

# TOWN WATER MANAGEMENT PROJECTS

Stormwater Management and use is an important part of the total water cycle management of the town. With the probability of declining rainfall and increased evaporation due to climate change it is prudent to maximise capture and minimise evaporation from current storages.

*January 2013*

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## Townsite Storm Water Management Projects

### Introduction

The Shire of Townsite is cognisant that water sustainability is a key driver to the continuing development of the district. To assist in the drought proofing of the town site and to use as much stormwater as possible the Shire has decided to implement the following projects from the Water Management Plan – A Vision for the Future 2011 – 2012. The project will enable more water to be harvested and transferred between storages within the town site and immediate surrounds to be used to minimise the draw on the Goldfields and Agricultural Water Supply (GAWS) to reticulate public gardens and sports areas. The installation of rainwater tanks on Shire buildings will further minimise the use of GAWS water by supplying toilets and hand basin. By harvesting and using the collected water the Shire can use the saved money to minimise rate increases to residents and bring forward other infrastructure projects.



Fig 1. Town Catchment – Project Location Overview

### 1.2. Railway Dam

**Objective:** To ensure adequate water is available in the event of fire and/or failure of the reticulated water supply the minimisation of the railway dam water from evaporation and water bird fowl contamination is necessary. The Railway Dam is centrally located within the town with easy access to vehicles on the Eastern side.

**Rationale:** The dam has an approximate total storage capacity of 19.91ML.



It is estimate that 44% (8.71ML) of the water is lost to evaporation each year.

The dam is used to top up the Oval Dam when required.

The dam is used for Emergency Services (Fire) vehicles to refill in the event of fire.

The water loss through evaporation equated to about \$24,000/year (assumption \$2.60/Kl)

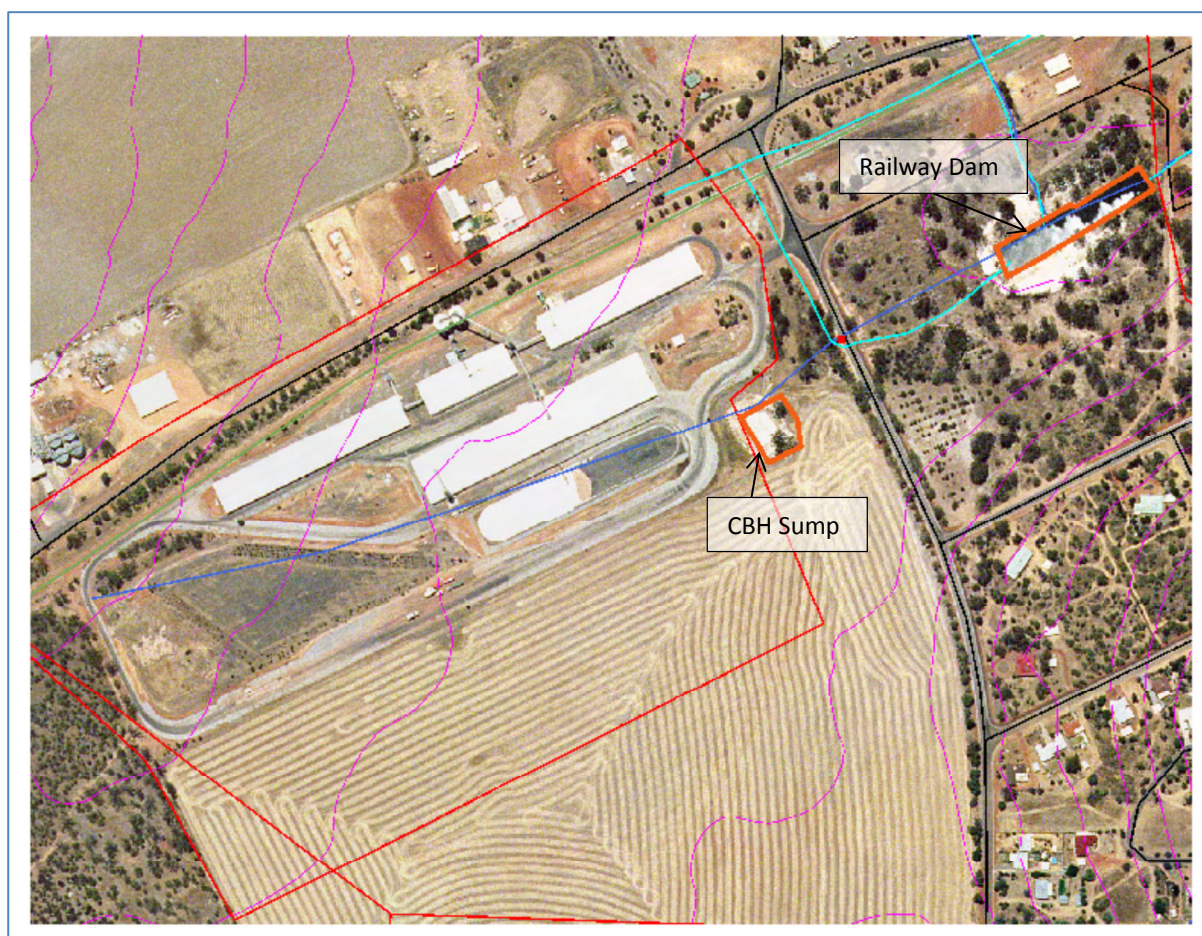


Fig 2. CBH catchment with sump and Railway Dam - Aerial Photo (2005)

### 1.2.1. Monitor water levels and usage to determine future work requirements

**Project:** Engage persons to monitor water levels at the railway dam as part of the monitoring of all storages in town. Record water use from storage and determine annual water storage, use, evaporation and leakage

#### Milestones

Project/Activity	Milestone	Date
Monitor Storages	Engage monitor	June 2013
	Fit Monitoring loggers	July 2013
	Monitoring	Ongoing

#### Budget

Activity	Labour	Materials	Contingency	Total
Monitor	1000		100	1100
Loggers		500	50	550
<b>Total</b>				<b>\$1600</b>

### 1.2.2. Use the Railway Dam as an emergency water source due to its location (centre of town)

**Objective:** Emergency services vehicles require a supply of water for fire fighting. The vehicles refill from this dam in the event of fire. At present vehicles need to set up suction hoses at the dam to transfer water to each vehicle, this takes man power and time. A mobile pump is required to transfer water between storages within the town (see project 1.4.2)

### 1.2.3. Construct a mobile pump platform to enable rapid filling of fire fighting vehicles

**Project:** It is proposed to construct a mobile pumping station that can be placed in situ in the event of need that will increase the safety of personnel and the efficiency of refilling vehicles



Fig 3. Example of Trailer Pump suitable for water transfer with tank fill capability.

**Rationale:** A trailer mounted pump that can be utilised to transfer water to emergency services vehicles will increase the safety and efficiency of the refilling process in the event of fire.

The pump will be a 3 - 4" petrol driven transfer high volume pump with 'camlock' or BIC fittings to ensure compatibility with emergency services vehicles.

The trailer unit will have equipment fitted that enables the transfer of water from the dam to the vehicle. This equipment will include;

- Priming mechanism/suction pump
- Suction hose with foot valve assembly
- Transfer hoses
- Fire extinguisher
- Spare fuel
- PPE

#### Milestones

Project/Activity	Milestone	Date
<b>Mobile pump trailer</b>	Engineering design parameters	Oct 2013
	Contract construction	Nov 2013
	Delivery of unit	Mar 2014
	Monitoring	Ongoing

#### Budget

Activity	Labour	Materials	Contingency	Total
<b>Engineering</b>	5000		500	5500

<b>design</b>				
<b>Trailer/Pump</b>		5000	500	5500
<b>Totals</b>				<b>\$11000</b>

#### 1.2.4. Consider roofing dam in future to minimise evaporation and water fowl contamination

**Objective:** The loss of water by evaporation from storage dams is of major concern water sustainability for the town. With the probability of declining rainfall and increased evaporation due to climate change it is prudent to minimise evaporation from current water storages by various means.

**Project:** It is proposed to construct galvanised steel sheet roof over the dam to achieve this. The steel roof should have a 30 year replacement life.

**Rationale:** Evaporation from this dam per year equates to 8.71ML or 44% of its capacity. A possible total water saving of 261.3ML (\$720,000) over the 30 year life of the roof. This would give a life time cost saving of \$240,000

##### Milestones:

<b>Roofing dam</b>	Engineering design and geotechnical parameters	Oct 2013
	Contract construction	Nov 2013
	Construction completed	Aug 2014
	Monitoring	Ongoing

##### Budget:

<b>Activity</b>	<b>Labour</b>	<b>Materials</b>	<b>Contingency</b>	<b>Total</b>
<b>Engineering design</b>	5000		500	5500
<b>Roof Structure</b>	50000	302860	35286	388146
<b>Guttering</b>		3000	300	3300
<b>Pipe</b>	500	500	50	550
<b>Ground works</b>	3000		300	3300
<b>Totals</b>				<b>\$401896</b>



### 1.3. School Dam Catchment

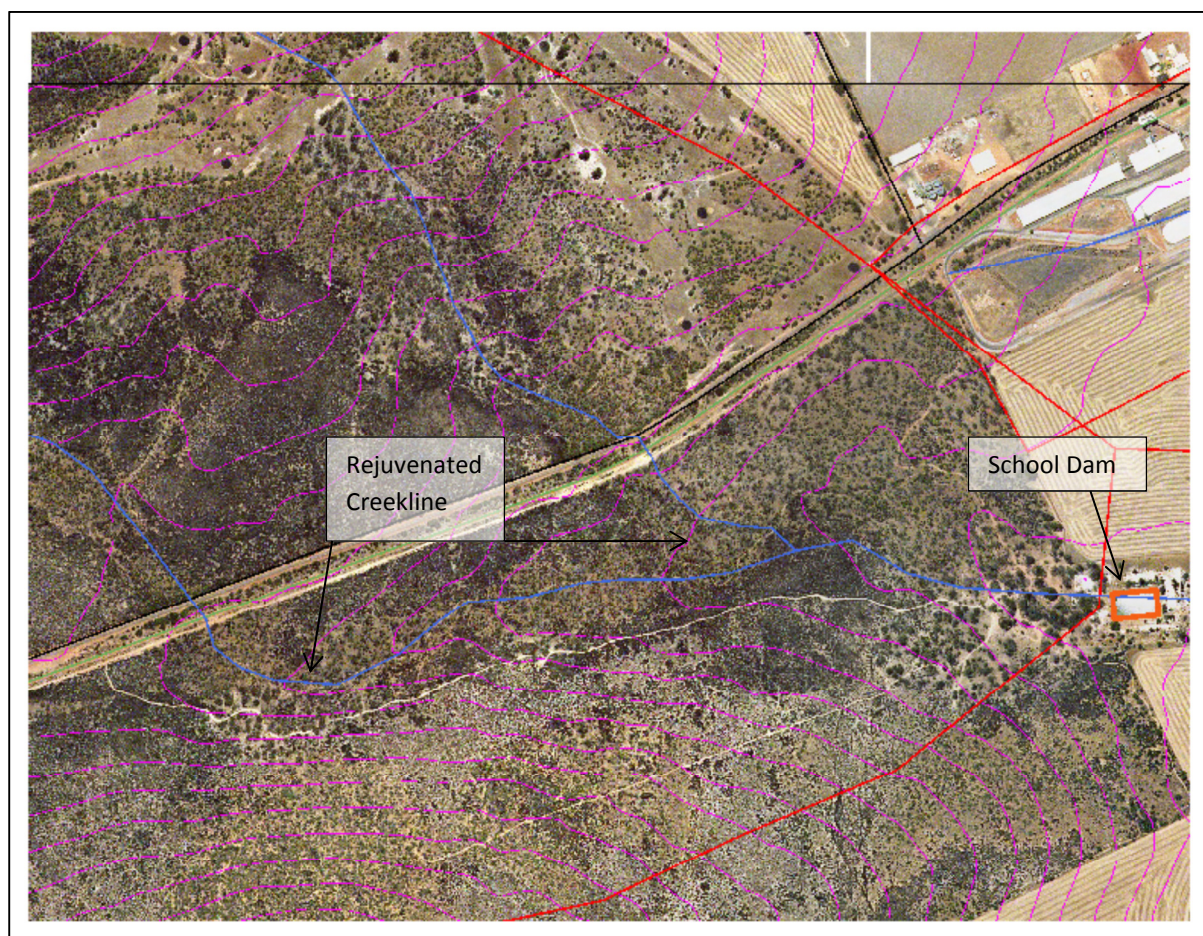


Fig 4. School Dam Catchment

#### 1.3.1. Maximise storm water runoff from the Reserve by improving/renovating the drainage channels and culverts to the School Dam

**Objective:** To improve the visual and practical amenity of the District High School oval and gardens an improvement to the water supply from the school dam is required.

**Rationale:** The school dam is fed from the surface drainage line within the Nature Reserve. This drainage line is well defined in the Northern section of the reserve but flattens out and becomes less defined in the lower reaches nearer the dam. This enables ponding of water, waterlogging and an increase in the chance of salinity in the reserve.

**Project:** It is proposed to redefine the creek line using a small earth mover. The channel will have 5:1 batters and a depth of 0.5m. The batters will be revegetated with native understory vegetation. All larger vegetation will be retained along the length of the works. The spoil removed during the construction will be stockpiled for use to remediate other areas within the reserve. Minor headwall and spill way works will be completed at the dam inlet.

#### Milestones

Project/Activity	Milestone	Date
Creek renovation	Hydrologic design	Oct 2013
	Contract construction	Nov 2013

	Contract culverts	Nov 2013
	Earth works completed	Mar 2014
<b>Revegetation</b>	Vegetation survey/identification	Sept 2013
	Order tube stock	Nov 2013
	Plantings complete	Sept 2014
<b>Dam Headworks</b>	Engineering design	Nov 2013
	Contract construction	Feb 2013
	Construction completed	Aug 2014
	Monitoring	Ongoing

#### Budget

Activity	Labour	Materials	Contingency	Total
Hydrologic design	4500		450	4950
Earthworks	10000		1000	11000
Revegetation	2200	2000	420	4620
Culverts	2000	4000	600	6600
Headwall	2000	4000	600	6600
Approvals	6300		630	6930
<b>Totals</b>				<b>\$41250</b>

#### 1.4. CBH catchment

Refer **Fig 1**, Projects 1.3 and 1.4.

**Objective:** Maximise the quantity and quality of stormwater runoff from the CBH site to be stored in two dams for use. See projects 1.4.2 and 1.4.3

**Rationale:** The CBH site in to the Western side of town has a large area of paved catchment. This delivers substantial runoff during rainfall events.

##### 1.4.1. Work with CBH to maximise the yield and quality of runoff water from their detention sump

**Project:** Engage CBH in negotiations to improve the quantity and quality or stormwater runoff and partner in remediation.

#### Milestones

Project/Activity	Milestone	Date
<b>MOU</b>	Develop MOU with CBH	Oct 2013
	Hydrologic design	Nov 2013
<b>Earthworks</b>	Contract earthworks	Jan 2014
	Earth works completed	Mar 2014
	Monitoring	Ongoing

#### Budget

Activity	Labour	Materials	Contingency	Total
MOU	1000		100	1100
Hydrologic design	5000		500	5500
Earthworks	5000	2000	700	7700
<b>Totals</b>				<b>\$14300</b>



#### 1.4.2. Transfer water from the CBH sump to the School Dam (via pump and pipe) when required

**Objective:** To maintain water levels in storages to the West of town and maximise harvesting is necessary to transfer water between storages. To maximise the use of infrastructure a multipurpose trailer mounted pump (project 1.2.3) will be used to connect to fixed pipe between storages

**Project:** Construct a water transfer pipe between two dams at the Western side of town

**Milestones:**

Project/Activity	Milestone	Date
Transfer Pipe	Engineering design	Oct 2013
	Contract construction	Nov 2013
	Contract pipe hardware supply	Nov 2013
	Earth and hardware installation works completed	Jan 2014
	Monitoring	Ongoing

**Budget:**

Activity	Labour	Materials	Contingency	Total
Engineering design	1000		100	1100
Pipe hardware		16500	1650	18150
Earthworks	1000		100	1100
Totals				\$19250

#### 1.4.3. Install mobile pumping unit to effectively transfer water between the School Dam and the CBH sump

See project 1.2.3

## 1.5. Sports Oval Dam

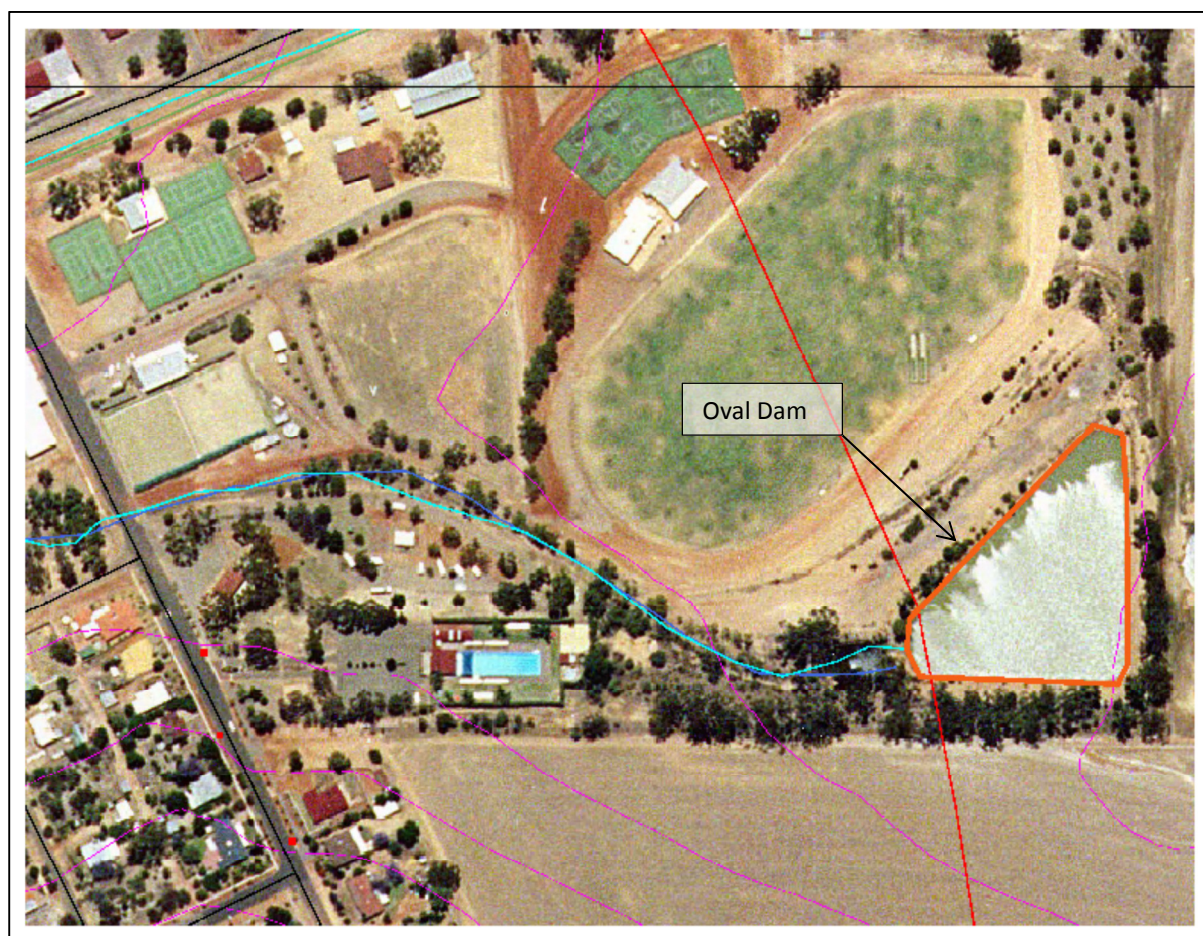


Fig 5. Town Oval Dam

### 1.5.3. Roof the Oval Dam to minimise evaporation and water fowl contamination

**Objective:** To improve the visual and practical amenity of Greater Sports Ground oval and gardens an improvement to the water supply from the oval dam is required. To maximise water efficiency of the dam it has been identified that evaporation causes the greatest loss.

**Rationale:** The dam has an approximate total storage capacity of 47.45ML. It is estimate that 44% (20.91ML) of the water is lost to evaporation each year. The loss of water by evaporation from storage dams is of major concern water sustainability for the town. With the probability of declining rainfall and increased evaporation due to climate change it is prudent to minimise evaporation from current water storages by various means. The steel roof should have a 30 year replacement life and deliver a water saving of 627.3ML (\$1,630,980) over the life of the roof. This would give a life time cost saving of \$1,176,680

**Project:** It is proposed to construct galvanised corrugated steel sheet roof over the dam to minimise evaporation.

#### Milestones:

Project/Activity	Milestone	Date
Creek renovation	Hydrologic design	Oct 2013
	Contract construction	Nov 2013

	Earth works completed	Mar 2014
<b>Revegetation</b>	Vegetation survey/identification	Sept 2013
	Order tube stock	Nov 2013
	Plantings complete	Sept 2014
<b>Dam headwall/spillway</b>	Engineering design	Nov 2013
	Contract construction	Feb 2013
	Construction completed	Aug 2014
	Monitoring	Ongoing

**Budget:**

Activity	Labour	Materials	Contingency	Total
Engineering design	5000		500	5500
Roof Structure	50000	350000	40000	440000
Earthworks	8000	4000	1200	13200
<b>Totals</b>				<b>\$458700</b>

**1.10. Shire Buildings**

**Objective:** Minimise the amount of water from the GAWS used in Shire buildings and associated gardens.

**Project:** Install rain water tanks to harvest water from the roof catchments on all Shire owned buildings. The tanks will be plumbed for approved uses and/or direct runoff to other storages.

**Rationale and Budget:**

Project	Roof area	Harvest volume at 320mm/yr	Tank size	Usage	Estimated Cost
1.10.1 Shire Office	570	182,400	61,000	130,000	17,336
1.10.2 CRC	1200	384,000	128,000	343,200	44,286
1.10.3 Bowling Club	342	109,440	37,000	135,200	11,528
1.10.4 Community Building	443	141,760	48,000	81,900	15,361
1.10.5 Town Hall	590	188,800	63,000	128,700	17,336
1.10.6 Recycling Centre	540	172,800	58,000	11,700	17,336



## Monitoring and Evaluation

Projects will be monitored in the short, medium and long term according to the Townsite Works & Maintenance Schedule to determine effectiveness of the project in meeting the designed outcomes and evaluated to enable improvement in subsequent plan versions.

Storages will be monitored (project 1.1) in the short, medium and long term to determine effectiveness and evaluated to enable improvement in subsequent plan versions and ensure maintenance schedules are appropriate.

## Document Review

Version	Review Date	Completion
Townsite V1.0	July 2013	

## References

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Stormwater Management Manual for Western Australia February 2004

Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2)  
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