

Client Ref: Lendlease

17 September 2020

Lendlease
Level 4, Kings Gate, 2 King Street
BOWEN HILLS, QLD 4001

Attention: Rob Ball

Dear Rob,

Yarrabilba Precinct 3D North Water and Sewerage Servicing Strategy

Further to your request, we have reviewed the provision of water and sewerage to the Precinct 3D North development. This development is the second stage of Precinct 3D development. The water and sewerage servicing strategy for the whole of Precinct 3D development was previously assessed and documented in the technical memorandum 'Yarrabilba Precinct 3D Water and Sewerage Servicing Strategy' dated 13 June 2018 (2018 memorandum, refer to Appendix A). The intent of this letter is to assess any impact of the Precinct 3D North area on the overall strategy.

1. Proposed Precinct 3D North Subdivisions

The proposed Precinct 3D North subdivision (Lot 15 to 22) is shown in Figure 1. The total area (excluding service easement) of the proposes seven non-residential lots is 4.95 ha (area of easements are excluded).

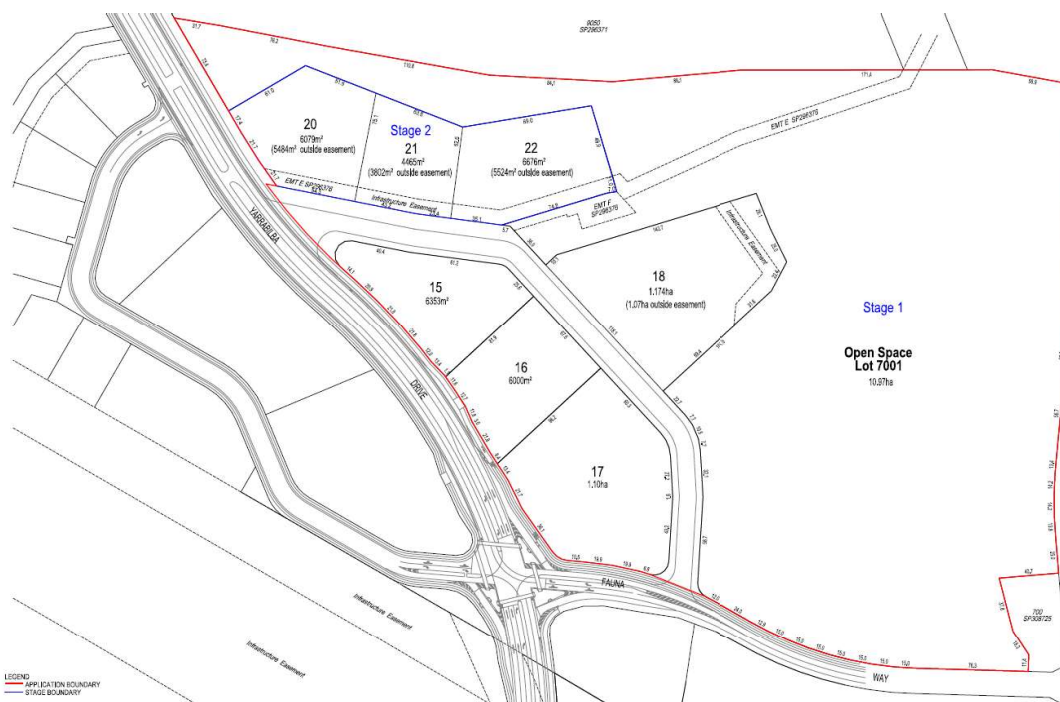


Figure 1 Proposed Precinct 3D North Development Area

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YB Precinct 3D North WS Planning Tech
Memo V3.docx

Please visit www.stantec.com to learn more about how Stantec design with community in mind.

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

Approval no: DEV2020/1145

Date: 6 July 2021



2. Population Assessment Revision

The 2018 memorandum allowed an estimated developable area of 8.17 ha for the Precinct 3D North development (referred to as 'Precinct 3D future'), which is higher than the proposed total area (4.95 ha) of subdivision in Figure 1. This means that the final Precinct 3D development population will be less than the planned population allowance in the 2018 memorandum. By applying the Logan City Council standard planning density rates for non-residential development (30 EP/ha for water and 37 EP/ha for sewerage), the revised Yarrabilba Precincts 1 to 3 development population is summarised in Table 1 and Table 2.

By comparing with the 2018 memorandum, the expected water EP of Precinct 3D North is reduced from 246 to 149 EP (97 water EP reduction) and the sewerage EP of Precinct 3D North is decreased from 302 to 183 EP (119 sewerage EP reduction). It is noted the estimated 2021 connected sewerage EP is increased to 11,910 EP with the inclusion of Precinct 3D North.

Table 1: Expected Water EP for Precincts 1, 2, and 3

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
1	1,658	110	375	253	2,396	2,396
2	5,432	320	0	1,639	7,391	6,071
3A	605	369	98	1,015	2,087	1,127
3B	1,249	59	0	0	1,308	1,308
3C	625	29	0	0	654	509
3D (Stage 1)	0	0	168	0	168	168
3D North	0	0	149	0	149	149
Total	9,569	887	790	2,907	14,153	11,728

Table 2: Expected Sewerage EP for Precincts 1, 2, and 3

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
1	1,658	110	460	253	2,481	2,481
2	5,432	320	0	1,639	7,391	6,071
3A	605	369	121	1,015	2,110	1,150
3B	1,249	59	0	0	1,308	1,308
3C	625	29	0	0	653	510
3D (Stage 1)	0	0	207	0	207	207
3D Future	0	0	183	0	183	183
Total	9,569	887	971	2,907	14,333	11,910

3. Impact on 2018 Memorandum Water Supply Servicing Strategy

The total water population for Precinct 3D is reduced from 414 to 317 EP, however the timing of Precinct 3D development in the water network analysis remains the same as previous assumptions. Based on the revised population there will be no impact on the water supply servicing strategy proposed in the 2018 memorandum. The seven lots (Lot 15 to 22) can be connected to the 150 mm diameter Precinct 3D main in PMA 2.

4. Impacts to 2018 Memorandum Sewerage Servicing Strategy

The total sewerage service population for Precinct 3D is reduced from 509 to 390 EP. This is an increase of 13 EP in the total EP over the Precinct 3 PNP report estimate (377 EP). This increase is very minor and the long term sewerage servicing strategy provided in the PNP report remains unchanged.

As per the Precinct 3 PNP, the strategy is to collect sewage at the interim pumping station PS3A in the short term with the pumping station being replaced in future with a permanent regional station. The interim station PS3A will operate in conjunction with the wet weather storage at PS1 to limit the pass forward flow to the Logan Village PS as agreed with LCC.

After the 2018 memorandum, LCC and Stantec have undertaken several assessments to estimate the capacity provided by the current Yarrabilba pump station (SPS 84) and the adjacent 2 ML storage tank, which can attenuate additional incoming flow under the wet weather condition. These studies concluded that the wet weather flows (one in two years) will be contained in the emergency storage tank up to development of 20,000 EP by controlling flow rates of the Yarrabilba pump station (SPS 84). It is noted the expected 2021 connected sewerage EP (including entire Precinct 3D) is 11,910 EP, which is less than 20,200 EP.

The change to operations allows the deferral of capital works for conveyance, including all pump upgrades and mains augmentations between Logan Village and Chambers Flat to 2020/21, and the need for regional WWTP to 2025/26. The confirmation of storage and conveyance capacity, execution of the Sub Regional IA, and the Council commitment to the delivery of the regional STP, will result in the removal of the need for a temporary STP at Yarrabilba. These findings were documented in the status report 'Yarrabilba Water & Wastewater Servicing – Status Report - June 2019' (refer to Appendix B).

The development of Precinct 3D North will not advance or materially change the triggers of any external or internal trunk sewerage transfer or treatment infrastructure.

It is also noted that a high level area check for the ultimate pumping station PS3 (including the emergency storage space) was undertaken based on the current LCC's standards and the latest Yarrabilba growth projection. There are sufficient areas outside the Lot 18 and Lot 22 for the future pumping station PS3 and bio basins for the storm water treatment (refer to the Figure 2 below).

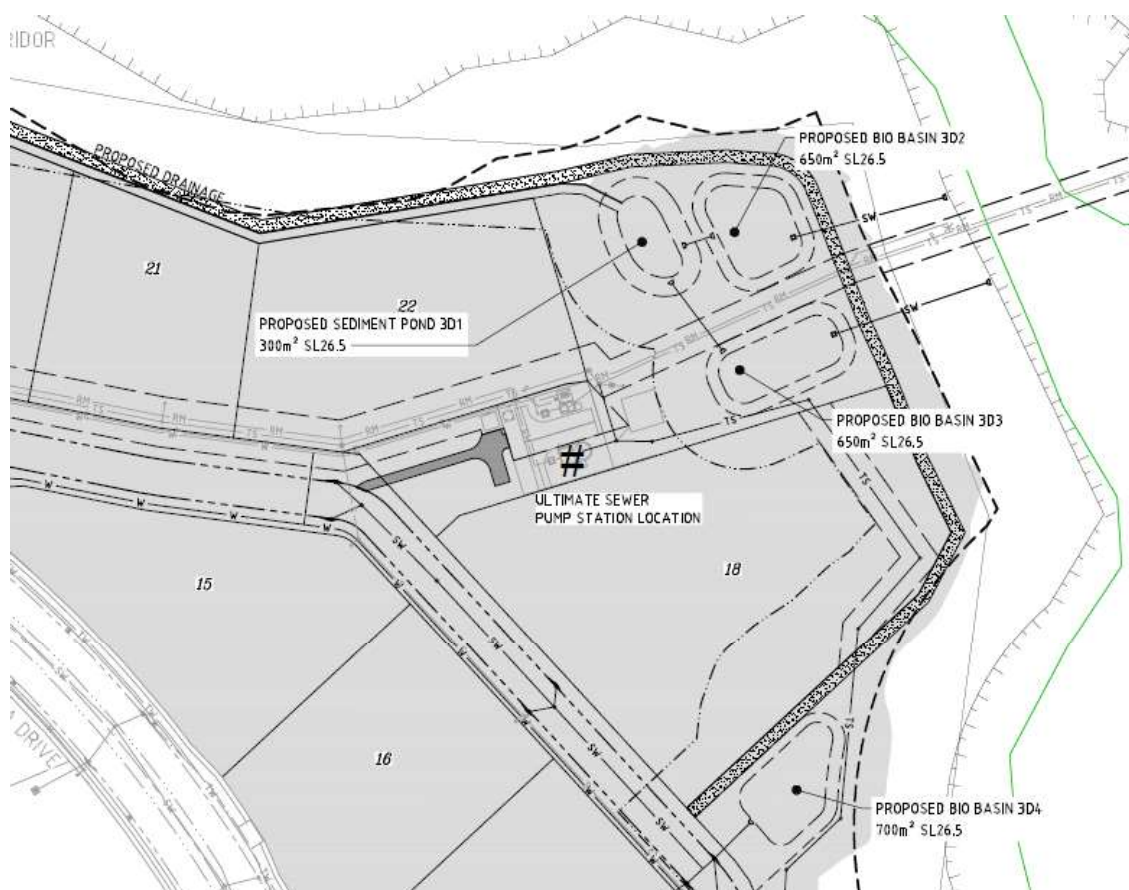


Figure 2 Preliminary Site Area Checks for Ultimate Sewerage Pumping Station PS3

5. Summary

The final revision of the Precinct 3D industrial area is 10.55 ha (reduced from 13.77 ha allowed in the 2018 memorandum). Populations associated with the Precinct 3D North ROL are 149 EP for water supply and 183 EP for sewerage. No impacts to the proposed water and sewerage servicing strategy of 2018 memorandum are identified.

Please do not hesitate to contact the undersigned on 0411 753 729 if you require any clarification.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Shane O'Brien', with a stylized flourish at the end.

Shane O'Brien

Stantec Australia Pty Ltd
RPEQ 9064

Appendix A - Technical Memorandum 'Yarrabilba Precinct 3D Water and Sewerage Servicing Strategy'

Client Ref: Lendlease

13 June 2018

Lendlease
Level 4, 2 King Street
BOWEN HILLS, QLD 4001

Attention: Rob Ball

Dear Rob,

Yarrabilba Precinct 3D Water and Sewerage Servicing Strategy

The intent of this letter is to outline the service strategy for the provision of water supply and sewerage infrastructure for the Yarrabilba Precinct 3D development. Triggers of external water supply and sewerage trunk infrastructure and initial assessment of short term solutions are also discussed.

1. Population Assessment and Timing

The Precinct 3D development area was previously scheduled to be completed after Precinct 5, however Lendlease has advised that the delivery of the non-residential development should be advanced to be completed before 2021 and the Precinct 5 development.

The development layout of the Precinct 3D area has been revised and will comprise two areas as shown in Figures 1 and 2:

- ROL 1 area (this ROL) located to the west of Yarrabilba Drive is proposed to be used for employment generating uses, i.e. general commercial and light industry. The total area of proposed non-residential lots (Lots 1 to 13, this ROL application) is 5.6 ha.
- Future development area to the east of Yarrabilba Drive also proposed for non-residential development, with an estimated developable land of 8.17 ha.

By applying the LCC standard planning density rates for non-residential development (30 EP/ha for water and 37 EP/ha for sewerage), the revised Precinct 3D development area of 13.77 ha generates a total of 413 EP for water supply and 510 EP for sewerage at the ultimate planning horizon.

The revised total development area of 13.77 ha compares to the previous development area of 10.2 ha as outlined in the Precinct Network Plan (PNP) for Precinct 3. The previous population of Precinct 3D was 306 EP for water supply and 377 EP for sewerage.

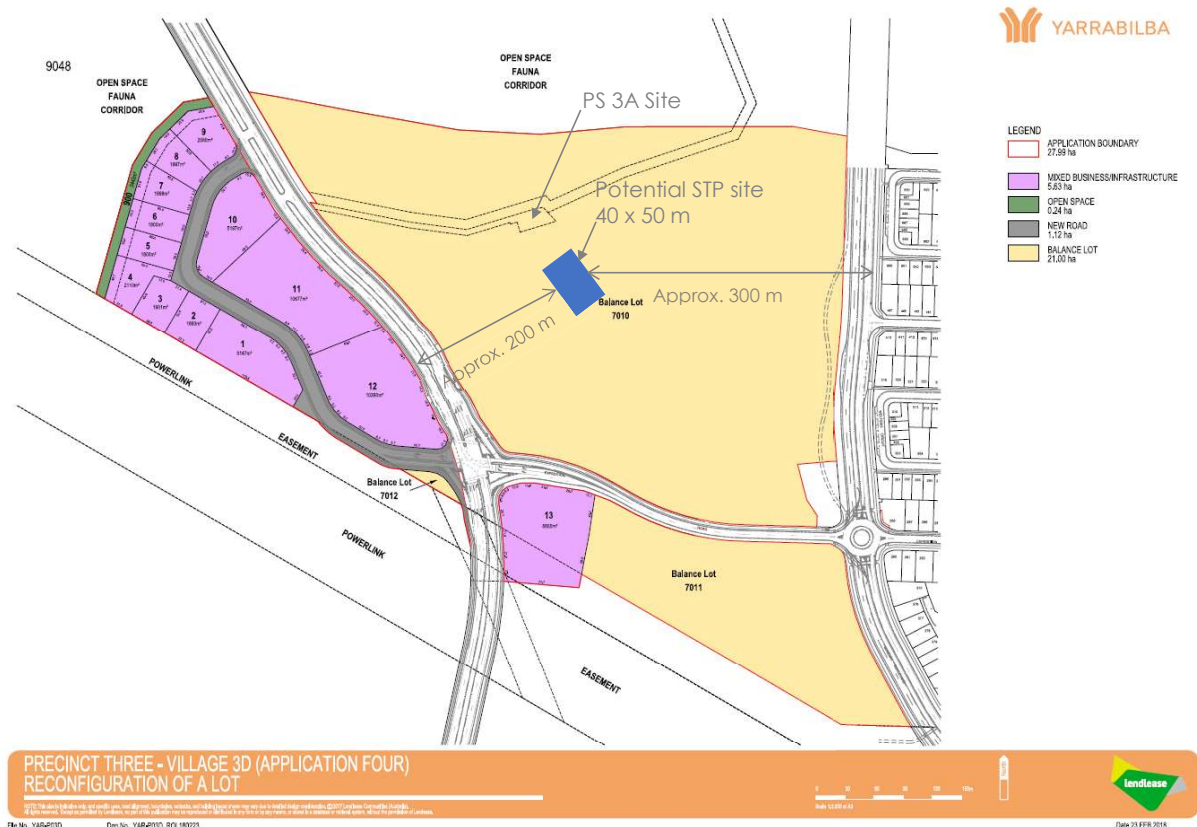


Figure 1 Proposed Precinct 3D Development Location (and possible STP Site)

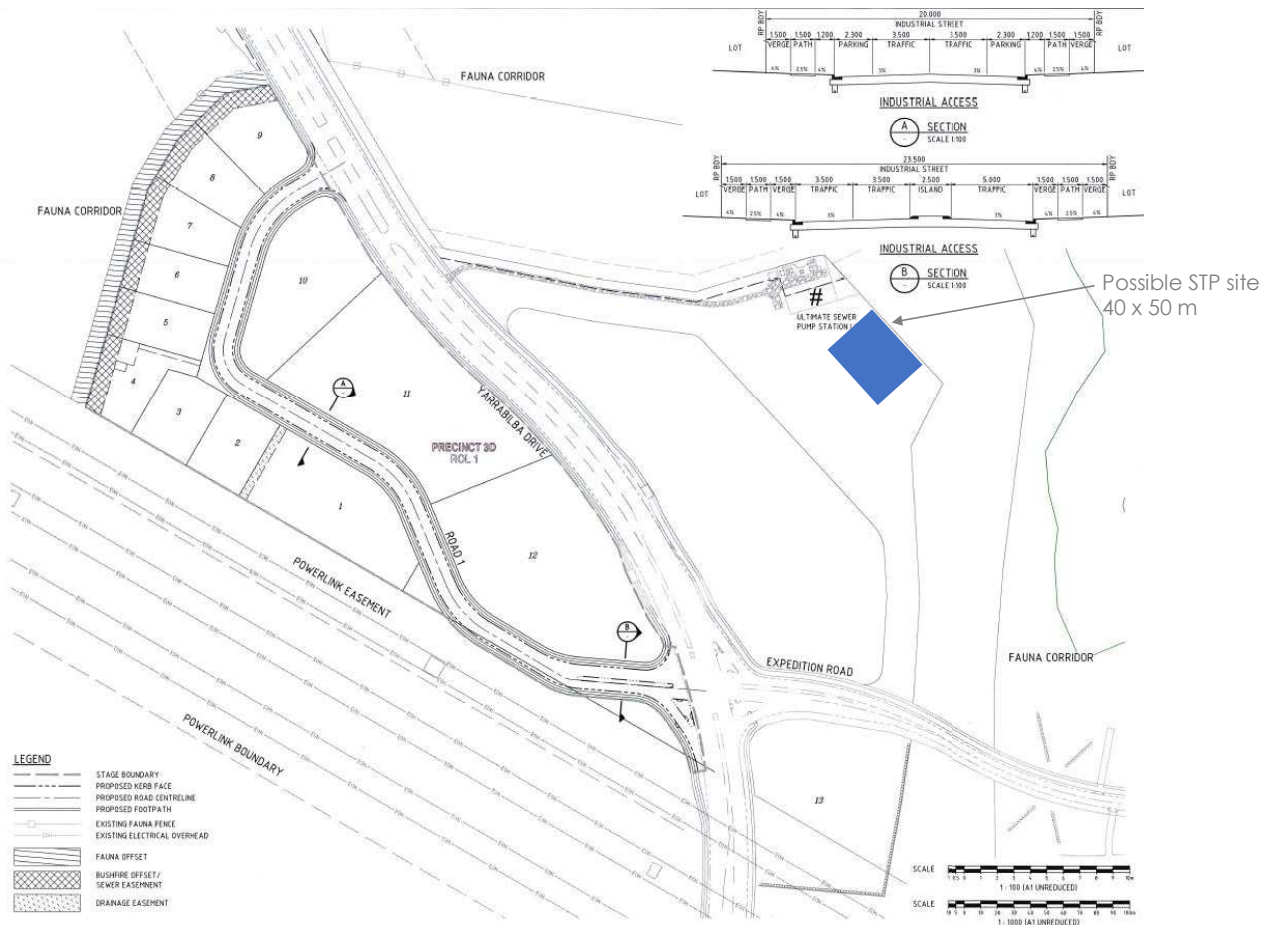


Figure 2 Proposed Precinct 3D Development Layout (showing ROL, pumping station and possible STP site)

The overall population of Yarrabilba Precincts 1 to 3 has been revised to take account of the larger area of Precinct 3D as summarised in Tables 1 and 2 for water supply and sewerage respectively. It is noted that the Private High School (1,320 EP) will not commence until 2022 and will ramp up over at least 5 years. In addition the Public High School (960 EP) will likely have a similar growth trajectory.

Table 1: Expected Water EP for Precincts 1, 2, and 3 (including revised 3D)

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
1	1,658	110	375	253	2,396	2,396
2	5,432	320	0	1,639	7,391	6,071
3A	605	369	98	1,015	2,087	1,127
3B	1,249	59	0	0	1,308	1,308
3C	625	29	0	0	654	509
3D ROL 1	0	0	168	0	168	168
3D Future	0	0	246	0	246	0
Total	9,569	887	886	2,907	14,250	11,579

Table 2: Expected Sewerage EP for Precincts 1, 2, and 3 (including revised 3D)

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
1	1,658	110	460	253	2,481	2,481
2	5,432	320	0	1,639	7,391	6,071
3A	605	369	121	1,015	2,110	1,150
3B	1,249	59	0	0	1,308	1,308
3C	625	29	0	0	653	510
3D ROL 1	0	0	207	0	207	207
3D Future	0	0	302	0	302	0
Total	9,567	887	1,091	2,907	14,452	11,727

2. Water Supply Servicing Strategy

The total water population for Precinct 3D is 414 EP with this ROL having a population of 168 EP. This is an increase of 107 EP in the total EP over the Precinct 3 PNP report estimate. This increase is very minor and the long term water supply servicing strategy provided in the PNP report remains unchanged.

Recent discussions with Logan City Council (LCC) indicate that pressures will need to be managed as Precinct 3D is low lying with resultant high static pressure. The boundaries of the proposed Pressure Management Areas (PMAs) were revised as part of the Precinct 5 PNP assessment and the demand of Precinct 3D was included in PMA 2.

Stantec has analysed the network and included the proposed Precinct 3D into PMA 2. To achieve this it is proposed to construct a main from the discharge point of the PRV along Yarrabilba Drive to link to the proposed mains in Precinct 3B. This link is proposed as 150 mm diameter and will result in improved

redundancy for PMA 2, providing a loop main through the zone. The future supply to the remainder of Precinct 3D (east of Yarrabilba Drive) will be provided by another internal link main looped back to Yarrabilba Drive.

The proposed layout of the internal mains is shown in Figure 3.

From the perspective of bulk supply to PMA 2, the strategy outlined in the Precinct 3 PNP is proposed. The supply to Yarrabilba has sufficient capacity to service Precincts 1, 2 and 3 up to 2021/22 (Travis Road Reservoir and Outlet Main: Detailed Planning Report, LCC, December 2016). At that time a new supply will be required to the Travis Road reservoir from the Southern Region Water Pipeline (SRWP) for future stages. The provision of this main was not part of the Precinct 3 conditions, and is being addressed as part of the Precinct 5 approvals.

As part of the Precinct 3 conditions, an augmentation will be constructed in Camp Cable Road between the Travis Road reservoir and the Waterford Tamborine Road. This main is currently being designed and will be delivered by LCC before 2021 and funded by the developer. In addition the first of two reservoirs was part of the approval and is currently being constructed.

Due to the small increase in water demand related to this Precinct 3 ROL (168 EP), and the fact that future school demand (more than 2,000 EP in two high schools) will not be required for a significant time, the triggers for all external works will not be affected, i.e. the triggers will remain as per the Precinct 3 PNP. It is also noted that non-residential development generally takes time a longer time to reach full demand than residential development and often has lower water demand than design figures.

3. Sewerage Servicing Strategy

The total sewerage service population for Precinct 3D is 509 EP with this ROL having a population of 207 EP. This is an increase of 132 EP in the total EP over the Precinct 3 PNP report estimate. This increase is very minor and the long term sewerage service strategy provided in the PNP report remains unchanged.

As per the Precinct 3 PNP, the strategy is to collect sewage at the interim pumping station PS3A in the short term with the pumping station being replaced in future with a permanent regional station. The interim station PS3A will operate in conjunction with the wet weather storage at PS1 to limit the pass forward flow to the Logan Village PS as agreed with LCC.

As noted in the 2017 EDQ South Logan Sewerage report, the existing sewerage infrastructure combined with the newly constructed 2 ML wet weather storage at pumping station PS1 can service 12,729 EP up to 2021. Approval of this application (Precinct 3D ROL 1) will bring the estimated 2021 connected population up to 11,727 EP by the end of 2021 (refer to Table 2). By the end of 2021 a new regional treatment plant (STP) is proposed to service Yarrabilba, Logan Village and the southern areas of Park Ridge. The construction of this STP is the subject of the Precinct 5 approvals and was not required under Precinct 3 approvals.

The development of ROL 1 of Precinct 3D will not advance or materially change the triggers of any external or internal trunk sewerage transfer or treatment infrastructure.

It is noted that the initial stages of the regional STP have commenced with the LWIA developing an engagement document entitled Community & Stakeholder Engagement Plan – Logan South Wastewater Treatment Plant – Planning Phase (April 2018). This document is currently before council. Consultation is programmed to commence in the near future with a completion date of early 2019. An extract from the document states that:

In 2016, a Logan South Wastewater Servicing Strategy was prepared by Cardno for Economic Development Queensland (EDQ) to guide sustainable infrastructure development for south west Logan. This strategy, which was subsequently endorsed by Council, identified the most viable option for providing wastewater infrastructure involved construction of two new permanent treatment plants. The strategy recommended a new WWTP at Cedar Grove (on a site currently owned by Council) to service the Greater Flagstone PDA and potentially Jimboomba, and a second site (called WWTP B in the strategy and in this plan) to service the Yarrabilba PDA, Greenbank, North Maclean, Logan Village and parts of Park Ridge.

In email correspondence relating to the Minutes of the Logan South PCG Meeting of 29/11/2017, Tony Goodhew of LCC (email of 9 January 2018) states that:

Council has directed that appropriate consultation be undertaken with the community in deciding the optimum site for WWTP B, based on the site options identified in the master strategy. Council has no preconceived outcome in relation to the site and hence may be consistent with the preferred site identified in the strategy. There is no suggestion that reassessment of the servicing strategy for Park Ridge and Yarrabilba is required.

It is therefore clear that LCC intend to locate a future STP in land between the Yarrabilba and Park Ridge development areas, not within the Yarrabilba PDA. As such the only possibility for an STP within the site is a small temporary site that may be required if LCC fail to deliver the regional plant before the end of 2021.

4. Temporary STP

Lendlease advised as part of the Precinct 5 application that a temporary sewage treatment plant (STP) could be constructed within the Precinct 3D area as a contingency plan in the case that the proposed Regional STP is not delivered before the end of 2021 (as outlined in the Logan South Sewerage Strategy).

A temporary STP could be sited in the balance of the 3D area on the eastern side of Yarrabilba Drive. A suitable location for a potential STP is shown in Figures 1 and 2. There is sufficient area available to construct a small facility, up to say 5,000 EP. Such a facility would require a footprint of around 40 m by 50 m (based on similar sized MBR or SBR plants housed in a purpose built shed), which could be accommodated in the balance land adjacent to the PS3A site. An odour control unit, single or multiple stage may be required to manage any odour from the plant. Buffer distance of 200 m to the ROL 1 development boundary and 300 m to future residential boundary, could be provided. This buffer distance is more than adequate for small plants enclosed in buildings with odour control.

In addition, a seasonal storage of around 20 ML together with an irrigation area of 150 ha would be required, based on previous MEDLI modelling on the site taking account of the local soil conditions. Potential irrigation areas are shown in the attached figure. These areas are located in future development stages which are not programmed for development during the life of a temporary STP.

5. Summary

The development of the Precinct 3D industrial area is proposed with an initial stage of 5.6 ha being the subject of this ROL. Populations associated with this ROL are 168 EP for water supply and 207 EP for sewerage. The impact of this ROL on the water and sewerage strategy was considered as part of the Precinct 3 PNP however is was proposed at the time that delivery would be after Precinct 5. The Precinct 3 PNP did consider the area in terms of network capacity, however the developable area and therefore the demand on the networks has increased by around 25%, or around 100 EP.

Although the total development population of Precincts 1/2/3 exceeds the available sewerage capacity at 2021, it is also noted that two proposed high schools with a total of more than 2,300 EP will not be commencing until 2022 with a long ramp up period.

The assessment of servicing for this ROL is summarised as follows:

- Water Supply – Precinct 3D will be serviced via PMA 2. This approach will provide reduction in pressure for the whole of Precinct 3D. External supply upgrade requirements and triggers are not changed from those presented and agreed in the Precinct 3 approval.
- Sewerage – Precinct 3D will be serviced by PS3 in the long term and by the interim station PS3A in the short term. External upgrade requirements and triggers are not changed from those presented and agreed in the Precinct 3 approval.
- Regional STP – LCC is progressing to consultation for a regional STP site to service Park Ridge and Yarrabilba. This site has been adopted by LCC as part of the Logan South Sewerage Strategy.
- Potential STP – A site is available for a temporary STP (if required) in the balance land to the east of the proposed ROL. Land is available in future development stages for irrigation in the areas to the south and the west of 3D ROL 1.

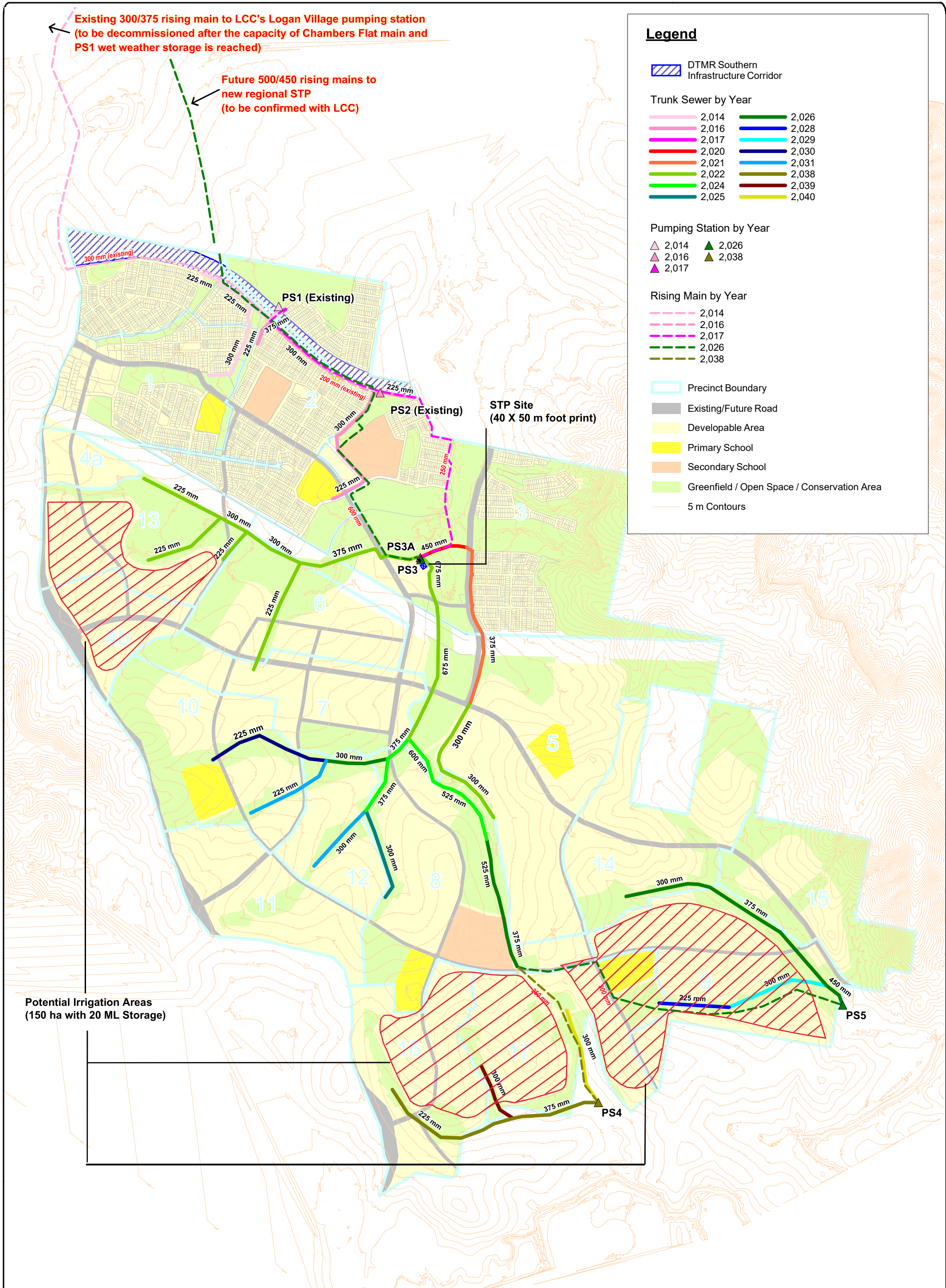
Please do not hesitate to contact the undersigned on 0411 753 729 if you require any clarification.

Yours sincerely



Shane O'Brien

Stantec Australia Pty Ltd
RPEQ 9064



Appendix B - Yarrabilba Water & Wastewater Servicing – Status Report - June 2019

Title	Yarrabilba Water & Wastewater Servicing – Status Report - June 2019
Client	Lendlease Communities (Yarrabilba)
Date	28 June 2019
Author	Adrian Sains – ACS Consult Pty Ltd
Status	V.1

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Shane O'Brien	Shane.O'Brien@stantec.com	0411 753 729

1.0	Infrastructure Agreement - IA executed May 2019. South Logan Infrastructure Review - Planning and design of Logan South water and wastewater infrastructure draft report issued for review by LWIA. The report is not currently fit for purpose to update the PDA infrastructure schedules as the draft is for all works in South Logan (internal and external to PDAs) and has no apportionment. LWIA are working on a report that will replicate the format of the AFM in the IA. - EDQ/Jacobs/Council workshop has been postponed until the Sth Logan data is available. Note that Flagstone developers are forecasting an increase in development growth rates from the assumptions included in the 2018 AFM model. Council/EDQ will rationalise overall expected growth for South Logan. Also note that Park Ridge growth forecasts have increased since the AFM was developed. - EDQ to facilitate a developer attended workshop in no earlier than August 2019.
2.0	Site B WWTP - At the Ordinary Council meeting on 16 April 2019, a report recommending a final preferred site for the Logan South Wastewater Treatment Plant B was approved. The site for the plant will be built at the eastern end of Pleasant View Road, Chambers Flat, adjacent to the Logan River. Land will be secured by private treaty or through compulsory acquisition. - The plant will service Yarrabilba, Park Ridge, Logan Village and Chambers Flat development. - The plant is not required until capacity is reached in the conveyance system (see below). At the latest the plant will need to be operational by 2025/26. - Allowing for one year to secure the land and two years to finalise designs, licencing and complete construction, it is likely that the plant could be operational in 2022/23 if required. - The form of construction will replicate the plant currently being constructed at Cedar Grove. Land will be required for wetland treatment and studies will be required to identify 3rd party users for recycled water in the ultimate scenario. The scope of those studies is currently being developed by LWIA for EDQ endorsement. Developers and key Council departments (e.g. parks and maintenance) are expected to be key stakeholders. - A comprehensive community engagement plan for Site B has been implemented by Council to ensure meaningful consultation, manage public perception and inform media coverage.

3.0	Conveyance Mains • To date Logan CC operational teams have not utilised the Yarrabilba emergency storage despite having repeat overflows at Logan Village caused by pumping at higher rates from Yarrabilba than the Logan Village pumps can handle. • Lendlease commissioned a report by Stantec report into opportunities to augment the conveyance system and defer the need for construction of the Site B WWTP. This report initiated a wholesale review of the wastewater servicing strategy for the Yarrabilba to Chambers Flat area by Logan CC in consultation with the Yarrabilba consultant team. • A calibrated hydraulic model was utilised by Logan CC to assess the performance of the existing wastewater network under a variety of design rainfall events. Changes to the operational regime were subsequently recommended by Logan CC. • The future operation involves controlling flow rates from the Yarrabilba pump station (SPS84) during all weather conditions and utilising the existing adjacent 2ML storage tank to attenuate additional incoming flow, and in major events the local detention basin. The Q2 flows will be contained in the emergency storage tank up to development of 20,000EP. • It is intended that the recommended operating philosophy will be implemented by the Water Operations Team in July 2019. • The change to operations allows the deferral of capital works for conveyance, including all pump upgrades and mains augmentations between Logan Village and Chambers Flat to 2020/21, and the need for Site B WWTP to 2025/26. • The confirmation of storage and conveyance capacity, execution of the Sub Regional IA, and the Council commitment to the delivery of the Site B WWTP, will result in the removal of the need for an interim local treatment plant at Yarrabilba.
4.0	Water Supply • SEQwater strategic planning has confirmed that the network should include a future connection from the Southern Regional Pipeline to the Travis Road reservoirs. Network modelling by Logan CC has confirmed that the existing network can service demands to 2023/24 at current growth rates (the model includes 450 dwellings / year for Yarrabilba). • Logan CC have confirmed the project to connect the SRWP to Travis Road will be included in the sub regional works programme. A detailed planning study by the Logan Water Alliance has commenced; the study will identify the required easements. Logan CC have confirmed that the easements will either be secured by private treaty or through compulsory acquisition. • The study is expected to be completed mid-2020. Design and construction would require 18 months; therefore, the network augmentation could be completed by 2021/22 at the earliest.
5.0	Programme • The attached draft delivery programme for water and sewer servicing has not been formally endorsed by Council as they are finalising reporting and studies on Site B and conveyance to Site B. • The dates are therefore indicative only.

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Note that this provisional programme has not been formally endorsed by Logan City Council. There are numerous variables that may impact on the delivery programme, particularly with respect to easements and land acquisition.

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