



# **Discovery Holiday Parks**

## Discovery Holiday Park Cradle Mtn RAA Infrastructure Assessment

April 2020

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# 1. Introduction

## 1.1 Purpose of this report

GHD was engaged by Discovery Holiday Parks to undertake the preliminary infrastructure assessment for the proposed expansion of the Cradle Mountain Holiday Park.

This report has been generated to outline the preliminary infrastructure requirements for the proposed expansion project which are:

- Description of existing infrastructure condition;
- Investigating the required water supply and sewer capacity; and
- Management of stormwater generated from the development.

## 1.2 Scope and limitations

This report has been prepared by GHD for Discovery Holiday Park and may only be used and relied on by Discovery Holiday Parks for the purpose agreed between GHD and Discovery Holiday Parks as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Discovery Holiday Parks arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points.

## 2. Existing Condition

### 2.1 Development

The site has significant tree cover and includes 34 cabins, an office, a private residence, a general use area, toilet block, 18 x 4 bed dormitory rooms, 2 x 8 bed bunkhouses and 66 camp sites (29 powered and 39 unpowered).

### 2.2 Water Supply

Whilst there are limited written records of existing water supply infrastructure for the development, GHD's investigations suggest there are two sources, namely:

- Rainwater harvesting, supplemented by water carting; and
- Supply from Parks and Wildlife Service (PWS) private scheme.

Bore water is used by some Cradle Mountain business and/or in combination with water licences to extract from stream or water body. While there is an historic bore within the Discovery Park, no groundwater is currently used by Discovery.

Anecdotally, rainwater is supplied to the "drinking water taps" most of the time, unless supplies are too low in the onsite tanks (refer Table 1 below). In this circumstance, water is supplied to the site from Sheffield Water Treatment Plant by tanker. Any surplus rainwater is usually supplied to cleaning sinks in the main "common area" huts.

Water from the PWS private scheme, originating from the two small dams adjacent to the development, is supplied to all uses other than drinking water taps. All taps labelled as drinking water are also labelled with a boiled water requirement.

**Table 1 Details of Rainwater Tanks**

Locations	Tank sizes
Southern "Common area" hut	24 kL and 10 kL
Northern "Common area" hut	2 x 10 kL
Cabin area	3 x 24 kL
Private residence near unpowered site 13	3 x 24 kL and 10 kL
AM Residence	24 kL and 10 kL
Cabin 34	2 x 10 kL
<b>Total Site Storage</b>	<b>262 kL</b>

The existing theoretical water demand has been calculated in accordance with TasWater guidelines as below. Based on this assessment, the average demand is 16,550 kL/year or 45.35 kL/day. This demand may be conservatively high as it assumes occupancy of all sites. As a comparison, based on AS/NZS1547:2000 On-Site wastewater Management Appendix

4.2D (no longer in 2012 revision for Australia), the equivalent demand is 37.7 kL/day for roof water tank supply and camping grounds.

**Table 2 Existing Water Demand**

Unit	ET/unit	Number of units	Total ET	Average Day Demand (kL/day)
Powered Van Site	0.5	29	14.5	9.9
Unpowered Van Site	0.5	39	19.5	13.4
Six Bed Cabins	0.5	22	11	7.5
Four Bed Cabins	0.5	11	5.5	3.7
One Bed Cabins	0.5	1	0.5	0.3
18 x 4 Bed Dormitory Rooms	0.6	18	10.8	7.3
Reception and Office	1	1	1	0.7
Managers Residence	1	1	1	0.7
Camp Kitchens	Included Above	2	0	0.0
Amenities Building	Included Above	1	0	0.0
2 x 8 Bed Bunkhouses	1.2	2	2.4	1.6
<b>Total ET</b>		<b>127</b>	<b>66.2</b>	<b>45.35</b>

The actual demands and water supplied to the site are not available. Parks has a commitment to provide water to the existing level of development.

Installation of water meters for the Discovery site would assist in refining the existing water use with a view to refining future water storage demands.

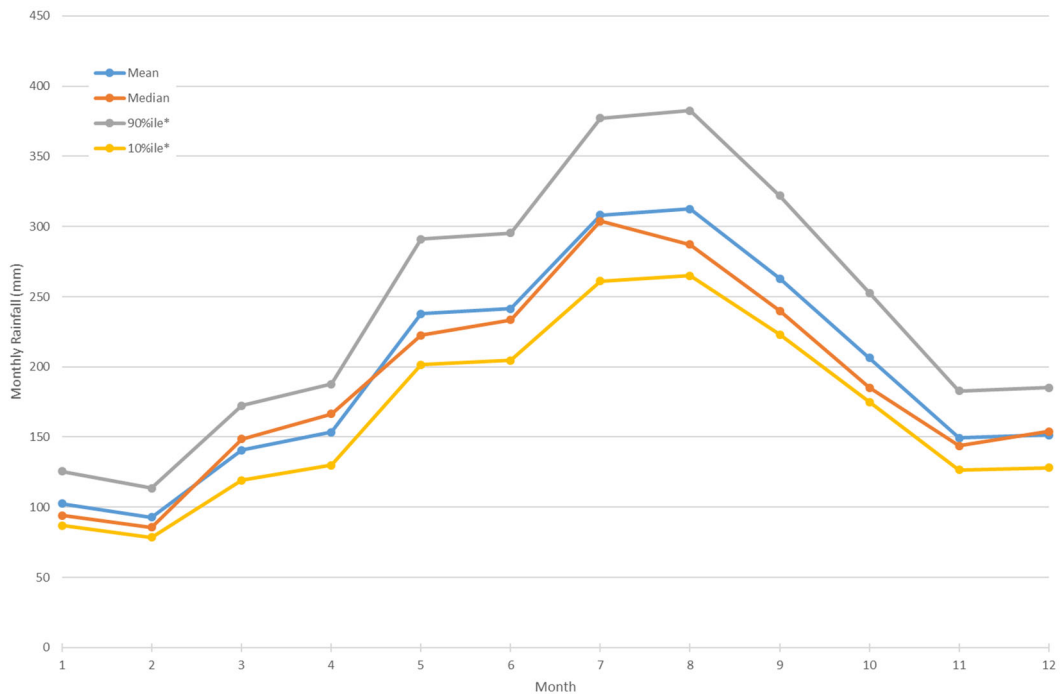
### 2.2.1 Rainwater Supply

Rainfall data from the Cradle Mountain Visitors Centre is summarised below.

**Table 3 Cradle Mountain Visitor Centre Rainfall**

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Mean	103	93	141	153	238	241	308	313	263	206	149	151	2,393
Median	94	86	149	166	223	234	304	287	240	185	144	154	2,325
90%ile*	125	114	172	188	291	295	377	383	322	253	183	185	2,929
10%ile*	87	79	119	130	201	205	261	265	223	175	127	128	2,028
min	17	13	59	49	92	61	100	147	87	18	29	70	1,885
max	282	232	248	345	548	495	495	635	433	450	284	263	3,306

\* annual percentile with average monthly ratio to total annual rainfall.



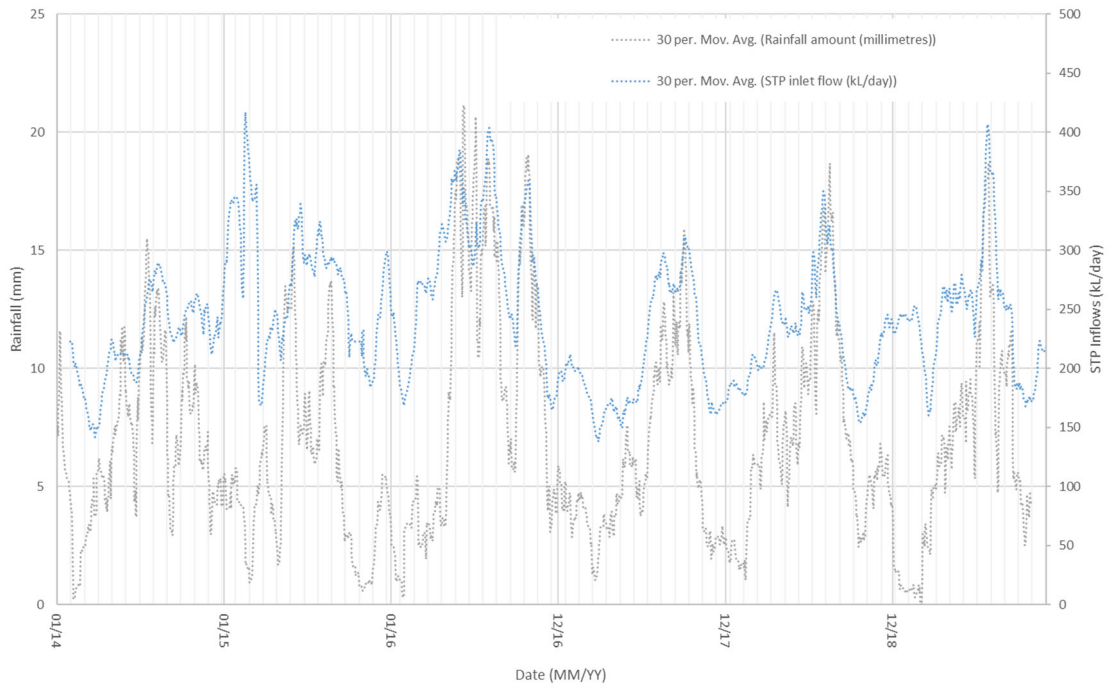
**Figure 1 Visitor Centre Rainfall (1995-2019)**

It is unclear which of the roofs contribute to the rainwater supply system. As a guide, the following is provided assuming all roofs contribute. The approximate existing roof area is 4,000 m<sup>2</sup>.

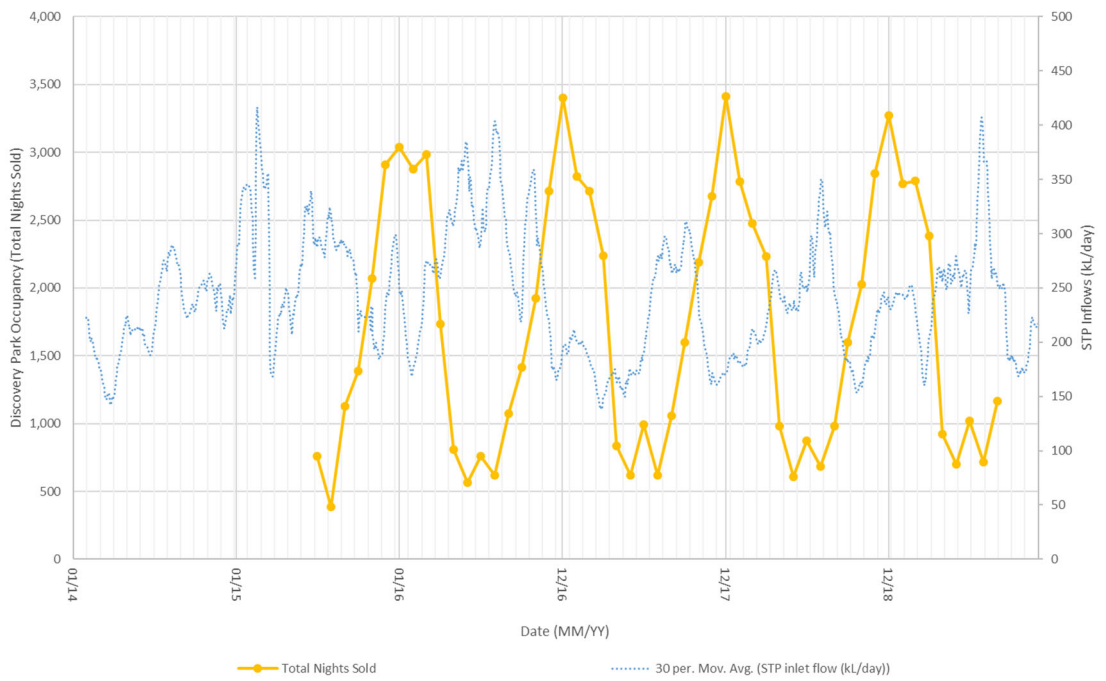
Based on no overflow or other losses, this equates to an average annual yield of 9,570 kL. Noting that the total storage is 262 kL, and the average dry month (February) yield of 370 kL, it can be seen that currently the total water demand (714 kL in February) is expected to be well in excess of the available yield from roof rainwater. This is in line with the anecdotal evidence presented above.

### 2.3 Wastewater Disposal

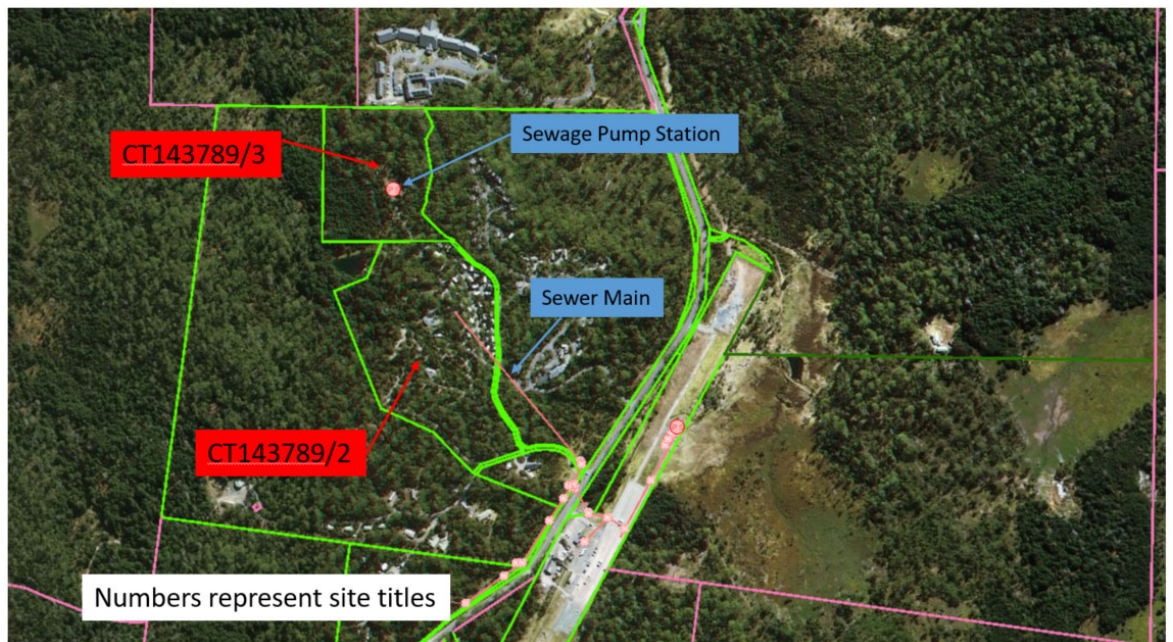
Wastewater from the existing site is collected by an existing TasWater Sewage Pump Station (SPS) which pumps to the TasWater Sewage Treatment Plant via a small diameter (DN63) rising main. Again, there are no records of the volumes flowing through this SPS, however total flows to the Sewage Treatment Plant have been provided by TasWater. These records show a strong correlation between STP inflows and Rainfall (rather than Occupancy), suggesting there is high inflow and/or infiltration in the broader TasWater sewerage system during rainfall.



**Figure 2 Historic Rainfall and STP Inflows**



**Figure 3 Historic Occupancy and STP Inflows**



**Figure 4 Sewer Infrastructure on site**

We understand the existing development contributes flows to the sewage system from the sources outlined below. Average Dry Weather Flow (ADWF) was calculated in accordance with the TasWater guidelines and is included below as the basis for further disposal rate calculations.

**Table 4 Existing Wastewater Disposal Rate**

Unit	ET/unit	Number of units	Total ET	ADWF (kL/day)
Unpowered Van Sites	0.6	39	23.34	12.6
Powered Van Sites	0.6	29	17.4	9.4
6 Bed Cabins	0.6	22	13.2	7.1
4 Bed Cabins	0.6	11	6.6	3.6
1 Bed Cabins	0.6	1	0.6	0.3
18 x 4 Bed Dormitory	0.92	18	16.56	8.9
Reception and Office	1	1	1	0.5
Managers Residence	1	1	1	0.5
Camp Kitchens	Included Above	2	0	0.0
Amenities Building	Included Above	1	0	0.0
2 x 8 Bed Bunkhouses	1.84	2	3.68	2.0
<b>Total</b>		<b>127</b>	<b>83.44</b>	<b>45.1</b>

As with water demand calculations, this calculation may be conservatively high due to lower occupancy rates especially during off peak periods.

## **2.4 Stormwater and Flooding**

The stormwater infrastructure in most of the site is shallow spoon drains. During the site visit, low levels of erosion and scouring were observed. Anecdotally, the lower part of the camping site is not used during wet periods. There is an unnamed watercourse towards the lower end of the site.

There is also a spring in the cul-de-sac for cabins 18-22. This spring discharges into a pit, with overflow piped to the ground around cabin 4 and then dispersed to the lower corner of the site.

A Discovery site manager noted that during and following significant rain events, there is significant sheet flow over roads and erosion of existing roads and channels. Staff undertake resurfacing and grading of the roads on a regular basis. There is opportunity for the existing drainage conditions to be improved to minimise drainage and erosion.

# 3. Proposed Condition

## 3.1 Development

The proposed concept is for a development at the Cradle Mountain Discovery Holiday Park for an additional 122 visitor accommodation sites. The site will provide 51 van sites (40 powered and 11 unpowered), 71 cabins, 1 amenities block and one new camp kitchen. Figure 4 shows the proposed site plan. The expansion will require the removal of 10 of the existing sites.



**Figure 5 Proposed Site Plan**

## 3.2 Water Supply

### 3.2.1 Proposed Demand

The proposed development will increase the demand for water on the site. The design demand has been calculated in accordance with the TasWater guidelines and is summarised below.

**Table 5 Proposed Water Demand**

Unit	ET/unit	Number of units	Total ET	Average Day Demand (kL/day)
Powered Van Site	0.5	40	20	13.7
Unpowered Van Site	0.5	11	5.5	3.7675
1 Bed Cabins	0.33	23	7.59	5.2
2 Bed Cabins	0.5	48	24	16.4

Unit	ET/unit	Number of units	Total ET	Average Day Demand (kL/day)
Amenities Block	Included Above	1	Included Above	0
Camp Kitchen	Included Above	1	Included Above	0
<b>Total ET</b>		<b>124</b>	<b>57.09</b>	<b>39.1</b>

### 3.2.2 Roofwater Supply

The proposed development will include additional roof areas that have the potential to be the source of additional roofwater supply. The additional roof area will be approximately 4,370 m<sup>2</sup> with the opportunity to yield an additional 8,495 kL/year (assuming no losses or storage overflow). This is much less than average annual demand (14,174 kL/year).

The total available roof area (proposed and existing) is approximately 8,379 m<sup>2</sup> yielding a maximum rainwater supply of 20,026 kL (assuming there is no overflow of the gutters, downpipes, nor tanks).

It can be seen from the above that while roof water supply can provide a significant contribution to water supply, additional supplies will be required for the proposed development

### 3.2.3 PWS Water Supply

As described above, PWS currently has a small water supply for private use (residences and visitor centres, current and new) and the Discovery Park. PWS advised they are considering options for expanding the capacity of this service but there are no firm timeframes for additional capacity to be provided for the Discovery Park.

### 3.2.4 TasWater Potable Water Supply

Options around tanker supply of potable water from the Sheffield Water Treatment Plant remain open, however, this is not likely to be a preferred primary option due to the cost and number of truck movements that would be required. However, this supply may be used to continue to supplement other water sources to improve water security.

### 3.2.5 TasWater Recycled Water

The TasWater Sewage Treatment Plant currently treats sewage from the Cradle Mountain Valley (including the Discovery Park) to Class A standard before pumping to the existing storage adjacent the Discovery Park for gradual discharge to the environment. There is an opportunity to integrate this recycled water into the Discovery Park (and other local users') Water Supply. Typically, uses for water treated to this standard are toilet flushing and washing machines with some potential for other uses.

There is an opportunity to use this water via a second piped system supplying:

- (a) Proposed cabins and amenities building for toilet flushing and laundry;
- (b) Fire Hydrants and hoses; and/or
- (c) Existing cabins and amenities buildings for toilet flushing and laundry.

We propose to include installation of pipes for (a) and (b) within the proposed development with potential to expand the use to (c) and the remainder of the fire hydrants and hoses once supply is secured from TasWater. The piped water supply network (including hydrants and hoses) within the site is currently owned by Discovery. It is proposed that the new

infrastructure within the site is constructed and owned by Discovery with infrastructure external to the property being owned by TasWater. The proposed main to the TasWater Reuse Water tank is proposed to be constructed by Discovery and handed over to TasWater at commissioning of the pipeline.

### **3.2.6 Bore Water Supply Options**

There are existing bores in the area. Additional investigation would be required to determine available yield and whether surface water (dams yield) would be effected by groundwater extraction.

### **3.2.7 Fire Fighting Supply**

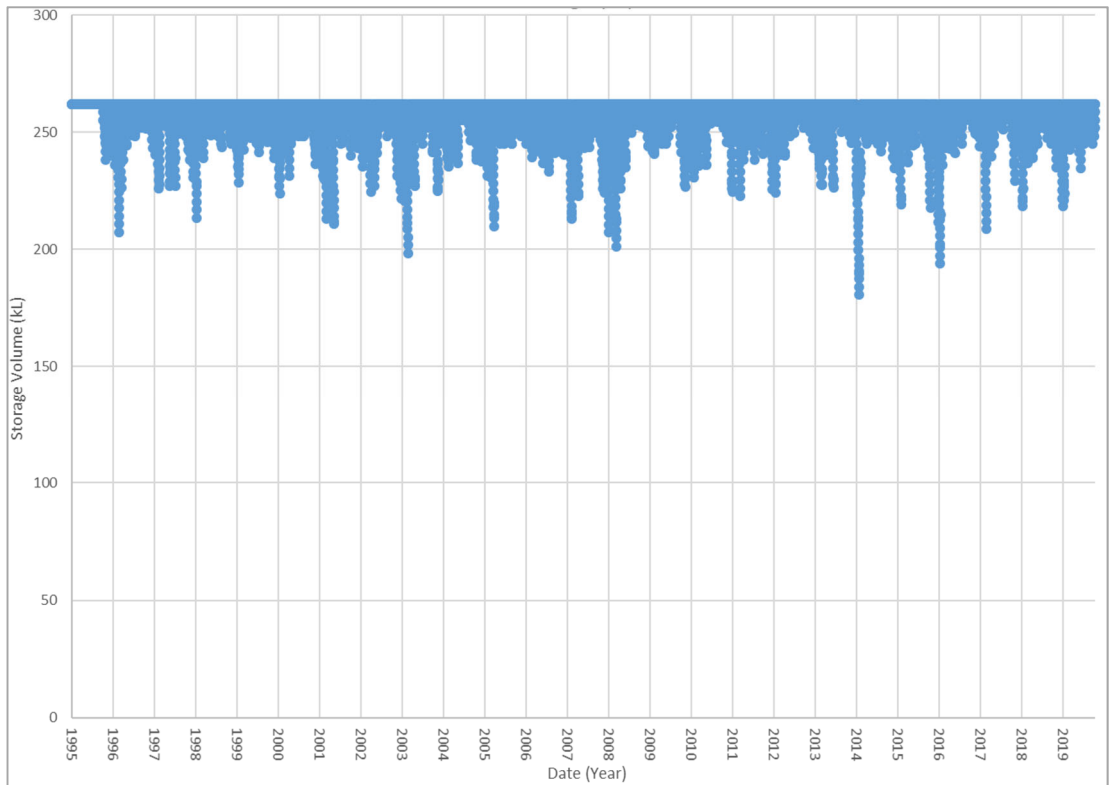
A static fire water supply of 10,000 L/building up to 150 kL for the hydrant supply is proposed as detailed in *Bushfire Report: Discovery Park Cradle Mountain* (Livingston Natural Resource Services). It is proposed to provide a static supply of water (rain or recycled) to each of the stages of development to meet this requirement. Parks has advised that any water stored within TasWater's recycled water reservoir can be used by Discovery to fulfil this requirement (on the basis that a connection from the reservoir to Discover is established). However, exact committed volumes for each stage will be confirmed with TasWater, PWS, and TFS prior to construction of each stage.

TasWater has advised that their current system is kept at a minimum reuse reservoir level of 432,000L to provide for firefighting water. This may change as reuse water is provided to developments. Should additional storage be required once reuse is used within development(s), this will be addressed as part of the detailed design process and any additional storage provided on a staged basis such that a minimum of 10,000 L/building be set aside for firefighting for each new building up to the total required for the hydrant system (150kL).

### **3.2.8 Staging**

Cabins 1-10 are proposed to be constructed as the first stage of the expansion. A daily water balance has been undertaken for the first stage of the proposed development. The following assumptions have been made:

- Stage 1 = 10 x 0.5 ET
- Storage Tank Capacity = existing tanks = 262 kL;
- No reuse available;
- 250 kL/ET/year; and
- Existing roofs and stage 1 roofs contribute to rainwater storage.



**Figure 6 Stage 1 Water Balance**

Based on the above, Stage 1 (10 cabins) could proceed without additional water supply to the site if all roofs within the park are captured and the reuse tank is available for fire-fighting.

### 3.2.9 Conclusion & Recommendation

We understand that PWS has committed to provide the current development level with a water supply through their system. We have therefore assumed that 44.6 kL/day is supplied to the site from PWS on an on-going basis. This is based solely on the demand for the existing development calculated in accordance with the TasWater’s supplement to the MRWA edition of WSA03 Water Supply Code of Australia.

This means that a further supply of 39.1 kL/day is required for the proposed development. Subject to further discussions with TasWater, utilisation of the reuse supply for non-potable uses appears to be the preferred means of meeting this additional demand for Stage 2 onwards. This is due to the constraints on additional rainwater harvesting, along with the uncertainty of groundwater availability and acquiring additional water from PWS.

A summary of the calculated annual proposed water supply and sources for both the existing and proposed works is included in Table 6

**Table 6 Summary Proposed Water Supplies**

Description	Source	Average Volume
Existing	PWS supply	45.4 kL/day
Existing Rainwater (reallocated to service proposed buildings)	Existing Roofs	26.2 kL/day
Proposed Rainwater	Proposed Roofs	28.6 kL/day

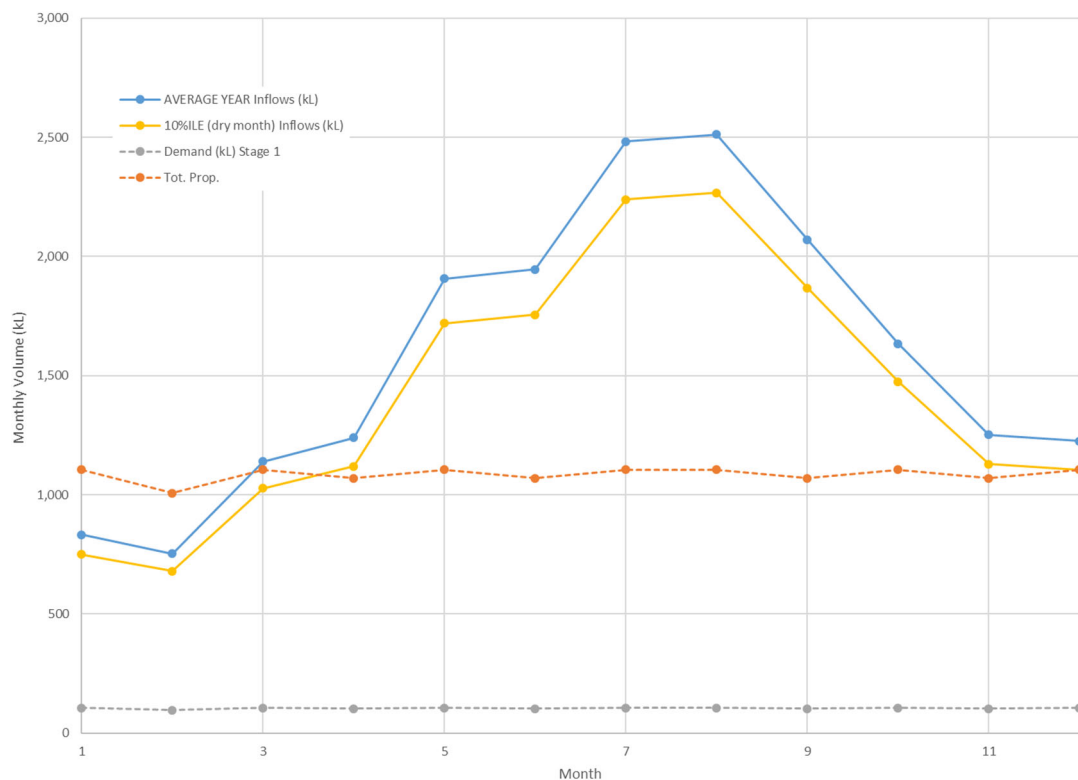
Description	Source	Average Volume
Proposed Recycled Water	TasWater	39.1 kL/day
<b>Total</b>		<b>139.3 kL/day</b>

The calculated total demand is less than the available supply under average annual conditions.

**Table 7 Summary Proposed Water Demand**

Description	Average Demand
Existing Total	45.4 kL/day
Proposed Total	39.1 kL/day
<b>TOTAL</b>	<b>83.4 kL/day</b>
Existing potential recycled	14.9 kL/day
Proposed area recycled	13.0 kL/day

A water balance has been undertaken to ascertain the amount of storage required to provide the above supply with reasonable surety based on the calculated supplied and demands. Monthly Demand and rainfall inflows are summarised below for average monthly rainfall, dry (10 percentile) monthly rainfall, Stage 1, and Total proposed development cases.



**Figure 7 Monthly Water Balance**

The above suggests that there is an available water supply for the site with an adequate level of reliability and quantity to service the anticipated use of the site in line with current quality expectations.

To provide a greater level of confidence in this analysis, it is recommended that Discovery establish water metering at the existing development to enable a greater level of accuracy in both current and projected demands,

### 3.3 Wastewater Disposal

Disposal of additional wastewater is proposed to be to the TasWater system via the existing pump station (SPS). The additional site loads are summarised below.

**Table 8 Proposed Equivalent Tenements**

Unit	ET/unit	Number of units	Total ET
Powered Van Site	0.6	40	24
Unpowered Van Site	0.6	11	6.6
1 Bed Cabins	0.5	23	11.5
2 Bed Cabins	0.75	48	36
Amenities Block	Included above	1	0
Camp Kitchen	Included above	1	0
<b>Total Additional ET</b>		<b>124</b>	<b>78.1</b>
Total Existing ET		125	83.44
<b>Total Proposed Site ET</b>			<b>160.34</b>

The existing SPS may need upgrading including an increase in the emergency storage. Any storage increase (if required) will need to be advised by TasWater. If required, Discovery would provide the additional storage and hand over to TasWater. The additional SPS would similarly be handed over to TasWater on commissioning (refer to Concept Services Plan Appendix A).

The proposed system and existing connection to the TasWater sewerage system can be designed to provide a system in accordance with the Water and Sewerage Industry Act 2008 and Water Supply Code of Australia WSA03-MRWA Edition, V2, TasWater Supplement.

### 3.4 Stormwater & Flooding

No information on flooding is currently available. Anecdotally, there are camp areas which are not used during wet periods.

As part of the development, local V-drains will be constructed along the access roads and immediately upslope of camping areas. These will discharge downslope of the development to existing drainage paths in a similar manner to the existing case. Preference will be given to minimising the catchment area discharging at each location in order to minimise potential for erosion due to the concentrated flows.

Overflows from roof water and rainwater tanks will be directed towards the roadside v-drains.

## 4. Conclusions and Recommendations

### 4.1 Water

GHD's estimates of available water supply and usage for the site indicate that water upgrades are required for the proposed development.

Utilisation of reuse supply from TasWater's STP for non-potable uses appears to be the preferred means of supplementing the existing rainwater and PWS supplies to meet the shortfall in supply for Stage 2 onwards, including providing for fire-fighting storage for Stage 1 onwards. This is due to the constraints on additional rainwater harvesting, along with the uncertainty of groundwater availability and acquiring additional water from PWS. This conclusion is subject to further discussion with TasWater around the cost and timing for this service, along with management of risks associated with reuse water.

To provide a greater level of confidence in quantifying water requirements, it is recommended that Discovery establish water metering at the existing development to enable a greater level of accuracy in both current and projected demands.

### 4.2 Sewer

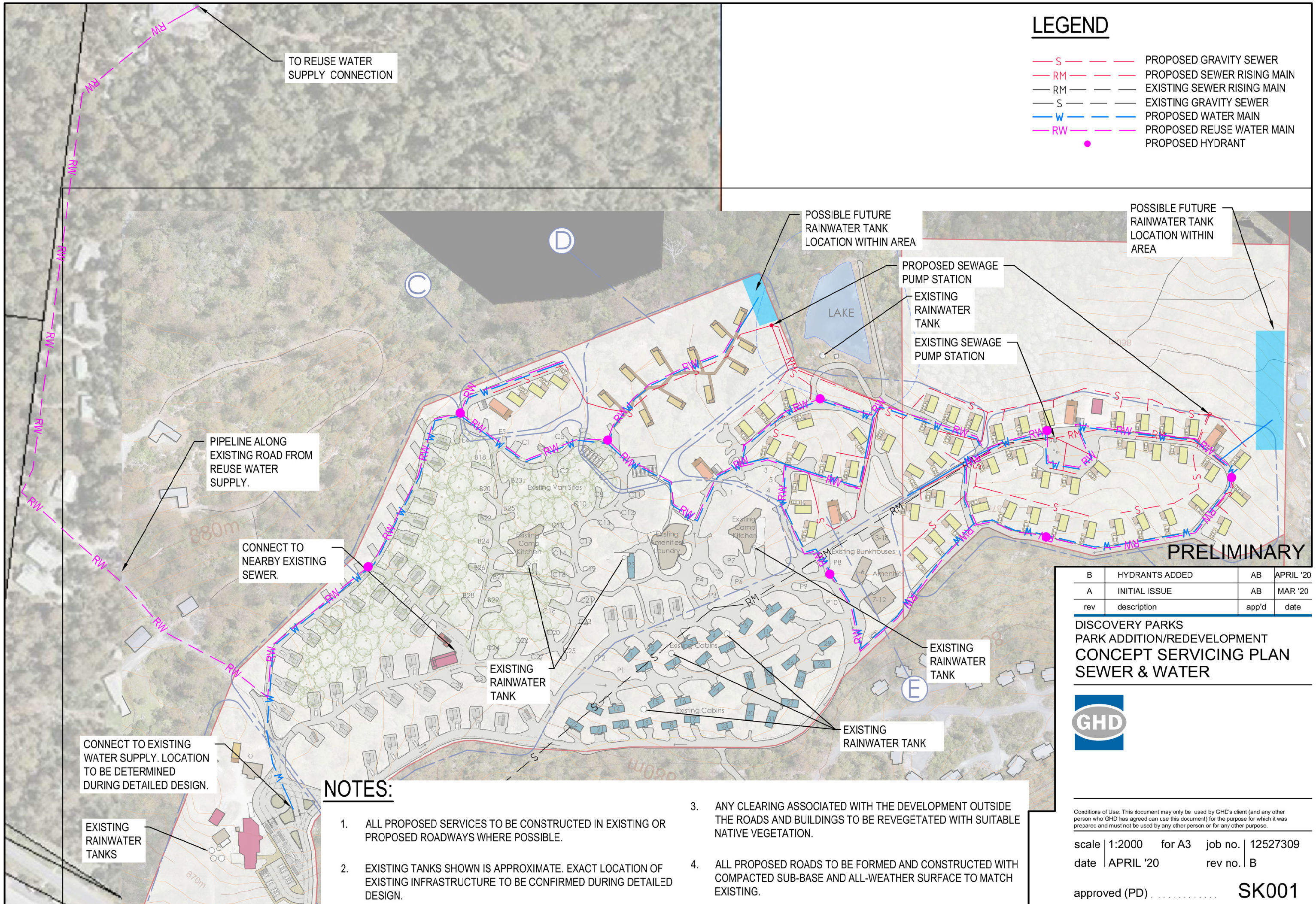
It appears that the existing sewage pump station transferring sewage from the site to TasWater's sewerage network can continue to cater for the proposed development. This is subject to Discovery undertaking any upgrades to achieve compliance with TasWater standards, including pump size and emergency storage capacity.

A concept servicing plan is included in Appendix A.

# **Appendix A** – Concept Services Plan

# LEGEND

- S — PROPOSED GRAVITY SEWER
- RM — PROPOSED SEWER RISING MAIN
- RM — EXISTING SEWER RISING MAIN
- S — EXISTING GRAVITY SEWER
- W — PROPOSED WATER MAIN
- RW — PROPOSED REUSE WATER MAIN
- PROPOSED HYDRANT



TO REUSE WATER SUPPLY CONNECTION

PIPELINE ALONG EXISTING ROAD FROM REUSE WATER SUPPLY.

CONNECT TO NEARBY EXISTING SEWER.

CONNECT TO EXISTING WATER SUPPLY. LOCATION TO BE DETERMINED DURING DETAILED DESIGN.

EXISTING RAINWATER TANKS

## NOTES:

1. ALL PROPOSED SERVICES TO BE CONSTRUCTED IN EXISTING OR PROPOSED ROADWAYS WHERE POSSIBLE.
2. EXISTING TANKS SHOWN IS APPROXIMATE. EXACT LOCATION OF EXISTING INFRASTRUCTURE TO BE CONFIRMED DURING DETAILED DESIGN.
3. ANY CLEARING ASSOCIATED WITH THE DEVELOPMENT OUTSIDE THE ROADS AND BUILDINGS TO BE REVEGETATED WITH SUITABLE NATIVE VEGETATION.
4. ALL PROPOSED ROADS TO BE FORMED AND CONSTRUCTED WITH COMPACTED SUB-BASE AND ALL-WEATHER SURFACE TO MATCH EXISTING.

POSSIBLE FUTURE RAINWATER TANK LOCATION WITHIN AREA

PROPOSED SEWAGE PUMP STATION

EXISTING RAINWATER TANK

EXISTING SEWAGE PUMP STATION

POSSIBLE FUTURE RAINWATER TANK LOCATION WITHIN AREA

**PRELIMINARY**

EXISTING RAINWATER TANK

EXISTING RAINWATER TANK

B	HYDRANTS ADDED	AB	APRIL '20
A	INITIAL ISSUE	AB	MAR '20
rev	description	app'd	date

### DISCOVERY PARKS PARK ADDITION/REDEVELOPMENT CONCEPT SERVICING PLAN SEWER & WATER



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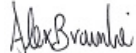
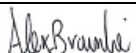
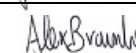
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Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	M.Hosseini/ F.Haynes	B.Davie		A.Brownlie		3/02/20
1	F.Haynes	A.Brownlie		A.Brownlie		3/4/20

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