Wollondilly Shire Council

Water & Sewer Servicing

Proposed Rezoning of Employment Lands, Picton Road, Maldon, NSW

P1002833JR01V03
October 2011

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

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Document and Distribution Status

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Revision No.	Description	Status	Release Date	Document Location			
				File Copy	MA Library	Client	Void
2	Draft	Draft	05.04.2011	1E,1P, 1H	-	1P	
3	Finalised (Council comments 19.07.2011)	Draft	10.10.2011	1E, 1P, 1H		1P	

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

All enquiries regarding this project are to be directed to the Project Manager.

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1 Introduction

1.1 Overview

This services assessment has been prepared by Martens and Associates on behalf of Wollondilly Shire Council to support the proposed rezoning of several existing lots located at Picton Road, Maldon, NSW. The lots considered in this study are as follows:

- Lot 2 D.P. 818975, Lots 1, 2 and 3 D.P. 732582, Lot 1 D.P. 105348 and Lot 31 D.P. 731012 (Area 1).
- Lots 30 and 31 D.P. 826690 (Area 2); and,
- Part of Lot 1 D.P. 1128013 (Area 3).

A plan of the study area is provided in Attachment A

This report summarises the preliminary assessment of potential water supply and sewerage services opportunities to service the proposed study area.

1.2 Scope of Works

1.2.1 Water

Scope of works in relation to water included the following:

1. Demand Estimation
   Estimation of potable water demands and fire demand requirements for the proposed rezoned lands based on Council nominated land-use types, and proposed lot sizes.

2. Available Water Services
   Determination of existing available reticulated water services to the study area.

3. Allied Mills Water Supply Infrastructure
   Assessment of existing Allied Mills water supply infrastructure including typical water demand.

4. Preliminary Network Modelling
   Assessment of existing town water network capacity to support estimated water demands of the proposed rezoned lands.

5. Augmentation Planning
   Consultation with Sydney Water regarding planned future works programs for the area.

6. Recommendations
   Provision of recommendations to enable progression to more detailed water reticulation planning and design for water supply sustainability for the proposed rezoning.

1.2.2 Sewer

Scope of works in relation to sewer included the following:

1. Sewage Generation Estimation
   Estimation of sewage generation rates, based Council nominated land-use types, and proposed lot sizes, including assessment of average dry weather flows and :"Design (peak) flows".

2. Allied Mills STP Infrastructure
   Assessment of Existing Allied Mills STP for suitability and availability of additional capacity for future servicing of additional proposed rezoned lands.

3. Sewage Management Options
   Assessment of options for alternative sewage management systems including individual on-site management systems; water recycling, centralised sewage management facilities and pump-out systems.

4. Preliminary Land Area Disposal Requirements
   Preliminary review of available site and soils information and preparation of effluent irrigation land area requirements based on likely land application rates and sewage generation estimates.

5. Augmentation Planning
   Consultation with Sydney Water regarding planned future works programs for the area.

6. Recommendations
   Provision of recommendations to enable progression to more detailed planning and design to achieve sewage management sustainability for the proposed rezoning.

1.3 Overview of Rezoning Concept Proposal

The proposed rezoning is broadly described as follows:

1. Rezoning of the lots identified above from Rural 1(a3) to Light Industrial 4(a) with an Environmental Protection Zone 7(a) or E3 Environmental Management Zone proposed adjacent to the Nepean River to protect the riparian buffer. Adjoining industrial zoned land is proposed to be rezoned IN3 Heavy Industrial under DLEP2010 in keeping with its current use.

2. Rezoned land could ultimately support 2000 m^2 lots for Areas 1 and 2 and 5 ha lots for Area 3. Lot yield is assumed to be approximately 105 lots in Areas 1 and 2 (depending on road reserve requirements) and 6 lots in Area 3. These figures are based on Council planning advice. Approximate available areas are 17.3 ha (Area 1), 8.9 ha (Area 2) and 30 ha (Area 3) respectively. It is noted that the ultimate lot sizes and yields may vary depending on the final layout of the sub-division.

3. Provision of internal roads and accesses with a minimum road reserve width of 21 m.

4. Provision of services including (but not necessarily limited to) reticulated water, telecommunications, electricity and gas. Initial advice obtained from Sydney Water indicates that reticulated town sewer will not be available to the site in the immediate future.

5. Provision of stormwater system including kerb and gutter together with pit and pipe system within road corridors. The stormwater system will include elements for quantity and quality management.

2 Water Supply

2.1 Potable Water Demand

Preliminary potable water demand estimates for each proposed rezoning area are based on preliminary lot yield estimates (Table 1). Demands were estimated utilising default demand rates in accordance with the *Water Supply Guide of Australia - Sydney Water Edition*, WSA-03-2002. Demand estimates are summarised in Table 2.

Table 1: Preliminary lot yield estimates

REZONING AREA	TOTAL AREA (ha)	% PUBLIC SPACE (ASSUMED)	BALANCE OF AREA (ha)	LOT SIZE (ha)	LOT YIELD
AREA 1	17.341	20	13.8728	0.2	69
AREA 2	8.943	20	7.1544	0.2	35
AREA 3[1]	30	20	24	5	6

1. Excludes riparian zone , public space excluded from remaining 30ha.

Table 2: Preliminary potable water demand estimates summary

REZONING AREA	MAX DAY DEMAND RATE - AREA (kL/d)[1]	AVE. DAY DEMAND RATE - AREA (kL/d)[2]	MAX HOUR DEMAND RATE - AREA (L/s)	MAX HOUR DEMAND RATE - LOT (L/s)
AREA 1	916	572	17.0	0.25
AREA 2	472	295	8.7	0.25
AREA 3[1]	1584	990	29.3	4.89

1. Based on 66 kL/ha/d (Table 2.1 *SW ed.* WSA 03-2002-2.2) 2. Ratio Max hr / Max day = 1.6; Max day / Ave day = 1.6

It is noted that demands for industrial uses vary considerably in volume and rate of flow. More detailed information on industry type and water use records for similar industries and diurnal usage pattern(s) should be established during future design of the water supply scheme.

No allowances have been made in estimating potable demand rates for the supplementation of water supply with rainwater harvesting or water recycling. Although such measures may be employed, they will

be industry specific and do not effect maximum demand assessment for future demand planning.

2.2 Fire Fighting Demand

2.2.1 Site Requirements

Should a reticulated water supply be available, the following hydrant design requirements are noted for the land (Table 3).

Table 3: Site external hydrant minimum requirements (from Table 2.2 AS 2419 2005).

	Attack Hydrant Unassisted	Feed Hydrant Unassisted
Minimum flow rate (L/s)	10	10
Minimum Residual Pressure (m Head)	25	15
Max. hose length reach to all portions of building (m)	60	60
Minimum hose stream length (m)	10	10

2.2.2 Within Lot Requirements

AS2419.1 (2005) specifies the following (Table 4) minimum number of fire hydrant outlets required to discharge simultaneously according to floor area. Note that industrial units belong to the BCA building classification of Class 8.

Table 4: Extracted fire hydrant requirement table AS 2419.1-2005. Based on BCA building classification and floor area

BUILDING CLASSIFICATION (SEE BCA)	FIRE COMPARTMENT FLOOR AREA (m^2)	NO. HYDRANT OUTLETES REQD TO FLOW SIMULTANEOUSLY
6,7 and 8 (NOTE 2)	$\leq$ 500	1
6,7 and 8	> 500 $\leq$ 5000	2
ALL CLASSES SPRINKLERED	> 5000 $\leq$ 10000	2
ALL CLASSES SPRINKLERED	> 10000	3
ALL CLASSES UNSPRINKLERED	> 5000 $\leq$ 10000	3
ALL CLASSES UNSPRINKLERED	> 10000	3 + ADDITIONAL HYDRANT PER EACH ADDITIONAL 5000m2

1. Extracted from Table 2.1 AS2419.1-2005. 2. One outlet is required to flow for these classifications where the total floor area of the building is greater than 500m^2, and the building is subdivided into fire compartments of 500m^2 or less

Based on the requirements of AS2419.1, all proposed industrial lots shall require a minimum of 1 hydrant and probably 2 or 3 for the majority of 2,000m^2 lots within zones 1 and 2 whilst zone 3 building are likely to require at least 3. This does not preclude the requirements for individual development fire system protection design which shall need to be conducted in accordance with the appropriate Australian Standards and building design codes.

2.3 Existing Available Reticulated Services

A single 150mm DICL diameter water main exists within the Picton Road road reserve. This main is supplied from the west (Picton) and terminates approximately at the Allied Mills site.

Mains pressure enquiries were lodged with Sydney Water for two locations along Picton Road. Pressure enquiry locations and results are provided in Attachment B. Existing pressures are summarised as follows:

Table 5: Pressure enquiry outcome summary.

Location	Maximum Pressure (m Head)	Minimum Pressure (m Head)	Maximum Permissible Flow (L/s@ 4 m Head)
Western Enquiry	78	68	18
Eastern Enquiry	78	75	17

2.4 Existing Infrastructure at Allied Mills

The Allied Mills site is equipped with its own private reservoir and booster system as part of the fire protection system for the site. The mills private fire protection system reservoir has a capacity of 900 KL. The system also has booster pumps and numerous external above-ground double hydrant valves. Water is supplied to both the private fire protection system reservoir and the site's potable reticulation system via a 150mm connection to the 150mm town main on Picton Road.

Assessment of Allied Mills water records shows daily average flow rates to the Mill of approximately 40KL. This approximates 25% of the estimated daily demand for each proposed 5ha lots within Area 3, confirming that demands for industrial uses vary considerably in volume and rate dependent upon industry type.

2.5 Preliminary Network Modelling

2.5.1 Modelling aims and methodology

The PIPES hydraulic model was used to assess the capacity of the existing reticulated service to support the proposed rezoning. The following assumptions were made:

- The existing 150 mm DICL main will be retained.
- Minimum mains residual pressure to be 4 m head.
- Demand rates as summarised in Table 1.
- Study areas were each supplied with a 150 mm UPVC main.
- Fire hydrants were located at the most hydraulically disadvantaged point within study area.
- Fire demand rates were assumed to be 10 L/s/hydrant.

Details of scenarios modelled in PIPES which deliver adequate water supply are summarised in Table 6.

Table 6: Summary of PIPES modelling scenarios.

Scenario	System Demand (L/s)				Description
	Study Area 1	Study Area 2	Study Area 3	Total	
1 [1]	10.0	-	-	10.0	Single fire hydrant in Study Area 1
2 [1]	-	10.0	-	10.0	Single fire hydrant in Study Area 2
3 [1]	-	-	10.0	10.0	Single fire hydrant in Study Area 3
4 [2]	16.0	-	-	16.0	Peak hour demand for 64 lots in Study Area 1
5 [2]	-	8.8	-	8.8	Peak hour demand for 35 lots in Study Area 2
6 [2]	-	-	14.6	14.6	Peak hour demand for 3 lots in Study Area 3
7 [2]	3.5	8.8	-	12.3	Peak hour demand for 35 lots in Study Area 2 and 14 lots in Study Area 1
8 [2]	6.0	-	9.8	15.8	Peak hour demand for 2 lots in Study Area 3 and 24 lots in Study Area 1

1. No base demand. Single fire hydrant operational. 2. Base demand only. No fire hydrants operational.

2.5.2 Results

Maximum residual pressures at study area outlets / hydrants for each modelled scenario are provided in Table 7.

Table 7: Maximum residual pressures at outlets / hydrants (m Head).

Scenario	Study Area 1	Study Area 2	Study Area 3	Comment [1, 2]
1	38.2	-	-	1 attack/ feed hydrant only
2	-	19.5	-	1 feed hydrant only
3	-	-	36.8	1 attack/ feed hydrant only
4	10.9	-	-	Insufficient for maximum lot yield
5	-	24.7	-	Insufficient for maximum lot yield
6	-	-	10.9	Insufficient for maximum lot yield
7	28.7	11.0	-	Insufficient for maximum lot yield
8	12.5	-	11.2	Insufficient for maximum lot yield

1. Attack hydrant requires 25m head. Feed hydrant requires 15m head (AS 2419, 2005). 2. Minimum head at building fixtures to be 5m head (AS 3500.1 2003). Preliminary building connection requirement assumed to be 10m head (5m residual @ main + 2m friction loss + 3m static).

Summary comments are as follows:

- The existing system cannot supply more than 1 simultaneous operational fire hydrant.
- There is inadequate supply to service the maximum lot yields for the total study area but also inadequate supply to service the maximum lot yield for any individual study areas.
- Scenarios 4-8 do not operate simultaneously with 1 operational fire hydrant.
- We note that scenarios 4-8 are not exhaustive combinations of lot densities or demand rates. They are indicative only and should be used as a guide for planning the types of industries and lot densities should the existing reticulated system be relied upon.

2.6 Recommendations

There is significant difficulty associated with determining water supply requirements when potential lot yields and specific types of industry remain unknown. Both factors significantly affect ultimate water

demand requirements. As such, recommendations are made to assist Council in shaping development controls to guide further development on the lands.

Recommendations are as follows:

- Sydney Water connection is unlikely to satisfy full site daily (potable and non-potable) and fire demands. Can be addressed by:
  - Supplementary site water storages and roof water collection;
  - Booster pumps:
  - Allowing less water intense industry.

- Amplification will be required on a site-by-site basis via the following mechanisms:
  - Booster pumps
  - static water supply reserves

- Requirements will need to be assessed on a lot by lot and industry type basis.

- Water supply objectives and controls are to be incorporated into a DCP or LEP for the control of future development and/or subdivision of the Maldon lands.

Recommended objectives and controls for water supply are as follows:

Objectives:

- To ensure potable and non-potable water supplies are adequate to satisfy all needs of the proposed development including fire fighting.

- To minimise the reliance on Sydney Water water supply infrastructure to achieve water supply objectives.

- To minimise the requirement for potable water consumption through utilising non-potable supply sources such as roof water collection, necessary on-site stormwater detention infrastructure (where appropriate) and treated on-site wastewater for satisfying non-potable uses such us toilet flushing, irrigation, cleaning and industrial processes where applicable.

- To promote environmentally sustainable water supply solutions to potable and non-potable water supply through the collection, treatment and reuse of site stormwater and wastewater resources.

- To ensure protection of surface and groundwater resources through implementation of sustainable stormwater harvesting management solutions (where appropriate).

- To ensure protection of land and native flora and fauna through implementation of sustainable stormwater harvesting management solutions (where appropriate).

- To minimise risk to health and safety associated with the supply of potable and non-potable water resources.

Controls:

- Water supply assessment be required to support each lot DA to:
  - investigate and report on water supply requirements (potable, non-potable and fire protection) for the proposed development;
  - investigate and report on available potable and non-potable resources (Sydney Water Feasibility application to be conducted as part of this assessment);
  - nominate a water supply strategy and provide sufficient security modelling utilising local climate records;
  - assess environmental impact / nominate recommendations for minimising impact on surface and groundwater resources with respect to water supply (i.e. water balance modelling).
  - assess fire protection requirements including fire hydrant and on-site fire storage and booster system design for the proposed development.

- Water supply assessment to be undertaken to satisfy relevant Council and industry guidelines and Australian Standards regarding potable and non-potable water supply and fire-protection.

3 Sewerage Services

3.1 Sewage Generation – Flow Estimates

Preliminary sewage generation rates have been estimated in accordance with the *Sewerage Code of Australia - Sydney Water Edition*, WSA-02-2002. Equivalent Population (EP) estimates and an assumed lot area breakdown are summarised in Table 8.

EP estimates were derived utilising default demand rates based on industry type which was selected with consideration to Council's nominated preferred land zoning of "light industrial" and Allied Mills preference for similar land uses related to cereals and flour processing. "Grain - Flour Milling" and "Grain – Cereals" were thus selected from the available categories in WSA-02-2002 along with the general "Future industrial area" category.

A number of assumptions have been made in estimating sewer generation rates:

- Percentage public space for roads *etc.* allowed for in each of the overall areas. Nominated percentages: 20% Area 1, 20% Area 2, and 0% Area 3.

- Public space within Area 3 has been assumed to be excluded from the nominated 30 ha total developable area and within the remainder of the remaining 80 ha that shall also include riparian protection zone.

- Percentage built-up area (floor area) used for estimating EP based on industry type has been assumed as follows: 60% for 2,000m^2 lots (Area 1 and Area 2), and 30% for 5ha lots (Area 3).

Table 8: Preliminary equivalent population (EP) estimates

		AREA 1	AREA 2	AREA 3[1]
TOTAL AREA (ha)		17.341	8.943	30
% PUBLIC SPACE - *ASSUMED*		20	20	0
TOTAL DEVELOPABLE AREA		13.873	7.154	30
LOT SIZE (ha)		0.2	0.2	5
LOT YIELD		69	35	6
% LOT BUILT-UP (B.U) AREA (FLOOR AREA) - *ASSUMED*		60	60	30
TOTAL AREA EQUIVALENT POPULATION (EP) BASED ON INDUSTRY TYPE	GENERAL INDUSTRY (EP/gross ha = 150)[2]	2080.9	1073.16	4500
	GRAIN - FLOUR MILLING (EP/B.U ha = 56)[3]	466.1	240.4	504
	GRAIN - CEREALS (EP/B.U ha = 560)[3]	4661.3	2403.9	5040
LOT EQUIVALENT POPULATION (EP) BASED ON INDUSTRY TYPE	GENERAL INDUSTRY (EP/gross ha = 150)[2]	30.2	30.7	750
	GRAIN - FLOUR MILLING (EP/B.U ha = 56)[3]	6.8	6.9	84
	GRAIN - CEREALS (EP/B.U ha = 560)[3]	67.6	68.7	840

1. Excludes riparian zone, public space area excluded from remaining 30 ha. 2. Table A1 WSA 02-2002-2.2 3.Table A2 & A3 (N>3) WSA 02-2002-2.2

EP's were used to derive sewage generation estimates. The following is noted:

- Table 9 summarises Average Dry Weather Flow (ADWF) on an Area basis against Industry type.
- Table 10 summarises ADWF on a lot size basis against industry type.
- Table 11 summarises "Design Flow" calculations based on the "general industry" category. "Design Flow" estimates are required for designing pipe networks and input to pump station designs. Design flow is the peak flow to be contained within a sewer system and is the sum of the following components.

Design flow = PDWF + GWI + IIF

where PDWF = d (peaking factor) * ADWF
GWI = groundwater infiltration
IIF = rainfall inflow and infiltration

Table 9: Sewage generation summary: per area basis – ADWF versus industry type

	GENERAL INDUSTRY (EP/gross ha = 150)[1]		GRAIN - FLOUR MILLING (EP/B.U ha = 56)[2]		GRAIN - CEREALS (EP/B.U ha = 560)[2]	
	EP	ADWF (L/s)	EP	ADWF (L/s)	EP	ADWF (L/s)
AREA 1	2080.9	4.37	466.1	0.98	4661.3	9.79
AREA 2	1073.2	2.25	240.4	0.50	2403.9	5.05
AREA 3	4500	9.45	504.0	1.06	5040.0	10.58

1. Table A1 WSA 02-2002-2.2 2.Table A2 & A3 (N>3) WSA 02-2002-2.2

Table 10: Sewage generation summary: per lot basis – ADWF versus industry type

	GENERAL INDUSTRY (EP/gross ha = 150)[1]			GRAIN - FLOUR MILLING (EP/B.U ha = 56)[2]			GRAIN - CEREALS (EP/B.U ha = 560)[2]		
	EP	ADWF (L/s)	DAILY FLOW ALLOWANCE (kL)	EP	ADWF (L/s)	DAILY FLOW ALLOWANCE (kL)	EP	ADWF (L/s)	DAILY FLOW ALLOWANCE (kL)
2000m^2 LOT (AREAS 1 & 2)	30.2	0.063	5.47	6.8	0.014	1.23	67.6	0.142	12.26
50000m^2 LOT (AREA 3)	750	1.575	136.08	84	0.176	15.24	840	1.764	152.41

1. Table A1 WSA 02-2002-2.2 2.Table A2 & A3 (N>3) WSA 02-2002-2.2

Table 11: Design sewage flow estimates – based on total areas, general industry

	ADWF (L/s)	PDWF "d" FACTOR[1]	PDWF (L/s)	GWI[2]	A_{EFF}[3]	C	I	IIF	DESIGN FLOW (L/s)
AREA 1	4.37	3.8	16.61	0.03	6.59	1.0	50.4	9.30	25.94
AREA 2	2.25	4.3	9.69	0.02	3.40	1.0	52.2	4.97	14.68
AREA 3	9.45	3.2	30.24	0.08	21.00	1.0	46.8	27.52	57.83

1. Figure B.1 WSA 02-2002-2.2 (based on gross development area) 2. Portion wet = 0.1 assumed (proportion of pipe network subject to GW ingress) - Appendix B3 WSA 02-2002-2.2 3. Portion impervious assumed to be 70% for areas 1 & 2 and 40% for area 3[3]

3.2 Connection to Town Sewer

Discussions have been held with Sydney Water regarding the provision of town sewerage reticulation to the site (Mr Adrian Miller – Manager, Urban Growth Strategy and Planning). Sydney Water advise:

- Further discussions and negotiations would be required regarding Council's commitment to adjusting the current proposed sewage augmentation works program for the Picton Thirlmere Tahmoor (PTT) Scheme to include the Maldon area within future plans.
- The proposed Maldon rezoning area lies outside of the current PTT scheme augmentation works area, thus if the Maldon Lands were to be included within the scheme, it would be at the expense of equivalent area already marked for inclusion within the scheme.
- Sewer augmentation scheme boundary adjustment matters be discussed and resolved prior to lodgement of any feasibility application.
- No advice is available regarding Picton Sewage Treatment Plant (STP) spare capacity until Council's commitment to adjustment of scheme boundaries is known.

3.3 Connection to Allied Mills STP

An assessment of the existing Allied Mills STP capacity to accept additional loads as proposed by the rezoning has been undertaken as part of this study. This assessment included:

- An inspection of the STP and effluent disposal system - undertaken 01.03.2011. Refer to Figure 1 and Figure 2.
- Review of STP specifications as supplied by Allied Mills staff.

Findings of the assessment are as follows:

- Existing STP System: *EconoCycle Maxi 30/4*.
  Ave Flow Rate: 8 KL/d
  Max Flow Rate: 10 KL/d

  4 tank system comprising:
  Septic Tank - 8.5KL
  Balance Tank - 8.5KL
  Aeration Tank 1 – 8.5KL
  Aeration Tank 2 – 7.5 KL with Clarifier and chlorine disinfection chamber

Located north of Mill site outside of fence adjacent to truck loading area.

- Irrigation System: Surface Irrigation area with 8 spray Heads spaced at 12m Centre to Centre. Total Irrigation area of approximately 1,150 m^2 (48m x 24m).

  Located north-east of Mill site in the open grass paddock. Between the mill and Picton Road.

- Flow rates or performance records of the STP were not supplied however the sewage management system appears to be operating satisfactorily. No odours were noted.

- Given the relatively small capacity of the STP, it is considered that routing of any sewerage flows from the proposed rezoned surrounding lands would not be a viable option.

- STP should continue to operate as a discrete stand-alone unit for the Allied Mills existing operations until such time as town sewer services become available.

- Any proposed increase to flows to the STP from additional development on the Allied Mills site should be subject to further STP capacity assessment.

- STP does not have sufficient capacity to service any additional part of the proposed rezoned lands.

Figure 1: Allied Mills STP (01.03.2011). Aeration tanks shown. Septic and balance tanks hidden in long grass on right of picture. Mill in background.

Figure 2: Allied Mills on-site effluent irrigation area (01.03.2011). 8 irrigation spray heads at 12m spacings. Mill in background.

3.4 Alternative Sewage Management Systems

Alternative sewage management options have been reviewed as part of this study. Findings are summarised within the following sub-sections.

3.4.1 Individual Lot On-site Sewage Management Systems

Individual on-site sewage management schemes would require both an individual STP (to treat effluent to a minimum secondary, or better, treatment standard) together with sufficient areas within each lot for effective disposal of treated effluent.

Irrigation area requirements for the establishment of individual on-site effluent management schemes have been evaluated with consideration to local area soil types and likely estimated sewage generation rates. Design Irrigation Rates (DIR) have been determined with reference to AS/NZS 1547:2000.

Site soils are likely to contain a 0.5m thick mixture of silt, clay and fine graded sand underlain by up to 2 m of clay (KBR, 2004). For the purpose of this analysis DIRs for Light clays and clays have been utilised:

Light Clay DIR = 20 mm/week or 2.86 mm/day
Medium to Heavy Clay DIR = 15 mm/week or 2.14mm/day.

Results are summarised in Table 12, Table 13 and Table 14 and show that for both the "General industry" and the "Grain - cereals" industry

classifications, unfeasible land areas are required to dispose of estimated daily effluent flows.

For the "Grain - flour milling" industry classification, area requirements are feasible however total lot areas would need to be increased to cater for the effluent irrigation area. For example, a 2,000m^2 Lot would require 573 m^2 irrigation area. Estimation of the daily sewer flow was based upon an allowance of 60% of the lot being built-up (or floor-space) leaving 40% remainder for site access, gardens, building setbacks etc. It is feasible that 10% of the 2,000m^2 (i.e. 200m^2) may be available for effluent disposal but this would not satisfy the total area requirement of 573m^2.

In addition, any additional area set aside for effluent irrigation would require set-backs from boundaries and buildings *etc*, nominally 6m if downslope and 3m if upslope of the disposal area. It is therefore likely that 2,000 m^2 individual lots would require an additional 700 – 800m^2 of land for effluent irrigation.

Table 12: Lot based on-site effluent irrigation area requirement: general industry

	DAILY FLOW ALLOWANCE (kL)	REQUIRED EDA (m^2) AT VARIOUS DIR VALUES (mm/day)	
		2.14	2.86
2,000m^2 LOT (AREAS 1 & 2)	5.47	2557	1913
50,000m^2 LOT (AREA 3)	136.08	63589	47580

Table 13: Lot based on-site effluent irrigation area requirement: grain – flour milling

	DAILY FLOW ALLOWANCE (kL)	REQUIRED EDA (m^2) AT VARIOUS DIR VALUES (mm/day)	
		2.14	2.86
2,000m^2 LOT (AREAS 1 & 2)	1.23	573	429
50,000m^2 LOT (AREA 3)	15.24	7122	5329

Table 14: Lot based on-site effluent irrigation area requirement: grain – cereals

	DAILY FLOW ALLOWANCE (kL)	REQUIRED EDA (m^2) AT VARIOUS DIR VALUES (mm/day)	
		2.14	2.86
2,000m^2 LOT (AREAS 1 & 2)	12.26	5728	4286
50,000m^2 LOT (AREA 3)	152.41	71219	53290

In summary, area requirement is likely to preclude the establishment of individual lot on-site effluent management systems for the proposed rezoned lands for the majority of industry types. Hence, industry type restrictions may be necessary if on-site effluent disposal is to be considered as part of a viable sewage management strategy. A detailed on-site wastewater assessment examining effluent generation rate and individual site and soil characteristics would be required if an individual on-site system was to be applied for in the future.

We recommend that industry types be clarified so that advice regarding on-site options can be further refined.

3.4.2 Recycled Water Re-use

Recycling of water is becoming widely practiced particularly across certain industries to save on both water consumption and sewage management requirements. The potential for this practice varies considerably with water quality requirements across industry types. Given the preliminary nature of this assessment this item has not been expanded upon. Specific research would be required on individual industry activities, unknown at this stage, to further explore this opportunity.

3.4.3 Centralised Sewage Management Facility

Establishment of a centralised sewage management facility for the proposed rezoned lands as a whole or on an area basis (i.e. Area 1, 2 and 3) includes the following advantages:

- Negates the requirements for extension and augmentation of the existing Sydney Water sewerage system.
- Allows the facility to cater specifically for trade strength waste associated with industrial lands.
- Allows for independent management (operations and financial) of the facility.

Disadvantages include:

- Land requirements for facility treatment infrastructure and deposal land area.
- Requirements of technical and managerial expertise for independent operation.
- Liability for maintaining sewerage reticulation, treatment and effluent disposal operations.
- Planning constraints to approval may be complex.

Preliminary on-site effluent disposal (irrigation) area requirements for centralised sewage management facilities on an area basis are summarised in Table 15. Area requirements area based on DIR rates for Light Clays (AS/NZS 1547, 2000). Results are a scaled up translation of the lot based results and reach the same conclusion that effluent irrigation area requirement is likely to preclude the establishment of centralised on-site effluent management systems for the proposed rezoned lands for the majority of industry types.

Table 15: Area Based On-Site Effluent Irrigation Area Requirement: Industry Comparison

	GENERAL INDUSTRY		GRAINS - FLOUR MILLING		GRAINS - CEREALS	
	DAILY FLOW ALLOWANCE (kL)	**AREA (ha)[1]**	**DAILY FLOW ALLOWANCE (kL)**	**AREA (ha)[1]**	**DAILY FLOW ALLOWANCE (kL)**	**AREA (ha)[1]**
AREA1	377.56	13.201	84.57	2.957	845.74	29.571
AREA2	194.71	6.808	43.62	1.525	436.16	15.250
AREA3	816.48	28.548	91.45	3.197	914.46	31.974
TOTAL	1388.76	48.56	219.64	7.68	2196.36	76.80

1. Based on DIR of 2.86mm/day (light clay)

Similarly to future assessment of individual on-site sewage management systems, a detailed on-site wastewater assessment examining effluent generation rates and individual site and soil characteristics would be required for future assessments of centralised sewage management facilities.

We recommend that sustainable lot numbers together with industry types be further investigated and refined if this option is pursued.

3.4.4 Pump-out Systems

Pump-out systems shift the mechanism of sewage transport from a piped (and pumped as required) reticulation network to road freightage. End of line sewage treatment and effluent disposal requirements still remain.

As such, pump-out systems can generally be an option for those industries that generate minor volumes of sewage or for short term solutions. However, as discussed in Section 3.1, sewage generation varies considerably with industry type. Hence, pump-out would likely prove cost prohibitive for high volume sewage generating industries such as the "general industry" and "Grains – cereals" classifications.

Thus, in summary employment of pump-out systems as a long-term sewage management solution for the proposed rezoned lands is not recommended due to the following:

- Potential for high volume sewage generation industries within proposed rezoned lands;
- Increased reliance on road network causing increased traffic, road maintenance requirements, road safety risks, vehicle pollution and waste spillage risks.
- Additional capacity within the Picton STP and effluent disposal scheme would still be required. As discussed in Section 3.2, advice is unavailable regarding Picton STP spare capacity until Council's commitment to adjustment of scheme boundaries is known.

3.5 Recommendations

Given preliminary findings with regard to connection of future lots to Sydney Water infrastructure, it is likely that future development of the lands shall need to rely on on-site sewage treatment and disposal alternatives. Preliminary assessment results suggest that on-site wastewater management is a viable alternative but shall depend on industry type, waste strength and site specific geotechnical and environmental conditions.

Recommendations are as follows:

- Development on the lands be restricted to low volume sewage generating industries such as "Grain-flour milling" industry types.
- Specific on-site sewage requirements shall need to be assessed on a lot by lot and industry type basis.

- On-site sewage management objectives and controls should be incorporated into a DCP or LEP for the control of future development and/or subdivision of the Maldon lands.

Recommended objectives and controls for sewage management should include:

Objectives:

- To ensure on-site wastewater management solutions are adequate to satisfy all needs of the proposed development.

- To conserve and reuse resources (water, nutrients and organic matter) through treated effluent reuse for irrigation and other non-potable uses such us toilet flushing, cleaning and industrial processes where applicable.

- To promote environmentally sustainable water supply solutions for non-potable water supply through the collection, treatment and reuse of wastewater resources.

- To minimise risk to public health and safety associated with on-site sewage management.

- To ensure protection of surface and groundwater resources through implementation of sustainable on-site sewage management solutions.

- To ensure protection of land and native flora and fauna through implementation of sustainable on-site sewage management solutions.

- To protect community amenity through proper design and implementation of on-site sewage management systems to ensure they do not interfere with quality of life. Where possible, such systems should enhance local amenity.

- Promotion of ecologically sustainable development.

Controls:

- An on-site wastewater and geotechnical assessment be required to support each lot DA to:
  - Investigate and report on sewage generation rates from the proposed development.
  - Investigate and report on environmental and geotechnical constraints to on-site sewage disposal.
  - Nominate minimum standards of acceptable on-site sewage

treatment.
- Determine minimum effluent disposal/irrigation requirements based on moisture and nutrient modelling and incorporating buffer/setback requirements to relevant site features.
- Provide specifications for the nominated treatment and disposal system including site location plan.
- Assessment to be undertaken in accordance with relevant Australian Standards, State government and Council guidelines and control plans.

4 References

Australian / New Zealand Standard 1547 (2000), *On-site domestic wastewater management.*

Department of Local Government, NSW Environment Protection Authority, NSW Health Department, NSW Department of Land and Water Conservation and the NSW Department of Urban Affairs and Planning (1998), *Environment and Health Protection Guidelines, On-site Sewage Management for Single Households.*

KBR (2004), EIS for Grain Milling Facility – Volume 1.

5 Attachment A – Site Plan

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CLIENT/PROJECT
WOLLONDILLY SHIRE COUNCIL
PICTON ROAD, MALDON, NSW

TITLE
SITE PLAN

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in mm unless otherwise specified.

PROJECT MANAGER: GRAY TAYLOR

DRAWING NUMBER: P1002833.JD02V01

DESIGNED:	MGD
DRAWN:	MGD
REVIEWED:	GT
DATUM:	DATUM
HORIZONTAL RATIO:	1:2500 @ A1 1:5000 @ A3
VERTICAL RATIO:	NA
SHEET	1 OF 4 SHEETS
PAPER SIZE:	A1 / A3

REV.	DESCRIPTION	DATE	ISSUED
1	ATTACHMENT A	11.03.2011	GT

6 Attachment B – Sydney Water Pressure Enquiry Information

i) Map showing pressure enquiry locations

ii) Pressure enquiry statements

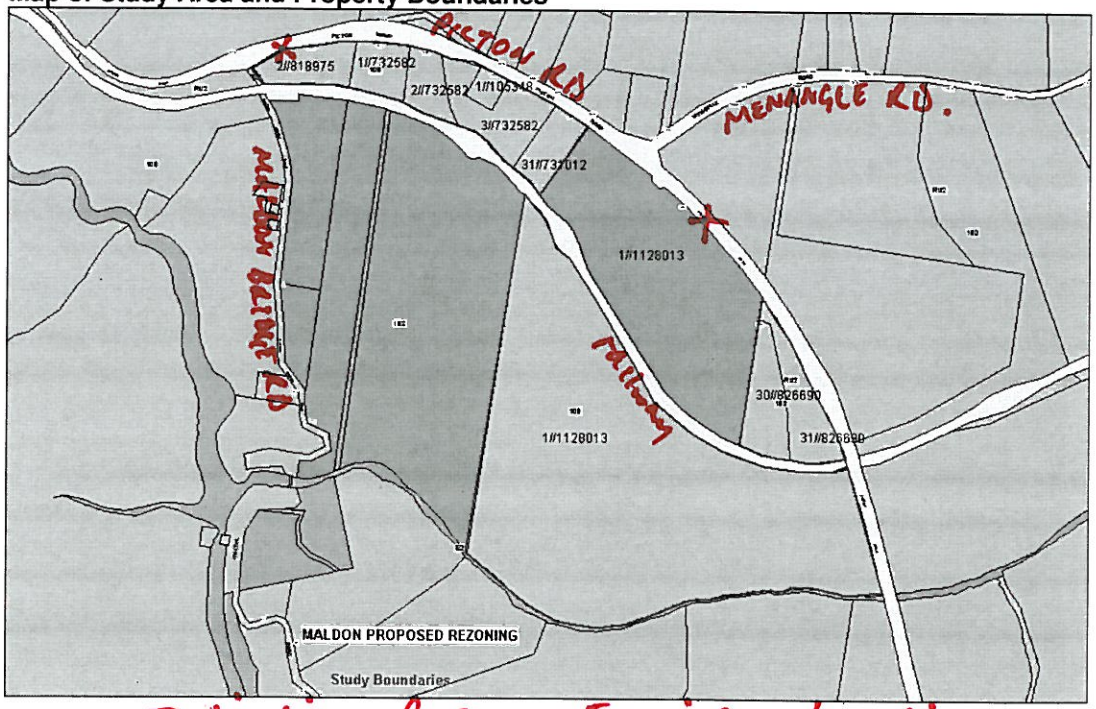
STRATEGIC PLANNING MANAGER

ATTACHMENT 1 – PROPERTY INFORMATION AND STUDY BOUNDARIES

Properties proposed for rezoning

Address and cadastre	Owner	Area (ha)
390-400 Picton Road 30 & 31 //826690	R & M Barca	8.943
330 Picton Road 1//1128013	Allied Mills	110.360 total – @24ha zoned 4(a) Industrial with @12ha of this not developed. @ 87 ha subject to rezoning - @30ha proposed industrial @ 60ha proposed environmental management
270 Picton Road 1//105348	Integral Energy	1.0460
300 Picton Road 31//731012	R & M Fitzsimmons	2.835
290 Picton Road 3//732582	E Birtles	5.230
250 Picton Road 2//732582	Blue Circle Southern Cement P/L	2.427
240 Picton Road 1//732582	Messrs Corbett	2.615
200 Picton Road 2//818975	A & J Dal Pozzo	3.188

Map of Study Area and Property Boundaries



x Indicative Pressure Enquiry Locations

Statement of Available Pressure and Flow

Sydney WATER

Martens & Associates
6/37 Leighton Pl
Hornsby, 2077

WMS No: **120128**
Contact No: 88493531
Fax No: 88493113

Attention: Nathan Foster

Date: 14/03/2011

Pressure & Flow Application Number: 3115215
Your Pressure Inquiry Dated: Fri March 11 2011
Property Address: Lot 2 Picton Rd Picton 2571

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Picton Rd	Side of Street: South
Distance & Direction from Nearest Cross Street	100 metres East from Maldon Ridge Rd
Approximate Ground Level (AHD):	152 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	78 metre head
Minimum Pressure	68 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	67
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15	61 48 28
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15	58 42 21
Maximum Permissible Flow	18	4

(Please refer to reverse side for Notes)

Robert Wickham
Team Leader
Asset Planning

Sydney WATER

Statement of Available Pressure and Flow

Martens & Associates
6/37 Leighton Pl
Hornsby, 2077

WMS No: **120148**
Contact No: 88493531
Fax No: 88493113

Attention: Nathan Foster

Date: 14/03/2011

Pressure & Flow Application Number: 3115222
Your Pressure Inquiry Dated: Fri March 11 2011
Property Address: 330 Picton Rd Picton 2571

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Picton Rd	Side of Street: South
Distance & Direction from Nearest Cross Street	300 metres East from Menangle Rd
Approximate Ground Level (AHD):	145 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	78 metre head
Minimum Pressure	75 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	73
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15	67 50 26
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15	63 44 19
Maximum Permissible Flow	17	4

(Please refer to reverse side for Notes)

Robert Wickham
Team Leader
Asset Planning