

RESTART NSW SAFE AND SECURE WATER PROGRAM.

SOUTH WEST NARRANDERA SEWER EXPANSION – SCOPING STUDY.

BACKGROUND:

In February, 2018 Council submitted an application to Restart NSW seeking funding support under the Safe and Secure Water Program to complete a feasibility study which would identify options to connect properties in south western Narrandera area, which currently operate on-site sewerage management systems, to extended sewerage reticulation infrastructure.

This application was successful and a grant of \$48,000 representing 75% of the estimated cost was approved on the basis that Council contributed an amount of \$16,000. The project cost plan is shown in the following table:

ITEM	DESCRIPTION	BUDGET ESTIMATE
1	Survey	\$14,850
2	Geotechnical Assessment	\$9,000
3	Draft Study and Report	\$11,500
4	Final Study and Report	\$22,250
5	Contingency	\$6,400
	TOTAL	\$64,000

A Consultant's Brief was prepared prior to soliciting quotes for the study, and this was issued on the basis of categorising the work into three (3) phases:

- Phase 1 Survey and Information Collection
- Phase 2 Option Study and Report
- Phase 3 Concept Study and Report.

Seven (7) prospective Consultants were identified and quotation documents were forwarded to each. As a result, two (2) quotes were received for completion of all 3 phases and one (1) quote was received for completion of phase 1. The quotes for the total project (\$78,850 & \$135,000) exceeded the available budget and were discarded. The quote from Building and Environmental Services Today (\$24,269 including geotechnical) was accepted for completion of phase 1.

It was decided to complete phases 2 and 3 "in-house" if resources are available.

DATA COLLECTION:

A detailed map of the study area has been prepared, and this provides locations of all existing On-Site Sewerage Management Systems (OSSMS) which have been categorised as private or commercial operations. A Properties Summary Spreadsheet has also been prepared and this includes a very detailed matrix of land ownership, land use, suitability (or not) for connection to any future sewerage infrastructure, and properties which are capable of further subdivision. This spreadsheet shows that there are about 140 residences and 35 commercial developments within the study area.

This map also indicates areas that are not suited to future residential or commercial development because of physical constraints such as flood-prone land, cemetery, sewerage treatment plant, Dixonville brick pit site, Narrandera Wetlands.

GEOTECHNICAL:

A geotechnical survey was carried out by McMahon Earth Science, and the Land Capability Report provides analysis of soil samples taken from 16 sites within the study boundary. It also provides construction details and driller’s logs relating to eleven (11) registered bore sites within the study area.

This report indicates that the predominant soil classification within the study area is “sandy loam” with exception of two (2) sites which are classified as “loam” and one (1) site classified as “clay-loam”. The “loam” sites are both within flood liable land and can be associated with river terraces and historical silt deposit, whilst the “clay-loam” site is a small low-lying area adjacent to Irrigation Way near the bridge over the irrigation canal. The “sandy loam” classification which is predominant within the area is considered to be highly suitable for on-site disposal of sewer effluent by conventional trenching systems or by surface irrigation.

McMahon Earth Science carried out a modelling exercise and determined that areas required for above-ground effluent disposal ranged from 164 square metres for average sized dwellings to 299 square metres for large dwellings. Similarly, the length of absorption trenches would be 47 lineal metres for medium dwellings to 65 lineal metres for large dwellings. Note that these are generalised requirements and site-specific investigations should be carried out for any future installations.

DEVELOPMENT POTENTIAL:

Building and Environmental Services Today (BEST) carried out a hypothetical exercise to compare the number of additional allotments that could be created by subdivision or boundary adjustment using 1,000 square metres as a base area for lots connected to sewerage infrastructure and 4,000 square metres for OSSMS. The results are as follows:

AREA	LOCALITY	SEWERED ALLOTMENTS (1,000 m ²)	OSSMS (4,000 m ²)
1	Area bounded by River Street, Main Canal and Railway	542	125
2	Area east of River street to railway	63	6
3	Area east of railway (excluding flood-prone land	30	0
4	Area west of railway (excluding flood-prone land)	16	1

This exercise provides an insight into the possible “flow-on” benefit of extending sewerage infrastructure within the study area, particularly to the more densely populated sectors. For instance, it would provide landowners in these sectors opportunity for subdivision of land on a more economical basis than is available for allotments requiring OSSMS. In locations other than River Street/Main Canal/Railway, 109 smaller allotments (connected to sewerage infrastructure) can be created compared with 7 larger allotments serviced by OSSMS’s.

In reality, it is highly unlikely that creation of additional allotments to this extent will occur in the foreseeable future for a number of reasons, such as a desire of existing owners to live on larger allotments, costs involved in subdividing land and providing services, current need and market for additional building allotments within these areas, etc.

It is also noted that Council's Local Environmental Plan does not specify minimum lot areas within the bounds of this study area, but a minimum area of 4,000 square metres has been required, historically, to accept on-site disposal of effluent. Early town and village surveys in NSW created "grid" type allotments generally having an area of about 1,000 square metres and this type of allotment size is prevalent in older established parts of Narrandera. Under the de-facto minimum lot area requirement these existing OSSMS's would not be permissible.

EXISTING OSSMS's

A visual inspection of 14 (10%) randomly selected OSSMS's which are operating within the study area was undertaken to assess the current level of performance. These inspections revealed the following results:

- Four (4) [30%] systems are operating within a high-risk category;
- Six (6) [40%] systems are operating within a medium-risk category; and
- Four (4) [30%] systems are operating within a low-risk category.

If these ratings are extrapolated across the whole study area, it would indicate that forty-two (42) occupied properties require urgent maintenance and fifty-six (56) properties require some form of maintenance or attention. This is a concerning revelation, but as the sample was only 10% of existing OSSMS's, it is considered that further investigation is warranted before any future plan of action is determined.

Problems noted during inspections include:

- Poorly maintained systems including irrigation of effluent above-ground without the presence of disinfection tablets in the aerated waste treatment system;
- Effluent being siphoned from the septic tank onto the ground surface bypassing any absorption trench;
- Broken septic tank lids providing access for vectors of disease such as flies, mosquitoes and/or vermin;
- Undersize land area available for subsoil disposal of effluent especially in relation to dwelling size and /or potential dwelling population;
- Insufficient access to septic tanks for maintenance purposes; and
- Play equipment located close to effluent ponding on the ground surface.

CONSTRAINTS:

Notwithstanding that the geotechnical report prepared by McMahon Earth Science concluded that the predominant soil profile within the study area is satisfactory for operation of On-Site Sewerage Management Systems, a number of constraints will affect the operation of these systems in certain areas. These constraints have been identified as:

- ❖ Flood prone land;
- ❖ Groundwater vulnerable areas;
- ❖ Old brick pit site at Dixonville;
- ❖ Area required for future stormwater retention basin East of River Street;
- ❖ Cemetery site, Douglas Street;
- ❖ Electricity sub-station site, River/Redgum Street;
- ❖ Light industrial zone;
- ❖ High density area, Audley/Twynam Streets;
- ❖ Sewerage treatment plant site, Bamblett Street;
- ❖ Narrandera wetlands.

Flood Prone Land: A large section within the study area lies within the flood zone identified in maps included in Narrandera Local Environmental Plan 2013. The area considered to be a “constraint” to operation of OSSMS’s lies within the 1:100 year flood inundation limits. Any land-based sewerage disposal systems in this area will need to have suitable provisions for flood proofing if permitted to operate.

Groundwater Vulnerable Area: Maps included in Narrandera Local Environmental Plan 2013 identify most of the land situated south of the Main Canal as being vulnerable to groundwater contamination. Provisions of the LEP require Council to consider “the likelihood of groundwater contamination from the development (including from any on-site storage or disposal of solid or liquid waste and chemicals)” when assessing any application for development within this area. This is an important consideration as the very nature of effluent generated by OSSMS’s would preclude their operation within the groundwater vulnerable area because of contamination potential.

It should also be noted that there are seven (7) privately owned and registered groundwater bores within the study area as well as several Council-operated water supply bores; there may also be unregistered groundwater bores in existence, but this has not been substantiated.

Narrandera Development Control Plan 2013 requires separation of 250 metres between an area used for land application of effluent and any domestic groundwater well/bore used for human consumption (Cl.5.1.4 Table 1). This separation distance appears to be based on EPA document “Environment and Health Protection Guidelines – On-Site Sewage Management for Single Households – January 1998”. In comparison, Australian Standard 1547:2012 (Table R1) only requires a separation of between 15-50 metres depending on soil type.

As the surface area enclosed by a radial distance of 250 metres is 196,428 square metres, it is not possible to comply with requirements of the DCP and operate an OSSMS on the same allotment (4,000 sq. m.), or any adjacent allotment, that includes a domestic ground water well/bore.

Dixonville Brick Pit site: This is an old brick pit which has been used over the years for dumping of hard rubbish and has, more recently, been filled. It is located within Lot 7 DP6829.

Light Industrial Zone: The range of land uses “permitted with consent” under Narrandera Local Environmental Plan 2013 realises a potential for greases, oils, fats, hydrocarbons and other contaminants to be discharged to the ground surface by OSSMS’s with a potential to contaminate groundwater.

High Density Area: The area centred on Audley and Twynam Streets, west of the railway include numerous small-area allotments which are not suitable for OSSMS's because of their size.

RETICULATED SEWER INFRASTRUCTURE:

Further investigation has been carried out to determine the feasibility of extending reticulated sewerage infrastructure to service parts of the study area; this has required a variation of the boundaries of those areas defined earlier, and has also resulted in a need adjust numbers of existing and possible holdings.

RIVER STREET AREA:



This area is generally located east of River Street and west of the railway line; it includes the light industrial areas along Douglas Street, Bolton Street and Twynam Street. It also includes an area in Audley Street which consists of a number of smaller residential allotments.

The more densely populated section of Audley Street (between Irrigation Way and Sugden Street) is of some concern as most of these allotments only have an area of approximately 1,000 square metres which is far below Council's LEP requirement of 4,000 square metres for operation of OSSMS's. In addition to this, the rear boundaries of allotments on the southern side of the Street are located within

20-65 metres of the Main Canal which is in contravention to requirements of Council’s DCP which requires a separation distance of at least 100 metres between an effluent disposal area and any permanent surface water body including rivers, creeks and dams.

The previous comments relating to contamination of groundwater by industrial activities applies to the Douglas/Bolton/Twynam Streets section of this area and support the desirability of providing reticulated sewers.

The current “equivalent tenements” (ET) in this area is 44, with a prospect of increasing to 201 ET’s if fully developed; the “equivalent persons” (EP) for design purposes will be a maximum of 704.

Preliminary investigation indicates that It is possible to provide a gravity sewer network within this area with drainage to a low point at Audley/Sugden Streets. Installation of a pumping station at this point will allow transfer of effluent to the existing sewerage treatment plant.

A preliminary cost of providing this infrastructure is shown in the following table:

ITEM	ESTIMATED COST (NSW REFERENCE RATES MANUAL)
Reticulation Mains	\$749,600
Pumping Station	\$461,100
Rising Main	\$72,600
TOTAL	\$1,283,300
The capital cost is \$29,165 per ET based on current development, and \$6,385 per ET based on maximum future development (Note that these costs do not include Council’s connection charges, developer costs etc.)	
Estimated Annual Revenue: For 44 existing Equivalent Tenements (\$716.70) \$31,535 For 201 possible Equivalent Tenements (\$716.70) \$144,055	
Note that cost estimates are based on the NSW Reference Rates Manual and revenue is based on Council’s current fees and charges.	

TOWNSEND STREET:



This area is bounded by the disused Narrandera-Jerilderie railway, Larmer Street and the Brewery Flat flood plain. There are currently 51 ET's in this area with a potential to increase to a total of 86, which would equate to 301 EP's which is adopted for design purposes.

The topography of within this area will allow most of it to be serviced by gravity sewers, but servicing the area south of Gundagai Street will require provision of a small pressurised system which can be directed to the gravity system for final disposal. The gravity reticulated system will drain to the western (unformed) end of Larmer Street where it will be pumped to the treatment plant.

A preliminary cost of providing this infrastructure is shown in the table:

ITEM	ESTIMATED COST (NSW REFERENCE RATES MANUAL)
Reticulation Mains	\$591,900
Pumping Station	\$347,200
Rising Main	\$62,000
Pressure Sewer System	\$37,200
TOTAL	\$1,038,300

The capital cost is \$20,360 per tenement based on existing development, or \$12,070 per tenement if the area is developed to its full potential. (Note that these costs do not include Council's connection charges, developer costs etc.)

Estimated annual revenue:

For 51 existing tenements (@ \$716.70)

\$36,550

For 86 possible tenements (@ \$716.70)

\$61,635

SUGDEN STREET AREA:



This area is generally located west of the disused Narrandera-Jerilderie railway line and is bounded by Hankinson and Acacia Streets. There are currently 10 existing tenements in the area with a potential to increase to a total of 21 tenements.

Whilst it would be possible to provide a gravity reticulation system in this area, the cost of installing a pumping station which would be required to transfer the wastewater to the treatment plant would be excessive when compared with installing a pressurised reticulation system throughout the whole area. A preliminary cost of providing a pressure reticulation system is shown in the following table

ITEM	ESTIMATED COST (NSW REFERENCE RATES MANUAL)
Pumps, tanks, reticulation and all equipment for 10 existing tenements only	\$203,500
The capital cost is \$20,350 per tenement for existing development (Note that these costs do not include Council's connection charges, developer costs etc.)	
Pumps, tanks, reticulation and all equipment for 21 existing and future tenements	\$291,500
The capital cost is \$13,880 per tenement for maximum development (Note that these costs do not include Council's connection charges, developer costs etc.)	
Estimated annual revenue: For 10 existing tenements (@ \$716.70) \$7,170 For 21 possible tenements (@ \$716.70) \$15,050	

IRRIGATION WAY:

Whilst existing development within the area bounded by River Street and the Main Canal (Dixonville) suggests that larger lots are more favoured, it is possible to make provision for connection of properties fronting Irrigation Way to reticulated sewerage by constructing a pressurised system. Such a system would drain to Irrigation Way/River Street intersection where it would connect to a gravity link to the treatment plant.

A preliminary cost of providing such a system is shown in the following table:

ITEM	ESTIMATED COST (NSW REFERENCE RATES MANUAL)
Complete pressure sewer system including property connection, reticulation, pumps and all associated equipment	\$505,600
The capital cost is \$36,115 per tenement for existing development and \$15,320 per tenement for maximum development. (Note that these costs do not include Council's connection charges, developer costs etc.)	
Estimated annual revenue:	
For 14 existing tenements (@ \$716.70)	\$10,035
For 33 possible tenements (@ \$716.70)	\$15,320

CONCLUSIONS:

1. Notwithstanding that the geotechnical report prepared by McMahon Earth Science indicates that soil profiles within the study area are conducive to operation of OSSMS's, other constraints (e.g. floodprone land, groundwater vulnerable areas) indicate that reticulated sewerage is the more appropriate method of effluent disposal in part of the study area;
2. The area generally located between River Street and the Main Canal (Dixonville area) remain as large-lot development with OSSMS's;
3. Council give consideration to implementing inspection of existing OSSMS's and work with property owners to bring all up to a satisfactory standard;
4. Council take action to review requirements of Narrandera Development Control Plan 2013 to provide for more realistic separation distances between effluent disposal areas and groundwater bores;
5. Council seek financial assistance to provide reticulated sewers to River Street area and Townsend Street area;
6. Reticulated sewers not be provided in the Sugden Street area because of the unlikely requirement for infill development and potentially high operation costs;
7. Reticulated sewers not be provided along Irrigation Way because of the high allotment cost and potentially high operational costs.