Stantec

Technical Mem

To:	Steve Dolores, Joshua Botton Economic Development Queensland	From:	R. Crozier / L. Harriott Stantec
File:	Lumina Parklands – 1A / 1B Revised Capacity	Date:	16 November 2023

Dear Steve,

Reference: Lumina Parkland – 1A / 1B Revised Sewer Capacity check

This technical memo, Revision B dated 16 November 2023, has been updated to provide clarity on the exiting Smith Collective Peak Wet Weather Flow's and the location at which these flows enter the existing sewer network. This will allow EDQ to assess the allowances match for the existing developed sites downstream of Lot 1A and Lot 1B, and how they impact the capacity of the sewer network. Note, the conclusions and maximum allowable EP's for Lot 1A and Lot 1B remain unchanged from the previous revision.

Economic Development Queensland (EDQ) requested a review of the maximum residential yields of Lot 1A and 1B considering the proposed GFAs of the various Lots for the current master plan. This technical memo provides advice on the following:

1. Maximum residential Equivalent Persons (EP) of Lot 1A and 1B that can be serviced by the existing sewer network.
2. Confirmation of adequate sewer capacity of the remaining Lot GFAs.
3. Maximum EP yields for all Lumina Lots based on the maximum capacity of the sewer network.

Figure 1 shows an overview of the Lumina Master Plan Lots as well as the existing Smith Collective development and the future QLD Health Lots. It is noted that due to topography only QLD Health Lots 7a and part of 7b/d discharge to the sewer network being assessed.

Figure 1: Lumina Master Plan Overview (source: EDQ website)

Sewer Population and Flows

The existing and future sewer populations have been calculated using the conversion rates provided in City of Gold Coast Water and Sewage Demand Table and using 5 x 200 L/EP/d to determine Peak Wet Weather Flow (PWWF). It is noted the populations from the existing Smith Collective development as well as future QLD Health populations are considered fixed populations that form the basis in determining available spare capacity of the existing sewer network which the proposed Lumina development can use.

Table 1 summarises the population and flows for the existing Smith Collective development. The existing residential yields were provided by EDQ and the non-residential yields were taken from the Smith Collective website. Total existing Smith Collective development has a total population of 2,131 EP with a PWWF of 24.7 L/s.

Table 1: Smith Collective Existing Population and Flows

Lot ID	Residential Dwellings	Gross Floor Area (m^2)	Conversion Rate	EP	PWWF (L/s)
1 Bedroom Units	533		1.31 EP / Bed	698	8.1
2 Bedroom Units	637		1.76 EP / Bed	1,121	13.0
3 bedroom Townhouses	82		2.51 EP / Bed	206	2.4
Retail/ Commercial		6,280	1.68 EP / 100 m^2 GFA	106	1.2
Total	**1,252**	**6,280**		**2,131**	**24.7**

While the PWWF from the existing Smith Collective of 24.7l/s is provided above, we have broken the total flows down into their sub-catchment flows to enable assessment of the existing flows downstream of Lot 1A and 1B connection points.

Figure 2 show the existing Smith Collective building layout, structure number (ie Smith 10) and address details.

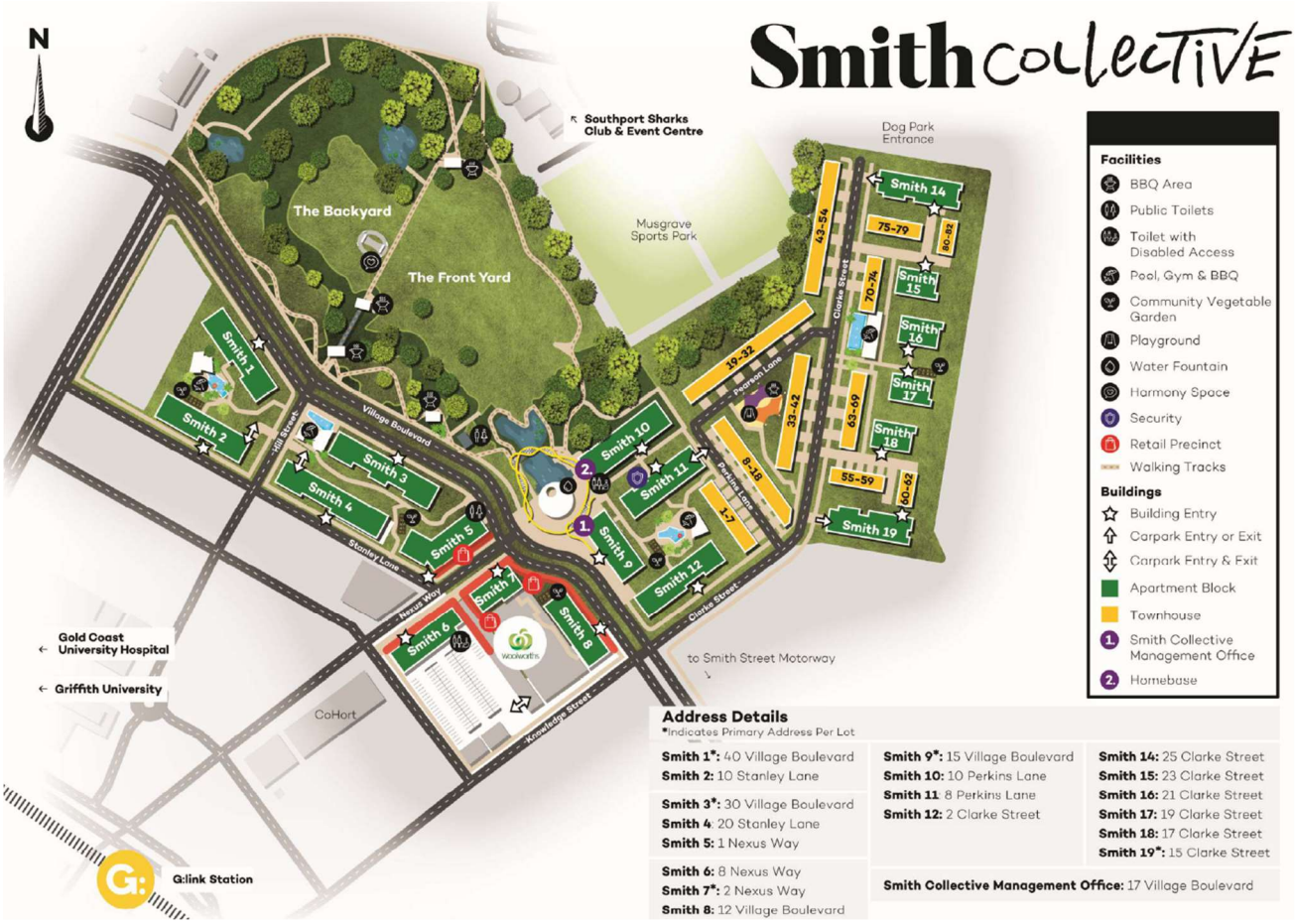

Figure 2: Smith Collective

The existing yield of each individual building within Smith Collective has been compiled using information provided from EDQ and existing development approvals. Table 2 summaries the yield for each existing development, the PWWF created by each development and the and also which sewer network segment the flows connect into. A full breakdown of the sub catchment contributions can also be found in the excel document '*304700205 Lumina Parklands PDA Sewerage Assessment Spreadsheet'* provided to EDQ.

This information has been provided to demonstrate the existing Smith Collective development has been included as part of the sewer capacity modelling, and flows entering the system downstream of Lot 1A and Lot 1B have been included within this assessment.

Table 2: Smith Collective Yield, PWWF and Catchment

Lot	Address	1 Bed	2 Bed	3 Bed	Total	PWWF (L/S)	Segment
SM1	40 Village Blvd	24	42	0	66	1.22	A, F, G
SM2	10 Stanley Lane	33	57	0	90	1.66	A, F
SM3	30 Village Blvd	18	38	0	56	1.05	A
SM5	1 Nexus Way	40	43	0	83	1.95	A, F
SM4	20 Stanley Lane	33	71	0	104	1.48	A
SM6	8 Nexus Way	12	42	0	54	1.04	A, J
SM7	2 Nexus Way	11	19	0	30	0.55	A, J
SM8	12 Village Blvd	24	31	0	55	1.00	A, J, K
SM9	17 Village Blvd	37	23	0	60	1.03	A, E
SM10	10 Perkins Lane	29	59	0	88	1.64	A
SM11	8 Perkins Lane	28	28	0	56	0.99	A
SM12	2 Clarke Street	30	54	0	84	1.55	A, E
SM14	15 Clarke Street	49	39	0	88	1.54	A, B, C
SM15	15 Clarke Street	29	13	0	42	0.70	A, B, C
SM16	15 Clarke Street	29	13	0	42	0.70	A, B
SM17	15 Clarke Street	29	13	0	42	0.70	A, B, D
SM18	15 Clarke Street	29	13	0	42	0.70	A, B, D
SM19	15 Clarke Street	49	39	0	88	1.54	A, B, D
Retail	-	0	0	0	0	1.22	A, J, K
1-7	-	0	0	7	7	0.20	A
8-18	-	0	0	11	11	0.32	A, B
19-32	-	0	0	14	14	0.41	A, B
33-42	-	0	0	10	10	0.29	A, B
43-54	-	0	0	12	12	0.35	A, B, C
55-59	-	0	0	5	5	0.15	A, B, D
60-62	-	0	0	3	3	0.09	A, B, D
63-69	-	0	0	7	7	0.20	A, B, D
70-74	-	0	0	5	5	0.15	A, B, C
75-79	-	0	0	5	5	0.15	A, B, C
80-82	-	0	0	3	3	0.09	A, B, C
	Total	**533**	**637**	**82**	**1252**	**24.7**	

Table 3 summaries the total existing sub catchment PWWF created by Smith Collective included in the modelling.

Table 3: Existing Smith Collective PWWF segment summary

Segment	Existing PWWF (L/s)
A	24.7
B	8.1
C	**3.0**
D	**3.4**
E	**2.6**
F	**4.8**
G	**1.2**
H	**0.0**
I	**0.0**
J	**3.8**
K	**2.2**
L	**0.0**
M	**0.0**

Table 4 summarises the population and flows for the future QLD health development. The future residential yields and conversion rates are taken from the Lumina Water Supply and Sewerage Network Investigation report (Carno now Stantec, April 2021). Total future QLD Health development discharging to the network being assessed has a total population of 508 EP with a PWWF of 5.9 L/s. It is noted that the remaining future QLD Health Lots 7c, 8c and part of 7 b/d discharge to the adjacent sewer reticulation network to the west.

Table 4: Future QLD Health Population and Flows

Lot ID	Gross Floor Area (m_2)	Conversion Rate	EP	PWWF (L/s)
7a	11,300	2.34 EP / 100 m^2 GFA - Centre Including 0.9 Discharge Factor	238	2.8
7b/d	12,833[1]	2.34 EP / 100 m^2 GFA - Centre Including 0.9 Discharge Factor	270	3.1
Total	**24,133**		**508**	**5.9**

1. **Assumed one-third (1/3) of total 7b/d GFA of 38,500 m^2 discharges to sewer network being assessed**

Table 5 summarises the population and flows for the proposed Lumina Development based on the latest master plan Lot dwellings and GFA counts. Total proposed Lumina development has a total population of 4,509 EP with a PWWF of 52.2 L/s.

Table 5: Proposed Lumina Sewer Populations and Flows

Lot ID	Residential Dwellings (2-Bed Units)	Gross Floor Area (m^2)	Conversion Rate	EP	PWWF (L/s)
1A	400		1.76 EP / Bed	704	8.1
1B	550		1.76 EP / Bed	968	11.2
2A		12,600		212	2.5
2B		21,050		354	4.1
2D		7,550		127	1.5
2E		15,000		252	2.9
3A-1		7,873		132	1.5
3A-2		7,873		132	1.5
3B		16,950		285	3.3
4		10,330	1.68 EP / 100 m^2 GFA	174	2.0
5		5,560		93	1.1
6A		14,522		244	2.8
6B		14,620		246	2.8
6C		12,002		202	2.3
6D		8,600		144	1.7
6E		5,261		88	1.0
8A		9,066		152	1.8
Total	**950**	**168,856**		**4,509**	**52.2**

The calculated total developed population of the sewer catchment is 7,148 EP with a PWWF of 82.7 L/s.

Reference: **Lumina Parkland – 1A / 1B Revised Sewer Capacity**

Sewer Network Capacity

The existing sewer network was assessed using a static desktop model which uses the existing and future development sewer flow inputs and the fixed capacity of key existing sewer pipe segments as shown in Figure 2. It is noted that the existing A106 sewer pump station capacity has not been assessed.

Figure 2: Key Existing Sewer Pipe Segments

It is noted that initial development of Lot 1A and Lot 1B discharge to separate sewer reticulon networks. Lot 1A connects to a DN150 (Segment M) that is shared with future Lot 2E while Lot1B connects to a separate DN150 that is shared with existing downstream Smith Collective residential development (Segment D). It is noted that the DN150 reticulation pipes that Lot 1A and 1B immediately connect to constrain the residential EP yield of both lots.

Table 2 shows the sewer network capacity results from the desktop model. The results indicate the proposed Lumina development dwellings and GFAs can be accommodated by the existing sewer network except for Lot 1B where the existing network can accommodate 673 EP (382 residential dwellings) instead of the proposed 968 EP (550 residential dwellings).

Table 2 also shows the maximum allowable Lot EP or GFA (depending on the land use type to be developed) that the existing sewer network can accommodate. It is noted the maximum allowable EP for each Lot is based on the current master plan GFA ratios for each Lot. Maximum allowable EPs or GFAs are much higher than the proposed EPs and GFAs. For example, there is an opportunity to increase the yield of Lot 8A significantly.

Table 2: Sewer Network Capacity Results

Lot ID	Proposed EP	Control Segment	Max Pipe Capacity (L/s)	Calculated Contributing Flow (L/s)	Control Pipe Spare Capacity (L/s)	Max Allowable EP	Max Allowable Residential Dwellings based on 1.76 EP/ 2-bed Unit	Max Allowable GFA using 1.68 EP / 100 m^2 GFA
1A	704	M	12.6	11.1	1.5	837	475	49,803
1B	968	D	11.2	14.6	-3.4	673	382	40,052
2A	212	K	45.7	29.7	16.1	358	204	21,331
2B	354	K	45.7	29.7	16.1	599	340	35,637
2D	127	K	45.7	29.7	16.1	215	122	12,782
2E	252	M	12.6	11.1	1.5	252	143	15,000
3A-1	132	K	45.7	29.7	16.1	224	127	13,328
3A-2	132	K	45.7	29.7	16.1	224	127	13,328
3B	285	K	45.7	29.7	16.1	482	274	28,696
4	174	K	45.7	29.7	16.1	294	167	17,488
5	93	I	20.6	1.1	19.5	158	90	9,413
6A	244	J	63.9	43.0	20.9	413	235	24,585
6B	246	J	63.9	43.0	20.9	416	236	24,751
6C	202	J	63.9	43.0	20.9	341	194	20,319
6D	144	J	63.9	43.0	20.9	245	139	14,560
6E	88	J	63.9	43.0	20.9	150	85	8,907
8A	152	G	13.7	3.0	10.7	1,078	613	64,180
Total	**4,509**					**6,958**	**3,953**	**414,160**

Reference: **Lumina Parkland – 1A / 1B Revised Sewer Capacity**

Lot 1A and Lot 1B Yields

Table 3 provides a comparison between Lot 1A and Lot 1B proposed dwellings and EP and the maximum allowable dwellings and EPs the sewer network can accommodate. The sewer capacity assessment shows an additional 75 lots can be accommodated in Lot 1A (increase from 400 to 475 x 2-bed dwellings) when Lot 2E is constrained to 15,000 m^2 GFA. Lot 1B can accommodate 382 x 2-bed dwellings (decrease from 550 to 382 x 2-bed dwellings).

Table 3: Lot 1A and Lot 1B Proposed and Maximum Yield Comparison

Lot ID	Proposed Dwellings (2-bed)	Proposed EP	Maximum Allowable Dwellings (2-bed)	Maximum Allowable EP
1A	400	704	475	837
1B	550	968	382	673
Total	**950**	**1,672**	**857**	**1,510**

Although Lot 1B cannot achieve the proposed dwelling yield, the maximum allowable EPs for other Lots can be increased and offset any initial Lot 1B yield shortfalls.

Conclusions

Based on the revised sewer capacity assessment the following is concluded:

1. Maximum population of Lot 1A that can be serviced by the existing sewer network is 837 EP.
2. Maximum population of Lot 1B that can be serviced by the existing sewer network 673 EP.
3. Adequate sewer capacity is available for the proposed Lot GFAs tabled in the current master plan.
4. Table 4 provides maximum EP or GFA yields for all future Lots based on the maximum capacity of the sewer network. Maximum allowable EPs or GFAs are much higher than the proposed EPs and GFAs. There is opportunity to accommodate an additional 2,440 EPs within Lots 2A to 8A. In addition, there is an opportunity to increase the yield of Lot 8A significantly.
5. There is an opportunity to undertake evidence based assessments of the existing sewer gravity network via sewer flow monitoring of key strategic locations. The observed data can be used to calculate actual ADWF and PWWF of the existing Smith Collective high-density development flows. The outcomes of the study can be used as robust justification to further increase Lumina development yields due to the specialised high-density characteristics of the existing Smith Collective development and proposed Lumina development.

Regards,

Roger Crozier
Stantec
Email:
roger.crozier@stantec.com