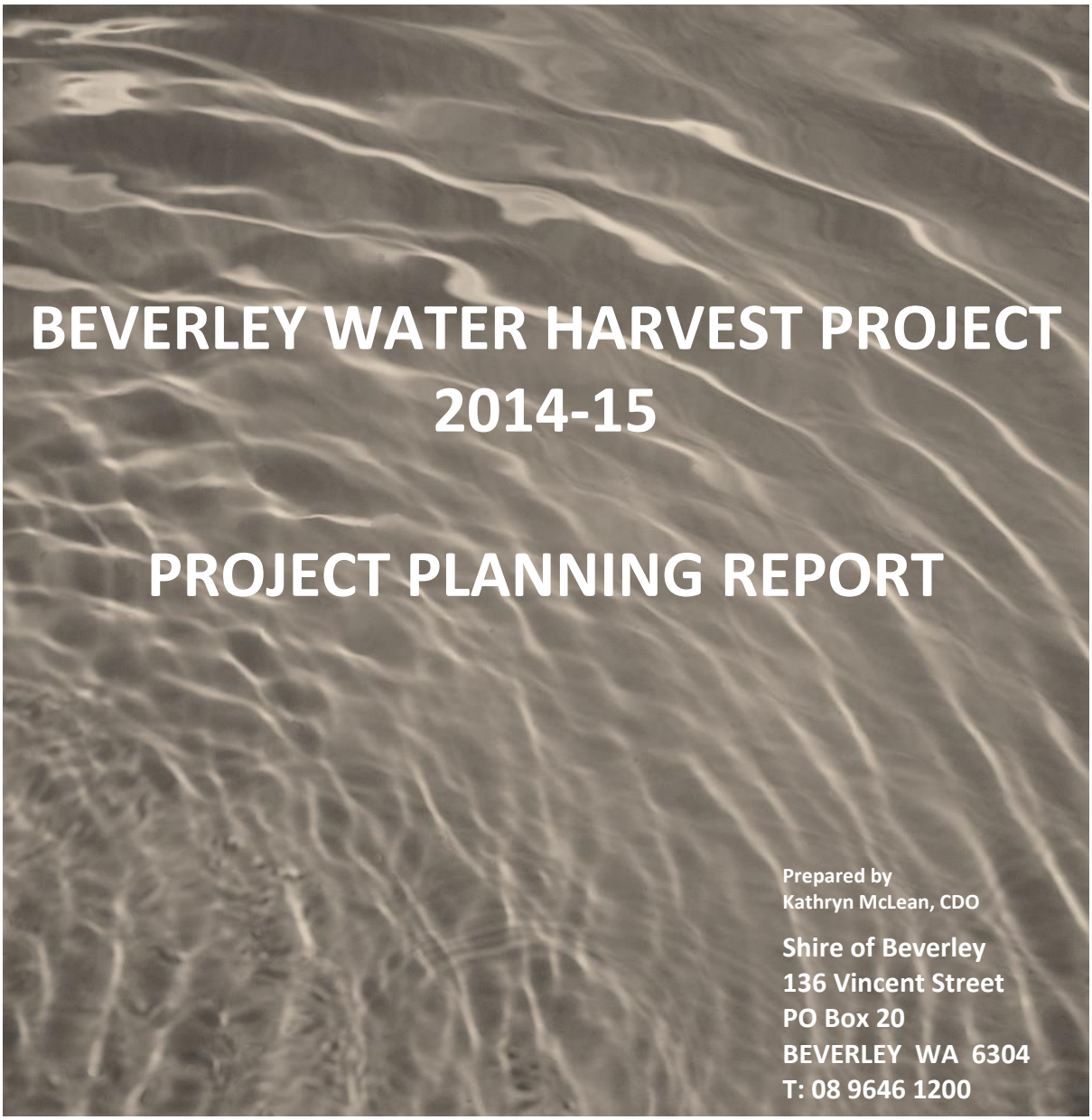


BEVERLEY WATER HARVEST PROJECT 2014-15

PROJECT PLANNING REPORT

Prepared by
Kathryn McLean, CDO

Shire of Beverley
136 Vincent Street
PO Box 20
BEVERLEY WA 6304
T: 08 9646 1200

CONTENTS

1.0 PROJECT SUMMARY

A sustainable water supply is a strategic outcome for the Shire of Beverley. This project aims to achieve real, visible and sustainable improvement in the water supply by allowing for "runoff (to) be stored for re-use as a second class water supply for irrigation" (2003/08, Curtin University, Department of Civil Engineering, Beverley Drainage Study).

The Beverley Water Harvest Project will involve construction of two retention basins that will capture storm water from town site streets and then, over a period of 4.9 days (at a full capacity of 3000m^3), pump the water to the town dam. The basins will be sized to match a 30 – 40mm rainfall event at each location.

2.0 HISTORY

Beverley is an agricultural town located on the banks of the Avon River, 130kms south east of Perth. Improvements to the Shire water supply where made by the Council in 1999 when a bore located west of the town centre was purchased. The Waterhatch Bore feeds into the town dam located downstream from the bore, supplementing the water supply for Shire activities and facilities.

Over a number of years the concept of harvesting street water to further supplement the water supply for these purposes has been investigated and reviewed by interested residents and the Shire of Beverley. In 2014, at the request of the community and the Shire staff, the Council engaged consultant engineer, Mr Rod Munn of RMECS, to investigate and construct a plan for the harvesting of storm water from particular town site streets as per a concept devised by local resident, Mr Fred Bremner.

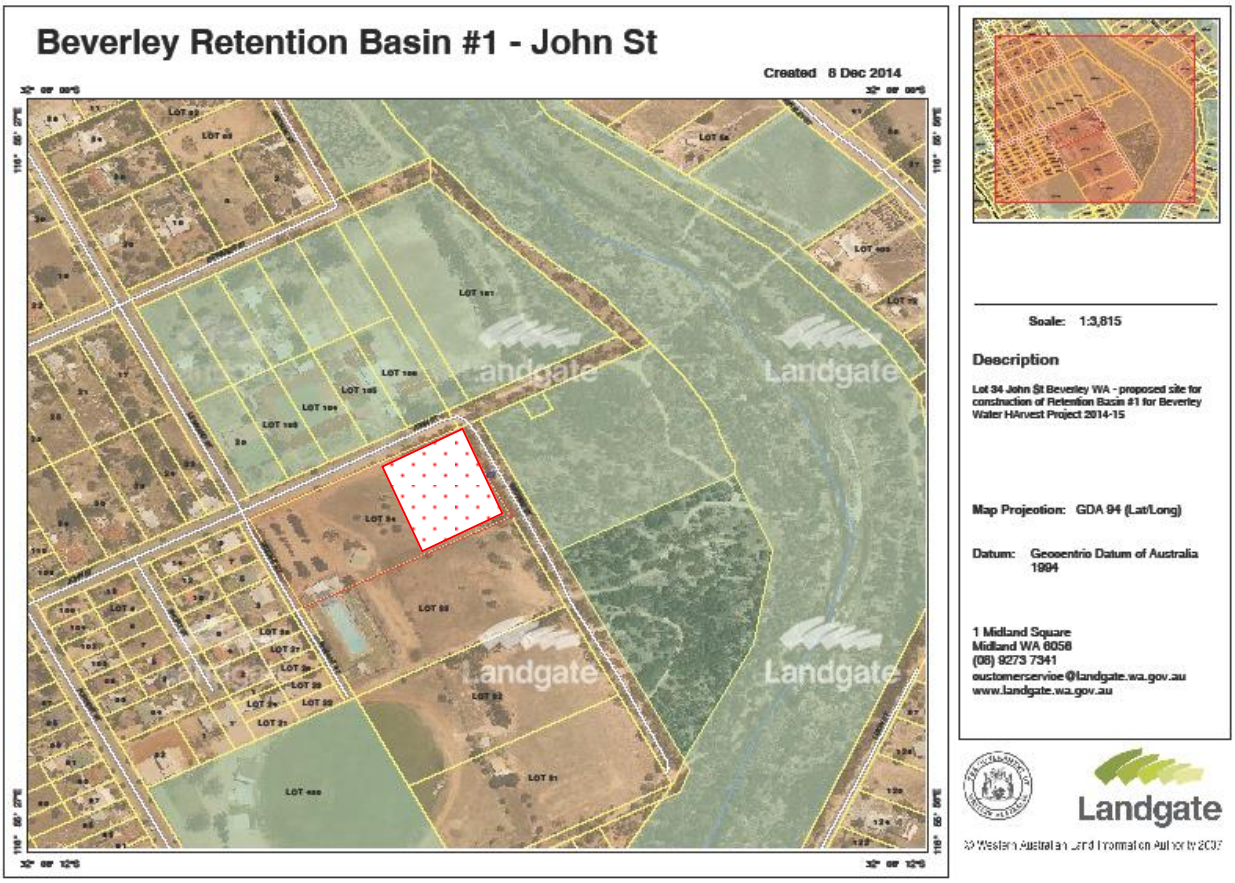
3.0 SITE INVESTIGATIONS

3.1 LOCATION

Construction of two retention basins, will involve using the already good system of kerb to kerb bitumised streets serviced by underground drainage to capture what would under normal circumstances drain into the Avon River. Overflow will follow the current course of storm water which follows a natural course through the Reserves (Lot 288 & Lot 289) adjacent to the Avon River.

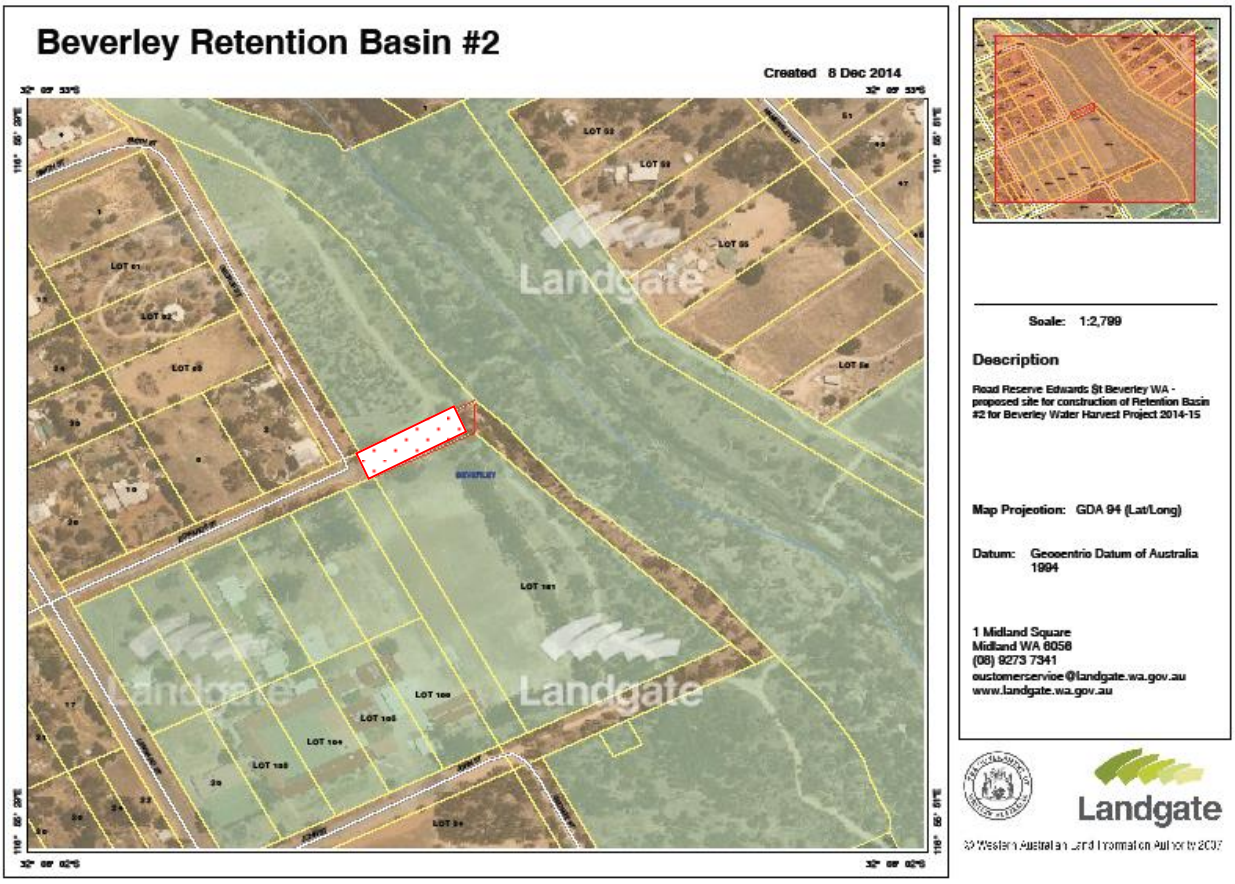
3.1.1 RETENTION BASIN #1

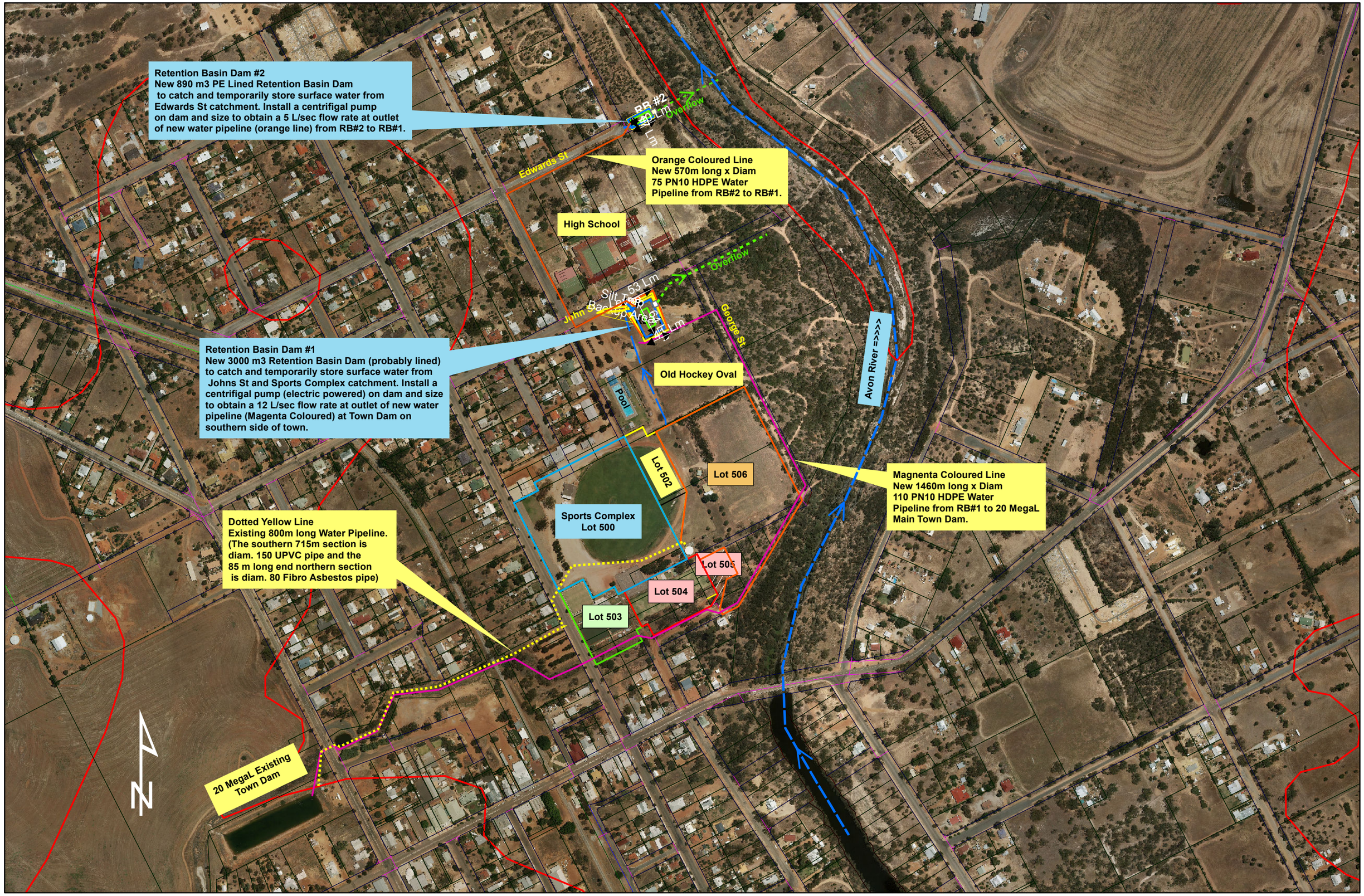
Lot 34 John Street, Beverley WA
Owned by Shire of Beverley
136 Vincent Street
PO Box 20
BEVERLEY WA 6304
T: 08 9646 1200



3.1.2 RETENTION BASIN #2

Road Reserve at eastern end of Edwards Street, where the bitumen ends in a cul de sac
Managed by Shire of Beverley
136 Vincent Street
PO Box 20
BEVERLEY WA 6304
T: 08 9646 1200





Draft Beverley Town Water Harvesting Plan - Rev 2

0 135 270 540 Meters

3.2 SOIL TESTING

Mr Fred Bremner conducted initial soil testing at the John Street site to determine the adequacy of the soil to retain water within a dam. Findings from these investigations are provided in Attachment A.

In summary, soil testing completed at the John Street site concluded that the soil structures from eleven different drill holes, were unsuitable for permanent dam construction, but may be suitable for a transfer dam, considering the short period of time between a rainfall event and pumping to the town dam.

Soil testing was not completed at the Edwards Street site as the soil profile within an existing 3metre excavated drain was considered too porous and it was recommended that any dam or basin would require lining.

Further site investigations and testing at the John Street site conducted by Rod Munn, indicated a mixture of dry, fine clay that is dispersive and not suitable and non-dispersive clay that has some ground water in it. In summary,

"I would say there is a > 50% probability that we will probably line this dam to preserve it into the future, mainly due to the rush of water into it, which could damage the clay lining if it contains some dispersive clay."

Of the Edwards Street site, Rod Munn says,

"I believe we should be able to construct an approx. 700 – 800m^3 retention basin within the 20m road reserve at the bottom of Edwards St (and would be approx. 30-35m long by about 3m deep with 3:1 batters, but we would need to line this to stop the batters from subsiding from the force of the incoming flow, and also allow it to seal. We would also need to construct an overflow weir at the river end, so it can overflow if reqd." See Attachment B.

4.0 CURRENT WATER SUPPLY

1. Town Dam located at Lot 11 Hunt Road, Beverley, WA, 6304

   Capacity 27,000kL

2. Waterhatch Bore located at Lot 78 (P24198) Waterhatch Road, Beverley, WA, 6304

   Capacity 30L/min = 15,768kL per annum (not used during the Summer months as water can be slightly saline and water evaporates leaving salt in the dam)

3. Beverley Waste Water Treatment Plant located at Lot 942 (P224679) – Effluent Reuse Project due for commission by Water Corporation in late March 2015

   Capacity 48kL/day = 17,520kL per annum

4. Water Corporation scheme water supply purchased to supplement town supplies

   As required

4.1 CURRENT REQUIREMENTS & COSTINGS

(at current scheme water charges)

SHIRE OF BEVERLEY WATER REQUIREMENTS – OVAL estimated by Shire of Beverley Works Supervisor			
MONTHS	DAYS	AMOUNT kL	COST 2014-2015 Water Corporation cost of $2.083/kL
Late Oct and Nov	42 days	6,300	$13,122.90
Dec - Feb	90 days	18,000	$37,494.00
Mar – early April	42 days	6,300	$13,122.90
TOTAL ANNUAL USAGE & COST OF WATER FOR IRRIGATION OF OVAL		**30,600.00kL**	**$63,739.80**

SHIRE OF BEVERLEY WATER REQUIREMENTS – TENNIS CLUB estimated by Tennis Club Grounds Person			
MONTHS	DAYS	AMOUNT kL	COST 2014-2015 Water Corporation cost of $2.083/kL
Late Oct and Nov	42 days	1,014	$2,112.16
Dec - Feb	90 days	2,173	$4,526.36
Mar – early April	42 days	1,013	$2,110.08
TOTAL ANNUAL USAGE & COST OF WATER FOR IRRIGATION OF TENNIS CLUB		**4,200kL**	**$8,748.60**

4.2 CURRENT REQUIREMENTS BASED ON WATER PURCHASES

(at current scheme water charges)

SHIRE OF BEVERLEY WATER USAGE FOR PARKS & GARDENS & OTHER ACTIVITIES as per standpipe records 2013-2014					
MONTHS	DAYS	AMOUNT kL per month (Museum Meter)	AMOUNT kL per month (Hunt Rd S/P)	AMOUNT kL per month (Other S/P)	COST 2014-15 Water Corporation cost of $2.083/kL
July	31	-	-	24.42	$50.87
August	31	645	247.00	11.81	$1,882.63
September	30	-	-	-	-
October	31	-	3.00	121.31	$124.31
November	30	-	-	194.57	$405.29
December	31	702	521.00	397.87	$3,376.27
January	31	-	-	157.09	$327.22
February	28	908	890.00	771.92	$5,353.14
March	31	-	-	305.78	$636.94
April	30	764	483.00	62.30	$2,727.27
May	31	-	-	10.99	$22.89
June	30	425	29.00	2.04	$949.94
TOTAL ANNUAL USAGE & COST OF WATER TO SUPPLEMENT ALL SHIRE ACTIVITIES		**3,444.00kL parks & gardens**	**2,173.00kL for all other Shire activities**	**2,060.10kL for all other Shire activities**	**$15,856.77**
TOTAL ANNUAL USAGE		**7,677.00kL**			

The current estimated water requirement for all Shire activities is based on an estimated requirement for the oval and tennis courts plus scheme water used for parks and gardens and other Shire activities during the 2013-2014 year. A total of 42,477kL per annum is required for all Shire activities.

5.0 FUTURE WATER SUPPLY

The Beverley Water Harvest Project 2014-15 will provide the infrastructure required to supplement the current town water supply with 30,019kL per annum from an average annual rainfall of 380mm.

RAINFALL RECORDS FOR BEVERLEY WA			
2004	333.1mm	2009	405.9mm
2005	474.5mm	2010	223.2mm
2006	453.0mm	2011	520.1mm
2007	377.0mm	2012	323.4mm
2008	386.1mm	2013	371.4mm

Rainfall records over the last 30 years indicate that the 10 year average annual rainfall has declined from 427mm in the 10 year period 1982 – 1993, to 417mm in the 10 year period 1994 – 2003, to 380mm in the 10 year period ended 2013.

To better prepare the community for periods of low rainfall and to cater for the declining average annual rainfall, the Beverley Water Harvest Project 2014-15 will enable construction of facilities for the harvesting and storage of water for community purposes.

The following table indicates the volume of water to be harvested under the Beverley Water Harvest Project 2014-15.

5.1 ESTIMATED HARVEST VOLUMES

(*as estimated by Harvey Morrell)

SHIRE OF BEVERLEY CATCHMENT AREAS & ESTIMATED HARVESTED WATER VOLUMES (based on average annual rainfall of 380mm)													
CATCHMENT AREA	**BUILT INFRASTRUCTURE or NATURAL ENVIRONMENT m^2**	**EARNEST DR m^2**	**EDWARDS ST m^2**	**FORREST ST m^2**	**JOHN ST m^2**	**LENNARD ST m^2**	**SHORT ST m^2**	**WRIGHT ST m^2**	**OVAL m^2**	**PONY CLUB m^2**	**SWIM POOL m^2**	**TOTAL CATCHMENT AREA m^2**	**70% EFFICIENCY kL**
Edward St			9,100	450	-	320		-	-	-	-	9,870	2,625.42
BDHS Buildings	4,678	-	-	-	-	-		-	-	-	-	4,678	1,244.35
BDHS Natural	38,164	-	-	-	-	-		-	-	-	-	38,164	4,350.70
TOTAL AREA & VOLUME												**52,712m^2**	**8,220.47kL**
John St	-	1,496	-	3,375	11,250	-	600	900	-	-	-	17,621	4,687.18
Hospital Buildings	2,827	-	-	-	-	-	-	-	-	-	-	2,827	751.98
Hospital Natural	12,586	-	-	-	-	-	-	-	-	-	-	12,586	1,434.80
TOTAL AREA & VOLUME												**33,034m^2**	**6,873.96kL**
Forrest St	-	-	-	4,680	-	-	-	-	-	-	-	4,680	1,244.88
													30% EFFICIENCY kL
Oval	-	-	-	-	-	-	-	-	40,000	-	-	40,000	4,560.00
Pony Club	-	-	-	-	-	-	-	-	-	40,000	-	40,000	4,560.00
Swimming Pool	-	-	-	-	-	-	-	-	-	-	40,000	40,000	4,560.00
TOTAL AREA & VOLUME												**124,680m^2**	**14,924.88kL**
TOTAL ESTIMATED ANNUAL WATER HARVEST VOLUME FROM THIS PROJECT*													**30,019.31kL**

6.0 RISK ASSESSMENT

6.1 PLANNING

- Approval will be established by the Shire of Beverley prior to construction.

- Application will be made for design plans from Western Power.

- Final project design and works schedule to be determined by consultant engineer and Shire of Beverley Works Manager

NB the current BMX track adjacent to Beverley District High School will need to be re-located.

6.2 ENVIRONMENTAL CONCERNS

- Clearing Permits – Jen Green (Environmental Protection Officer) visited the sites and has drawn up preliminary applications for clearing at both sites.

- Overflow – Basin #1 will include a lined overflow spillway that will direct water to the natural water course that currently runs into Reserve Lot 288.

- Overflow – Basin #2 will include a lined spillway with a new open drain excavated from the rear of the spillway allowing any overflow to run the course of the water currently being dispersed from the street drainage to Reserve Lot 289.

- Basin #1 and Basin #2 will each have a silt trap at water entry point.

6.3 COMMUNITY SAFETY

- Security fencing and appropriate warning signs – each retention basin will be enclosed by 1.8m high security fencing once construction is complete. The silt trap area at basin #1 will be enclosed by a 1.2m high ring lock fence. Temporary fencing has been considered in the construction budget.

Volume of Spoil from Void to be removed from RB#1 = 6150 Lcm.

Volume of Spoil from Void to be removed from front silt trap area = 320 Lcm.

Total Volume of Spoil to be removed from site = 6,470 Lcm.

Total Volume of Material from void (RB#1 & Front Silt Trap) to be pushed out by Dozer = 5580 m3.

Retention Basin Water Storage Capacity @ H.W.M = 3100 m3.

John St

Lennard St

George St - Undeveloped Road Reserve

Wright St

I.L. Inlet Ø375 by 22000 long Entry Pipe = 9.010 (from existing U/G Longitudinal Street Drainage system under eastern kerbline). Block up Ø375 pipe downstream of this point.

I.L. 9.010

I.L. 9.066

9.871

I.L. 8.864

9.799

9.858

9.869

I.L. 8.880

I.L. 8.940

Secure Fence through approx 1000 deep flat bottom open drain here.

Approx GPS 493174 6448286

T.O.Emb = 10.100

I.L. 9.160

9.965

Approx GPS 493137 6448267

New Ringlock Fence (type F2)

I.L. Outlet Ø375 by 18000 long Entry Pipe = 8.800

I.L. Overflow Spillway = 9.000 (Line spillway surface with Liner and tie into basin liner)

9.908

I.L. Outlet concrete Silt Trap / Spillway = 9.100 (Tie liner into concrete slab under).

I.L. Inlet concrete Silt Trap / Spillway = 9.300

10.068

10.033

10.001

Testhole #2

I.L. 9.145

10.120

10.287

I.L. 9.268

10.223

Silt Trap Area - Excavate and remove approx 320 cm spoil material from site, and grade to entry to Basin.

New 1.8m High Security Fence (type F1)

HWM (9.000)

Floor (9.500)

Lot 34

Retention Basin #1

10.000

Testhole #3

10.048

Ø110 PN10 HDPE pressure water line to Main Town Dam (1460 Lm).

Foot Valve on float

10.086

Approx GPS 493201 6448233

Existing Ringlock Fence

New Ringlock Fence (type F2)

T.O.Emb = 10.100

Approx GPS 493164 6448215

Approx. location of centrifigal pump.

2 x 1.8m wide swinging gates to allow easy access to pumping and power infrastructure.

Testhole #5

Swimming Pool Carpark

Toilet Block

10.226

I.L. 9.420

New Open Drain from Sports Complex Culvert Pipe

Testhole #6

Lot 33

SITE PLAN

Swimming Pool Kiosk & Pumping Infrastructure

I.L. 9.480

10.369

Existing Ringlock Fence

PRELIMINARY

Swimming Pool

Existing Swimming Pool Fence

Note : I.L. of Ø600 Culvert pipe outlet from sports complex area is at 9.700.

I.L. 9.540

10.580

N

0 5 10 15 20 25

Scale 1 : 500

Rev No.	Date Issued	Comment
2	6-11-14	Preliminary
1	11-11-14	Preliminary

Approved for Construction

Name :

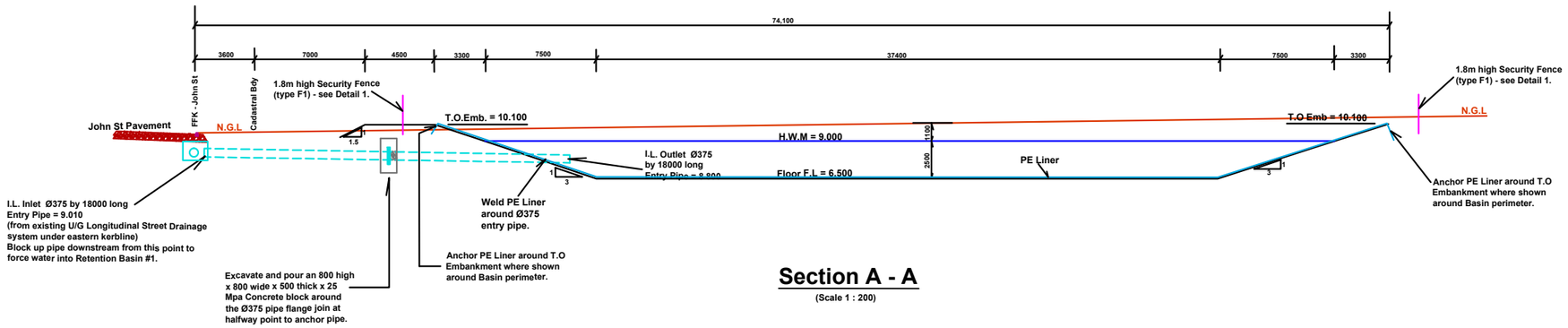
Signature :

Date :

R Munns Engineering Consulting Services
PO Box 19 BEACON WA 6472
Ph : (08) 9686 1181 Mob : 0407 604 164
Email : rmecs@westnet.com.au

SHIRE OF BERVERLY
Town Water Harvesting Project
Retention Basin #1 - Site Plan

Project No. :	BEV - TWHP	Project Location :	Lot 34 - Beverley
Drawing No. :	BEV - TWHP - 001	Drawing Title :	Retention Basin #1 Site Plan
Drawn :	Rod Munns	Date :	11th November 2014
Revision No. :	1	Scale : 1 : 500 (U.O.N)	Original Sheet Size : A2



Section A - A

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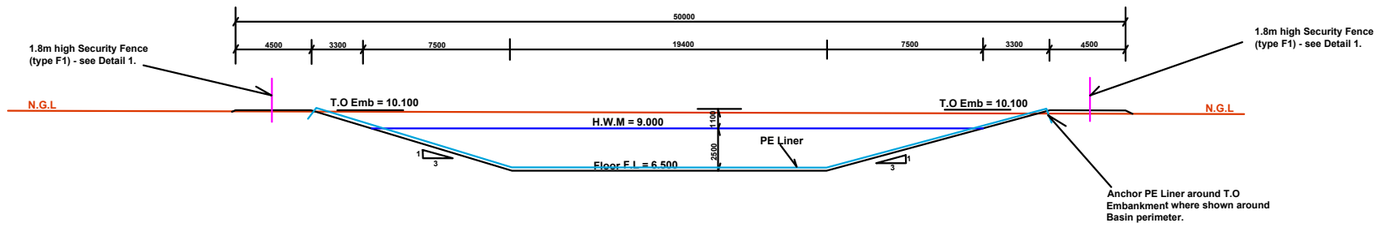

Section B - B

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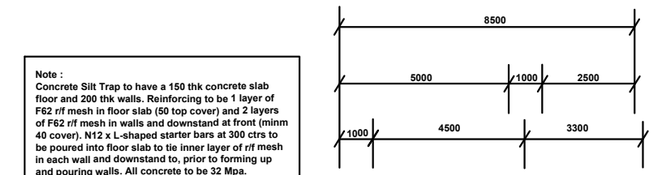
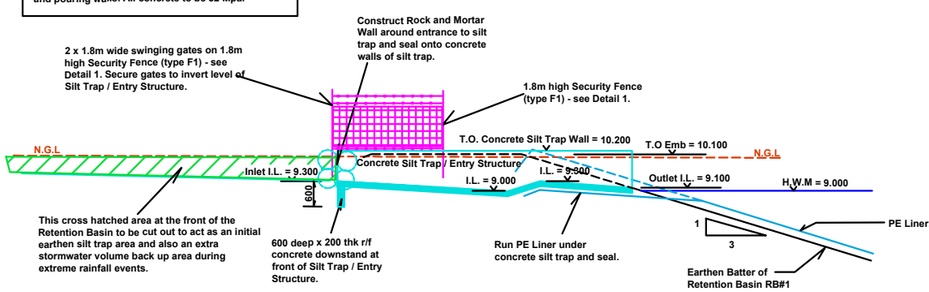


Note :
Concrete Silt Trap to have a 150 thk concrete slab floor and 200 thk walls. Reinforcing to be 1 layer of F62 r/f mesh in floor slab (50 top cover) and 2 layers of F62 r/f mesh in walls and downstand at front (minm 40 cover). N12 x L-shaped starter bars at 300 ctrs to be poured into floor slab to tie inner layer of r/f mesh in each wall and downstand to, prior to forming up and pouring walls. All concrete to be 32 Mpa.



Section C - C

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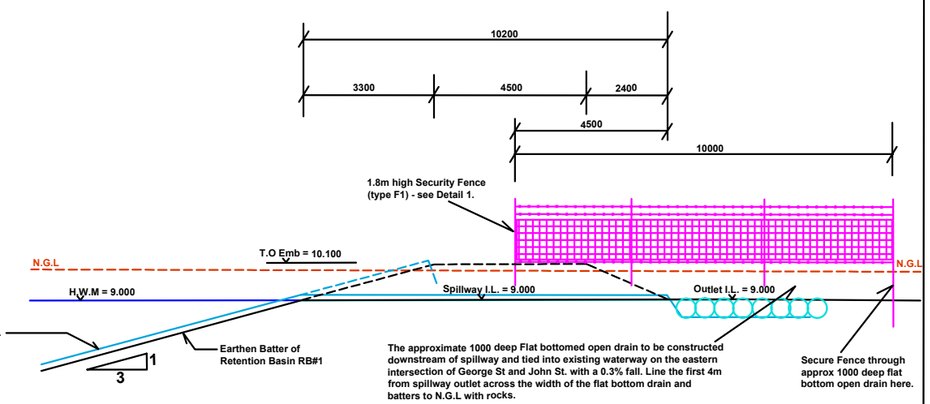


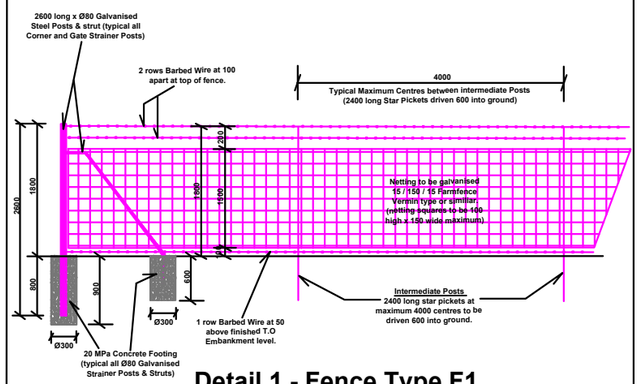
Section D - D

(Scale 1 : 100)

CROSS SECTIONS

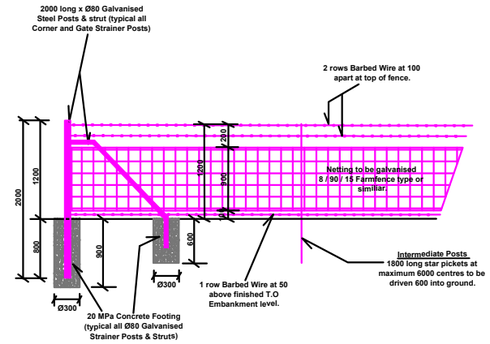
PRELIMINARY

FENCING DETAILS



Detail 1 - Fence Type F1

(Scale 1 : 50)



Detail 1 - Fence Type F1

(Scale 1 : 50)

REQUIRED FENCING MATERIALS

Fence Type F1

13 each x 2600 long x Ø80 Galvanised Strainer Posts and Ø40 Galvanised Struts & fittings.

55 x 2400 long Star Pickets.

241 Lm of 15 / 150 / 15 Farmfence Vermin type Galvanised Netting or Similar.

725 Lm of Barbed Wire.

4 x 1800 high x 1800 wide prefabricated swinging gates, hinges & fittings.

Fence Type F2

4 each x 2000 long x Ø80 Galvanised Strainer Posts and Ø40 Galvanised Struts & fittings.

25 x 1800 long Star Pickets.

152 Lm of 8 / 90 / 15 Farmfence type Galvanised Netting or Similar.

456 Lm of Barbed Wire.

Rev No.	Date Issued	Comment
0	6-11-14	Preliminary
1	11-11-14	PreliminaRY

Approved for Construction
Name :
Signature :
Date :

R Munns Engineering Consulting Services
PO Box 19 BEACON WA 6472
Ph : (08) 9686 1181 Mob : 0407 604 164
Email : rmecs@westnet.com.au

SHIRE OF BERVERLY
Town Water Harvesting Project
Retention Basin #1 - Sections Plan & Fencing Details

Project No. : BEV - TWHP		Project Location : Lot 34 - Beverley	
Drawing No. : BEV - TWHP - 002		Drawing Title : RB#1 - Sections Plan & Fencing Details	
Drawn : Rod Munns		Date : 11th November 2014	
Revision No. : 1	Scale : Various		Original Sheet Size : A2

Volume of Spoil from Void to be removed from RB#2 = 1770 Lcm.

Volume of Spoil from Void to be removed from spillway open drain = 80 Lcm.

Volume of Spoil from Voids to fill existing open drain void = - 500 Lcm.

Total Volume of Spoil to be removed from site = 1,350 Lcm.

Total Volume of Material from void (RB#1 & Front Silt Trap) to be pushed out by Dozer = 1530 m3.

Retention Basin Water Storage Capacity @ H.W.M = 890 m3.

South Western Edge of Avon River Plain

??? St

PE Liner Installation Contractor to weld PE liner over spillway to extent shown (so end can be anchored under rock protection in outlet open drain.

Earthworks Contractor to excavate new open drain from rear of spillway structure whilst constructing the retention basin.

F.O.Emb = 10.000

F.W.M (9.000)

Floor (6.500)

Retention Basin #2

Approx. location of centrifigal pump

Foot Valve on float.

10.005

9.647

9.870

10.000

9.785

7.705

7.970

9.300

9.370

Existing Open Drain void on High School land (highlighted in orange). Earthworks Contractor to backfill with material won from excavating Retention Basin #2 adjacent and track or wheel compact in layers.

Earthworks Contractor to excavate new open drain from existing open drain to new Silt Trap / Entry Structure area whilst constructing the retention basin.

Edward St

Ø75 PN10 HDPE pressure water line from Retention Basin#2 to Retention Basin #1 (570 Lm).

High School Grounds

South Western Edge of Avon River Plain

Undeveloped Road Reserve

N

SITE PLAN

PRELIMINARY

0 5 10 15 20 25

Scale 1 : 500

10.580

Rev No.	Date Issued	Comment
0	4-11-14	Preliminary
0	11-11-14	Preliminary

Approved for Construction

Name :

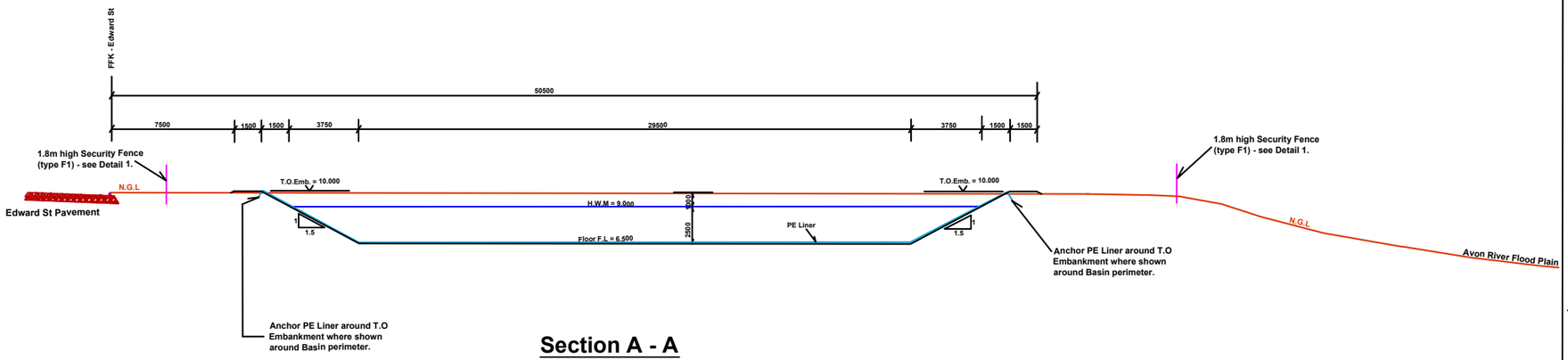
Signature :

Date :

R Munns Engineering
Consulting Services
PO Box 19 BEACON WA 6472
Ph : (08) 9686 1181 Mob : 0407 604 164
Email : rmecs@westnet.com.au

SHIRE OF BERVERLY
Town Water Harvesting Project
Retention Basin #2 - Site Plan

Project No. : BEV - TWHP		Project Location : Lot 34 - Beverley	
Drawing No. : BEV - TWHP - 003		Drawing Title : Retention Basin #2 Site Plan	
Drawn : Rod Munns		Date : 11th November 2014	
Revision No. : 1	Scale : 1 : 500 (U.O.N)		Original Sheet Size : A2



Section A - A

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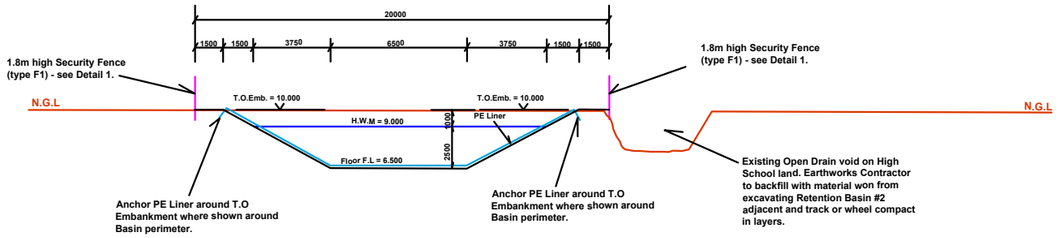

Section B - B

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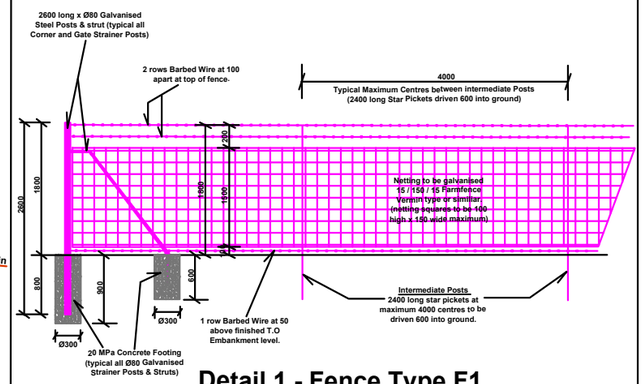
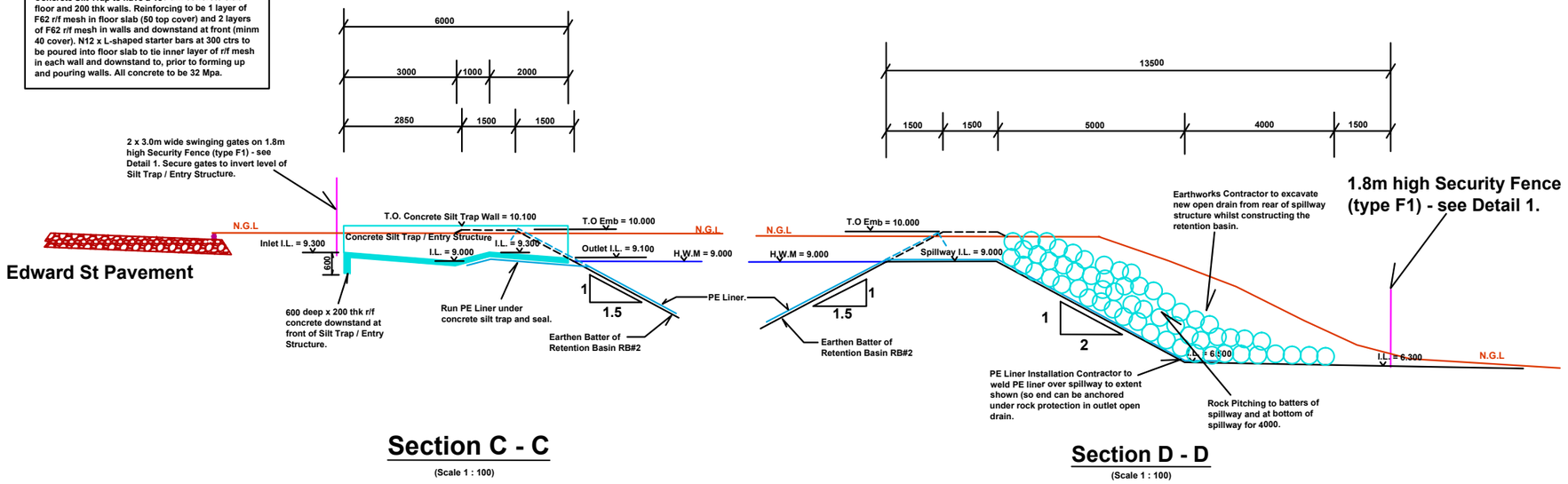
FENCING DETAILS



Detail 1 - Fence Type F1

(Scale 1 : 50)

Note :
Concrete Silt Trap to have a 150 thk concrete slab floor and 200 thk walls. Reinforcing to be 1 layer of F62 r/f mesh in floor slab (50 top cover) and 2 layers of F62 r/f mesh in walls and downstand at front (minm 40 cover). N12 x L-shaped starter bars at 300 ctrs to be poured into floor slab to tie inner layer of r/f mesh in each wall and downstand to, prior to forming up and pouring walls. All concrete to be 32 Mpa.



Section C - C

(Scale 1 : 100)

Section D - D

(Scale 1 : 100)

CROSS SECTIONS

REQUIRED FENCING MATERIALS

Fence Type F1

8 each x 2600 long x Ø80 Galvanised Strainer Posts and Ø40 Galvanised Struts & fittings.

33 x 2400 long Star Pickets.

133 Lm of 15 / 150 / 15 Farmfence Vermin type Galvanised Netting or Similar.

400 Lm of Barbed Wire.

2 x 1800 high x 1800 wide prefabricated swinging gates, hinges & fittings.

2 x 1800 high x 3000 wide prefabricated swinging gates, hinges & fittings.

PRELIMINARY

Rev No.	Date Issued	Comment
0	4-11-14	Preliminary
1	11-11-14	Preliminary

Approved for Construction
Name :
Signature :
Date :

R Munns Engineering Consulting Services
PO Box 19 BEACON WA 6472
Ph : (08) 9686 1181 Mob : 0407 604 164
Email : rmecs@westnet.com.au

SHIRE OF BERVERLY
Town Water Harvesting Project
Retention Basin #1 - Sections Plan & Fencing Details

Project No. : BEV - TWHP		Project Location : Lot 34 - Beverley	
Drawing No. : BEV - TWHP - 004		Drawing Title : RB#2 - Sections Plan & Fencing Details	
Drawn : Rod Munns		Date : 11th November 2014	
Revision No. : 1		Scale : Various	Original Sheet Size : A2

8.0 BUDGET ESTIMATES

8.1 CAPITAL BUDGET RETENTION BASIN #1

(current at 17th November 2014)

Note : All costs below are GST Exclusive.

RETENTION BASIN #1 PART - CAPEX					
Work Type	**Retention Basin #1 & Associated Piping Infrastructure**	**CWSP Funded**	**Shire Cash**	**Shire In Kind**	**Total**
	Item Description	**$**	**$**	**$**	**$**
Pre - Funding Preliminary Costs	Engineering Consulting Costs - define Scope of Works & Project Budget		$1,500		$1,500
	Soil Testing - on RB1 Site on Hockey Oval	$2,000			$2,000
	Other Preliminary Costs - Planning, Power Application Costs, Permits etc		$600		$600
Post - Funding Preliminary Costs	Engineering Consulting Costs - Finalise Design and Onsite Inspection Costs	$4,000			$4,000
	Other Preliminary Costs	$500			$500
Re-locate BMX Track	Re-locate BMX track			$11,939	$11,939
Power Reticulation Costs	Western Power - install new 3 phase power supply near Basin	$0			$0
	Run power from supply to pump, install pump protection switches, auto switch on / off system, commission pumps.		$14,000		$14,000
	Service shed for electrical infrastructure, cement base, install		$700	$672	$1,372
Retention Basin Construction Costs	Remove trees on basin site and for outlet open drain to George St			$5,000	$5,000
	Basin RB1 Construction - 3000 m3 basin on Old Hockey Oval near John St & cut out most of 320 m3 triangular earthen silt trap at front of Basin	$9,000			$9,000
	Remove approx 6,470 Lcm of spoil from void offsite.			$12,000	$12,000
	Supply & Install (Weld Onsite) HDPE Liner - Contractor (30 Year Life)	$24,000			$24,000
	Install Liner - Shire Crew assistance to anchor liner at top of embankment			$3,000	$3,000
	Construct concrete silt trap / entry structure and rockwork - to let abnormal storm event flows into basin.			$8,000	$8,000

	Construct Overflow Structure & Open Drain to existing overflow pathway - including clearing.			$4,000	$4,000
Open Drain Costs - Street > Basin	Construct 18m long x diam. 375 U/G drainage pipe from longitudinal drain pipe pit on east side John St to basin - for normal rainfall events and stormwater flows			$3,000	$3,000
	Shape and Tidy Up triangular earthen silt trap area at front of Basin - for abnormal rainfall events and stormwater flows			$2,500	$2,500
	Construct 180 Lm Open Drain from Complex Outlet Drain to basin inlet.			$3,000	$3,000
Water Pipeline Reticulation Costs	1460 Lm x Diam. 110 PN10 HDPE Water Pipeline costs and fittings @ $ 17/Lm		$24,820		$24,820
	Excavation and installation of 1460 Lm water pipeline buried under mostly open drain invert and run through existing culverts under Railway Line and streets.			$18,000	$18,000
Pumping & Associated Infrastructure Costs	Electric Powered Centrifigal Pump on base - to provide 12 L/sec flow from RB#1 & RB#2 (will empty approx 3000 m3 basin in 4.9 days) to Main Town Dam		$5,500		$5,500
	Suction Pipeline, fittings, foot valve and float system for foot valve		$2,500		$2,500
	Construct concrete base slab for pump.			$200	$200
	Install pump on slab and connect suction pipeline and main pressure Diam. 110 PN10 HDPE reticulation pipeline and assist electrician to commission pump system.			$1,800	$1,800
Security Fencing	308m mesh panel temporary fencing during construction (3 months) including delivery to site and install		$3,700		$3,700
	1.8m high small netting ringlock, 2.4m high star pickets and galv strainer posts - total length = 241 Lm - materials.		$3,000		$3,000
	Install 241Lm x 1.8m high security fence.		$3,000		$3,000
	1.2m high ringlock fence around triangular earthern silt trap area - total length = 152 Lm - materials.		$1,800		$1,800
	Install 152 Lm of 1.2m high ringlock fence around triangular earthen silt trap area.		$1,800		$1,800
	Sub Total Costs	**$39,500**	**$62,920**	**$73,111**	**$175,531**

8.2 CAPITAL BUDGET RETENTION BASIN #2

(current at 17th November 2014)

Note : All costs below are GST Exclusive.

RETENTION BASIN #2 PART - CAPEX					
Work Type	**Retention Basin #2 & Associated Piping Infrastructure**	**CWSP Funded**	**Shire Cash**	**Shire In Kind**	**Total**
	Item Description	**$**	**$**	**$**	**$**
Pre - Funding Preliminary Costs	Engineering Consulting Costs - define Scope of Works & Project Budget	$1,140			$1,140
	Other Preliminary Costs - Planning, Power Application Costs, etc	$430			$430
Post - Funding Preliminary Costs	Engineering Consulting Costs - Finalise Design and Onsite Inspection Costs	$1,500			$1,500
	Other Preliminary Costs	$430			$430
Power Reticulation Costs	Western Power - install new 3 phase power supply near Basin	$25,000			$25,000
	Service shed for electrical infrastructure, cement slab base, install		$700	$672	$1,372
	Run power from new supply to pump, install pump protection switches, auto switch on / off system, commission pumps.		$12,500		$12,500
Retention Basin Construction Costs	Clear approx 3 large trees onsite & remove from site (large one at front is dead).			$4,000	$4,000
	Basin RB2 Construction - 800 m3 basin at end of Edwards St & cut out inlet drain and outlet drain and fill in existing drain to east of basin and wheel / track compact in 300 thick layers.	$8,000			$8,000
	Remove approx 1,350 Lcm of spoil from void offsite (remaining after existing drain is backfilled).			$2,500	$2,500
	Supply & Install (Weld Onsite) HDPE Liner - Contractor (30 Year Life)	$24,000			$24,000
	Install Liner - Shire Crew assistance to anchor liner at top of embankment			$2,000	$2,000
	Construct Concrete Silt Trap / Inlet Structure			$7,000	$7,000
	Shape overflow structure and install rockwork to batters after liner is installed.			$5,000	$5,000
Open Drain Costs - Street > Basin	Construct Sealed Drainage Structure from longitudinal drain pipe on east side of Edwards St to Basin inlet - for normal rainfall events and stormwater flows			$1,500	$1,500
Water Pipeline Reticulation Costs	570 Lm x Diam. 75 PN10 HDPE Water Pipeline costs and fittings @ $12 / Lm		$6,840		$6,840
	Excavation and installation of 570 Lm water pipeline buried between RB1 and RB2 - via Edward and Lennard Sts.			$4,500	$4,500
Pumping & Associated Infrastructure	Electric Powered Centrifigal Pump on base - to provide 5 L/sec flow from RB#2 to RB#1 (will empty approx 900 m3 basin in 2 days)		$4,500		$4,500

Costs	Suction Pipeline, fittings, foot valve and float system for foot valve.		$2,500		$2,500
	Construct concrete base slab for pump.			$200	$200
	Install pump on slab and connect suction pipeline and main pressure Diam. 75 PN10 HDPE reticulation pipeline and assist electrician to commission pump system.			$1,500	$1,500
Security Fencing	192m mesh panel temporary fencing during construction (3 months) including delivery to site and install		$2,200		$2,200
	1.8m high small netting ringlock, 2.4m high star pickets and galv strainer posts - total length = 133 Lm - materials.		$3,000		$3,000
	Install 133Lm x 1.8m high security fence.		$2,000		$2,000
	Sub Total Costs	**$60,500**	**$34,240**	**$28,872**	**$123,612**
	Contingency		**$10,000**		**$10,000**
	Total Project Costs	**$100,000**	**$107,160**	**$101,983**	**$309,143**

Shire Contribution	**$209,143**

9 .0 PROJECT MANAGEMENT

The Shire of Beverley staff will work in conjunction with a consultant engineer during the final project design and implementation of works schedule.

The Community Development Officer will be responsible for any periodic reporting and liaison with community group members.

10.0 LONG TERM MANAGEMENT

Long term management of the system will remain the responsibility of the Shire of Beverley. Maintenance of the infrastructure will become a part of the Shire of Beverley works schedule, with operating budgets including provision for ongoing maintenance. Capital upgrades will be budgeted as required.

10.1 ONGOING OPERATING BUDGET RETENTION BASIN #1

(current at 9th December 2014)

Note : All costs below are GST Exclusive.

Retention Basin #1 & Associated Piping Infrastructure	**Total $**
Item Description	
Annual Pump & Water Piping Infrastructure Depreciation and Replacement Costs ($7000 / 10 Yrs = $700 / Yr)	$700
Annual HDPE Liner Depreciation and Replacement Costs ($24,000 / 30 Yrs = $800 / Yr)	$800
Annual Power Costs to run pump 2 pole 11 kW pump will run for 505 hrs to pump 21800 kL (based on power cost rate of $0.26 / kWhr)	$1,145
Labour Costs to check and maintain retention basin and pumping system $45 x 80 Hrs)	$3,600
Annual average Electrical Contractor Costs (fee)	$500
Sub Total Costs / Annum	**$6,745**

10.2 ONGOING OPERATING BUDGET RETENTION BASIN #2

(current at 9th December 2014)

Note : All costs below are GST Exclusive.

Retention Basin #2 & Associated Piping Infrastructure Item Description	Total $
Annual Pump & Water Piping Infrastructure Depreciation and Replacement Costs ($6000 / 10 Yrs = $600 / Yr)	$600
Annual HDPE Liner Depreciation and Replacement Costs ($24,000 / 30 Yrs = $800 / Yr)	$800
Annual Power Costs to Run Pump - 4 pole 3 kW pump will run for 456 hrs to pump 8220 kL (based on power cost rate of $0.26 / kWhr)	$220
$150 / Yr cost for Power Line Charge (fee)	$150
Labour Costs to check and maintain retention basin and pumping system ($45 x 50 Hrs)	$2,250
Annual average Electrical Contractor Costs (fee)	$300
Sub Total Costs / Annum	**$4,320**
Combined Total Operating Costs / Annum	**$11,065**

An ongoing operating budget of $6,745 (including depreciation) for Basin #1 and $4,320 (including depreciation) for Basin #2 would be required in the Shire of Beverley operating budget per annum (subject to indexation).

This total allocation of $11,065 would be offset by savings in the consumption of scheme water required to supplement Shire activities (and any possible future opportunities derived from an enhanced supply of non-potable water).

11.0 ASSESSMENT

The Beverley Water Harvest Project 2014-15 will result in two retention basins within the town site which will serve to capture storm water before the water is then pumped to the town dam for use in irrigation of the oval and tennis courts. The total estimated project cost is $309,143 with a Shire contribution made up of $107,160 cash and $101,983 in kind and allowing for successful grant funding of $100,000.

The volume of water harvested will account for 70% of the Shire of Beverley water requirements. Combined with the current water infrastructure within the town, including the town dam, the Waterhatch Bore and the soon to be commissioned Waste Water Treatment Plant, this project will enhance the town water supply by providing a more sustainable supply to meet the current and future needs of the Shire of Beverley with opportunities to extend the use of this non potable water to landholders and for emergency services purposes.

12.0 ACKNOWLEDGEMENTS

Community Group

Mr Fred Bremner
Mr Don Davis
Mr Harvey Morrell
Mr Scott Morrell
Mr Jethro Sleer
Mr Dan Wilkinson

Consultant Engineer
Mr Rod Munn, RMECS

Consultant Electrician
Mr Karl Smith, Beverley Electrical Services

Shire of Beverley
Mr Steve Vincent, Works Manager
Mr Stefan De Beer, Planner

13.0 ATTACHMENTS

A Soil Test Report – Mr Fred Bremner
B Email Regarding Soil Testing & Recommendations – Mr Rod Munn
C Letters of Support

Mrs. Kathryn McLean
Community Coordinator
Shire of Beverley
P.O. Box 20
Beverley 6304

Dear Kathryn Re. Beverley Town Street Water Harvesting Project

I have completed the soil Sampling of the project area as directed by Mr. Steve Vincent Beverley Shire Works Supervisor, involving drainage water outlets from both John and Forrest Streets.
Mr. Jethro Sleer project manager was on site to observe the total of 54 samples taken from eleven sites with five samples from each site at 1mt intervals, the total depth at each site being 6mts, with the exception of site no. eight where rock was encountered at 4mts. Each site has been GPS recorded by Mr. Vincent.
The samples are being stored in a shed at the Beverley District High School as arranged by Mr. Sleer and are ready for inspection by Mr. Rod Munns, the project consultant employed by the Beverley Shire Council to prepare plans and engineer the project.

A visual inspection of each sample during the drilling process appears to suggest that soil structures are unsuitable for permanent dam construction, however as the water captured by a transfer dam will immediately be pumped to the existing town dam, there may not be a significant loss of water leakage through the profile, this will be determined by Mr. Munns.

Other options available to the consultant to capture water from both John St. and the Town Oval outlets include, as were discussed on site with Mr. Sleer, the lining of a transfer dam or the construction of an earth tank vertically excavated with a minor degree of wall slope at a site number location as determined by the best quality soil samples.
If either the above options are considered to be not feasible, the appropriate positioning of large tanks, the size of which will be determined by Mr. Munns, will then be the best option capture water from both the above outlets.

With regard to the Edwards Street outlet, no drilling has been done at this stage until further advice is received.
There is an approximate 3mtr excavated drain in existence, which with minor earth works, could be used as a transfer dam to link up with the Forrest and John Streets facility.
If this were the recommended option by Mr. Munns, it would require lining due to the porous nature of the earth profile in the walls of the drain.

I thank you for the opportunity to be involved and offer any further assistance if required.

Yours Faithfully,

Fred Bremner.

Kathryn McLean

From: rmecs@westnet.com.au
Sent: Tuesday, 14 October 2014 9:37 PM
To: Kathryn McLean
Cc: Jethro
Subject: Re: Water Harvest Electricity Update

Kathryn,

I made some clay mould "dams" over the weekend in the plastic bottles using the samples from the 4 closest testholes to the Hockey Oval dam site, and have filled them with water and recorded and photographed results and will make up a photographic and worded report probably this weekend showing the results. At this stage from the 4 samples nearest the dam site, one of the samples (#2 in the middle of the BMX track) is holding perfectly and the clay is not dispersive. The sample from testhole #6 is also holding water well but the clay is slightly dispersive. The 2 x samples from testholes No.s 3 and 5 did hold water for a while but due to the clay being very dispersive, they failed sometime approx 6-8 hrs after I filled them with water. As a comparison, the clay moulds from testholes #s 3 and 6 held water until it evaporated approx 50-60 hrs after I filled them with water. At 77 hrs after initially filling (tonight at 6.30pm) I refilled all of the clay moulds with water and the moulds from testholes 3 and 5 (with very dispersive clay) leaked their water straight through in approx 1 minute. By comparison, the testhole #6 mould despite having dry cracks held all of the water I poured in straight away and is still holding water after 2 hrs and will probably continue to do so. The clay mould from testhole #2 when water was poured in lost approx 10% of its water through a dry crack and then "took up" with the water and stopped leaking through and this is still holding water and will probably continue to do so.

So I guess what I am saying is that two of the samples are OK for holding water and not being too dispersive, and two are not. I can also say that the dry fine clay is dispersive and will be no good so we would have to remove this during dam construction. The only good clay that we can use that will seal and is not dispersive is the clay that has some groundwater moisture in it. I guess what will determine whether we need to line this dam, is the quantity of this good moist clay we can find when the dozer starts digging it out. Having said that, at this stage I would say there is a > 50% probability that we will probably line this dam to preserve it into the future, mainly due to the rush of water into it, which could damage the clay lining if it contains some dispersive clay. I believe we should try and get it to seal without a liner initially and see how it goes after a few reasonable rainfall events and then decide if it needs lining or not. As Fred stated, I believe we should be budgeting to line this dam, just in case and in all likelihood it will require lining for future preservation. (note if all of the clay onsite was like the clay removed from testhole #2, then we would probably not need to line the dam) Also, the problem we have with the water inflow is that we may not be able restrict it (the incoming water flow) - to drop sediment out and also slow it down to prevent damage to the batters - as we will need to collect as much of surface water runoff each time and get it into the dam as quickly as possible. I'm still thinking about how if at all we could do this, but without a large area out in front of the dam to catch and slow the water down before it enters the dam, it is highly unlikely we will be able to slow it down. So we will have to construct either a concrete spillway or a reasonably well constructed rock gabion basket spillway with geofabric layer under it. Maybe if we can also seal the drain coming across to the dam entry from John St (including the water from the underground longitudinal pipe running under the eastern kerb), then this would reduce the amount of silt that could run into the dam (would only be from the drain from off the sports oval area, but this water would be running across slowly anyway). I did have a good discussion onsite with Steve Vincent about these issues and will continue to discuss these with him.

I have been flat out over the last few days but am hoping I will get a bit of time tomorrow avo to contact Karl and also Tyco pumps about the pumping requirements and subsequent power requirements.

I did complete the level surveys of both sites and have sufficient info to determine design levels of the 2 dams / retention basins. I believe we should be able to construct an approx 700-800 m3 retention basin within the 20m road reserve at the bottom of Edwards St (and would be approx 30-35 m long by about 3m deep with 3:1 batters, but we would need to line this to stop the batters from subsiding from the force of the incoming flow, and also allow it to seal. We will also need to construct an overflow weir at the river end, so it can overflow if reqd. I believe we should not worry about power for this site and budget for a diesel powered pump with auto float start.

I have sufficient info to update the plan and will do so tomorrow if possible and get away to Tyco Pumps so they can size pumps and pipe and power requirements.

Regards

Rod Munns

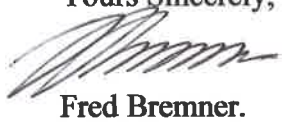
130 Forrest Street
Beverley 6304
21/10/2014

Mr. Steve Gollan
C.E.O.
Shire of Beverley
P.O. Box 20
Beverley 6304

Dear Steve,

As a past member of the Rural Water Advisory Committee, advisory body to the Minister for Water with 10 years experience with community water supply projects in Shires throughout the agricultural areas of the State, I give my full support to the proposed grant application to the Department of Water, by the Shire of Beverley's Community Development Officer Mrs. Kathryn McLean, to harvest water from the Town streets of Beverley for the purposes of providing emergency supplies and additional sources for the watering of Council parks, gardens and the town oval.

Yours Sincerely,



Fred Bremner.
FR and BF Bremner Rural Water Services
Zone 3 member 1998 to 2008 of the Rural Water Advisory Committee
Department of Water registered assessor for the
Farm and Pastoral Water Grant Scheme 1995 to 2008

23rd October 2014

To whom it may concern,

This group of 6 interested people have a common view of the street runoff water that is currently going into the river and could be conserved for use in the community. Currently the community through the Shire Council pays a considerable amount for water used on our gardens, Street trees, road building and fire emergencies.

This group of people known as the Beverley Water Harvesting committee of which I am a member have assessed the amount of water that could be Harvested and held for the above purposes and have gained the support of the Beverley Shire Council and the community. Many people have asked why we have not done this before, and have offered their ideas for conserving water for consideration.

This is a confirmation to us that we are organising this project with support of the Beverley Shire Council through their Community Development Officer and also the community.

Our aim is to have a staged plan designed for conserving the water from all practical catchment areas in the townsite and store it for the benefit of the community.

Yours sincerely,

Harvey Morrell