

TOWN OF BASSENDEAN

NOTICE OF A MEETING OF THE RIVER PARKS COMMITTEE

Dear Committee Member

A meeting of the River Parks Committee of the Town of Bassendean will be held in the **Committee Room**, 48 Old Perth Road, Bassendean, on Tuesday 5 March 2019, commencing at 3.00pm.



Ms Peta Mabbs
CHIEF EXECUTIVE OFFICER

28 February 2018

A G E N D A

1.0 DECLARATION OF OPENING/ANNOUNCEMENT OF VISITORS

Acknowledgement of Traditional Owners

The Town of Bassendean acknowledges the past and present traditional owners of the land on which we gather to conduct this meeting, and pays its respects to their Elders, both past and present.

2.0 ATTENDANCES, APOLOGIES AND APPLICATIONS FOR LEAVE OF ABSENCE

Committee Members

Cr Melissa Mykytiuk, Presiding Member
Cr Kathryn Hamilton
Cr Bob Brown
Nonie Jekabsons, Community Representative
Paul Bridges, Community Representative
John Wood, Community Representative
Naomi Bannister, Community Representative
Jane Bremmer, Community Representative

Members of the Committee (Advisory role only)

Augustine Okom, Dept. of Biodiversity, Conservation & Attractions – Rivers & Estuaries Branch
Peter Kane, Dept. of Planning – Lands & Heritage
Andrew Hawkins, Dept. of Planning – Lands & Heritage
Tim Sparks, Dept. of Water
Stephen Summerton, Dept Fire Emergency Services

Officers

Simon Stewert-Dawkins, Director Operational Services
Jeremy Walker, A/Manager Asset Services
Amy Holmes, Minute Secretary

3.0 DEPUTATIONS

4.0 CONFIRMATION OF MINUTES

4.1 River Parks Committee Minutes of 13 November 2018

OFFICER RECOMMENDATION – ITEM 4.1

That the minutes of the River Parks Committee meeting held on 13 November 2018 be confirmed as a true record.

5.0 ANNOUNCEMENTS BY THE PRESIDING PERSON WITHOUT DISCUSSION

6.0 DECLARATIONS OF INTEREST

7.0 BUSINESS DEFERRED FROM PREVIOUS MEETING

8.0 REPORTS

8.1 River Parks Committee - Instrument of Appointment and Delegation Attachment No. 1:

At its meeting held on 18 December 2018, Council resolved to amend the River Parks Committee's Instrument of Appointment and Delegation, so that members from external organisations of the Committee are attending in an advisory role only.

The current representatives from the following external organisations have been consulted, and the general consensus is that these members preferred not to have voting rights on this Committee, as they felt that there could be a conflict of interest when matter concerning their areas, are voted on.

- One representative from the Department of Planning Lands and Heritage;
- One representative from the Department of Biodiversity, Conservation & Attractions;
- One representative from the Department of Water and Environmental Regulation; and
- One representative from the Department of Fire & Emergency Services.

OFFICER RECOMMENDATION – ITEM 8.1

That the Committee notes the changes made to the Instrument of Appointment and Delegation.

8.2 Success Hill Spillway Investigation (Ref:PARE/PLANNG/1 - Jeremy Walker, Senior Environmental Officer)

APPLICATION

The purpose of the report is to present to the Committee a report on the Success Hill Reserve spillway which has been damaged due to stormwater, and the outcomes of the investigation carried out.

ATTACHMENT

Attachment No. 2

Syrinx Environmental, Success Hill Spillway Investigation Report - March 2018

BACKGROUND

In April 2016, Officers applied for grant funding through the Department of Biodiversity Conservation & Attractions Riverbank funding program to undertake site investigations and prepare technical drawing & specifications for the restoration of the foreshore south of the Success Hill fishing platform up to the overhead Water Corporation pipe.

Initially, the Town was informed that the riverbank grant application was not successful, however, the Department of Biodiversity, Conservation & Attractions- Rivers & Estuaries Division (DBCA) contacted the Town in early 2017 to advise that funding had become available, and the funding application was being reconsidered due to State Government funding becoming available.

On 10 February 2017, a significant storm event occurred (second highest rainfall event on record) and unfortunately, the Success Hill Reserve spillway was subject to stormwater damage, causing the bottom section of the drainage outfall structure to collapse.

The Town informed DBCA of the drainage structure issues and Officers were advised that the proposed funding for the foreshore restoration works would need to be placed on hold until the drainage infrastructure is rectified.

Officers then met with consultants to undertake investigations to determine the cause of the collapse and to make recommendations for suitable reinstatement.

Consultant were commissioned to undertake the investigational works which entailed the following:

- **Desktop Assessment;** Site management history, catchment & Groundwater Investigation & data collation and interpretation;
- **Site Assessment;** Site Assessment and ground-truth, Arborist Assessment, Geotechnical Investigation and Physical feature survey (levels and location of spillway structure only); and
- **Analysis & Reporting;** Collate and analyse desktop and field data, provide investigations report summarising all findings and provide recommendations for further work stages, including a temporary solution for storm water.

In May 2018, officers presented the Success Hill Reserve spillway investigation report to Council and the following was resolved:

“OCM – 15/05/18 - MOVED Cr Mykytiuk, Seconded Cr Wilson, that:

- 1. Council receives the Syrinx Success Hill Spillway Investigation Report;*
- 2. Officers implement an interim measure as outlined in the report using funds allocated in 2017/18 Budget;*
- 3. Council undertake public consultation using have your say platform on two options for rectifying the spillway to gauge public view on the preferred option;*
- 4. Council consider allocating \$180,000 in 2018-19 Budget to undertake concept design, detailed design and construction of a new spillway structure; and*
- 5. That the Town of Bassendean consult with the Wadjuk Working Party about the proposal.”*

Funding was allocated in the 2018/2019 Budget and in accordance with OCM–15/05/18 and the Syrinx Environmental Pty Ltd report recommendations, plans were prepared for the interim treatment measure, detailing how a flexible pipe would connect to the existing pipe outlet and a flexible pipe laid on the embankment surface, in order to divert stormwater to the river.

The interim pipe plans were presented to the Department of Biodiversity Conservation & Attractions, and in November 2018, the Town received the required conditional approvals to commence works to install a temporary drainage outlet.

In December 2018, WCP Civil completed the installation of the temporary drainage outlet and in January 2019, three quotes were received from suitable qualified consultants to undertake a concept design for the damaged spillway. GHD consultants were assessed as the best proposal and as such have been appointed to undertake the works.

COMMUNICATION AND ENGAGEMENT

Immediately after the Spillway collapsed, the Town erected safety fencing and signage to reinforce that visitors are remain on the paved footpath leading to the floating platform on the Swan River, and to reinforce that access to the collapsed spillway was restricted. Asset Services regularly inspect the site to ensure the safety fence and signage remain in place.

In May 2018, Council received the Success Hill Reserve Spillway report and resolved to undertake public consultation using the “Your Say Bassendean” platform on two options for rectifying the spillway.

On 4 June 2019, it is intended that GHD Consultants will present the draft Success Hill Reserve concept design options to the River Parks Committee.

STRATEGIC IMPLICATIONS

Community Strategic Plan 2017-2027; Strategic Priority 2:
 Natural Environment

Objectives <i>What we need to achieve</i>	Strategies <i>How we're going to do it</i>	Measures of Success <i>How we will be judged</i>
2.2 Protect our River, Bushland Reserves, and Biodiversity	2.2.1 Protect and restore our biodiversity and ecosystems	Community / Stakeholder satisfaction Survey (River, Bushland and Reserves) Biodiversity and Bush Condition (“Keighery” Scale of bush condition) measurement
	2.2.2 Sustainably manage significant natural areas	
	2.2.3 Partner with stakeholders to actively protect, rehabilitate and enhance access to the river	
2.3 Ensure the Town’s open space is attractive and inviting.	2.3.1 Enhance and develop open spaces and natural areas to facilitate community use and connection.	Community / Stakeholder Satisfaction Survey (Open Space and use of Open Space)
	2.3.2 Sustainably manage ground water, facilitate the conversion of drains to living streams	Increase in Public Open Space Tree Canopy Area monitoring (Private and Public realms) Water Quality (entering the Swan River analysed in accordance with the Australian Government National Health and Medical Research Council Guidelines)

STATUTORY REQUIREMENTS

Local Government Act 1995

COMMENT

In 2012/13, Council allocated funds to install a PVC liner to improve the flow rate, general efficiency and resilience to physical damage of the drainage pipe that leads to the Success Hill Spillway.

As part of the desktop study after the Success Hill Reserve spillway collapse, the Town engaged a consultant to review a 2016 Cardno Engineering Drainage Assessment Study. The review of the 2016 report confirmed that no major spillway flood issues were identified.

As part of the investigational works, Syrinx Environmental Pty Ltd investigated the groundwater levels on site near the toe of the embankment where ground water is visually evident. The data obtained from Perth Groundwater Atlas suggests that the groundwater was not affecting the spillway, however, the geotechnical assessment indicated the presence of natural springs along the western river bank, upstream of the spillway which could have impacted the structure.

The geotechnical assessment identified the site as fluvial with several factors that could have contributed to the failure of the structure. The factors consist of both stormwater discharge and groundwater seepage through the spillway concrete, leading to subsequent soil erosion, thus undermining the spillway. Additionally, the natural groundwater discharge from the western riverbank, combined with disturbance from boat wash and foot traffic, may have exacerbated the broader scale erosion process.

An arborist undertook an assessment of all the trees along the within close proximity to the spillway, this assessment was important to differentiate trees with root structures that contribute to existing slope stability, and trees with root structures that were contributing to 'root wedging' and further destabilising the spillway structure. The arborist findings identified explicitly that an *Agonis flexuosa* appeared to have contributed significantly to the failure of the spillway. Tree roots can be seen growing through the mortar in the structure and have created large cracks in the spillway, however, due to the long life expectancy of the tree and the significant contribution to bank stabilisation, it is not recommended to remove the tree.

Using the findings from each assessment, Syrinx Environmental Pty Ltd provided recommendations to the Town for an interim measure and two options that could be explored in more detail during the concept design. The options are for construction feasibility such as site access, machine movement and steep slope conditions.

The interim measure involved connecting a flexible pipe to the existing outlet and laid along the surface of embankment, anchored in intervals to maintain intended alignment and strength. The existing stormwater pit has been patched and sealed.

The scope for GHD to undertake the concept design is as follows:

- Investigate and identify WSUD opportunities to reduce discharge impacts (flow & quality) upstream of spillway;
- Surface runoff management to minimise erosive discharge effects on the embankment;
- Potential for repositioning spillway structure away from adjacent tree's protection zone or provision of root wedging protection;
- Consideration of springs onsite, and incorporation of their influence into spillway design;
- Provision of concept design with inclusion for two spillway options based on the spillway investigation report on open channel flow, and piped flow discharge;
- The concept design should consider the current environmental condition of the site and shall explore potential to increase indigenous, aesthetic and amenity value; and
- Provide cost estimates for each design and allow for draft changes, as the design will be presented to the River Parks Committee for feedback prior to public consultation.

Since the Arborist investigations, mentioned above were conducted, the *Agonis flexuosa* (Peppermint tree) that contributed to the destabilising the spillway structure, has collapsed and a small tree downstream has also collapsed.

It is intended that once the new outfall structure is in place, that the Town again seek riverbank grant funding to undertake the planned foreshore restoration works.

FINANCIAL CONSIDERATIONS

In the 2019/20 Budget Council has included \$20,000 to prepare concept designs that will be used for community engagement in order to inform the final designs for the foreshore treatment.

OFFICER RECOMMENDATION – ITEM 8.2

That the River Parks Committee recommends that Council:

1. Receives the project update on the Success Hill Reserve collapsed spillway; and
2. Notes that GHD consultants will present the Success Hill Reserve concept design options to the River Parks Committee meeting on 4 June 2019, for discussion.

8.3 Department of Planning, Lands & Heritage - Draft 2018-2023 Ashfield Flats Reserve Works Program (PARE/DESCONT/6) Simon Stewert-Dawkins Director Operational Services

APPLICATION

The purpose of the report is to provide an update on the Department of Planning, Lands & Heritage's draft Ashfield Flats Concept Plan, the public consultation undertaken and the Department's report on the community feedback received.

ATTACHMENT

Attachment No. 3

- Department of Planning Lands & Heritage - Ashfield Flats Feature Survey & Fence Alignment

BACKGROUND

Ashfield Flats Reserve represents the largest remaining river flats in the Perth Metropolitan Area and covers approximately 64 hectares. This reserve is listed as a Bush Forever Site No. 214 and the site is listed in the Directory of Important Wetlands in Australia.

In November 2018, Council considered the Department of Planning, Lands & Heritage's Report on the community feedback received for the Ashfield Flats Draft Works Program 2018-2023 and (OCM-21/11/18) resolved the following:

- "1. Council receives the report on a meeting of the River Parks Committee held on 13 November 2018;*
- 2. Council acknowledges the community feedback received regarding the Ashfield Flats Draft Works Program 2018-2023;*
- 3. Council supports all the recommendations contained in the 'Report on the community feedback received for the Ashfield Flats Draft Works Programme 2018-2023' for:*
 - a) the Department of Planning, Lands & Heritage to approach the Department of Transport and request a fixed Swan River speed camera be erected at Ashfield Flats, to assist with the control of boat speed, with the aim to reduce the impact of boat wash as a contribution to reducing riverbank erosion at Ashfield Flats; and a sign be erected with a contact number to report speeding boats;*

- b) *the Department of Planning, Lands & Heritage to seek the advice of the Department of Transport to direct all Swan River traffic and modify existing nautical maps to use the channel navigation markers between Ron Courtney Island and Garvey Park;*
 - c) *the Western Australian Planning Commission and the Department of Planning, Lands & Heritage to develop a policy in accordance with the Dog Act 1976, in consultation with representative community groups, to control dog access at Ashfield Flats Reserve in order to assist with the management of future rehabilitation areas;*
 - d) *requests that any foreshore fencing constructed be sympathetic to the natural environment; and*
4. *Council notes that a number of the recommendations contained in the 'Report on the community feedback received for the Ashfield Flats Draft Works Program 2018-2023' are contingent on the outcomes of the Hydrological Study being completed in approximately 18-24 months and that the study will heavily influence the recommendations proposed and the preparation of an Ashfield Flats Foreshore Management Plan to be prepared by the Department of Planning, Lands and Heritage in consultation with the Department of Biodiversity Conservation and Attractions."*

On 21 December 2018, the Town wrote to the Department of Planning Lands & Heritage outlining the above Council resolutions.

The Town received an email on 19 February 2019, from the Department of Planning Lands & Heritage advising the following:

"A meeting was held with the Department of Biodiversity Conservation and Attractions on site at Ashfield Flats this morning to reconfirm the alignment of the temporary foreshore fencing. As previously noted, and following the community consultation on this matter, the Department is proceeding with the installation of the temporary fence, as the onsite conditions are now suitable and we need to complete the works before we get any wet weather. All things being equal we plan to commence the works next week. Week commencing Monday 25 February. The works are planned to take approximately 3-4 weeks.

As agreed as part of the community consultation, the Department will be proceeding with the works involving the following:

- *Construction of a temporary fence identical to the recently installed fencing erected to protect the samphire area at Ashfield Flats.*
- *The fence will proceed along the alignment that was discussed in the community consultation sessions and Parks and River Committee, although as per the recommendations from the Community consultation an additional access point is to be provided in the fence line – taking the total access points from the original 5 to 6. This provides an appropriate level of access to the river for the community as well as balance to areas to allow for future revegetation work.*

We do have a completed feature survey showing the fence alignment and topographical features that we can share with you, however we would note that it may not be a useful tool to share on the Town's website, as these types of survey maps may cause confusion to a reader who are not familiar with this type of presentation.

- *The existing path to be left in situ in the short term, this is to recognise that until we have obtained the results of the hydrological study, it is not cost effective to install temporary path structures. The existing path will be accessible to the community via access points in the temporary fence line. Once the hydrological study is completed we will then be able to propose a new path alignment and construction methodology that we would then share as part of the ongoing community consultation.*
- *Appropriate signage to follow, as part of the agreement to provide information/education for the people using Ashfield Flats and why we are all interested in conserving and preserving this valuable resource. The signage is also intended to reflect the outcomes as identified in the community consultation undertaken to date. We need to seek the agreement of DBCA for the style of the signage to be employed and this is to commence.*
- *Please also note that the fence works in no way impedes the bike path and walking path, the fence is to be constructed on either side of the path, allowing for the path to be unaffected.*
- *Once the hydrological study is completed – approximately 18 months, we would then expect to be in a position to consider the realignment of the bike path etc, however this will be subject to community consultation as agreed – although noting that the science will determine what options are available for the community to consider, recognising that the DBCA approval is also first required.*

On 28 February 2019, the Department of Planning, Lands and Heritage advised the following:

"In respect to the draft works program, the Department is waiting for the results of the hydrological study, which will inform the draft works program and provide guidance on the next steps and timing. The draft program will then be modified accordingly and an update provided. Community consultation will occur, once appropriate options have been identified. It remains the intention of the Department that a Management Plan for Ashfield Flats will then be produced to provide a holistic plan for all stakeholders.

In the interim the Department in conjunction with the Department of Biodiversity Conservation and Attractions (DBCAs), as the statutory responsible authority, will be seeking to undertake urgent remediation works to the more significant blow-outs in the river fringe. This will, however, be subject to funding availability and Form 7 approval from DBCAs being obtained in time to allow the works to proceed during low Summer tides.

Normal revegetation works, weed and fire management works will continue in the interim.

The Department would like to request that the Town of Bassendean coordinate similar activities on their management areas, particularly weed management, as this has a direct bearing on the success of activities on the WAPC lands.

The Department is waiting for the results of the hydrological study, which will inform the draft works program and provide guidance on the next steps and timing. The draft program will then be modified accordingly and an update provided. Community consultation will occur, once appropriate options have been identified. It remains the intention of the Department that a Management Plan for Ashfield Flats will then be produced to provide a holistic plan for all stakeholders.

COMMUNICATION & ENGAGEMENT

To inform residents of the works being undertaken on the WAPC owned land which is managed by the Department of Planning Lands & Heritage, the following information, including survey maps, was provided on the Town's Website and Facebook page:

“Community members walking along Ashfield Flats may have noticed that the Department of Planning Lands and Heritage (DPLH) has commenced with the installation of temporary fencing on Ashfield Flats.

The Ashfield Flats are managed by the DPLH on behalf of the WA Planning Commission. The temporary fencing is part of the Ashfield Flats Restoration Plan developed by the DPLH. The fence has been constructed to provide access to the river for the community, while allowing for future revegetation works.

The fence is made from pine and post rail with PVC coated mesh infill and will be 1.1 metres high so as to avoid impacting on the river views that are important to our community. The fence will only proceed along the alignment as proposed in the community consultation from 11 June to 15 August 2018 on Your Say Bassendean and on 30 July at the Community Briefing, and as discussed with the Town of Bassendean’s River Parks Committee. Consistent with recommendations from the community consultations, an additional access point is to be provided in the fence line, to provide a further opportunity to view the river.

An image of the type of fence being constructed can be seen below.”



COMMENT

The Department of Planning Lands & Heritage has previously advised that the recommendations contained in the report on the community feedback received for the Ashfield Flats Draft Works Program 2018-2023 are contingent on the Hydrological Study being completed in approximately 18 months, and this study will heavily influence the recommendations proposed and the preparation of an Ashfield Flats Foreshore Management Plan to be developed by the Department of Planning, Lands and Heritage in consultation with the Department of Biodiversity Conservation and Attractions.

In regards to OCM – 21/11/18 Council resolution that:

“The Department of Planning, Lands & Heritage to approach the Department of Transport and request a fixed Swan River speed camera be erected at Ashfield Flats, to assist with the control of boat speed, with the aim to reduce the impact of boat wash as a contribution to reducing riverbank erosion at Ashfield Flats; and a sign be erected with a contact number to report speeding boats”;

“The Department of Planning, Lands & Heritage to seek the advice of the Department of Transport to direct all Swan River traffic and modify existing nautical maps to use the channel navigation markers between Ron Courtney Island and Garvey Park”;

the Department of Planning Lands & Heritage advised on 26 February 2019, as follows in relation to a speed camera and redirection of river traffic:

“The Department is currently progressing this matter with the Department of Transport.

The Department would note that in respect to the Town’s resolution, it would be the Department’s comments that although the Department is happy to have this conversation with the Department of Transport, the Town of Bassendean as a land owner/manager of this area also, should write to the Department of Transport on this matter, as the more voices that are added, will help to reinforce that this is an important issue.”

In regards to OCM – 21/11/18 Council resolution that:

“The Western Australian Planning Commission and the Department of Planning, Lands & Heritage to develop a policy in accordance with the Dog Act 1976, in consultation with representative community groups, to control dog access at Ashfield Flats Reserve in order to assist with the management of future rehabilitation areas”;

the Department of Planning, Lands and Heritage intends to progress the resolution by initially meeting the Senior Ranger on site to consider what dog controls the department is seeking to achieve in accordance with the Dog Act 1976.

The Town has reiterated to the Department of Planning, Lands and Heritage that before Council can consider a draft permit for the Town of Bassendean to control dogs on Ashfield Flats Reserve, that in accordance with the OCM – 21/11/18, the Department will need to consult with representative community groups and provide a report to the Town so that Council can appreciate the extent of consultation with representative community groups undertaken.

STRATEGIC IMPLICATIONS

Community Strategic Plan 2017-2027; Strategic Priority 2: Natural Environment

Objectives <i>What we need to achieve</i>	Strategies <i>How we're going to do it</i>	Measures of Success <i>How we will be judged</i>
2.2 Protect our River, Bushland Reserves, and Biodiversity	2.2.1 Protect and restore our biodiversity and ecosystems	Community / Stakeholder satisfaction Survey (River, Bushland and Reserves) Biodiversity and Bush Condition ("Keighery" Scale of bush condition) measurement
	2.2.2 Sustainably manage significant natural areas	
	2.2.3 Partner with stakeholders to actively protect, rehabilitate and enhance access to the river	

FINANCIAL CONSIDERATIONS

Nil.

OFFICER RECOMMENDATION – ITEM 8.3

That the River Parks Committee recommends to Council that it notes the Department of Planning, Lands and Heritage's implementation works that have commenced at the Ashfield Flats Reserve.

9.0 **MOTIONS OF WHICH PREVIOUS NOTICE HAS BEEN GIVEN**

9.1 **Turf Management Practices - Nonie Jekabsons**

The following is proposed to be moved at this meeting:

“That the Bassendean River Parks Management Committee liaise with Town of Bassendean staff to improve the processes and procedures around turf management of the Town’s parks, reserves and street verges with a view to minimising the pollution of our waterways and the Swan River.”

9.2 **PFOS and PFAS Groundwater Sampling – Nonie Jekabsons**

The following is proposed to be moved at this meeting:

“That the Bassendean River Parks Management Committee request the Town of Bassendean include testing for Perfluorooctane sulfonate (PFOS) and Polyfluoroalkyl Substances (PFAS) in the ongoing groundwater sampling programme to ascertain whether these chemicals are present.”

9.3 **Decline of Success Hill Reserve and River Embankment – Jane Bremmer**

The following is proposed to be moved at this meeting:

“That the River Parks Committee discuss the increasing decline of the Success Hill Reserve, including the river embankment, reserve and spillway and the ongoing and future management options planned. A report back be provided to the Committee following the WALGA weeds forum.”

10.0 **ANNOUNCEMENTS OF NOTICES OF MOTION FOR THE NEXT MEETING**

11.0 **CONFIDENTIAL BUSINESS**

12.0 **CLOSURE**

Council resolved the following River Parks Committee meeting scheduled:

- 3pm - 4 June 2019; and
- 3pm - 10 September 2019.

ATTACHMENT NO. 1



TOWN *of* BASSENDEAN

RIVER PARKS COMMITTEE

INSTRUMENT OF APPOINTMENT AND DELEGATION

1.0 INTRODUCTION

The Council of the Town of Bassendean (hereinafter called the "Council") hereby establishes a committee under the powers given in Section 5.8 of the Local Government Act 1995, such committee to be known as the Bassendean River Parks Management Committee, (hereinafter called the "Committee").

Membership of the Committee shall, unless otherwise specified, be for a term ceasing at the date of the Local Government election in the year the Town's local government elections are held, after which time the Council may appoint members for a further term.

The Committee shall act for and on behalf of Council in accordance with provisions of the Local Government Act 1995, local laws and policy of the Town of Bassendean and this Instrument.

2.0 NAME

The name of the Committee shall be the Bassendean River Parks Management Committee.

3.0 OBJECTIVES, STRATEGIES AND PROJECTS

In accordance with the 2017-2027 Strategic Community Plan, the Committee shall make recommendations to Council on the following Objectives and Strategies:-

Protect our River, Bush land Reserves, and Biodiversity

- 2.2.1 Protect and restore our biodiversity and ecosystems
- 2.2.2 Sustainably manage significant natural areas
- 2.2.3 Partner with stakeholders to actively protect, rehabilitate and enhance access to the river

Ensure the Town's open space is attractive and inviting

- 2.3.1 Enhance and develop open spaces and natural areas to facilitate community use and connection.
- 2.3.2 Sustainably manage ground water and facilitate the conversion of drains to living streams

- **Projects for the Term of the Committee include**

- Undertake Natural Areas and River rehabilitation progressively in accordance with Department of Biodiversity, Conservation & Attractions – Best Management practices for foreshore stabilisation.
- Advocate with relevant partners to collaborate on protection and rehabilitation.
- Develop a Strategy for the protection and rehabilitation of natural areas.
- Liaise with Department of Planning to prepare an Establishment Plan for Ashfield Flats Reserve and Develop Management Plans for the Town's 4 managed river parks.
- Formulate Open Space Master Plan for Rivers and Parks
- Develop and implement irrigation hydro-zoning and eco- zoning programs for Rivers, Parks and Reserves
- Water Quality monitoring
- Plan and convert drains to Living Streams
- Develop Swan River Precinct Plan.
- Continue to implement the Bushcare Volunteers program

Examples of Specific Projects could include:-

- *Ashfield Flats*
- *Bindaring Park*
- *Living Streams/ Drains*
- *Success Hill Reserve*
- *Bushcare Volunteer Program*
- *Pickering Park*
- *Point Reserve*
- *Sandy Beach Reserve*
- *Liaise with Swan River Trust*
- *Liaise with WAPC*
- *Water Quality*

4.0 MEMBERSHIP

Membership of the Committee shall consist of 8 members, with voting rights, comprising the following:

- Three Councillors from the Town of Bassendean; and
- Five community representatives.

Four members in an advisory role, with no voting rights, comprising the following:

- One representative from the Department of Planning Lands and Heritage;
- One representative from the Department of Biodiversity, Conservation & Attractions;
- One representative from the Department of Water and Environmental Regulation; and
- One representative from the Department of Fire & Emergency Services.

5.0 PRESIDING MEMBER

The Committee shall appoint a Presiding Member and Deputy Presiding Member to conduct its business. The Presiding Member shall ensure that minutes of the proceedings are kept and that business is conducted in accordance with the Town of Bassendean Standing Orders Local Law.

The Presiding Member must cast a second vote if the votes of the members present are equally divided.

The Local Government Act 1995 places responsibility for speaking on behalf of Council with the Mayor, or the CEO if the Mayor agrees.

The Presiding Member and members of Council committees are to refrain from speaking publicly on behalf of the committee or Council, or to issue any form of written material purporting to speak on behalf of the committee or Council without the prior approval of the Mayor.

6.0 MEETINGS

The Committee shall meet quarterly:

- 6.1 Notice of meetings shall be given to members at least 3 days prior to each meeting.
- 6.2 If any member is absent from 3 consecutive meetings without leave of the Committee, they shall forfeit their position on such Committee.
- 6.3 The Presiding Member shall ensure that detailed minutes of all meetings are kept and shall, not later than 5 days after each meeting, provide Council with a copy of such minutes.

- 6.4 All members of the Committee shall have one vote. If the votes of the members present are equally divided, the person presiding is required to cast a second vote in accordance with the Local Government Act.
- 6.5 The Town of Bassendean will provide technical advice and secretarial and administrative support through the Chief Executive Officer and Council staff.
- 6.6 All members are required to comply with the Town of Bassendean's Code of Conduct.

7.0 QUORUM

Quorum for a meeting shall be at least 50% of the number of offices whether vacant or not, equalling five members. A decision of the Committee does not have effect unless it has been made by a simple majority.

8.0 DELEGATED POWERS

The Committee has no delegated powers under the Local Government Act and is to advise and make recommendations to Council only.

9.0 TERMINATION OF COMMITTEE

Termination of the Committee shall be:

- 9.1 In accordance with the Local Government Act 1995; and
- 9.2 At the direction of Council.

10.0 AMENDMENT TO THE INSTRUMENT OF APPOINTMENT AND DELEGATION

This document may be altered at any time by Council on the recommendation of the Committee, or after giving 14 days notice to the Committee.

11.0 COMMITTEE DECISIONS

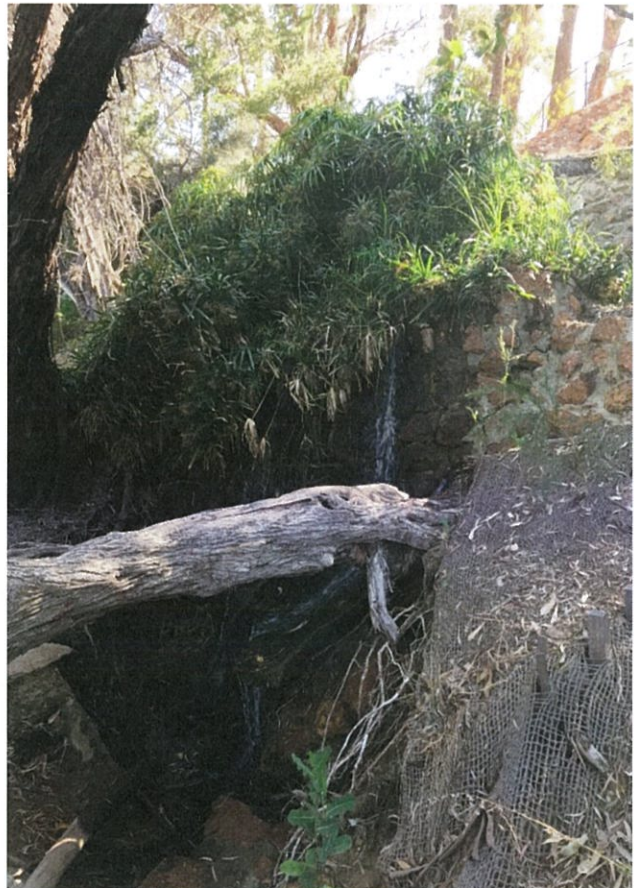
Committee decisions shall not be binding on Council if such decisions are in conflict with the delegated powers of the Council.

ATTACHMENT NO. 2

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SUCCESS HILL SPILLWAY INVESTIGATION

March 2018
For The Town of Bassendean

Document Control

Report 17038RPT001

Version	Date	Prepared by	Approved	Issue Details
2	09.03.18	Lazar Cirkovic	Zhiliang Lin	For Approval

Limitations of Report

Syrinx Environmental PL has prepared this report as a professional consultant. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for the use, perusal or otherwise, by parties other than the Client, the Owner and their nominated consulting advisors without the consent of the Owner. No further information can be added without the consent of the Owner, nor does the report contain sufficient information for purposes of other parties or for other uses. The information contained in this report has been prepared in good faith, and accuracy of data at date of issue has been compiled to the best of our knowledge. However, Syrinx Environmental PL is not responsible for changes in conditions that may affect or alter information contained in this report before, during or after the date of issue.

Syrinx Environmental PL accepts site conditions as an indeterminable factor, creating variations that can never be fully defined by investigation. Measurements and values obtained from sampling and testing are indicative within a limited time frame and unless otherwise specified, should not be accepted as actual realities of conditions on site beyond that time frame.

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1.0 INTRODUCTION

The Success Hill Spillway (hereafter known as “the Spillway”), located on the Success Hill Reserve (see Figure 2) is a man-made structure which conveys stormwater from the upstream drainage catchment down a cascading rock structure, through a small stream into the Swan River (see Figure 1). The Spillway is accessible to the public by foot and is located within the Success Hill Reserve recreational area.

In November 2016, the Town of Bassendean (the Town) became aware that the Spillway structural conditions were severely deteriorating based on reported visual evidence. These included cracks in concrete, soil erosion, and rocks that had dislodged from the concrete structure. The Town undertook minor repair works as part of their maintenance regime to prolong the longevity of the Spillway.

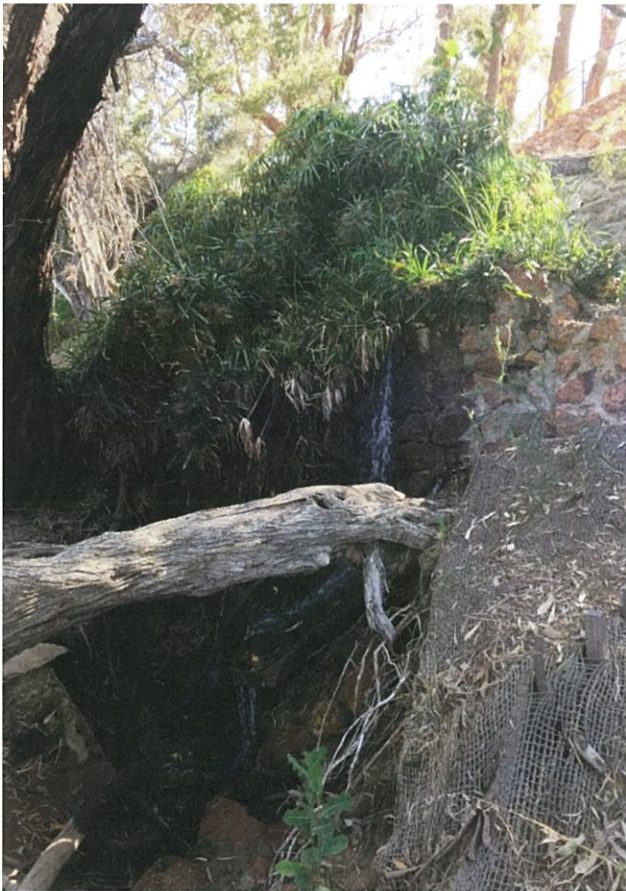


Figure 1 Degraded Spillway Structure

The Town did not have funds available to commence detailed investigations during that time, and prior to the February 2017 Budget Review, a significant storm event occurred which contributed to the structure collapsing. Upon the 2017/2018 Council budget review, funds have been allocated to facilitate rectification works and Syrinx Environmental PL (Syrinx) was appointed in late 2017 to carry out investigations on the causes of collapse and to make recommendations for suitable reinstatement.

1.1 PURPOSE OF THIS DOCUMENT

This document presents findings based on the investigations undertaken in November 2017 and desktop studies on the key causes of the spillway failure. This document also highlights and describes recommendations for interim measures, and conceptual solutions which consider public safety issues, and engineering/ structural improvements.

This document should be read in conjunction with the following referenced documents:

- Stormwater Management Manual (2004);
- Best Management Practices for Foreshore Stabilisation (2009);
- Water and Rivers Commission (2000); and
- Bassendean Drainage Assessment - Drainage Review and Assessment, CW926200 (2016).

1.2 LOCATION OF THE SPILLWAY

The Success Hill Spillway structure is located along the Swan River foreshore in the Success Hill Reserve adjacent to Seventh Avenue, (refer to Figure 2 Location).



Figure 2 Location of the Success Hill Spillway

1.3 SITE MANAGEMENT HISTORY

The Town has previously commissioned Syrinx in 2009 to complete foreshore restoration works on the Success Hill Reserve eroded embankment upstream of the jetty (Previous works). These works included a new staircase leading down the embankment, and the provision of a new Jetty. An Acid Sulfate Soils (ASS) investigation and ASS management plan (ASSMP) was also included in the works. However, the area of influence in the 2009 works did not include areas of the Spillway structure or surrounding affected landscapes.

The Town has provided feedback that cracks in the Spillway structure were visually evident in the past suggesting that the structural integrity of the Spillway may be declining. Subsequently, the Town has included minor repair works as part of their maintenance regime to prolong the longevity of the Spillway. However, no significant structural works were done to improve the structure's stability.

Despite all efforts of the Town's maintenance team, the Spillway has succumbed to its structural inadequacy and collapsed over time, resulting in an unstable and unsafe environment.

1.4 ABORIGINAL CONSULTATION 2007

The Town conducted indigenous consultation in 2007 to carry out works to improve site amenities, recreational facilities, and the environmental aspects of the Success Hill Reserve. These include, but are not limited to stormwater treatment measures such as existing pipe upgrading and replacement, removal of existing pipe and outfall structures rectification, Design and construction of stormwater treatment, underground stormwater treatment, earthworks, and Installation and maintenance.

A Section 18 (refer to Appendix 3) has been provided to the State Land Services and a letter to the Town authorising the proposed works.

2.0 SITE ASSESSMENT

2.1 DRAINAGE

As part of the drainage investigations, the Town has provided Syrinx with drainage maps and a Drainage Assessment Study (Cardno 2016) to assist in assessing the hydraulic adequacy of the Spillway discharge system. The Town has also previously spent approximately \$88,000 and "installed a PVC liner under the Success Hill Reserve to improve flow rate, the general efficiency of the concrete pipe, and resilience to physical damage.

No major flood issues were identified at Success Hill in the Bassendean Drainage Assessment (Cardno 2016). All recommendations made for flood rectification measures through Water Sensitive Design (WSUD) and other drainage initiatives were not within the catchment of the collapsed Spillway structure.

In addition to reviewing the Drainage Assessment Study, empirical methods that include the rational formula and Colebrook-White equations were used to verify the capacity of the existing discharge pipe. These methods were deemed sufficient to facilitate an understanding of whether discharge capacity and flow velocities could have contributed to the failure of the structure.

The drainage catchment was derived by tracing the flow paths indicated on the provided urban pipe network by the Town (DRAINS Catchment Boundaries, 2017) and was determined to be approximately 25.6 ha in size. A rainfall intensity of 26.9 mm/ hr for a 10 (Ten) year, one-hour duration event was derived from the Australian Rainfall-Runoff point source IDF curve and used as input for the hydraulic calculation. A suitable Runoff Coefficient (C-factor) of 0.8 which represents the percentage of the impervious surface present within the catchment was assumed through inspection of aerial imagery and on-site assessments. The hydraulic gradient of the existing pipe was calculated to be

approximately 1 in 150 at the last 140 m of the pipe before the discharge point. Figure 3 reflects the 140 m extent where 1 in 150 hydraulic gradient is applicable.

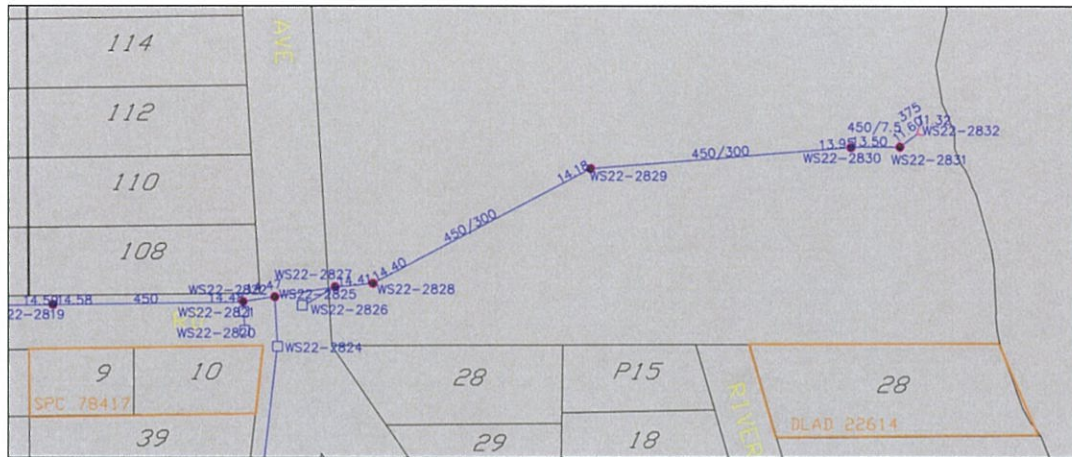


Figure 3 DRAINS section showing the stormwater pipe which discharges to the Spillway

With the above input parameters, it is calculated that the catchment would yield discharge volumes of 1.53 m³/s through the rational method. Given the pipe's high discharge invert level which was visually verified on site, the pipe was determined to be a free outfall as it is not influenced by tide levels, or by any initial downstream top water levels.

The design capacity of the existing 0.45 m dia. pipe culvert was calculated to be only 0.26 m³/s based on the Colebrook-White formula for pipe flows suggesting that the pipe is undersized. A derived size of 0.9 m dia. was required to accommodate the flow of 1.53 m³/s associated with a 10-year 1-hour duration storm event.

The 1% AEP flood map in the Town's Drainage Assessment (Cardno 2016) did not reveal significant flood issues within the Spillway catchment, suggesting that the pipe may be operating under submerged conditions given the set-out catchment specific scenarios. However, the Cardno 2016 report is a catchment-wide flood risk assessment and does not provide critical information on flow velocities and discharge volumes at the spillway structure to ascertain the operational conditions of the 0.45 m discharge pipe.

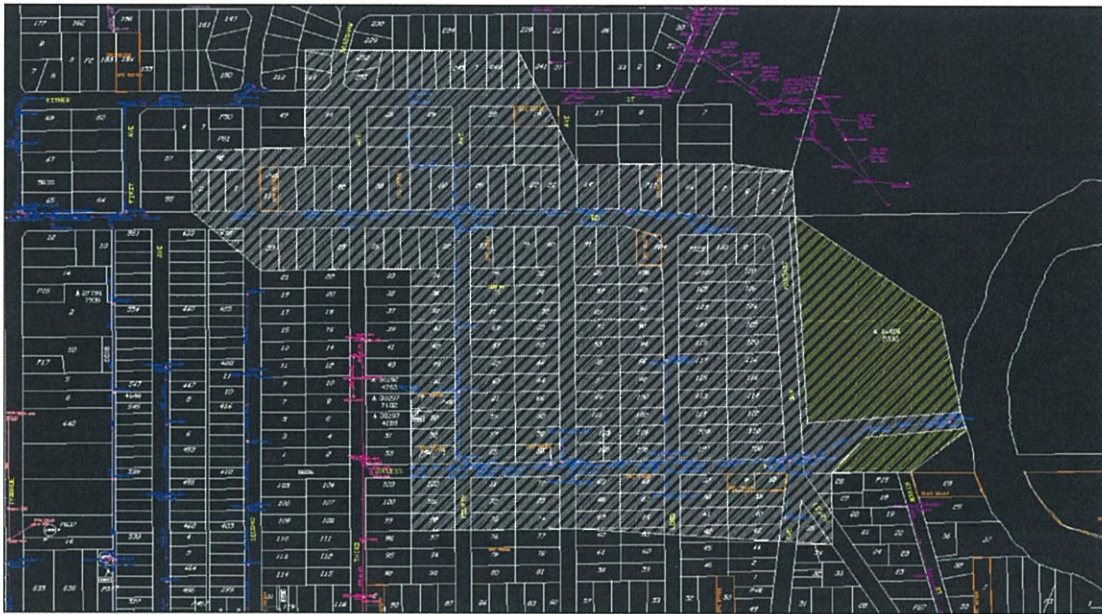


Figure 4 Urban Pipe Network and Catchments

2.2 GROUNDWATER LEVELS

Groundwater levels to be used in the investigation were obtained from previous project reports and the Perth Groundwater Map Atlas. Groundwater levels were also inspected on site near the toe of the embankments where localised areas of groundwater seepage were visually evident.

Data obtained from the Perth Groundwater Atlas indicated that groundwater levels across the Site were ~ 13 m below the natural surfaces (Figure 5), and as such, suggests that the groundwater is not impacting on the Spillway structure. However, the geotechnical report produced by CMW Geosciences (2017) stated the presence of natural springs along the western river bank, upstream of the outflow structure and close to the vicinity of the Spillway. It is possible that water seepage from the spring may have interfered (or be interfering with) the Spillway structure.

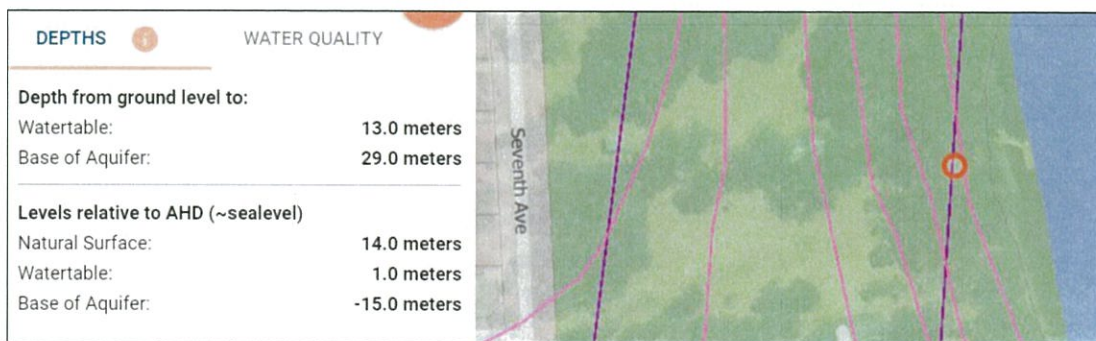


Figure 5 Perth Groundwater Map Atlas

2.3 ACID SULFATE SOILS

The Perth Groundwater Map Atlas indicates that the Spillway is located within in a high to moderate Acid Sulfate Soil (ASS) disturbance risk zone, as shown in Figure 6. The Spillway is also located in close proximity to the Swan River, a sensitive receptor which has the potential to be adversely impacted by the disturbance of ASS from activities which disturb soil and/or groundwater.

During the detailed design phase, if more than 100 m³ of soil is anticipated to be disturbed, or if dewatering/lowering of the water table is required to facilitate construction, then a site-specific ASS investigation will need to be completed in accordance with the Department of Water and Environmental Regulation's guideline Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (2015). Based on the results of the ASS investigation, the development of an ASSMP may be required to manage ASS if these are found to be present on site.

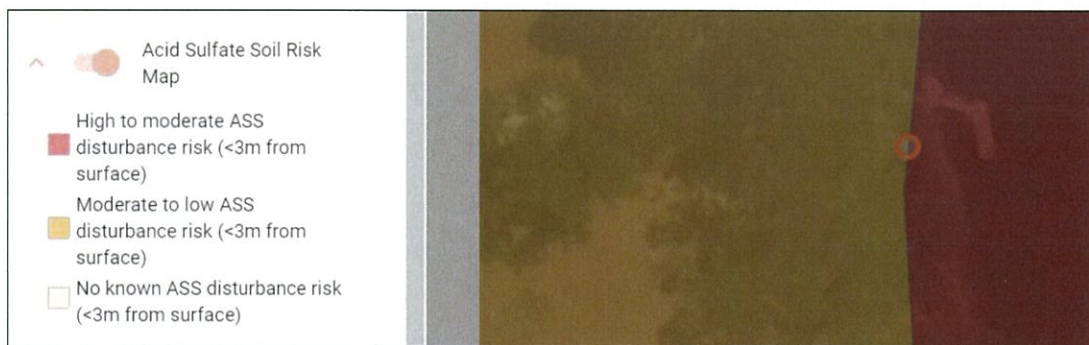


Figure 6 Acid Sulphate Soil Risk Map

Previous ASS investigations

An ASS investigation has been previously carried out in an area adjacent to the Spillway in 2009 (by MPA Williams and Associates) which identified ASS to be present at sample point HA02 within their study area, approximately 27 m north of the Spillway. As a result of the investigation, an ASS Management Plan (ASSMP) was formed by MPA Williams and Associates before the escarpment works were carried out to manage the risk from ASS.

The relative distances between the Spillway structure and the HA sampling locations tested during the 2009 ASS investigation are shown in Figure 7, which show that the HA sampling locations used in 2009 do not sit within the footprint of the Spillway area. Therefore, although the 2009 ASS investigation report indicates that ASS could be present within the Spillway footprint, the report does not characterise the risk from ASS or the specific ASS chemistry within the Spillway area.

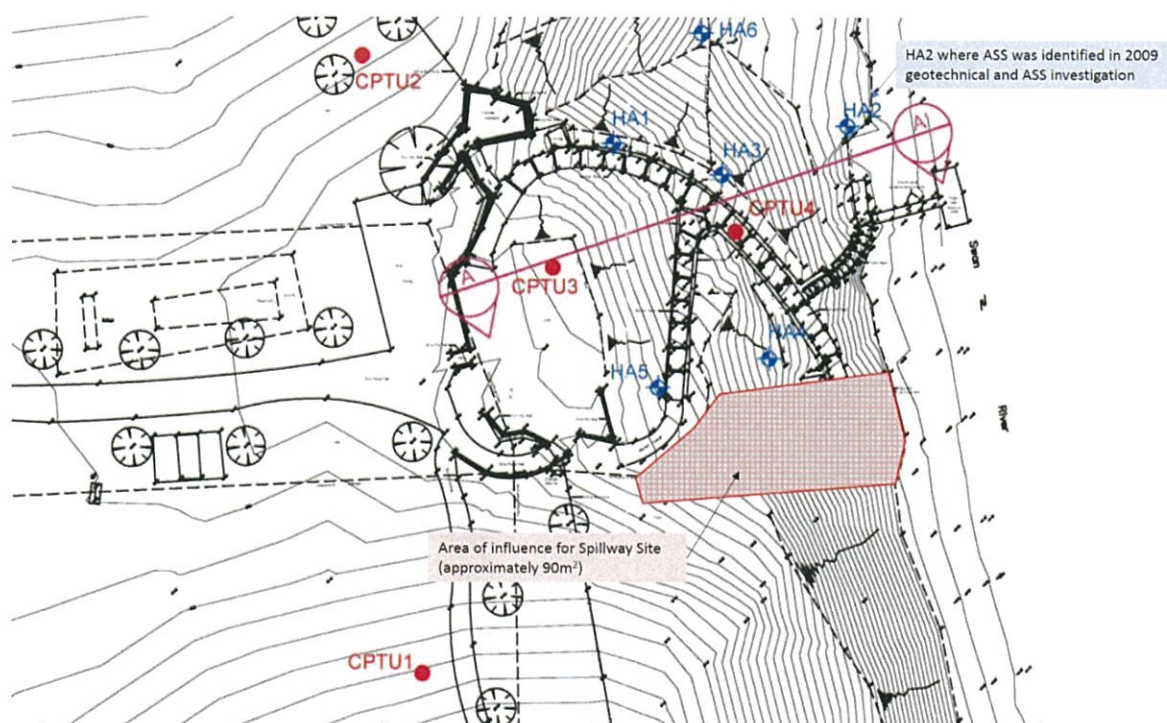


Figure 7 Sampling locations used in the 2009 ASS investigation by MPA Williams and Associates in proximity to the Spillway site

2.4 GEOTECHNICAL INVESTIGATION

Syrinx engaged CMW Geosciences to provide a specialised assessment of the Spillway's geotechnical site conditions to understand if there were any geotechnical processes within the area that could have contributed to the structural failure. The CMW Geotechnical Investigation Report (shown in Appendix 1) was used to inform this report.

Overall, the CMW Geotechnical Investigation Report has identified the Site to be highly fluvial with several factors that could have contributed to the structure's failure. These factors consist of mixed influences from both stormwater and groundwater seepage through the Spillway concrete leading to subsequent soil erosion thus undermining the structure foundation. Additionally, the natural groundwater discharge from the western river bank combined with disturbance from boat wash and foot traffic may exacerbate the broader scale natural erosion processes acting on the outside bank of the river meander on this section of the river.

The Geotechnical Investigation Report provided three viable options for remediation which Syrinx considered holistically amongst other technical elements such as arborist advice and drainage investigations which are described further in the sections below.

2.5 OVERLAND FLOW INVESTIGATION

Syrinx carried out onsite investigations and had identified several drainage issues that should be addressed to improve the current site conditions.

It appears on site that the embankment erosion and underwash of the Spillway structure have been caused by overland flows, especially at localised sections where the structure intercepts the overland flow path. Currently, the existing pedestrian footpath acts as a preferential flow path where runoff would be channelled. However, based on the height of the footpath curb (approximately 100 mm), the footpath would only be able to facilitate conveyance of the more frequent storm events. During the larger storm events, the footpaths steep hydraulic gradient and high inertia runoff volumes make it is possible for the runoff to spill over at the edge of the footpath bend as shown in Figure 8 below.

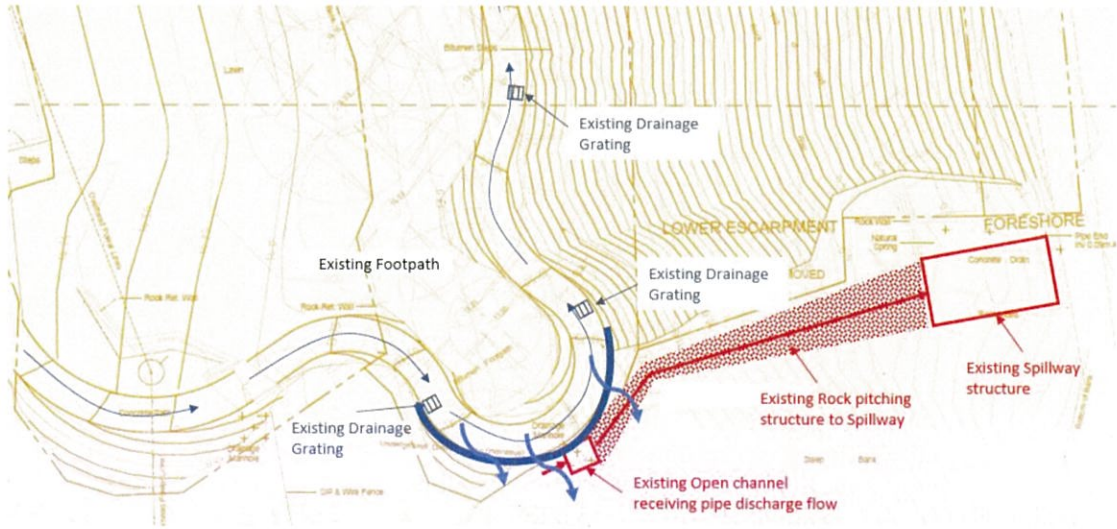


Figure 8 Overflows from existing footpath bend

The existing open discharge channel (Figure 10) that is directly receiving a discharge from the 450 mm pipe appears to be insufficient to serve the upstream drainage catchment. From hydraulic calculations, the catchment would have an approximate discharge rate of 1.53 m³/s through the pipe

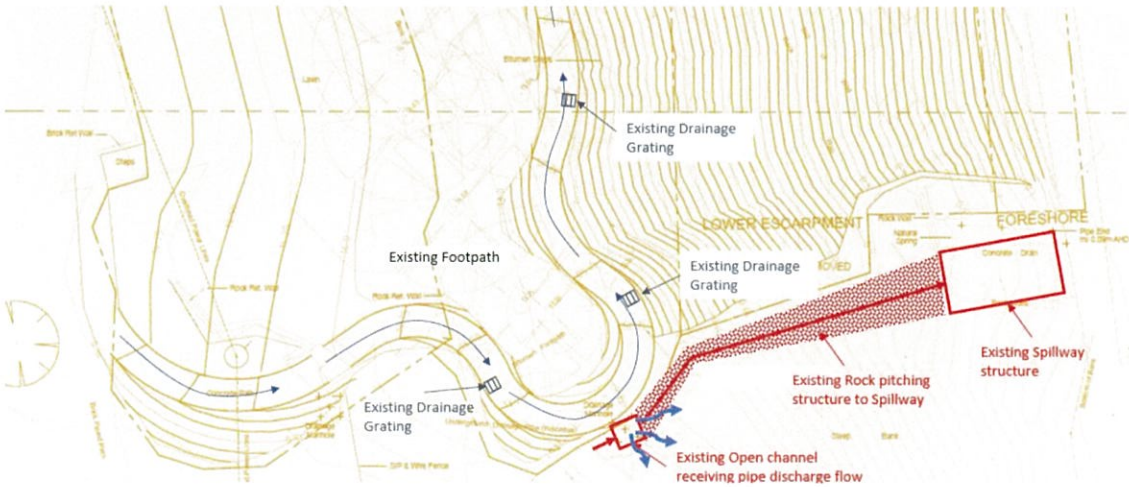


Figure 9 Inadequate Open Channel size serving existing 450 mm dia discharge pipe

under submerged conditions. These volumes would cause the open channel to overflow as the existing channel has less than the required cross-sectional flow area. In its condition, the open channel would have filled up quickly during a storm event and overflowed down the embankment thus contributing to the erosion of the embankment materials around the structure toe instead of along its designated flow path toward the Spillway.



Figure 10 Pipe Discharge Open Channel

In addition, a runoff interception gap beside the pipe discharge point has been identified where the footpath would not sufficiently intercept runoff from the higher embankments. This means that even during the frequent storm events, flows would have made its way down the embankment freely thus contributing to the erosion at the Spillway structure toe (refer to Figure 11 below).

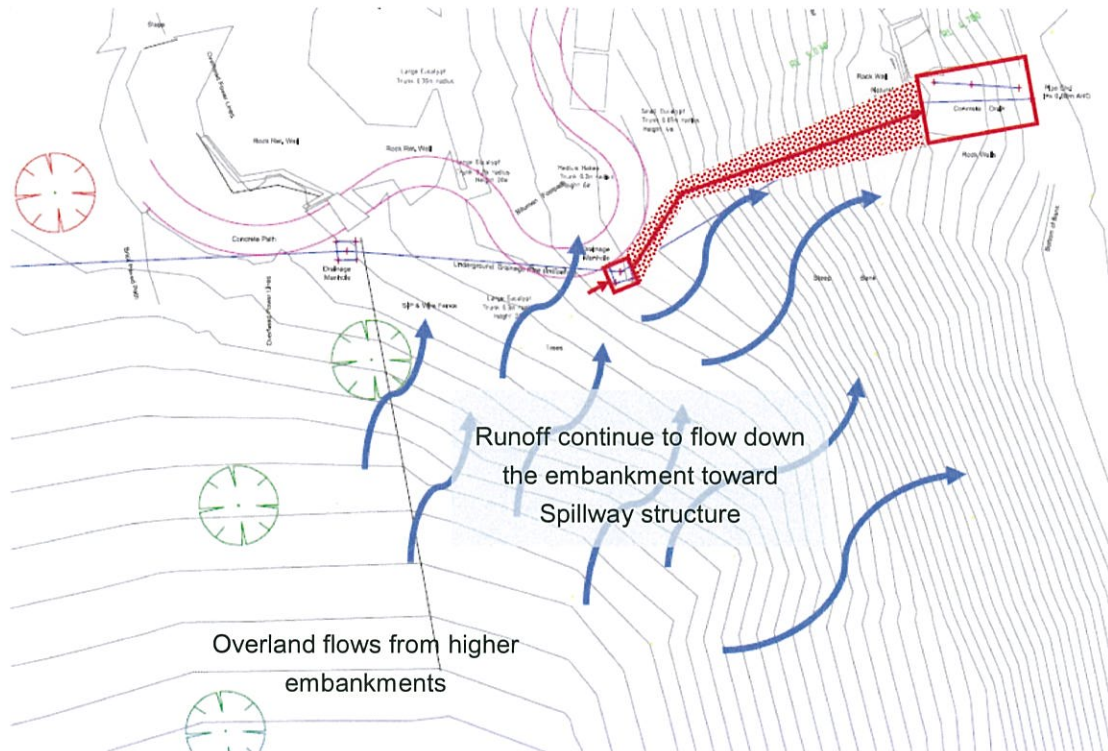


Figure 11 Un-intercepted overland flows from higher embankments

2.6 ARBORIST ASSESSMENT

Arbor Logic was engaged to assess the health and condition of the trees along the embankment within close proximity to the Spillway. This assessment was important to differentiate trees with root structures that contribute to existing slope stability, and trees with root structures that were contributing to “root wedging” and further destabilising the Spillway structure instead.

The arborist assessed tree health condition by visually inspecting the tree’s main stem, primary and secondary branch system, and tree root plate area, and in-ground stability through cracking or heaving around the tree root zone. The Arborist report describing its findings in detail has been attached to this document for further reference (refer to Appendix 2).

The Arborist assessment indicates that the trees within proximity hold low to high retention values. Trees with insignificant root strength and health were of low retention value and could potentially be removed to facilitate Spillway reinstatement works. In addition, the Spillway should be located away from trees with root structures that are seemingly threatening to the Spillway structural integrity. It is also necessary for additional protection against root wedging which is to be considered in the Spillway reinstatement design in sections where the structure comes within proximity to the tree.

Given the above findings, suitable locations for the future Spillway reinstatement works have been identified. These locations consider the necessary tree protection zones where excavations should be limited to avoid further slope destabilisation.

2.7 SUMMARY OF FINDINGS

The desktop study revealed that the primary influences that have contributed to the degradation and destabilisation of the Spillway structure are the lack of surface runoff interception and inadequate sizing of the open channel receiving discharge flow from the existing 450 mm pipe (Runoff Management). Lack of structural protection from root wedging from surrounding trees (root wedging), and the subtle ground movements associated with the geomorphological processes at the river meander (geotechnical movements).

2.8 RUNOFF MANAGEMENT

As described in Section 2.4 above, it is essential to prevent overland flows from intercepting the Spillway structure toe and causing destabilisation through undermining. From hydraulic calculations, the size of the open channel is inadequate and is the likely source of frequent spill overflows from the pipe discharge onto the embankment. The heavy rainfall event in February 2017 is likely to have further aggravated the erosion effect thus contributing to the structure's eventual failure.

Efforts to minimise overland flow erosion effects especially from spill overflows from the footpath should be made, and this can be achieved through a cut off open channel drainage system which will be further elaborated in Section 4.0.

2.9 LACK OF ROOT WEDGING PROTECTION

Arborist findings have identified explicitly that an *Agonis flexuosa* (labelled Tree no. 5, Appendix 2) appeared to have contributed significantly to the failure of the Spillway. The Spillway was constructed within its protection zone where root growth activity is unusually high. Being attracted to water, the tree roots eventually punched through the mortar structure of the Spillway causing structural damage. The root growth has subsequently created cracks and splits in the structure which aggravated the effects of underwashing from the embankment overland flows.

It was not recommended to remove the tree as it's root system and has a long-life expectancy and contributes significantly to bank stabilisation. Repositioning the Spillway away from this tree should be considered in the reinstatement design.

2.10 LACK OF PROTECTION FROM GROUND MOVEMENT

As the existing Spillway is located at the outer embankment of the river meander. The Spillway will be subject to movement from the erosion/ sedimentation geomorphological processes and flow actions of the river that the lower section of the Spillway structure may not have been protected from. This increases the potential for cracking as the embankment loses material and reductions in its passive resistance particularly in the Spillway cascade areas.

2.11 OTHER CONSIDERATIONS

The Geotechnical report from CMW Geosciences indicated water seepage within close vicinity of the Spillway in the form of a spring. It is not ascertained that this water is groundwater due to discrepancies in available groundwater data. It is suspected that the continuous flow from the existing 450 mm dia pipe may serve as the spring's primary source, e.g. flows from the pipe may be infiltrated into the embankment at localised ground depressions and emerged from the ground as "springs" through vertical sub-surface flow processes. To rule this possibility out, it is recommended for a temporary pipe be installed to divert the flow directly into the Swan River thus potentially cutting off recharge source of the spring flow and monitoring whether the spring dries out eventually.

If this is unsuccessful, then it is recommended to implement further (detailed) investigations on alternative spring input sources to identify the spring area of influence.

This should be undertaken as part of the detailed design process if the Town decides to proceed with the option described in Section 4.2 below.

3.0 RECOMMENDATIONS

The proposed approach to the Spillway restoration aims to deliver a safe and functional outfall structure by addressing the key findings described above through the following recommendations.

- Intercept adjacent overland flows and increase capacity of downstream open channel receiving 450 mm pipe to accommodate upstream catchment flow volumes;
- Realign the flow path of the Spillway structure away from the *Agonis flexuosa* as much as possible, or incorporate root wedging protection measures at critical areas that come within proximity of the tree protected zone;
- Retain large healthy trees and enhance protection of existing root system to maintain slope stability;
- Provide temporary discharge pipe to facilitate direct discharge from existing 450 mm dia pipe to Swan River to minimise surface overland flow down the embankment and potential recharge of springs;
- The stormwater pit upstream of pipe discharge shall be patched/ fixed to minimise seepage through the embankment;
- Provide rock revetment protection along the toe of the embankment to reduce the effects of river erosion geomorphological processes that could compromise structural stability at the Spillway outlet;
- Due diligence investigation of the presence of Acid Sulphate Soils as the Site is within high to moderate ASS disturbance risk zone (<3 m from surface).

Given the above recommendations, Syrinx has prepared the following possible solution for consideration. This proposal also considers construction feasibility such as site access, machine movement and steep slope conditions. Order of Magnitude cost for each option can be referred to in Appendix 4.

3.1 DIRECT PIPE DISCHARGE TO RIVER

- Allow existing overland flow to flow across the pedestrian footpath;
- Provide an open stormwater channel along the outer edge of the footpath where the path bends to the left. The channel will capture the adjacent overland flows from the higher embankments and runoff spillovers from the pedestrian footpath. It is recommended that the Channel be sized to accommodate 1 in 10-year storm events (minimally);
- Modify existing stormwater pit to serve open stormwater channel;
- The open channel will be connected to the existing stormwater pit;
- Install an outflow pipe that extends from the existing stormwater pit to the toe of the embankment where the stormwater discharges through a headwall into the Swan River and will include two manholes. The pipe shall be sized to at least 900 mm dia to cater for a 10-year 1-hour duration storm event;
- Provide a rock riprap open channel from the pipe discharge headwall to dissipate velocities and hydraulic energy before discharging into the River (to be explored in further detail during the Detailed Design phase).

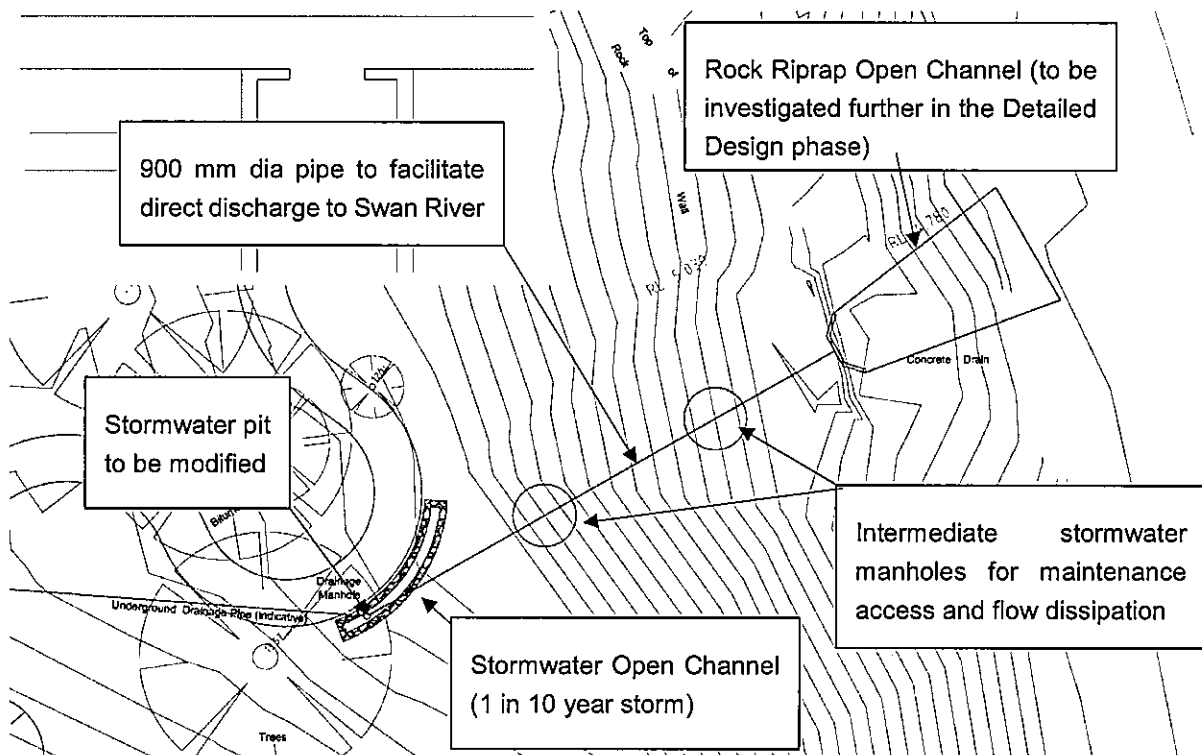


Figure 12 Direct Pipe Discharge to River Option

3.2 OPEN CHANNEL DISCHARGE TO RIVER

- Allow existing overland flow to flow across the pedestrian footpath;
- Provide an open stormwater channel along the outer edge of the footpath where the path curves towards the stairs leading to the jetty . The channel will capture the adjacent overland flows from the higher embankments, runoff spill overs from the pedestrian footpath;
- Install an open flow channel rock outflow structure (e.g. Reno Mattress and gabion walls) extending from the footpath bend to the River as shown in the diagram below sized to accommodate the overland flow runoff and 450 mm dia existing pipe discharge;
- The rock outflow channel shall be sized to approximately 2 m wide to accommodate a 10-year, 1-hour duration storm event. The channel shall be consistently 2 m wide throughout from the 450 mm dia pipe discharge to the discharge point at the river;
- A series of cascades shall be provided along the flow path down the embankment to dissipate flow energies and velocities; and
- Geotextile underlay will be provided through the proposed rock outflow structure to create separation and reduce effects of undermining from subsurface flows.

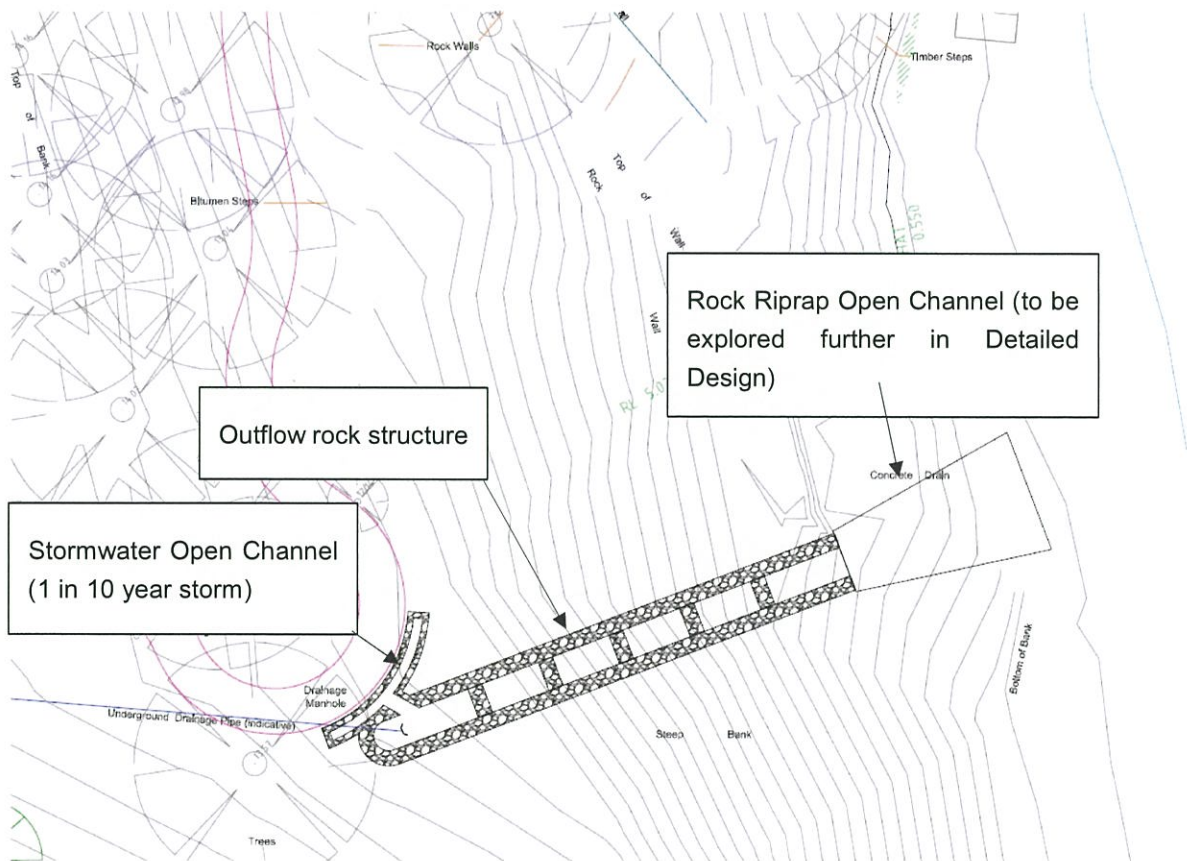


Figure 13 Open Channel Discharge to River Option

3.3 RECOMMENDATION FOR INTERIM MEASURE

- Install a pipe from the existing 450 mm dia discharge pipe to be discharged directly into the Swan River through a rock riffle;
- The pipe should be connected seamlessly to the existing 450 mm dia pipe to ensure no leakage of flows that could contribute to overland runoff;
- The pipe shall be laid on the surface of the embankment with anchor blocks placed at intervals throughout its length to maintain its overall intended alignment;
- It is suspected that the consistent flow from the existing 450 mm dia discharge pipe may have contributed to the development of the springs below, the interim pipe will prevent runoff from flowing down the surface of the embankment thus cutting off this supply and would be the first step to assessing whether the continuous flow is indeed contributing to the spring development. From there, it can be further assessed whether more detailed investigations on the springs will be necessary during the Detailed Design phase;
- Patch and seal the existing cracked stormwater pit (presented in Figure 16 and Figure 15) that is connected to the existing 450 mm dia pipe. Location of the cracked Stormwater pit is reflected in Figure 14; and
- Gaps, holes, and depressions created by the collapse of the Spillway structure shall be backfilled with blue metal until the new permanent structure is completed.

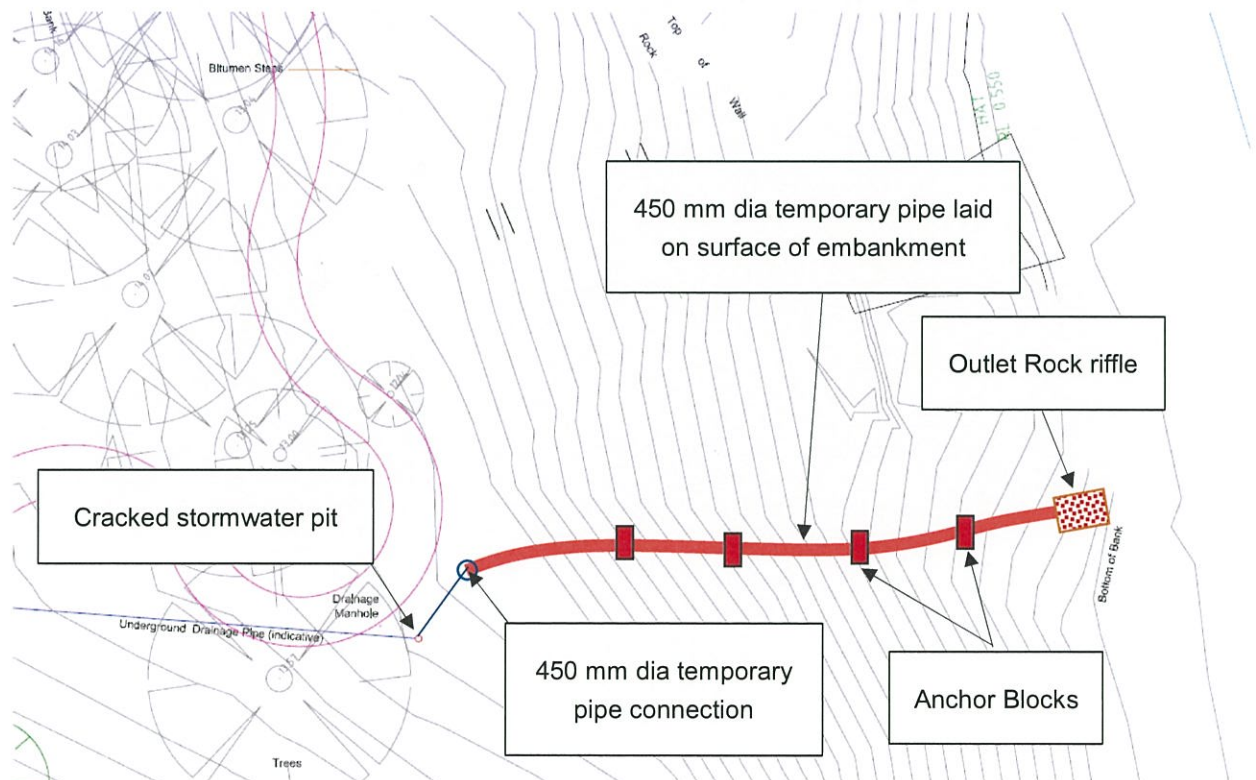


Figure 14 Interim measure for Spillway discharge



Figure 16 Image of cracked stormwater pit from the ground surface

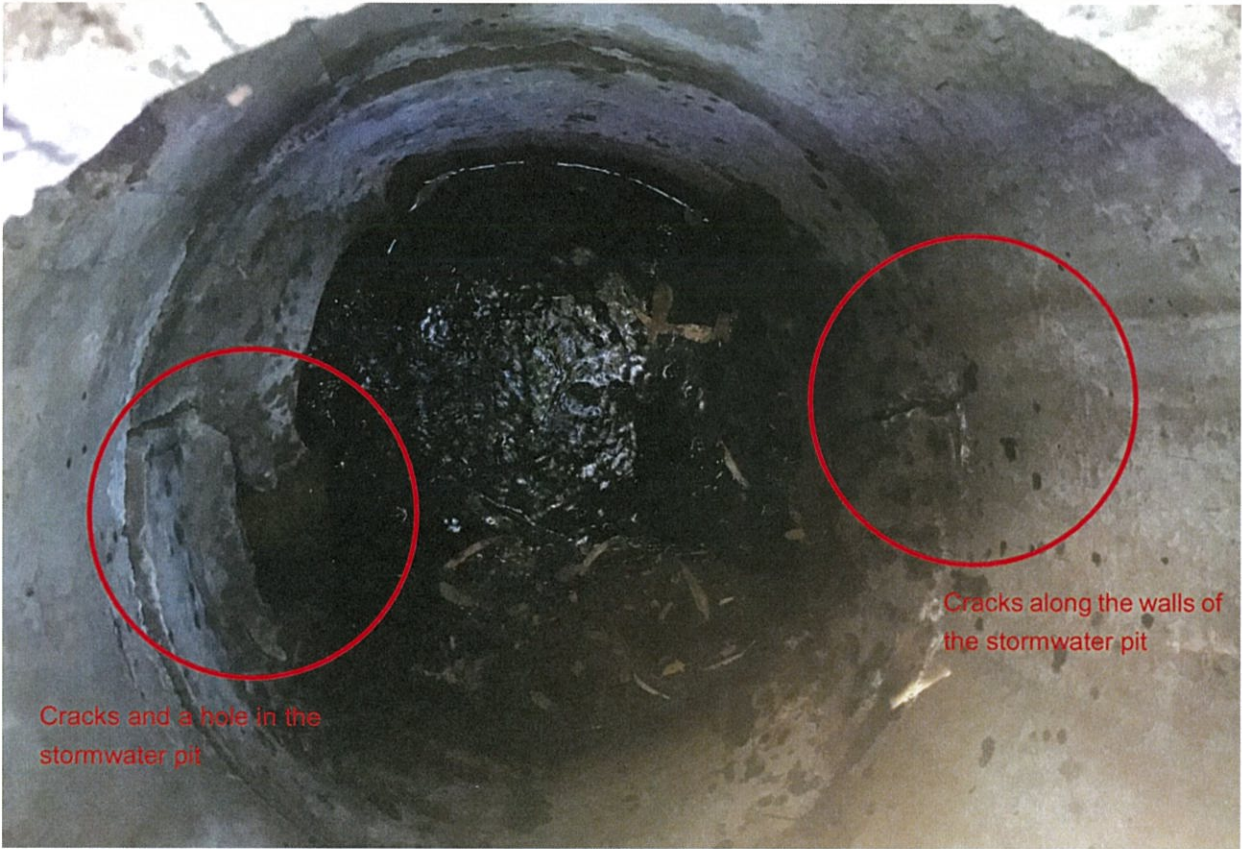


Figure 15 Image of cracks in stormwater pit that requires patching and sealing

4.0 CONCLUSION

Considering the issues and options above, Syrinx recommends a Direct Discharge to River (refer to Section 4.1) because this option eliminates the issue of overland flow down the embankment altogether through pipe installation. It is also simpler and more flexible to identify a suitable pipe alignment than a flow path for a "waterfall".

Nonetheless, the Open Channel Discharge to River (refer to Section 4.2) can be considered if the Town is concerned about visual aesthetics and would like to maintain a view of open water flow as users walk down the existing pathway towards the jetty. This approach would require a more detailed assessment of the natural springs if evidence of a spring is still present despite diverting the 450 mm dia discharge pipe to the Swann River.

5.0 RECOMMENDATIONS FOR FURTHER WORKS

Following the review of this document, it is recommended that a Concept Design for the preferred options (x2) be developed followed by Detailed Design for the preferred option.

The Order of Magnitude cost for each option has been provided in Appendix 4.

REFERENCES

CMW Geosciences (21 November 2017). Success Hill Reserve Drainage Outfall Structure.

ARBOR Logic (20 November 2017). Assessment of Trees; Spillway, Success Hill Reserve.

Ben Nash Surveys (28 November 2017) Success Survey.

DRAIN Catchment Boundaries (2017) The Town of Bassendean.

Best Management Practices for Foreshore Stabilisation 2009, Swan River Trust, Approaches and Decision-Support Framework.

Water and Rivers Commission 2000, Stream Stabilisation Water and Rivers Commission, River Restoration Report No. RR 10.

Ministry for employment protection; Housing and Works; Indigenous affairs; Heritage; Land information, ref no: 11-13179, Section 18 to Town of Bassendean 11 February 2009.

Cardno 2016, Bassendean Drainage Assessment – Drainage Review and Assessment, CW926200.

APPENDICES

APPENDIX 1 GEOTECHNICAL INVESTIGATION

TECHNICAL MEMORANDUM

To: Syrinx Environmental

From: Dave Pearce

Attention: Lazar Cirkovic

Date: 11 January 2018

Email: LCirkovic@syrinx.net.au

Reference: PER2017-0267AB Rev 1

Cc: AJohnston@syrinx.net.au

Pages: 7

Subject: **SUCCESS HILL RESERVE DRAINAGE OUTFALL STRUCTURE**

1 SCOPE

This technical memorandum presents the findings of a site visit undertaken on 20 November 2017 by CMW Geosciences Pty Ltd (CMW) to the Success Hill Reserve drainage outfall structure. The scope of work and associated terms and conditions of our engagement were detailed in our CTR (ref. PER2017 - 0267AA, Rev 0) dated 1st June 2017.

2 OBSERVATIONS

- The drainage outfall structure comprises a 4-tier concrete/rock construction that was designed to facilitate the flow of stormwater/groundwater from a pipe outlet at the top of the slope into the river below;
- The slope is approximately 10.0m to 15.0m in height at angles of approximately 45° - 60° comprising predominantly sand with clay, trace gravel. The slope is vegetated with frequent, large (>5.0m tall), mature trees and abundant small shrubs and grasses;
- The second horizontal tier (upslope from the river) has collapsed and broken into concrete fragments up to 2.5m in length. Due to the collapse, the water flow has been diverted from the outflow structure and is actively eroding the natural slope causing further instability to the existing structure and nearby trees;
- The diverted water flow has created a scour feature within the natural sandy embankment approximately 1.0m in depth and 2.0m to 3.0m wide at the base of the slope which has led to the collapse of the outfall structure in this location;
- The remaining outfall structure was observed to be in varied condition and age. Tension cracks and evidence of erosion were observed in several places within the concrete;
- On a broader scale, the drainage outfall structure is situated on the western outside-cut bank of a relatively tight meander in the river channel; and
- Several natural springs can be observed to be outflowing from the western river bank, upstream of the outflow structure.

3 DISCUSSION AND CONCLUSION

In a broad sense, the embankment in this location may currently be being subjected to a number of natural and anthropogenic actions and these are briefly summarised as follows:

3.1 Ongoing Natural Actions

- The bank of the river on the outside of the meander may be undergoing continual natural erosion, particularly in times of flood water levels with fast water flow along this area of the bank;
- This ongoing erosion of the toe of the slope may lead to slope instability (as seen in Photographs 5 below);
- The embankment slope is also at quite a steep angle which may be subject to ongoing slope movement (creep);
- The possible presence of groundwater springs within the slope embankment may lead to additional soil erosion and scour;
- Flow of rainwater overland down the slope may also cause erosion, scour and instability.

3.2 Anthropogenic Actions

- The erosion of the river bank may also be exacerbated by the presence of leisure boats in this area causing additional wash to the bank;
- Foot traffic in this area of the embankment may also cause additional slope instability by reducing vegetation;
- The presence of concentrated water flow within and around the outfall structure may cause additional soil erosion and instability.

3.3 Outfall Collapse

The collapse of the outflow structure was likely caused by a combination of the actions detailed above. In particular, either seepage of the stormwater through the concrete and subsequent soil erosion undermining the structure foundation or erosion of the structures foundation from groundwater spring flow leading to collapse. It is likely that the stormwater breached the outflow structure at areas of cracking from slope movement or concrete erosion (particularly in areas of the waterfall features form tier to tier).

4 RECOMMENDATIONS AND REMEDIATION OPTIONS

It is important to note that the natural actions detailed above will be an ongoing process that cannot be readily controlled without significant engineering. Given that the location is a natural river bank with no public access and only an outfall structure as an asset, the undertaking of significant engineering remediation or stabilisation is not considered beneficial for this project.

However, it must be borne in mind that, if another structure is proposed, the slope will continue to be subjected to the processes detailed above which will likely influence it. The eventual remediation option chosen to rectify the collapsed section of the drainage outfall structure and provide an alternative outfall must consider this.

In addition, access to the drainage outfall structure is difficult, even on foot, and may present challenges regarding remediation measures that require conventional earthmoving plant.

Based on the above, several remediation options are possible, as follows:

Option 1

- Temporarily divert the flow of water with provisional flexible piping to the base of the embankment;
- Remove the two large trees surrounding the collapsed section and the larger broken pieces of concrete;
- Fill the scour hole with stone aggregate; and

- Reconstruct the horizontal concrete apron at the collapsed section and fix / patch other cracked/damaged sections of the structure.

Option 2

- Temporarily divert the flow of water with provisional flexible piping to the base of the embankment;
- Remove the two large trees surrounding the collapsed section and the larger broken pieces of concrete;
- Fill the scour hole with stone aggregate; and
- Demolish the entire existing drainage outflow structure and reconstruct a new structure based on either the existing or new design.

Option 3

- Temporarily divert the flow of water with provisional flexible piping to the base of the embankment;
- Excavate a permanent flexible piping system into the embankment connected to a small concrete outflow structure at the base of the slope to facilitate the storm water/ground water discharge into the river;
- Leave the existing structure in place and fill the scour hole with stone aggregate / rock fill.

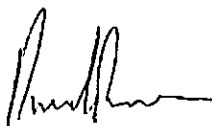
Option 3 presents the remediation method likely to limit disturbance to the river embankment and cost associated with remediation. It also presents a solution that will be least affected by the advance of embankment erosion as no structures are proposed.

If an additional outfall structure is being proposed, then it is recommended that an additional intrusive geotechnical investigation is completed in order to provide an assessment to aid design and construction of the structure.

5 CLOSURE

This report has been prepared for use by Syrinx Environmental in relation to the Success Hill Drainage Outfall Structure project in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. Use of this report by parties other than Syrinx Environmental and their respective consultants and contractors is at their risk as it may not contain sufficient information for any other purposes.

For and on behalf of
CMW Geosciences Pty Ltd



Dave Pearce
Engineering Geologist



Reviewed by: **Alex Petty**
Associate

Distribution: 1 copy to Client (electronic)

Original held by CMW Geosciences Pty Ltd

Appendix A Photographs



Photograph 1: Scour feature and collapsed 2nd tier concrete structure.



Photograph 2: Outflow pipe at the top of the embankment.



Photograph 3: Tension cracking within the existing structure.



Photograph 4: Natural spring outflowing on the western river embankment upstream of the drainage outflow structure.



Photograph 5: (Right) Outflow structure. (Left) Recent collapse of several trees due to ongoing slope instability.

APPENDIX 2 ARBORIST ASSESSMENT



November 20, 2017

Syrinx Environmental Pty Ltd
12 Monger Street
Perth WA 6000

Attn: Lazar Cirkovic

RE: Assessment of Trees; Spillway, Success Hill Reserve

Dear Lazar

Further to your request and my inspection of the trees in the identified area, the following is a brief of my findings and comments at this time.

Should you have any queries regarding this report, or if I can be of any further assistance, please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read "JRM", is written over a light blue horizontal line.

JASON ROYAL

Dip. Arboriculture (UK)
Tech. Arbor A

1. Terminology Used

The following terminology has been commonly used throughout this report:

“Trees”	meaning the trees that are the subject of this report situated in the identified area of the existing spillway at Success Hill Reserve
“TPZ”	meaning ‘Tree Protection Zone’; the area where the majority of the Tree’s root mass is considered likely to be found. Any works required in this zone are considered likely to have some potential to impact the Tree’s future health.
“SRZ”	meaning ‘structural root zone; the area where the majority of the Tree’s larger in-ground supportive root mass is considered likely to be found. Any works required in this zone are considered likely to have some potential to impact the Tree’s future health and possibly its in-ground stability as well.
“AS 4970”	meaning Australian Standards 4970; Protection of Trees on Development Sites
“AS 4373”	meaning Australian Standards 4373; Pruning of Amenity Trees

2. Purpose of the Assessment

Undertake an assessment of the Trees in the identified area to provide comment on their species, current condition, suitability for the given area and provide general considerations for any design of any changes to the existing spillway.

3. Particulars of this Assessment

The findings and opinion provided in this report are my own and have been based on the visual observations of the Tree undertaken on the morning of November 16, 2017.

All observations of the Trees were undertaken from ground level.

No exploratory excavations were undertaken as part of this particular assessment to verify the actual root zone spread of each Tree.

As such the allocation of TPZ for each Tree has at this stage been based on AS 4970 guidelines, with some amendments being made for the physical size and canopy dimensions of the Tree, its condition, the known root zone morphology of its given species in the sort of soil profile considered to be typical to this area of Western Australia.

4. Method of the Assessment

The Trees were visually assessed from ground level in accordance with 'visual tree assessment' methods¹ and principles. This is a method based on the sciences of tree biology, physiology, tree structure, and tree bio-mechanics. It is a method widely used by arborists worldwide to identify visible signs on trees that provide an indication as to its health and structural properties at the time of inspection.

The overall health of each Tree was adjudged from an inspection of its leaf, overall percentage of leaf mass present in the canopy of the Tree, and the presence (or absence) of any pest or disease factor that could have an effect on the overall health of the Tree.

The structural integrity of each Tree was determined from a visual inspection of its main stem, primary (and secondary) branch unions to determine the presence of any areas considered to be a structural 'defect' or 'imperfection' such as unions with included bark, swelling, or noticeable splitting at them. Symptoms of decay, growth patterns and defects are identified and assessed as to their potential to cause whole tree, part tree or branch failure, and where considered necessary further investigation by way of the use of sounding techniques was utilised to determine the presence and general extent of any areas of cavity or associated decay within a tree's main stem structure.

Each Tree's root plate area was also inspected to identify any visible signs of root plate, movement, cracking or heave from which a determination of the in-ground stability of the Tree can be ascertained.

With regards to any future works the known root zone morphology of the species was taken into consideration when allocating the recommended TPZ for each of the identified trees. Note: Whilst some reference and acknowledgment is given to the guidelines set down in AS 4970, the TPZ for each Tree has been based on the known typical root zone morphology for specimens of their species, the condition of the given Tree, and the known tolerance to root zone disturbance of the given species.

The Trees were also assessed using the principles of SULE; "Safe-Useful-Life-Expectancy"².

SULE is a system that can be used to provide an indication of the length of time an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection.

It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor based on the tree's current health and structural condition, and the known typical life span of specimens of its given species for the given area/situation. There are many factors that can affect SULE of a tree such as:

- Obvious past influences.
- Health and vitality and presence of any pest or disease pathogen.
- Estimated age in relation to expected life expectancy for the species.
- Structural defects which may influence the potential life expectancy for the species.
- Remedial work which may be necessary to allow retention in the existing situation.
- 'Rootable' soil volume for the area in which it is situated.
- Environment and climate factors.

As such, at best the SULE for any given tree can only be estimated within a 'range' of years, with the following ranges typically used; Long Term (>40 years), Medium Term (15-40 years), Short Term (5-15 years), and Limited (<5yrs). Whilst there are many variables that can affect a tree's SULE, this information can be used as a guideline to the potential usefulness of retaining each Tree.

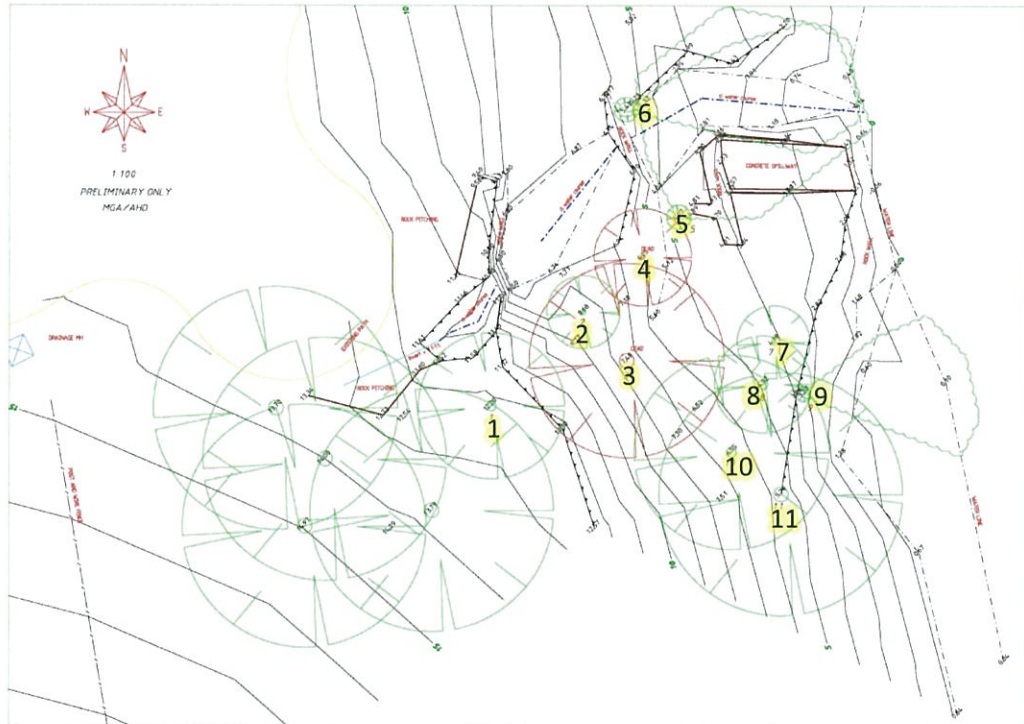
¹ Field Guide for Visual Tree Assessment (VTA); The Body Language of Trees, A Handbook for Failure Analysis; C Mattek, H Breloer

² SULE: Its use and status into the new millennium; J Barrell; 2001

5. Summary of Key Findings of the Assessment

11 Trees of notable size were identified in the area inspected.

A guide to their location has been provided below.



Six of the Trees were identified as West Australian Peppermint (*Agonis flexuosa*), the majority of which were noted to be juvenile or semi-mature specimens.

Three of the Trees were identified as Swamp Sheoak (*Casuarina obesa*); two of which are dead.

One other Tree was identified as a Bracelet Honey Myrtle (*Melaleuca armillaris*) and looks to have previously failed (root plate failure) but has retained sufficient root mass to keep alive.

All of the Trees are considered to be species common to the metropolitan Perth area, and are considered suitable for the given area/situation.

Two of the Trees in the area inspected were noted to be dead, and as such were considered to have a low retention value from an arboricultural point of view.

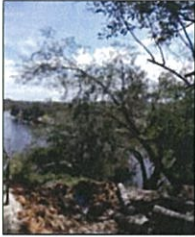


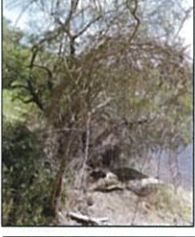



All of the other Trees looked to be in good health at this time based on the condition of their leaf and overall volume of leaf mass present in their canopy.



Two other Trees in the area inspected were noted to have failed at/below ground level; one of which was noted to have fallen into the Swan River.

There is also some evidence to suggest that one other Tree (a WA Peppermint) may have partially failed at/below ground level but has since re-stabilised; the largest oldest Tree in the area inspected.

Three other Trees in the area inspected (all juvenile WA Peppermint) showed evidence to suggest that root plate failure is likely to occur in the foreseeable future; unless measures are taken to prevent further undermining of their root plate and/or prevent further erosion of the embankment area.

The table overleaf provides further details on each of the identified Trees.

Tree No	Species	Height (metres)	DBH (cm)	Approx. Canopy Spread (metres diameter)		Health	Structure	Age Class	SULE	Image	Comments	Retention Value
				N-S	E-W							
1	West Australian Peppermint (<i>Agonis flexuosa</i>)	6.5	25	3-4	3-4	Excellent	Acceptable	Semi-mature	Long term (>40 yrs)		Reasonably good specimen. Grown on a lean but not considered an issue at this time. Top of embankment near pipe exit point	Medium
2	Swamp Sheoak (<i>Casuarina obesa</i>)	2.5	15	2-3	2-3	Excellent	Acceptable	Semi-mature	Long term (>40 yrs)		Ok specimen. Smaller tree. Section of its canopy has been topped. Otherwise ok	Low
3	Swamp Sheoak (<i>Casuarina obesa</i>)	9	72	5-6	6-7	Dead	Questionable	Mature	n/a dead tree		Dead tree. Mid-embankment area	Very Low
4	Swamp Sheoak (<i>Casuarina obesa</i>)	6	18	2-3	2-3	Dead	Questionable	Semi-mature	n/a dead tree		Dead tree. Mid-embankment area	Very Low
5	West Australian Peppermint (<i>Agonis flexuosa</i>)	9	106	7-8	9-10	Excellent	Acceptable	Mature	Long term (>40 yrs)		Large mature specimen. Possible partial root plate failure but equally looks to be root stable at this time. Area of decay noted in lower main stem. Not of a major concern at this time. Any excavation to its west or south could have major implications to its in ground stability. All canopy to the east of its main stem	Medium
6	Bracelet Honey Myrtle (<i>Melaleuca armillaris</i>)	9	32	4-5	n/a	Good	Questionable	Mature	Short-term (5-15 yrs)		Ok specimen. Looks to have fallen but kept growing. Any excavation to its west could have major implications to its in ground stability. All canopy east of base of main stem	Low
7	West Australian Peppermint (<i>Agonis flexuosa</i>)	7	16	2-3	5-6	Excellent	Undesirable	Semi-mature	Medium term (15-40 yrs)		Ok specimen. Grown on a lean. Ok at this time but may cause issues longer term. All canopy east of base of main stem. Any excavation to its west could have major implications to its in ground stability	Low

Tree No	Species	Height (metres)	DBH (cm)	Approx. Canopy Spread (metres diameter)		Health	Structure	Age Class	SULE	Image	Comments	Retention Value
				N-S	E-W							
8	West Australian Peppermint (<i>Agonis flexuosa</i>)	7	14	2-3	2-3	Excellent	Acceptable	Semi-mature	Long term (>40 yrs)		Reasonably good specimen. Grown on a slight lean but not considered an issue at this time. All canopy east of base of main stem. Any excavation to its west could have major implications to its in ground stability	Low
9	West Australian Peppermint (<i>Agonis flexuosa</i>)	10	50	6-7	n/a	Good	Poor	Mature	Limited (<5 yrs)		Up-rooted and fallen into River	Very Low
10	West Australian Peppermint (<i>Agonis flexuosa</i>)	8	18	2-3	2-3	Excellent	Acceptable	Semi-mature	Short-term (5-15 yrs)		Ok specimen. Very edge of embankment; failure looks likely in foreseeable future unless measures are taken to stop further undermining and embankment erosion	Low
11	West Australian Peppermint (<i>Agonis flexuosa</i>)	11	30	3-4	5-6	Excellent	Acceptable	Semi-mature	Short-term (5-15 yrs)		Ok specimen. Very edge of embankment; failure looks likely in foreseeable future unless measures are taken to stop further undermining and embankment erosion	Low

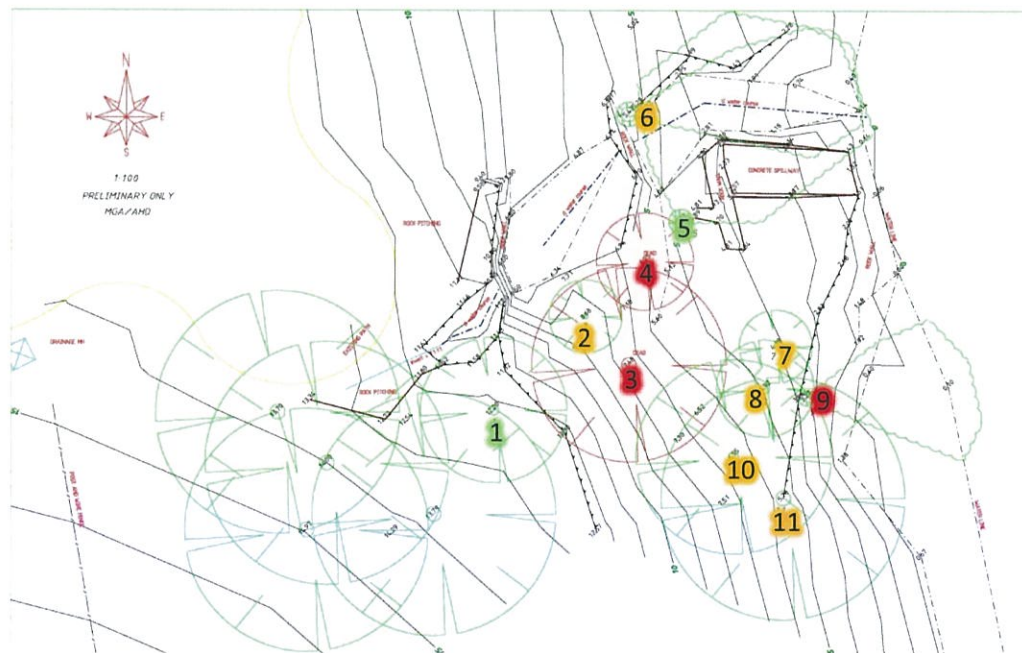
6. Design Considerations

6.1 Retention Value

The two dead Trees are considered to have a very low retention value from an arboricultural point of view. One of the Trees that has suffered root plate failure is also considered to have a very low retention value from an arboricultural point of view.

The smaller leaning juvenile Trees are also considered to have a lower retention value from an arboricultural point of view.

This opinion has been expressed on a copy of the Site plan below and is recommended to be taken into consideration as part of the design process.



- Red Numbers; Very Low retention value
- Orange Numbers; Lower retention value
- Green Numbers; Trees with most retention value for this Site

6.2 The location of the Trees is recommended to be accurately surveyed along with their current existing ground level and overlaid onto any design drawings to ascertain potential impact to the Trees.

6.3 The nominal TPZ of each Tree to be retained is recommended to be overlaid onto any design drawings to ascertain any potential encroachments.

Should any be noted then further arboricultural input is recommended to be sought.

6.4 Suggest looking to construct any spillway structures on top of the existing ground levels and minimise the need for any excavations within the nominal TPZ area of any Tree desired to be retained.

6.5 **In particular any excavations undertaken in the areas of TPZ to the west/south-west of the Trees can be expected to have a major impact to their in-ground stability; particularly those Trees that already look to have been subject to some degree of root plate failure.** This factor needs to be taken into consideration if these Trees are desired to be retained.

6.6 Any design proposed is recommended to have a degree of further arboricultural input to review and determine potential impact to any Trees to be retained.

Attachment; Company Information and Disclaimer

Company Name:



A.C.N.:

107 194 061

A.B.N.:

66 566 369 687

Insurance Details:

General Liability;	QBE	\$20 million
Professional Indemnity;	Vero	\$10 million
Personal Protection;	Macquarie, Asteron	

Office/Contact Details

Postal Address:	PO Box 1025, Balcatta WA 6914
Physical Office Address:	4c/5 Mumford Place, Balcatta
Ph:	(08) 9240 7555
Fax:	(08) 9240 7522

Consultant Details

Consultant Contact:	Jason Royal Dip. Arboriculture (UK) Tech. Arbor A
Ph:	(08) 9240 7555
Mobile:	0409 105 745
Email:	jason@arborlogic.com.au



Disclaimer

This advice has been provided in good faith and based upon the material information provided by the Client to Arbor logic, and based on the visual inspection of the tree(s) at the time this advice was prepared.

Arbor logic does not accept liability arising out of loss or damage that results from: -

- Material information not being provided by the Client to Arbor logic at the time this advice was prepared.
- The provision of misleading or incorrect information by the Client or any other party to Arbor logic upon which this advice was prepared.
- This advice being used by the Client or any other party in circumstances or situations other than the specific subject of this advice.
- Failure by the Client to follow this advice.
- The action(s) or inaction(s) of the Client or any other party that gives rise to the loss of, or damage to, the subject of this advice.

The information provided in this advice may not be reissued or printed without Arbor logic's written permission.

It is also important to take into consideration that all trees are living organisms and as such there are many variables that can affect their health and structural properties that remain beyond the scope of reasonable management practices or the advice provided in this report based on the visual inspection of the tree(s).

As such a degree of risk will still remain with any given tree(s) despite the adoption of any best management practices or recommendations made in this report.

APPENDIX 3 INDIGENOUS CONSULTATION (SECTION 18)



MINISTER FOR
EMPLOYMENT PROTECTION; HOUSING AND WORKS; INDIGENOUS AFFAIRS;
HERITAGE; LAND INFORMATION

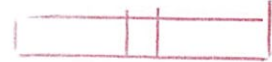


Our Ref: 11-13179



Mr Larry Fouracres
Manager State Lands – Metropolitan
State Land Services
PO Box 1575
MIDLAND WA 6936

Document #: ILET-321508
Date: 20.02.2008
Officer: SIMON STEWERT-DAWKINS
File: PARE/DESCONT/2



Dear Mr Fouracres

I refer to the Notice dated 27 August 2007 (received by the Department of Indigenous Affairs ("DIA") on 30 August 2007) submitted by the Town of Bassendean and the subsequent notice submitted by State Land Services ("the Landowner") on behalf of the Town of Bassendean on 8 January 2008 to the Aboriginal Cultural Material Committee ("ACMC") pursuant to section 18(2) of the *Aboriginal Heritage Act 1972* ("AHA").

The Notice advised that the land described in Schedule 1 of the Notice as A Class Reserve 16456 Success Hill, Bassendean ("the Land"), for the purpose described in Schedule 2 of the Notice as improvements to the reserve amenity, recreational facilities and environmental aspects of the Success Hill Reserve ("the Purpose").

In accordance with my powers under section 18(3) of the AHA and following consideration of recommendations from the ACMC, I hereby grant consent to the use of the Land for the Purpose subject to the conditions set out below.

I am advised that based on current knowledge the Purpose will impact upon two Aboriginal sites within the meaning of section 5 of the AHA ("Sites") on the Land. The Sites are DIA 3536 (Swan River) and DIA 3757 (Success Hill).

Conditions of Consent

That the Landowner:

1. Immediately cease carrying out of the Purpose if skeletal remains ("Remains") are found and report the matter to the Western Australia Police and the Registrar of Aboriginal Sites ("the Registrar"). Where it is determined that the Remains are Aboriginal in origin and not a police matter, they must remain *in situ* and undisturbed until the Registrar makes a decision about how to proceed in respect of the Remains. The Landowner must at its expense manage the Remains in accordance with the Registrar's decision and report the whereabouts of the Remains to the DIA and Anthropology Department of the Western Australian Museum.

2. Provide to the Registrar annually, or at the completion of the Purpose if the Purpose is completed within one year, a written report advising the Registrar whether and to what extent the Purpose has impacted on all or any Sites or objects within the meaning of section 6 of the AHA ("Objects") that may be located on the Land and to assist the ACMC to reassess the status of the Sites. This report is to include a detailed description of:
- a. whether such Sites or Objects have been partially or entirely impacted by the Purpose;
 - b. the level, type and effect of any such impact (including, where possible, the provision of photographs taken during and after the impact);
 - c. where Sites or Objects have been salvaged, when and how such salvage took place, who was present at the salvage and, subject to issues of cultural confidentiality, to where the material was re-located.

This condition should not be construed as preventing the proponent from advising the Registrar in writing of all or any of the matters outlined above at any time prior to the completion of the Purpose. The Registrar and the ACMC welcome the provision of comprehensive and ongoing information about Sites and Objects in Western Australia.

Failure to comply with these conditions may constitute an offence under section 55 of the AHA. DIA carries out routine checks on compliance with conditions of Ministerial consents.

Requests and Advice

The following information has been provided by the ACMC for the information and guidance of the Landowner and does not constitute a condition of consent.

The ACMC requests that the Landowner erect a plaque/artwork prepared in consultation with the Aboriginal people consulted and research of records for the area (e.g. Site file DIA 3757 and Carter B 2005 Nyungah Land, Swan Valley Nyungah Community, Guildford) recognising the wide-ranging Aboriginal links to Success Hill.

The ACMC also requests that the Landowner give due consideration to requests made by the Aboriginal people consulted about the Purpose, regarding the protection of Aboriginal heritage and the recognition of Aboriginal culture and history. For example, recognition of Aboriginal heritage values, beliefs and prior occupation of the area may be conveyed through interpretive signage, street naming or murals.

In addition, the Landowner should ensure that all persons employed or engaged in respect of the Purpose are made aware of their obligations under the AHA, including by inserting into all and any relevant contracts, project plans, scopes of works, tenders and other similar documents a requirement that such persons be provided with a copy of a document

prepared by DIA and entitled "Advice to Developers" and/or an electronic copy of a document prepared by DIA and the Department of Housing and Works and entitled "Aboriginal Heritage Procedures Manual", both of which can be found at:

- <http://www.dia.wa.gov.au/Heritage/IntroForDevelopers.aspx>; and
- <http://www.dia.wa.gov.au/Heritage/HeritageManual/default.aspx>

Right of Review of Decision

Where the Landowner is aggrieved by a decision of the Minister made under section 18(3) of the AHA, the Landowner may apply to the State Administrative Tribunal for a review of the decision. The Tribunal's website is www.sat.justice.wa.gov.au.

Other Matters

This consent can only be relied upon by the applicant Landowner. Any subsequent landowner within the meaning of the AHA must make their own application under the AHA.

Copies of the AHA, the *Aboriginal Heritage Regulations 1974* and the *State Administrative Tribunal Act 2004* may be viewed and downloaded from the website of the State Law Publisher at www.slp.wa.gov.au.

If you have any queries in relation to your application, please contact Peter Randolph, DIA Senior Heritage Officer, on 9235 8100.

Yours sincerely



**HON MICHELLE ROBERTS MLA
MINISTER FOR INDIGENOUS AFFAIRS**

08 FEB 2008

cc: Mr Gary Evershed
Chief Executive Officer
Town of Bassendean

APPENDIX 4 ORDER OF MAGNITUDE COST

Appendix 4 ORDER OF MAGNITUDE COST

CONCEPT DESIGN	\$	9,700.00
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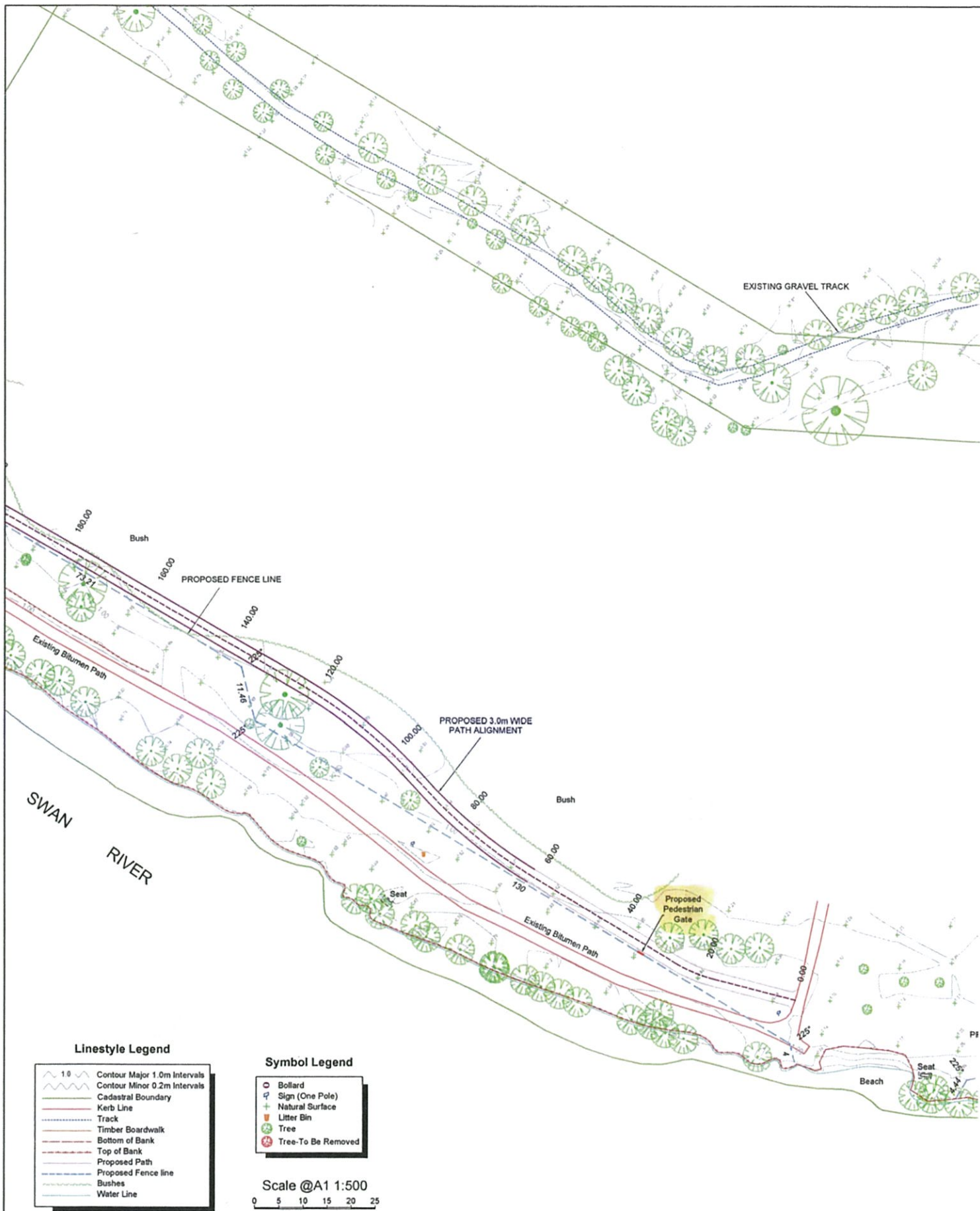
DETAIL DESIGN	\$	26,000.00
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INTERIM STORMWATER DIVERSION	\$	25,000.00
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Option 1 - DIRECT PIPE DISCHARGE TO RIVER		
1	Preliminary Works for Permanent Structure	
	Subtotal - 2. Preliminaries:	\$ 21,900.00
2	Removal of Existing Structure	
	Subtotal - 3. Removal of Existing Structure:	\$ 35,200.00
3	Option 1 - DIRECT PIPE DISCHARGE TO RIVER	
	Subtotal - 3.1 DIRECT PIPE DISCHARGE TO RIVER	\$ 49,708.00
	TOTAL:	\$ 106,808.00

Option 2 - OPEN CHANNEL DISCHARGE TO RIVER		
1	Preliminary Works for Permanent Structure	
	Subtotal - 1. Preliminaries:	\$ 21,900.00
2	Removal of Existing Structure	
	Subtotal - 2. Removal of Existing Structure:	\$ 35,200.00
3	Option 2 - OPEN CHANNEL DISCHARGE TO RIVER	
	Subtotal - 3 OPEN CHANNEL DISCHARGE TO RIVER:	\$ 85,850.00
	TOTAL:	\$ 142,950.00

ATTACHMENT NO. 3



18077-F01-3.0.dwg

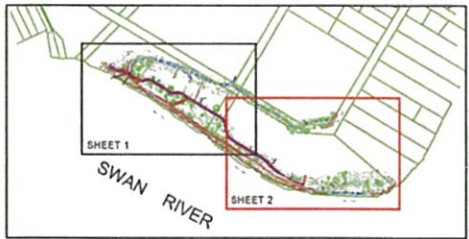
VER	DATE	BY	AMENDMENTS	FILE SOURCE
1.0	18.05.2018	SW	Issued for Information	18077-1.0-15052018-MGA94-F
2.0	23.05.2018	SF	Path Alignment Added	18077-1.0-15052018-MGA94-F
3.0	30.05.2018	SF	Path Alignment Changed	18077-1.0-30052018-MGA94-F

Notes:

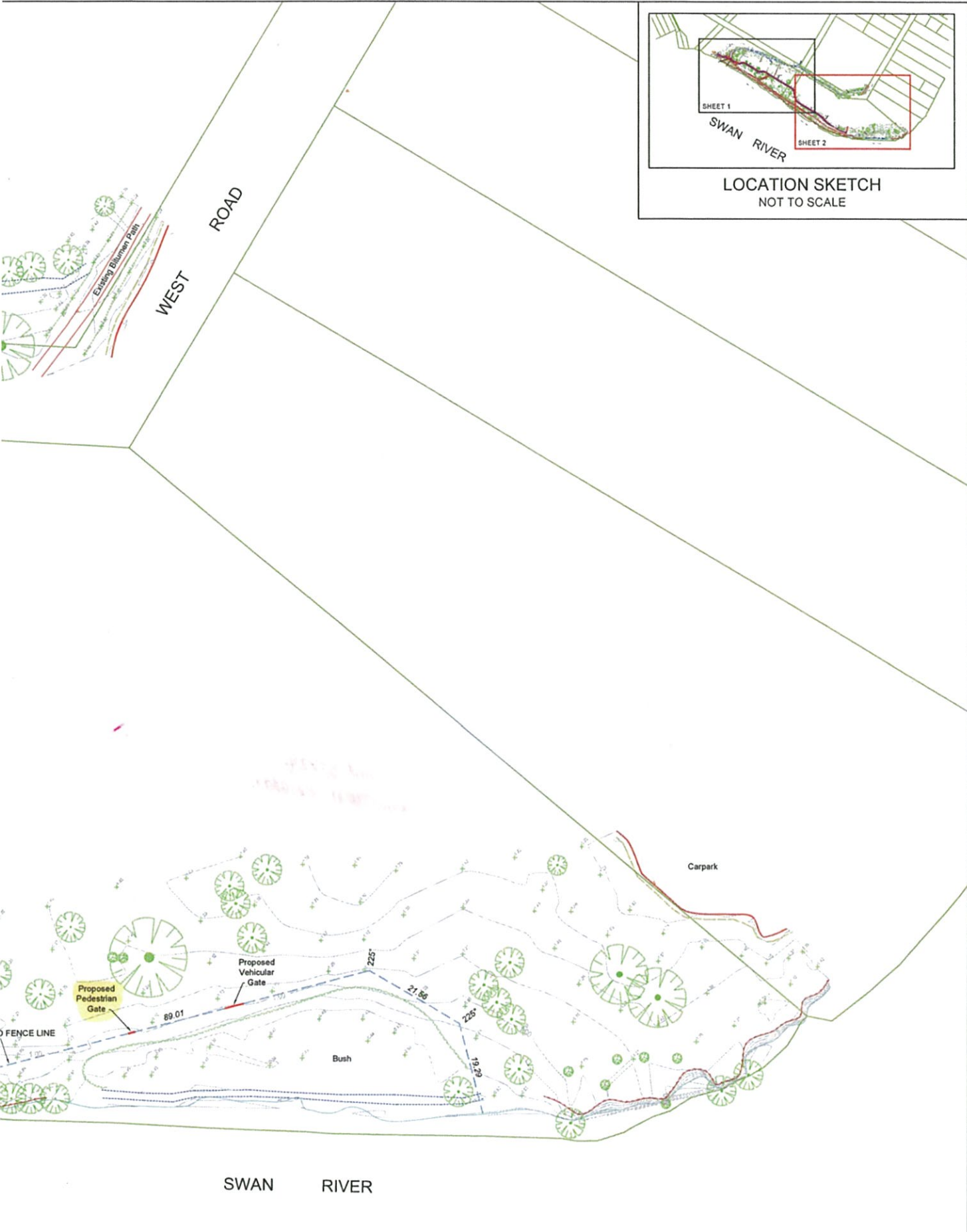
1. Boundary plotted from Landgate SCDB digital data only.
2. True position of Boundary is subject to a re-establishment survey.
3. Heights established from SSM BAYS 34 via GPS connection.
4. Trees highlighted in Red are to be Removed or Pruned.

CLIENT:

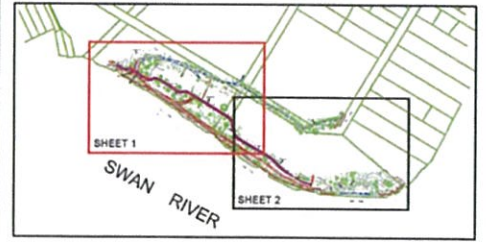
12b Pepler Ave. Salter Point WA 6152
 Ph: 9450 7188
 email: admin@basurveys.com.au
 web: www.jbasurveys.com.au



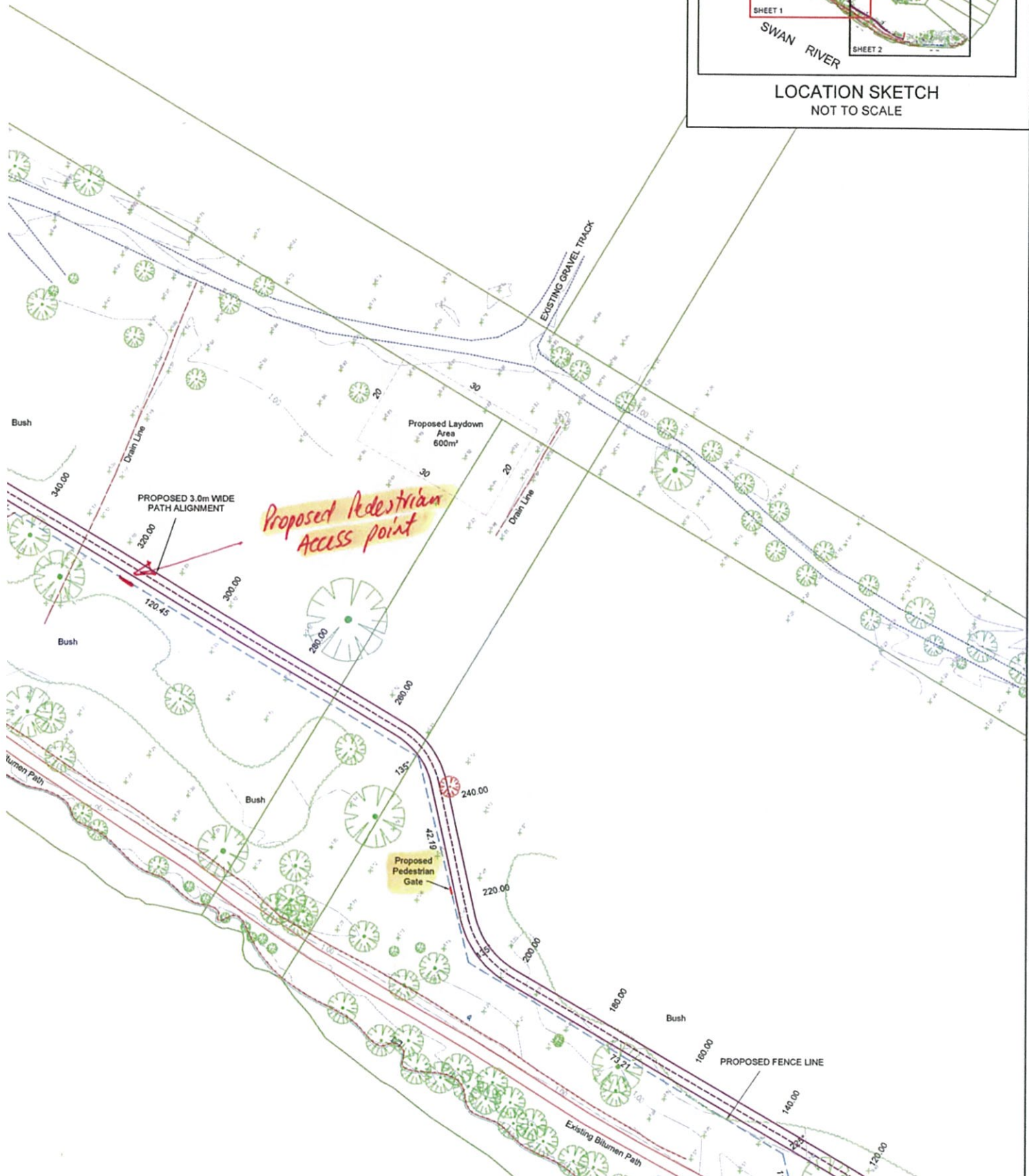
LOCATION SKETCH
NOT TO SCALE



JOB NO: 18077	TITLE: FEATURE SURVEY	DATUM	
PROJECT:		VERT: AHD	
ASHFIELD FLATS PROPOSED FENCE LINE & FOOTPATH LOT 301 ON DP40483 WEST ROAD, BASSENDEAN, WA, 6054		HORIZ: MGA94 Z50	
		SCALE: 1:500	
SURVEYOR: SW		DWG NO: 18077-F01	VER: 3.0
DATE OF SURVEY: 15.05.2018	DRAWN BY: SF	SHEET NO: 2 OF 2	A1
APPROVED BY: NRW			



LOCATION SKETCH
NOT TO SCALE



Proposed Pedestrian Access point

PROPOSED 3.0m WIDE PATH ALIGNMENT

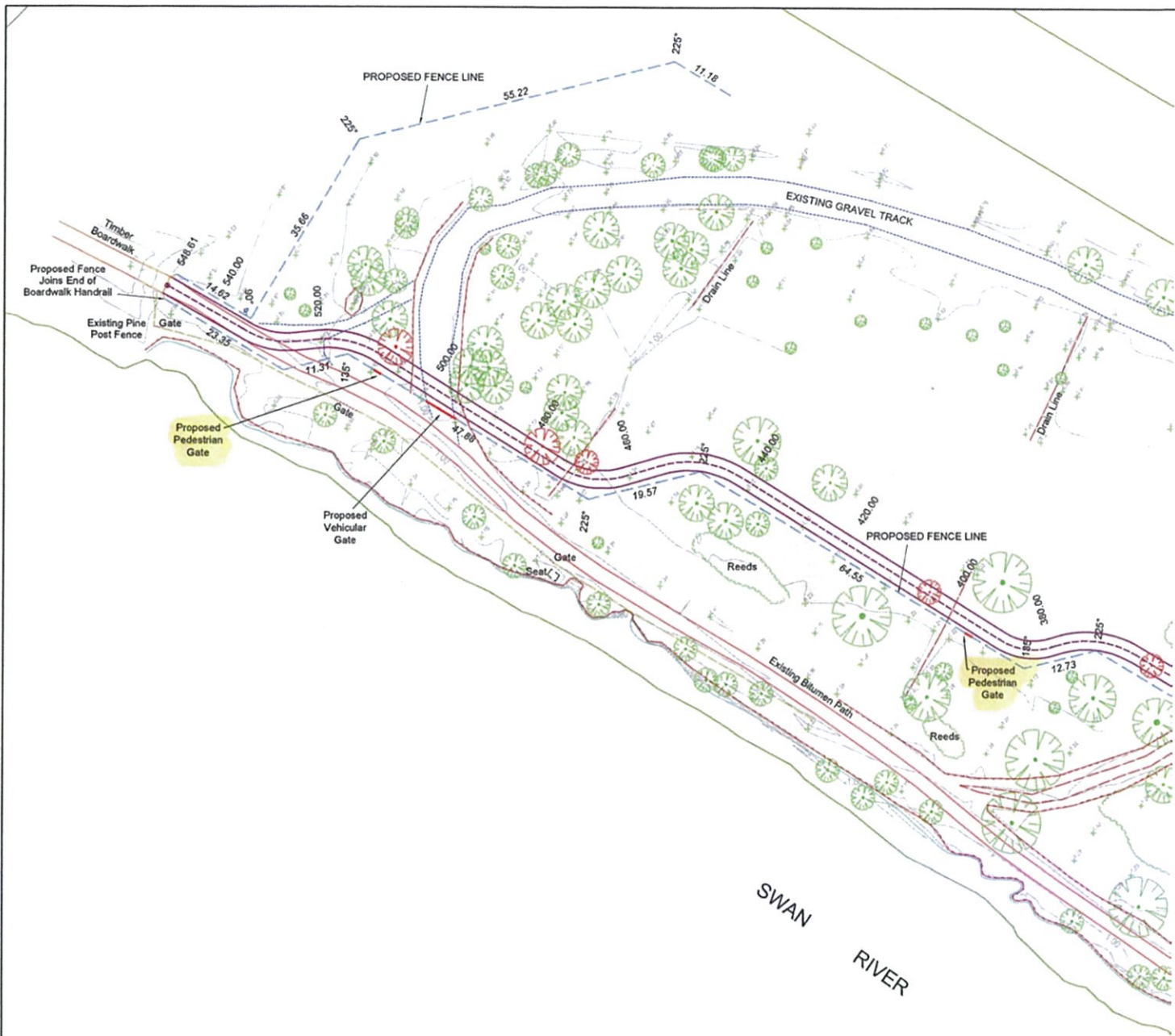
Proposed Laydown Area 600m²

Proposed Pedestrian Gate

PROPOSED FENCE LINE



JOB NO: 18077	TITLE: FEATURE SURVEY	DATUM	N 
PROJECT: ASHFIELD FLATS PROPOSED FENCE LINE & FOOTPATH LOT 301 ON DP40483 WEST ROAD, BASSENDEAN, WA, 6054		VERT: AHD HORIZ: MGA94 Z50	
		SCALE: 1:500	
		DWG NO: 18077-F01	VER: 3.0
		SHEET NO: 1 OF 2	A1
SURVEYOR: SW	DATE OF SURVEY: 15.05.2018	DRAWN BY: SF	APPROVED BY: NRW



Symbol Legend

- Bollard
- Sign (One Pole)
- Natural Surface
- Litter Bin
- Tree
- Tree-To Be Removed

Linestyle Legend

- 1.0 Contour Major 1.0m Intervals
- 0.2m Contour Minor 0.2m Intervals
- Cadastral Boundary
- Kerb Line
- Track
- Timber Boardwalk
- Bottom of Bank
- Top of Bank
- Proposed Path
- Proposed Fence line
- Bushes
- Water Line

Scale @A1 1:500
 0 5 10 15 20 25

18077-F01-3.0.dwg

VER	DATE	BY	AMENDMENTS	FILE SOURCE
1.0	18.05.2018	SW	Issued for Information	18077-1.0-15052018-MGA94-F
2.0	23.05.2018	SF	Path Alignment Added	18077-1.0-15052018-MGA94-F
3.0	30.05.2018	SF	Path Alignment Changed	18077-2.0-30052018-MGA94-F

- Notes:**
1. Boundary plotted from Landgate SCDB digital data only.
 2. True position of Boundary is subject to a re-establishment survey.
 3. Heights established from SSM BAYS 34 via GPS connection.
 4. Trees highlighted in Red are to be Removed or Pruned.

CLIENT:



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