Appendix M

Waterway Barrier Works Technical Report

Fishology.

Waterway investigation and fish community survey in relation to the Scenic Rim Agricultural Industrial Precinct project.

Technical Report – April 2020

Document Control

Project Title	Waterway investigation and fish community survey in relation to the Scenic Rim Agricultural Industrial Precinct project.
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Cover photograph – Backpack electrofishing within site five of the study area.

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1.0 Introduction

Fishology Consulting have been engaged by Kalfresh Pty Ltd (Kalfresh) to undertake a waterway and fish habitat assessment to facilitate the assessment of the proposed Scenic Rim Agricultural Industrial Precinct (SRAIP) project. The SRAIP project has been declared by the Queensland Co-ordinator General a 'ço-ordinated project' under the *State Development and Public Works Organisation Act 1971* requiring the proponent to submit an Impact Assessment Report.

1.1 Background

Kalfresh propose to develop the Scenic Rim Agricultural Industrial Precinct (SRAIP). As outlined in the Impact Assessment Statement (iCubed Consulting, 2019) the project is to create a place where primary and secondary high value rural activities are located in close proximity to each other, to create opportunities not realised in the typical food-to-retailer system. The SRAIP proposal will provide approximately forty hectares of developable land for rural industrial infrastructure, as well as the services and infrastructure required to operate such a precinct.

The proposed development layout is provided in Appendix A and will consist of:

- 15 industrial allotments,
- Private and internal roads,
- a bio-energy facility (a digester),
- a stormwater detention basin,
- an overland flow path (floodway),
- a composting site,
- effluent irrigation area,
- proposed dams, and
- environmental protection area (vegetation).

1.1.1 Proposed site

The SRAIP is proposed within the Scenic Rim local government area west of the township of Kalbar on the Cunningham Highway (Figure 1). The development site is over land parcels described as: Lot 2 on SP192221, Lot 3 on SP192221, Lot 4 on SP192221, Lot 2 on RP20974. Lot 2 on RP44024, Lot 1 on RP216694; and Lot 2 on RP44024.

The 174 hectare site is on the western edge of high value cropping land situated along Warrill Creek, within a priority agricultural area (DILGP, 2017). The site has a long-standing history of agricultural production and rural industry. In 1992 Kalfresh established the existing vegetable packing and processing facilities on the site. Current land uses include high value cropping, cattle grazing and vegetable processing. Current land uses and the proposed SRAIP are dependent on the availability of water. Water security for the site is provided by on-site bores and Moggera Dam via diversions to Warrill Creek.

The southeast portion of the site is part of the Warrill Creek floodplain and contains both the high value cropping and the vegetable processing facilities. The existing processing facilities and site offices are located directly off the Cunningham Highway. A levee bank and Cunningham Highway surround this area protecting it from flooding. The middle portion of the property is relatively flat before transitioning to foothills to the west and north. The middle and northern portions of the site are relatively undeveloped and currently used for cattle grazing.

1.1.2 Site hydrology

The Impact Assessment Report (RPS, 2020) describes the existing on-site hydrology. Within the elevated land in the northern portion of the site, ephemeral gullies exist that flow after seasonal rainfall. There are several existing farm dams on site for watering livestock. Department of Agriculture and Fisheries (DAF) waterway mapping indicates that there are three green 'low-risk' waterways and a single amber 'moderate-risk' waterway within the site (Figure 1). The mapping indicates that there is no waterway connectivity through the cropping area to Warrill Creek.

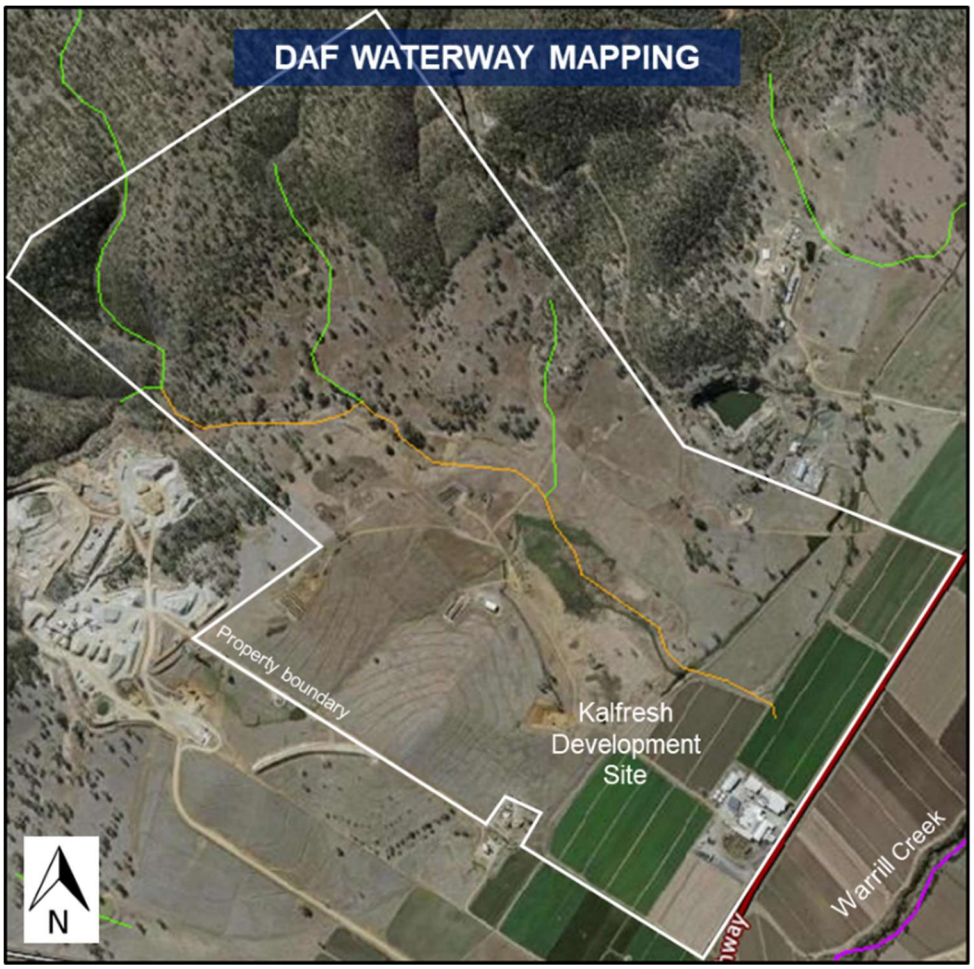

Figure 1. Study area showing DAF waterway mapping layer, including amber, green waterways and downstream purple waterway (Warrill Creek).

The existing vegetable processing and packing facilities utilise bore water that is pumped from the facility to two discharge points. The first is a high point west of the processing facility where water is discharged to a perched table drain. The water then runs north down this table drain to the centre of the site, where it is treated via overland flow through a very broad and flat basin. The overland flow is captured at the bottom of the basin by a channel adjacent to the existing levee bank and directed to the lawful point of discharge (Figure 2).

The second point of discharge is a constructed drain northeast of the processing facilities. The water flows northwards within the drain to the lawful point of discharge.

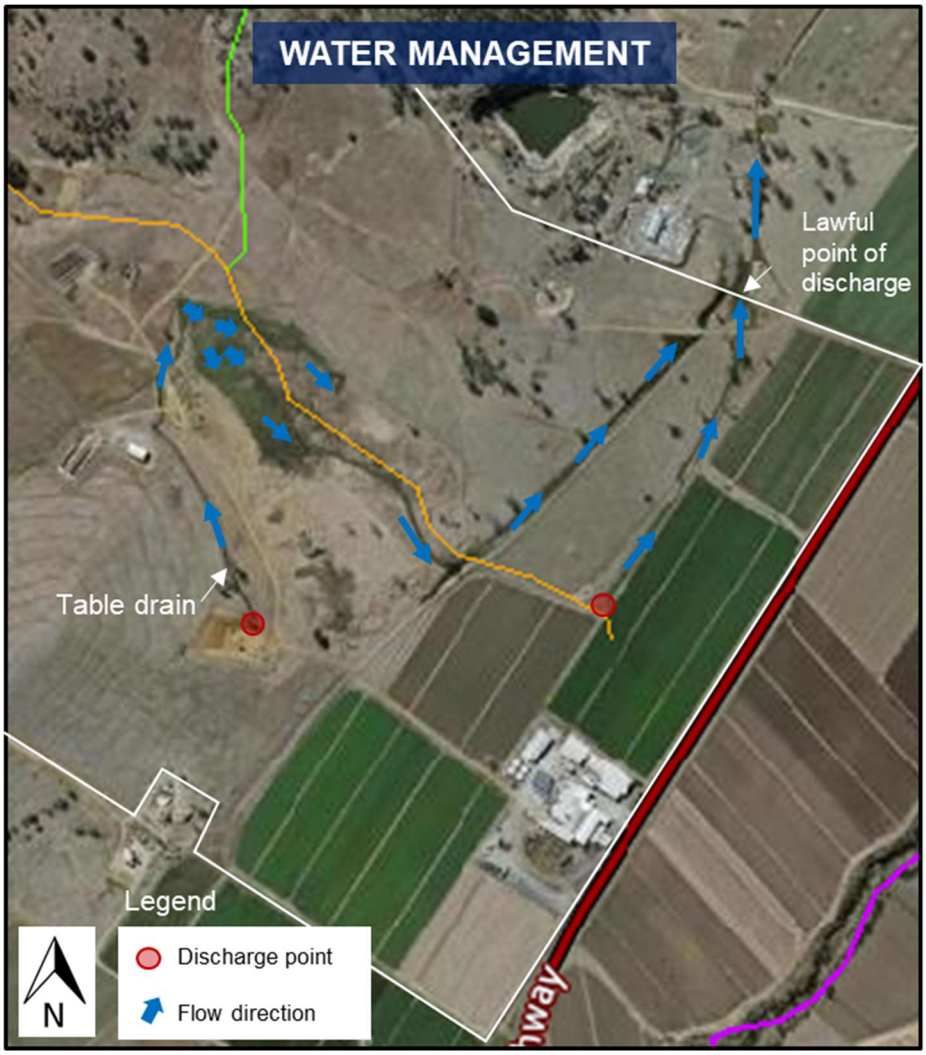

Figure 2. Processing water discharge points.

1.2 Scope of study

The DAF waterway mapping layer was derived from existing data sets with some ground truthing as set out in Fisheries Queensland's *Guide for the determination of waterways using the spatial layer Queensland waterways for waterway barrier works* (DAFF, 2013). The responsibility for determining the fitness of the mapping in representing the on-ground site conditions, rests solely with the user (DAFF, 2013). Waterways that provide fish passage are a matter of State environmental significance (MSES) and therefore the avoid, minimise, mitigate then offset assessment hierarchy applies.

The scope of this study and report is to provide relevant information on waterway features and attributes, aquatic habitat and fisheries values, fish community characteristics and fish passage connectivity within the proposed development site. This information will inform the development of impact mitigation measures, assist in determining if the proposal will result in a significant residual impact to waterways that provide fish passage and form a component of the Impact Assessment Report.

The scope of this investigation includes:

- A waterway investigation within the proposed development site.
- Fish community survey within representative sites.
- Development of mitigation measures as required for the proposed development.
- Assessment of development against State Development Assessment Provisions (SDAP) State Code 18 included in Appendix S of the Impact Assessment Report (RPS 2020).

2.0 Methods

2.1 Study conditions

Field investigations for this project were undertaken on the 5th March 2020. In the week prior to the field investigation, the region experienced a total 5 mm of rain. Prior to this in February 2020, the region experienced approximately 121.8 mm of rain (BOM current weather observations Gatton). This was the first substantial rainfall the region had experienced for nearly 12 months. At the time of the site visit the property was green, dams were full of water and the mapped amber waterway had a small amount of flow. Anecdotal information confirms that prior to the summer rainfall recorded in February, the mapped waterways (not subject to water releases) and dams on the site were dry.

2.2 Study sites

2.2.1 Waterway Investigation

A total of nine sites were investigated to confirm waterway presence, location and extent, DAF waterway classification and waterway features within the proposed development site (Figure 3). These included five sites located on the DAF mapped amber waterway and two sites located on tributary DAF mapped green waterways (Figure 3). Two additional sites were also located on the historical diversion channel to document the downstream flow paths. As part of the field investigation a walkover of the upper reaches of the green waterways were undertaken to determine the presence of any upstream habitats.

To assess the physical and hydrological features of the mapped waterway within the site a walkover of the waterway was undertaken. A visual assessment was made of bed and bank features, any obstructions within the waterway channel, fish habitat features and hydrological characteristics. Photos of site characteristics are presented in Appendix B.

A description of aquatic habitat was recorded including riparian vegetation (native trees, exotic trees, shrubs, littoral grasses and terrestrial grasses), aquatic vegetation (species of rushes/sedges, floating macrophytes, submerges macrophytes and algae) and habitat cover components (rock, timber, undercuts, plant litter). Average depth (cm) and width (m) of the waterway banks (low flow channel and high bank) were measured at randomly selected locations within sites. Each of the habitat variables recorded as abundant (>90%), frequent (50 – 90%), occasional (10 – 50%), rare (< 10%) or absent (0%).

The information collected on aquatic habitat features is used to confirm the DAF waterway classification. The waterway features within the site will also be used to inform any fish passage remediation measures that may be required (i.e. low flow channel width, pool size and depth etc). Only waterways located within the site were investigated during this project.

2.2.2 Fish survey sites

Fish community sampling with backpack electrofishing was used within a total of four sites within the proposed development site (Figure 3).

2.3 Fish sampling

Backpack electrofishing was used as the primary fish sampling methodology within all the four study sites. This technique is commonly used for sampling small creeks and wetlands, because of the ability to sample complex structure, aquatic vegetation and water depths under 1m (Schoenebeck *et al.,* 2005). Backpack electrofishing provides robust estimates of relative abundances and fish diversity within sites (Lake, 2013), and all wadable habitat types within a stream reach can be sampled. Within each site comparable electrofishing effort was used so that resulting fish abundance data was consistent between sites.

Within each site all available habitat types were sampled with backpack electrofishing. During the survey fish counts were recorded and 30 individual fish from each were measured to obtain minimum and maximum lengths for each species. During electrofishing operations any fish that are observed and could be positively identified were added to the total catch. This project was undertaken under General Fisheries Permit number 181014 and animal ethics approval CA 2015/07/888.

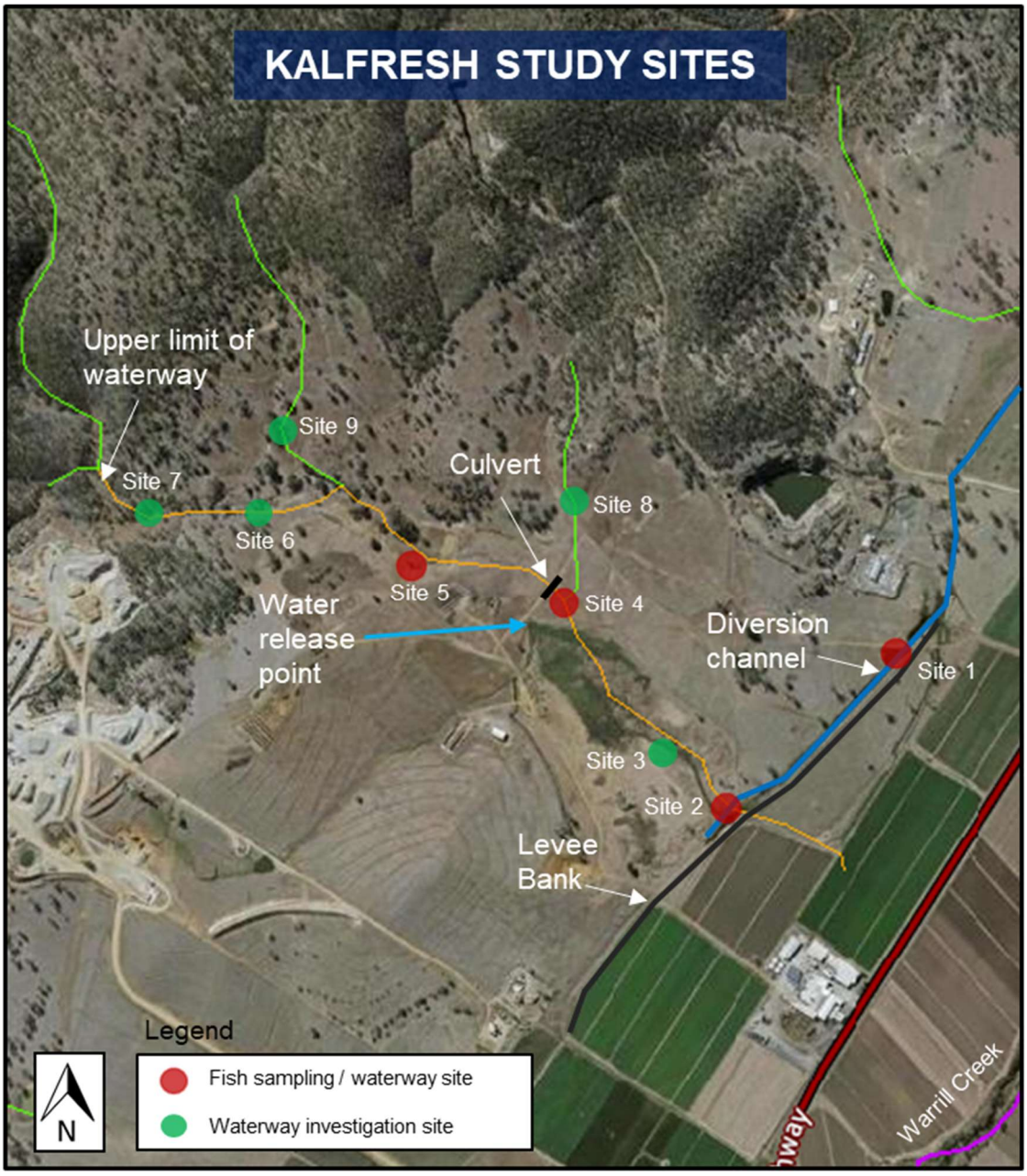

Figure 3. Waterway and fish sampling investigation sites within the Kalfresh site. DAF mapped green and amber waterways are shown as well as historical levee bank (black line), and location of diversion channel (blue line).

3.0 Results and Discussion

3.1 Description of waterways within the Kalfresh site

The following describes the extent and characteristics of the waterways within the proposed development site.

3.1.1 Upper green mapped waterways

There are three mapped green waterways located within the site, one above the upper section of the amber waterway and two green waterways that join the amber waterway mid-way down the site (Figure 1 and 3).

The green waterways within the site were found to be drainage lines, contained no defined bed or banks, other waterway features or fish habitats (Table 1; Appendix A). Further, the sites did not contain adequate water or flow despite recent and substantial rainfall in the month prior and the day before the site investigation. Therefore, it was determined that these were not waterways for the purpose of the *Fisheries Act 1994.*

3.1.2 Central amber waterway

A DAF mapped amber waterway runs through the middle of the proposed development site (Figure 1). To adequately assess the characteristics of this waterway a total of six sites were visited from the top to the bottom of the site (Figure 2).

The upper section of this waterway (between 4 and 7) were found to have waterway features that included defined bed and banks and some pool formations (Table 1). Generally, in the upper section (sites 6 and 7) small pools were present due to underlying bedrock and where bedrock was not present large sections of stream were dry (Table 1; Appendix A). The pools in this upper section were very shallow (mean depth of 20cm) and would easily evaporate during seasonal periods of dry weather. It is unlikely that this upper section of the waterway would retain permanent flow such that waterway connectivity would continue to occur following rain events. No fish were observed or caught in the upper section of the waterway.

The middle section of this waterway (between sites 4 and 5) had a series of deeper semi-permanent pools (Appendix B). These pools had been dry and only recently filled with water from recent rains. At the time of the site visit there was a small amount of flow and the flow path between the pools was poorly defined and dominated by emergent vegetation.

Below the naturally formed pools of site 5 an historical farm dam had been constructed in the location of the dam depicted on the development layout (Appendix A). This dam has failed and redirected flow along an alternative flow path to northeast of the original waterway alignment. The failing of the dam has caused the scouring of a significant pool below the dam

Table 1. Habitat characteristics of the sampling sites within study area as shown in Figure 3. Each of the habitat variables recorded as abundant >90%), frequent (50 – 90%), common (10 –50%), rare (< 10%) or absent (0%).

Site Characteristics	1	2	3	4	5	6	7	8	9
Revised waterway risk rating	UNMAPPED	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GULLY	GULLY
Hydrology / bed	Wet constructed drainage channel with two shallow pools	Wet drainage channel with small shallow pools	Very shallow areas of standing water	Small pools	Medium pools	Bedrock areas holding water. Mostly dry	Bedrock areas holding water. Mostly dry	Drainage line / gully	Drainage line / gully
Waterway features present	Artificial channel with flowing water	Artificial channel with flowing water	No defined bed or banks	Defined bed and banks	Defined bed and banks	Defined bed and banks	Defined bed and banks	Not a waterway	Not a waterway
Permanency of habitat	High – due to farm water management	High – due to farm water management	High – due to farm water management	Moderate	Moderate	Low	Low	None	None
Mean depth (cm)	45	50	4	50	75	Nil	20	Nil	Nil
Max depth (m)	0.60	0.55	0.05	0.65	1.5	Nil	0.55	Nil	Nil
Low flow width (m)	9.3	6.5	n/a	2.4	4.5	n/a	2.75	n/a	n/a
High flow width (m)	16.3	>20	>20	5.6	9.3	10.9	8.1	n/a	n/a
Native riparian canopy	Poor / degraded	Poor / degraded	Poor / degraded	Poor / degraded	Poor / degraded	Sparse coverage	Sparse coverage	Poor / degraded	Poor / degraded
Habitat features	Shallow pools / frequent emergent veg	Shallow pools frequent emergent veg	Poor habitat	Small pools with common emergent veg	Deep pools, degraded with some habitat features	Dry rocky bed	Rocky bed with some habitat features	n/a	n/a
Impacts	Modified hydrology	Modified hydrology	Modified hydrology	Waterway barrier	Impacted by d/s barriers	Impacted by d/s barriers	Impacted by d/s barriers	n/a	n/a

wall within in the alternate flow path that anecdotal information indicates is semi-permanent. The failed dam does not hold water of any significant depth although is likely to cause the upstream pools (site 5) to hold more water. The construction and failing of the dam in this location has created semi-permanent pools than would have historically existed within this reach of the waterway. No fish were captured within this middle section of the amber waterway.

In the lower section of the amber waterway (between sites 2 and site 4) the waterway features became less defined. At site four a waterway crossing with a 450mm diameter pipe culvert concentrates flow creating waterway features including a downstream scour pool and defined bed and bank immediately below the crossing. Downstream of site four the amber waterway did not contain any waterway features and becomes very shallow without defined bed or banks (Table 1).

West of site four, water from the Kalfresh vegetable washing operation exits the perched table drain where it disperses and spreads down into the valley floor, before being captured by the drainage channel (Figure 2). Fish were found in this lower section of the amber waterway (diversion channel), including sites 2 and 4. The constant release of water into the lower section of the site would act to waterlog this area and enhance any natural flows experienced within the site. It is highly likely that this artificially increases opportunities for fish passage into the site from downstream habitats of Warrill Creek.

It is likely that the classification as an amber 'moderate risk' waterway is a result of the low gradient of the land in combination with the waterway mapping capturing the gullies as green waterways. Based on the findings above, this investigation recommends reclassifying the amber waterway as green 'low risk' waterway (Table 1). The characteristics of this waterway indicate it has a lower risk to fish passage consistent with a green 'low risk' waterway classification. This study also confirms that upper waterway limit is the upper extent of the mapped amber waterway (Figure 3).

Land use practices such as cropping and grazing as well as the discharge of vegetable processing water has modified the lower reach of the amber waterway. An interrogation of aerial imagery indicates that there was an historical flow path through the lower section of the site in 1962, although this defined flow path did not exist by 1970 with no alternative flow path being created (despite flow paths showing clearly elsewhere in the imagery) (DNRME, 2020). It is likely that due to the very low gradient and the broadness of the valley this area acted like a wetland or soak and would not have held water for any significant period of time, providing intermittent fish habitats, during time of significant rainfall events. Regardless of the current lack of waterway features, barriers within this lower reach of the waterway would likely pose a low risk to fish passage consistent a green waterway classification.

This investigation confirmed that the DAF waterway mapping layer has accurately mapped a discontinuation of the waterway through downstream cropping areas (Figure 3). As within the cropping area below the levee bank and constructed drainage channel no waterway features currently exist.

3.1.3 Lower historical diversion channel

The historical diversion channel is located at the base of the amber waterway and has been partly formed by the construction of the earthen levee bank (Appendix B). This channel and levee bank were built to divert flows and flood water away from high value cropping areas located to the south. Water collects in the diversion channel and continues to flow off site in a north easterly direction. This channel joins another green mapped waterway on the property next door and eventually runs into Warrill Creek. Fish were found to occur where the waterway joins the diversion channel and further downstream.

The diversion channel is an historical artificially constructed waterbody that now acts as the downstream reach of the waterway. This area is constantly wet and has small amounts of flow from the water releases further upstream. The constant release of water from the Kalfresh vegetable washing operation has created almost permanent habitat along this channel. Despite the almost permanent habitat, the channel and occasional pools are very shallow and dry out quickly when the water releases cease. Habitats are limited and dominated by emergent vegetation and weeds.

Water management within the site will change as part of the SRAIP. Water used for vegetable processing will be reused as part of digestate irrigation activities and treated and reused within the proposed facilities. This will reduce the permanency of habitats within the lower waterway reach and waterway connectivity reducing opportunistic fish passage.

3.2 Fish communities within the study area

Fish sampling within four sites recorded a total of 618 fish, representing a total of six fish species (Table 2). Five of these fish were small bodied native species and a single pest fish species, the mosquitofish (*Gambusia holbrooki*) (Table 2). All the native fish caught in the study area considered common within south-eastern Australia (McDowall, 1996; Pursey *et al.* 2004).

Overall Mosquito fish dominated the fish catches within all study sites representing 83% of the total number of fish recorded (Table 2). Four of the native fish species recorded within the proposed development are shown below in Figure 4.

3.2.1 Fish recolonisation following dry conditions

The farm manager responsible for livestock management within the Kalfresh site observed that all the waterways and dams within the site went dry last year, as a result of the dry conditions that were experienced between March 2019 and January 2020. It was noted that the middle section of the amber waterway that would normally hold semi-permanent water within the scour hole created by the dam also went dry during these conditions.

Fish sampling for this project found that fish were present within the lower reaches of the site, in the historical diversion channel and the lower section of the amber waterway. Recording fish in these locations means that fish would have recolonised these areas after the rainfall

Table 2. Fish catch recorded from the four study sites; no fish were recorded within site 5. # indicates pest fish species.

FAMILY *Species Name*	Common Name	Site 1	Site 2	Site 4	Site 5	Total
ATHERINIDAE						
Craterocephalus marjoriae	Marjorie's hardyhead	2	-	-	-	2
CHANDIDAE						
Ambassis agassizii	Olive perchlet	13	26	15	-	54
ELEOTRIDAE						
Hypseleotris klunzingeri	Western carp gudgeon	1	3	9	-	13
MELANOTAENIIDAE						
Melanotaenia duboulayi	Duboulay's rainbowfish	5	1	-	-	6
POECILIIDAE						
Gambusia holbrooki	Mosquito fish #	204	118	218	-	540
TERAPONTIDAE						
Leiopotherapon unicolor	Spangled perch	3	-	-	-	3
Elecrofishing effort (seconds)		622	311	222	439	1594
Total fish diversity		6	4	3	0	6
Total fish abundance		228	148	242	0	618
Catch per unit effort (fish per 100 seconds)		37	48	109	0	39

Figure 4. Four of the native fish species recorded including olive perchlet (left top and bottom), spangled perch (left middle), Crimson-spotted rainbowfish (right top) and Majorie's hardyhead (right bottom).

events experienced in January 2020. Fish colonisations after February 2020 rain events indicate that fish can successfully migrate upstream by negotiating several potential downstream barriers on neighbouring properties (several dams and road crossings) and the constructed channels when there is enough rainfall. No fish were found above site four likely due to the presence of a waterway barrier.

As mentioned in previous sections the constant release of water from vegetable washing operations into the lower section of the site, would result in a waterlogged channel. This would enhance any natural flows experienced within the site and increase opportunities for fish passage into the site from downstream dams and Warrill Creek.

3.2.2 Waterway barrier

Despite fish colonisation into the site after recent rainfall, no fish were recorded within the middle to upper reaches of the amber waterway (site five and above). This is despite the middle reach having semi-permanent fish habitat within the site (Table 1; Appendix A). The most obvious reason for the lack of fish within this site was the presence of a downstream barrier, that is preventing fish from migrating upstream. The barrier to fish passage in this case was a narrow pipe culvert (reinforced concrete pipe 450mm diameter, 7.4m long) part of an internal road crossing at site four. It appears that the area below the culvert has eroded away and at the time of the site visit the outlet for the pipe was above the water level within the downstream pool (Figure 5).

Figure 5. The waterway crossing that is acting as a barrier to fish passage.

Many small bodied Australian native fish have relatively poor swimming speeds (Watson *et al*. 2020), do not jump to migrate upstream and are unlikely to have migrated through this pipe during higher water levels. Although fish may migrate past such a barrier, if there was enough

rainfall to overtop and drown-out the waterway crossing and create suitable hydrological conditions.

At the time of the field investigation there was a noticeable congregation of fish below this structure. For example, the catch per unit data from fish sampling indicates that there were over twice as many fish in this location, compared to the two sites located further downstream (sites 1 and 2). Waterway barriers often cause high congregations of fish and impact fish communities in many ways. Impacts include increase predation and disease, block access for recolonisation, spawning and feeding habitats. The impacts of barriers to fish migration are widely recognised in Australia (Mallen-Cooper, 1997; Walker, 1985; O'Connor *et al.*, 2006) and have been implicated in the decline of native fish in Australia over the previous 100 years (Mallen-Cooper, 1999).

4.0 Impact mitigation measures

Aspects of the SRAIP may impact waterways within the site include filling to establish allotments, construction of the floodway, internal roads and construction of on-stream dams. Where works trigger operational works that is the construction or raising of waterway barrier works a development approval is required under the *Planning Act 2016* unless the works comply with relevant accepted development requirements. A development application will be submitted for works that require development approval. The creation of the industrial allotments and proposed floodway will modify approximately 340m of the constructed diversion channel and approximately 150m of the lower reach of the amber waterway. Impact mitigation measures are detailed on submitted Cardno drawings.

In order to improve and provide fish habitats and waterway connectivity through the floodway it is proposed to construct billabong type habitats within the constructed floodway, through the current water treatment area and upstream to the existing culvert crossing (site 4). These billabong type habitats will be connected by a spoon drain (~20 cm deep) to direct and concentrate low flows. Waterway features such as pool, riffle run formations cannot be incorporated due to the extremely low gradient of the land.

The proposed billabong habitats will vary in depth with shallow and deeper sections. These habitats will incorporate areas for refuge during dry conditions with deep sections being constructed up to 1.5m deep. The billabong habitats will be irregular in shape, approximately 20 – 30m long and varying in width (3-7m wide). Emergent vegetation will colonise shallow sections and native trees and shrubs will be planted in clumps adjacent to the billabong habitats. This will provide some shading and will moderate water temperature during summer months. Dense riparian planting within the floodway cannot be achieved as it will compromise the flood conveyance of the floodway.

The upstream and downstream waterway connection points within the floodway will be designed and constructed such that there will no drops in elevation greater than 1:30 on the downstream side and any low flow channels will be maintained. Due to the extremely low gradient of the flood way and the incorporation of a spoon drain it is likely that a small rise in the bed level of the spoon drain will be required at the lawful point of discharge. Fish passage will be addressed by constructing any downstream side with a gradient no greater than 1:30.

Waterway crossings will be constructed in compliance with the relevant accepted development requirement (ADR) for operational work that is the construction or raising of waterway barrier works (DAF, 2018). The internal vehicle crossing, identified above as a barrier to fish passage, will be upgraded in compliance with the accepted development requirements for a replacement culvert crossing on a moderate risk (amber) waterway.

The proposed private road will incorporate a vehicle crossing consisting of four 1200 x 300 reinforced concrete box culverts (RCBC). This crossing will comply with the ADR requirements for a new culvert crossing on a low risk (green) waterway. One of the culverts within the culvert array will be installed below the proposed flood way bed level to create a low flow channel.

This low flow channel will be in line with the spoon drain connecting the billabong habitats during low flows.

Works undertaken on the historical dam within the upper reaches of the waterway will be undertaken in line with the ADR specifications for new dams and weirs. Other dams proposed as part of the SRAIP are not on waterways and will be used for storage of vegetable processing water prior to reuse within the site.

Incorporation of fish habitats and providing waterway connectivity throughout the development site and undertaking works in compliance with the ADR will result in improved fish habitats, fish passage and waterway connectivity. The proposed development is unlikely to result in a significant residual impact to waterways that provide fish passage as fish passage and the condition of the waterway including fish habitats will be improved upon completion of the works.

5.0 Conclusion

Fishology Consulting have been engaged by Kalfresh Pty Ltd to undertake a waterway investigation and fish community sampling to facilitate the assessment of the proposed SRAIP project. The SRAIP proposal will provide approximately forty hectares of developable land for rural industrial infrastructure, as well as the services and infrastructure required to operate such a precinct.

Department of Agriculture and Fisheries waterway mapping indicates that there are three green 'low-risk' waterways and a single amber 'moderate-risk' waterway within the site. The green waterways within the site were found to be upper drainage lines that did not contain waterway features, retain water or have any flow despite recent and substantial rainfall and therefore were not waterways for the purpose of the *Fisheries Act 1994.* The amber waterway was found to have lower risk to fish passage consistent with a green 'low risk' waterway classification and it is recommended the waterway be reclassified accordingly.

Fish sampling found that fish were present within the lower reaches of the site, in the historical drainage channel and the lower section of the amber waterway. No fish were observed or sampled in the middle and upper reaches of the mapped amber waterway. This is likely due to the presence of an existing waterway barrier.

Aspects of the SRAIP that may impact waterways within the site includes filling to create allotments, construction of the floodway, internal roads and works to on-stream dams. The waterway crossings and any works to on-stream dams will comply with the accepted development requirements for operational works that is construction or raising of waterway barrier works. Works will be undertaken to replace the existing culvert crossing and provide fish passage to upstream habitats. Fish habitat and waterway connectivity will be provided as part of the SRAIP through the incorporation of billabong type habitats within the floodway and lower reach of the mapped amber waterway. These habitats will be connected via an unlined spoon drain that will concentrate low flows.

Undertaking works in compliance with the ADR, incorporating fish habitats and providing for waterway connectivity with the site will minimise and mitigate any impacts to waterways that provide fish passage. The proposed SRAIP will not result in a significant residual impact.

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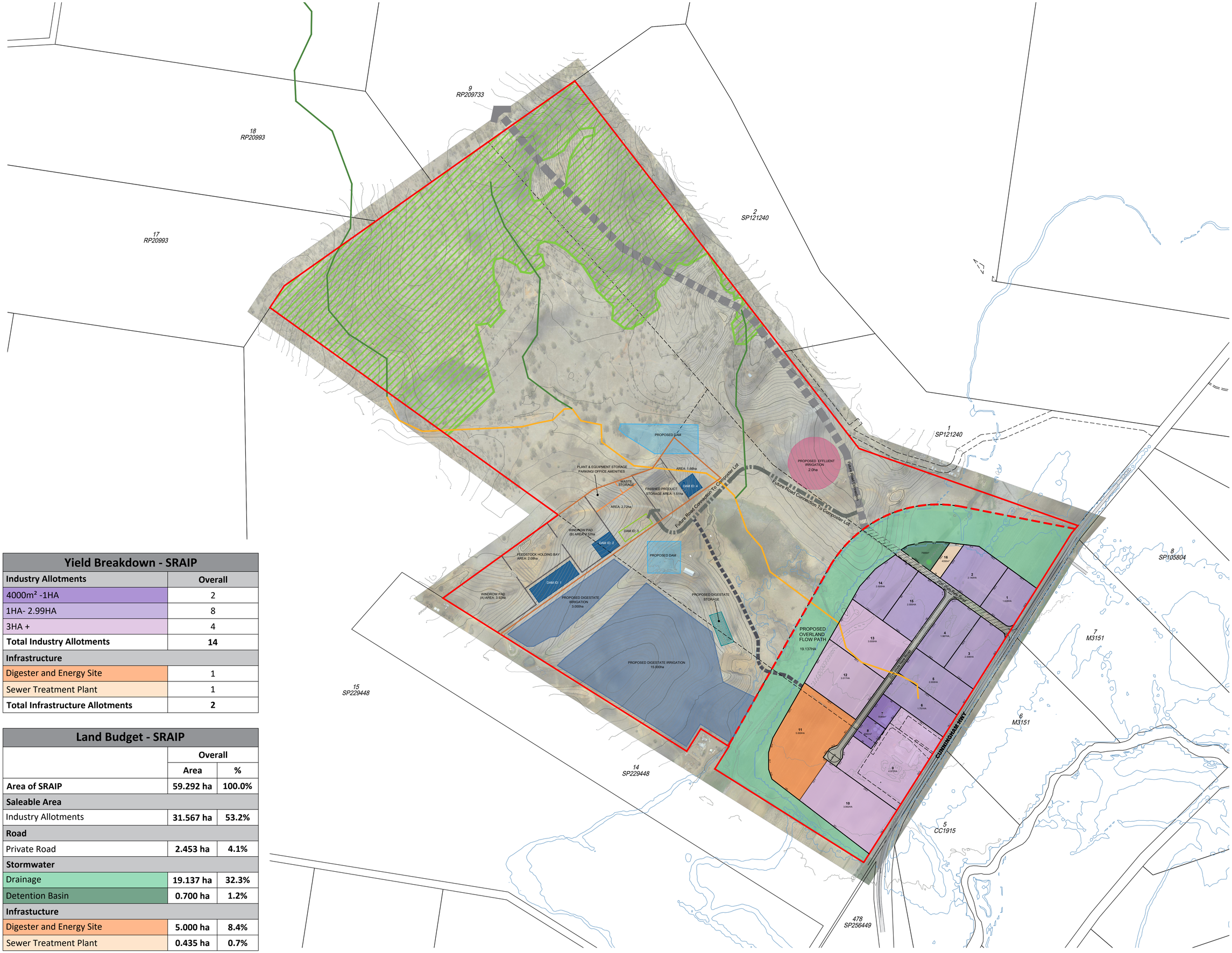
7.0 Appendix

Appendix A. Overall layout



Yield Breakdown - SRAIP	
Industry Allotments	**Overall**
4000m² -1HA	2
1HA- 2.99HA	8
3HA +	4
Total Industry Allotments	**14**
Infrastructure	
Digester and Energy Site	1
Sewer Treatment Plant	1
Total Infrastructure Allotments	**2**

Land Budget - SRAIP		
	Overall	
	Area	**%**
Area of SRAIP	**59.292 ha**	**100.0%**
Saleable Area		
Industry Allotments	**31.567 ha**	**53.2%**
Road		
Private Road	**2.453 ha**	**4.1%**
Stormwater		
Drainage	**19.137 ha**	**32.3%**
Detention Basin	**0.700 ha**	**1.2%**
Infrastucture		
Digester and Energy Site	**5.000 ha**	**8.4%**
Sewer Treatment Plant	**0.435 ha**	**0.7%**

0 25 50 75 100 150 1 : 5,000 @ A1

SCENIC RIM AGRICULTURAL INDUSTRIAL PRECINCT

6200 CUNNINGHAM HWY KALBAR CONCEPT OVERALL

PLAN REF: 142489-06L
DATE: 16 MARCH 2020
CLIENT: KALFRESH
DRAWN BY: LZ
CHECKED BY: PHE

Legend

- Site Boundary
- SRAIP Industrial Precinct
- 0.25m Contours
- Existing Boundaries
- Existing Easement
- Drainage
- Detention Basin
- Proposed Overland Flow Path
- Proposed Flow Path Q100
- Proposed Bio Basin
- Proposed Effluent Irrigation
- Proposed Digestate Irrigation
- Proposed Dam
- Proposed Digestate Storage
- Proposed Composting Area
- Lechate Pond
- Proposed Composter Lot Road Access
- Proposed Plant & Equipment
- Proposed Windrow & Finished Product
- Proposed Stormwater Basin
- Proposed Wagner Quarry Access - *(not part of the SRAIP proposal and subject to separate development approval)*
- Environmental Protection Area *(clearing within the Environmental Protection Area is subject to future Low Order Approval)*
- Low Order Queensland Waterway
- Medium Order Queensland Waterway
- Road Connection to Composter Area
- Access Easement for Wagners Road Alignment

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 5m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: DCDB
Adjoining information: DCDB.
Contours: RPS Survey
Aerial photography: RPS Survey
Overland Flow Path: Aurecon

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Appendix B. Waterway investigation photos

Site 1 – Shallow pool on diversion channel near north-eastern property boundary.

Site 2. Shallow pools within diversion channel next to levee bank.

Site 3. Very shallow standing water (maximum depth 50mm) within water treatment wetland.

Site 4 – Small pool below culvert crossing contained fish. Culvert acting as barrier to fish passage.

Site 5 - Pool habitat and dry channel upstream. No fish present.

Site 6 – Dry channel

Site 7 – Isolated shallow pool and dry upstream channel.

Site 8 – Dry gully with no waterway features.

Site 9 - Gully with no waterway features.