## **Appendix B:**

Water and Sewer Services report

Ardill Payne & Partners





# **INFRASTRUCTURE CAPACITY REPORT**

## **BROKEN HEAD QUARRY**

Broken Head Road, Suffolk Park

for: Winten Property Group

March 2023

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## Table of Contents

				. 5
2. HI	ISTORY	OF SI	TE SERVICING ASSESSMENTS	.4
3. SE	EWER S	YSTEN	Λ CAPACITY	.4
3.2	1 Se	ewer C	apacity Constraints	. 5
	3.	1.1	Broken Head Sewage Pumping Station Pumps (BHSPSP)	. 5
	3.	1.2	Broken Head Rising Main discharging to S-3009-MNH-1259	. 5
	3.	1.3	Gravity receiving main draining manhole S-3009-MNH-1259	. 6
	3.	1.4	Clifford St Sewage Pumping Station	. 6
3.2	2 E>	xcess S	ewerage Capacity as Residential Lots	. 6
	3.	2.1	Capacity by conventional sewerage	. 6
	3.	2.2	Capacity by pressure sewerage	. 7
4. W	VATER S	SUPPL	Y CAPACITY	. 7
5. CC	ONCLUS	SION .		. 7
6. DI	ISCLAIN	ИER		. 8
7. A <sup>-</sup>	TTACH	MENT	S	.9

## List of Tables

Table 1 Sewer Excess Capacity by element	:5
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## 1. Introduction

The Broken Head Quarry is nearing the end of its extraction phase and the site will be rehabilitated when quarrying activities finish. With appropriate rezoning the post quarry site has the potential to provide some residential lots. Rezoning the site for residential development has the potential to make better use of existing council water and sewer infrastructure by utilising unused capacity.

Both north and south of the site there are areas served by the Byron Shire Council (BSC) reticulated water and sewer system. The mains servicing the southern area and linking it to the northern areas pass through the site, see Figure 1.

The purpose of this report is to quantify any under-utilisation of infrastructure capacity and assess how that capacity could translate to future residential lots on the site.



Figure 1 Site in relation to areas with reticulated services, and water and sewer mains.



## 2. History of site servicing assessments

Two infrastructure servicing reports have previously been prepared for the site. The 2014 report reported on a fully developed subdivision concept design while the 2018 report gave a range of potential lot yields and development costs based on different lot sizes and servicing technologies. Both previous reports, while concentrating on internal site constraints, did consider the external constraints imposed by the potentially available capacity in BSC infrastructure.

What is most relevant to this report has been Councils advice that BSC's Suffolk Park water and sewer infrastructure and the loads and demands on it have not changed significantly since 2014.

## 3. Sewer System Capacity

The excess capacity for the sewerage system as a whole will be dictated by that part of the system that can receive the smallest additional flow before requiring an upgrade. BSC has identified a number of elements in the sewer system which could act as the limiting factor to additional load being placed on the system. These constraining elements are discussed below. Because there are two possible connection points for the site, see Figure 2, it is possible to bypass some of the possible limitations by using connection point 1 rather than 2.



Figure 2 Possible sewer connection points



#### 3.1 Sewer Capacity Constraints

The identified constraining elements are summarised in Table 1 and discussed below. The resulting identified available sewer capacity is 12.7 L/s.

Constraint	Excess Capacity, L/s	Can be bypassed?
Gravity receiving main draining manhole S-3009-MNH-	12.7	No
1259		
Broken Head Rising Main discharging to S-3009-MNH-1259	15.3	Yes
Broken Head Sewage Pumping Station Pumps	>20	Yes
Clifford St Sewage Pumping Station	>20	No

#### Table 1 Sewer Excess Capacity by element

#### 3.1.1 Broken Head Sewage Pumping Station Pumps (BHSPSP)

#### Calculated available excess capacity 20 L/s

This constraint applies to Connection Point 2 only.

It is possible that by pumping sewage into Connection Point 2 while the BHSPSP are running the increased back pressure could cause a reduction in the BHSPSP pumping rate. The Broken Head rising main is 1.67km of 100mm PVC pipe. The static lift is 24m. The rising main is fed by Mono CEO62 pumps pumping at 8.3L/s. The proposed connection point for the development would be 1.2km from the BHSPS. The CE062 operating range is 6 to 12 bar (60m – 120m).

The back pressure experienced by the BHSPS with the pumps running at 8.3 L/s is calculated as 34.9m. To raise the pressure at BHSPS to 60m by introducing flow into Connection Point 2 requires an introduced flow of 20 L/s. Because the BHSPS pumps are positive displacement with 60m being the bottom of the normal operating range this increase in pressure will have no measurable impact on the BHSPS pump capacity.

#### 3.1.2 Broken Head Rising Main discharging to S-3009-MNH-1259

Calculated available excess capacity 15.3 L/s.

This constraint applies to Connection Point 2 only.

The Broken Head Rising Main is 100mm PVC main. According to the BSC Development Servicing Plan design criteria the maximum velocity of flow through the pipe is 3 m/s. This equates to a maximum flow of 23.6 L/s or 15.3 L/s of excess capacity.



#### 3.1.3 Gravity receiving main draining manhole S-3009-MNH-1259

Calculated available excess capacity 10.7 L/s.

Common to both connection points.

An EPA-SWMM model of the receiving sewer (150Ø PVC @ 1%) indicates that 19 L/s of continuous inflow in addition to the peak flows created by the local service connections can be safely added to the receiving manhole.

The Broken Head Rising Main delivers inflow at 8.3 L/s therefore an additional 10.7 L/s of capacity is available.

#### 3.1.4 Clifford St Sewage Pumping Station

#### Assumed available excess capacity 20 L/s.

Common to both connection points.

The Clifford St SPS serves an extensive catchment (3009). There is also an associated catchment and pump station (3010). GIS data suggests that the two systems are somehow linked but due to lack of resources BSC has not been able to confirm how or what impact that may have on the capacity of the systems.

According to GIS data the two systems have a combined current pumping capacity of 75 L/s (50 + 25) and a rising main capacity of 106 L/s (as determined by 3m/s DSP criteria). It is not known how much of the pumping capacity is currently under-utilised but given the available rising main capacity it is reasonable to assume that at least 20 L/s of excess capacity is available.

#### 3.2 Excess Sewerage Capacity as Residential Lots

The layout and means of sewering the development will determine the actual number of lots that can be serviced with a discharge limit of 10.7 L/s. Pressure sewers can service more lots than conventional gravity sewers with pumping stations because of the reduced length of pipes subject to inflow and infiltration.

The connection point in the Taylors Lake Rd road reserve (Connection Point 2) can be used to utilise this capacity and is not opposed by Council.

#### 3.2.1 Capacity by conventional sewerage

Calculations determining the capacity the site when sewered by conventional gravity sewerage, with gravity collection pipes feeding into pump stations, are presented in Attachment 1.

Nominally these show that if served by a single pumping station the available 10.7 L/s of sewer capacity could service 114 lots. However, the topography of the site dictates that, in lieu of a tunnel, at least two pumping stations are required reducing the lot yield to 93 lots.



#### 3.2.2 Capacity by pressure sewerage

An increased number of lots can be serviced by a pressure, rather than gravity, sewer system. This is because the allowances for inflow and infiltration are reduced.

The actual yield by pressure sewer is dependent on detailed design but the pressure sewer code WSA 07-2007-1.1 §4.4.4.2 provides a simplified design flow equation, Q = AN + B which can be used to quantify the yield. Coefficients A and B, ultimately determined by the system supplier and design, have an impact on the result but backworking from existing local pressure sewer schemes and WSA allowances a yield in excess of 300 lots is achievable.

However, BSC Pressure Sewer Policy places no obligation on Council to accept the use of pressure sewers in areas that can be serviced by conventional systems. Therefore, the potentially available capacity is noted but not assumed to be available.

### 4. Water Supply Capacity

Advice from BSC is that the Suffolk Park water supply has plenty of capacity but there is a limitation to the elevation that can be supplied and meet the required levels of service. Pumped pressure zones exist in the area for this reason eg Corkwood.

It is understood that in excess of 20 L/s can be supplied at Connection Point 2 without impacting either the Suffolk Park or Broken Head supplies levels of service. This equates to the peak instantaneous demand (PID) for 133 lots or the fire requirement for a hydrant flow of 10 L/s at 95<sup>th</sup> percentile PID for 100 lots.

Significantly more lots can be supplied by the installation of a reservoir to store water for the elevated pressure zone to pump from. If large enough this reservoir could increase the lot yield into the 300 plus lots potentially possible if the development were sewered by pressure sewers.

### 5. Conclusion

Trunk mains for both the Byron SC water and sewerage systems traverse the Broken Head Quarry site. These trunk mains provide potential access to the unutilised capacity within these systems.

The investigations and calculations undertaken in this report indicate that there is 12.7 L/s of unutilised capacity in the sewer system and 20 L/s in the water system. If no additional facilities or technologies are used these flows translate to 93 lots using sewer as the constraint and 100 lots for water. Therefore, a minimum potential yield of 93 lots is achievable.

The introduction of pressure sewers and water reservoirs has the potential to double or even triple this yield if their use were to be approved by Council.



## 6. Disclaimer

This report has been prepared by Ardill Payne & Partners (APP) at the request of Winten Property Group for the purpose of determining the Broken Head Quarry available water and sewer capacity and is not to be used for any other purpose or by any other person or corporation.

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## 7. Attachments

Attachment 1 Conventional Sewerage Calculations



**ATTACHMENT 1** 

Attachment 1: Conventional Sewerage Calculations

#### Sewer EP (equivalent population) calculation based on WSAA Design code

