

Happy Valley outfall channel

Community Working Group
Meeting 2

Monday, 13 January 2014

Agenda

- Welcome
- Project Update
- Locations for remediation/staging
- Flood mitigation
- Remediation principles/applications
- Security
- Next steps
- Close

2. Update & Timeline

What have we been doing?

2. Update/ timeline

- **12 November 2012**
 - Community Information session held to discuss the Happy Valley Channel system, existing community use, upgrade objectives, nominations for reference group.
- **4 December 2012**
 - Community Working Group Meeting 1 to discuss terms of reference, process, independent hydrology assessments, community design brief

- **5th February 2013**

SA Water engaged SKM to undertake:

“an assessment of the Happy Valley Dam Outfall Channel in its current condition. The assessment must investigate the entire flood hydrology of the dam and examine scenarios of the channel with different levels of flow restriction (blockages from trees). SKM are also required to undertake a concept design to stabilise the embankment undermining and limit further erosion. This concept design needs to consider cost in addition to amenity.”

- Hydrological model
- Identified catch drain capacity
- Community site walk April 2013
- Hydraulic modelling of extreme flood conditions
- Geotechnical review
- Field survey commissioned (approx 4.2km length of the catch drain)
 - Survey of catch drain
 - Photogrammetric field survey of dam crest, reservoir gauge boards, spillway area and culvert structures
 - Field survey of outlet channel easement (tress)
 - Three dimensional laser scan of outlet channel

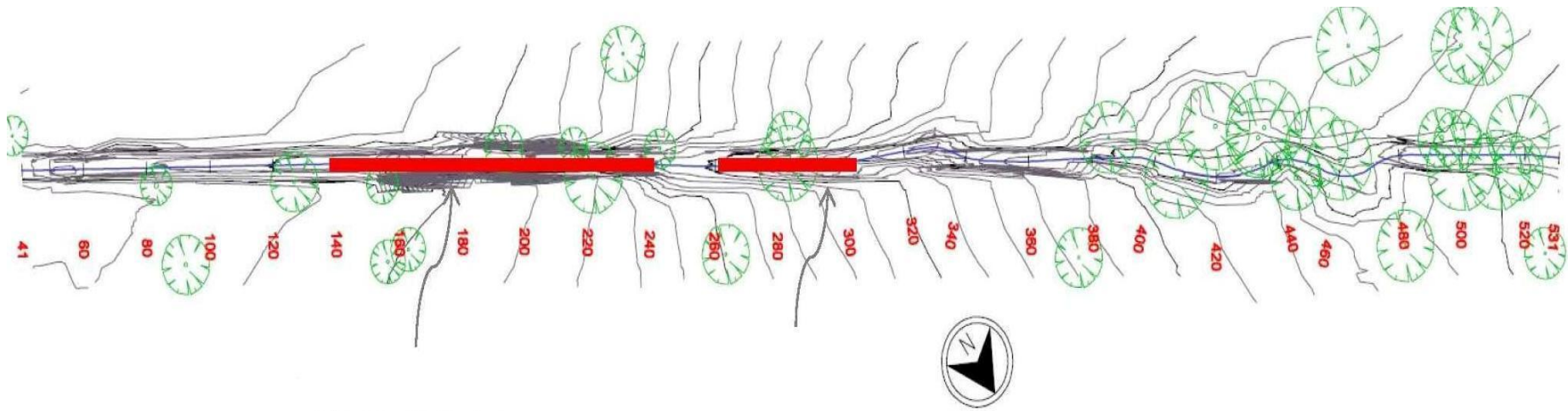
- **May 2013**
Website live
- **June 5 2013**
SKM delivered Report 1, SA Water requested further consideration of remedial options
- **17 July 2013**
SKM delivered Report 2

3. Locations

3. Locations

- Identifying areas for remedial work
- Staged approach to upgrade works
- Identifying priority areas

Identified priority location area 1 (location of temporary fencing)



ENLARGEMENT 11

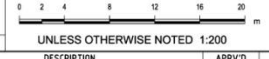
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SEE CONTINUATION SHEET 10

SEE CONTINUATION SHEET 13

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 N: 815487 424
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 GRID INTERVAL: 100m
 AERIAL PHOTOGRAPHY BY: AIRCOMETRIX - FLOWN FEB 2011
 NTL - DEMONSTRATES TOP OF WALL LEVEL



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 10/100 Kinnear Street
 PERTH WA 6001
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REV	DATE	DRN	DESCRIPTION	APRVD
2	19/04/2013	AJW	TEXT NOTES ADDED FOR OUTLET DIA/VERT SIZES & INVERTS (SMT 3 of 12)	
1	13/03/2013	AJW	PRELIMINARY ISSUE ONLY	

REVISIONS

CONTRACTOR/COMPANY NAME: _____
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 DATE: 13/01/2014

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**CROSS SECTION 1
 (SEE SHEET 12)**

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CHANNEL UPGRADE WORKS
 HAPPY VALLEY DAM
 TOPOGRAPHIC SURVEY

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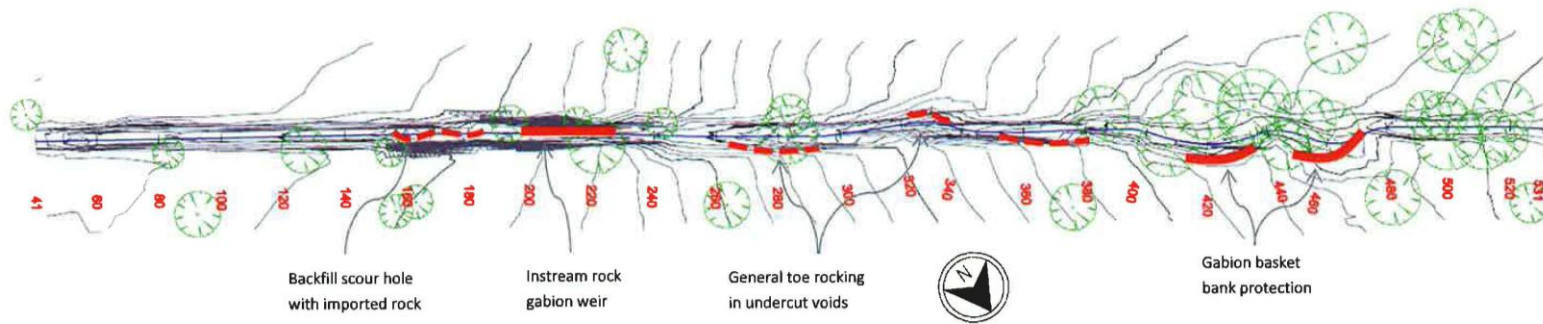
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11 OF 12	12/01463

DRAWING NUMBER: 2013 - 22005 - 11

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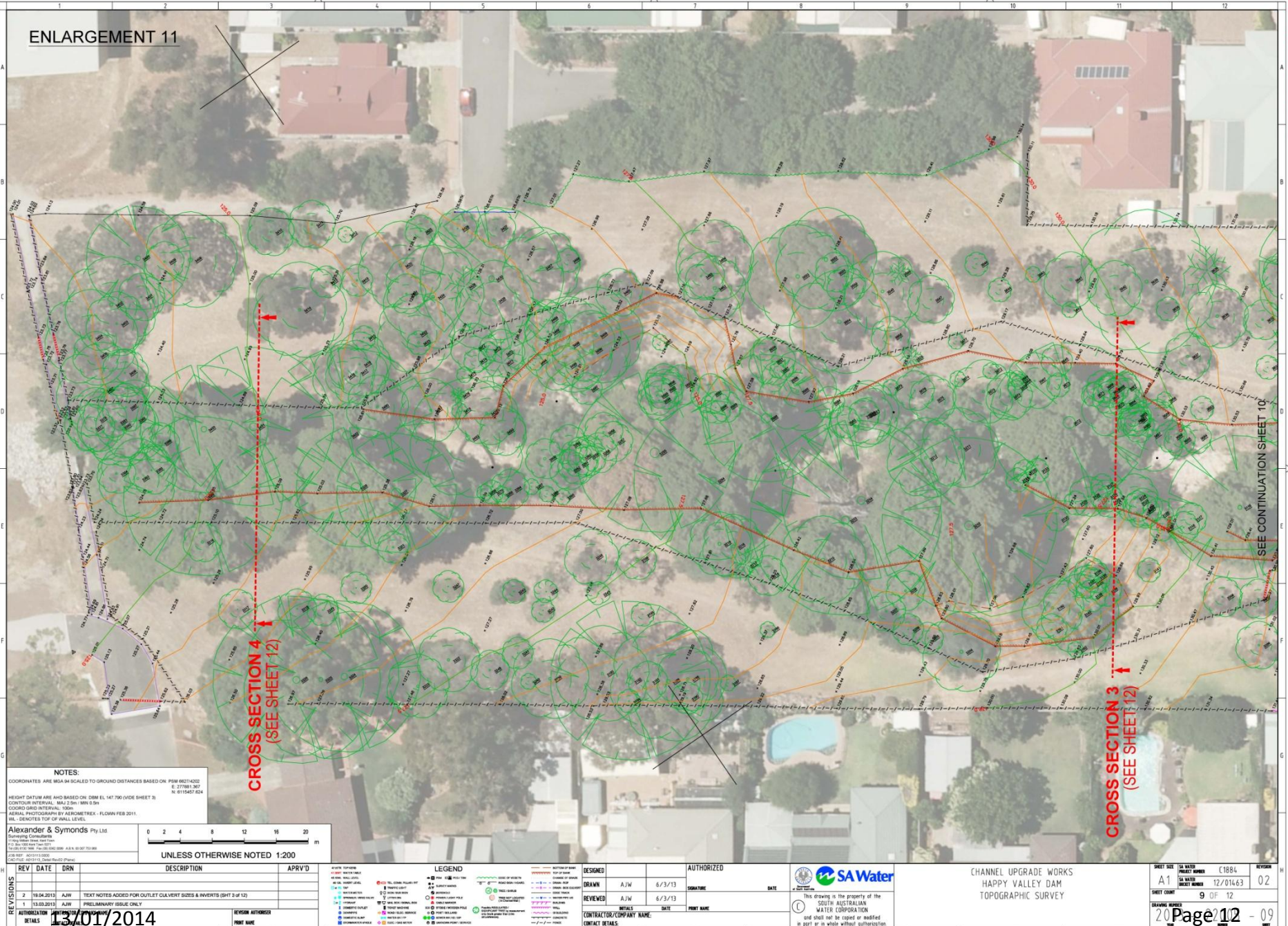
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Identified priority location area 2 (Near council wetlands)



*Note: only significant trees are shown for clarity

ENLARGEMENT 11



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 N: 8114847 424
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 COORD GRID INTERVAL: 500m
 AERIAL PHOTOGRAPHY BY AEROMETREX - FLOWN FEB 2011
 M.L. DENOTES TOP OF WALL LEVEL

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REV	DATE	DRN	DESCRIPTION	APR'VD
2	18/04/2015	AJW	TEXT NOTES ADDED FOR OUTLET CULVERT SIZES & INVERTS (SHT 3 OF 12)	
1	15/03/2015	AJW	PRELIMINARY ISSUE ONLY	

REVISIONS

15/01/2014

LEGEND

Symbol	Description
Green circle	Vegetation
Orange line	Proposed path
Red dashed line	Cross section line

DESIGNED

DESIGNED	AJW	6/3/13
REVIEWED	AJW	6/3/13

AUTHORIZED

SIGNATURE	DATE

SA Water

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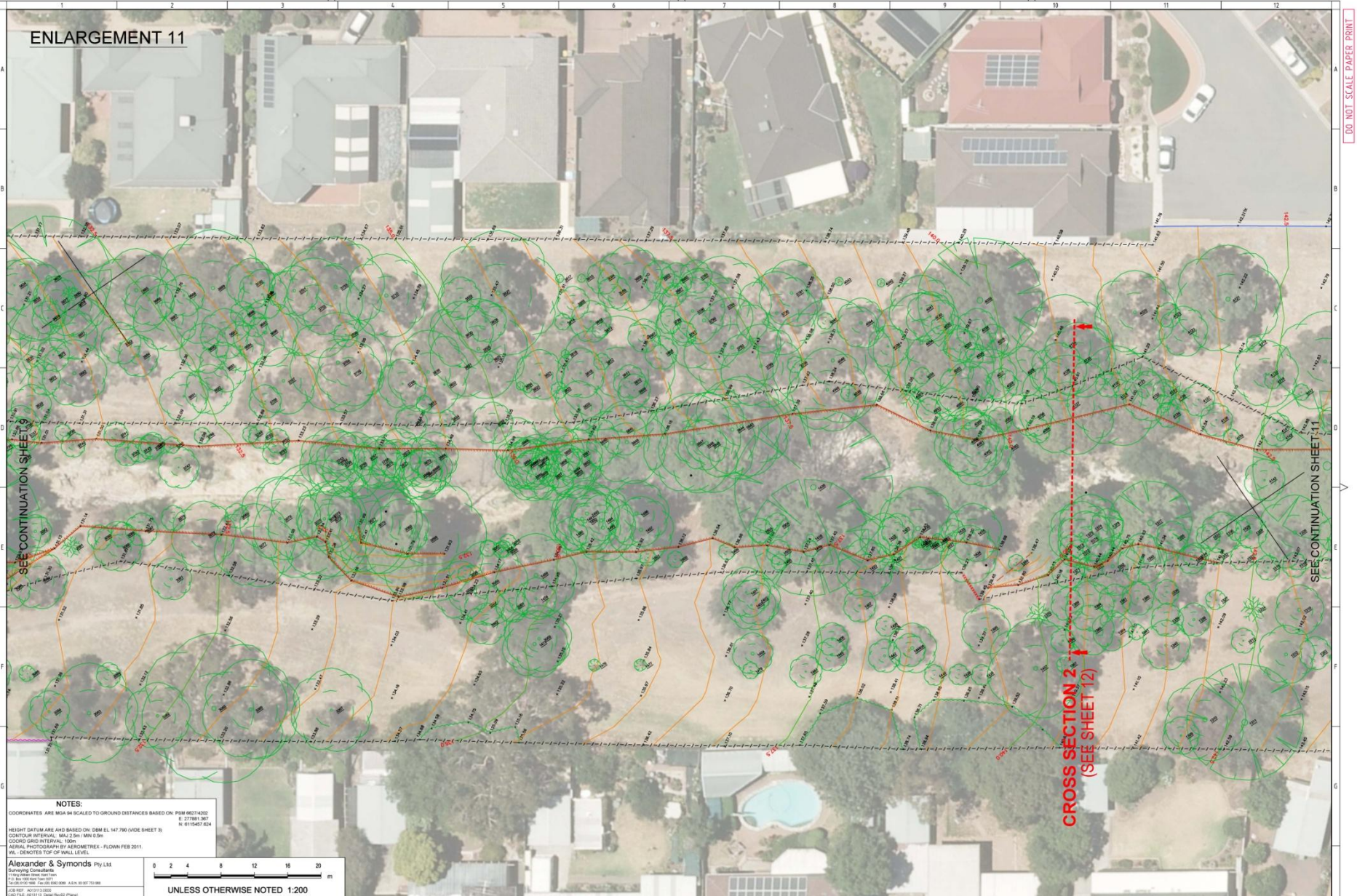
**CHANNEL UPGRADE WORKS
 HAPPY VALLEY DAM
 TOPOGRAPHIC SURVEY**

SHEET SIZE	A1	SA WATER PROJECT NUMBER	C1884	REVISION	02
SHEET COUNT	9	OF	12		
DRAWING NUMBER	20				

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ENLARGEMENT 11



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 N: 6115457.624
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 COORD GRID INTERVAL: 100.0
 AERIAL PHOTOGRAPH BY AEROMETREX - FLUSH FEB 2011
 WL - DENOTES TOP OF WALL LEVEL

Alexander & Symonds Pty Ltd
 Surveying Consultants
 17 The Esplanade, South Fremantle
 WA 6155
 Tel: 08 9447 2100 Fax: 08 9447 2101
 GCS: WGS 1984
 UTM: 50 S
 UTM ZONE: 50 S
 UTM EASTING: 277681.367
 UTM NORTHING: 6115457.624

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SA Water

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CHANNEL UPGRADE WORKS
 HAPPY VALLEY DAM
 TOPOGRAPHIC SURVEY

SHEET SIZE	SA WATER	C1884	REVISION
A1	PROJECT NUMBER	12/01463	02
	SA WATER		
	PROJECT NUMBER		
		10	OF 12
DRAWING NUMBER			
2013 - 22005 - 10			

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Page 14

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5. Flood mitigation

SKM - Flood Mitigation Assessment

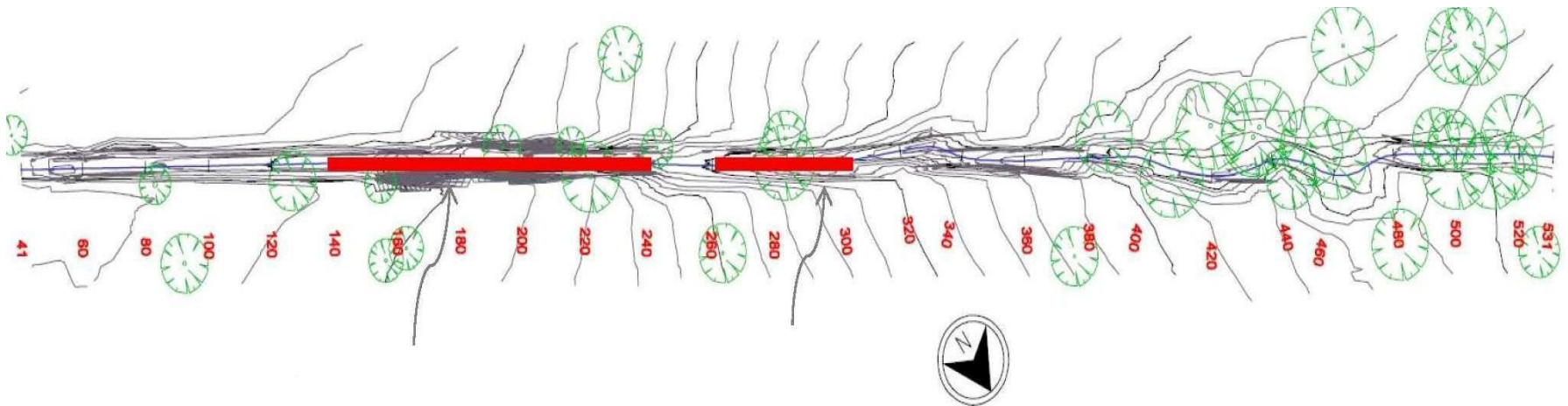
- SA Water commissioned SKM to undertake a study in order to:
 - Understand the existing flood capacity of the reservoir and outfall channel;
 - Assess the likely impacts on the flood capacity of the dam and outlet channel if the channel were to be blocked by debris, such as might result from undermining of the outlet channel banks and collapse of one or more trees into the channel;
 - Assess the increase flood risk to the adjacent residential area from blockage of the channel;
 - Assess the increase in likelihood of dam overtopping as a result of blockage of the channel;
 - Prepare a concept design and cost estimate for upgrade and stabilisation of the outlet channel.

SKM – Flood Mitigation Assessment

- Some sections of the outlet channel erosion has caused significant undercutting of the banks.
- This, combined with the presence of large trees on the channel banks and in the channel itself, has led to concern over the risk of a major blockage occurring in the channel.
- It is considered most likely that such a blockage would form immediately downstream of locations where there is significant erosion and/or large trees with unstable root systems adjacent to the channel

SKM – Flood Mitigation

- In order to understand the consequences of channel blockage, a sensitivity analysis was conducted on three blockage scenarios.
- These blockages were assumed to form at three locations identified as vulnerable due to the presence of large trees, significant undercutting or relatively low channel banks.
- The three locations were chainage 185, 300 and 480



SKM – Flood Mitigation

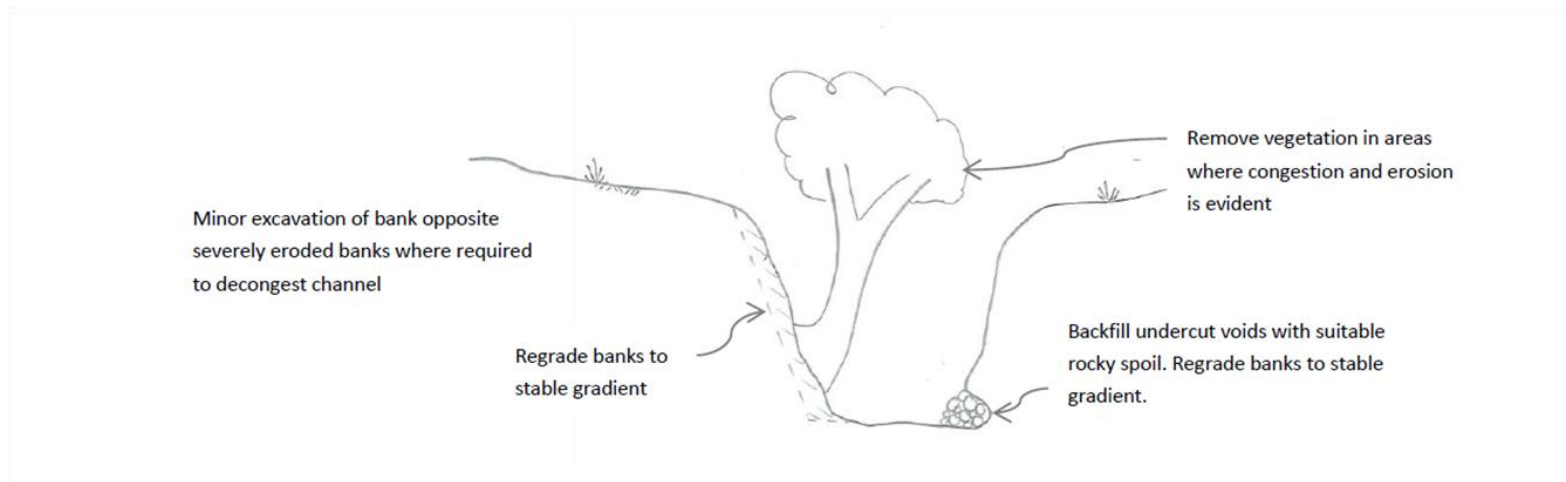
- The blockages were modelled by including a weir structure in the model at these locations, with three different weir heights at 25%, 50% and 75% of the channel blocked by depth
- Model was run for 1 in 100, 1 in 1,000 and 1 in 10,000
- The model results demonstrate that the location most vulnerable to flooding as a consequence of blockage is near the downstream end of the channel
- A greater than 50% blockage in the downstream end during a 1 in 100 flood event could result in some overtopping (Tandana Court)
- Further upstream, would require a combination of a greater than 1 in 1,000 event and a 50% blockage in order for overtopping to occur (the probability of such an event is at least as rare as the flood causing it)

SKM – Flood Mitigation

- There appears significant capacity within the channel to pass the probably maximum flood with more than adequate freeboard, in a no blockage scenario
- A 75% partial blockage in the lower reaches of the channel would result in channel overtopping and flooding in a 1 in 100 year event
- Selective removal of in-channel vegetation should be considered to reduce the likelihood of a blockage forming, and hence reduce the risk of overtopping
- Have requested SKM to undertake analysis of blockage occurring immediately adjacent Chandlers Hill Road

SKM - Flood Mitigation Assessment

- Maintenance program to monitor tree/bank condition
- Strategic tree removal
 - Remove vegetation in areas where congestion and erosion is evident
 - Remove vegetation that are in the lower reaches of the bank
 - Leave trees in the upper reaches of the bank if integrity of the bank is stable and does not need to be laid back



4. Remediation Principles

Community Design Brief

- *Natural looking materials (no concrete) should be used for restoring the channel banks. Consideration could be given by appropriate technical/engineering experts to the building up of sections of the channel floor to create a creek like environment. Such an approach would be subject to an engineering assessment but could improve the aesthetics and help to regulate the flow of water exiting the Happy Valley reservoir and catch drain.*
- *Consideration could be given to relocating the existing stock fence. In areas identified as high risk, safety fencing may be required; such fencing should be integrated into the natural surrounds. Mitigate the risk to public safety by installing signage as an alternative to high safety fencing in low risk areas.*
- *The landscaping should rehabilitate and complement the existing vegetation by introducing new indigenous ground covers and understory. It should utilise the current ability for the public to interact with the site by enhancing the existing pedestrian walking trails, using natural soft surface (crush rock) to link the Memorial Garden to the East and the Onkaparinga wetlands to the West.*

Remediation Issues

- Sections to be remediated – Issues
 - Accessibility
 - Safety
 - Landscape
 - Integration with ‘non remediated sections’
 - Tree removal
 - Channel encroachment

Stabilisation drivers

- Available budget
- Hydraulic design of the channel – the selection of the remedial option should be informed by an understanding of channel hydraulics
- Maintenance – the acceptable ongoing level of channel maintenance will affect the choice of remedial options
- Local community – design brief and expectations around amenity value
- Available land – to enable regrading of banks in some locations
- Existing structures – Chandlers Hill Road culvert and two footbridges

Remediation Principles

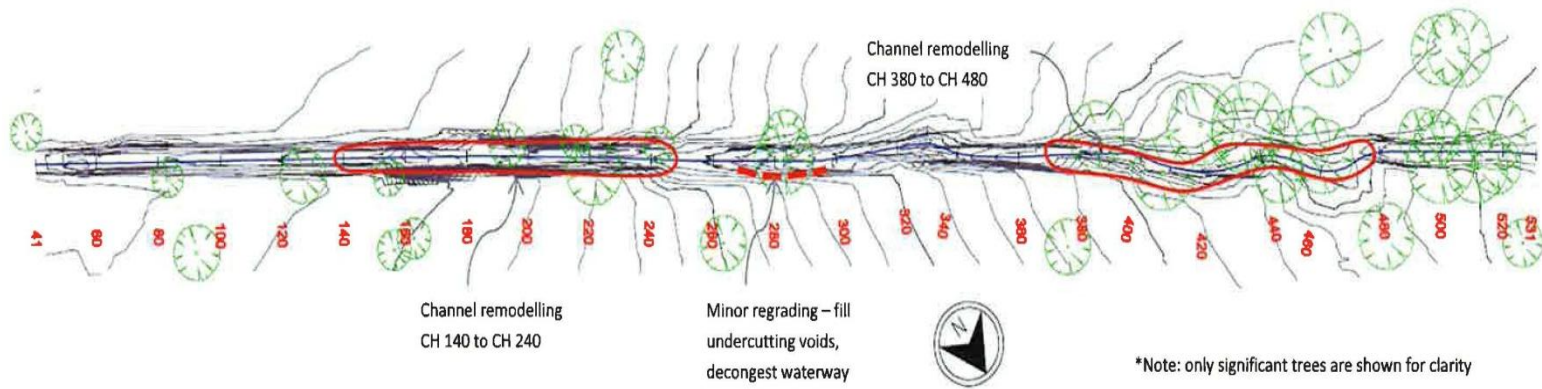
- The foundation properties of the outfall channel are relatively well suited for structures such as rock gabions, concrete channel lining or rock chutes
- Remediation should focus on localised erosion and undercutting of banks
- Prevention of further scour hole development
- Managing future sediment movement where possible
- High vegetation presence is likely to inhibit the overall extent of remediation works, due to limited access to the site with machinery

Remediation Principles

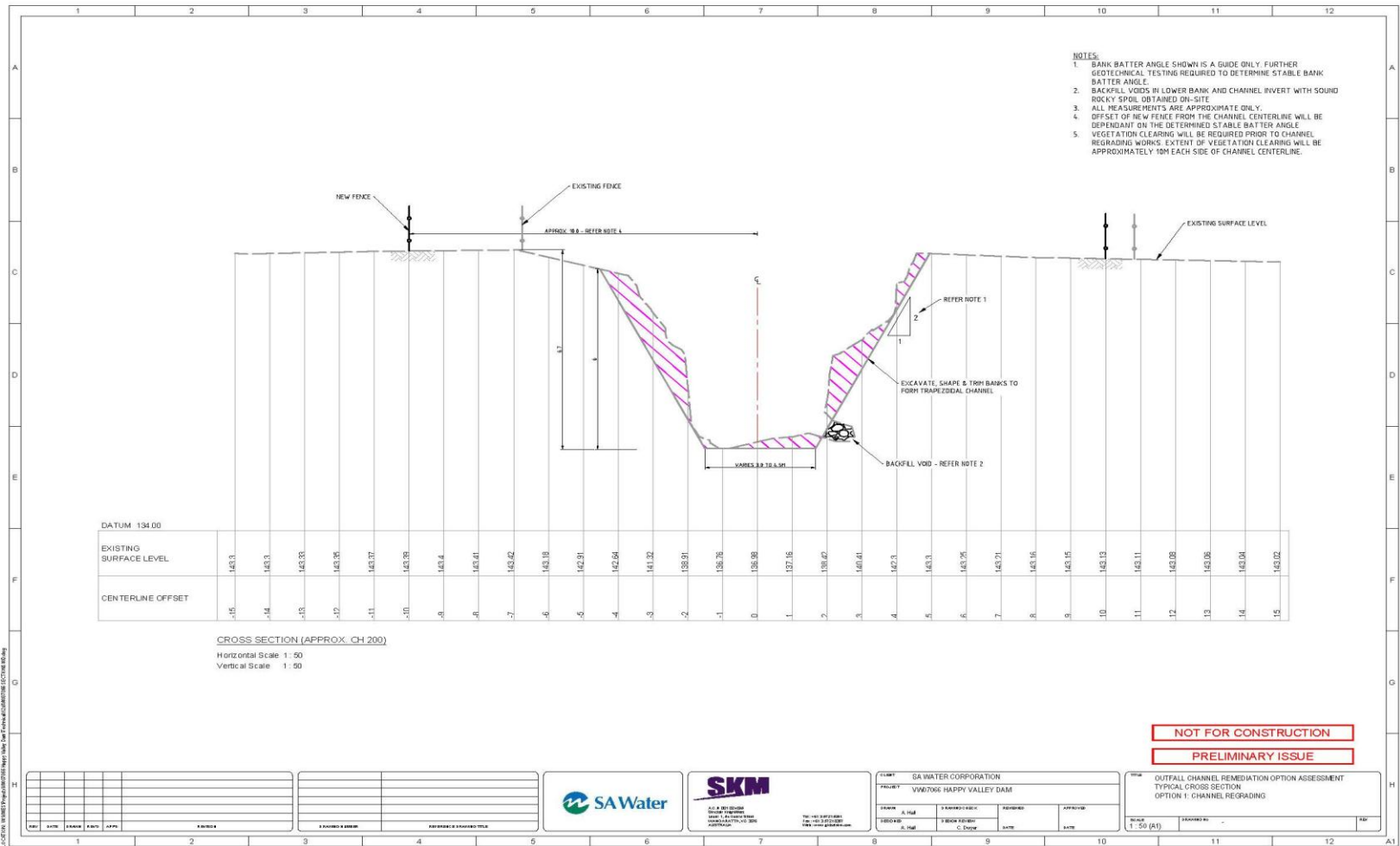
- Selective tree removal
- Lay back of channel banks in priority areas
- Channel integrity – use of gabion structures, concrete channel lining, rock chute
- Landscaping channel surrounds and top of banks
- Bank integration to create meandering alignment
- Temporary ramp for access

Regrade Channel

Option 1: Regrade channel

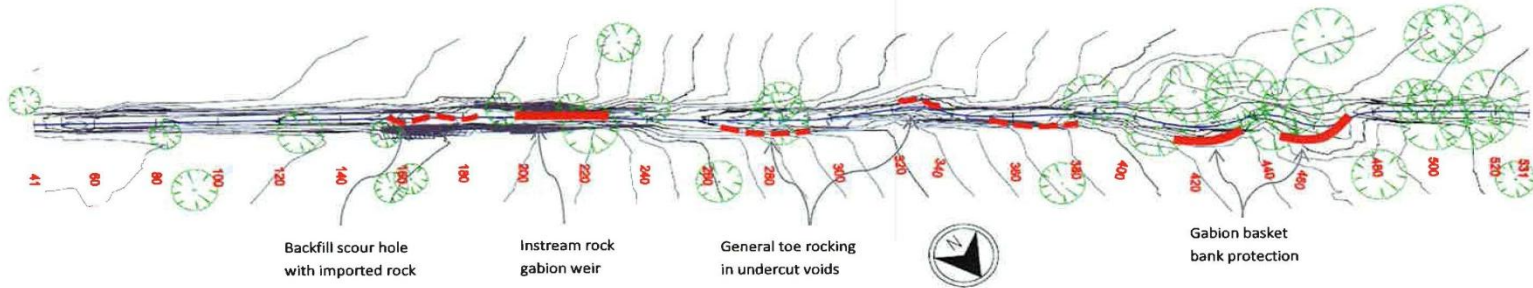


Priority Area 1 (Near temporary fencing)



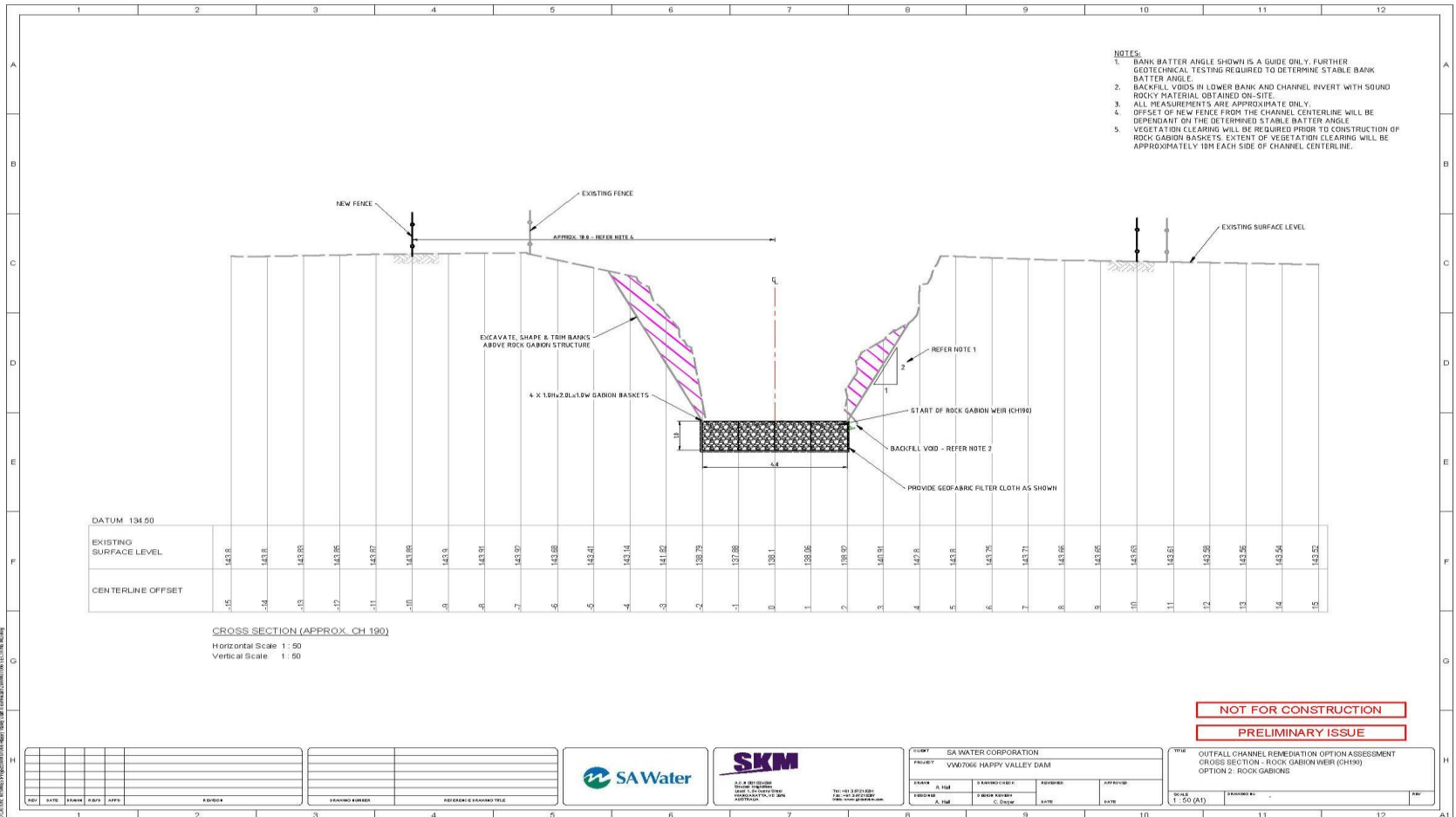
Rock Gabions

Option 2: Rock gabions



*Note: only significant trees are shown for clarity

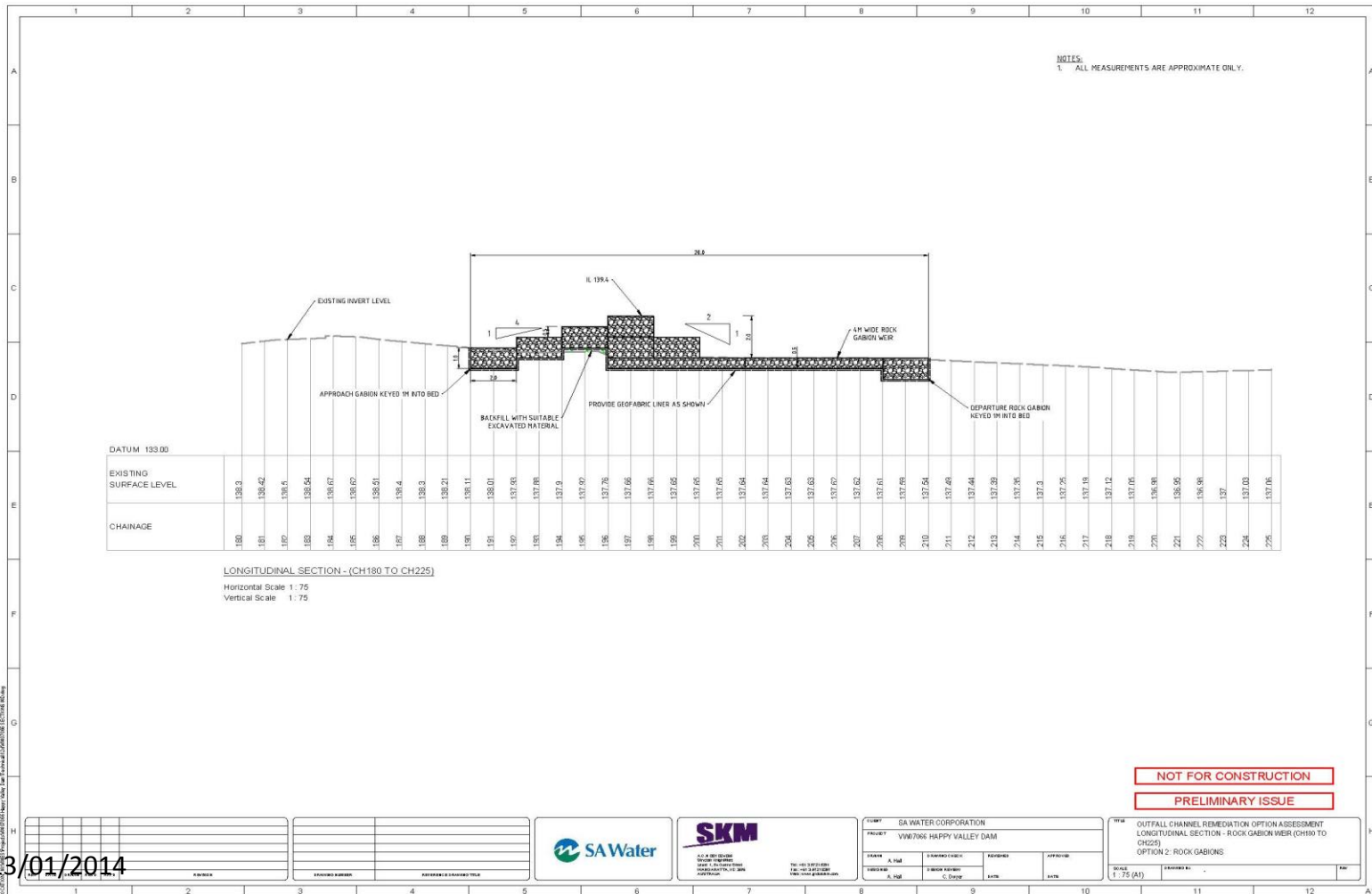
Priority area 1 (Near temporary fencing)



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<p>DATE: 04/01/2014 10:28 AM USER: JAMES.PHILLIPS@sa.gov.au PROJECT: W067066 HAPPY VALLEY DAM</p>	<table border="1"> <tr><th>REV</th><th>DATE</th><th>BY</th><th>APP</th><th>DESCRIPTION</th></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	REV	DATE	BY	APP	DESCRIPTION																<table border="1"> <tr><th>STATION</th><th>NUMBER</th><th>REVISION</th><th>STATION TITLE</th></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	STATION	NUMBER	REVISION	STATION TITLE														 <small> ALL SKM DESIGN DOCUMENTS ARE PRELIMINARY AND NOT TO BE USED FOR CONSTRUCTION WITHOUT THE EXPRESS WRITTEN PERMISSION OF SKM. </small>	<table border="1"> <tr><td colspan="4">CLIENT: SA WATER CORPORATION</td></tr> <tr><td colspan="4">PROJECT: W067066 HAPPY VALLEY DAM</td></tr> <tr><td>DESIGNER: J. PHILLIPS</td><td>3 BANKING/LEVEL</td><td>REVISION:</td><td>APPROVED:</td></tr> <tr><td>DRAWN: J. PHILLIPS</td><td>3 BANK PROFILE</td><td>DATE:</td><td>DATE:</td></tr> <tr><td>CHECKED: J. PHILLIPS</td><td>C. STONE</td><td></td><td></td></tr> </table>	CLIENT: SA WATER CORPORATION				PROJECT: W067066 HAPPY VALLEY DAM				DESIGNER: J. PHILLIPS	3 BANKING/LEVEL	REVISION:	APPROVED:	DRAWN: J. PHILLIPS	3 BANK PROFILE	DATE:	DATE:	CHECKED: J. PHILLIPS	C. STONE			<table border="1"> <tr><td colspan="2">TITLE: W067066 HAPPY VALLEY DAM</td></tr> <tr><td colspan="2">PROJECT: W067066 HAPPY VALLEY DAM</td></tr> <tr><td colspan="2">OPTION 2: ROCK GABIIONS</td></tr> <tr><td>SCALE: 1:50 (A1)</td><td>DRAWN BY: J. PHILLIPS</td></tr> </table>	TITLE: W067066 HAPPY VALLEY DAM		PROJECT: W067066 HAPPY VALLEY DAM		OPTION 2: ROCK GABIIONS		SCALE: 1:50 (A1)	DRAWN BY: J. PHILLIPS
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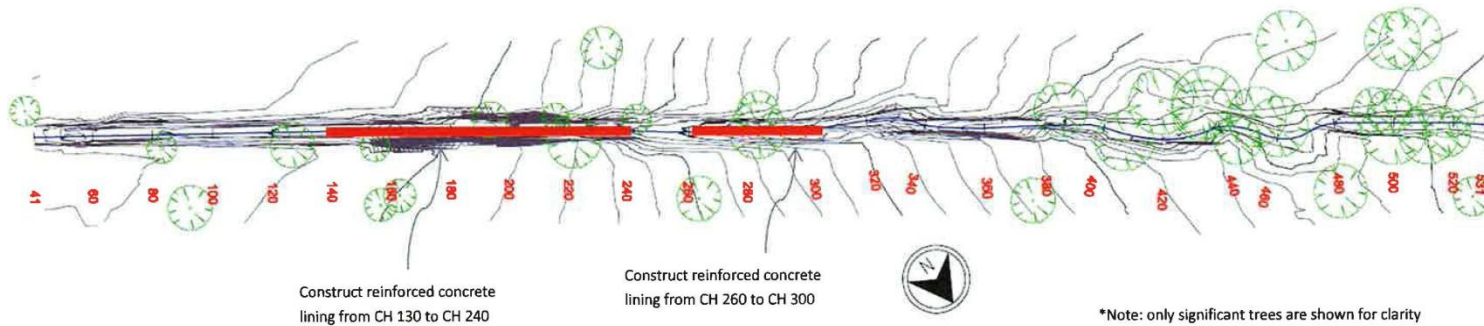
Priority area 2 (Near Council wetlands)



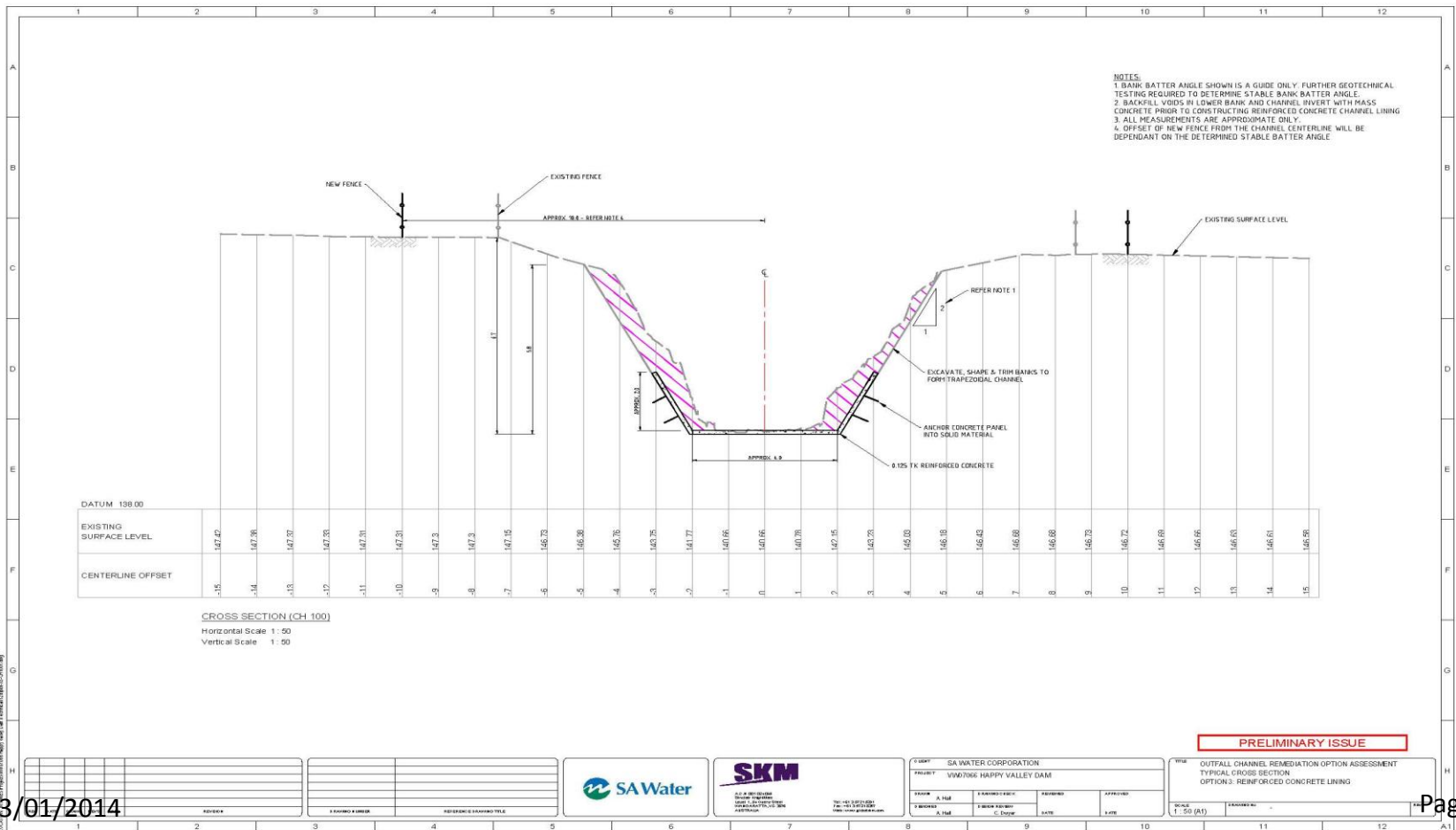
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Reinforced concrete lining

Option 3: Reinforced concrete lining

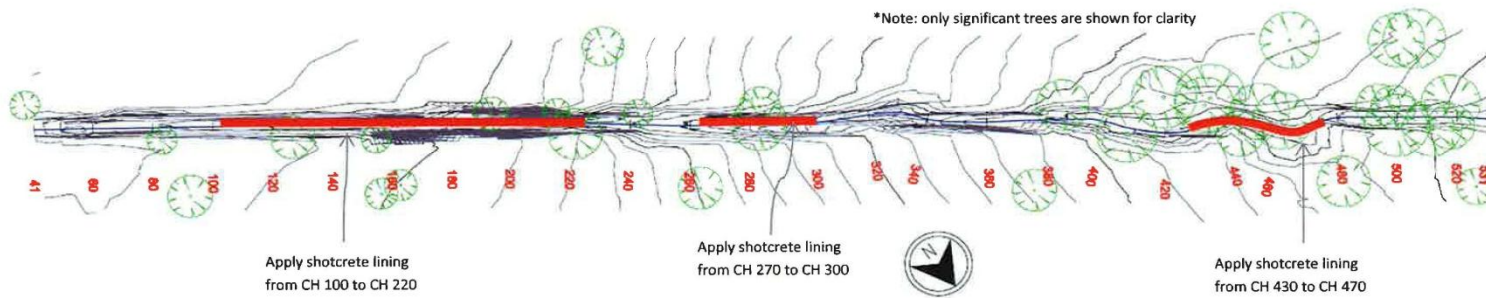


Priority area 1 (Near temporary fencing)

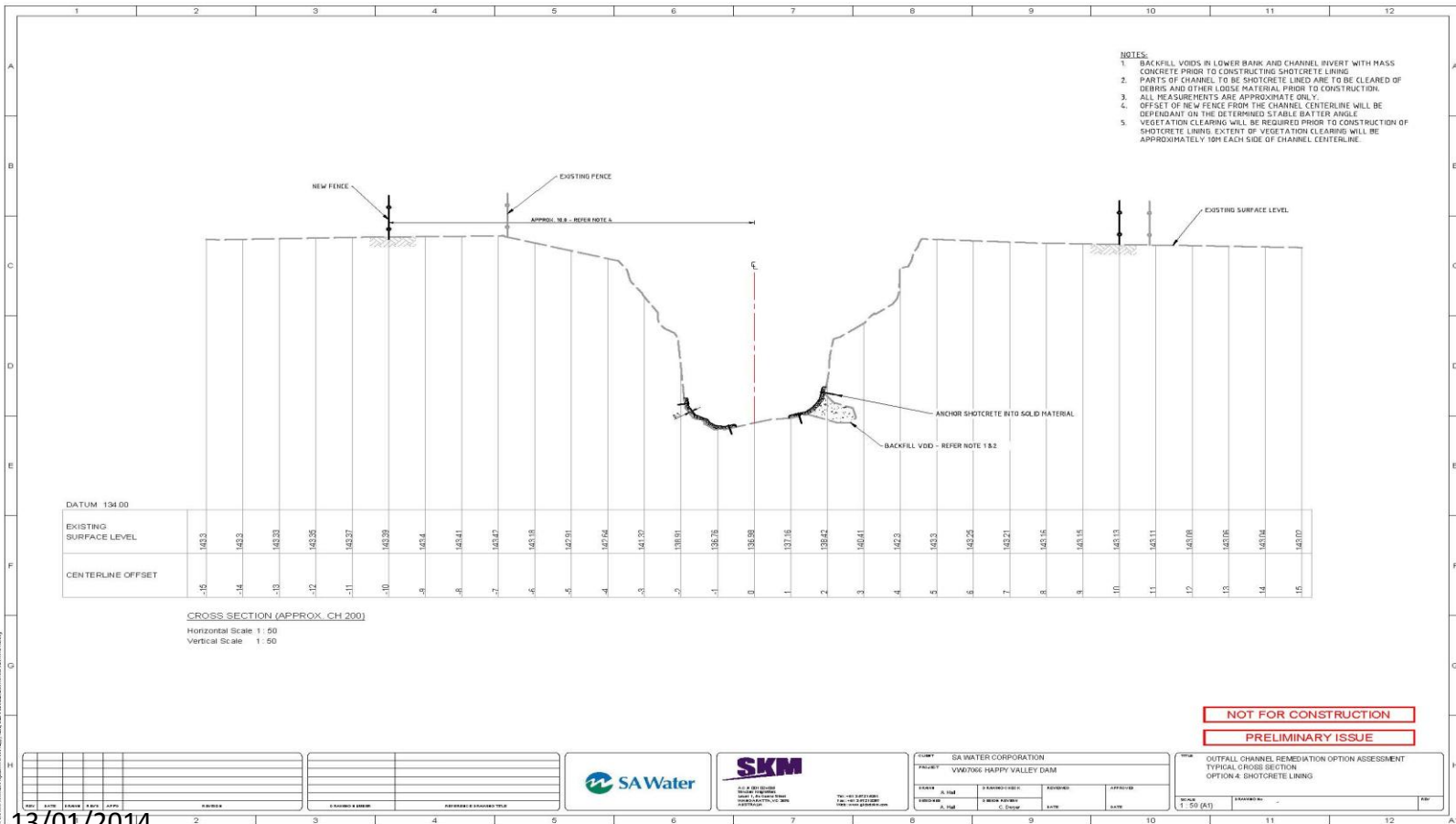


Shotcrete lining

Option 4: Shotcrete lining

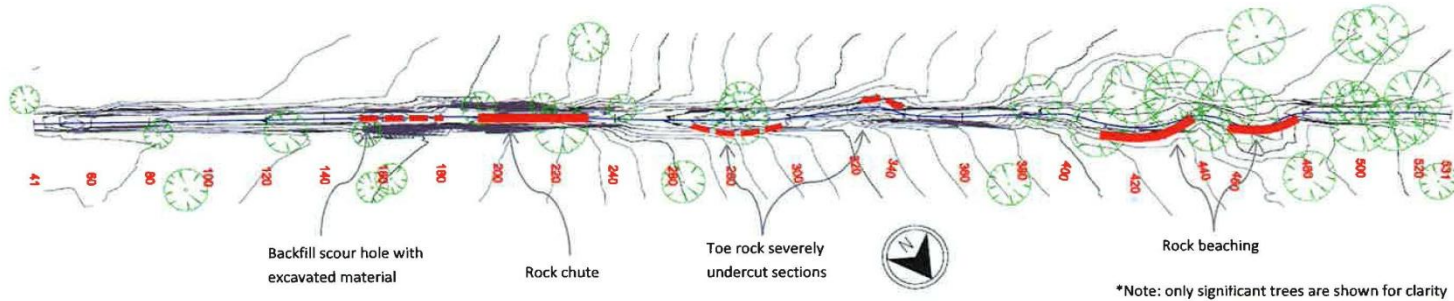


Priority area 1 (Near temporary fencing)

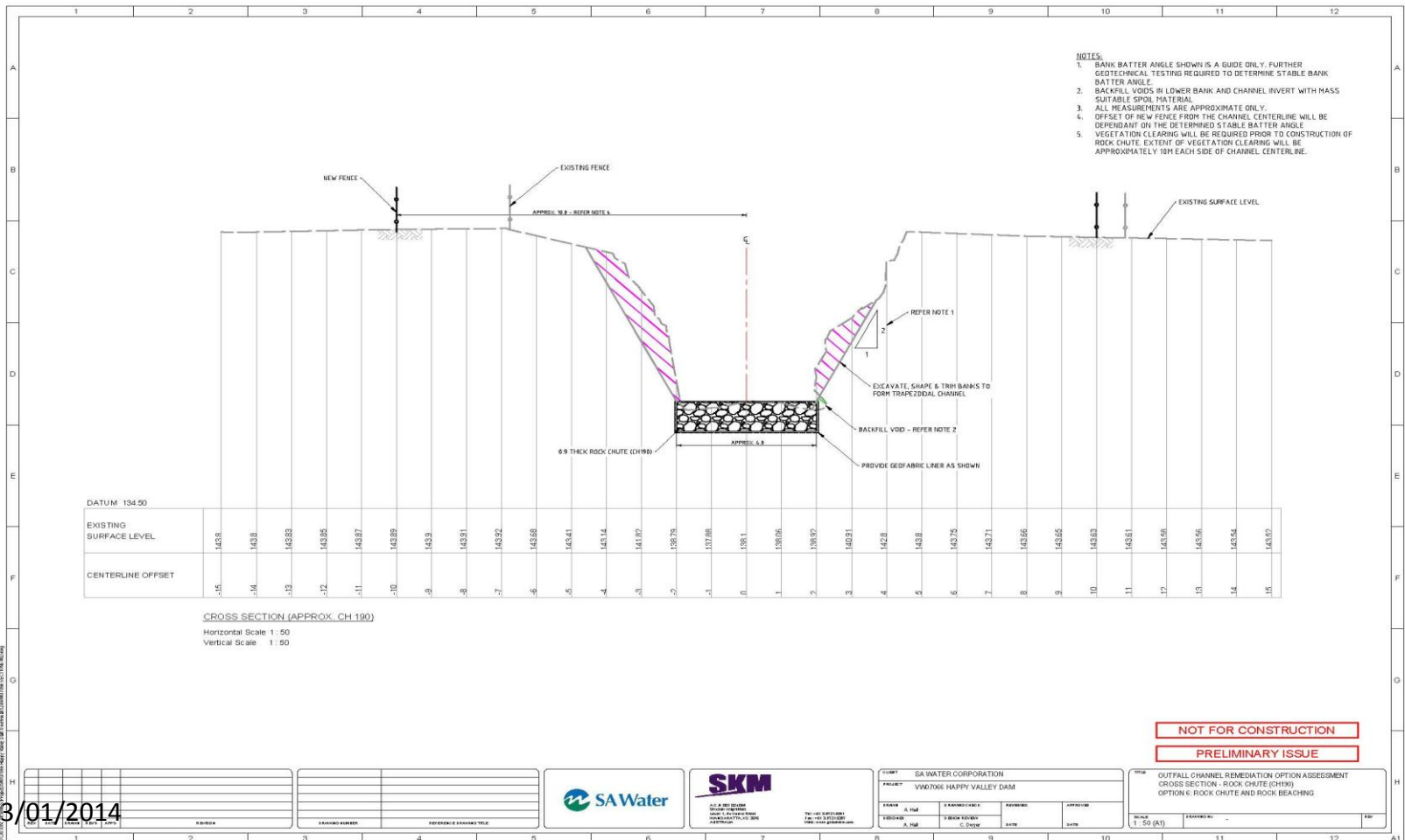


Rock chute and rock beaching

Option 6: Rock chute and rock beaching

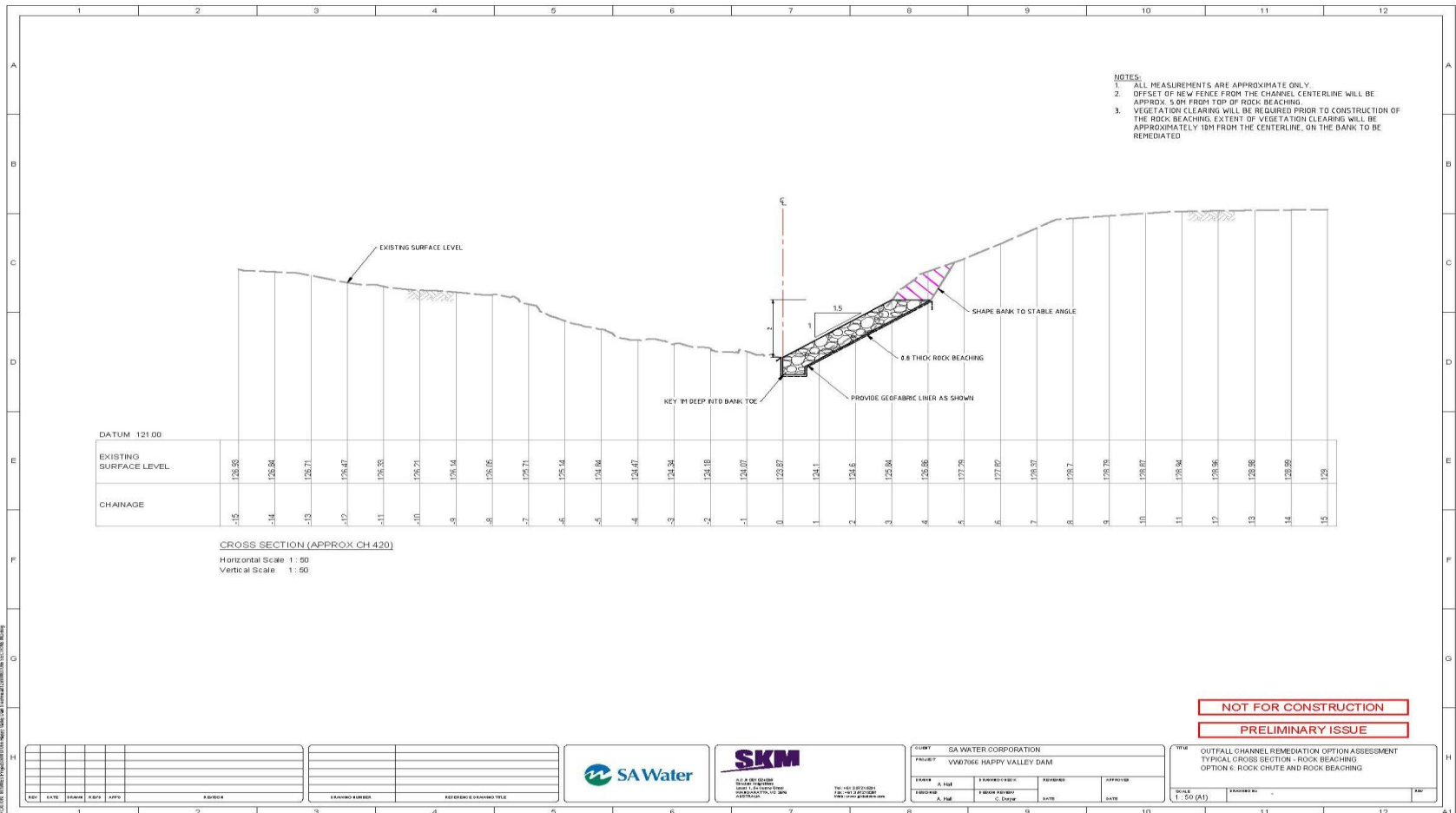


Priority Area 1 (Temporary fencing)



13/01/2014

Priority area 2 (Near Council Wetlands)



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OUTFALL CHANNEL REMEDIATION OPTION ASSESSMENT
TYPICAL CROSS SECTION - ROCK BEACHING
OPTION 6: ROCK CHUTE AND ROCK BEACHING

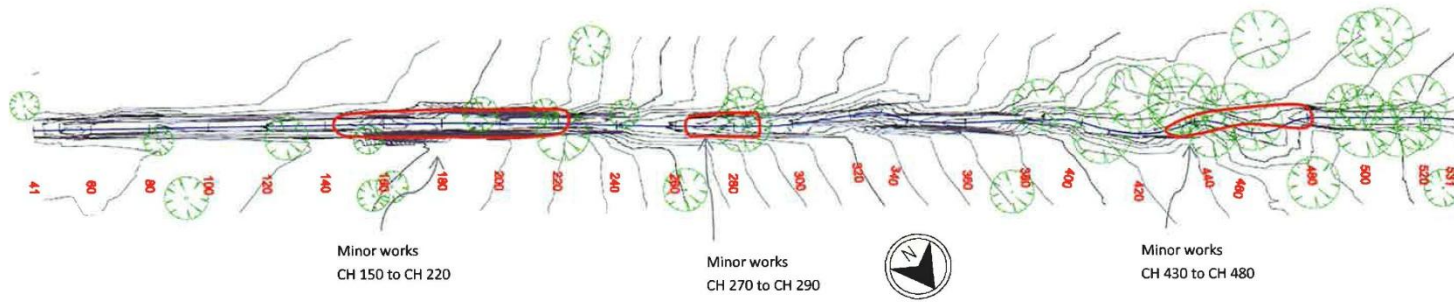
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SA WATER CORPORATION				
PROJECT: VV07066 HAPPY VALLEY DAM				
DATE	BY	REVISION	DATE	BY

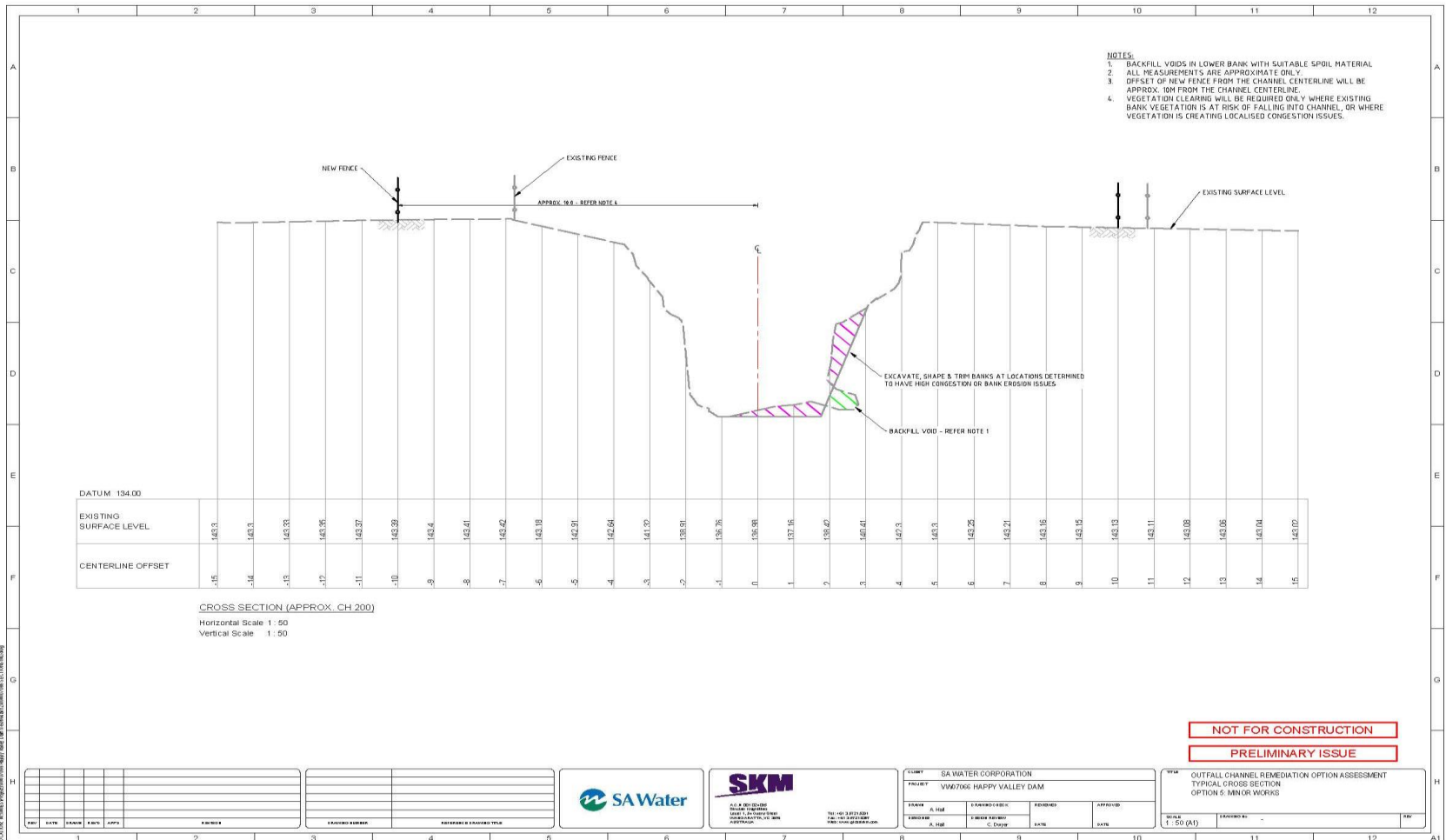
Minor Works – selective tree removal and channel re-profiling

Option 5: Minor works – selective tree removal and channel re-profiling



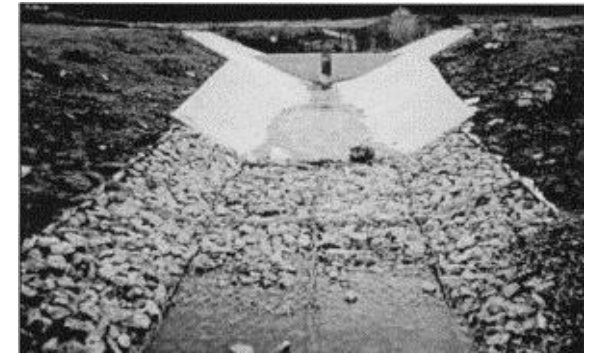
*Note: only significant trees are shown for clarity

Priority area 1 (Near temporary fencing)

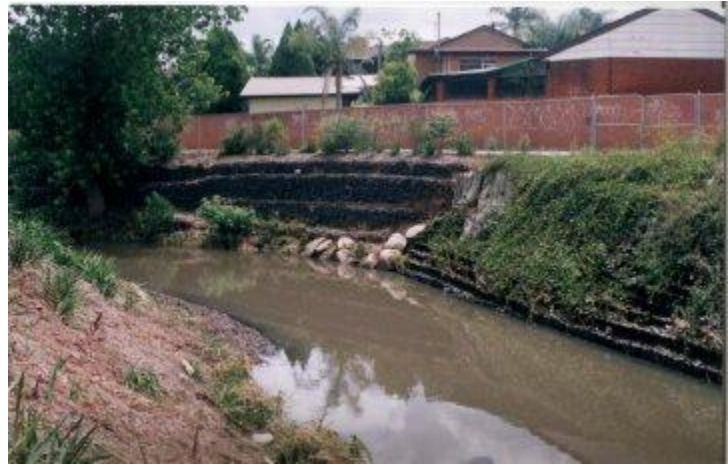




Concrete





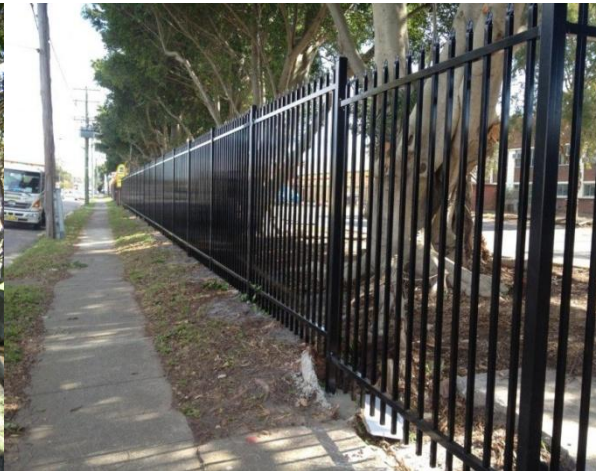
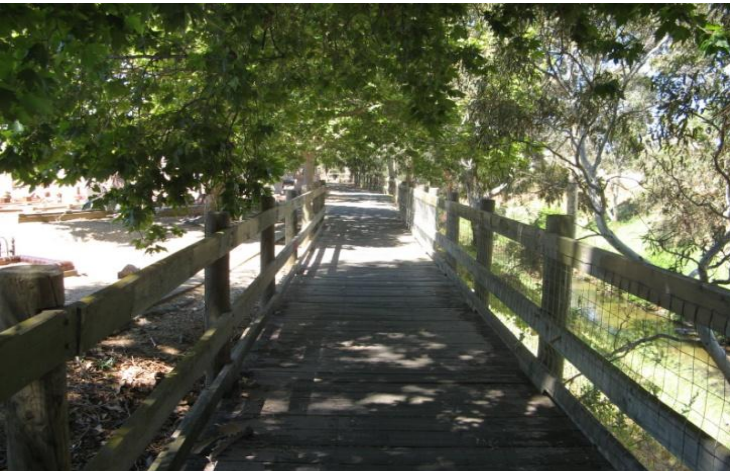


6. Security

Security

- Current
 - Farm fencing
 - No signage
 - Easy access into channel
- Find agreement on type of fencing
- Create a barrier/protection for pedestrians and children

Fencing within landscapes





7. Next Steps

Where to from here....

- Reconvene in 1 month with concept sketches on remedial options
- Fencing options
- Landscape design
- **Wednesday 28th August**