

PLANNING & SUSTAINABILITY COMMITTEE**9****14 NOVEMBER 2012**

**INVESTIGATION INTO FLOODING ISSUES IN MOOROOBOOL,
WESTCOURT AND BUNGALOW – PEER REVIEW OF THE HYDRAULIC
MODELLING FOR THE MOODY CREEK DRAINAGE STUDY - DIVISIONS 4
AND 5**

T Smith 1/3/37-34-#3777168

RECOMMENDATION**That Council:**

- 1) Notes that the Moody Creek catchment is subject to flooding events that cannot be contained within the existing drainage channels and that it is not practically and financially viable to implement flood mitigation works that will completely eliminate flooding in the catchment.**
- 2) Approves the commencement of negotiations to acquire the land required at Site 1 for the construction of an additional 120,000 m³ detention basin on Moody Creek with a report to come back to Council on progress with those negotiations.**
- 3) Delegate authority to the Chief Executive Officer in accordance with Section 257 of the *Local Government Act 2009* to negotiate and determine any and all matters associated with the acquisition of land whether by agreement or not , pursuant to the *Acquisition of Land Act 1967*.**
- 4) Approves the commencement of detailed design and preparation of cost estimates for an additional detention basin at Site 1, and upgrading the existing detention basin at Site 1A for consideration in the 2013/14 capital works program.**
- 5) Endorses an application under the Local Government Grants and Subsidies Program – Local Government Floods Response Subsidy 2012-2013 for 40% of the cost of eligible elements of the project.**
- 6) Approves the commencement of the detailed design of channel training works identified by VDM consulting to provide relief from Q10 flooding for consideration in the 2013/14 capital works program.**

EXECUTIVE SUMMARY:

There is a history of flooding in the Moody Creek catchment with recent events in January 2009 and March 2012 when over 400 properties across the Moorroobool, Westcourt and Bungalow areas were flooded to depths greater than 300mm.

Following the 2009 flood event, Council engaged VDM consulting to review flood mitigation options in the Moody Creek catchment. In their 2010 report, VDM identified a suite of options that could be implemented to reduce but not eliminate flooding impacts. These included the construction of a new detention basin and expansion of an existing detention basin, channel training works, and the installation of tidal gates and a large pump station at the bottom end of the catchment.

In August 2012 Council engaged Worley Parsons to peer review the VDM Moody Creek drainage management study with specific emphasis on the effectiveness of the flood detention basin works proposed by VDM. Worley Parsons raised some inconsistencies in the interpretation of flow paths and other assumptions from the digital terrain model, and identified that the number of properties inundated under various flooding scenarios had been overestimated by VDM. However, they concluded that the construction of the flood detention works was worthwhile from an economic perspective with positive benefit cost ratios.

Based on the modelling, up to 100 houses will receive benefit from flooding in the Q20 event with reductions in flood depth of up to 600mm.

This report provides further details of the proposed flood detention works and seeks Council's endorsement to proceed with negotiations to acquire land and commence detail design for the detention basins. About half of the land currently forms part of Lot 795 on SP252228 and is designated Residential 3 Planning Area. An approval application to develop this land is currently with Council. The other half is Moody Creek and environs. The land would need to be acquired by agreement or resumption. There are no existing approvals for the change of use of the land and no existing approval rights.

BACKGROUND:

Moody Creek joins Chinaman Creek just upstream of Ray Jones Drive where its outflow is affected by tide. Moody Creek is tidal through to Cochrane and Swallow Streets and the Raintrees Shopping Centre at Moorroobool.

Overbank breakouts occur upstream and downstream of Moody Street, from the Cochrane Street drain, from Koppen Swamp over Swallow Street and at the McCoombe Street culvert causing flooding in this area of Moorroobool. Below Alfred Street, breakouts occur throughout the areas in Westcourt and Bungalow covered by the addresses of the Petitioners. The channel of Moody Creek is not capable of conveying a 1 in 10 year flow through to Trinity Inlet without bank overflows. The overflows occur in the area of Dillon, Tills and McCoombe Streets, and below Mulgrave Road to Scott Street. When this happens, flood levels in Moody Creek restrict drainage from the Brown and McCormack Street areas.

Council's CBD and Environs Drainage Management Plan (2001) predicts the extent and depth of flooding for rainfall events up to a 1 in 100 year Average Recurrence Interval (ARI). The indicative Q10 or 1 in 10 year flood inundation map produced by the model clearly shows the Moody/McCoombe/Cochrane Streets area, Westcourt and Bungalow as being inundated by that 1 in 10 year flood.

Following flooding in areas of Mooroolool, Westcourt and Bungalow on the 19 March 2012, a petition was presented to Council from commercial and residential properties in Westcourt and Bungalow requesting that Council conduct an inspection of the drainage system and maintain, improve and upgrade the drainage system to fix the flooding problem.

A report (#3608947) presenting a response to the petition was considered by Council's at the Infrastructure Meeting on the 18 July, 2012. Council noted that the drainage system had been inspected and that it was in reasonably good condition. It also noted that a Moody Creek Drainage Study had been completed by VDM Consulting and that it had examined options to mitigate flooding in the Mooroolool, Westcourt and Bungalow areas.

Given the extent and seriousness of the flooding, Council requested a peer review of the hydraulic modelling and damage estimates done by VDM to confirm the feasibility of construction of the major detention basin (125 megalitres) on Moody Creek adjacent to Ramsey Drive at Kanimbla. VDM had recommended this detention basin at Site 1 as the priority project, together with an upgrading of the existing detention basin just below it at Site 1A (33 to 55 megalitres). The location of the detention basins is shown in attachment 1 and the concept design of the new detention basin in attachment 2.

Worley Parsons, Sydney was commissioned to carry out the peer review and their draft report was received on the 1 November, 2012. Their review examined the model results, damage estimates, cost benefit and other comments made by VDM.

VDM primarily targeted the 1 in 20 flood in their analysis. VDM provided their computer model files to Worley Parsons for the review. This allowed Worley Parsons to examine in particular the impacts of detention in the upper catchment with an additional detention basin at Site 1 and with the upgrading of the existing detention basin at site 1A.

COMMENTS:

If flooding in the Moody creek system could be reduced by detention for a Q20 rainfall event, this would substantially reduce the flood damage that occurred on the 19 March, 2012 and in the January 2009 floods. VDM developed a range of flood mitigation options in an attempt to achieve this including additional detention at Sites 1 and 1A.

The outcome of the Worley Parsons review of VDM's work is summarised as follows:

- Worley Parsons review was a desk top study. With that qualification, they raised a number of issues with the model assumptions and VDM's interpretation of flow paths from the digital terrain model. However, after running a number of simulations with the model, they concluded that overall the modelling methods used by VDM were "generally sound".

- Worley Parsons pointed out some minor variations in the model outcomes. They suggest flows immediately downstream of Sites 1 and 1A with additional detention would be 30% to 40% less (up to 0,6m depth) with the additional basin and upgrade of the existing basin. Overall they suggest 5% less peak flows in the overall system.
- Refer to attachment 3 for estimated reduction in flood impacts due to the new detention basin at site 1 only, and attachment 4 for the estimated reduction in flood impacts due to the new detention basin plus enlargement of the existing basin.
- Worley Parsons identified some inconsistencies in the numbers of properties adopted by VDM to estimate flood damage and report the damage costs. While they agreed that almost 700 properties were affected by inundation to depths greater than 150mm. They suggested a lower benefit/cost ratio (BCR) than VDM, a figure closer to 1.1.
- Worley Parsons produced the BCR for the additional detention basin at Site 1 based on capital cost of \$7.4M and damages saved over 20 years of \$8.3M. VDM had adopted a significantly greater number of affected properties and BCR of over 3.0. From aerial photos, the real number appears closer to that calculated by Worley Parsons.
- However, in spite of the lower BCR, Worley Parsons concluded that the overall result still appeared favourable from an economic perspective.
- They suggested that the decision on whether to upgrade the existing detention basin needed to be made on cost. It would deliver benefits to another 24 properties with the 1 in 20 year flood, but at an estimated cost of another \$2M.
- In relation to other comments made by VDM about flooding, Worley Parsons suggest that with the current development at Kanimbla without detention, the impact downstream is more like 10% more water in the lower reaches of Moody Creek, rather than the 20% suggested by VDM.

The land required for the major detention basin currently forms part of Lot 795 on SP252228. The area required in Lot 795 is about 4 hectares. Of that about half is designated Residential 3 Planning Area and the other half is Moody Creek and it's environs. There are no existing approvals for the change of use of the land and no existing approval rights. The land would need to be acquired by agreement or resumption. In the event that the subject land cannot be acquired through negotiations with the land holder, Council is seeking delegated authority to acquire the land by way of compulsory acquisition in terms of the *Acquisition of Land Act 1967*.

The VDM report also included the installation of channel training works (levee banks) at three sites below the flood detention basins to contain the Q10 events within the stream/drain channels (see attachment 5). The levee proposed at the Wuchopperen Health Service on Moody Creek in Moody Street would provide immediate relief from flooding for that centre and nearby residents and would be the higher priority following flooding in 2009 and 2012. However, further assessment and design works are required to better define costs of these works. Approval is sought in this report to undertake design work for these channel training works.

CONSIDERATIONS:

Corporate and Operational Plans:

This report links to Corporate Plan Goal 4.6 - Ensure an efficient drainage network that minimises disruption and damage to infrastructure, the community and the environment.

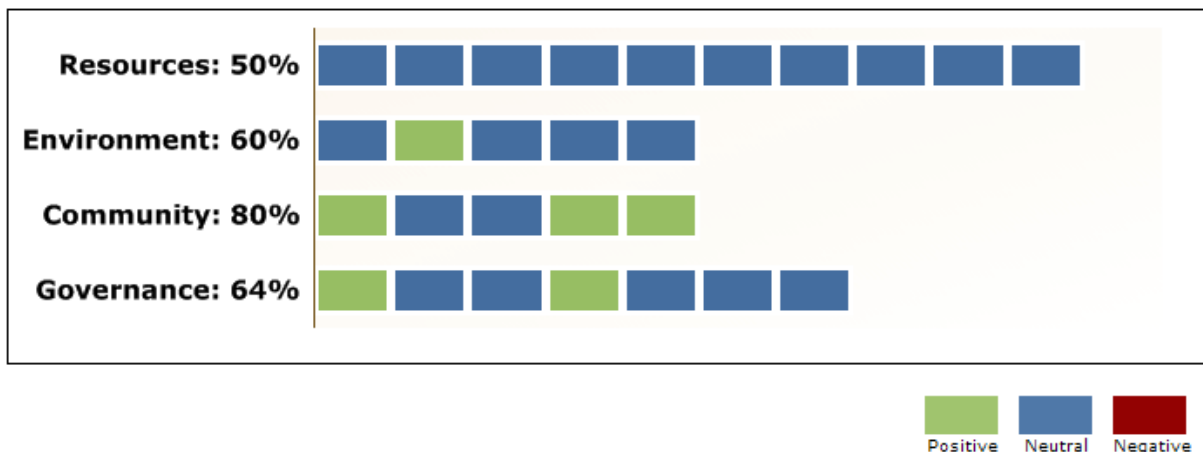
Financial:

Flood mitigation projects reduce Council's liability exposure and the exposure of local businesses and residents to flood damage, loss and disruption from flood inundation.

VDM provided preliminary estimates of cost for a detention basin (120 megalitres) at Site 1 of \$1.5M plus the cost of acquiring land required for the basin, and \$2M to upgrade the existing detention basin at Site 1A. They suggested Council might look at what priority they might give the upgrade the existing given that it probably only benefits about an additional 24 properties.

At this stage, Council has not provided funding for this project in the 10 year capital works program. This is because it was considered that implementation of the project would be dependent on the availability of external funding under a Commonwealth or State flood mitigation works program. A suitable program has now been released, the Local Government Floods Response Subsidy Program 2012-13 that offers 40% subsidy for flood mitigation projects. It is proposed that this project be submitted for consideration for subsidy funding under this program.

Sustainability:



The positive outcomes recorded above are based on the delivery of the flood detention basins.

Environment: reducing stormwater flow into the Mooroolbool, Westcourt and Bungalow areas reducing flood impacts and environmental degradation in those areas

Community: delivering more open space, and reducing the incidence of flood damage to public infrastructure and providing improved immunity to flooding for the community in the Mooroolbool, Westcourt and Bungalow areas

Governance: providing construction and operational opportunities for the Council workforce and local contractors

Public consultation will need to continue with residents in the Moody Creek catchment – Kanimbla, Mooroolool, Westcourt and Bungalow, when design concepts are finalised.

CONCLUSIONS:

The VDM study and the Worley Parsons review have confirmed that flood flows are worsened below Kanimbla because of the absence of detention on Moody Creek.

Worley Parsons also comment that the benefit provided by the existing small detention basin adjacent to Ramsey Drive has been overrun by the extent of development with an estimated 10% more water modelled in the lower reaches of Moody Creek during a 1 in 20 average recurrence interval flood.

Worley Parsons review of the VDM flood modelling confirms that the impact of additional detention on Moody Creek, investigated for Sites 1 (120 megalitres) and 1A (33 megalitres increased to 53 megalitres with the upgrading), will provide significant benefit in Mooroolool, and benefit to a lesser extent in the lower reaches down through Westcourt and Bungalow. The addition of flood flows from the significant catchments at McCoombe Street and Cochrane Street (through Koppen Swamp) will tend to “drown out” the impacts of the detention further downstream. The other factor is that on the flatter wider flood plain in the lower catchment, reduction in flow makes less difference as far as flood level is concerned. At the same time, any reduction in flood level at the junction of the McCoombe Street, Cochrane Street and Spence Street drainage systems with Moody Creek will encourage greater outflow and so improved drainage when the tide levels are favourable.

Therefore it can be expected that the construction of additional detention at Site 1 and Site 1A will provide significant benefit to about 100 properties in Mooroolool with the direct benefit reduced downstream as the other drainage systems join Moody Creek.

VDM's and the Worley Parsons benefit/cost ratios for additional detention at Sites 1 and 1A are better than 1.0. Worley Parsons conclusion is that the project stands up from an economic point of view.

ATTACHMENTS:

- Attachment 1: VDM drawing No. 14 showing the location of Sites 1 and 1A
- Attachment 2: VDM drawing C200A showing the concept details of a the proposed detention basin at Site 1
- Attachment 3: Worley Parsons estimated change in flood impacts due to the construction of the new flood detention basin at site 1
- Attachment 4: Worley Parsons estimated change in flood impacts due to the construction of the new flood detention basin at site 1 plus the enlargement of the existing flood detention basin at site 1A
- Attachment 5: VDM location of proposed channel training works

Attachment 6: Worley Parsons report on the pier review of the Moody Creek study is available in the Councillors room for their perusal (DM5 number #3783751).

Tim Smith

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Helius Visser

Manager Infrastructure Management

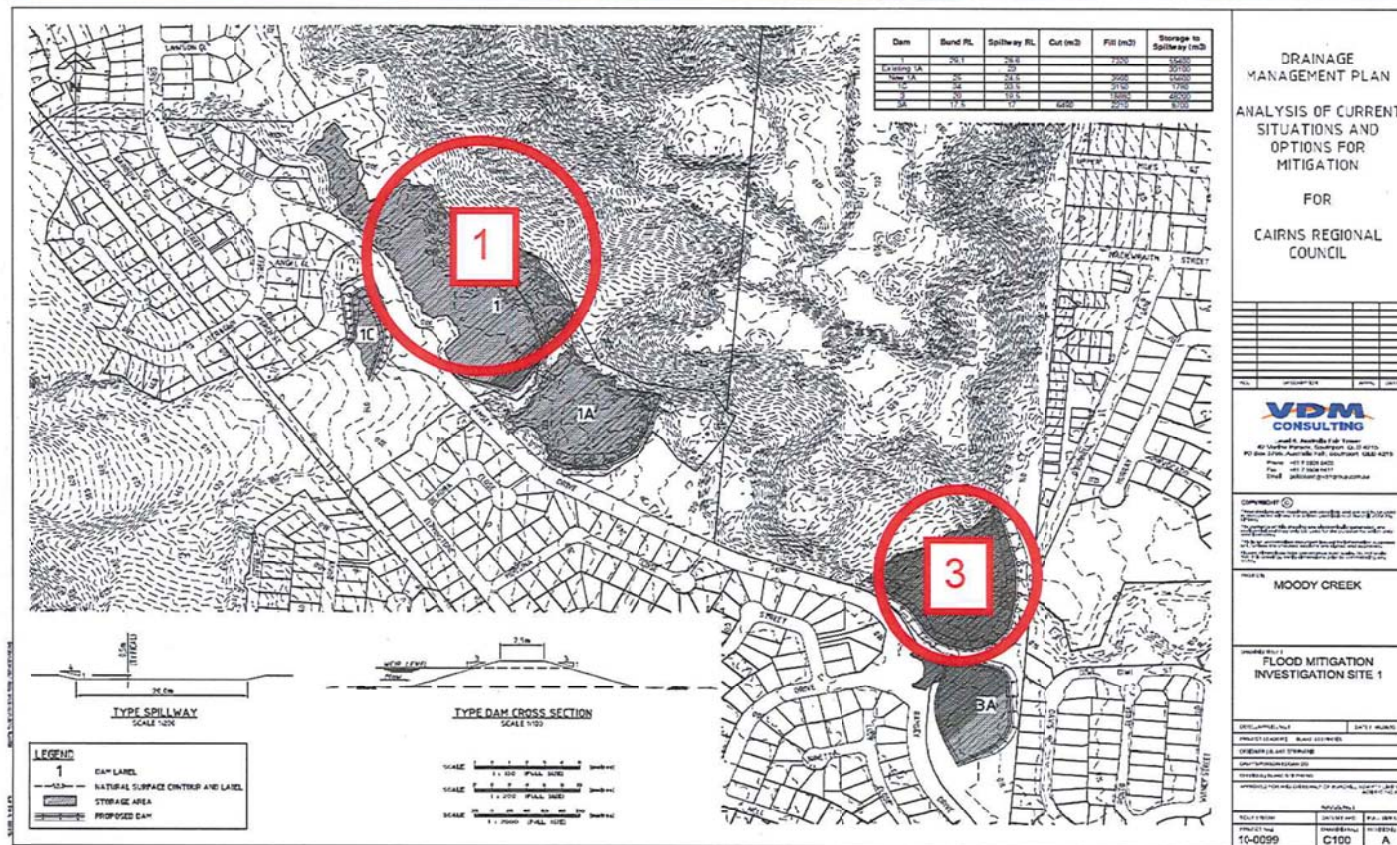
Bruce Gardiner

General Manager Infrastructure Services

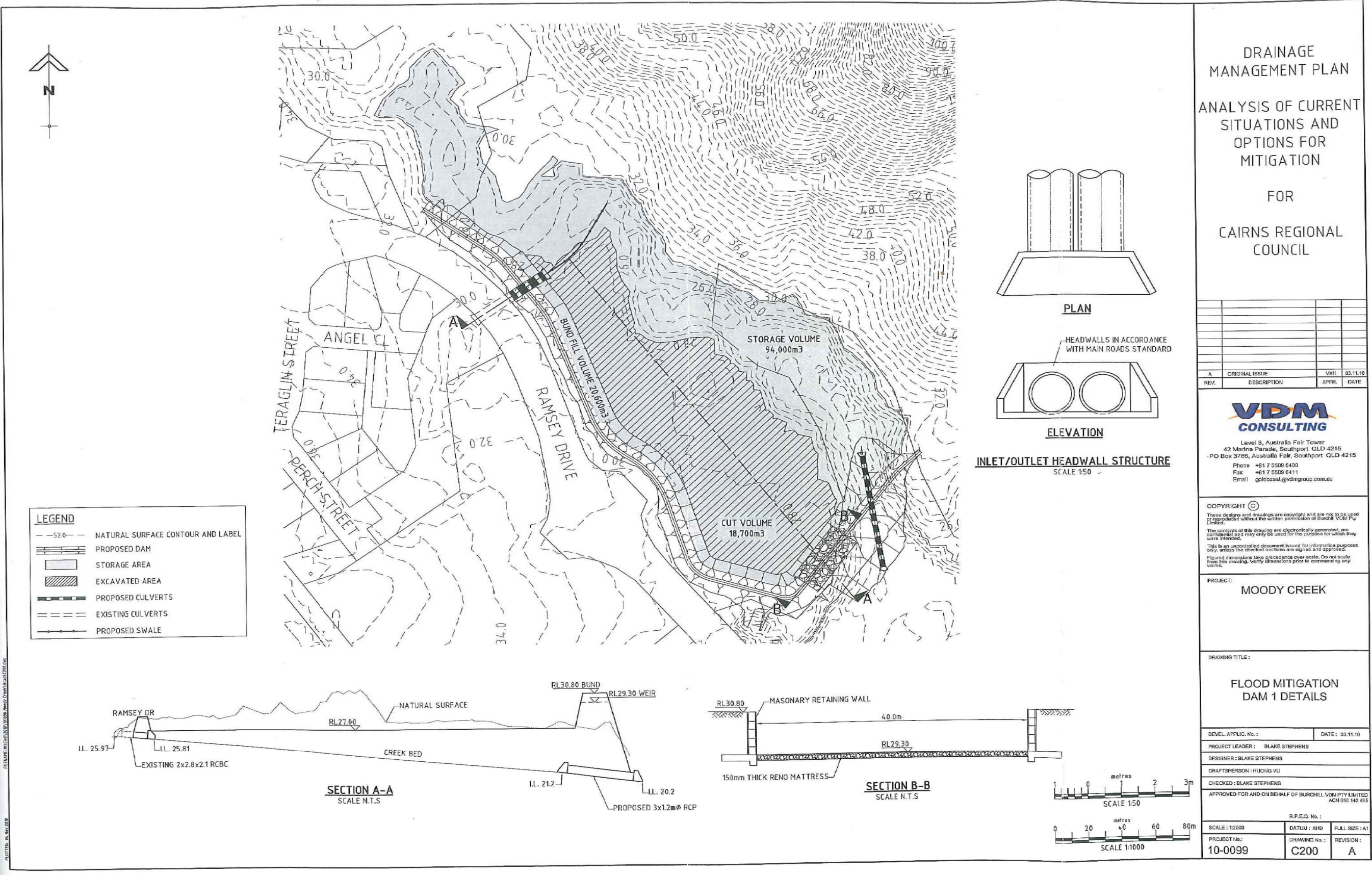
Attachment 1 - VDM drawing No. 14 showing the location of Sites 1 and 1A



Investigation Site 1&3 — Only site 1 is viable

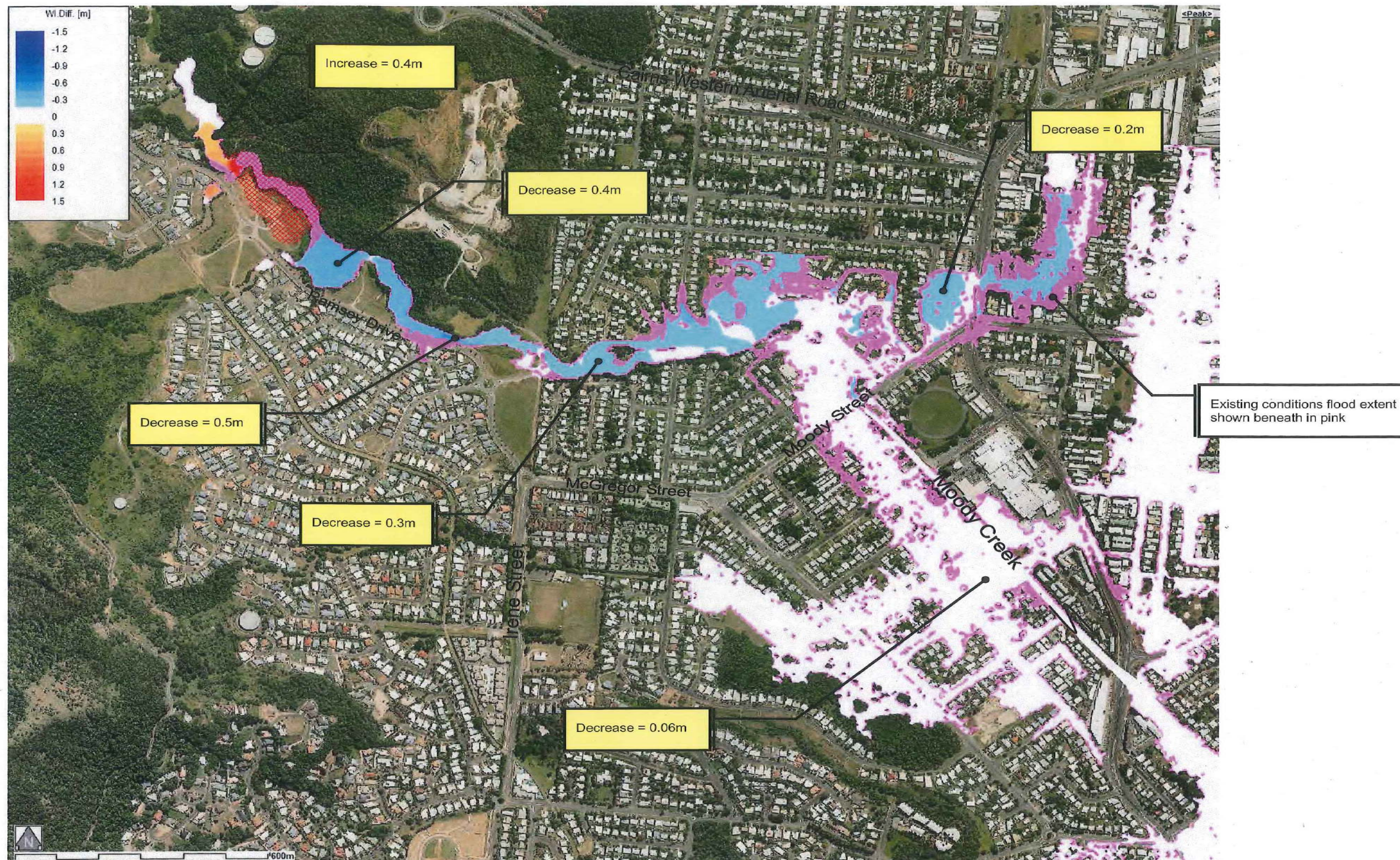


Attachment 2: VDM drawing C200A showing the details of a the proposed detention basin at Site 1



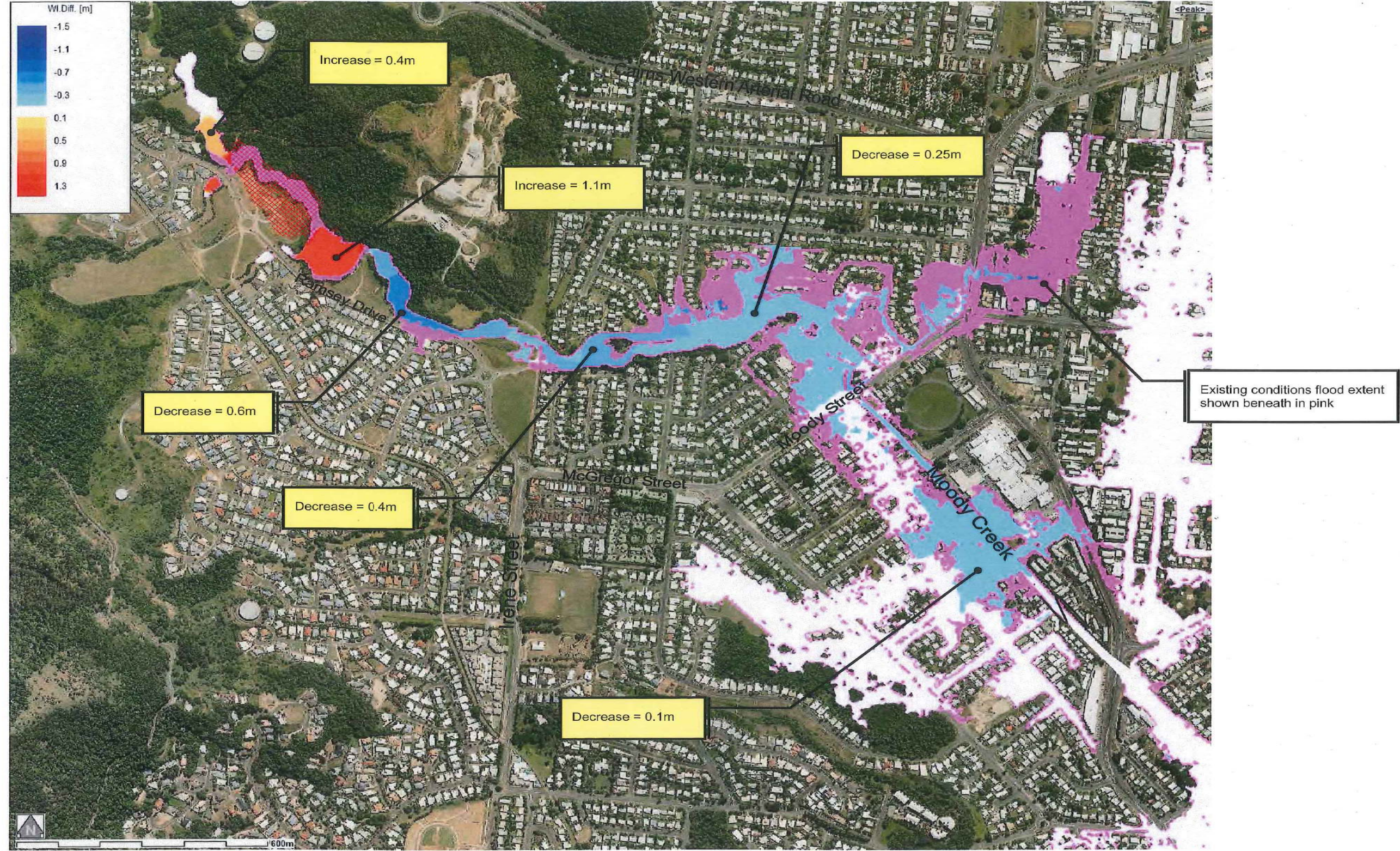
Attachment 3: Worley Parsons estimated change in flood impacts due to the construction of the new flood detention basin at site 1

FIGURE 4



Attachment 4: Worley Parsons estimated change in flood impacts due to the construction of the new flood detention basin at site 1 plus enlargement of the existing flood detention basin at site 1A

FIGURE 5



rp301015-03104 – Moody Creek Drainage Study Review
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CHANGE IN FLOOD LEVELS FOR Q20 EVENT IN THE
DAM 1 PLUS DAM 1A UPGRADE SCENARIO

Attachment 5: VDM location of proposed channel training works

