered operator of this environmental authority becomes aware that a person has removed waste from the approved place and disposed of the waste in a manner which is not authorised by this environmental authority or improper or unlawful, then the registered operator of this environmental authority must, as soon as practicable, notify the administering authority of all relevant facts, matters and circumstances known concerning the disposal.
F3J10	All regulated waste generated by the storage, treatment or reprocessing operations must only be treated or reprocessed at a facility approved by the administering authority to accept such waste.
F3J11	Regulated waste must not be received from any person who requires a environmental authority but is not approved to transport such waste under the provisions of the <i>Environmental Protection (Interim) Regulation 1995</i> .
F3J12	Record keeping: The registered operator of this environmental authority must keep and maintain permanent records for every load of waste transported off the premises, and must include the following information: (a) date of transport; and (b) description of waste; and (c) cross reference to relevant waste transport documentation; and (d) quantity of waste; and (e) destination of the waste; and (f) results of analysis (where applicable); and (g) method of waste treatment, reprocessing or disposal to be used (where applicable).
F3J13	Records made in accordance with Part 3(J) condition number F3J12 must be kept for a period of

	five (5) years and must be made available to any authorised person of an administering authority on request.
F3J14	Loading and unloading areas: All loading/unloading of regulated wastes must only take place in bunded areas or in specified areas.
F3J15	The registered operator of this environmental authority must ensure that a facility or equipment is available for the containment and recovery of any spillages at the loading point.
Agency interest: Self-Monitoring and Reporting	
Condition number	Condition
G3J1	All complaints received by the registered operator of this environmental authority relating to operations at the approved place must be recorded in a log book with the following details: (a) time and date of complaint; and (b) type of communication (telephone, letter, personal etc.); and (c) name, contact address and contact telephone number of complainant (Note: if the complainant does not wish to be identified then "Not identified" is to be recorded); and (d) response and investigation undertaken as a result of the complaint; and (e) name of person responsible for investigating complaint; and (f) action taken as a result of the complaint investigation and signature of responsible person.
G3J2	The complaints record required by Part 3(J) condition number G3J1 must be maintained for a period of not less than five (5) years.
G3J3	Incident Recording A record must be maintained of events including but not limited to: (a) the time, date and duration of equipment malfunctions; and (b) any shut-downs of pollution control equipment associated with the pump stations and the sewage treatment plant; and (c) the hours of operation of the pump stations and plant.
G3J4	The record required by Part 3(J) condition number G3J3 must be maintained for a period of not less than five (5) years.
G3J5	Details concerning any bypass of plant effluent shall be monitored and recorded in terms of event date, duration, cause of bypass, and actions taken in reporting and averting the bypass.
G3J6	Notification of Emergencies and Incidents As soon as practicable after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this environmental authority, the registered operator of this environmental authority must notify the administering authority of the release by telephone or facsimile.
G3J7	The notification of emergencies or incidents as required by Part 3(J) condition number G6 must include but not be limited to the following: (a) the registered operator of the environmental authority; and (b) the location of the emergency or incident; and (c) the number of the environmental authority; and

	(d) the name and telephone number of the designated contact person; the time of the release; and (e) the time the registered operator of the environmental authority became aware of the release; and (f) the suspected cause of the release; and (g) the environmental harm and or environmental nuisance caused, threatened, or suspected to be caused by the release; and (h) actions taken to prevent further any release and mitigate any environmental harm and or environmental nuisance caused by the release.												
G3J8	Monitoring of Contaminant Releases to Waters Not more than fourteen (14) days following the initial notification of an emergency or incident, the registered operator of the environmental authority must provide written advice of the information supplied in accordance with Part 3(J) condition number G3J7 in addition to: (a) proposed actions to prevent a recurrence of the emergency or incident; (b) outcomes of actions taken at the time to prevent or minimise environmental harm and or environmental nuisance; and (c) the results of any environmental monitoring performed.												
G3J9	The registered operator of this environmental authority is responsible for the making of determinations of the quality of the contaminants released for the release points, quality characteristics, and at the frequency specified in Part 3(J) Agency interest: Self-Monitoring and Reporting Table 1: Part 3(J) Agency interest: Self-Monitoring and Reporting - Table 1 <table border="1"> <thead> <tr> <th>Quality Characteristic</th><th>Frequency</th></tr> </thead> <tbody> <tr> <td>5-day Biochemical Oxygen Demand in mg/L</td><td>Monthly</td></tr> <tr> <td>Suspended Solids in mg/L</td><td>Monthly</td></tr> <tr> <td>pH</td><td>Monthly</td></tr> <tr> <td>Dissolved Oxygen mg/L</td><td>Monthly</td></tr> <tr> <td>Faecal Coliform in organisms/100mL</td><td>Monthly</td></tr> </tbody> </table>	Quality Characteristic	Frequency	5-day Biochemical Oxygen Demand in mg/L	Monthly	Suspended Solids in mg/L	Monthly	pH	Monthly	Dissolved Oxygen mg/L	Monthly	Faecal Coliform in organisms/100mL	Monthly
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G3J10	All determinations of the quality of contaminants released to waters must be made in accordance with methods prescribed in the <i>Department of Environment and Heritage Water Quality Sampling Manual, 2nd Edition, February 1995</i>, or more recent additions or supplements to that document as such become available.												
G3J11	All determinations of the quality of contaminants released must be performed by a person or body acceptable to the administering authority.												
G3J12	Records must be kept of the results of all determinations of the quality of contaminants released to waters for a period of at least five (5) years.												
G3J13	Monitoring of Volume of Release The daily quantity of contaminants released must be determined by a method acceptable to the administering authority.												
G3J14	Records must be kept of the results of all determinations of the daily quantity of contaminants released to waters for a period of at least five (5) years.												
G3J15	All instruments measuring and recording sewage waste flows must be accessible and capable												

	of being read without opening the instrument cabinet.
G3J16	The recordings of sewage waste flow must be marked to show the true calendar date and time of day.
G3J17	Noise Monitoring Monitoring must be undertaken to investigate any complaint of noise nuisance upon receipt of a request from the administering authority to carry out such monitoring.
G3J18	The method of measurement and reporting of noise levels must comply with the <i>Department of Environment and Heritage Noise Measurement Manual, second edition, March 1995</i> , or more recent additions or supplements to that document as become available.
G3J19	The method of measurement and reporting of noise levels must be undertaken by a person or body acceptable to the administering authority.
G3J20	Records must be kept of the results of all monitoring of noise levels and other information required to be recorded in conjunction with such monitoring for a period of at least five (5) years.
G3J21	Exception Reporting The registered operator of this environmental authority must notify the administering authority in writing of any monitoring result which indicates an exceedance of any environmental authority limit within twenty-eight (28) days of completion of analysis.
G3J22	The written notification required by Part 3(J) condition number G3J21 above must include: (a) The full analysis results; and (b) Details of investigation and corrective actions taken; and (c) Any subsequent analysis.
G3J23	Monitoring Reporting Any data compiled, collected or recorded in compliance with Part 3(J) condition numbers G3J9 and G3J13 shall be supplied to the administering authority on a six (6) monthly basis. These reports shall cover the following periods during the year: (a) 1 January to 30 June; and (b) 1 July to 31 December. Each six (6) monthly Monitoring Report shall be presented as per Part 3(J) condition numbers G3J24, G3J25 and G3J26 and two (2) printed copies shall be delivered to the administering authority within four (4) weeks of the close of each six (6) monthly period.
G3J24	Discharge quantity pertaining to the six-monthly period, compiled, collected or recorded in accordance with Part 3(J) condition number G3J13 (Discharge Quantity) shall be presented, including appropriate precipitation data from the sewer catchment: 1) in a tabular format, showing date of recording and raw data. The table shall be referred to as Table 1; and 2) Graphically showing raw data vs time
G3J25	Discharge quality pertaining to the six monthly period, compiled, collected or recorded in accordance with Part 3(J) condition numbers C3J7 and G3J9 (Discharge Quality) shall be presented: 1) in a tabular format, showing the date and day of fortnightly sampling; raw data; and calculated values for median faecal coliform levels. This table shall be referred to as Table 2; 2) Graphically showing data referred to in Part 3(J) condition number G3J25, vs time

	in a tabular format, showing calculated 80th percentile values for biochemical oxygen demand and the number of exceedances for levels of biochemical oxygen demand specified in Part 3(J) condition number C3J7, using data collected for the respective period. Also required are the maximum and minimum results based upon data contained in Tables 1, and 2, including limits as specified in Part 3(J) condition number C3J7. This table shall be referred to as Table 3.
G3J26	Data pertaining to the six (6) monthly period, compiled, collected or recorded in accordance with Part 3(J) condition number G5 (bypass of plant effluent) for the six (6) monthly period, shall be presented in a tabular format showing: (a) date of commencement of bypass; and (b) duration of bypass (hours); cause of bypass; and (c) total bypass duration for the period (hours); and (d) actions taken in reporting and averting the bypass. This table shall be referred to as Table 4.

Part 3(K): Kilcoy STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Kilcoy Sewage Treatment Plant William Street, KILCOY QLD 4515. Lot 3 RP118370.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site specific conditions of approval

Agency interest: Water	
Condition number	Condition
K3K1	Only treated effluent to be released to waters The only contaminants permitted to be released to waters from Lot 3 RP118370 are: (a) treated effluent that has passed through the sewage treatment process; and (b) sewage that has bypassed the sewage treatment process during period where hydraulic flow exceeds three times average dry weather flow (ADWF) if the sewage has been treated by fine screening prior to release.
K3K2	Release points to waters The only location from which a contaminant may be released to waters from Lot 3 RP118370 is through release point W1 to waters described as Sheep Station Creek located at approximately 13 km AMTD.
K3K3	Maximum Quantity of Contaminants Released The total quantity of contaminants released from release point W1 from Lot 3 RP118370 during any dry weather day must not exceed 600 cubic metres.
K3K4	Bypass Events

	The holder of this environmental authority must take all reasonable and practicable measures to minimise the occurrence of by-pass events.
K3K5	Sampling and In-situ Monitoring Point for Releases to Water Determinations of the quality of contaminants released to water to check conformity with the release quality characteristics specified in Part 2(C) Agency interest: Water of this environmental authority must be undertaken at the sampling and in-situ measurement point described as the outlet prior to discharge into Sheep Station Creek.
K3K6	Sampling and In-situ Monitoring Points Details for Releases to Land Determinations of the quality of contaminants released to land to check conformity with the release quality characteristics specified in condition Part 2(C) C3 of this environmental authority must be undertaken at the sampling an in-situ monitoring point described as from the effluent detention channel, prior to irrigation.
K3K7	Notwithstanding any other conditions of this environmental authority, the holder of this environmental authority must undertake all reasonable measures to ensure that as large a proportion as is practicable of the treated sewage effluent is reused for worthwhile purposes instead of being released to waters, for example, for irrigation purposes.

Part 3(L): Kooralbyn STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Kooralbyn Sewage Treatment Plant 8-22 Etruscan Road, KOORALBYN QLD 4285. Lot 371 SP238312 and Lot 173 SP238312.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: Water	
Condition number	Condition
WT3L1	All ponds used for the storage or treatment of contaminants, sewage or wastes at or on the authorised place must be constructed, installed and maintained: (a) so as to minimise the likelihood of any release of effluent through the bed and banks of the pond to waters (including groundwater); and (b) so that a freeboard of not less than 0.5 metres is maintained at all times except in emergencies; and (c) so as to ensure the stability of the ponds construction.
WT3L2	The holder of this environmental authority must implement an effective and appropriate plan for the management of Blue-Green Algae in the effluent treatment and storage lagoon, which details how the holder of this environmental authority will manage the actual and potential environmental impacts resulting from any occurrence of blue-green algae outbreaks.

Agency interest: Water	

Part 3 (N): Oxley Creek STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(g) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100,000EP	Oxley Sewage Treatment Plant (EP Limit – 975,000) 240 Donaldson Rd, ROCKLEA QLD 4106 Lot 818 Plan SL5746, Lot 957 Plan SL7763, Lot 1207 Plan M3117, Lot 1 Plan RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (1)(a) thermally reprocessing or treating, in a year, the following quantity of general waste — 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (2)(a) thermally reprocessing or treating, in a year, the following quantity of category 2 regulated waste— 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.
ERA 61 Thermal waste reprocessing and treatment (3)(a) thermally reprocessing or treating, in a year, the following quantity of category 1 regulated waste— (a) 5,000t or less	Oxley Sewage Treatment Plant 240 Donaldson Rd, ROCKLEA QLD 4106. Lot 818 SL5746, Lot 957 SL7763, Lot 1207 M3117, Lot 1 RP99640, Lot 83 SP220962, Lot 82 SP220962, Lot 2 on Plan RP37416, Lot 2 RP99640, Lot 100 SP1622583.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: Water	
Condition number	Condition
WT3N1	Effluent must only be released from release point W2 (Part 2(B) Table 1) when the hydraulic capacity of W1 is exceeded or when effluent cannot otherwise be discharged through W1 (Part 2(B) Table 1).

Agency interest: General	
Condition number	Condition
G3N1	The Demonstration Pyrolysis Plant (DPP) trial must be conducted in accordance with the following limitations: a) The trial can run for a maximum period of 24 months from the commencement date of the trial; b) Within 10 business days of the commencement of the trial, the holder of this environmental authority must notify the administering authority in writing that the trial has commenced; and c) A post-trial report must be submitted to the administering authority within 60 days of completion of the trial.
G3N2	Operation of the activity must cease if: a) the retort temperature drops below 400°C; or b) the afterburner temperature drops below 1100 °C; or c) the afterburner residence time is less than 2 seconds.
G3N3	A DPP post-trial report required by condition G3N1 must include at least the following: a) A description of the trial process, including gasifier unit operating conditions during the trial; b) A description of the type and total quantity of wastes processed during the trial; c) A description of waste feed rate; d) A description of test methods and the Quality Assurance and Quality Control procedures adopted during the monitoring program required by condition A3N4; e) A summary of all results collected during the trial as part of the air emissions monitoring program required by condition A3N4. Contaminant concentrations must be presented at standard temperature and pressure and each contaminant result must include the relevant mass emission rate, exit velocity, volume flow rate and temperature at exit; f) An interpretation of the results collected under condition A3N4 including a comparison with relevant trigger limits described in condition A3N4; and g) An assessment of the results of collected under condition A3N4 against the air emission limits described in the European Union's Directive (2010/75/EC) on industrial emissions.
G3N4	The post-trial report required by condition G3N1 must be completed by an appropriately qualified person .
Agency interest: Waste	
Condition number	Condition

W3N1	The activity must only accept the following wastes: a) tyres; b) green waste; c) municipal solid waste; d) sewage wastes; e) plastic polymer waste; and f) food and organic waste .																				
W3N2	No more than 20m³ of waste is permitted be held on site in relation to the DPP trial activity at any time.																				
W3N3	All waste must be stored within a secondary containment system .																				
W3N4	Incompatible wastes must not be mixed in the same container or waste storage area.																				
Agency interest: Air																					
Condition number	Condition																				
A3N1	RP1 and RP2 must be monitored independently (using isokinetic sampling) as required by condition A3N4 (Table 1).																				
A3N2	Monitoring of the following must be undertaken at RP1 and RP2 as required by condition A3N4 (Table 1), when the DPP is operating: a) afterburner temperature and residence time; b) gasifier temperature; and c) stack flue gas concentration of oxygen, NO ₂ , SO ₂ and CO.																				
A3N3	Monitoring must be conducted in accordance with the notes and associated requirements prescribed incondition A3N4.																				
A3N4	Contaminants must only be released to air from the point sources listed in <i>Table 1 – Point source air trigger limits</i> and in accordance with the notes and associated requirements. Table 1 – Point source air trigger limits <table><tr><th>Release point</th><th>Minimum release height above ground (metres)</th><th>Minimum velocity (m/sec)</th><th>Contaminant released</th><th>Trigger limit (see Note 1)</th><th>Monitoring frequency</th></tr><tr><td rowspan="2">Release point (RP) 1 - Stack serving LPG combustion gasses generated from operating of the pyrolysis plant.</td><td rowspan="2">8</td><td rowspan="2">15</td><td>Carbon Monoxide (CO)</td><td>150 mg/ Nm³ at 3% O₂</td><td rowspan="2">Annually</td></tr><tr><td>Oxides of Nitrogen (as NO₂)</td><td>350 mg/ Nm³ at 3% O₂</td></tr><tr><td>Release point (RP) 2 - Stack</td><td>8</td><td>15</td><td>Total Solid Particles</td><td>30 mg/ Nm³</td><td>Continuous monitoring of</td></tr></table>	Release point	Minimum release height above ground (metres)	Minimum velocity (m/sec)	Contaminant released	Trigger limit (see Note 1)	Monitoring frequency	Release point (RP) 1 - Stack serving LPG combustion gasses generated from operating of the pyrolysis plant.	8	15	Carbon Monoxide (CO)	150 mg/ Nm³ at 3% O ₂	Annually	Oxides of Nitrogen (as NO ₂)	350 mg/ Nm³ at 3% O ₂	Release point (RP) 2 - Stack	8	15	Total Solid Particles	30 mg/ Nm³	Continuous monitoring of
Release point	Minimum release height above ground (metres)	Minimum velocity (m/sec)	Contaminant released	Trigger limit (see Note 1)	Monitoring frequency																
Release point (RP) 1 - Stack serving LPG combustion gasses generated from operating of the pyrolysis plant.	8	15	Carbon Monoxide (CO)	150 mg/ Nm³ at 3% O ₂	Annually																
			Oxides of Nitrogen (as NO ₂)	350 mg/ Nm³ at 3% O ₂																	
Release point (RP) 2 - Stack	8	15	Total Solid Particles	30 mg/ Nm³	Continuous monitoring of																

	serving treated process gasses generated from pyrolysis in the retort.			Carbon Monoxide	100 mg/ Nm ³	NO ₂ , SO ₂ and CO during every feedstock trial . One continuous air sample per feedstock trial (see Note 1).
				Oxides of Nitrogen (as NO ₂)	400 mg/ Nm ³	
				Sulphur Dioxide (SO ₂)	200 mg/ Nm ³	
				Hydrogen Chloride (HCl)	60 mg/ Nm ³	
				Hydrogen Fluoride (HF)	4 mg/ Nm ³	
				Total Volatile Organic Compounds (as n-propane equivalent)	20 mg/ Nm ³	
				Cadmium and its compounds (as Cd)	0.05 mg/ Nm ³	
				Mercury and its compounds (as Hg)	0.05 mg/ Nm ³	
				Total Heavy Metals	0.5 mg/Nm ³ (sampling period of 2 hours)	
				Dioxins and furans (I-TEQ for PCDDs and PCDFs, including half LOD)	0.1 mg/Nm ³ (sampling period of 4 hours)	
				Polycyclic Aromatic Hydrocarbons (PAH) (see Note 2)	No limit nominated	
				PFAS extended suite containing 28 compounds (see Note 3)	No limit nominated (sampling period 3 - 4 hours)	

Note 1: All concentrations limits for the stack serving the treated process gases (100% compliance) refer to an 11% O₂ reference level, and must be averaged over the sample period of at least 30 minutes except for dioxins and furans, heavy metals, and PFAS, that refer to a specific sampling period.

Note 2: The Polycyclic Aromatic Hydrocarbons (PAH) limit refers to the total of the 16 priority pollutants listed by the United States EPA, namely, Naphthalene, Acenaphthylene,

	Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(α)anthracene, Chrysene, Benzo(β)fluoranthene, Benzo(k)fluoranthene, Benzo(α)pyrene, Indeno[123cd]pyrene, Dibenz[ah]anthracene and Benzo[ghi]perylene, expressed as Benzo(α)pyrene equivalents, using the potency equivalence factors specified by the World Health Organisation. Note 3: PFAS must be quantified by applying the Total Oxidisable Precursor Analysis (TOPA), to provide analysis of PFAS extended suite of 28 compounds. In order to determine PFAS concentrations, you must analyse the PFAS extended suite containing 28 compounds from at least the following sources: a) Sewage sludge used in the trial, and b) Stack emissions during the selected trial where PFAS emissions are expected to be maximum. Associated requirements 1) The release of contaminants from a point source must be directed vertically upwards without any impedance or hindrance; 2) Monitoring must be undertaken during a release and at the authorised release points, frequency and for the contaminants specified in the above table; 3) Monitoring must be undertaken when emissions are expected to be representative of actual operating conditions for the sample period; 4) All monitoring devices must be effectively calibrated and maintained in accordance with the manufacturer's instructions and Australian and international standards; 5) Air Monitoring must be in accordance with the current edition of the administering authority's Air Quality Sampling Manual and must also comply with the Australian Standard AS 4323.1 - 1995 "Stationary source emissions Method 1: Selection of sampling positions". If monitoring requirements are not described in the department's Air Quality Sampling Manual, monitoring protocols must be in accordance with a method as approved by New South Wales EPA, Victorian EPA or United States EPA; 6) All air emission stack monitoring must be conducted by an experienced person or body which holds current National Association of Testing Authorities (NATA); and 7) During every sampling period the following additional information must be gathered: i) gas velocity and volume flow rate; ii) temperature and oxygen content; iii) water vapour concentration; and iv) DPP throughput rate at the time of sampling.
A3N5	If the trigger limits identified in the monitoring program required by condition A3N4 are exceeded the operator of the activity must: a) notify the administering authority of the exceedance within 24 hours of becoming aware of the exceedance; and b) within 24 hours of becoming aware of the exceedance, or within another timeframe as agreed to in writing by the administering authority, implement actions to: i. mitigate or manage any environmental harm caused, or likely to be caused, by the exceedance; and

	ii. reduce the concentration of the quality characteristic subject to the exceedance to a concentration in emissions that is at or below the trigger limit.
A3N6	Only liquified petroleum gas (LPG) is permitted to be used as a fuel for to operate the Demonstration Pyrolysis Plant (DPP) .

Part 3(O): Rosewood STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(c) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 1,500 but not more than 4,000EP	Rosewood Sewage Treatment Plant 55-69 Rosewood-Warrill View Road ROSEWOOD QLD 4340. Lot 1 RP129830.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: General	
Condition number	Condition
G3O1	Activities conducted under this environmental authority must not be conducted contrary to any of the following limitations: (a) Inflows must not exceed the peak design capacity of three times the Design Average Dry Weather Flow (DADWF) of 800kL on any dry weather day; and (b) Inflows up to and including three times the DADWF must receive the standard treatment processes of the plant; and (c) Inflows greater than three times DADWF may bypass the standard treatment processes of the plant.
G3O2	All reasonable and practicable measures must be taken to prevent the likelihood of environmental harm being caused.
G3O3	Any breach of a condition of this environmental authority, with the exception of breaches described in Part 3(O) condition G3O4 must be reported to the administering authority as soon as practicable, or at most, within 24 hours of becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
G3O4	The holder of this environmental authority must notify the administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.
G3O5	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
G3O6	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this

	environmental authority.
G3O7	A receiving environment monitoring program (REMP) must be designed and implemented by appropriately qualified persons to monitor the effects of the activity on the aquatic values on waters .
G3O8	The receiving environment monitoring program required by Part 3(O) condition G3O7, must include at least the following: (a) description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and (b) description of applicable environmental values and water quality objectives to be achieved; and (c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the receiving environment monitoring program is proposed; and (d) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the monitoring program¹. Alternatively, receiving environment monitoring program compliance may be achieved by the holder of this environmental authority becoming and remaining a "contributing member" in regional studies of water quality and ecosystem health which are endorsed by the administering authority. ¹The monitoring program should be developed using the Department's Receiving Environment Monitoring Program Guideline (EM1260) 2014 or later version.
G3O9	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for <i>in situ</i> monitoring of pH, dissolved oxygen and chlorine.
G3O10	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.
G3O11	You must record the following details for all environmental complaints received: (a) date and time complaint was received; and (b) name and contact details of the complainant; and (c) nature of the complaint; and (d) investigations undertaken; and (e) conclusions formed; and (f) actions taken.
G3O12	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority to investigate a complaint not considered by the administering authority to be frivolous or vexatious, of environmental nuisance arising from the activity . The monitoring results must be provided to the administering authority upon request.
G3O13	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and

	4. ensure plant, equipment and measures are operated in a proper and effective manner; and 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and 6. ensure that reviews of environmental performance are undertaken at least annually																																																	
G3O14	Chemicals and fuels in containers of greater than 15 litres must be stored within a secondary containment system .																																																	
G3O15	Other than as permitted by this environmental authority, the release of a contaminant into the environment must not occur.																																																	
Agency interest: Air																																																		
Condition number	Condition																																																	
A3O1	Odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .																																																	
Agency interest: Water																																																		
Condition number	Condition																																																	
WT3O1	The only contaminants to be released to surface waters, excluding bypass releases covered by water Part 3(O) conditions WT3O4 and WT3O5 are: Treated effluent from the Rosewood Sewage Treatment Plant to waters described as Western Creek at W2 in the approved plans in ATTACHMENT G: Aerial Photo of Rosewood STP and Release Point W1 Outfall to Brisbane River at approximately 1.5 AMTD. These releases are to be in accordance with <i>Part 3(O) Table 1 — Surface water release limits</i>, and the associated requirements. Part 3 (O) Table 1 - Surface water release limits <table><tr><th>Quality Indicator (units)</th><th>Monitoring frequency</th><th>Minimum</th><th>Maximum</th><th>Long term 80th percentile⁵</th><th>Short term 80th percentile⁵</th><th>Monitoring Location</th></tr><tr><td>BOD5 (mg/L)</td><td>Monthly</td><td>-</td><td>40</td><td>20</td><td>30</td><td>6</td></tr><tr><td>pH (pH unit)</td><td>Monthly</td><td>6.5</td><td>8.5</td><td>-</td><td>-</td><td>6</td></tr><tr><td>Dissolved Oxygen (mg/L)</td><td>Monthly</td><td>2</td><td>-</td><td>-</td><td>-</td><td>7</td></tr><tr><td>Escherichia coli (cfu/100mL)</td><td>Monthly</td><td>-</td><td>1,000</td><td>-</td><td>-</td><td>6</td></tr><tr><td>Suspended solids (mg/L)</td><td>Monthly</td><td>-</td><td>60</td><td>30</td><td>40</td><td>6</td></tr><tr><td>Free</td><td>Monthly</td><td>-</td><td>0.7</td><td>-</td><td>-</td><td>6</td></tr></table>	Quality Indicator (units)	Monitoring frequency	Minimum	Maximum	Long term 80th percentile ⁵	Short term 80th percentile ⁵	Monitoring Location	BOD5 (mg/L)	Monthly	-	40	20	30	6	pH (pH unit)	Monthly	6.5	8.5	-	-	6	Dissolved Oxygen (mg/L)	Monthly	2	-	-	-	7	Escherichia coli (cfu/100mL)	Monthly	-	1,000	-	-	6	Suspended solids (mg/L)	Monthly	-	60	30	40	6	Free	Monthly	-	0.7	-	-	6
Quality Indicator (units)	Monitoring frequency	Minimum	Maximum	Long term 80th percentile ⁵	Short term 80th percentile ⁵	Monitoring Location																																												
BOD5 (mg/L)	Monthly	-	40	20	30	6																																												
pH (pH unit)	Monthly	6.5	8.5	-	-	6																																												
Dissolved Oxygen (mg/L)	Monthly	2	-	-	-	7																																												
Escherichia coli (cfu/100mL)	Monthly	-	1,000	-	-	6																																												
Suspended solids (mg/L)	Monthly	-	60	30	40	6																																												
Free	Monthly	-	0.7	-	-	6																																												

	Chlorine Residual (mg/L)						
	Total Nitrogen (mg/L)	Annual Mass Load (dry weather (kg))	-	-	-	-	6
	Total Phosphorus (mg/L)	Annual Mass Load (dry weather (kg))	-	-	-	-	6
Associated monitoring requirements - COD may be monitored as an alternative to BOD5 once a reliable correlation has been determined through analysis of a minimum number of 24 wastewater samples over a minimum period of 12 months and with the agreement of the administering authority. - Indicators for TN and TP may be done as 24 hour composite samples. - Annual Mass Load/Volume must be calculated on a rolling weekly basis. - Limits for free chlorine residual and total chlorine concentrations are set considering potential toxicity to the receiving waters. - Sampling must be in accordance with the Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained. - Rosewood STP Monitoring location is at the outlet from the chlorine detention tanks. - Rosewood STP Monitoring location for dissolved oxygen is at the outlet from the energy dissipation flume. <u>Advice</u> Enterococci counts are the recommended pathogen indicator for assessing potential risks to recreational water. Limits should be set based on the level of recreational use of receiving waters - either primary or secondary recreation. E.coli counts may be more relevant for small plants where recreational use in receiving waters is unlikely							
WT3O2	Monitoring of contaminant releases to waters excluding bypass releases covered by Part 3(O) conditions WT3O4, WT3O5 and WT3O6 must be undertaken in accordance with <i>Part 3(O) Table 1 —Surface water release limits</i> and the associated monitoring requirements, and records of the results must be kept.						
WT3O3	In addition to Part 3(O) condition WT3O1, the release to waters must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visually objectionable matter.						
WT3O4	Bypass releases must be screened prior to being released.						
WT3O5	The administering authority must be notified within 24 hours of any bypass release ceasing.						
WT3O6	The following details must be recorded in relation to each bypass release: - the start time, date and duration of the release; and - the estimated volume of the bypass release; and - the level of treatment at the sewage treatment plant prior to discharge; and - the cause of the release; and - any monitoring of the water quality released.						
WT3O7	Contaminants must not be released to groundwater or at a location where they are likely to release to groundwater .						

Agency interest: Noise																																																														
Condition number	Condition																																																													
N3O1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .																																																													
Agency interest: Land																																																														
Condition number	Condition																																																													
L3O1	The only contaminants allowed to be release to land are treated effluent from the Rosewood Sewage Treatment Plant within the defined Landscaped Irrigation Area in the Approved Plans in Attachment H Figure 2 and in accordance with <i>Part 3(O) Table 2 - Treated effluent release limits to irrigation area</i>. Part 3(O) Table 2 - Treated effluent release limits to irrigation area. <table><tr><th>Quality Indicator (units)</th><th>Monitoring frequency</th><th>Minimum</th><th>Maximum</th><th>Long term 80th percentile⁵</th><th>Short term 80th percentile⁵</th><th>Monitoring Location</th></tr><tr><td>BOD5 (mg/L)</td><td>Monthly</td><td>-</td><td>40</td><td>20</td><td>30</td><td>6</td></tr><tr><td>pH (pH unit)</td><td>Monthly</td><td>6.5</td><td>8.5</td><td>-</td><td>-</td><td>6</td></tr><tr><td>Dissolved Oxygen (mg/L)</td><td>Monthly</td><td>2</td><td>-</td><td>-</td><td>-</td><td>7</td></tr><tr><td>Escherichia coli (cfu/100mL)</td><td>Monthly</td><td>-</td><td>1,000</td><td>-</td><td>-</td><td>6</td></tr><tr><td>Suspended solids (mg/L)</td><td>Monthly</td><td>-</td><td>60</td><td>30</td><td>40</td><td>6</td></tr><tr><td>Total Nitrogen⁴</td><td>Monthly</td><td>-</td><td>-</td><td>-</td><td>-</td><td>6</td></tr><tr><td>Total Phosphorus⁴</td><td>Monthly</td><td>-</td><td>-</td><td>-</td><td>-</td><td>6</td></tr></table> Associated requirements - Monitoring must be in accordance with the administering authority's Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained. - Monitoring must be undertaken when treated sewage effluent is being irrigated, unless irrigation has ceased for longer than the relevant parameters specified minimum frequency (e.g. if TSS was only required to be monitored once a week, then a TSS sample would not be required after the first week following cessation of the release). - BOD and Total Suspended Solids are about determining that the plant is achieving design outputs. - Indicators for TN and TP are recommended to be done as grab samples. - Enterococci counts are the recommended pathogen indicator for assessing potential risks to recreational water, E. coli counts may be more relevant for land irrigation where recreation is unlikely. - Rosewood STP Monitoring location is at the outlet from the chlorine detention tank.						Quality Indicator (units)	Monitoring frequency	Minimum	Maximum	Long term 80th percentile ⁵	Short term 80th percentile ⁵	Monitoring Location	BOD5 (mg/L)	Monthly	-	40	20	30	6	pH (pH unit)	Monthly	6.5	8.5	-	-	6	Dissolved Oxygen (mg/L)	Monthly	2	-	-	-	7	Escherichia coli (cfu/100mL)	Monthly	-	1,000	-	-	6	Suspended solids (mg/L)	Monthly	-	60	30	40	6	Total Nitrogen ⁴	Monthly	-	-	-	-	6	Total Phosphorus ⁴	Monthly	-	-	-	-	6
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Total Phosphorus ⁴	Monthly	-	-	-	-	6																																																								

	7. Rosewood STP Monitoring location for dissolved oxygen is at the outlet of the energy dissipation flume.
L3O2	Treated effluent released to land must be done in accordance with documentation that ensures: (a) drainage to groundwater and subsurface flows of contaminants to surface waters are prevented; and (b) surface pondage and run-off of effluent is prevented; and (c) degradation of soil structure is minimised; and (d) soil sodicity and the build-up of nutrients and heavy metals in the soil and subsoil are minimised; and (e) spray drift or overspray does not carry beyond effluent disposal areas; and (f) effluent disposal areas are maintained with an appropriate crop in a viable state for transpiration and nutrient uptake; and (g) sufficient buffer zones are maintained between irrigation sites and sensitive environmental receptors.
L3O3	When weather conditions or soil conditions preclude the release of treated sewage effluent to land, effluent must not be irrigated to land.
L3O4	Treated sewage effluent may be removed from the site and used for an alternate purpose, with the written consent of any third party involved.
Agency interest: Waste	
Condition number	Condition
W3O1	All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

Part 3(P): Sandgate STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(f) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 50,000 but not more than 100,000EP.	Sandgate Sewage Treatment Plant Bicentennial Road, BOONDALL QLD 4034. Lot 1 RP63707.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval.

Agency interest: Water	
Condition number	Condition
WT3P1	Effluent must only be released from release point W2 (Part 2(B) Table 1) when the hydraulic capacity of W1 is exceeded or when effluent cannot otherwise be discharged through W1 (Part 2(B) Table 1).

WT3P2	For the annual reporting period the total mass load of total nitrogen and total phosphorus release must be less than the limits specified in Part 3(P) <i>Table 1 – Mass Load Limits for Total Nitrogen and Total Phosphorus</i>. Part 3(P) Table 1 – Mass Load Limits for Total Nitrogen and Total Phosphorus <table border="1"> <tr> <td>Total Nitrogen Mass Load Release Limit</td><td>45,825 kg/year</td></tr> <tr> <td>Total Phosphorus Mass Load Release Limit</td><td>18,250 kg/year</td></tr> </table> Associated requirements Total nitrogen and total phosphorus annual mass loads are to be calculated as follows: - Annual TN Mass Load (kg) = Annual TN Mass Load (kg) = Yearly sum of Daily Release Volume (ML) for all dry weather days/ the number of dry weather days x 365 x Yearly Median dry weather TN Concentration (mg/L). - Annual TP Mass Load (kg) = Yearly sum of Daily Release Volume (ML) for all dry weather days/ the number of dry weather days x 365 x Yearly Median dry weather TP Concentration (mg/L).	Total Nitrogen Mass Load Release Limit	45,825 kg/year	Total Phosphorus Mass Load Release Limit	18,250 kg/year
Total Nitrogen Mass Load Release Limit	45,825 kg/year				
Total Phosphorus Mass Load Release Limit	18,250 kg/year				

Part 3 (Q): Toogoolawah STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(b)(ii) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 100 but not more than 1,500EP— otherwise - no IT or IR	Toogoolawah Sewage Treatment Plant Lot 1 RP135864.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest	
Condition number	Condition
M3Q1	Application of treated effluent All effluent from the maturation ponds must be applied to the vetiver plantation area.
M3Q2	Effluent must not be applied to land at a rate, or in a manner, that will cause contamination of groundwater, or cause releases of effluent from the vetiver plantation area, in dry weather.
M3Q3	Vetiver Plantation Area Monitoring Program The holder of this environmental authority must develop and implement a program to monitor soil and groundwater in the vetiver plantation area in accordance with Part 3(Q) condition M3Q6.
M3Q4	The holder of this environmental authority must submit to the administering authority a report with every second annual monitoring report on the monitoring program, including an assessment of the impact and sustainability of the application of treated effluent to the vetiver plantation area. This report shall include an interpretation of the results and conclusions by an appropriately qualified person in the field of effluent land disposal.
M3Q5	The vetiver grass plantation area must be bunded to exclude stormwater from entering the area

	and to minimise stormwater runoff being released from the area.																										
M3Q6	Soil Monitoring At not greater than 2 yearly intervals, the holder of this environmental authority must take representative samples of the soil and subsoil from 2 sites within the vetiver grass plantation area and from 1 site outside of the plantation area, and analyse the sample for the quality characteristics specified in Part 3(Q) Table 1 — Soil Monitoring — Toogoolawah STP. Part 3(Q) Table 1 — Soil Monitoring — Toogoolawah STP <table> <tr> <th>QUALITY CHARACTERISTIC</th><th>UNITS</th></tr> <tr> <td>pH</td><td>pH scale</td></tr> <tr> <td>Exchangeable Sodium Percentage (ESP)</td><td>% Na</td></tr> <tr> <td>Exchangeable Cations</td><td>meq/100 g</td></tr> <tr> <td>Total Cations</td><td>meq/100 g</td></tr> <tr> <td>Specific Conductance or electrical conductivity</td><td>µS/cm</td></tr> <tr> <td>Total Nitrogen</td><td>mg/kg</td></tr> <tr> <td>Phosphorous (extractable)</td><td>mg/kg</td></tr> <tr> <td>Potassium (exchangeable)</td><td>meq/100 g</td></tr> <tr> <td>Total Calcium (exchangeable)</td><td>meq/100 g</td></tr> <tr> <td>Total Chloride</td><td>mg/kg</td></tr> <tr> <td>Total Magnesium (exchangeable)</td><td>meq/100 g</td></tr> <tr> <td>Total Sodium (exchangeable)</td><td>meq/100 g</td></tr> </table>	QUALITY CHARACTERISTIC	UNITS	pH	pH scale	Exchangeable Sodium Percentage (ESP)	% Na	Exchangeable Cations	meq/100 g	Total Cations	meq/100 g	Specific Conductance or electrical conductivity	µS/cm	Total Nitrogen	mg/kg	Phosphorous (extractable)	mg/kg	Potassium (exchangeable)	meq/100 g	Total Calcium (exchangeable)	meq/100 g	Total Chloride	mg/kg	Total Magnesium (exchangeable)	meq/100 g	Total Sodium (exchangeable)	meq/100 g
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Total Magnesium (exchangeable)	meq/100 g																										
Total Sodium (exchangeable)	meq/100 g																										
M3Q7	Only treated effluent to be released to waters The only contaminant permitted to be released to waters from Lot 1 RP135864 is treated effluent that has passed through the sewage treatment process.																										
M3Q8	Release points to waters The only location from which a contaminant may be released to waters from Lot 1 on Plan RP135864 is to a table drain, downslope of the vetiver plantation, discharging into a tributary of Cressbrook Creek at release point W1.																										
M3Q9	Maximum Quantity of Contaminants Released The total quantity of effluent released from release point W1 from Lot 1 on Plan RP135864 during any wet weather day must not exceed 1100 cubic metres, and must be monitored from the overflow location at the edge of the vetiver plantation area.																										
M3Q10	There must be no release of contaminates to release point W1 on a dry weather day.																										
M3Q11	Sampling and In-situ Monitoring Point for Releases to Water Determinations of the quality of contaminants released to water to check conformity with the release quality characteristics specified in Part 2(C) Agency interest: Water of this environmental authority must be undertaken at the sampling and in-situ measurement point described as outlets prior to discharge into a tributary of Cressbrook Creek.																										

M3Q12	The holder of this environmental authority must monitor effluent quality during release events to waters. For release events that last longer than 3 days, such monitoring must occur at intervals of no greater than 3 days.
M3Q13	The Site Based Management Plan for the approved place required under Part 2(C) condition AC5 should include: (a) effluent application rates and frequency of applications; (b) harvesting procedures and program; (c) soil and groundwater monitoring programs; (d) wet weather inspection procedures; (e) effluent release monitoring procedures; (f) pump maintenance programs; and (g) a plan to manage Blue-Green algae.
M3Q14	Management of Blue-Green Algae The holder of this environmental authority must implement an effective and appropriate Plan for the Management of Blue-Green Algae for the effluent lagoons, which details how the holder of this environmental authority will manage the actual and potential environmental impacts resulting from any occurrence of blue-green algae outbreaks.
M3Q15	The Management Plan for Blue-Green Algae must address at least the following matters: (a) weekly inspection to detect the presence of any bloom; (b) notification and reporting if blue-green algae blooms are confirmed; (c) the collection and analysis of samples if a bloom is suspected; and (d) remedial actions.
M3Q16	A copy of the Management Plan for Blue-Green Algae must be kept at a location readily accessible to the personnel that are carrying out the environmentally relevant activities.
M3Q17	The holder this environmental authority must not implement a Management Plan for Blue-Green Algae or amend a Management Plan for Blue-Green Algae where such implementation or amendment would result in a contravention of any conditions of this environmental authority.

Part 3(R): Wynnum STP

Environmentally relevant activity	Locations
ERA 63 Sewage treatment (1)(e) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— more than 10,000 but not more than 50,000EP	Wynnum Sewage Treatment Plant Tanker St, LYTTON QLD 4178 Lot 3 RP162446.

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site-specific conditions of approval

Agency interest: Water			
Condition number	Condition		
WT3R1	For the annual reporting period the total mass load of total nitrogen release must be less than the limit specified in Part 3(R) <i>Table 1 – Mass Load Limits for Total Nitrogen</i>. Part 3(R) <i>Table 1 – Mass Load Limits for Total Nitrogen</i> <table border="1"> <tr> <td>Total Nitrogen Mass Load Release Limit</td><td>14,235 kg/year</td></tr> </table> Associated requirements Total nitrogen and annual mass loads are to be calculated as follows: Annual TN Mass Load (kg) = Annual TN Mass Load (kg) = Yearly sum of Daily Release Volume (ML) for all dry weather days/ the number of dry weather days x 365 x Yearly Median dry weather TN Concentration (mg/L)	Total Nitrogen Mass Load Release Limit	14,235 kg/year
Total Nitrogen Mass Load Release Limit	14,235 kg/year		

Part 3 (S): Lowood STP

Environmentally relevant activity	Locations
ERA 63 - Sewage Treatment 1: Operating sewage treatment works, other than no-release works, with a total daily peak design capacity of (d) more than 4000 but not more than 10,000EP	Lowood Sewage Treatment Plant Forest Hill - Fernvale Road LOWOOD QLD 4311 Lot 1 SP295901

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site specific conditions of approval

Agency interest: General	
Condition number	Condition
G3S1	All reasonable and practicable measures must be taken to prevent or minimise environmental harm caused by the activities.
G3S2	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority to investigate a complaint of environmental nuisance arising from the activity . The monitoring results must be provided within 10 business days to the administering authority upon its request.
G3S3	All analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses. The only exception to this condition is for in situ monitoring of pH and DO.
G3S4	A receiving environment monitoring program must be designed and implemented by an appropriately qualified person(s) to monitor the effects of the activity on waters.

G3S5	The receiving environment monitoring program required by condition G3S4, must include at least the following: (a) description of potentially affected receiving waters including key communities and background water and sediment quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and (b) description of applicable environmental values and sediment and water quality objectives to be achieved; and (c) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the Receiving Environment Monitoring Program is proposed; and (d) water and sediment quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the monitoring program. Alternatively, receiving environment monitoring program compliance may be achieved by the holder of this environmental authority becoming and remaining a contributing member in regional studies of water quality and ecosystem health which are endorsed by the administering authority.
G3S6	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
G3S7	The activity must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency; and 2. establish and maintain control measures that minimise the potential for environmental harm; and 3. ensure plant, equipment and measures are maintained in a proper and effective condition; and 4. ensure plant, equipment and measures are operated in a proper and effective manner; and 5. ensure that staff are trained in and aware of their obligations under the <i>Environmental Protection Act 1994</i>; and 6. ensure that reviews of environmental performance are undertaken at least annually.
G3S8	All information and records required by the conditions of this environmental authority must be kept for a minimum of five years with the exception of environmental monitoring results which must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the administering authority upon request and in the format requested.
G3S9	You must record the following details of all environmental complaints received: 1. date and time the complaint was received; and 2. name and contact details of the complainant when provided and authorised by the Complainant; and 3. nature of the complaint; and 4. investigation undertaken; and 5. conclusions formed; and 6. actions taken.
G3S10	Activities conducted under this environmental authority must not be conducted contrary to any of the following limitations:

	1. Inflows must not exceed the peak design capacity of 5 times the Design Average Dry Weather Flow (DADWF) of 9.25 ML/day (DAFWF = 1.85 ML/day) on any day unless the standard treatment processes of the plant are bypassed.
G3S11	An annual monitoring report must be prepared and submitted to the administering authority by 30 November each year, for the preceding financial year.
G3S12	All waste generated in carrying out the activity must be reused, recycled, or removed to a facility or designated onsite location(s) that can lawfully accept the waste.
G3S13	The holder of this environmental authority must notify administering authority in writing of any monitoring result that indicates an exceedance of or non-compliance with any approval limit within 28 days of completion of analysis.
Agency interest: Noise	
Condition number	Condition
N3S1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .
Agency interest: Air	
Condition number	Condition
A3S1	Other than as permitted within this environmental authority, odours or airborne contaminants must not cause environmental nuisance at a sensitive place or commercial place .
Agency interest: Land	
Condition number	Condition
L3S1	Treatment and management of acid sulfate soils must comply with the latest edition of the Queensland Acid Sulfate Soil Technical Manual.
Agency interest: Water	
Condition number	Condition
WT3S1	All batteries, liquid chemicals, fuels, and other liquid substances with potential to cause environmental harm must be stored within a secondary containment system that is impervious to the materials stored within it and must be managed to prevent the release of contaminants to waters or land .
WT3S2	The only contaminants to be released to surface waters, excluding bypass releases covered by water conditions WT3S5 and WT3S6 , are from the Lowood Sewage Treatment Plant to waters described as Brisbane River from release point RP1 in accordance with Table 1—Surface water release limits and the associated requirements. Table 1—Surface water release limits

Release Point (GDA 94 Zone 56J)			Quality Characteristics	Minimum	50th %ile (long term)	90th %ile (long term)	Maximum																																
RP1	Easting 460437.1258	Northing 6961702.3135	BOD 5 day (mg/L)	-	10	-	15																																
			Total Suspended Solids (mg/L)	-	10	-	15																																
			Dissolved Oxygen (mg/L)	2	-	-	-																																
			Ammonia Nitrogen (mg/L as N)	-	1	-	2																																
			Total Nitrogen (mg/L as N)	-	5	-	7.5																																
			Total Phosphorus (mg/L as P)	-	2	-	3																																
			pH (scale)	6.5	-	-	8.5																																
			Enterococci (cfu/100ml)	-	100	400	-																																
Associated monitoring requirements 1. Sampling must be in accordance with the Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained. 2. Indicators for TN and TP must be done as 24 hour composite samples. 3. Samples must be representative of the release.																																							
WT3S3	Monitoring of contaminant releases to waters, excluding bypass releases covered by water conditions WT3S5 and WT3S6, must be undertaken in accordance with Table 2—Monitoring frequency and the associated monitoring requirements and records of the results must be kept. Table 2—Monitoring frequency <table><tr><th colspan="2">Monitoring locations (GDA 94 Zone 56J)</th><th rowspan="2">Quality Characteristics</th><th rowspan="2">Minimum Frequency</th></tr><tr><th>Easting</th><th>Northing</th></tr><tr><td rowspan="8">460626.5950</td><td rowspan="8">6961589.6180</td><td>BOD5 (mg/L)</td><td>Weekly</td></tr><tr><td>Total Suspended Solids (mg/ L)</td><td>Weekly</td></tr><tr><td>Total Nitrogen (mg/L)</td><td>Weekly</td></tr><tr><td>Ammonia(mg/L as N)</td><td>Weekly</td></tr><tr><td>Total Phosphorus (mg/L)</td><td>Weekly</td></tr><tr><td>pH (pH units)</td><td>Weekly</td></tr><tr><td>Dissolved Oxygen (mg/L)</td><td>Weekly</td></tr><tr><td>Enterococci (cfu/100mL)</td><td>Weekly</td></tr><tr><td>460591.9400</td><td>6961555.7550</td><td>Volume (inflow) (ML)</td><td>Daily</td></tr><tr><td>460437.1258</td><td>6961702.3135</td><td>Volume (outflow) (ML)</td><td>Daily</td></tr></table>							Monitoring locations (GDA 94 Zone 56J)		Quality Characteristics	Minimum Frequency	Easting	Northing	460626.5950	6961589.6180	BOD5 (mg/L)	Weekly	Total Suspended Solids (mg/ L)	Weekly	Total Nitrogen (mg/L)	Weekly	Ammonia(mg/L as N)	Weekly	Total Phosphorus (mg/L)	Weekly	pH (pH units)	Weekly	Dissolved Oxygen (mg/L)	Weekly	Enterococci (cfu/100mL)	Weekly	460591.9400	6961555.7550	Volume (inflow) (ML)	Daily	460437.1258	6961702.3135	Volume (outflow) (ML)	Daily
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	Associated monitoring requirements 1. Monitoring must be in accordance with the Water Quality Sampling Manual and all monitoring devices must be effectively calibrated and maintained. 2. Monitoring must be undertaken when the activity is in operation and samples must be taken during a release. 3. Total inflow before bypass release point. 4. Total outflow is treated discharges and excludes flows those that are bypassed.
WT3S4	In addition to WT3S2, the release to waters must not produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter, or other visually objectionable matter excluding bypass releases covered by water conditions WT3S5 and WT3S6.
WT3S5	Bypass releases must be screened prior to being released from release point RP1.
WT3S6	The administering authority must be notified within 24 hours of any bypass release ceasing.
WT3S7	The following details must be recorded in relation to each bypass release: (a) the start time, date and duration of the release; and (b) the estimated volume of the bypass release; and (c) the level of treatment at the sewage treatment plant prior to discharge; and (d) the cause of the release; and (e) any monitoring of the water quality released.
WT3S8	Treated sewage effluent may be removed from the site and used for an alternate purpose, with the written consent of any third party involved.

Part 3 (T): Luggage Point STP

Environmentally relevant activity	Locations
ERA 62 Resource recovery and transfer facility operation: 1 operating a facility for receiving and sorting, dismantling, baling or temporarily storing—(c) category 2 regulated waste	Luggage Point Sewage Treatment Plant 200 Main Beach Road, PINKENBA QLD, 4008

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site specific conditions of approval

Agency interest: Waste	
Condition number	Condition
W3T1	The activity must only accept sewage sludge and residues generated by the environmental authority holder for storage, consolidation and/or transfer.
W3T2	The activity must not store more than 150,000m ³ of sewage sludge and residues at the at any time.
W3T3	All waste received for the activity must be stored within the locations identified as “Existing Drying Beds” “New Hardstand Area” and “Sludge Lagoons (Screenings & Grit Sludge Disposal Area)” in ATTACHMENT N: Luggage Point ERA 62 Storage Area .
Agency interest: Air	
Condition number	Condition
A3I1	The holder of this environmental authority must develop and implement an ongoing odour monitoring program. The program must include, but not limited to: a) an evaluation of the performance of the odour mitigation and management measures of the plant operations, including: i. an inspection of potential odour sources; and ii. associated emission control systems; and iii. real-time odour monitoring; and iv. a review of monitoring data.
A3I2	If monitoring required under condition A3I1 indicates that environmental nuisance is caused by odour release from the activity , the environmental authority holder must take all reasonable and practicable measures to abate odour emissions.

Definitions:

Key terms and/or phrases used in this document are defined in this section and **bolded** throughout this document. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

50th percentile means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

80th percentile means not more than one (1) of the measured values of the quality characteristic is to exceed the stated release limit for any five (5) consecutive samples for a sampling point at any time during the environmental activity(ies) works.

Long term 90th percentile means not more than one tenth of the measured values are to exceed the stated release limit for the limit period, e.g. not more than five (5) for any fifty (50) consecutive samples for the long term period.

Act means the *Environmental Protection Act 1994*.

Activity means the environmentally relevant activity to which the environmental authority relates.

Administering authority means the Department of Environment and Science or its successor.

Annual return means the return required by the annual notice (under section 308 of the *Environmental Protection Act 1994*) that applies to the environmental authority.

Australian Water Quality Guidelines means the Australian and New Zealand Guidelines for Fresh and Marine Water Quality as revised or amended from time-to-time.

Authorised person means a person holding office as an authorised person under an appointment under the *Environmental Protection Act 1994* by the chief executive or chief executive officer of a local government.

Annual Mass Load means the yearly sum of daily release volume (ML) for all dry weather days x the yearly dry weather median concentration of pollutant in treated effluent released from a specified wastewater treatment plant.

Appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Background, for noise, means noise measured in the absence of the noise under investigation, as $L_{A90,T}$ being the A-weighted sound pressure level exceeded for 90 percent of the time period of not less than 15 minutes, using Fast response.

BOD₅ means the 5 day biochemical oxygen demand determined using standard tests (e.g. those used by NATA laboratories). This test is not inhibited for nitrification, otherwise would be referred to as "carbonaceous" BOD.

Bypass means when the standard treatment processes of the plant do not occur as a result of wet weather and inflows that are in excess of the peak design capacity for inflow resulting in the release of untreated or partially treated effluent from the sewage treatment plant to the environment.

Bubble licence means a single licence and load limit that includes multiple operations

Commercial place means a place (other than a sensitive place) used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

Composite in respect of sampling means either time based taken at hourly intervals to cover the period in the twenty-four (24) hours of the sampling day during which a contaminant release occurs; or taken after set flow volumes to cover the period of the sampling day during which the contaminant release occurs.

The **date of practical completion** means the practical completion of the offsite nutrient reduction action agreed in writing by administering authority and the holder of the environmental authority.

Day means any 24 hour period.

Design Average Dry Weather Flow (DADWF) means the average dry weather flow of the treatment plant at the design horizon.

Demonstration Pyrolysis Plant (DPP) means the pyrolysis project being undertaken at the Oxley Creek STP (Lot 2/RP37416 and Lot 100/SP162583) that will involve the thermal decomposition of various wastes on a trial basis. The trial will process commercial and industrial waste streams, contaminated biosolids, and hazardous wastes, and is authorised to operate for a maximum period of 24 months from its commencement date.

Dry weather day means a day which less than 1 mm of rainfall is recorded at any rainfall measuring station recognised by the Commonwealth Bureau of Meteorology within the sewered area connected to the sewage treatment plant, or if no such measuring station exists, at the nearest such station to the sewage treatment plant. The term also excludes days during which recorded rainfall over the 4 preceding days exceeds a cumulative rainfall of 50 mm.

Dry weather flow means flow which occurs from the sewage treatment plant to the designated receiving water during a dry weather day.

Dwelling means any of the following structures or vehicles that is principally used as a residence

- (a) a house, unit, motel, nursing home or other building or part of a building;
- (b) a caravan, mobile home or other vehicle or structure on land;
- (c) a water craft in a marina.

Environmental harm as defined in Section 14 of the *Environmental Protection Act 1994*.

Environmental nuisance as defined under Chapter 1 of the *Environmental Protection Act 1994*.

Environmental value as defined under Chapter 1 of the *Environmental Protection Act 1994*.

Feedstock trial is defined as any change in operation of the **Demonstration Pyrolysis Plant (DPP)** that is expected to substantially alter the emissions output, and which involves any of the following:

- (a) a change in the composition of the feedstock supplied to the retort of the DPP; or
- (b) a change in the internal operating conditions of the retort or thermal oxidiser.

Groundwater means water that occurs naturally in, or is introduced artificially into, an aquifer.

Incompatible waste means waste that may chemically react when:

- (a) placed in proximity to other wastes; and/or
- (b) mixed with other wastes

Land means land excluding waters and the atmosphere.

Long Term (limit) means a limit applied to consecutive samples taken over a one year or 52 week period (on a rolling basis for limit calculations) where consecutive samples are taken.

Long term 50th percentile means the median value of the measured values in ranked order or the quality characteristic is not to exceed the stated release limit for any twenty-six (26) consecutive samples where:

- (a) the consecutive samples are taking over a one year period;
- (b) the consecutive samples are taken at approximately equal periods; and
- (c) the time interval between the taking of each consecutive sample is not less than ten (10) days or greater than eighteen (18) days.

Long term 80th percentile means that not more than five (5) of the measured values of the quality characteristic are to exceed the stated release limit for any twenty-six (26) consecutive samples where:

- (a) the consecutive samples are taking over a one (1) year period;
- (b) the consecutive samples are taken at approximately equal periods; and
- (c) the time interval between the taking of each consecutive sample is not less than ten (10) days or greater than eighteen (18) days.

Long term 90th percentile means not more than one tenth of the measured values are to exceed the stated release limit for the limit period, e.g. not more than five (5) for any fifty (50) consecutive samples for the long term period.

L_{A 1, adj, 10 mins} means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response.

L_{A 10, adj, 10 mins} means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for ten percent (10%) of any 10 minute measurement period, using Fast response.

L_{A max adj, T} means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over any 10 minute period, using Fast response.

L_{Aeq adj, T} means the adjusted A weighted equivalent continuous sound pressure level measures on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the activity is causing a steady state noise, and no shorter than one hour when the approved activity is causing an intermittent noise.

L_T means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over a time period of not less than 15 minutes, using Fast response.

Measures has the broadest interpretation and includes plant, equipment, physical objects, bunding, containment systems, monitoring, procedures, actions, directions and competency.

Median means the middle value, where half the data are smaller and half the data are larger. If the number of samples is even, the median is the arithmetic average of the two middle values.

Maximum means that the measured value of the quality characteristic or contaminant must not be greater than the release limit stated.

Minimum means that the measured value of the quality characteristic or contaminant must not be less than the release limit stated.

Noise affected premises means a **noise sensitive place** or a **commercial place**

Range means that the measured value of the quality characteristic or contaminant must not be less than the higher release limit stated nor lower than the lower release limit stated.

mg/L means milligrams per litre.

NATA means National Association of Testing Authorities.

Noxious means harmful or injurious to health or physical well-being.

NTU means nephelometric turbidity units

Offensive means causing offence or displeasure; is unreasonably disagreeable to the sense; disgusting, nauseous or repulsive

Offset means a unit of pollution reduction also known as a credit

Offset Credit means a unit of pollution reduction, expressed in tonnes per year, equivalent to the pollutant load avoided by an offset works under the Qld Government's "Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management". Offset credits accrue following the date of practical completion of works designed to generate offset credits.

Offsite nutrient reduction action means an action taken to counter-balance a point source nutrient increase under the department's '*Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management*'.

Organic waste includes:

- (a) a substance used for manufacturing fertiliser for agricultural, horticultural or garden use;
- (b) animal manure;
- (c) cardboard and paper waste;
- (d) fish processing waste;
- (e) food and food processing waste;
- (f) grease trap waste;
- (g) green waste; and
- (h) waste generated from an abattoir.

Participating member means, for the purposes of an equivalent REMP, being an actively participating member in a study which is the equivalent of the REMP and any monitoring program resulting from such study.

Polycyclic Aromatic Hydrocarbons (PAH) means limit is for total of the 16 priority pollutants listed by the United States EPA, namely, Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(α)anthracene, Chrysene, Benzo(β)fluoranthene, Benzo(κ)fluoranthene, Benzo(α)pyrene, Indeno[123cd]pyrene, Dibenz[ah]anthracene and Benzo[ghi]perylene, expressed as Benzo(α)pyrene equivalents using the potency equivalence factors specified by the World Health Organisation.

Prescribed contaminants means contaminants listed within Schedule 9 of the *Environmental Protection Regulation 2008*.

Receiving environment monitoring program means a monitoring program designed to monitor and assess the potential impacts of controlled and/or uncontrolled releases of contaminants to the environment from the activity.

Records include breach notifications, written procedures, analysis results, monitoring reports and monitoring programs required under a condition of this authority.

REMP means the Receiving Environmental Monitoring Program.

Release point (RP) 1 means the stack serving LPG combustion gasses generated from operating of the **DPP**.

Release point (RP) 2 means the stack serving treated process gasses generated from pyrolysis in the retort unit in the **DPP**.

Secondary containment system means a system designed, installed and operated to prevent any release of contaminants from the system, or containers within the system, to land, groundwater, or surface waters.

Site means the place to which the environmental authority relates or the premises to which this environmental authority relates.

Release of a contaminant into the environment means to:

- (a) deposit, discharge, emit or disturb the contaminant
- (b) cause or allow the contaminant to be deposited, discharged, emitted or disturbed
- (c) fail to prevent the contaminant from being deposited, discharged emitted or disturbed
- (d) allow the contaminant to escape
- (e) fail to prevent the contaminant from escaping.

Sensitive place includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

- (i) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- (j) a motel, hotel or hostel; or
- (k) a kindergarten, school, university or other educational institution; or
- (l) a medical centre or hospital; or
- (m) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a *World Heritage Area*; or
- (n) a public thoroughfare, park or gardens; or
- (o) for noise, a place defined as a sensitive receptor for the purposes of the *Environmental Protection (Noise) Policy 2019*.

Short-term (limit) means a limit is applied to five consecutive samples (on a rolling basis for limit calculations) where consecutive samples are taken.

Short term 50th percentile means that the median value of the measured values in ranked order of the quality characteristic is not to exceed the stated release limit for any five (5) consecutive samples where:

- (a) the consecutive samples are taking over a ten (10) week period;
- (b) the consecutive samples are taken at approximately equal periods; and
- (c) the time interval between the taken of each consecutive sample is not less than ten (10) days or greater than eighteen (18) days.

Short term 80th percentile means that not more than one (1) of the measured values of the quality characteristics are to exceed the stated release limit for any five (5) consecutive samples where:

- (a) the consecutive samples are taken over a five (5) month period;
- (b) the consecutive samples are taken at approximately equal intervals; and
- (c) the time interval between the taking of each consecutive sample is not less than 25 days.

Sustainable irrigation scheme means an irrigated commercial farming arrangement, designed to generate income and operated in accordance with MEDLI modelling endorsed by the administering authority. MEDLI modelling is to be used to limit environmental harm, whereby a land and groundwater based REMP is not required.

Total heavy metals mean a cumulative total of **Type 1** and **Type 2 substances**.

Total Nitrogen (TN) means the sum of Organic Nitrogen, Ammonia Nitrogen, Nitrite plus Nitrate Nitrogen, expressed as mg/L as Nitrogen. This includes both the inorganic and organic fraction of nitrogen.

Total Phosphorus (TP) means the sum of the reactive phosphorus, acid-hydrolysable phosphorus and organic phosphorus, as mg/L of Phosphorus. This includes both the inorganic and organic fraction of phosphorus.

Type 1 substances means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements.

Type 2 substance means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.

Volatile organic compounds (VOC) means any chemical compound based on carbon chains or rings with a vapour pressure greater than 2mm of mercury (0.27 kPa) at 25°C), that participate in atmospheric

photochemical reactions. The substances that are specifically excluded are: methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts. This is according to the definition of VOC outlined in the Australian Government National's Pollutant Inventory.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

Watercourse means a river, creek or stream in which water flows permanently or intermittently- in a natural channel, whether artificially improved or not; or in an artificial channel that has changed the course of the watercourse.

Wet Weather Day means a day which is not a dry weather day.

Works or operation means the development approved under this authority.

You means the holder of the environmental authority.

Pollution Credit means a unit of pollution reduction, expressed in tonnes per year, equivalent to the pollutant load generated by an offsite nutrient reduction action under the department's '*Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management*'. Pollution Credits accrue from 1 July 2021. Pollution Credits accrue on the date of practical completion of the offsite nutrient reduction action designed to generate the pollution credit.

Attachments:

1. **ATTACHMENT A:** REMP SAMPLING LOCATIONS *Source: NearMap Pty Ltd, October 2012.*
2. **ATTACHMENT B:** Beaudesert Sewage Treatment Plant Nutrient Offset Project *Proposal Version 1 Print date 13 December 2013.*
3. **ATTACHMENT C:** Laidley STP- Release Point.
4. **ATTACHMENT D:** Forest Hill STP-W1 Release Point
5. **ATTACHMENT E:** Helidon Sewage Treatment Plant Schedule of Approved Documents
6. **ATTACHMENT F:** Maps of Release Points
 - a. **Attachment F.1** - Boonah STP Release Point Location
 - b. **Attachment F.2** - Aratula STP Release Point Location
 - c. **Attachment F.3** - Kalbar STP Release Point Location
7. **ATTACHMENT G:** Aerial Photo of Rosewood STP and Release Point W1 Outfall to Brisbane River.
8. **ATTACHMENT H:** Rosewood STP Landscaped Irrigation Area. (Source: Google Maps)
9. **ATTACHMENT I:** Lower Brisbane River Catchment sewage treatment plants' locations.
10. **ATTACHMENT J:** Lower Brisbane River Catchment sewage treatment plants REMP sampling locations.
11. **ATTACHMENT K:** Gatton Irrigation area
12. **ATTACHMENT L:** Laidley Creek Sewage Treatment Plant Nutrient Offset Project Delivery Proposal, dated 15th October 2016, included in Attachment L of this environmental authority, excluding sections 5.3.3, 5.3.4 and 6.
13. **ATTACHMENT M:** Canungra STP General (Process Flow Diagram) PF24
14. **ATTACHMENT N:** Luggage Point ERA 62 Storage Area

Attachment A: BEAU- REMP SAMPLING LOCATIONS. *Source: NearMap Pty Ltd, October 2012.*



Attachment B: Beaudesert Sewage Treatment Plant Nutrient Offset Project Proposal Version 1
Print date 13 December 2013



BEAUDESERT STP NUTRIENT OFFSET PROPOSAL
ATTACHMENT B



ATTACHMENT B

BEAUDESERT SEWAGE TREATMENT PLANT NUTRIENT OFFSET PROJECT PROPOSAL

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BEAUMESERT STP NUTRIENT OFFSET PROPOSAL
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1. INTRODUCTION

Elevated levels of nutrients and sediments in receiving waters have adverse ecological and economic implications. Nutrient pollution of receiving waters arises from both point source, such as end of pipe discharges from sewage treatment plants (STPs), and non-point sources. The *Environmental Protection Act 1994* seeks to regulate the amount of nutrient discharges from point sources, including STPs.

Nutrient offsetting is an approach to improve water quality in creeks and rivers by reducing the amount of nutrients entering waterways through alternate, lower costs methods (e.g. stream-bank rehabilitation) than traditional projects (e.g. STP infrastructure upgrades). An offset is a reduction in pollutant load, measured in kilograms, which is created by an action, activity or technology; this may be used by the licensed person/entity to comply with relevant regulated conditions or to achieve nutrient abatement targets, such as zero net emissions. An offset may only be used by the licensed person/entity and the Department of Environment and Heritage Protection (DEHP) governs, to which environmental relevant activity (ERA) licence the offset can be attached.

Water Utilities can apply to DEHP to undertake nutrient abatement projects for offsetting an existing licensed activity where the project is undertaken in the same waterway catchment as the activity itself. If approved, nutrient offsetting delivers the opportunity for regulated point source dischargers to optimise receiving water quality outcomes, providing an overall net community benefit, whilst achieving a more efficient capital outcome by offsetting investment in point source pollution abatement with investment in non-point source pollution abatement.

2. BACKGROUND

The DEHP is currently developing a policy to allow water quality offsets as an alternative approach to effluent management in Queensland. To assist in better defining the elements of the policy, DEHP has approached the South East Queensland (SEQ) service providers to select pilot water quality offset schemes.

Queensland Urban Utilities had identified the following three high population growth pilot project areas to trial the offset projects:

- Beaumesert/Bromellon
- Lockyer Valley
- Bremer River

This proposal details the implementation of a nutrient offsets scheme for the Environmentally Relevant Activity (ERA) undertaken at the Beaumesert Sewage Treatment Plant (BSTP). The key driver for the pilot project is to have

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zero net emissions of Total Nitrogen discharged into the Logan River from the Beaudesert Sewage Treatment Plant (STP) during wet weather periods. The STP is compliant with its EA during dry weather periods due to water recycling activities on local farms and sporting facilities. This recycling activity can reduce the volume of treated effluent discharged to the Logan River to nil. However, in wet weather years, when the recycled water demand decreases, there is a risk that the STP will breach EA conditions for Total Nitrogen (TN) annual mass loads. Future growth will further exacerbate the STP compliance issue.

Nitrogen abatement is proposed to be achieved by preventing nitrogen bound in river bank sediments from eroding and entering the waterways, through implementation of Biotechnical Erosion Control techniques to structurally repair chronically eroded banks of the upper Logan River and strengthen the riparian corridor with environmental plantings.

3. INTENT AND DURATION

The nitrogen offset project will be based on the intent documented in the Queensland State Governments *Offsets Policy* and the Department of Environment and Heritage Protection's *Flexible Options for Managing Point Source Water Quality Emissions: Draft Water Quality Offsets Framework*.

Queensland Urban Utilities will commence the Beaudesert STP nutrient offset project once the QUU nutrient offsets project methodology, offset duration and the relevant amendments to the BSTP EA conditions are agreed with EHP officers.

It is proposed that the duration of the Beaudesert STP nutrient offset will be a maximum of 10 years in duration - from the date of practical completion of the Beaudesert STP nutrient offset project works as detailed in Attachment A. The maximum 10 year period will be split into two five year periods. A strategic review of the offset project outcomes will occur after the initial 5 year period by the **project control group (PCG)**. The PCG will subsequently determine whether any additional offset works and/or amendments to offset conditions are needed prior to approving that the offset can be applied for the second 5 year period (to make up to the maximum 10 year period).

Irrespective of the offset performance and the future integrity of the offset works, after successful practical completion of the project the offset will be valid for a minimum five year period from the date of practical completion.

4. METHODOLOGY

The transfer of sediment bound nitrogen compounds to the Logan River will be prevented through implementation of Biotechnical Erosion Control (BEC) techniques. BEC is the permanent repair of riparian corridors (known historically to suffer from chronic erosion) using structural remediation of river

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banks and strengthening of the river banks over time using environmental plantings. The project areas have been identified by suitably qualified experts from SEQ Catchments - the local Natural Resource Management (NRM) provider.

The pilot scheme will quantify then monitor for 10 years the mass load of sediment and nutrient avoided by the BEC works.

Based on the outcomes of a preliminary investigation report undertaken by SEQC Services Pty Ltd, QUU subsequently engaged SEQC Services Pty Ltd to undertake detailed design of the BEC works and produce an avoided soil erosion quantification report incorporating:

1. river bank erosion modeling (using the calibrated models on the AS is and the various TO BE scenarios for the stabilised river bank);
2. detailed design of the BEC works (structural engineering design and landscaping design) within the project area;
3. soil sampling and analysis to more accurately predict the average annual erosion of the river bank with and without the BEC works;
4. detailed methodology to quantify avoided sediment and nutrient loss and the application of this methodology to the project area; and
5. a statement of the sediment and nutrient loads avoided by the offset project.

Using this current 'best science' approach, SEQC Services Pty Ltd has quantified the mass of TN offset, as a result of the project, to be 5 tonnes/year (T/yr). (see Appendix 1 for the final draft report).

5. REGULATORY APPROVAL

QUU will make application to EHP to amend the Beaudesert STP EA (Ref. EPPR00515313) to:

1. increase the TN mass load by 5 T/year on the signed date of practical completion of the Beaudesert STP nutrient offset project (as per the methodology in section 4);
2. decrease the TN mass load by 5 T/year a maximum period 10 years after the signed date of practical completion of the Beaudesert STP nutrient offset project, or after the five year review of the project outcomes if applicable (see Section 4); and
3. ensure QUU undertakes all activities identified in this proposal document.

6. PROJECT AREA

The project area is the area of land on which an offsets project is carried out and can cover multiple land areas or facilities. The proposed project area for this pilot scheme is located approximately 3km west of Beaudesert STP adjacent to the Ilbogan Park on Beaudesert Boonah Rd (Figure 1). The overall project area is divided into two sites. Site 1 extends 300m to 400m east of Ilbogan Park on the southern/eastern reach of the Logan River. Site 2 is

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located 400m downstream of Site 1 on the same side of the Logan River and extends 100m downstream.

The target Logan River reaches has highly eroded and degraded riparian areas. Historical studies and modelling undertaken by Healthy Waterways Limited and the latest preliminary report detailed in Attachment 1 indicates these river banks contribute significant sediment and nutrient pollution to the upper Logan River, which is the same receiving water for environmental discharges from the Beaudesert STP. The pilot nutrient offsets scheme will help reduce non-point sediment and nutrient (nitrogen and phosphorus) pollution from the target reaches of the Logan River through best practice riparian and river restoration investment (BEC techniques).

Queensland Urban Utilities will utilise existing Landowner Deeds each land owner within the project area has with SEQ Catchments as secured by QUL's contractual arrangements with SEQ Catchments and their subsidiary company SEQC Services Pty Ltd. The combination of these site access and security instruments will allow the offset project works and ongoing maintenance and monitoring program to proceed and also protect the project area from interference for the duration of the offset project. The project area is shown below, in light green shading.



Figure 1: Proposed project area on the Logan River shown in light green shading. The area is three kilometres west of Beaudesert STP

7. NITROGEN OFFSET ESTIMATION AREA (NOEA)

The surface area of river bank required for the nitrogen offset is dependent on the modelled amount of sediment transferred from the land to the waterway and the amount of nitrogen present in the sediment. Queensland Urban Utilities offset provider, SEQC Services Pty Ltd, has used a combination of the following technologies to determine the boundaries of the NOEA:

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- field surveys and soil core sampling and analysis;
- satellite and/or aerial photography;
- Light Detection and Ranging (LIDAR) mapping; and
- soil, vegetation and landform maps.

The use of LIDAR mapping will be primarily used to determine rates of soil erosion over the duration of the offset project – based on advice from expert fluvial geomorphologists and SEQC Services Pty Ltd – see Section B for the monitoring program.

It should be noted that NOEAs do not have to be attached to one another, and can span the boundaries of multiple properties – as is the case for the Beaudesert STP NOEA.

7.1 Planting and management of a NOEA

The following management regime proposed by SEQC Services Pty Ltd will be applied within the NOEA:

1. The NOEA will consist of river bank and bed stabilisation works followed by planting and/or seeding with a mix of indigenous or native tree, shrub and grass species within a reasonable timeframe of completion of the stabilisation works.
2. Thinning of trees and shrubs, weed control and the application of fertiliser will be undertaken in a uniform manner throughout the NOEA.

7.2 Requirement to remodel and re-quantify the NOEA

A NOEA will be remodelled and re-quantified for TSS and TN transfer during construction of the agreed offset works (see Appendix 1) only if the significant changes are made to the detailed design of the offset project works. For example, it may be found during construction that overall site characteristics are significantly different to those used in the initial modelling and quantification studies, such as a large area of the underground offset project area is rock which has a much lower erosion and transfer rate of sediment than the surrounding soils and this rock mass was not obvious when the project was originally modelled and quantified.

In these cases, the remodelling and re-quantification must clearly delineate the affected area, any additions to the NOEA (eg. additional length river bank will be restored) and associated amendments to the detailed design to ensure the targeted offsets can be achieved or the offset mass load can be proportionately reduced.

A NOEA will not be remodelled and re-quantified for TSS and TN transfer after practical completion of the agreed offset works (see Appendix 1) after

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erosion events caused by nature (eg. rainfall events and floods). These events will be managed through the monitoring and reporting part of the project – see Section 8.0.

A NOEA may be remodelled and re-quantified for TSS and TN after the initial five year offset period if deemed necessary by the offset project control group (see Sections 4 and 8). The outcomes of this work may include QUU to undertake additional offset area remedial works prior to the offset being rolled over to the next five year period.

8. MONITORING, RECORD-KEEPING AND REPORTING REQUIREMENTS

A project control group (PCG) will be established to maintain regular liaison with EHP officers for the duration of the Beaudesert STP nitrogen offset project. Within 12 weeks of the date of practical completion of the project works, a final report will be provided to EHP including the process, outcomes and learning's.

The final report will also identify ongoing maintenance, risk management issues and possible improvements that can be applied to future offset projects.

8.1 Geospatial information requirements

The boundary of the NOEA within the project area will be surveyed and Lot referenced and provided to EHP as required. Light detection and ranging (LIDAR) and photo-point technology will be used to map the physical layout of terrain and landscape features.

8.2 Project monitoring and reporting

During Construction

Queensland Urban Utilities and the contractor will monitor the NOEA and adjust the NOEA boundary as required if part of the NOEA no longer meets the requirements of the project or based on further stratification of the project – see Section 7. Any project incidents or amendments to the project area or NOEA will be notified to EHP.

Post Practical Completion

Queensland Urban Utilities will monitor and report on the Beaudesert STP nitrogen offset project in accordance with monitoring and reporting program detailed in Table 1.

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Table 1 – Project Areas Monitoring Program (Riparian Establishment Phase)

Monitoring Requirements by Year	Objective	Monitoring Mechanism	Reporting
Year 0 (Immediately after practical completion)	- Ensure that project works (earthworks & revegetation) are constructed in accordance with design plans. - Select appropriate PhotoPoint site(s).	Pre and post works photo-point: – PhotoPoint Post works: – LIDAR	Practical Completion Report including 'as constructed' plans, photographs and digital terrain maps (LIDAR). (12 weeks after practical completion of project works)
Year 1	- Monitor and review growth of riparian vegetation - Confirm ongoing maintenance requirements - Assess river bank erosion	PhotoPoint (year 1)	Year 1 Annual report
Year 2		– PhotoPoint (year 2) – LIDAR	Year 2 Annual report
Year 3		PhotoPoint (year 3)	Year 3 Annual report
Year 4		PhotoPoint (year 4)	Year 4 Annual report
Year 5		– PhotoPoint (year 5) – LIDAR	Year 5 Annual report including photographs and digital terrain maps (LIDAR).
Throughout Project Establishment Phase (Years 0-5)	Ensure EHP officers are notified of significant wet weather impacts on the project area. Ensure a coordinated and balanced response to significant wet weather impacts on the project area.	- Minor erosion event: damage is to a limited area of the NOEA and is within the erosion avoided estimate (see Appendix 1). Action: Photographic record - Major erosion event as declared by PCG. Guidance: damage has resulted in the erosion avoided estimate (see Appendix 1). Action: – PhotoPoint – LIDAR	- Minor erosion: No notification to EHP. Include detail in relevant annual report - Major erosion: Notified to EHP within 1 month of becoming aware of damage. Event actions and response actions managed by the PCG.

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8.3 Records

Queensland Urban Utilities will keep the following records in relation to the Beaudesert STP nitrogen offset project:

- design plans and 'as constructed' plans;
- monitoring data, site inspection observations/logs and annual reports;
- relevant invoices and receipts;
- contract documents and related records;
- detailed logbooks of activity where the activity has not been undertaken by a third party under a contract; and
- references to relevant published literature.

9. BROADER RECEIVING WATER QUALITY AND COMMUNITY BENEFITS

In addition to providing a neutral nitrogen offset, the project will repair eroded riparian corridors and provide the following overall net benefits:

1. stabilised Logan River bed and banks to reduce erosion and protecting freehold land;
2. reducing sediment mass load transfer and local turbidity levels in the Logan River;
3. reducing sediment bound Total Phosphorus (TP) mass load transfer to the Logan River;
4. better control the spread of environmental and declared weeds along the existing riparian corridor of the Logan River;
5. enhancement of biodiversity;
6. provision of shade and habitat for aquatic organisms;
7. establishment of permanent native vegetation; and
8. provide for future aquatic habitat protection in the Logan River.

10. POTENTIAL RISKS

The following risks are identified in undertaking the pilot offset scheme:

1. Project construction delays due to wet weather events;
2. Total destruction of the offset works due to a natural disaster event such as a major flood in the first 5 years; and
3. Technology risks with the river bank stabilisation and toe erosion model and proposed LiDAR monitoring system.

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11. CONCLUSION

Successful implementation of the Beaudesert STP nitrogen offsets project will ensure Queensland Urban Utilities:

- contributes to the development of a state wide offset policy by EHP that will enable alternative effluent management options to be effectively implemented;
- achieves its objective of providing affordable services to its customers by adopting prudent and sustainable sewage management measures at lowest long term costs to customers; and
- achieves its future waterway nitrogen emission targets to assist in the protection of the environmental values of the Logan River system.

12. REFERENCES

1. Water Quality and Investigations, November 2012
2. Environmental Protection Agency, Development of a water quality metric, for nutrient offsets for Moreton bay, Queensland, November 2007.

13. TIMEFRAMES

An indicative timeframe is provided in Table 2 below.

Table 2 –

Tasks	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Dec 2023
Information gathering	Oct'12-May'13						
Scheme partners identification	Dec'12-Feb'13						
Approvals (EHP & Queensland Urban Utilities' Board)		May'13-Sep'13					
Detailed design and soil erosion modelling. Quantify nitrogen mass load offset		July'13-Sep'13					
Commence project works		Oct'13					
Project area maintenance (riparian vegetation)		Nov'13-Dec'18				Full establishment	
Project monitoring, evaluation and reporting		Oct'13-Dec'23 Nitrogen Offset terminates December 2023					

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Attachment C: Laidley STP - Release Point



Attachment D: Forest Hill STP-W1 Release Point



Attachment E: Helidon Sewage Treatment Plant: Schedule of Approved Documents

The environmentally relevant activity must be constructed, operated and maintained in accordance with all undertakings of the environmental authority application and any other documents approved by the administering authority as set out in the Approved Documents Schedule.

In the event of any inconsistency arising between the undertakings of the environmental authority application or other approved documents as set out in the Approved Documents Schedule and the conditions of this environmental authority, the conditions of this environmental authority must apply.

For the purposes of this environmental authority the following stated documents are approved documents:

1	Application for Environmental authority with accompanying report dated August 1995 by Gutteridge Haskins and Davey Pty. Ltd on behalf of Gatton Shire Council
2	Helidon Sewerage Scheme Locality Plan, (Figure 3.1 of the above mentioned report).
3	Treatment Plant Layout Plan, Figure 3.2 of the above mentioned report).
4	Process Flowsheet, (Figure 3.1 of the above mentioned report).
5	Topographical Map, (Figure 4.1 of the above mentioned report).
6	Report by Land Resource Assessment and Management Pty. Ltd titled "Assessment of land based disposal of effluent at Helidon" attached to Gutteridge Haskins and Davey Pty. Ltd's report.
7	Map 1 of Land Resource Assessment and Management Pty. Ltd's report.
8	Letter dated 18 November 1995 from Gutteridge Haskins and Davey Pty. Ltd providing additional information as requested by the Department of Environment and Heritage under section 62 of the <i>Environmental Protection Act 1994</i> .
9	Fax dated 1-5 January 1996 from Mr. Steve Moller of Gatton Shire Council, containing pages relevant to zoning from the councils strategic plan.
10	Fax dated 19 January 1996 from Mr. Steve Moller of Gatton Shire Council informing of real property descriptions of the location of um stations number 2 and 3.
11	Fax dated 19 January 1996 from Mr. Steve Moller of Gatton Shire Council informing of real property descriptions of properties adjacent to the location of pump station number 1.
12	Fax dated 19 February 1996 from Jeanette Clewett (for Geoff Hacquoil) both of Gutheridge Haskins and Davey Pty. Ltd. containing further information including pages 3, 4 and 5 containing the location of the pump station overflow discharges and page 6 with a plan of pump station 1.
13	Fax dated 22 February 1996 from Mr. Nick Apostolidis of Gutteridge Haskins and Davey Pty. Ltd. outlining the path and, destination of the emergency overflow from the secondary treatment lagoon.

Attachment F: Map of Release Points Boonah STP Release Point Location

Attachment F.1 Boonah STP Release Point Location



Attachment F: Map of Release Points Aratula STP Release Point Location

Attachment F.2 Aratula STP Release Point Location

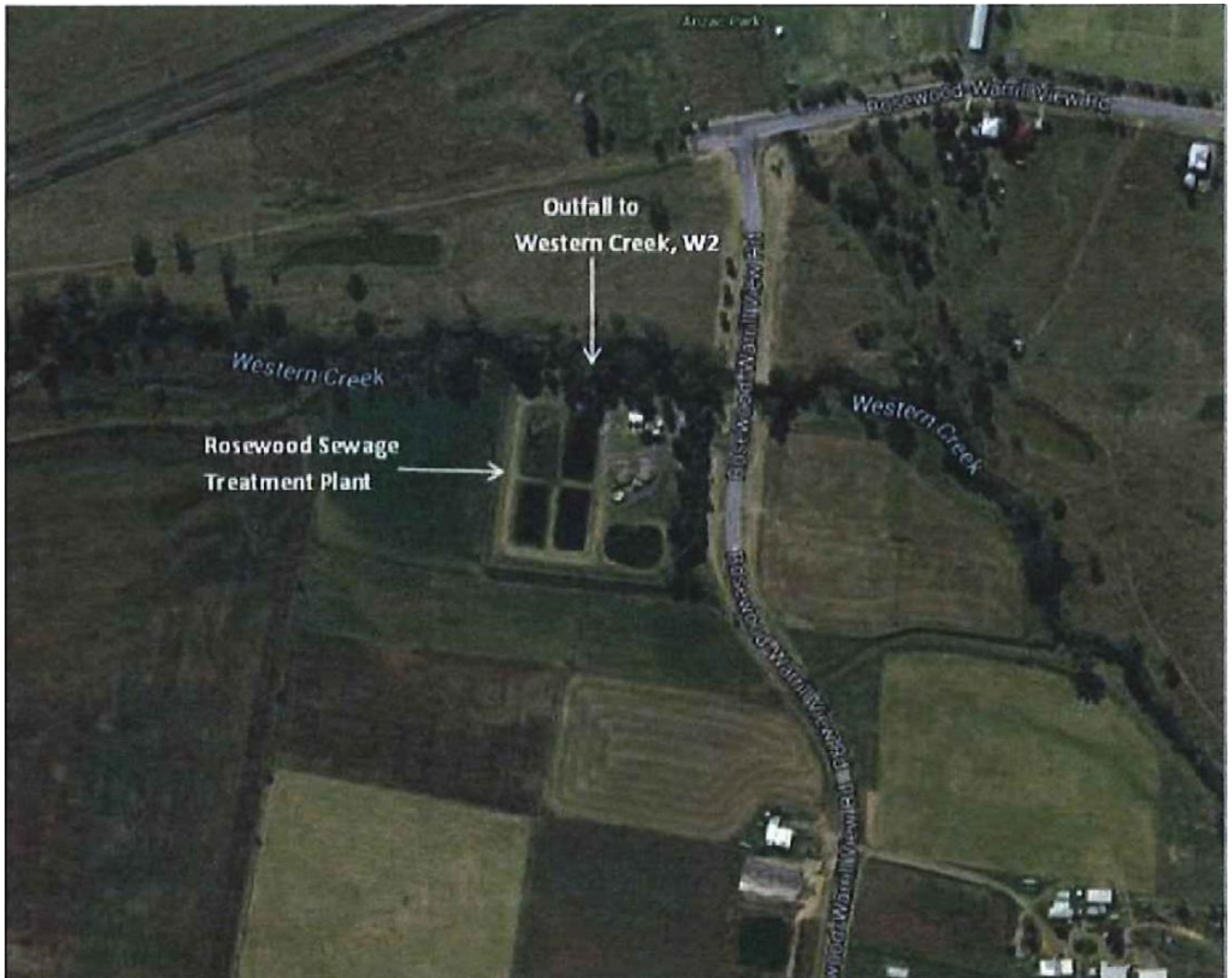


Attachment F: Map of Release Points Kalbur STP Release Point Location

Attachment F.3 Kalbur STP Release Point Location



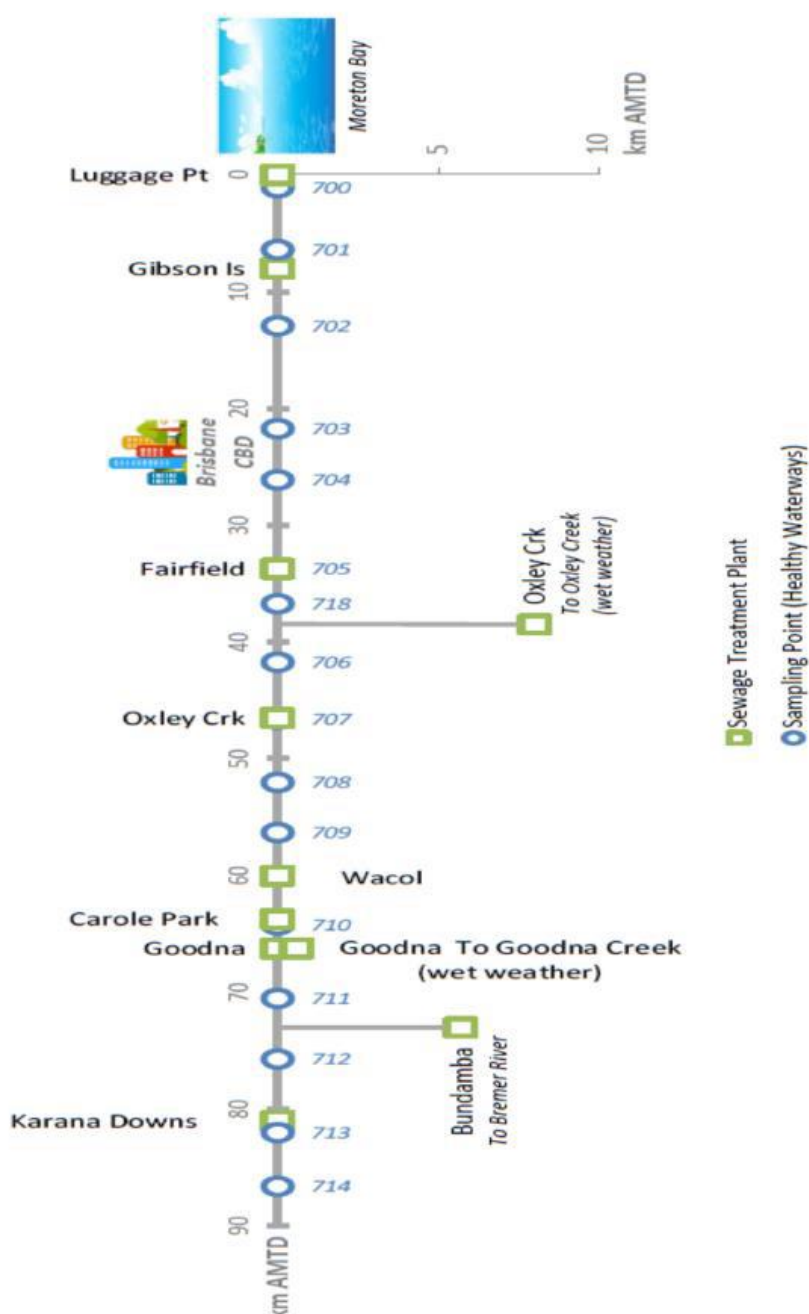
**Attachment G: Aerial Photo of Rosewood STP and Release Point W1 outfall to Brisbane River
(Source; Google Maps 2015).**



Attachment H: Rosewood STP Landscaped Irrigation Area. (Source: Google Maps)



Attachment J: Lower Brisbane River Catchment sewage treatment plants REMP sampling locations.



Attachment K: Gatton Irrigation area



Attachment L: Laidley Creek Sewage Treatment Plant Nutrient Offset Project Delivery Proposal, dated 15th October 2016, excluding sections 5.3.3, 5.3.4 and 6



Queensland Urban Utilities
Laidley Creek Sewerage Treatment Plant Nutrient Offset
Project Delivery Proposal

Subject Project Delivery Proposal for the Laidley Creek STP Nutrient Offset
Distribution Cameron Jackson, Queensland Urban Utilities
Date 15th October 2016
Contact Paul McDonald and Paul Daly, SEQC Services Pty Ltd

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Commercial in Confidence

Executive Summary

Queensland Urban Utilities (QUU) commissioned SEQC Services to undertake a range of detailed investigations to further the planning required to invest in the rehabilitation of Laidley Creek under the State Government's 'Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management' document (known as the 'Nutrient Policy'). The proposed project requires the achievement of a 5 tonne/yr TN and 1 Tonne/yr TP offset in order to offset wet-weather related discharges from the Laidley STP into the Laidley Creek system. The information contained within this report achieves the required outcomes under the Nutrient Offset Policy using a similar strategy to that employed as part of the successful QUU Beaudesert Nutrient Offset Pilot Project.

Laidley Creek is in a highly degraded state which has been exacerbated by the 2011 and 2013 floods in the Lockyer Valley. A range of erosion mechanisms are present and the risk of future large scale erosion in the target investment area is significant. The proposed investment area is a 'regional hot-spot for restoration', which will have significant additional public good benefits in terms of improved water quality in the Brisbane River and Moreton Bay, improved water quality at the Mt Cosby Water Treatment Plant and enhanced biodiversity values in Laidley Creek. The proposed works are strongly supported by local landowners, the State Government and the Lockyer Valley Regional Council; and complement river restoration investments from other organisations.

The modelling and direct on-ground investigations undertaken have identified significant potential for future erosion in the target area, particularly resulting from the erosion of the inset channel features, creek bed deepening and associated failure of unstable shear creek banks. Based on a flow threshold of 90m³/s the modelling indicates long term annual sediment losses per length of waterway estimated at being 7.2 m³/m and 8.8 m³/m for Reach 1 and Reach 2 respectively. The estimates of sediment offset indicate the proposed works have the potential to result in a 90% sediment load reduction, which translates to a sediment offset of 6.5m³/m for Reach one and 7.9m³/m for Reach 2 annually. A detailed analysis of soil nutrient concentration through the target reach was conducted where 9 soil cores were taken and 85 samples extracted and analysed. The results of this analysis demonstrate a soil concentration of 0.063% TN and 0.125% TP.

Following the stream bank erosion nutrient offset decision support framework developed as part of the Beaudesert Pilot Project and the outcomes of the modelling and soil analysis **a total length of 2.05 kilometres of deliverable works** and associated structures is required to achieve the target nutrient offset. At the project area these works will achieve an estimated 12,000T of sediment erosion avoided per year, with an associated nutrient offset of 7.57 T TN and 14.96T TP. Using an attenuation factor of 1.5 given the downstream distance of the STP from the project area, **it is proposed that the project will achieve a nutrient offset at the Laidley STP point of discharge of 5.05T TN and 9.98T TP.**

The on-ground works are proposed to be delivered over a one year period, with 2050m of bank battering, revegetation and associated in-stream structures to be delivered. Engagement with all landholders that will be involved with the project has received their in-principal support for delivery on their properties. Further, relevant State Government Departments and the Lockyer Valley Regional Council have been engaged and are supportive of the proposed works.

To deliver the on-ground works required to achieve the identified nutrient offset outcome a total budget of \$1,598,000 (Ex GST) is required. This includes earthworks, materials, revegetation and site management for 5 years, project management and RPEQ certification of the in-stream structures constructed. It is important for QUU to recognise that SEQC Services has worked to keep the required budget as low as possible. This will mean that revegetation will occur at 900 stems/ha and that the budget is reliant on some support from landholders (in moving infrastructure and spreading spare soil). Whilst the works proposed are based on engineered designs and will build resilience in the site, river restoration faces inherent risks associated with climatic events. In the event that minor earthworks repairs are necessary over the licence period, SEQCS will discuss any suggested repairs with QUU and seek a variation to cover those costs.

This is an ambitious project and positive media opportunities would arise as a result of its delivery. SEQC Services thanks QUU for the opportunity to undertake this scoping project and is excited by the opportunity to work on such a significant regional project with QUU in the near future.

Commercial in Confidence

Report Structure

The following report is presented in a number of sections that together provide the relevant investigations and an implementation strategy for QUU to progress toward the investment in the Laidley STP nutrient offset.

Section 1: Target Investment Area and Geomorphic Assessment

Section 2: The Modelling Methodology and Results

Section 3: Soil Assessment

Section 4: Engagement

Section 5: Proposed Nutrient Offset

Section 6: Project Budget

SEQC Services has engaged the services of geomorphic experts to assist with the geomorphic assessment and modelling, and engaged The Department of Science, Information Technology and Innovation to undertake all soil analyses.

Section 1: The Target Investment Area and Geomorphic Assessment

1.1: Investment Area Overview

The target investment area for the proposed nutrient offset is located in an area of Laidley Creek that SEQ Catchments has been delivering work in since 2013. Work delivered here to date has been funded by the State Government's Natural Disaster, Relief and Recovery Arrangements, The Department of Environment and Heritage Protection as part of their 'Health Country Support Program' and the Port of Brisbane as part of the Offsite Stormwater Treatment Pilot Project.

The target area for the nutrient offset to be delivered entails a section of Laidley Creek in the areas of Mulgowie and Thornton. As noted SEQ Catchments has been working in this area for some time and has developed an overarching rehabilitation implementation strategy for the area, this has included separating the target area of Laidley creek into 3 Reaches. The proposed delivery locations for QUU stretch along a 3.5km reach of the Creek in Reach 1 and 2 as shown in Figure 1.

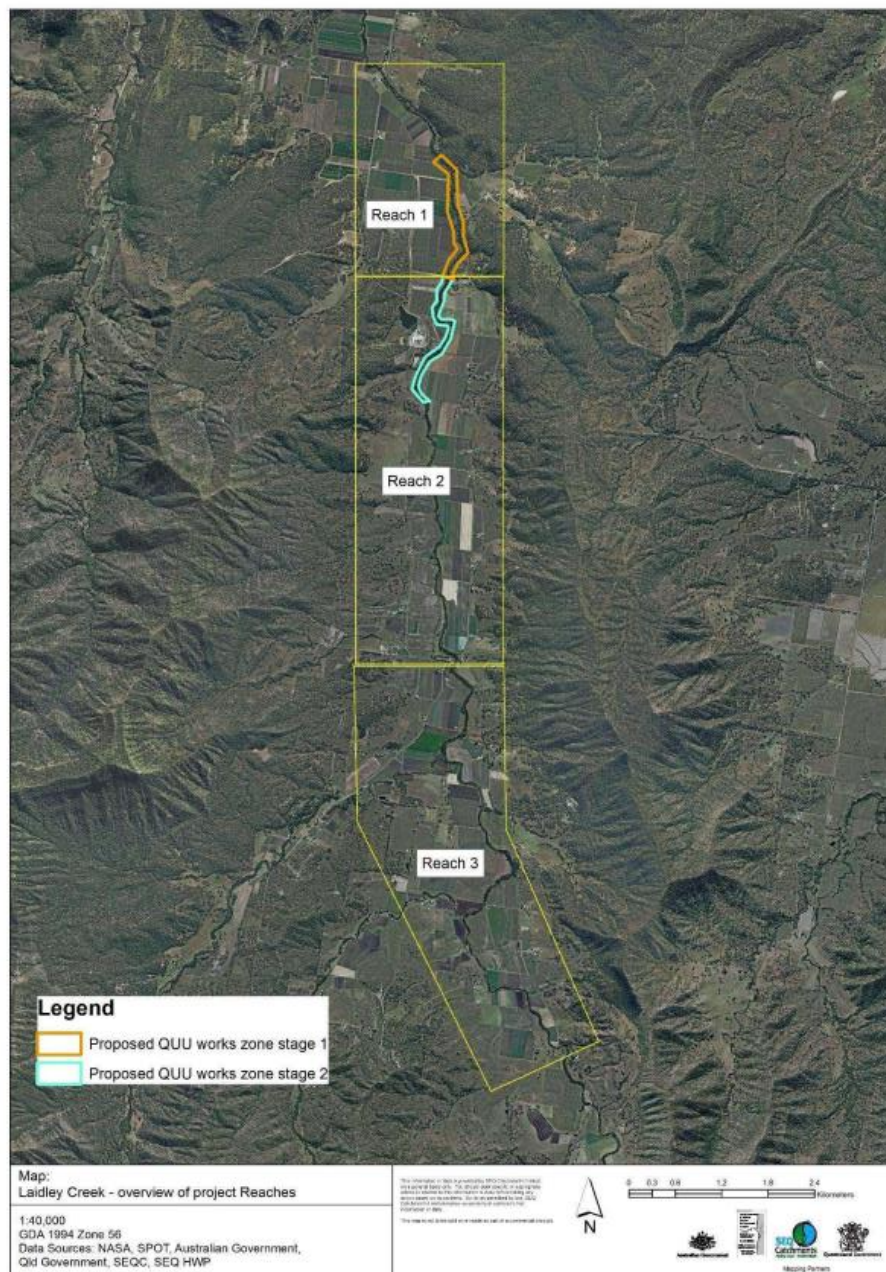


Figure 1: Map of Laidley Creek Strategic target area showing the 3 reaches and highlighting the proposed QUU works zones.

1.2: Understanding Laidley Creek

Laidley Creek is a significant source of sediment and nutrient loads into Lockyer Creek and subsequently the Brisbane River (Alluvium, 2016¹). This is particularly evident during major flood events. Recent channel adjustment after flooding in 2011 and 2013 resulted in substantial loss of land, damage to public and private infrastructure, and large volumes of sediment eroded and transported downstream to Lockyer Creek. As Lockyer Creek joins the Brisbane River downstream of Wivenhoe Dam, there are no major barriers to sediment transport between Laidley Creek and the Brisbane River.

Sediment generated from erosion in Laidley Creek therefore has potential to be transported to the Brisbane River potentially impacting on Brisbane's water supply and treatment process, Moreton Bay and the industries that rely on a healthy and functioning ecosystem in the Bay such as Fisheries and Tourism.

The system is significantly altered from its natural state and has a highly degraded riparian corridor. The Creek is not stable; it is continuing to deepen and widen and in some places is at risk of avulsion (finding a new course). These aspects of creek instability have implications for increased sediment supply to the downstream system as described above.

A review of historic channel change was undertaken to inform this investigation. Aerial imagery from various years between 1951 and 2013 was available to assess the historic rates of channel change (Figure 2). The analysis of historical aerial photos enabled changes in vegetation condition, channel width and planform to be assessed both historically and also more recently in the flood event of 2013. Limited change in the planform alignment of the macrochannel of Laidley Creek through the area of works was found, however there appears to have been widening of the inset channel throughout the area.



Figure 2: Laidley Creek bank alignment in Reach 1 from 1951 to 2013 – the red lines indicate top of macro-channel bank in 2013

Significant degradation of the inset features of the macrochannel has occurred between 1951 and 2013 (Figure 3). Mobilisation of sediment from these inset features has led to significant volumes of sediment transported downstream.

¹ Laidley Creek Management Options memo from Alluvium, 2016.



Figure 3: Degradation of inset bench within Reach 1 Laidley Creek demonstrated by change in aerial photography and change in elevation between 2011 and 2013 displayed on 2014 LIDAR (yellow and pink displays a drop in elevation indicating erosion has occurred)

1.3: Erosional processes within Laidley Creek

The erosion in Laidley Creek is the result of a range of complex and interrelated processes. Previous assessments have indicated that bed incision (i.e. channel deepening) processes may be occurring in the upper portion of Reach 1 and throughout Reach 2 (Alluvium, 2013), this was confirmed with a detailed field inspection undertaken and bed grade surveys undertaken for both reach 1 and 2 (Figure 4 shows the reach 1 survey). The incision processes may have been initiated by a combination of:

- Increased flows due to catchment clearing and burning of the steep hill slopes
- Reduction in coarse sediment supply due to ford and culvert crossings in upper reaches and tributaries
- Reduction in coarse sediment supply due to localised gravel extraction activities
- Loss of channel resistance through riparian clearing and desnagging

The bed incision has most likely resulted in increased rates of fluvial scour along the toe of the bank which has initiated mass failure of the upper bank. This process accounts for the active widening of the inset channel which has been observed in the aerial imagery analysis. Mass failure and/or scour of the bank has resulted in the collapse of constructed levees. In the 2013 flood event, such breaches in the constructed levees created concentrated floodplain flow paths and associated floodplain scour (e.g. Figure 5). The implementation strategy detailed in section 5.3 is designed to halt ongoing bed incision and reduce the potential for erosion on the creek banks through a combination of soft and hard engineering earthworks and associated revegetation.

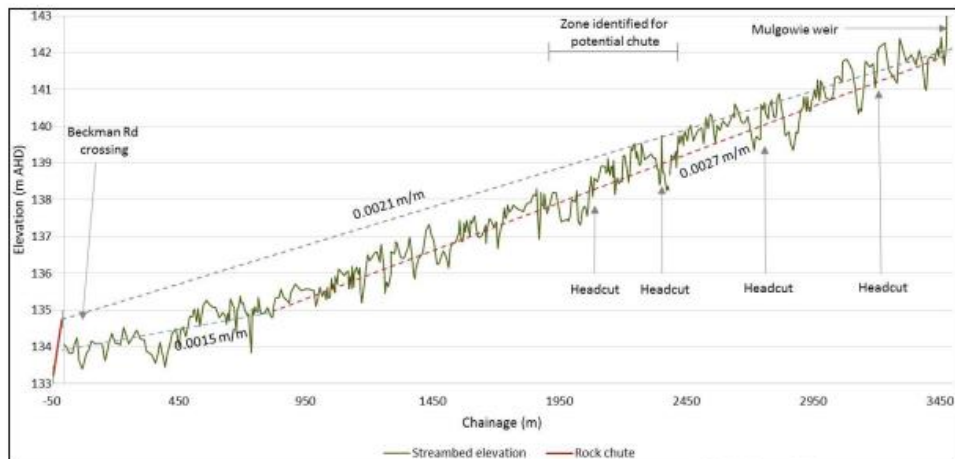


Figure 4: Bed grade survey outcomes in reach one, a number of incisions were found toward the upstream area of reach one that required bed control structures to limit further deepening. Similar issues have been identified in Reach 2.

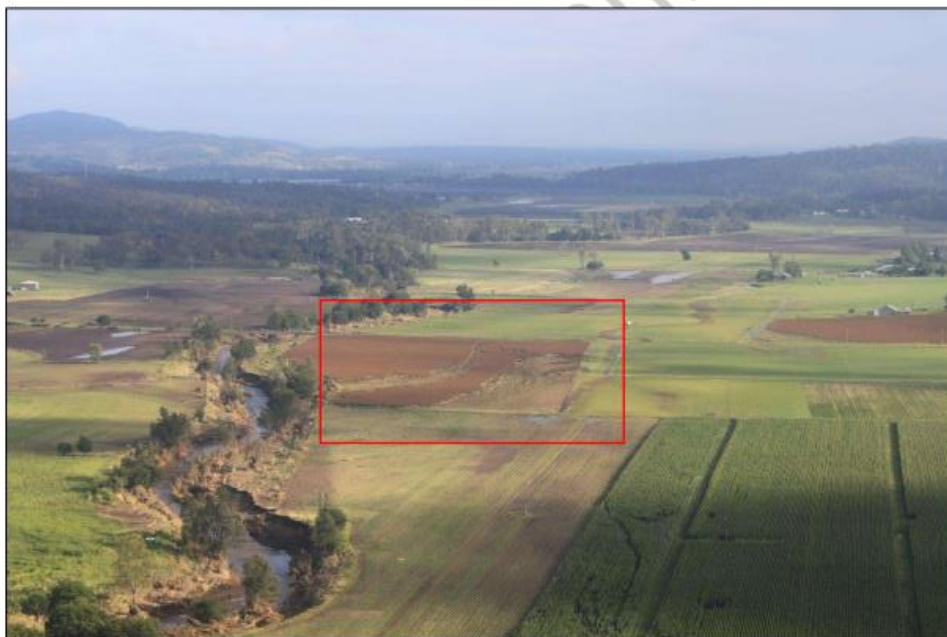


Figure 5: An area where the levee has been breached and the floodplain scoured, leading to a mass loss of soil. Also note the highly eroded creek banks following the 2013 flood.

Section 2: Modelling Methodology and Results

2.1: Modelling Methodology

The erosion avoided estimates identified in this report were generated using the methodology developed during the Beaudesert Pilot Project in 2013. The primary models used to generate these estimates include the Bank-Stability and Toe Erosion Model (BSTEM), developed by the National Sediment Laboratory of the USDA's Agricultural Research Station and HEC-RAS, a one dimensional flow model developed by the US Army Corps of Engineers.

The investigation phase of this project has been able to leverage off the considerable amount of work undertaken to date as part of prior investments in Laidley Creek. The following section includes a brief description of the key components of the modelling process undertaken to identify the expected erosion in the project area under both un-remediated and remediated conditions.

Key components of the modelling process have included:

2.1.1: Calibration of the model

Calibration of the model is important to ensure estimates of future erosion are accurate. The BSTEM package is used to assess erosion at the toe of stream banks and subsequent upper bank collapse. LiDAR captured in 2011 (pre 2013 flood) and 2013 (post flood) was used to calibrate BSTEM. The 2013 flood event resulted in overbank inundation, breaking through the levee at several locations along the target reach, causing significant floodplain scour (see Figure 5). However this study has concentrated on sediment loss from instream sources and not floodplain scour. As a consequence only in channel flows have been used for the assessment, which according to geomorphologists Alluvium Consulting is considered to provide a conservative estimate of future erosion.

The model was calibrated through an analysis of eight representative cross sections through reaches 1 and 2. These cross sections represented locations where bank erosion occurred in the 2013 flood event. The calibration process comprised adjustment of model parameters to establish a match between the 2013 surveyed cross-section topography at each cross section and the modelled cross-sections topography following the application of the 2013 flood event to the 2011 bank profile.

Adequate calibration was achieved for five of the eight BSTEM cross-sections, an example is shown in Figure 6. This example demonstrates vertical shear failure, which results in the angular failure plane shown (yellow line). Achieving an adequate calibration in five of the eight BSTEM cross-sections gives a level of confidence that the model is providing a reasonable representation of the bank erosion processes given the complexity of erosional processes. (Further calibration details see Appendix 1.1).

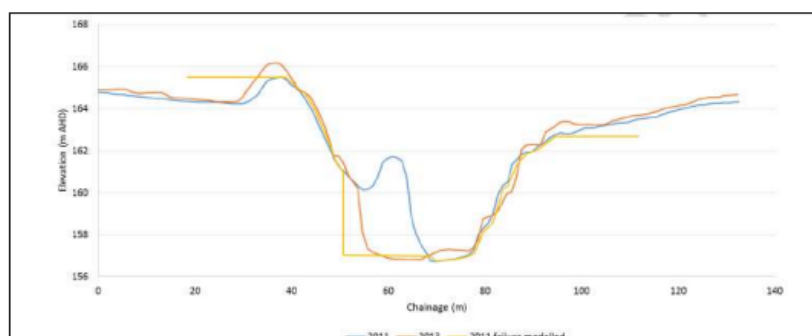


Figure 6: An example of the cross sectional model outcome compared to the pre and post flood LiDAR data. 2011 LiDAR in blue, 2013 LiDAR in orange and the calibrated model outcome shown in yellow. The modelled outcome shows the result of the 2013 event on the 2011 LiDAR data set, which then aligns with the actual erosion measured via the 2013 LiDAR.

2.1.2: Classification of geomorphic units

The classification of geomorphic units is important in understanding how different features of the waterway are affected by flow events. Cross sections used to assess the modelling outcomes were selected to represent the different geomorphic units found in the target section of Laidley Creek. Each geomorphic unit was classified into one of three categories:

- High bank – High, shear banks, typically consisting of resistant clay which is less erodible than the inset features
- Inset floodplain – depositional features located above the low water level, typically consisting of erodible sandy-loam soils. Major erosion of these features occurred during the January 2013 flood event
- Bench – distinctly-stepped depositional features located above the low water level, typically consisting of erodible sandy-loam soils. Major erosion of these features occurred during the January 2013 flood event

Each geomorphic unit along the target reach was assigned an individual identifier and the length for each was determined, this assisted in identifying the estimated expected erosion.

2.1.3: Design flood events

A range of design flood events were run in order to estimate sediment loss volumes for different magnitude flood events, these flood events are entered into the model to assess expected erosion. A partial Flood Frequency Analysis (FFA) was run using data from the Mulgowie Gauge to determine design events between 1 and 10 years. As previously discussed based on information from the DNRM gauge rating and previous studies, it is assumed that the gauge data represents only in channel flows. The results from the FFA are shown in Table 1.

Table 1: Design Peak flows for Laidley Creek at Mulgowie Weir

Average Recurrence Interval (ARI)	1	2	5	10
Peak Discharge – Laidley Creek at Mulgowie Weir (m ³ /s)	71	187	277	309

The BSTEM analysis within Hec-RAS is sensitive to both peak flows and flow duration. As such, a key input into the hydraulic model is a flow hydrograph. The hydrographs for events matching the design peak flows in the 42 year flow record were analysed. The duration of flows was variable for each peak

flow event, as such both a short duration and long duration event was run for each ARI peak flow. An example for the short and long duration event for the 10 year ARI event is shown in Figure 7.

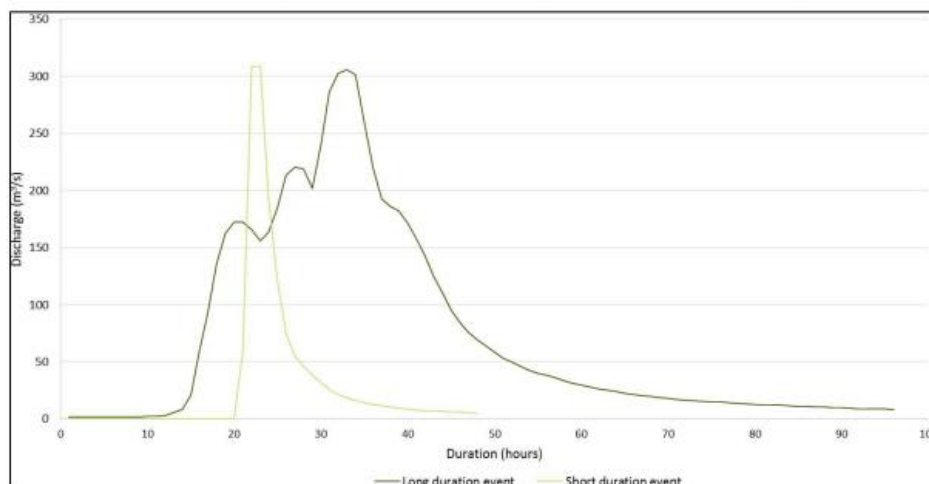


Figure 7: Long and short duration hydrographs for the 10 year ARI peak flow

Section 2.2 Modelling Results

2.2.1: Event sediment loss

The modelled outcomes of expected erosion resulted in large variance between the short and long duration flows identified as part of the flood frequency analysis, with events skewed toward the longer duration flows (See Appendix 1.2 for further detail). Therefore an average flow duration was identified by Alluvium Consulting (geomorphologist experts) and is considered to be a conservative assumption. Table 2 shows the sediment loss expected in each reach under the short, average and long duration design events.

2.2.2: Annualised estimates

To determine an annual sediment loss the relationship between flood magnitude and sediment load was applied to the flow record at the Mulgowie Weir gauge. Each individual flow event above a threshold was extracted in order to determine the volume of erosion per event. Events had a seven day independence so events which have multiple peaks are only counted once (this is considered a conservative assumption).

A bank erosion threshold is required as there is currently significant weedy vegetation within the channel which provides some limited stabilisation to the underlying bank material. These weeds are typically shallow rooted and provide limited resistance to erosion. Based on Alluvium Consulting's experience in modelling waterway erosion they have assumed that once a threshold of 90 m³/s is reached under an 'average duration flow' this weedy vegetation is stripped and the banks which are composed predominately of sandy-loam material begin to erode (for further detail see Appendix 1.2).

Table 2: Sediment loss estimate for each design event

Design event	Peak flow (m ³ /s)	Short durations		Average durations		Long durations	
		Reach 1	Reach 2	Reach 1	Reach 2	Reach 1	Reach 2
		volume (m ³)		volume (m ³)		volume (m ³)	
1 year	72	4,436	10,421	7,287	16,116	10,138	21,811
2 year	185	9,833	21,768	25,000	51,899	40,168	82,031
5 year	284	11,417	24,509	35,793	75,046	60,169	125,583
10 year	309	11,554	23,930	35,355	70,367	59,155	116,804
2011 – 2013 (m ³)*	380	66,000	192,000	66,000	192,000	66,000	192,000

* This is one event only and was calculated using a differential DEM analysis

Based on these assumptions, long term sediment losses per length of waterway are estimated to be 7.2 m³/m and 8.8 m³/m for Reach 1 and Reach 2 respectively. Table 3 shows the average sediment loss estimates broken down into estimates for the left and right bank at the 90m³/s flow threshold used.

Alluvium is confident that these rates are likely to occur over the next 10 years while the channel morphology remains similar to the current condition. After this period there is the potential for more resistant clay boundary layers to be reached which may reduce rates of erosion. However there is also the potential for bed incision to result in significant rates of bank erosion and mass failure of the steep banks which abut the floodplain which to date have been comparatively stable compared to the inset features. These estimates do not account for the additional erosion that would arise from such incision. Similarly the estimates do not include the loss of sediment associated with floodplain scour.

Table 3: Average sediment loss results in each reach under different scenarios

Flow threshold		Left bank (reach 1)	Right bank (reach 1)	Left bank (reach 2)	Right bank (reach 2)
90 m ³ /s	Total sediment loss (m ³)	442,882	484,016	755,541	1,327,292
	Annual sediment loss per year (m ³)	10,545	11,524	17,989	31,602
	Annual sediment loss per length of waterway (m ³ /m/year)	3.6	3.6	3.2	5.6

2.2.3: Sediment avoided estimates

Alluvium estimates that the proposed works have the potential to result in a significant reduction in sediment loads from Reach 1 (≈90-95 % and Reach 2 (≈92-98 %). These estimates assume uniform vegetation establishment throughout the reach across the 10 year establishment period. In order to make a final calculation of erosion to be avoided, SEQCS has taken a conservative approach and used 90% avoided in both reaches, resulting in a sediment offset of 6.5m³/m for Reach one and 7.9m³/m

for Reach 2. Table 4 details estimates for erosion for each bank in reach 1 and 2. Reach 2 has higher expected erosion rates because of its more degraded state and the expectation of greater stream powers in that reach. For further detail on these estimates see Appendix 1.4.

Further, on-ground creek bed surveys and geomorphological assessments in the field were conducted to sense-check the validity of the LiDAR data and modelling outcomes. This has provided a significant degree of confidence in the results achieved as part of the modelling process.

Table 4: Annualised erosion avoided available by undertaking works along Laidley Creek in Reach one and two and annualised avoided erosion 'offset' m³/per metre of bank. For full modelled outcomes see Appendix 1.4, tables 9-12.

Side of creek	Reach 1		Reach 2	
	Left bank	Right bank	Left bank	Right bank
Average offset from years 1 to 10 on the left bank (m ³)	9,960 (total possible works extent 2950m)	6,034 (total possible works extent 1500m)	16,604 (total possible works extent approx 5678 m)	11,356 (total possible works extent approx 5678 m)
Annualised offset m ³ /per metre of bank	3.4	4.0	2.9	5.5

Section 3: Soil Assessment

3.1: Soil Nutrient Concentration Sampling Methodology

The methodology developed as part of the Beaudesert pilot project was employed to ascertain the nutrient concentration of the soil profile along the proposed project area. In brief, the nutrient concentration of the soil profile is identified through the direct measurement of Total Nitrogen (TN) and Total Phosphorus (TP) concentration in the soil at a range of locations along the target project area, at 50cm intervals to a depth of 4.5 metres, essentially the erodible bank profile of the area modelled.

Soil sampling from seven locations were conducted, including a triplicate at location 5 (see Figure 8 for map of locations). Samples were collected with a geoprobe industrial soil corer which in all but one location achieved a sample depth of 4.5m. 85 bulk samples were taken at 50cm intervals and sent for analysis at the laboratories of the Queensland Government Department of Science, Information Technology and Innovation (DSITI).

Analysis of the soil samples has included both the Dumas and Kjeldahl method of nutrient analysis (See appendix 2 for further detail). Whilst the Dumas method truly determines Total N, the Kjeldahl method only converts protein N and some nitrate (NO³-N) into ammonium². Both methods have been undertaken as the Dumas method is only accurate at levels higher than 0.05%. Alternatively the Kjeldahl test provides readings down to 0.01%.

² Simonnea, E., & Mills, H (1998) Does the nitrate fraction account for differences between dumas-N and Kjeldahl-N values in vegetable leaves? Journal of Plant Nutrition 21 (12), 2527-2534.

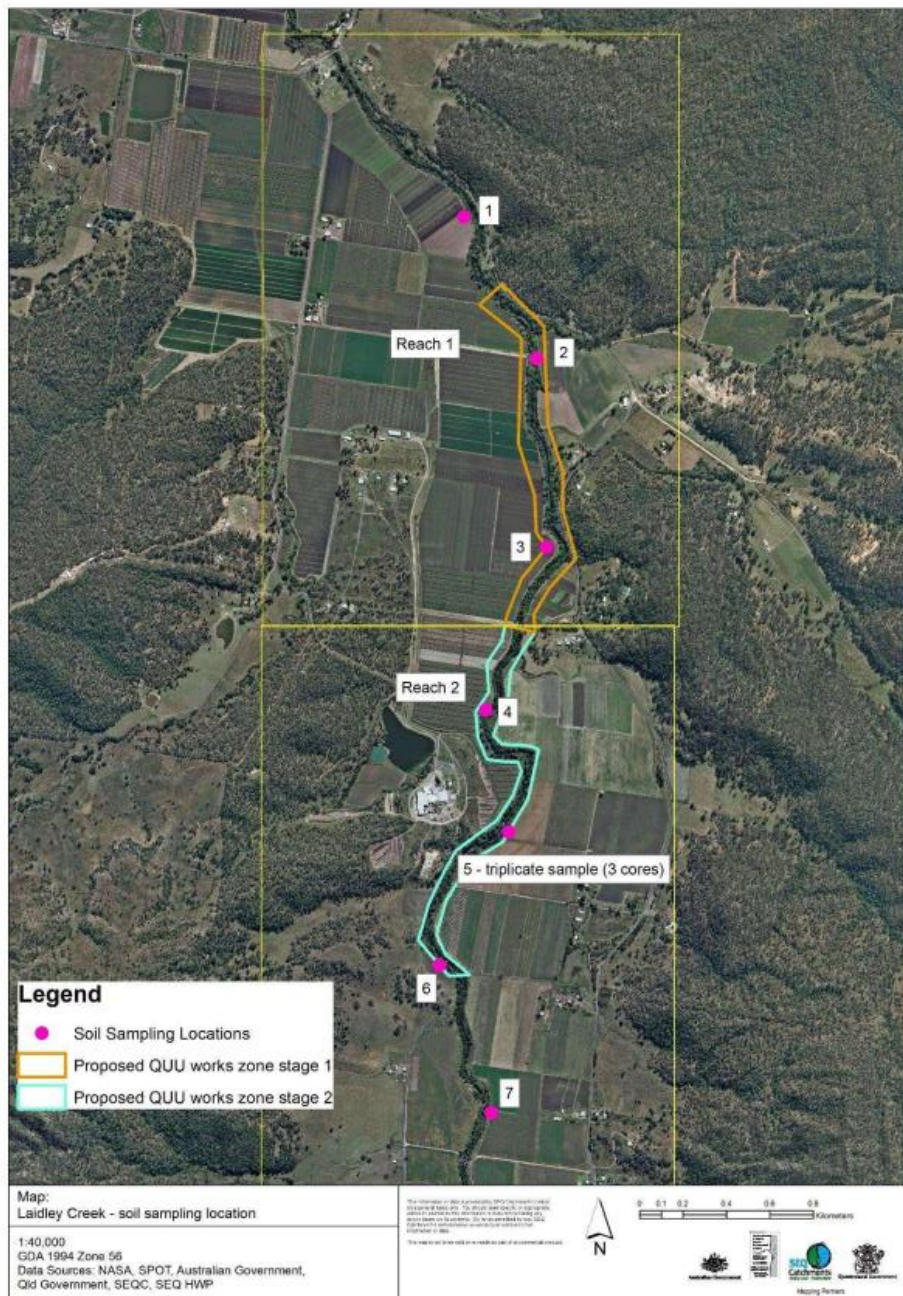


Figure 8: Soil sample locations

3.2: Soil Nutrient Concentration Analysis Results

Thirty-nine of the 85 soil samples returned TN estimates (Dumas technique) greater than the 0.05% detection limit and 76 of the 85 soil samples returned TKN results greater than the 0.01% detection limit. The 39 samples for which both TN and TKN estimates were greater than the respective detection limits was used to generate an understanding of the component of TN represented by TKN (percentage increase of TN over TKN). The approach used provides a median difference of 14.3% increase in TN over TKN.

As QUU's Environmental Authority regulates TN, Dumas is the appropriate measure to convert sediment erosion avoided to nutrient (TN) erosion avoided for the purposes of the Policy. The challenge in determining a soil profile TN level for the purposes of calculating nutrient erosion avoided is that for much of the lower soil profile, TN is below the Dumas test detection method (0.05%); though well above the TKN detection level (0.01%)

The approach employed by SEQC Services was to use TN values where TN >0.05% and use the conservative estimate of central tendency to convert TKN to TN for TN values <0.05% and TKN values >0.01%. Of the 85 samples analysed 13 returned a TKN of <0.01%, these samples have been calculated as having a value of 0.01% TN as the TKN analysis used provides the greatest possible accuracy of methodologies available at the selected laboratory. **On this basis (and assuming TN=0.01, when TKN<0.01), the total profile TN over the 9 profiles is 0.063%.**

For assessing Total Phosphorus (TP) the Total Kjeldahl Phosphorus (TKP) analysis was used as per the methodology employed under the Beaudesert Pilot Project and as TP is not the limiting nutrient identified in the system, the TKP analysis more than adequately provided the target TP offset QUU is seeking with a **TP concentration of 0.125%**. The averages for both analyses can be seen in Table 5, see Appendix 3 for full table of results.

Table 5: Average nutrient concentration of the soil assessed from the project location. Note profile 5 is a triplicate sample.

Soil profile assessed	Average TN (%)	Average TKP (%)
1	0.066	0.146
2	0.056	0.126
3	0.078	0.142
4	0.074	0.118
5.1	0.052	0.108
5.2	0.047	0.094
5.3	0.042	0.137
6	0.069	0.146
7	0.083	0.104
Average nutrient concentration	0.063	0.0125

3.3: Soil Bulk Density

Using Particle Size Analysis undertaken by DSITI 30 samples were assessed which resulted in an average PSA of 15.56% coarse sand, 43.98% fine sand, 20.17% silt and 20.29% clay.

To identify the bulk density of soil in the samples, the above noted average percentage soil composition was entered into two different soil texture triangles that are used to interpret percentage soil composition in to a known bulk density³. **The percentage soil composition of the samples**

³ From Carleton University, Ottawa Canada (http://http-server.carleton.ca/~msmith2/45211/Module5/soil_triangle.htm) and Geosciences Cooperation

classified the soil type on average as a sandy clay loam with a bulk density average of 1.44 (see Appendix 5 for full results).

Section 4: Engagement

4.1: Landholder Engagement

SEQC Services has engaged over the past several years with the majority of landholders in the Mulgowie to Thornton area where the proposed project is to be delivered. Over this time we have established strong relationships with a number of landholders and through past projects demonstrated our ability to undertake waterway restoration projects, improving riparian condition and importantly increasing farm resilience when faced with future flooding events.

The proposed delivery area will work on 3 private landholders properties and across multiple properties owned by the Mulgowie Farming Company (MFC), the major horticulture enterprise operating in the Mulgowie area. The details of each landholding can be found in Section 5.3. SEQC Services has engaged with all of the identified landholders where works are proposed for delivery and received their in-principal support for work to take place.

Should the project be funded, SEQC Services will request that each landholder sign an individual agreement stating they agree to the work, will not undertake any actions that in some way will impact the delivered works and in the future will continue to manage the restored riparian area of their property.

4.2: Government Engagement

The primary point of contact has been the Department of Natural Resources and Mines. They have supported all works delivered by SEQC Services in Laidley creek previously and provided their in-principal support for works to be delivered under this proposed plan. Once funded SEQC Services will act expeditiously to gain a Riverine Protection Permit (RPP) for the works detailed in Section 5.3.5 (detailed technical designs). We foresee no issues in gaining this permit.

The Department of Science, Information Technology and Innovation has supported the sampling regime undertaken to ascertain the nutrient concentration of the soil used to assess the required offset proposed in this report. Further, they have been engaged via work with the Offsite Stormwater Steering Committee (a Port of Brisbane project) to establish a water quality monitoring program that in time will complement the work proposed as part of this project.

SEQC Services is of the understanding that QUU has had a preliminary meeting with the Department of Environment and Heritage Protection (EHP) to assess their level of support for the proposed project. It is understood that this meeting went well and EHP have expressed support for the project. SEQC Services is available to assist QUU moving forward with any further engagement of EHP to discuss the contents of this report and any aspects of the proposed project to ensure the Government's acceptance of the project under the Nutrient Policy.

The Lockyer Valley Regional Council has been engaged regarding the proposed works. Personnel from Council have visited the area several times with SEQC Services personnel and are aware and supportive of the proposed works and other works undertaken to date in the creek by SEQC Services.

based on information from Washington State University
(http://geocoop.stormloader.com/soil_h2o.htm?140,222)

Section 5: Proposed Offset

5.1: Offset Quantum

It is SEQC Services understanding that QUU has a target offset of 5 tonnes TN and 1 tonne TP per year. Following the stream bank erosion nutrient offset decision support framework developed as part of the Beaudesert pilot project, the primary data set used to calculate the required on-ground activities to achieve the target offset is the 'annual sediment offset' identified in the modelling process and the nutrient concentration identified as part of the soil nutrient assessment.

The framework depicted in Figure 9 uses the annualised erosion avoided estimates of 6.5m³/m for Reach one and 7.9m³/m for Reach 2 where works are planned for delivery and the nutrient concentration findings of 0.063% TN and 0.0125 TP.



Figure 9: Stream bank erosion nutrient offsets decision support framework

Using the decision support framework and SEQC Services understanding of the project area, a total length of 2.05 kilometres of deliverable works and associated structures is required to achieve the target nutrient offset. At the project area these works will achieve an estimated 12,000T of sediment erosion avoided per year, with an associated nutrient offset of 7.57 T TN and 14.96T TP. Using an attenuation factor of 1.5 given the downstream distance of the STP from the project area, **it is proposed that the project will achieve a nutrient offset at the Laidley STP point of discharge of 5.05T TN and 9.98T TP.**

5.2: The Project Site

The proposed works are to be delivered in the upper section of Reach 1 and lower section of Reach 2. Within this area, the works to be delivered will occur at strategic locations on either side of the creek, in total rehabilitating 2.05km of creek bank (Figure 10).

The proposed works align with SEQC Services rehabilitation strategy for the area, progressively working upstream building natural resilience within the creek over time. These works will build upon efforts to date funded by a range of other organisations. The program of works considers these other organisations commitment to further funding the improvement of Laidley creek along the target area.

As noted in the geomorphic assessment, Laidley Creek is experiencing instabilities in both the creek bed and banks. Therefore investment must target the stabilisation of these two erosion threats, as targeting a single threat alone will not achieve the desired outcome. Under the Mechanism only restoration of the creek banks will contribute toward the offset quantum, however investment in controlling bed erosion is required to protect the investment in the bank stabilisation works (Alluvium, 2016⁴).

⁴ Laidley Creek Management Options memo from Alluvium, 2016.

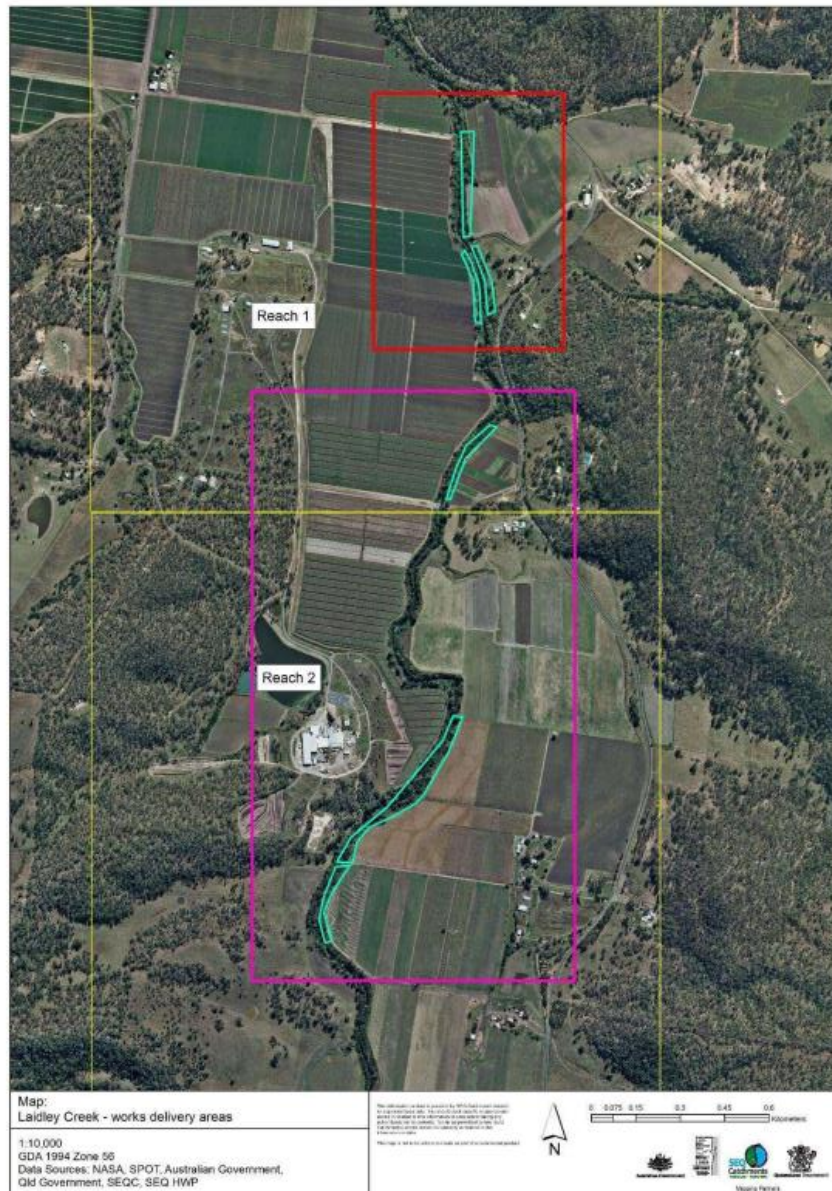


Figure 10: Shows an overview of the proposed locations where works will be delivered (in green) and broken down in to locations to be delivered in downstream (red) and upstream (purple). The yellow outlines show the delineation of reach 1 and 2.

5.3: Implementation Strategy

The following delivery plan details the specifics of the on-ground deliverables, the investment locations, technical plans and proposed timeline for delivery (noting that delivery timings are linked to climate and seasonal conditions).

The proposed works will include the delivery of 850m of bank battering and associated revegetation (see Figure 11 for example). It is proposed a further 1.2km of bank battering and revegetation be undertaken, the installation of rock beaching at several locations and the construction of one grade control structure in Reach 2. After planting, vegetation on the sites will be managed intensively for 2 years and less intensively for another 3 years so as to give it the best chance of survival.

Section 5.3.5 details the technical plans that are identified for delivery over the implementation process.



Figure 11: An example of a battered bank on Laidley Creek

5.3.1: Proposed Delivery Plan

The proposed works are to be delivered from the most upstream extent of restoration work currently delivered, shown in Figure 12. There are three particular locations where work will be delivered in year 1, across 3 different landholders' properties, including:

Landholder one: Mulgowie Farming Company

Lot/Plan and property details: 17 Mulgowie School Road, Mulgowie, 4341; Lot 49 CH3149 & Lot 2 RP28308; Primary land use is small crops and fodder – irrigated; 55.2Ha in size and free hold tenure.

Proposed works: 300m of bank battering, levee adjustment and revegetation. Figure 13 shows a typical eroded section along where the works are proposed. SEQC Services has worked with MFC over the past several years undertaking bank stabilisation works. Due to the large size of the organisation they are able to offer significant in-kind contributions to any projects delivered on their land. In the form of machinery to spread excavated soil on their cultivation and personnel to assist with some watering of the remediated creek bank to establish grass cover.

Landholder two: Michael Lerch

Lot/Plan details: 126 Mulgowie Road, Mulgowie, 4341; L1 RP215312; Primary land use is small crops and fodder – irrigated; 18.27Ha in size and free hold tenure.

Proposed works: 350m of bank battering, levee adjustment and revegetation. Figure 12 shows a map where these works are proposed for.

Landholder three: Maree & Lindsay Smith

Lot/Plan details: 130 Mulgowie School Road, Thornton, 4341; Lot 2 & 3 RP807883; Primary land use is for a dwelling; 2.79 Ha in size and free hold tenure.

Proposed works: 200m of bank battering, revegetation and fencing. Figure 12 shows a map where the works are proposed for delivery.



Figure 12: Delivery locations with relevant landholder details next to the works zone proposed to be delivered on their property



Figure 13: Typical eroded bank with only grass growing on it and no trees. This type of bank is highly prone to erosion in future flow events.

Commercial in Confidence



Figure 14: Upstream delivery locations with relevant landholder details next to the works zone proposed to be delivered on their property

The works to be delivered will work cooperatively with other organisations investing in the area. One landholder is located in Reach 1 of the project area and the other two locations for delivery are in Reach 2, above the Laidley Creek Weir (See Figure 14). In addition to the bank battering works delivered this year will include the construction of a grade control structure and rock beaching to increase the resilience of a particularly vulnerable sub reach. The 3 landholders where works are proposed include the following properties:

Landholder Four: Robert Elliot

Lot/Plan and property details: 137 Mulgowie Road, Mulgowie, 4341; Lot 2-3 CC1420, Lot 4 RP32848 & Lot 4 RP836235; Primary land use is small crops and fodder – irrigated; 155.1Ha in size and free hold tenure.

Proposed works: 300m of bank battering, levee adjustment and revegetation. Figure 14 shows a map where the proposed works are to be located.

Landholder one (different property to year 1 delivery): Mulgowie Farming Company

Lot/Plan and property details: 152 Mulgowie Road, Mulgowie, 4341; Lot 49 CH3149 & Lot 2 RP28308; Primary land use is small crops and fodder – irrigated; 55.2Ha in size and free hold tenure.

Proposed works: 600m of bank battering, levee adjustment and revegetation. An area of rock beaching will also be installed along this site where there is a particular risk of erosion along the toe of the bank identified in the modelling process and ground-truthed with an on-site inspection. This stretch of the project is also where a grade control structure will be installed as it was a section of the creek that was noted as having significant deepening potential. Rock chute style grade control structures are one of the most effective methods to halt incision. The structures limit deepening by providing a fixed hardened point within the channel bed. Cut-off walls at the crest and toe provide further security against this process. The structures can also lower the hydraulic gradient upstream of the crest which can reduce stream power and increase the likelihood of vegetation establishment. Figure 15 shows an example of a grade control structure installed further upstream in Laidley creek.

Figure 14 shows where the proposed works are to be located.

Landholder five: Paul Emmerson

Lot/Plan and property details: 153 Mulgowie Road, Mulgowie, L80 CH311035 & L136 CH311847 & L141 RP215334 & L2 RP32854 & L11 SP145223; Primary land use is small crops and fodder – irrigated; 108.29 Ha in size and free hold tenure.

Proposed works: 300m of bank battering, levee adjustment and revegetation. Figure 14 shows the actual area of delivery.

In addition to the in-kind contributions mentioned it should be noted the considerable productive land 'given up' by the landholder to undertake the project. This however provides a win-win outcome for QUU in the form of a location for project delivery, the landholder through improved farm resilience when faced with floods and the greater society and environment through the avoidance of sediment delivered downstream resulting from an on-going erosion problem.

The above noted locations are the result of our geomorphic assessment and negotiations with landholder to approve the delivery of work on their land. Given the 2 year delivery timeframe, should any issues arise that greatly change the developed technical plans or landholders change position on investment on their property, SEQC Services will be able to identify other areas for investment close to those proposed above and still achieve the required offset outcomes.

5.3.3: Ongoing maintenance and monitoring

As per the methodology used at the Beaudesert project, SEQC Services will continue to maintain the site for a period of five years post construction. This will include periodic weed management, inspections of the constructed structures and ongoing engagement with the landholders involved in the project.

SEQC Services will monitor the site as per the agreement between QUU and EHP as regulated by the amendments made to the Laidley STP. SEQC Services has budgeted for biennial LiDAR monitoring. QUU will need to confirm with EHP if this is a suitable monitoring regime. If annual LiDAR is required the proposed budget will need to be updated to account for this.

5.3.4: Proposed Delivery Timeframe

All efforts will be made to achieve the outcomes identified in the timeline, however unforeseen circumstances such as landholder related issues and delays related to the weather may impact on delivery. Should this occur the delivery schedule will be reviewed in discussion with QUU.

Table 6: Proposed delivery timeline

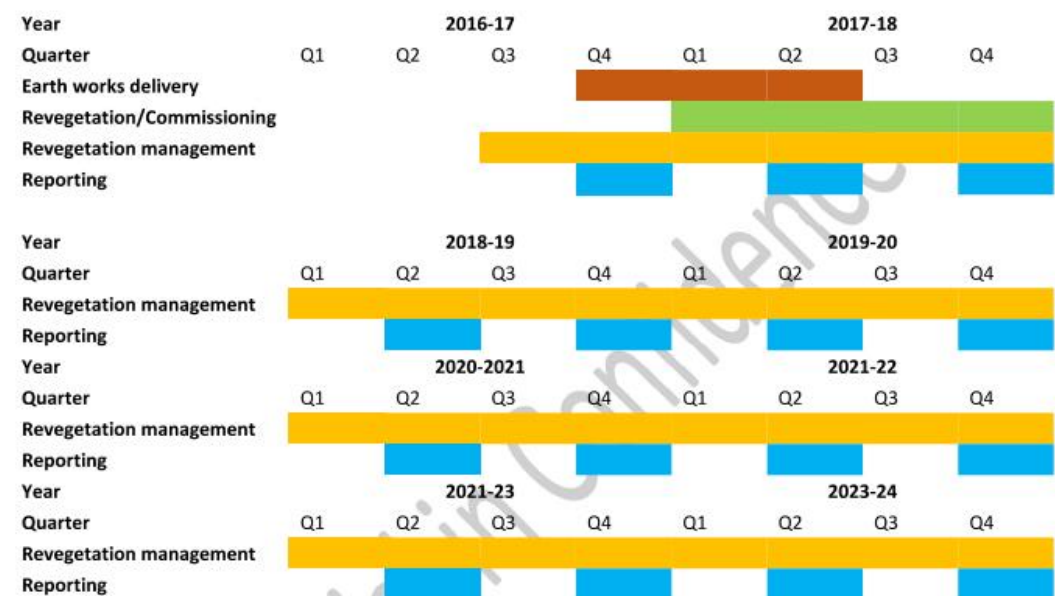


Figure 15: An example of a grade control structure constructed upstream in Laidley creek in 2013

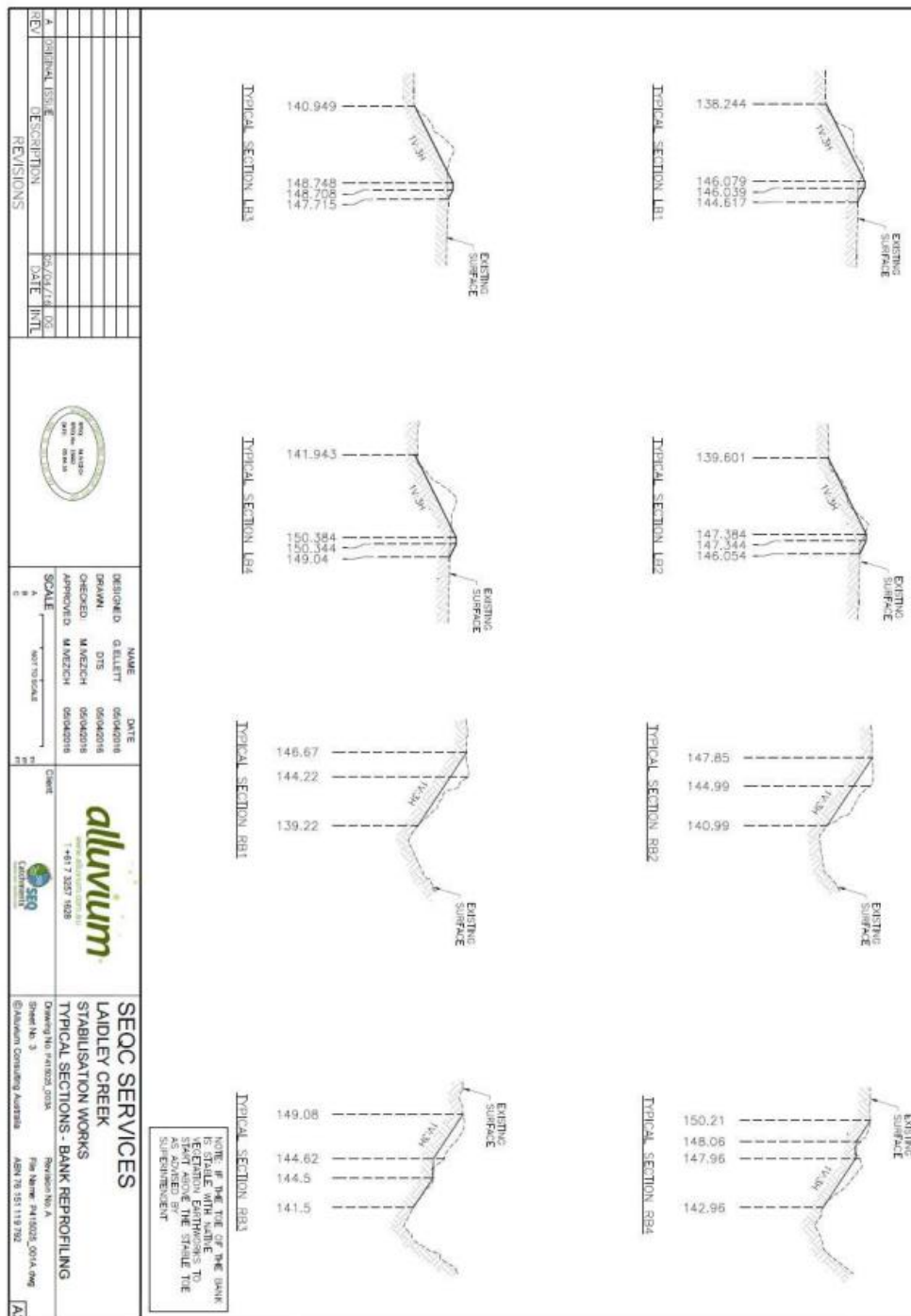
5.3.5: Technical Plans

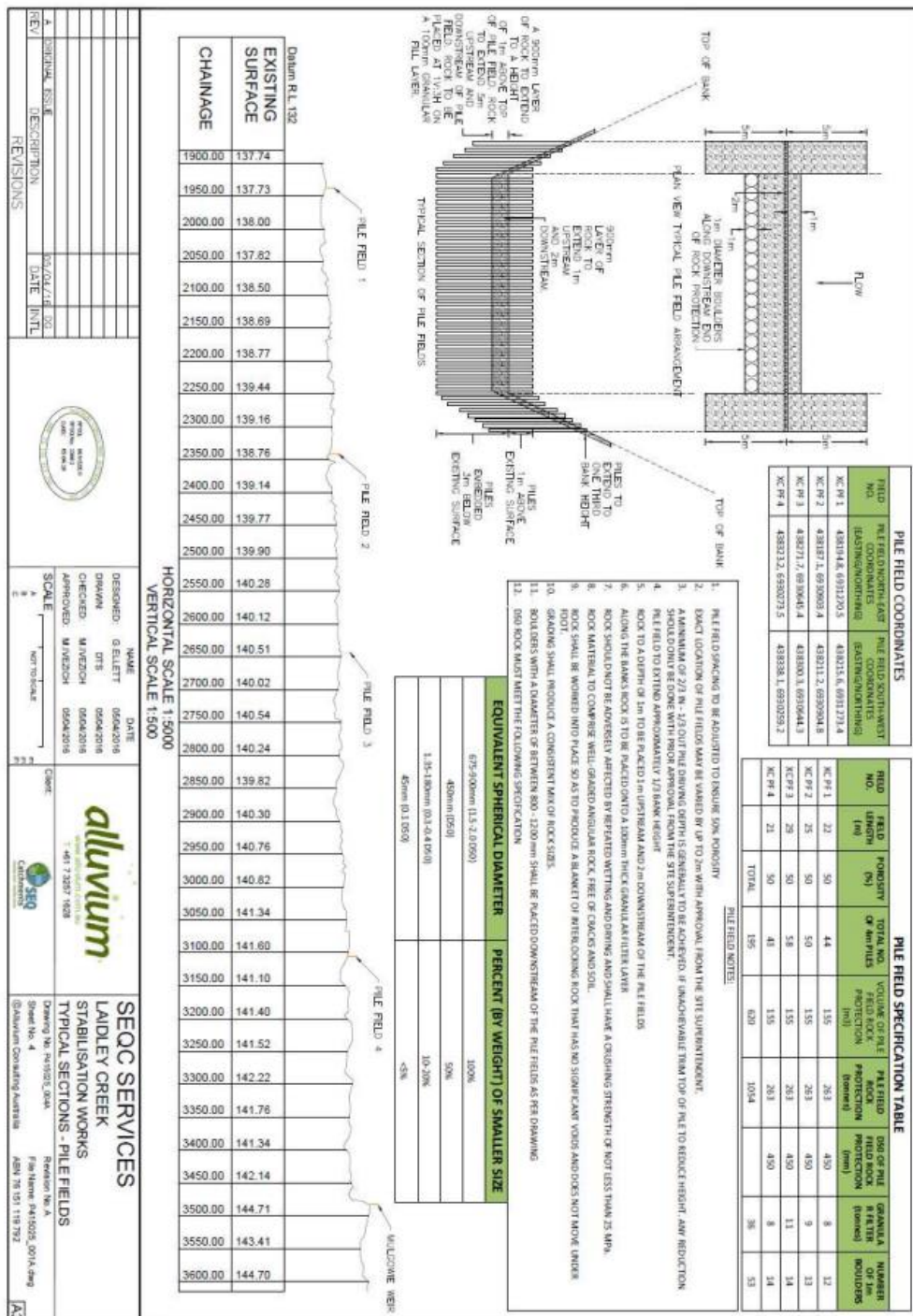
Note that the below technical plans go beyond the scope of works proposed under section 5.3.

Reach 1



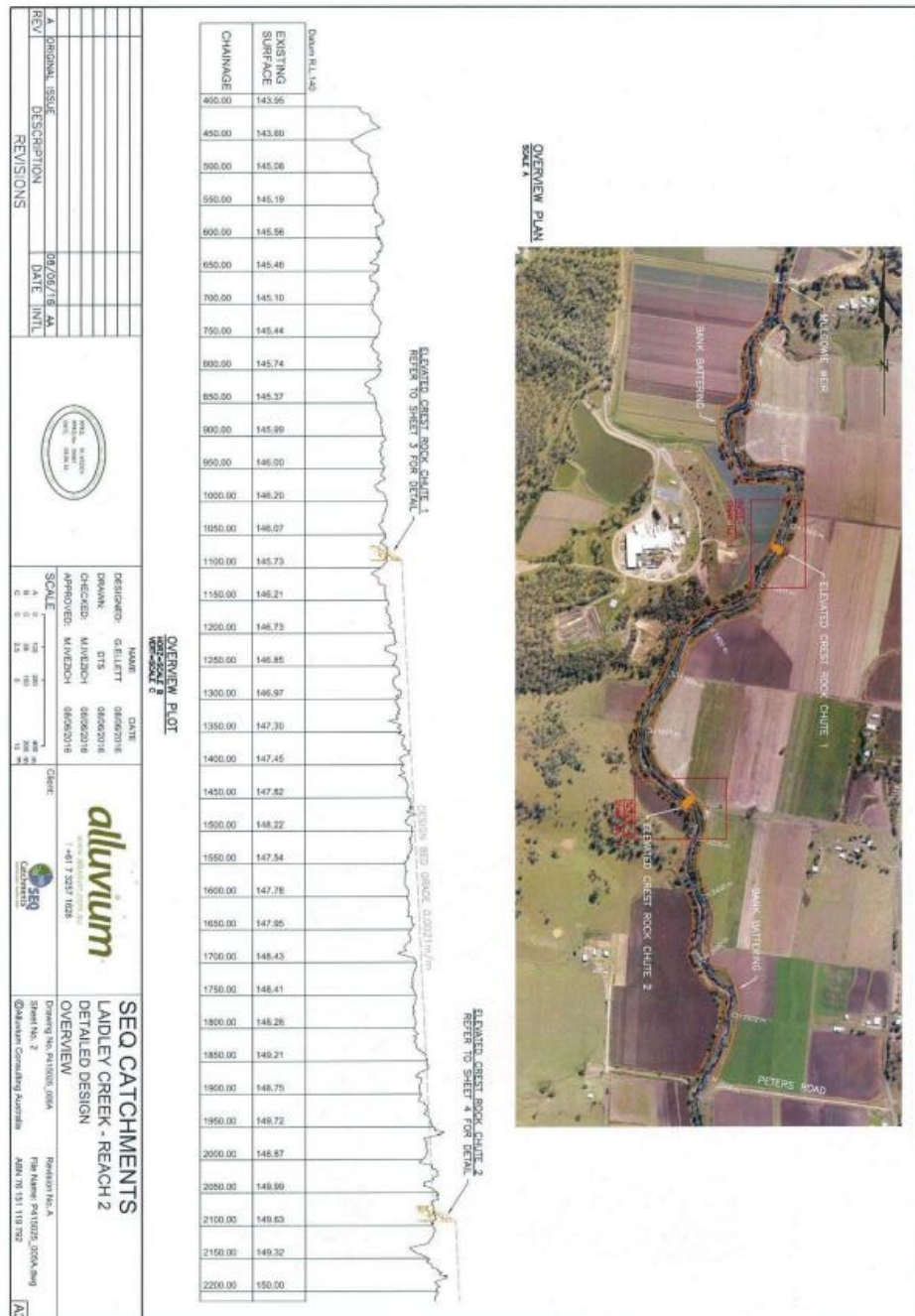


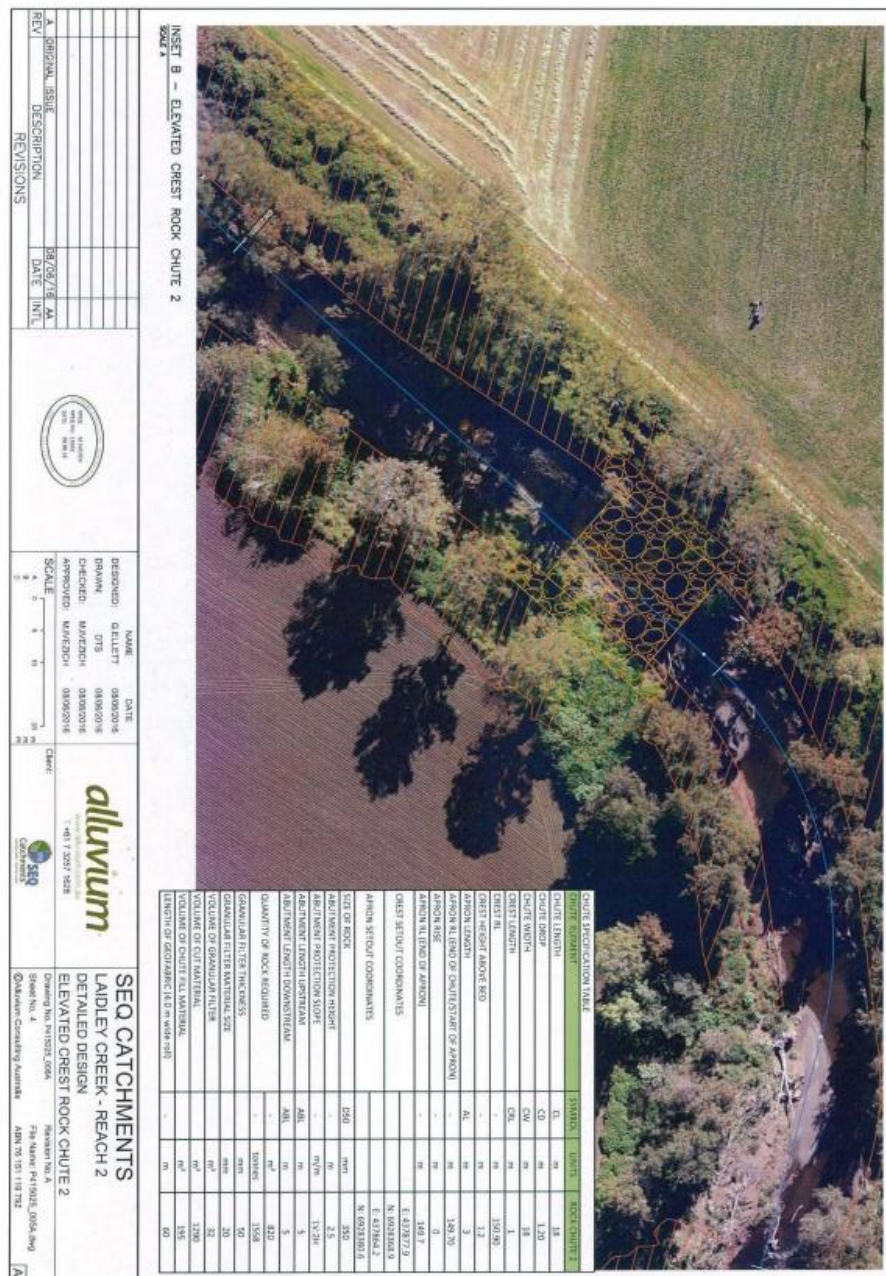




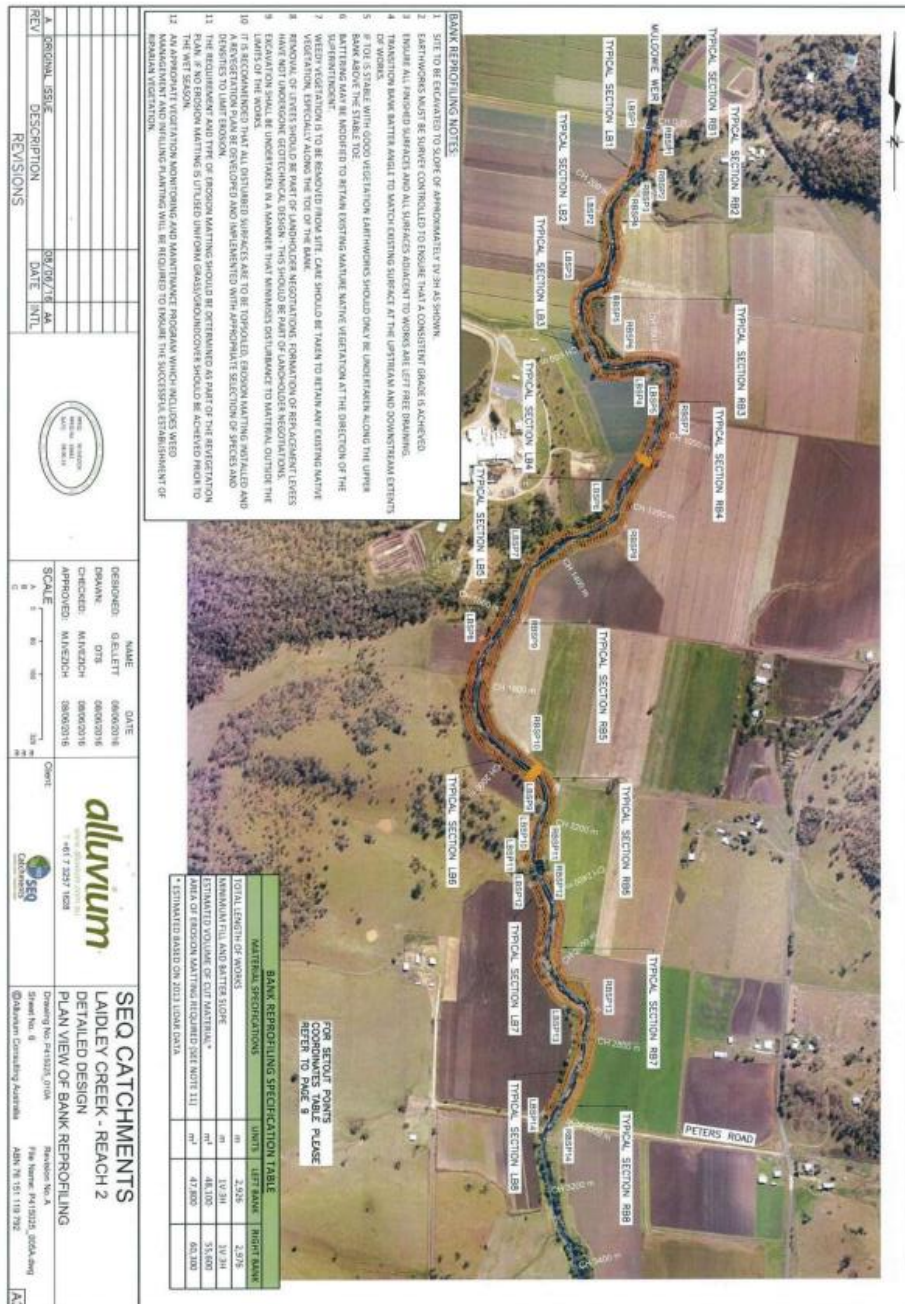
Reach 2

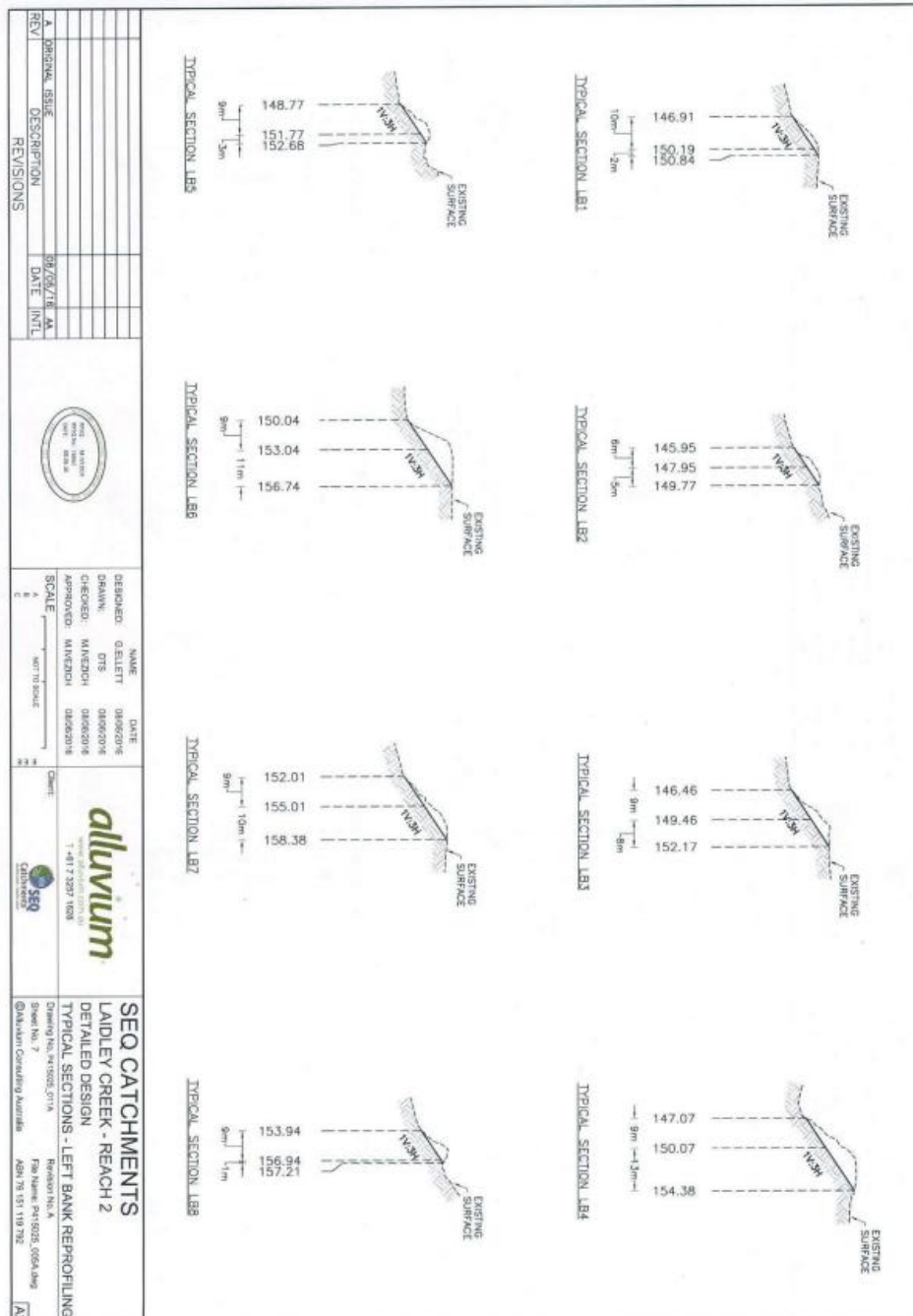


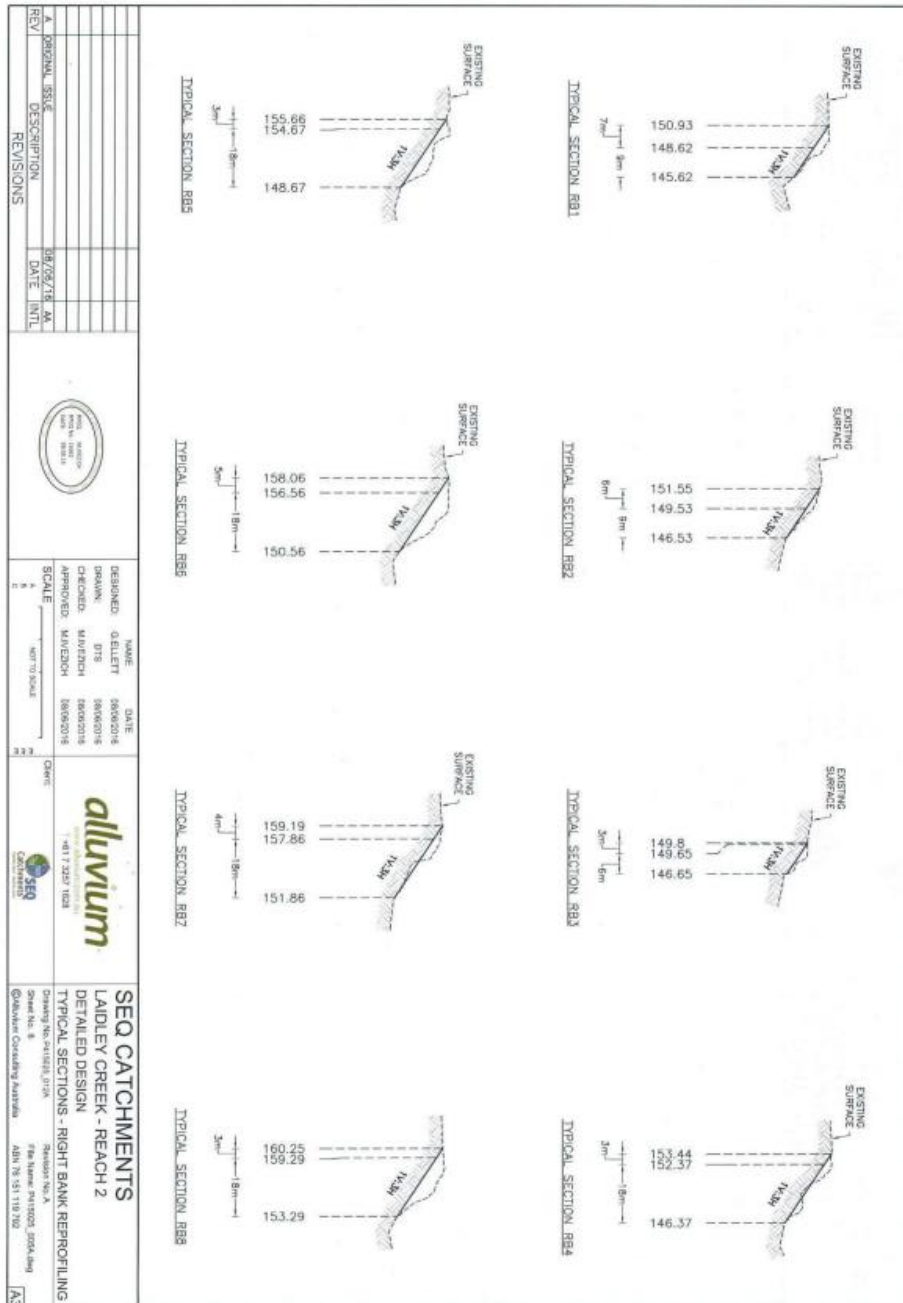












ROCK CHUTE NOTES																
MATERIALS 1. ROCK SHOULD NOT BE ADVERSELY AFFECTED BY REPEATED WETTING AND DRYING AND SHALL HAVE A CRUSHING STRENGTH OF NOT LESS THAN 25 MPa. 2. SAND ROCKS MUST MEET THE FOLLOWING SPECIFICATION: <table border="1"> <thead> <tr> <th>TEST</th> <th>MINIMUM</th> <th>MAXIMUM</th> </tr> </thead> <tbody> <tr> <td>ASTM D1555-05(2008)</td> <td>100%</td> <td>100%</td> </tr> <tr> <td>ASTM D1555-05(2008)</td> <td>100%</td> <td>100%</td> </tr> <tr> <td>ASTM D1555-05(2008)</td> <td>100%</td> <td>100%</td> </tr> <tr> <td>ASTM D1555-05(2008)</td> <td>100%</td> <td>100%</td> </tr> </tbody> </table> 3. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 4. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 5. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 6. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 7. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 8. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 9. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 10. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 11. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 12. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 13. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 14. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 15. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 16. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE. 17. ROCKS MUST BE PLACED IN A SINGLE ROW 1.5 METRES ON EACH SIDE OF THE CHUTE.		TEST	MINIMUM	MAXIMUM	ASTM D1555-05(2008)	100%	100%	ASTM D1555-05(2008)	100%	100%	ASTM D1555-05(2008)	100%	100%	ASTM D1555-05(2008)	100%	100%
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BATTERING SETPOINT POINTS	
SETPOINT POINT	EASTING
BP01	488111.7
BP02	488011.6
BP03	487911.5
BP04	487811.4
BP05	487711.3
BP06	487611.2
BP07	487511.1
BP08	487411.0
BP09	487310.9
BP10	487210.8
BP11	487110.7
BP12	487010.6
BP13	486910.5
BP14	486810.4
BP15	486710.3
BP16	486610.2
BP17	486510.1
BP18	486410.0
BP19	486309.9
BP20	486209.8
BP21	486109.7
BP22	486009.6
BP23	485909.5
BP24	485809.4

NAME	DATE
DESIGNED: O. ELIOTT	08/03/2016
DRAWN: M. WATSON	08/03/2016
CHECKED: M. WATSON	08/03/2016
APPROVED: M. WATSON	08/03/2016

SCALE: 1:1000

alluvium

1:481.7 1807.038

SEQ CATCHMENTS
LADLEY CREEK - REACH 2
DETAILED DESIGN
NOTES

Drawn by: M. WATSON
Checked by: M. WATSON
Approved by: M. WATSON

Project No: 15/119/702
File Name: 15/119/702_0004.dwg
Revision: A3

LAIDLEY CREEK REVEGETATION

Zone : Blank		To bl area (M2) : 2500		Target RE : 12.3, 12.3.3	
Canopy Species		Common Name	Quantity		
Botanical Name					
<i>Casuarina cunninghamiana</i>		River She-oak	21		
<i>Eucalyptus tereticornis</i>		Forest Red Gum	20		
Total			41		
Subcanopy Species					
Botanical Name	Common Name	Quantity			
<i>Melaleuca bracteata</i>	Black Tea Tree	24			
<i>Melaleuca viridula</i>	Weeping Bottlebrush	20			
Total			44		
Understorey Species					
Botanical Name	Common Name	Quantity			
<i>Costaraspium australe</i>	Black Bean	24			
<i>Ficus coronata</i>	Sandpaper fig	20			
Total			44		
Ground Species					
Botanical Name	Common Name	Quantity			
<i>Lomandra hystrix</i>	Common Rush	100			
Total			221		
TOTAL STEMS			221		

[illegible]

24. MONITOR AND RECORD DATA FROM PHOTO MONITORING POINTS AT MONTH INTERVALS.

LAIDLAY CREEK REVEGETATION

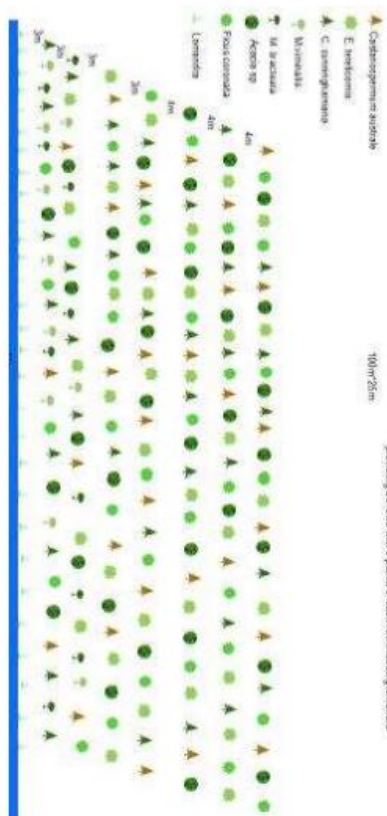
25. ALL PLANTS SHALL BE SET IN TO SPECIFIED HOLES/CLIMATE, WELL WATERED, AND COVERED WITH MULCH. THE PLANTS SHALL BE SET IN TO THE GROUND IN A HOLE THAT IS 10 CM DEEPER THAN THE PLANT'S ROOTS. THE PLANTS SHALL BE SET IN TO THE GROUND IN A HOLE THAT IS 10 CM DEEPER THAN THE PLANT'S ROOTS. THE PLANTS SHALL BE SET IN TO THE GROUND IN A HOLE THAT IS 10 CM DEEPER THAN THE PLANT'S ROOTS.

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100m/25m

Row 3: 5 meters apart at 100m (approx) to bank facing upstream providing 28 rows with 5 plants in each row including upstream.



Work located on Laidley Creek at
Mulgowie.

Section 6: Budget

Activity	Key tasks	Cost (\$) exc GST
Earthworks	1 Grade control Structure, weed biomass removal, 2050m bank battering and 50m rock beaching	\$702,000
Risk contingency	Manage risk profile at 8%	\$56,160
Revegetation & site preparation	Site revegetation at 900 stems/ ha.	\$168,000
Commissioning period FY 17/18	Site maintenance	\$47,200
Project management	Landholder and contractor management, reporting, project coordination	\$315,000
Revegetation maintenance yr1 18/19	5 passes	\$59,640
Revegetation maintenance yr2 19/20	4 passes	\$45,000
Revegetation maintenance yr3 21/22	4 passes	\$45,000
Revegetation maintenance yr4 22/23	4 passes	\$45,000
Revegetation maintenance yr5 23/24	3 passes	\$30,000
Monitoring	Biennial LiDAR, Engineer signoff	\$85,000
Total		\$1,598,000

Notes

- Establishment phase (earthworks and revegetation) will occur over 2 years
- Vegetation will be monitored and managed for 5 years from planting to ensure successful establishment
- LiDAR costs have been calculated based on biennial flight runs. In the event that the licence condition requires yearly LiDAR, a variation will be submitted.
- The budget has been developed as leanly as possible, as such there is limited contingency available. Whilst the works proposed are based on engineered designs and will build resilience in the site, river restoration faces inherent risks associated with climatic events. In the event that minor earthworks repairs are necessary over the licence period, SEQCS will discuss any suggested repairs with QUU and seek a variation to cover those costs.

Appendix

Appendix 1:

Appendix 1.1: Calibration of BSTEM model

The BSTEM package is used to assess erosion at the toe of stream banks and subsequent upper bank collapse. LiDAR captured in 2011 (pre 2013 flood) and 2013 (post flood) was used to calibrate the BSTEM model. For modelling purposes it has been assumed that changes in bank morphology between the two LiDAR data sets resulted from the January 2013 flood event. The 2013 event was therefore used for model calibration.

The 2013 flood event resulted in overbank inundation, breaking through the levee at several locations along the target reach, causing significant floodplain scour. However this study has concentrated on sediment loss from instream sources and not floodplain scour. As a consequence only in channel flows have been used for the assessment, thus our estimates of future erosion avoided are conservative. Previous investigations (Alluvium, 2013) have found that the rating table at the Mulgowie gauge is representative of in-channel flows only. Data from the Mulgowie Gauge was used to generate a hydrograph for the 2013 flood event for calibration purposes.

The model was calibrated through an analysis of eight representative cross sections through reaches 1 and 2 (Figure 16 & 17). These cross sections represented locations where bank erosion occurred in the 2013 flood event. The calibration process comprised adjustment of model parameters to establish a match between the 2013 surveyed cross-section topography at each cross section and the modelled cross-sections topography following the application of the 2013 flood event to the 2011 bank profile

The method for calibrating the model was as follows:

- Step 1 - Field testing of the soil profile of the inset features was undertaken to determine the soil property inputs to the model. Four soil samples (cores) were taken from inset features through reaches 1 and 2. Each of the soil samples revealed the inset features to be largely comprised of sandy-loam with some clay loams present.
- Step 2 – Set up Hec-RAS model with 2011 geometry, including 8 BSTEM cross sections
- Step 3 – Input typical properties for sandy-loam soil type
- Step 4 – run model with 2013 flood event hydrology and compare the modelled bank failure in the 8 BSTEM cross sections with the 2013 cross-section geometry
- Step 5 - modify the cohesion, critical shear stress and erodibility parameters and rerun model. Repeat process with modified parameters until an adequate match is found.

Adequate calibration was achieved for five of the eight BSTEM cross-sections, two examples are shown in Figure 18. These examples demonstrate vertical shear failure, which results in the angular failure plane shown. It should be noted that BSTEM only models bank erosion and cannot simulate sediment accretion such as in Figure 18 or stream bed incision processes.



Figure 16: Reach one BSTEM cross sections (green lines) used for model calibration

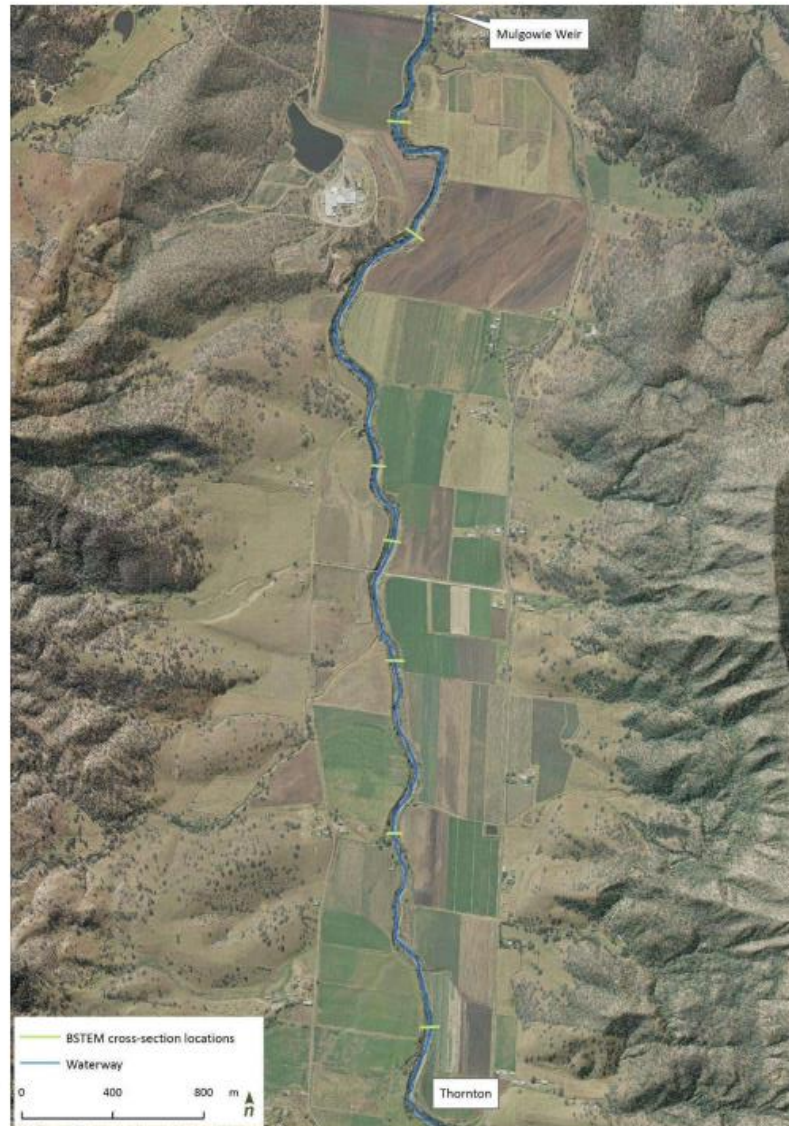


Figure 17: Reach two BSTEM cross sections used for modelling

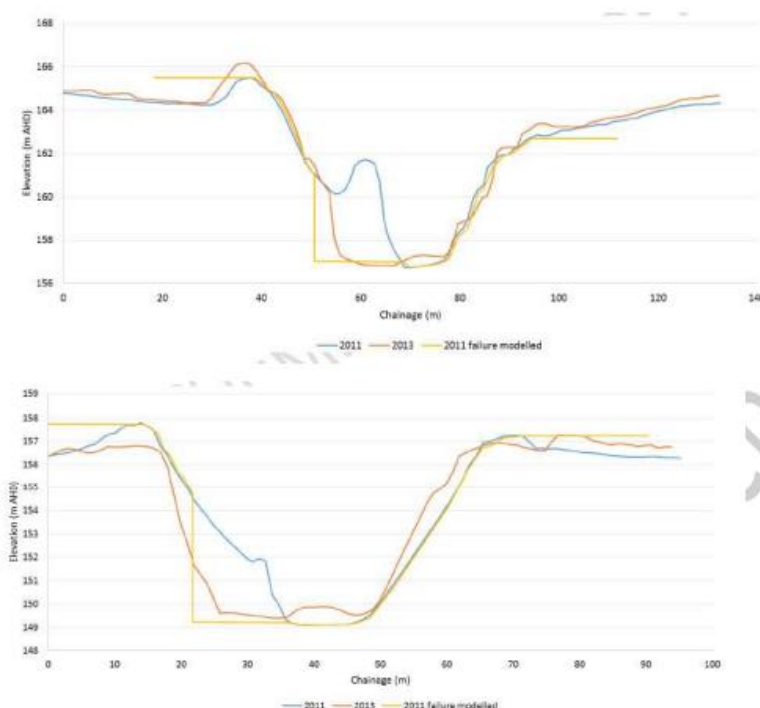


Figure 18: 2011 and 2013 surface elevation at 2 BSTEM cross-sections (blue – 2011 and Orange – 2013), with the modelled surface elevation shown by the yellow line.

Bank erosion processes are complex and can be impacted by variations in the spatial and temporal variations in a range of complex and interrelated factors including soil parameters, vegetation, sediment supply and transport and within channel velocity distribution. To date it has not been possible to incorporate all the variables into an erosion model. However achieving an adequate calibration in five of the eight BSTEM cross-sections gives a level of confidence that the model is providing a reasonable representation of the bank erosion processes given the complexity of erosional processes.

The calibrated soil parameters for the sandy to clay loam soils which comprise the inset features are shown in Table 7.

Table 7: Soil parameters used for modelling

Parameter	Value
Saturated bulk density (kg/m^3)	1836
Friction angle (degrees)	30
Cohesion (kPa)	4
Phi b (degrees)	15
Critical shear stress (Pa)	4
Erodibility ($\text{m}^3/\text{N-s}$)	4.5×10^{-8}

BSTEM cross-section selection

BSTEM cross-section locations were chosen strategically to represent the specific geomorphic units found in the reaches (as described above). Each geomorphic unit identified was represented by one representative cross-section. A difference in cross sectional area between the current cross-sections and modelled eroded cross section was calculated using the results from BSTEM. The difference in cross sectional area was multiplied by the length of the corresponding geomorphic unit to identify the expected sediment loss from each geomorphic unit making up the 2 reaches. The representative cross-sections adopted for Reach 1 and Reach 2 are shown in Figure 18.

Appendix 1.2: Modelling Results

Event sediment loss

The sediment loss estimates for each duration event for each reach are shown in Table 8. The sediment loss calculated for the 2013 flood event is also shown. The relationship between flood magnitude and sediment load for Reach 1 and Reach 2 is shown in Figure 19 and Figure 20 respectively. Due to the large variance in the sediment loss estimates between the short and long duration events average sediment loss estimates were generated for each design event, based on an 'average' flow event. Comparisons of average duration events with the long and short duration events indicates that events are skewed to the longer distribution. Therefore using the average sediment loss estimates is considered to be a conservative assumption.

Several geomorphic units were not used for the sediment loss estimates. These include areas of high banks which abut the floodplain terrace. The soil within these areas was found to be more resistant clays which have a greater resistance to erosion and are not represented by the soil properties used in the model calibration.

Table 8: Sediment loss estimate for each design event

Short durations		Short durations		Average durations		Long durations	
		Reach 1	Reach 2	Reach 1	Reach 2	Reach 1	Reach 2
Total	Peak flow	volume (m3)		volume (m3)		volume (m3)	
	(m3/s)						
1 year	72	4,436	10,421	7,287	16,116	10,138	21,811
2 year	185	9,833	21,768	25,000	51,899	40,168	82,031
5 year	284	11,417	24,509	35,793	75,046	60,169	125,583
10 year	309	11,554	23,930	35,355	70,367	59,155	116,804
2011 – 2013 (m3)*	380	66,000	192,000	66,000	192,000	66,000	192,000

* This is one event only and was calculated using a differential DEM analysis

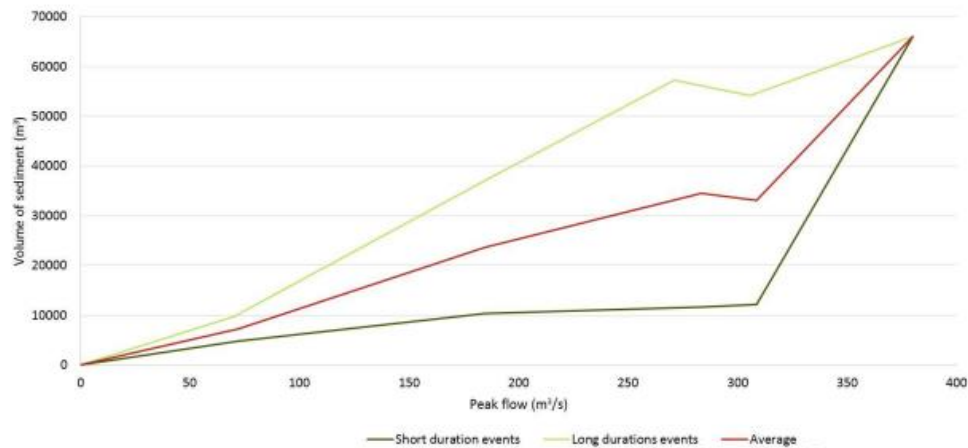


Figure 19: Relationship between flood magnitude and sediment load for Reach 1

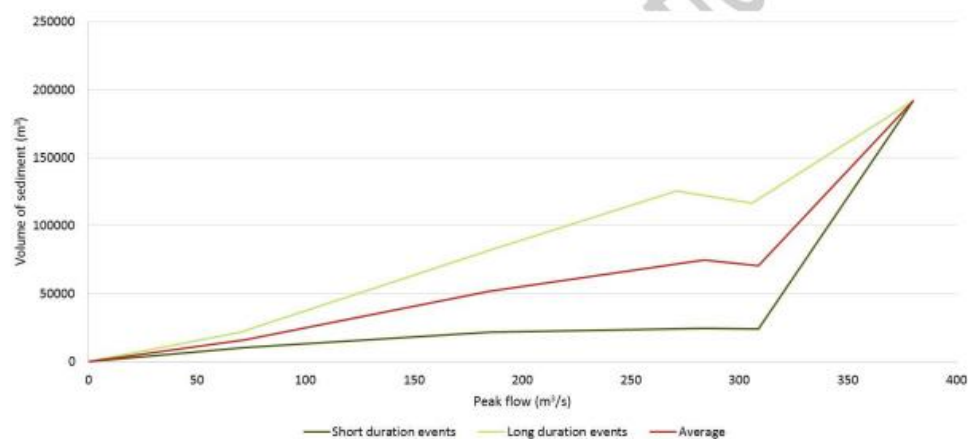


Figure 20: Relationship between flood magnitude and sediment load for Reach 2

This assumption is supported by findings from the temporal LiDAR analysis, which indicated that limited erosion occurred on these banks during the January 2013 flood event. However if incision is left unmanaged these steep banks are likely to eventually erode due to mass failure which will result in significant sediment loads which are not currently accounted for in the modelling. The incision process cannot easily be incorporated into the modelling as the rate of bed erosion is unknown. Additionally, geomorphic units abutting the road on the right bank were omitted from the investigation as erosion is likely to be restricted by the road infrastructure and associated protection works.

Appendix 1.3: Annualised estimates

To determine an annual sediment loss the relationship between flood magnitude and sediment load was applied to the flow record at the Mulgowie Weir gauge. Each individual flow event above a threshold was extracted in order to determine the volume of erosion per event. Events had a seven day independence so events which have multiple peaks are only counted once (this is considered a conservative assumption).

A bank erosion threshold is required as there is currently significant weedy vegetation within the channel which provides some limited stabilisation to the underlying bank material. These weeds are typically shallow rooted and provide limited resistance to erosion. It is assumed this weedy vegetation is stripped once the threshold is exceeded and the banks are then predominately exposed sandy-loam material.

The actual critical threshold of the weedy vegetation is unknown and likely to be variable along the reach due to factors like varying types of vegetation, density, age etc. The hydraulic model was run with a range of flows to determine the average shear stresses through each reach in order to compare these with typical critical shear stress values in the range of the weedy vegetation. The critical shear stress for each reach for the flow thresholds of 50 m³/s, 70 m³/s and 90 m³/s is shown in Table 9.

Table 9: Critical shear stress values for varying steady state peak flow events

Peak flow	Reach 1		Reach 2	
	Mean stress (N/m ²)	shear	Median stress (N/m ²)	shear
50 m ³ /s	28.6		25.5	
70 m ³ /s	33.9		31.2	
90 m ³ /s	38.4		36.2	

The relationship developed using short duration and long duration hydrographs was also applied to each reach and threshold scenario. The results are shown in Table 10. The sediment loss results were annualised over the 42 year period of the flow record and a sediment loss per metre of channel was determined. These are also shown in Table 10. Given that the duration of median flow events were skewed to the long duration hydrograph it is recommended that the average of the short and long duration results is used for the reach based estimates. It is also recommended that a flow threshold of 90 m³/s is adopted for the initiation of scour. Based on these assumptions, long term sediment losses per length of waterway are estimated to be 7.2 m³/m and 8.7 m³/m for Reach 1 and Reach 2 respectively. Table 11 shows the average sediment loss estimates broken down into estimates for the left and right bank.

These rates are likely to occur over the next 10 years while the channel morphology remains similar to the current condition. After this period there is the potential for more resistant clay boundary layers to be reached which may reduce rates of erosion. However there is also the potential for bed incision to result in significant rates of bank erosion and mass failure of the steep banks which abut the floodplain which to date have been comparatively stable compared to the inset features. These estimates do not account for the additional erosion that would arise from such incision. Similarly the estimates do not include the loss of sediment associated with floodplain scour.

Table 10: Sediment loss results in each reach under different scenarios

Flow threshold		Short durations (reach 1)	Average durations (reach 1)	Long Durations (reach 1)	Short durations (reach 2)	Average durations (reach 2)	Long Durations (reach 2)
50 m³/s	Total sediment loss (m³)	523,844	1,068,005	1,612,166	1,172,304	2,397,074	3,621,843
	Annual sediment loss per year (m³)	12,472	25,429	38,385	27,912	57,073	86,234
	Annual sediment loss per length of waterway (m³/m/year)	4.1	8.3	12.5	4.9	10.1	15.2
70 m³/s	Total sediment loss (m³)	472,604	991,448	1,510,292	1,062,011	2,226,506	3,391,002
	Annual sediment loss per year (m³)	11,252	23,606	35,959	25,286	53,012	80,738
	Annual sediment loss per length of waterway (m³/m/year)	3.7	7.7	11.7	4.5	9.3	14.2
90 m³/s	Total sediment loss (m³)	431,538	926,491	1,421,444	973,879	2,082,189	3,190,500
	Annual sediment loss per year (m³)	10,275	22,059	33,844	23,188	49,576	75,964
	Annual sediment loss per length of waterway (m³/m/year)	3.4	7.2	11.0	4.1	8.7	13.4

Table 11: Average sediment loss results in each reach under different scenarios divided into left and right bank expected erosion

Flow threshold		Left bank (reach 1)	Right bank (reach 1)	Left bank (reach 2)	Right bank (reach 2)
50 m³/s	Total sediment loss (m³)	513,803	554,608	892,782	1,504,935
	Annual sediment loss per year (m³)	12,233	13,205	21,257	35,832
	Annual sediment loss per length of waterway (m³/m/year)	4.1	4.2	3.7	6.3
70 m³/s	Total sediment loss (m³)	475,403	516,451	817,652	1,409,497
	Annual sediment loss per year (m³)	11,319	12,296	19,468	33,559
	Annual sediment loss per length of waterway (m³/m/year)	3.8	3.9	3.4	5.9

Flow threshold		Left bank (reach 1)	Right bank (reach 1)	Left bank (reach 2)	Right bank (reach 2)
90 m ³ /s	Total sediment loss (m ³)	442,882	484,016	755,541	1,327,292
	Annual sediment loss per year (m ³)	10,545	11,524	17,989	31,602
	Annual sediment loss per length of waterway (m ³ /m/year)	3.6	3.6	3.2	5.6

Appendix 1.4: Sediment avoided estimates

Based on the principal that rehabilitation works have been delivered which mitigate ongoing severe erosion likely to occur if the target area is left in its current degraded state, the following estimates of sediment loss avoided have been identified.

The method involves:

1. Developing a new geometry file in the HEC-RAS model where banks were battered to a gradient of 1V:3H as shown in Figure 21.
2. Re-runing all BSTEM scenarios outlined previously (i.e. short and long duration events for each ARI peak flow and the 2013 event) to determine the relationship between flow and average sediment loss under two scenarios:
 - Scenario A -One year after construction which assumes vegetation coverage on the bank consists of 50% coverage with perennial ryegrass, 25% with shrubs, 15% with small trees and 10% with larger trees. Based on a diverse suite of riparian vegetation after a single year of establishment and growth a shear stress threshold of 40 Pa was adopted (Fischenich, 2001).
 - Scenario B -Ten year after construction which assumes vegetation coverage on the bank consists of 50% coverage with perennial ryegrass, 25% with shrubs, 15% with small trees and 10% with larger trees. Based on a diverse suite of riparian vegetation after ten years of establishment and growth a shear stress threshold of 120 Pa was adopted (Alluvium, 2013).
3. Using the flow and average sediment loss relationship for Scenario A and Scenario B and the 90 m³/s flow threshold adopted for existing sediment loss estimates the annual sediment loss over the 42 year flow record for Scenario A and Scenario B was estimated. These results represent the annual sediment loss one (Scenario A) and ten (Scenario B) years after construction.
4. For years 2 to 9 annual sediment loss is linearly interpolated between the Scenario A and Scenario B results.
5. The sediment offset in each of the ten years is the difference between the sediment load under current conditions and under design conditions. Given that the sediment load under design conditions changes over time (as vegetation matures and provides increased resistance to erosion) then the offset is different in each year.

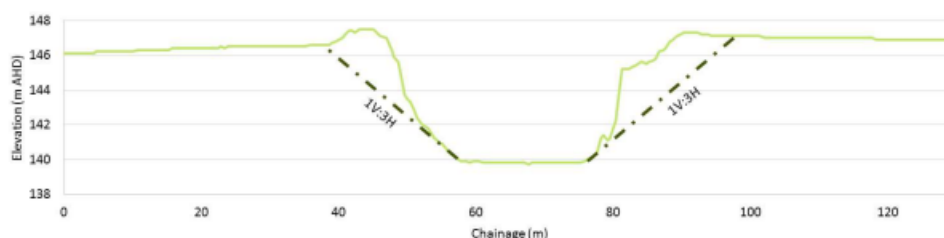


Figure 21: Conceptual diagram of bank battering works to achieve a gradient of 1V:3H, also used as the geometric input for modelling.

At this stage the incision process and grade control structure(s) have not been included in the analysis of sediment loss avoided. However it is assumed that to achieve the outlined vegetation establishment rates a grade control program will be required to address the observed knickpoints.

The sediment offset for each year following construction of the stabilisation works on the left and right bank of Reach 1 is shown in Table 12 and Table 13 respectively. The sediment offset for each year following construction of the stabilisation works on the left and right bank of Reach 2 is shown in Table 14 and Table 15 respectively. The right bank estimates are based on works in the upper 1500 m of the reach as shown in Figure 22, whilst the indicative extent of proposed works in Reach 2 is shown in Figure 23. To achieve the desired offset both banks need to be managed along with the grade control program to stabilise the streambed. As a result, the offset values for each reach should be averaged between both banks.

As discussed earlier, long term sediment losses per length of waterway are estimated to be 7.2 m³/m and 8.7 m³/m for Reach 1 and Reach 2 respectively. The estimates of sediment offset indicate the proposed works have the potential to result in significant reduction in sediment loads from Reach 1 (≈90-95 %) and Reach 2 (≈92-98 %). These estimates assume uniform vegetation establishment throughout the reach across the 10 year establishment period.

There is the potential for erosional damage (i.e. localised toe scour or loss of vegetation) in the initial years following construction during high flow events. If suitable maintenance works are not undertaken to repair any localised damage to the bank, or poorly establishing vegetation, the erosional damage could be exacerbated in subsequent flow events. If this was to occur the predicted sediment offset estimates are unlikely to be achieved. As a result, it is recommended that the lower end of the modelled range be adopted as sediment avoided estimates for both Reach 1 and Reach 2. It is recommended that a 90 % reduction be adopted as a sediment reduction for the proposed works in both Reach 1 and Reach 2. As a result, the adopted sediment avoided estimates for the proposed works should be 6.5 m³/m/year and 7.9 m³/m/year for Reach 1 and Reach 2 respectively.

A monitoring and maintenance program will be an important component of implementing the proposed works. Monitoring the condition of works will be important for identifying any new issues and determining appropriate repairs and maintenance to ensure the works are on trajectory to maximise the sediment offsets.

Table 12: Annual sediment offset for works in Reach 1 on the left bank where works are proposed

	Annual predicted sediment load (m ³ /year)	Sediment offset by works in specific year (m ³)	Offset per m of bank (m ³ /m)
Existing conditions (left bank)	10545	-	-
1 year after construction	1157	9388	3.2
2	1030	9515	3.2
3	903	9642	3.3
4	776	9769	3.3
5	649	9896	3.4
6	521	10024	3.4
7	394	10151	3.4
8	267	10278	3.5
9	140	10405	3.5
10 year after construction	13	10532	3.6
Average offset from years 1 to 10 on the left bank (total works extent 2950m)		9960	3.4

Table 13: Annual sediment offset for works in Reach 1 on the right bank where works are proposed

	Annual predicted sediment load (m ³ /year)	Sediment offset by works in specific year (m ³)	Offset per m of bank (m ³ /m)
Existing conditions (left bank)	6375	-	-
1 year after construction	681	5694	3.8
2	605	5770	3.8
3	530	5845	3.9
4	454	5921	3.9
5	378	5997	4.0
6	303	6072	4.0
7	227	6148	4.1
8	151	6224	4.1
9	76	6299	4.2
10 year after construction	0	6375	4.3
Average offset from years 1 to 10 on the right bank (total works extent 1500m)		6034	4.0

Table 14: Annual sediment offset for works in Reach 2 on the left bank where works are proposed

	Annual predicted sediment load (m ³ /year)	Sediment offset by works in specific year (m ³)	Offset per m of bank (m ³ /m)
Existing conditions (left bank)	17898	-	-
1 year after construction	1376	16522	2.9
2	1358	16540	2.9
3	1340	16558	2.9
4	1321	16577	2.9
5	1303	16595	2.9
6	1285	16613	2.9
7	1267	16631	2.9
8	1248	16650	2.9
9	1230	16668	3.0
10 year after construction	1212	16686	3.0
Average offset from years 1 to 10 on the left bank (works extent approx 5678 m)		16604	2.9

Table 15: Annual sediment offset for works in Reach 2 on the right bank where works are proposed

	Annual predicted sediment load (m ³ /year)	Sediment offset by works in specific year (m ³)	Offset per m of bank (m ³ /m)
Existing conditions (left bank)	11524	-	-
1 year after construction	336	11188	5.5
2	299	11225	5.5
3	261	11263	5.5
4	224	11300	5.5
5	187	11337	5.5
6	149	11375	5.5
7	112	11412	5.5
8	75	11449	5.6
9	37	11487	5.6
10	0	11524	5.6
Average offset from years 1 to 10 on the right bank (works extent approx 5678 m)		11356	5.5

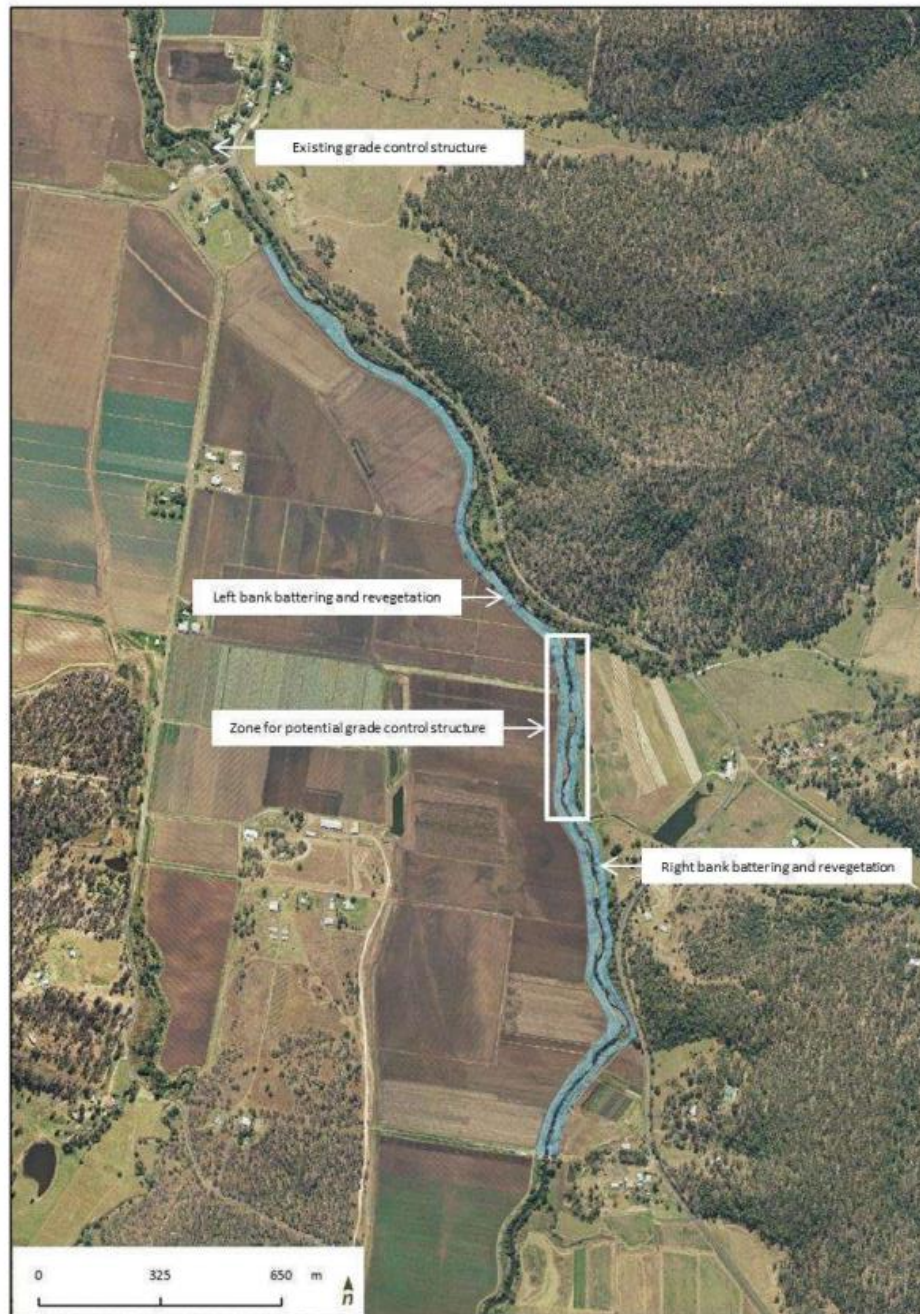


Figure 22: Total extent of possible works in Reach one

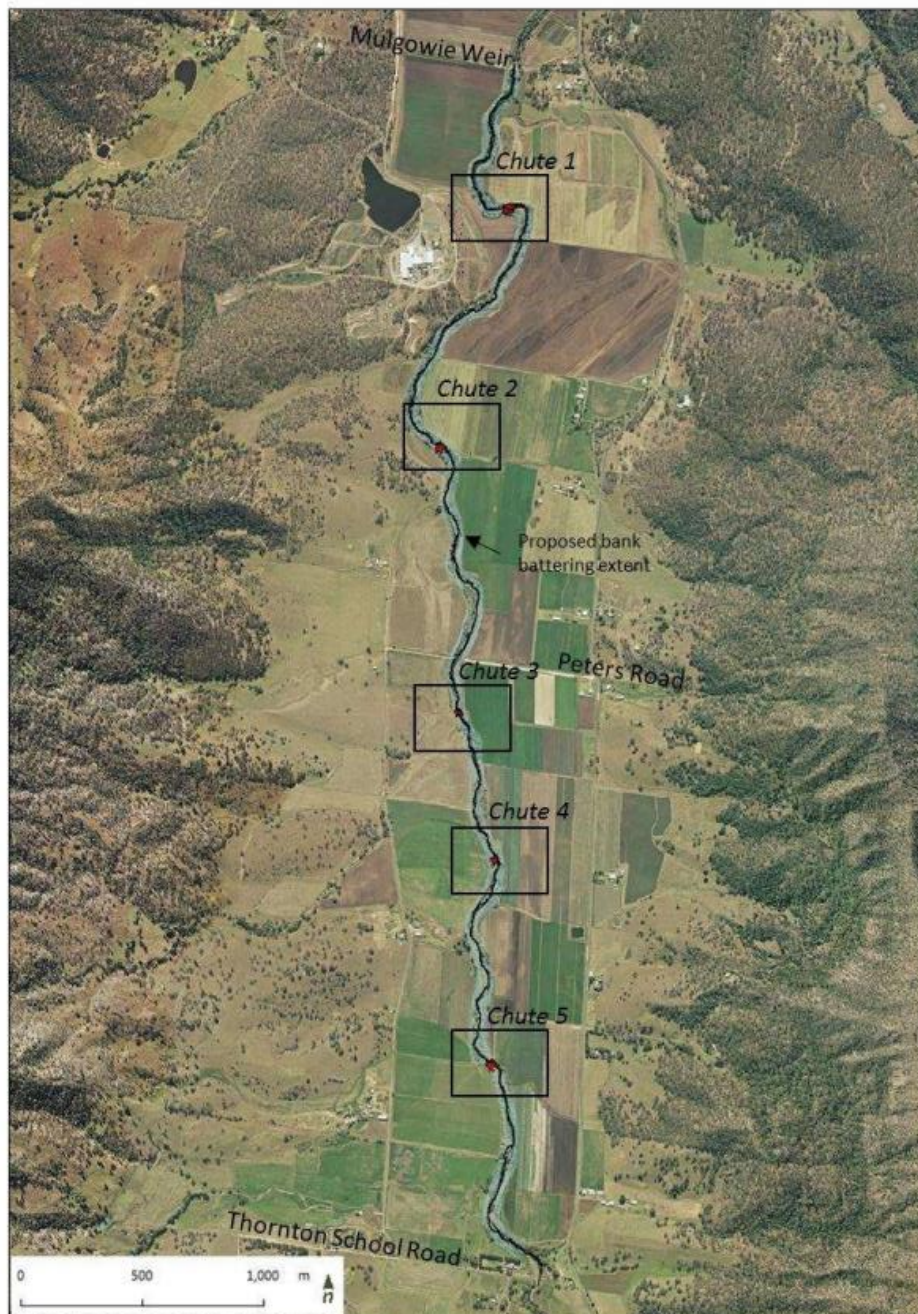


Figure 23: Total extent of possible works in Reach 2

Appendix 2: Total Nitrogen Calculations

Introduction

SEQC Services undertakes soil sampling in order to ascertain the Total Nitrogen (TN) content of soil which is to be protected through river restoration works. The nitrogen content of the soils is an important component of the calculation of a potential nutrient offset under the *Nutrient Mechanism*.

In recent sampling of soils at Laidley Creek, SEQC Services has undertaken both the Dumas and Kjeldahl method. Whilst the Dumas method truly determines Total N, whereas the Kjeldahl method only converts protein N and some nitrate (NO₃-N) into ammonium (Eric Simonne, 1998), both methods have been undertaken as the Dumas method is only accurate at levels higher than 0.05%. Alternatively the Kjeldahl test provides readings down to 0.01%.

Nine soil cores were taken at the Laidley project site to measure the bank profile depths from top-of-bank to approximately stream base. Around nine samples were taken at 50cm intervals from the nine cores (vis profile depth around 4.5m); providing 85 soil samples which were measured for TN (Dumas – detection limit 0.05%), TKN (detection limit 0.01%) and TKN. Thirty-nine of the 85 soil samples returned TN estimates (Dumas technique) greater than the 0.05% detection limit and 76 of the 85 soil samples returned TKN results greater than the 0.01% detection limit.

The 39 samples for which both TN and TKN estimates were > the respective detection limits were used to generate an understanding of the component of TN represented by TKN (percentage increase of TN over TKN).

Figure 24 below highlights the frequency distribution for percentage increase of TN over TKN.

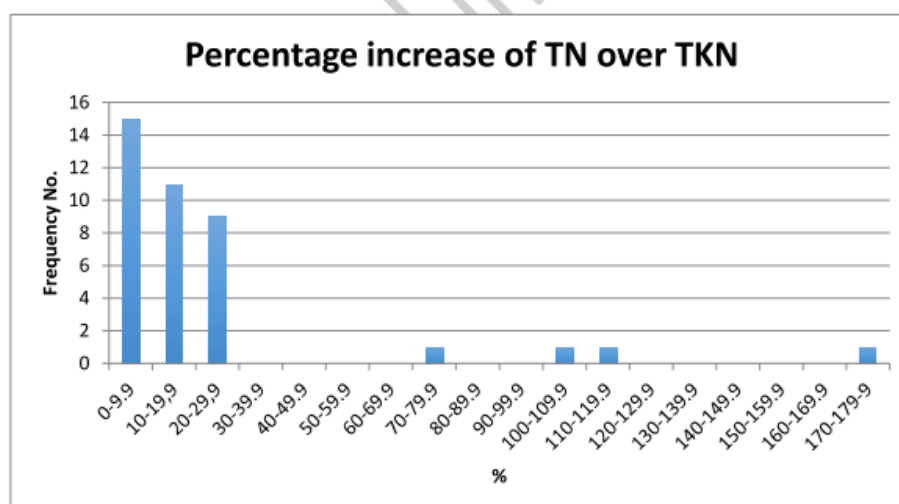


Figure 24: Difference in TN between Dumas and Kjeldahl methods over 39 samples at Laidley Creek.

The data for the 39 samples are highly skewed, with seven of the 39 samples showing no difference. Two measures of central tendency have been assessed:

$$1. \frac{[\text{Sum of TN for the 39 samples}] - [\text{Sum of TKN for the 39 samples}]}{\text{Sum of TKN for the 39 samples}} \%$$

$$2. \text{Median} \left[\frac{(TN - TKN)}{TKN} \right] \%$$

The first approach provides a mean of 14.9%; whereas the second provides a median of 14.3%. The two results are similar: The more conservative estimate of percentage increase in TN over TKN (14.3%) is used here.

As QUU's Environmental Authority regulates TN, Dumas is the appropriate measure to convert sediment erosion avoided to nutrient (TN) erosion avoided for the purposes of the Policy. . The challenge in determining a soil profile TN level for the purposes of calculating nutrient erosion avoided is that for much of the lower soil profile, TN is below the Dumas test detection method (0.05%); though well above the TKN detection level (0.01%)

The approach recommended by SEQC Services is to use TN values where TN >0.05% and use the conservative estimate of central tendency to convert TKN to TN for TN values <0.05% and TKN values >0.01%.

On these bases (and assuming TN=0.01, when TKN<0.01), the total profile TN over the 9 profiles is 0.063%

Appendix 3: Soil Nutrient Analysis Raw Data

		Queensland Government					
DSITI - Chemistry Centre							
Soil Analysis Report							
Job No:	16-0386						
Report ID:	16-0386-F-V1						
			Method	S_DUM_CN	S_DUM_CN	* S_KJNP_AA	* S_KJNP_AA
			Component	TC	TN	TKN	TKP
			Units	%	%	%	%
Sample No	Customer's ID	Description	Depth (m)				
16-0386-0001	10-Jan	Sample 1	0.10-0.10	3.16	0.23	0.22	0.17
16-0386-0002	Jan-60	Sample 2	0.60-0.60	1.25	0.08	0.07	0.15
16-0386-0003	1-110	Sample 3	1.10-1.10	0.98	0.06	0.05	0.16
16-0386-0004	1-160	Sample 4	1.60-1.60	1.42	0.08	0.07	0.16
16-0386-0005	1-210	Sample 5	2.10-2.10	1.11	0.07	0.06	0.16
16-0386-0006	1-260	Sample 6	2.60-2.60	0.63	<0.05	0.04	0.16
16-0386-0007	1-310	Sample 7	3.10-3.10	0.37	<0.05	0.02	0.14
16-0386-0008	1-360	Sample 8	3.60-3.60	0.26	<0.05	0.02	0.13
16-0386-0009	1-410	Sample 9	4.10-4.10	0.37	<0.05	0.02	0.12
16-0386-0010	1-460	Sample 10	4.60-4.60	0.39	<0.05	0.02	0.11
16-0386-0011	10-Feb	Sample 11	0.10-0.10	0.84	0.06	0.05	0.14
16-0386-0012	Feb-60	Sample 12	0.60-0.60	1.30	0.10	0.1	0.15

16-0386-0013	2-110	Sample 13	1.10-1.10	1.25	0.09	0.08	0.14
16-0386-0014	2-160	Sample 14	1.60-1.60	1.22	0.08	0.07	0.14
16-0386-0015	2-210	Sample 15	2.10-2.10	1.28	0.09	0.08	0.13
16-0386-0016	2-260	Sample 16	2.60-2.60	0.74	0.05	0.05	0.12
16-0386-0017	2-310	Sample 17	3.10-3.10	0.36	<0.05	0.02	0.12
16-0386-0018	2-360	Sample 18	3.60-3.60	0.25	<0.05	0.02	0.10
16-0386-0019	2-410	Sample 19	4.10-4.10	0.25	<0.05	0.02	0.11
16-0386-0020	2-460	Sample 20	4.60-4.60	0.30	<0.05	0.02	0.11
16-0386-0021	10-Mar	Sample 21	0.10-0.10	2.36	0.17	0.16	0.15
16-0386-0022	Mar-60	Sample 22	0.60-0.60	2.12	0.14	0.13	0.15
16-0386-0023	3-110	Sample 23	1.10-1.10	2.24	0.16	0.16	0.16
16-0386-0024	3-160	Sample 24	1.60-1.60	0.92	0.06	0.05	0.16
16-0386-0025	3-210	Sample 25	2.10-2.10	0.93	0.06	0.05	0.16
16-0386-0026	3-260	Sample 26	2.60-2.60	0.81	0.05	0.04	0.14
16-0386-0027	3-310	Sample 27	3.10-3.10	0.30	<0.05	0.02	0.14
16-0386-0028	3-360	Sample 28	3.60-3.60	0.36	<0.05	0.02	0.11
16-0386-0029	3-410	Sample 29	4.10-4.10	0.43	<0.05	0.03	0.11
16-0386-0030	3-460	Sample 30	4.60-4.60	0.93	0.06	0.05	0.14
16-0386-0031	10-Apr	Sample 31	0.10-0.10	3.40	0.32	0.30	0.21
16-0386-0032	Apr-60	Sample 32	0.60-0.60	1.18	0.08	0.07	0.16
16-0386-0033	4-110	Sample 33	1.10-1.10	1.23	0.07	0.07	0.15
16-0386-0034	4-160	Sample 34	1.60-1.60	1.22	0.08	0.04	0.11
16-0386-0035	4-210	Sample 35	2.10-2.10	0.66	0.05	0.04	0.13
16-0386-0036	4-260	Sample 36	2.60-2.60	0.53	<0.05	<0.01	0.02

16-0386-0037	4-310	Sample 37	3.10-3.10	0.98	0.07	0.04	0.11
16-0386-0038	4-360	Sample 38	3.60-3.60	0.29	<0.05	0.03	0.14
16-0386-0039	4-410	Sample 39	4.10-4.10	0.24	<0.05	<0.01	0.03
16-0386-0040	4-460	Sample 40	4.60-4.60	0.15	<0.05	<0.01	0.12
16-0386-0041	5.1-10	Sample 41	0.10-0.10	1.68	0.14	0.13	0.15
16-0386-0042	5.1-60	Sample 42	0.60-0.60	1.72	0.15	0.14	0.16
16-0386-0043	5.1-110	Sample 43	1.10-1.10	0.78	0.06	0.05	0.15
16-0386-0044	5.1-160	Sample 44	1.60-1.60	0.63	<0.05	0.03	0.13
16-0386-0045	5.1-210	Sample 45	2.10-2.10	0.42	<0.05	0.03	0.14
16-0386-0046	5.1-260	Sample 46	2.60-2.60	0.57	<0.05	0.04	0.14
16-0386-0047	5.1-310	Sample 47	3.10-3.10	0.46	<0.05	<0.01	0.02
16-0386-0048	5.1-360	Sample 48	3.60-3.60	0.33	<0.05	0.02	0.14
16-0386-0049	5.1-410	Sample 49	4.10-4.10	0.28	<0.05	<0.01	0.02
16-0386-0050	5.1-460	Sample 50	4.60-4.60	0.15	<0.05	<0.01	0.03
16-0386-0051	5.2-10	Sample 51	0.10-0.10	1.89	0.12	0.11	0.15
16-0386-0052	5.2-60	Sample 52	0.60-0.60	1.65	0.14	0.13	0.16
16-0386-0053	5.2-110	Sample 53	1.10-1.10	0.72	0.05	0.05	0.14
16-0386-0054	5.2-160	Sample 54	1.60-1.60	0.65	<0.05	0.04	0.15
16-0386-0055	5.2-210	Sample 55	2.10-2.10	0.18	<0.05	<0.01	0.02
16-0386-0056	5.2-260	Sample 56	2.60-2.60	0.60	<0.05	0.04	0.14
16-0386-0057	5.2-310	Sample 57	3.10-3.10	0.53	<0.05	<0.01	0.02
16-0386-0058	5.2-360	Sample 58	3.60-3.60	0.21	<0.05	0.02	0.14
16-0386-0059	5.2-410	Sample 59	4.10-4.10	0.24	<0.05	<0.01	<0.01
16-0386-0060	5.2-460	Sample 60	4.60-4.60	0.16	<0.05	<0.01	0.01

16-0386-0061	5.3-10	Sample 61	0.10-0.10	1.07	0.08	0.07	0.14
16-0386-0062	5.3-60	Sample 62	0.60-0.60	1.68	0.14	0.14	0.16
16-0386-0063	5.3-110	Sample 63	1.10-1.10	0.64	<0.05	<0.01	0.06
16-0386-0064	5.3-160	Sample 64	1.60-1.60	0.68	0.05	0.04	0.16
16-0386-0065	5.3-210	Sample 65	2.10-2.10	0.54	<0.05	0.03	0.15
16-0386-0066	5.3-260	Sample 66	2.60-2.60	0.22	<0.05	0.02	0.15
16-0386-0067	5.3-310	Sample 67	3.10-3.10	0.62	<0.05	0.03	0.13
16-0386-0068	5.3-360	Sample 68	3.60-3.60	0.32	<0.05	0.02	0.13
16-0386-0069	5.3-410	Sample 69	4.10-4.10	0.22	<0.05	<0.01	0.14
16-0386-0070	5.3-460	Sample 70	4.60-4.60	0.16	<0.05	<0.01	0.15
16-0386-0071	10-Jun	Sample 71	0.10-0.10	2.59	0.20	0.20	0.17
16-0386-0072	Jun-60	Sample 72	0.60-0.60	1.76	0.11	0.10	0.15
16-0386-0073	6-110	Sample 73	1.10-1.10	1.55	0.1	0.09	0.15
16-0386-0074	6-160	Sample 74	1.60-1.60	1.01	0.07	0.06	0.17
16-0386-0075	6-210	Sample 75	2.10-2.10	0.72	<0.05	0.04	0.15
16-0386-0076	6-260	Sample 76	2.60-2.60	0.67	<0.05	0.04	0.13
16-0386-0077	6-310	Sample 77	3.10-3.10	0.64	<0.05	0.03	0.13
16-0386-0078	6-360	Sample 78	3.60-3.60	0.53	<0.05	0.03	0.14
16-0386-0079	6-410	Sample 79	4.10-4.10	0.40	<0.05	0.02	0.13
16-0386-0080	6-460	Sample 80	4.60-4.60	0.30	<0.05	0.02	0.14
16-0386-0081	10-Jul	Sample 81	0.10-0.10	1.04	0.17	0.08	0.16
16-0386-0082	Jul-60	Sample 82	0.60-0.60	1.17	0.1	0.08	0.15
16-0386-0083	7-110	Sample 83	1.10-1.10	0.58	0.11	0.04	0.14

16-0386-0084	7-160	Sample 84	1.60-1.60	0.22	<0.05	0.02	0.06
16-0386-0085	7-210	Sample 85	2.10-2.10	<0.05	<0.05	<0.01	<0.01
16-0386-0086	7-260	Sample 86	2.60-2.60	-- NR --	-- NR --	-- NR --	-- NR --
16-0386-0087	6-510	Sample 87	-	0.36	<0.05	0.02	0.13

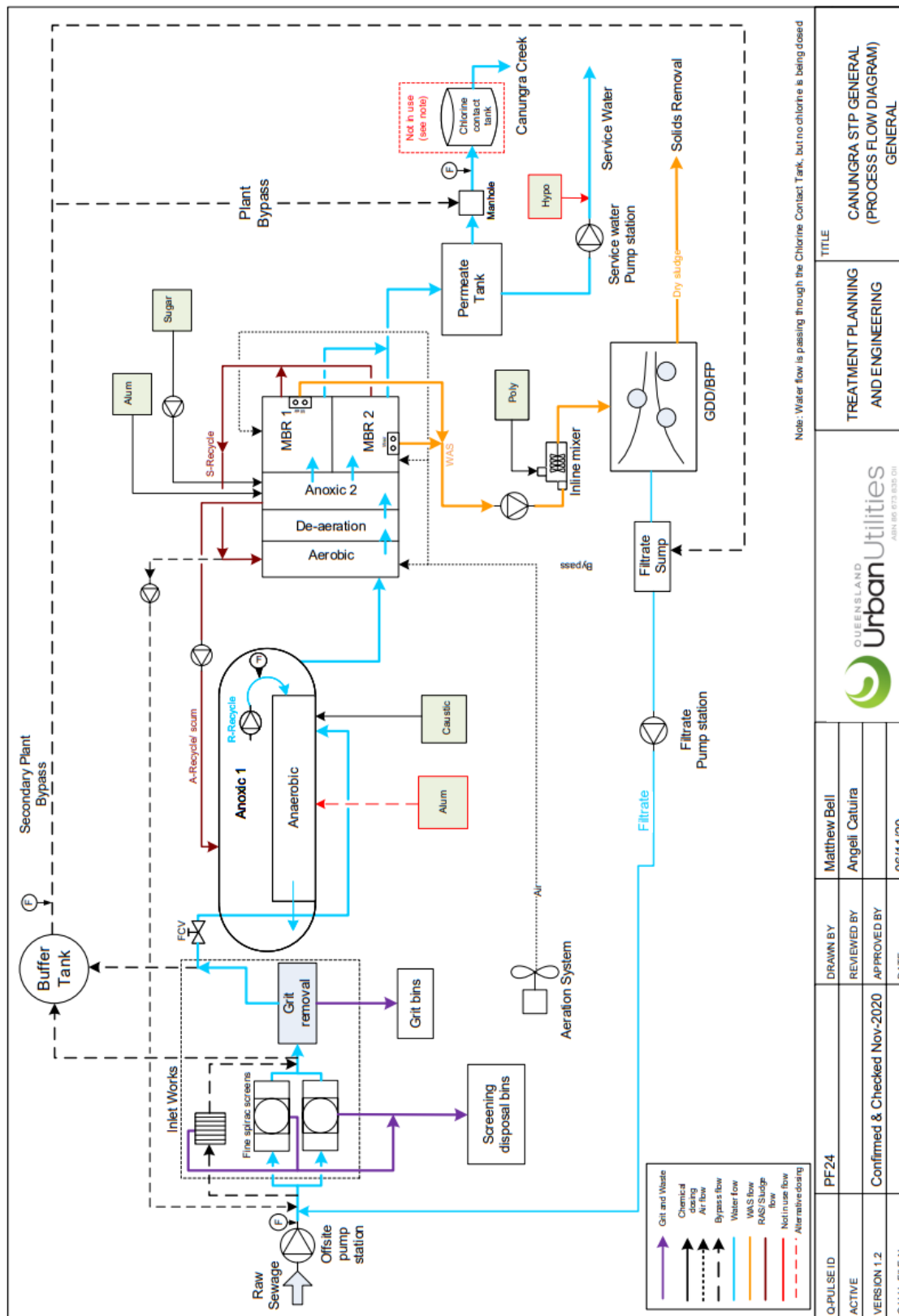
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Appendix 4: Particle Size Analysis Results Raw Data

Sample Matrix : Soil								
					S_PSA	S_PSA	S_PSA	S_PSA
					Coarse sand	Fine sand	Silt	Clay
Sample No	Customer Sample ID	Site	Obs	Depth (m)	%	%	%	%
16-0298-0001	2-Oct		0	0.10-0.20	27.4	56.6	9.2	10.1
16-0298-0002	Feb-60		0	0.60-0.70	11.4	60.9	21.4	17.1
16-0298-0003	2-110		0	1.10-1.20	9.3	58.4	22.7	19.1
16-0298-0004	2-160		0	1.60-1.70	11	53.2	24.6	19
16-0298-0005	2-210		0	2.10-2.20	3	48.3	29.6	28.2
16-0298-0006	2-260		0	2.60-2.70	TF	TF	TF	TF
16-0298-0007	2-310		0	3.10-3.20	14.7	51.9	17.3	21.1
16-0298-0008	2-360		0	3.60-3.70	20.7	46	17.1	21.1
16-0298-0009	2-410		0	4.10-4.20	23.7	44.2	17.3	19.5
16-0298-0010	2-460		0	4.60-4.70	17.1	49.5	17.2	21.3
16-0298-0011	3-Oct		0	0.10-0.20	1.4	38.9	38.3	31
16-0298-0012	Mar-60		0	0.60-0.70	1.9	18.8	35.5	48.6
16-0298-0013	3-110		0	1.10-1.20	1.1	29.2	35.3	41.2
16-0298-0014	3-160		0	1.60-1.70	7.5	48.7	22.8	26.7
16-0298-0015	3-210		0	2.10-2.20	4.9	43.5	26	30.2
16-0298-0016	3-260		0	2.60-2.70	3.9	40.1	26.3	33.8
16-0298-0017	3-310		0	3.10-3.20	9.8	53.9	18.9	23
16-0298-0019	3-410		0	4.10-4.20	20.6	35.4	18.7	28.2
16-0298-0020	3-460		0	4.60-4.70	<1.0	28	31.9	44.1
16-0298-0021	5.1-10		0	0.10-0.20	20	57.2	13.6	12.4
16-0298-0022	5.1-60		0	0.60-0.70	11.7	47.5	24.1	22.8

16-0298-0023	5.1-110		0	1.10-1.20	24.8	46.9	15.3	15.9
16-0298-0024	5.1-160		0	1.60-1.70	14.2	61.7	13.6	14.2
16-0298-0025	5.1-210		0	2.10-2.20	37.4	41.5	9.9	12.4
16-0298-0026	5.1-260		0	2.60-2.70	14.7	51	20.4	17.8
16-0298-0027	5.1-310		0	3.10-3.20	23.7	45	18.5	17.8
16-0298-0028	5.1-360		0	3.60-3.70	24.2	43.1	18.6	17.8
16-0298-0029	5.1-410		0	4.10-4.20	37.8	40.6	11.1	12.9
16-0298-0030	5.1-460		0	4.60-4.70	58	27.3	9.3	7.7

Attachment M: Canungra STP General (Process Flow Diagram) PF24



ATTACHMENT N: Luggage Point ERA 62 Storage Area

