[redacted]

DEBRA
BUTCHER
CONSULTING

17 August 2020

Strategic Planning Department
Moorabool Shire Council
PO Box 18
Ballan VIC 3342
Lodged by email: info@moorabool.vic.gov.au

Our reference: DBC 0047 Amendment C91moor Submission

Dear Sir/Madam,

AMENDMENT C91 TO THE MOORABOOL PLANNING SCHEME
Application of the Land Subject to Inundation Overlay
Submission

1. INTRODUCTION

Debra Butcher Consulting Pty Ltd acts on behalf of Urban Land Development Pty Ltd (ULD), the owner of land at 94 to 98 Main Street, Bacchus Marsh. The property is located at the north west corner of Main Street and Gisborne Road and is currently vacant.

The purpose of this correspondence is to lodge a submission to Amendment C91, objecting to the inclusion of the subject land in the Land Subject to Inundation Overlay (LSIO) as proposed by the Amendment. In particular, ULD objects to:

- The inappropriate inclusion of the subject site in the LSIO; and
- The use of the LSIO where the Special Building Overlay (SBO) appears to be the more appropriate planning tool.

These matters are discussed further below.

2. INAPPROPRIATE INCLUSION OF THE SITE IN THE LSIO

ULD retained Afflux Consulting (Afflux) to undertake a review of the supporting documents to the amendment to enable an understanding of why the site has been included within the area to which the LSIO is to be applied. Afflux has particular expertise in hydrodynamic modelling and undertook a review of the background documents supporting the amendment to determine the robustness, or otherwise, of the modelling work that had been undertaken.

Afflux's advice following this review is attached to this letter at Annexure A.

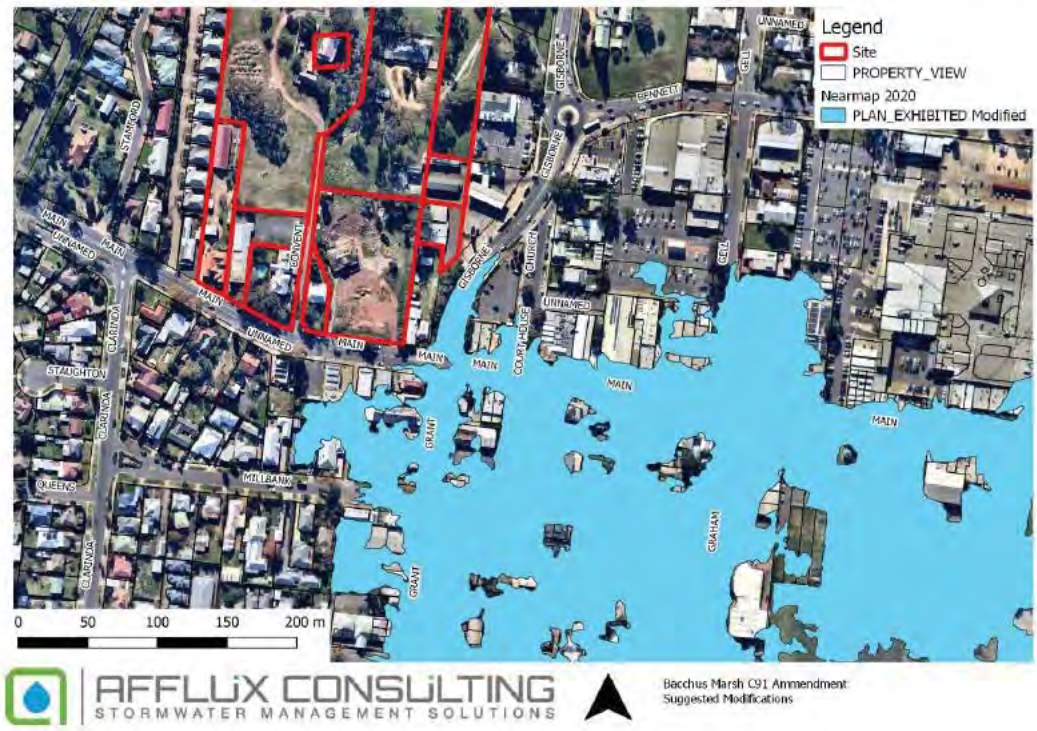
In summary, Afflux found that the review of the technical reports and peer reviews of flood models generally demonstrated good adherence to standard modelling methods and industry norms, suitable for larger catchments and flow paths. However, Afflux found that for this particular site, the work has resulted in anomalous mapping in this location and an overestimation of flooding impact. In relation to this issue Afflux notes the following.

'*The site has been incorrectly represented as to the extent of the LSIO based on the high level modelling due to low grid resolution (8m), the ignoring of site specific features that affect the trapped low point (existing council drainage) and application of hydrology, all of which give an incorrect representation. Given the level of expertise and extensive review work associated with this amendment, it is suggested that the amendment be applied (rather than completely remapped) but the mapping be trimmed to Grant Street and Gisborne Road in particular on the northern side of Main Street to represent the flooding uncertainty in this area*'.

The report includes the following recommendations:

- *'Remove the proposed LSIO from the subject site;*
- *Trim the flood extents to Grant Street/Gisborne Road on the north side of Main Street'.*

It includes a map showing the recommended revised extent of the LSIO, as included below.



On this basis of the Afflux advice we request the removal of the LSIO from applying to the subject site.

3. APPLICATION OF THE SBO IN PLACE OF THE LSIO

In assessing the merits and implications of this Amendment, we undertook a review of Planning Practice Note 12: Applying the Flood Provisions in Planning Schemes (PPN12).

The Practice Note outlines the circumstances in which the various flood related zones and overlays are to be applied including the LSIO and the SBO. Table 1 of PPN12 details the particular circumstances relevant to each control as shown in the extract on the following page.

In the case of the SBO, Table 1 specifies that it is to be applied to areas affected by stormwater flooding along overland flow paths and that this appropriate for urban areas only, however notes that it can also be applied by councils for regional towns, provided overland flow path areas are delineated.

In relation to the LSIO, the Table states that it is to be applied to mainstream flooding from a river or stream in both urban and rural areas.

Table 1. Application of the flood zone and overlays

	Urban Floodway Zone	Floodway Overlay	Land Subject to Inundation Overlay	Special Building Overlay
Urban or rural areas?	Urban areas only	Both urban and rural areas	Both urban and rural areas	Urban areas only
Mainstream or stormwater flooding?	Mainstream flooding from a river or stream	Mainstream flooding from a river or stream	Mainstream flooding from a river or stream	Stormwater flooding along overland flow paths
Application	Case 1 (see Fig. 2.3) • Urban land which is mainly undeveloped • The stream channel or primary flow path area • Important for conveying and/or storing floodwater • Higher flood depths and/or flow velocities • Higher potential flood risk • Unsuitable for intensive urban development.	All cases • The stream channel or primary flow path area • Important for conveying and/or storing floodwater • Higher flood depths and/or flow velocities • Higher potential flood risk, but usually not as severe as in the UFZ. Case 2 • Rural land which is mainly undeveloped. Case 3 • Urban land which is mainly undeveloped • Unsuitable for intensive urban development but may be suitable	Case 5 (see Fig. 2.1) • Rural or urban areas where the extent of the floodway has not been identified and only the extent of land subject to inundation is known • Areas that cover the total extent of land subject to inundation, including the higher risk floodway component • LSIO can be applied as an interim measure until further mapping of the floodway is carried out. Case 6 (see Fig. 2.2) • Rural land that is mainly undeveloped • Areas where the	Case 8 (see Fig. 2.4) • Urban land that is inundated if the capacity of the drainage system is exceeded during heavy rainfall • Currently used by Melbourne Water in the Melbourne metropolitan area • Can be applied by councils for regional towns provided overland flow path areas are delineated.

Based on the advice from Afflux, and our review of the amendment documentation, it would seem that the more appropriate control for the Bacchus Marsh town centre is that of the SBO given the flooding seems to relate to stormwater flooding along overland flow paths.

As noted in the previous section of this letter, we submit that our client's land should not be included in the LSIO (or the SBO) at all. Nonetheless, we consider it appropriate to also question the use of the LSIO more generally in the context of the recommendations of PPN12 and the urban environment of the Bacchus Marsh town centre.

4. CONCLUSION

We would be pleased to discuss the matters raised in this submission with Council and/or Melbourne Water and reserve the right to respond to any further issues (including any made in submissions) if we consider they might affect the subject site. We also request that Council keep us informed of the Amendment process post this exhibition process.

Any queries regarding this submission, should be directed to the undersigned on either [redacted] or via email [redacted]

Yours sincerely,

Debra Butcher
Director

Annexure A: Afflux Consulting Advice

AFFLUX CONSULTING
STORMWATER MANAGEMENT SOLUTIONS

ABN: 71 716 830 580

11th August 2020

Ross Closter

Urban Land Developments

Reference: J489_BacchusMarshSBO_L01

Dear Ross,

Re: Bacchus Marsh Planning Scheme Amendment C91

This letter reviews the proposed Land Subject to Inundation Overlay proposed in Bacchus Marsh, and specifically the modelling with respect to the site at 92-92 Main Street, Bacchus Marsh. This overlay is associated with the C91 Amendment to the Moorabool Planning Scheme and is based on a range of modelling from multiple consultants and authorities. This letter is primarily concerned with the technical aspects of the derived flood extents and whether the produced flood overlay is appropriate. My qualifications for this opinion are contained herein.

Site Analysis

This analysis is primarily concerned with the site formally known as 94-98 Main Street Bacchus Marsh, cornering Main and Gisborne Roads. The proposed LSIO for the area is shown in Figure 1 with the subject site highlighted. The site is approximately 7,000m^2 and it is noted that this is on the area is on the edge of the proposed LSIO and as will be shown in this report on the edge of the model extent. The site and surrounds are shown in Figure 2.

Technical Analysis

I have reviewed the GHD background report for the Bacchus Marsh Floodplain Mapping and supporting Cardno Peer Review and Flood Related Planning Controls documents. In general I am in agreement with the methodologies, and discussion in each of these reports. However for this particular site I note a number of key points regarding the modelling:

- 8m Grid resolution is set for the mapping
- No Council Pipes modelled
- Input flows as either "pit spew" methodology (described in detail below) or
- Inflows as 2d_bc for areas with no defined input location (explored below)
- No information regarding the underlying RORB models or catchment delineation for these models

These model points are generally acceptable for a large scale model with a focus on riverine and large drain flows. However, this site in particular is much more nuanced urban flood study site, and in trying to meet the requirements of the larger study has been overlooked in a number of ways.

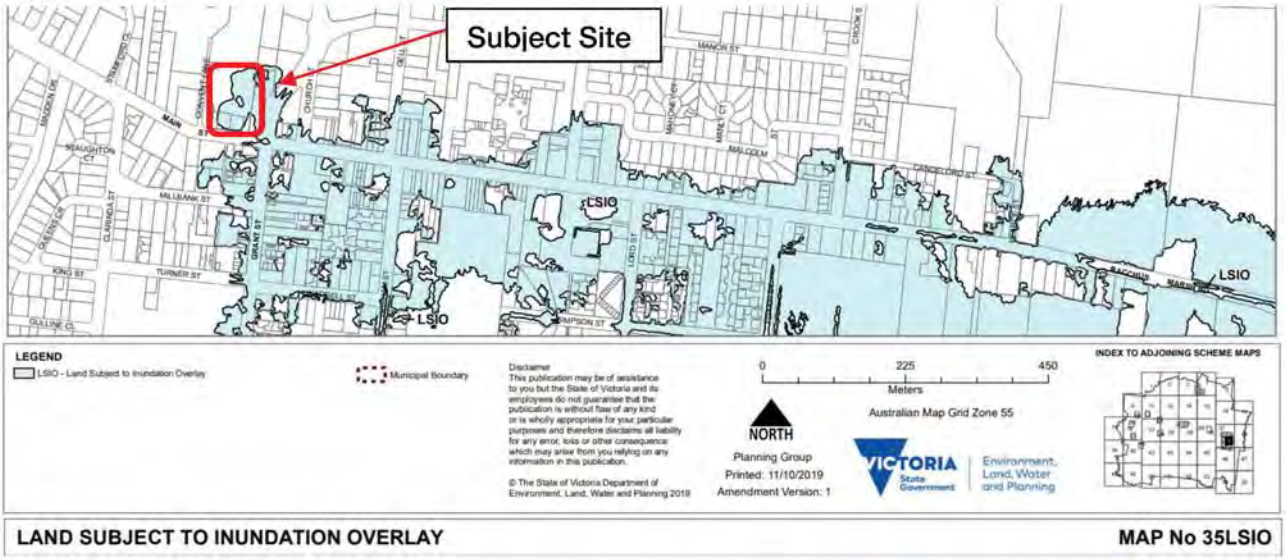


Figure 1 Proposed LSIO

Figure 2 Reference Site

Grid resolution – The selected grid resolution is large for defining urban flood extents. Generally the grid size should be selected on the premise of having at least 2 calculation points in any major flow path. For the Werribee River with 20-30m width this is appropriate. For an urban street a 2-3m grid is more appropriate for a 6m wide flow path (typically street width). This is particularly relevant for the subject site as it is a trapped low point by Gisborne Road to the east of the site. The levels selected for this road (at 8m intervals) are particularly important in setting the outflow weir level along Gisborne Road.

Council Pipes – Again in a large catchment flood study Council pipes have a minor influence in large riverine flows. In this case, and exacerbated by the grid resolution the sites trapped low point fills with water that cannot leave the site. This is one of the reasons that the mapping shows flood extents in all ARI's (Figure 10). The site is well serviced by Council pipes (Figure 3) with a number in particular designed to drain the low point. Not having these pipes in this model impacts this site and this part of the model more than the rest of the model.

Flow Inputs – The flows for the model are input in two main ways:

- Through direct application to a pipe system through a 1d_bc node. This is how flows are applied to the Fiskin St Drain. The entire flow for a catchment (or drain in this case) is applied at the pit, with the capacity of the pipe limiting the flow and the remainder bubbling out of the pit (pit spewing).
- Through application of a catchments flows directly to the grid. The modelling report suggests this as regular 2d_sa application (as described in Figure 7) which would apply to the lowest part of the catchment first. The catchment that this is applied to is shown in blue in Figure 5 and highlighted in Figure 8. The lowest part of the catchment is a significant distance from the site, and the catchment has significant grade (Figure 9). It is therefore suggested that the application was actually 2d_sa (ALL), where the flow is applied equally to every cell in the catchment.

The input method influences this site in a number of ways. The flows that are seen on the site are probably from the direct grid application (the catchment application erroneously just covers into this site), that decision along with the grid resolution and lack of council pipes traps and directly fills the site as a bathtub. As there is no outlet, the flooding gets deeper and larger on the site as the ARI is increased. This is seen in the mapping with all ARI's represented (Figure 10). The other possible flooding of the site from this model technique is excess flow from the pit spew method travelling north up Grant Street and falling off the edge of the model into the site. This method is less likely but possible, and here the grid resolution issues and lack of definition around the roundabout at Grant and Main streets becomes a much bigger driver of the flooding. This was confirmed on site and can be seen in Figure 4. Flow is much more likely to turn right at Main Street (due to the influence of the roundabout and local levels) with any minor spill accounted for by the Council pipe system.

The final point is (no Rorb catchments shown) strongly related to this. The application of the 2d_sa shape should be strongly related to the Rorb catchments, but also take into account the hydraulics of the application. Without the Rorb catchments shown this can't be checked, but as noted above the 2d_sa application probably should be trimmed to Main Street and not extend onto this site for hydraulic reasons.

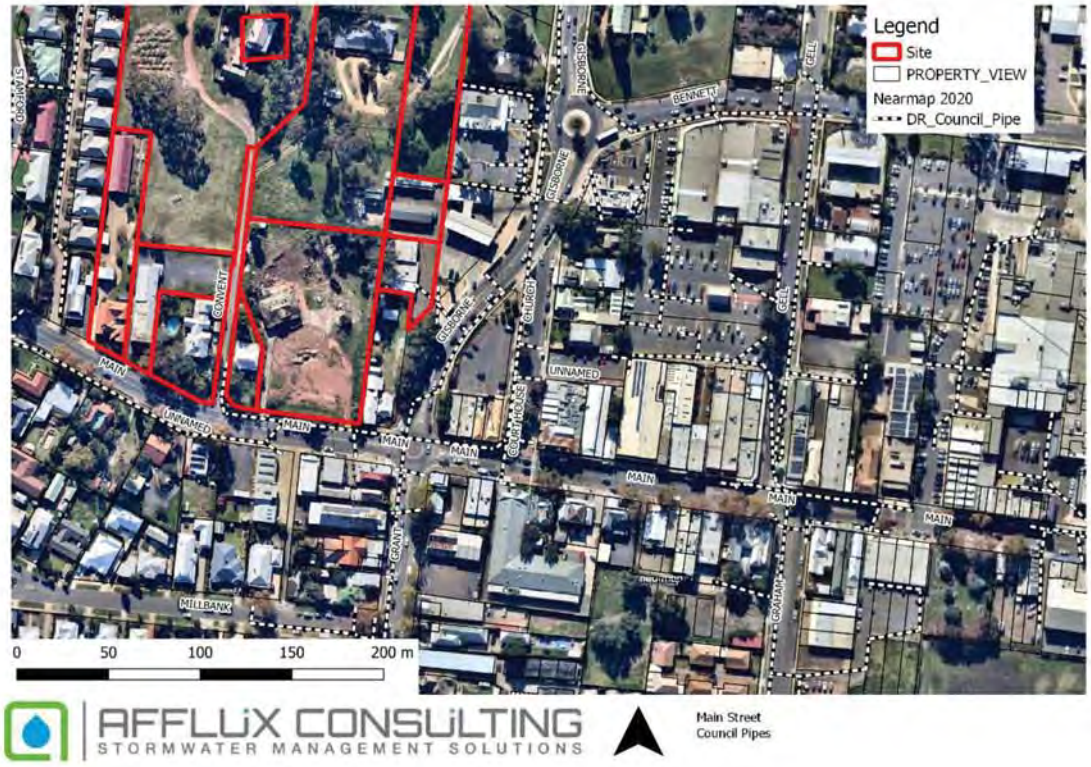


Figure 3 Council Pipes in vicinity of site

Figure 4 Main Street Roundabout

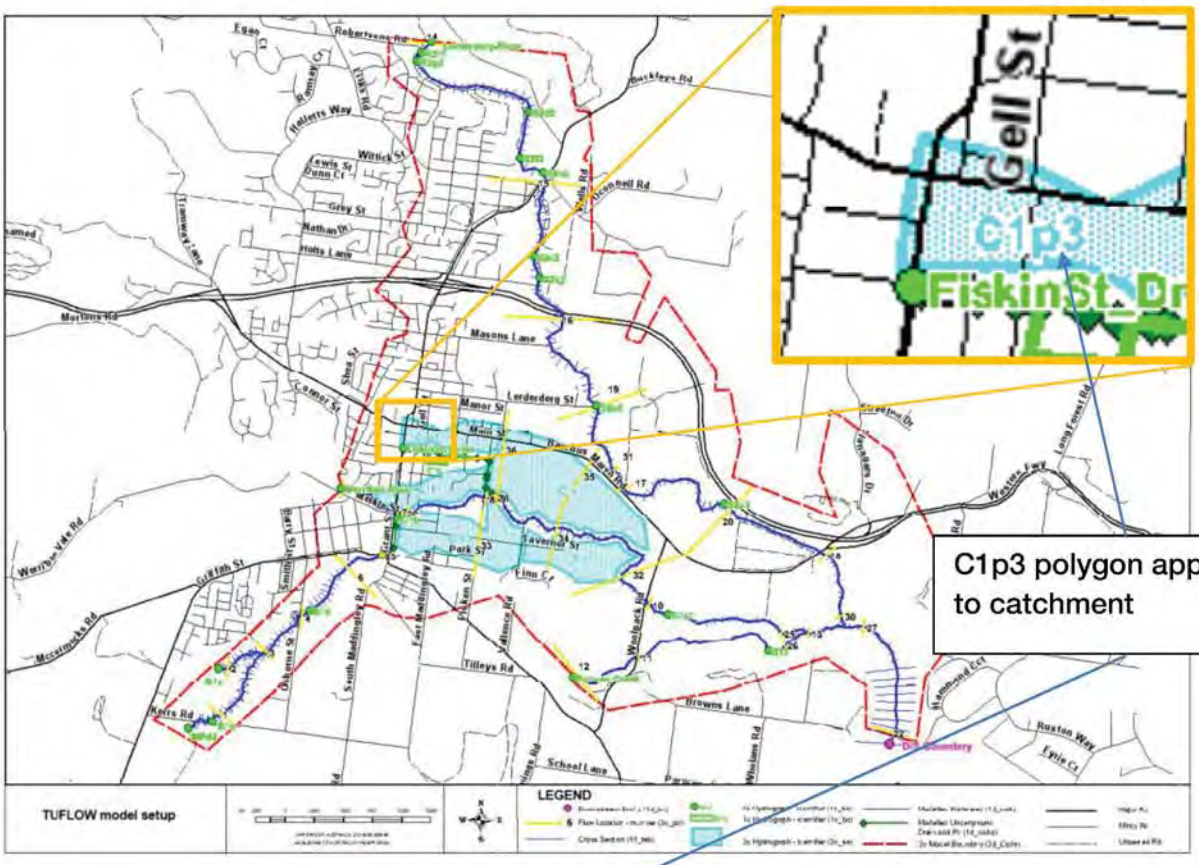


Figure 5 Supplied GHD model setup

TUFLOW Identifier	TUFLOW input type	PMF 100 yr ARI	50 yr ARI	20 yr ARI	10 yr ARI	5 yr ARI
C1b	1d_bc	32.56	11.26	7.39	5.74	4.71	3.94
C1p3	2d_sa	62.99	15.61	12.44	8.82	6.83	5.63

Figure 6 Flow Input value and type

Inflow hydrographs were also applied directly to the 2D domain via of 2d_sa polygons. A 2d_sa polygon applies the hydrograph to the lowest cell in the polygon if the area is dry, or is evenly distributed over already wet cells. A 2d_sa polygon aims to simulate local catchment runoff generated from an area where there is no clear defined drainage path.

Figure 7 Inflow Methodology

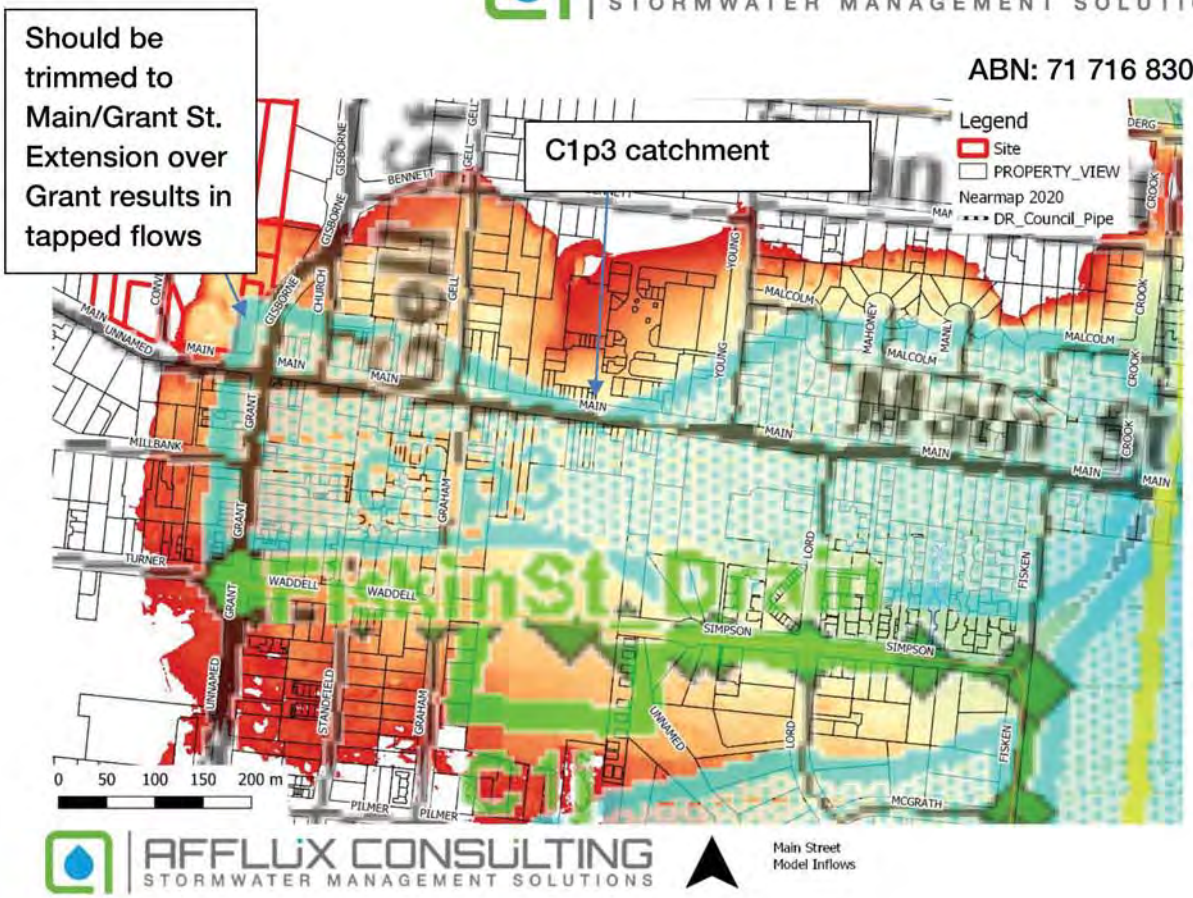


Figure 8 Flow Input area C1p3 surrounding subject site

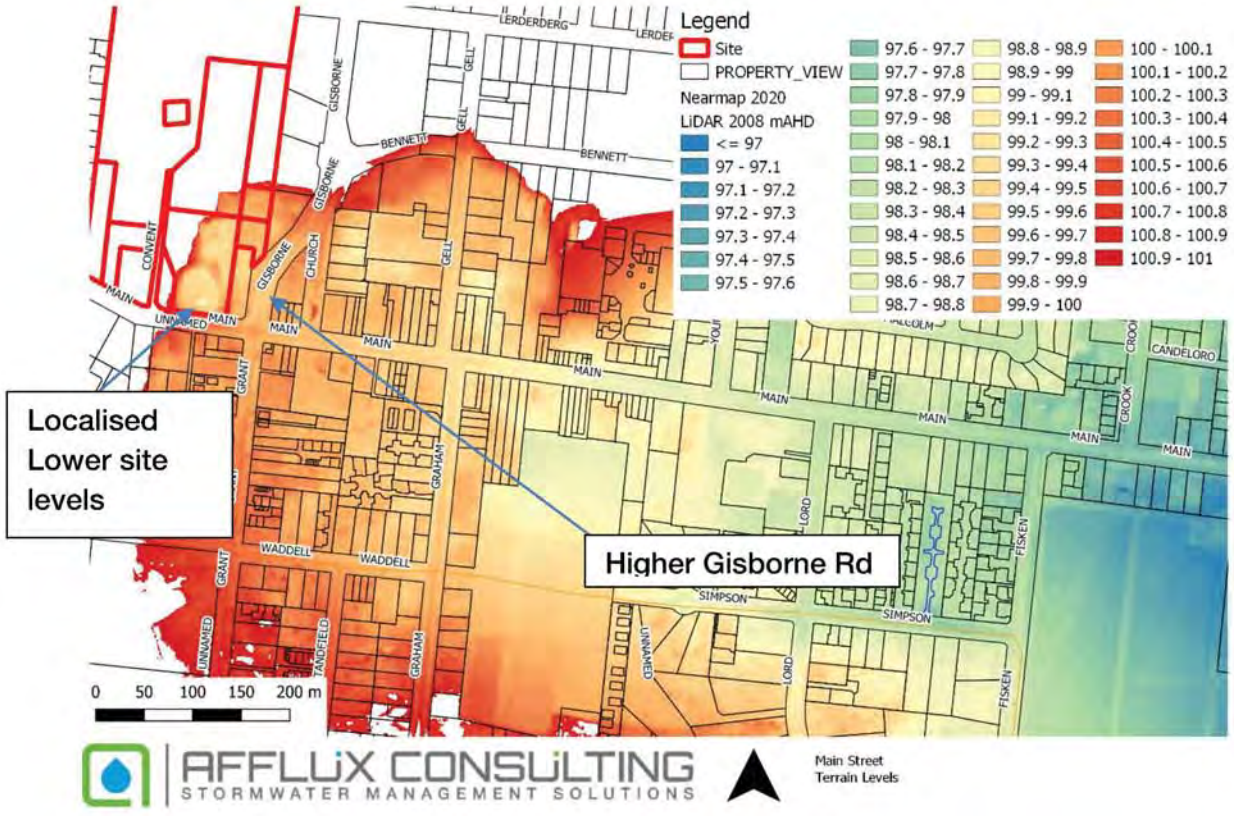


Figure 9 Terrain surrounding subject site

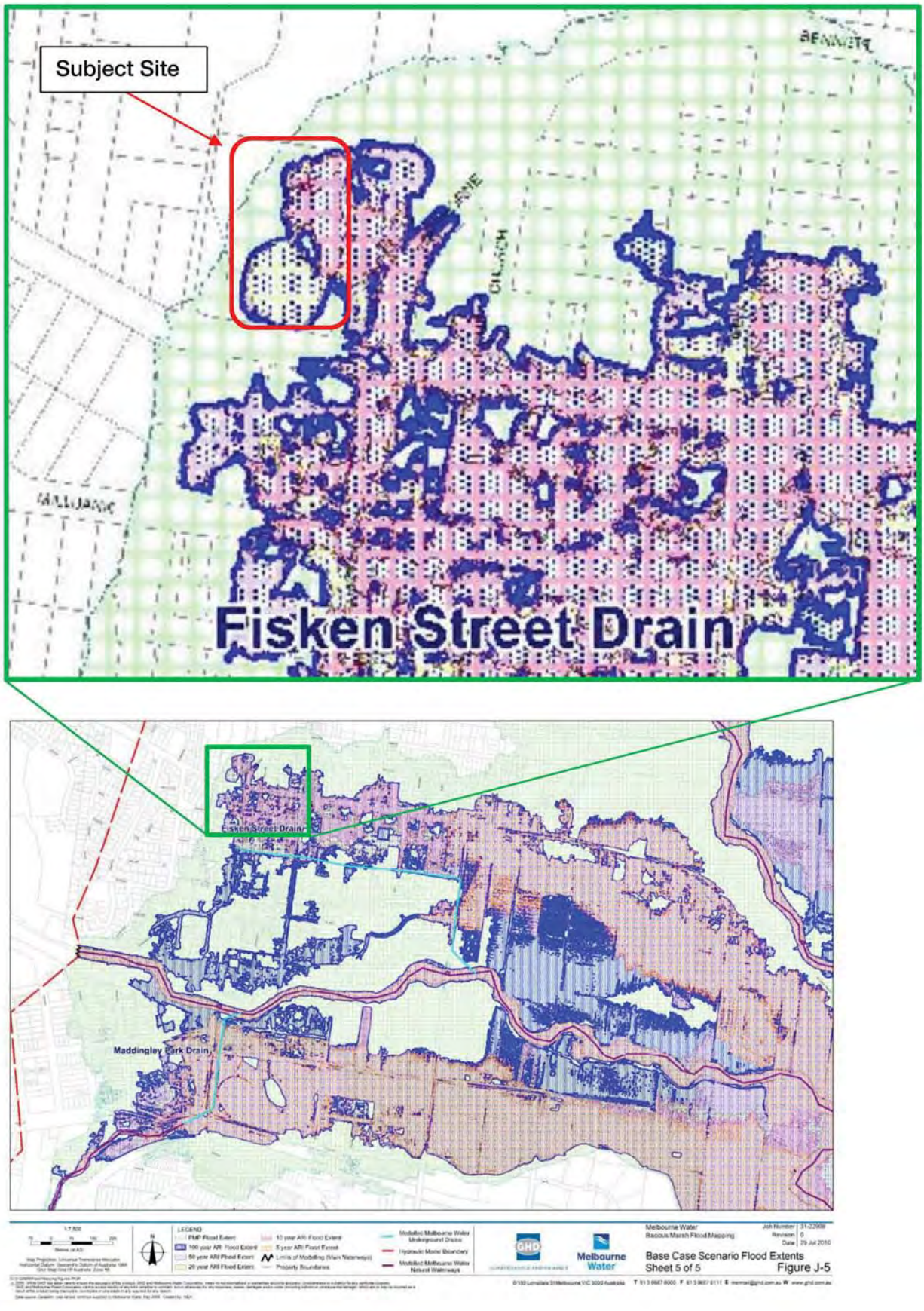


Figure 10 Modelled Flood Extents and Flood Frequency

Summary

The review of the technical reports and peer reviews of the flood models generally found good adherence to standard flood modelling methods and industry norms. The modelling spent significant time reviewing the hydrology and topography used in the modelling, and ensuring that the major elements were well represented. As a standalone exercise the levels as found in the reports could be expected to be generally representative of the levels of risk estimated in the mapping.

However for this particular site, the careful review of parameters to meet industry expectations for the larger catchments and flow paths has resulted in anomalous mapping for this location. This is not a criticism of the modelling, or planning amendment method, as no flood model can accurately cover every situation but it has resulted in an overestimation of flooding on this particular site. In some respects this can be seen as a model boundary or edge effect as the site is essentially outside of the focus of the modelling. The main focus of the modelling is the flows in the Werribee River and Fiskin Street Drain – as is highlighted by both the methodology and discussed extensively in the report. This site is on the edge of the influence of these systems, with the modelling spilling into this area, without the resolution or setup to properly represent this site.

This site has been incorrectly represented as to the extent of the LSIO based on the high level modelling due to low grid resolution (8m), the ignoring of site specific features that affect the trapped low point (existing council drainage) and application of hydrology, all of which give an incorrect representation. Given the level of expertise and extensive review work associated with this amendment, it is suggested that the amendment be applied (rather than completely remapped) but the mapping be trimmed to Grant Street and Gisborne Road in particular on the northern side of Main Street to represent the flooding uncertainty in this area. The suggested LSIO extent is shown in Figure 11.

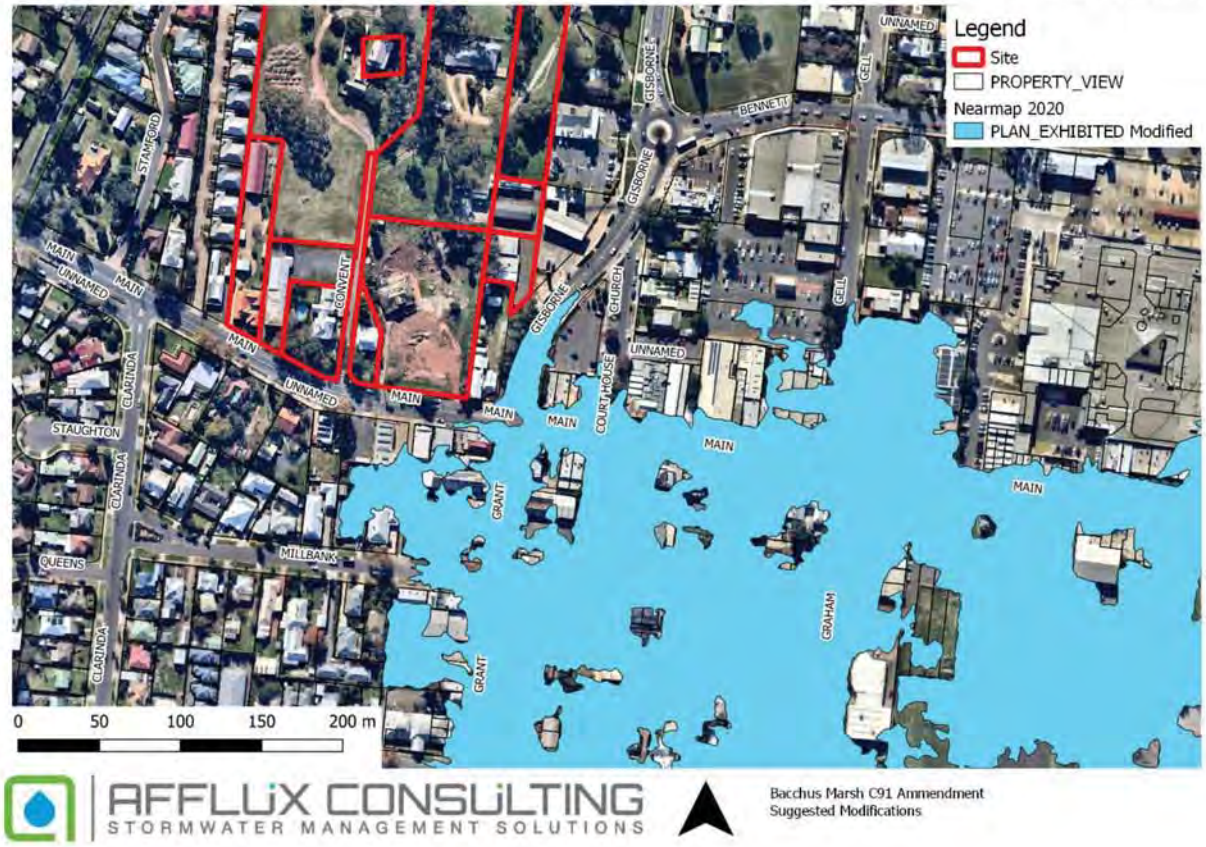


Figure 11 Suggested Modifications to C91 Ammendment

Recommendations

This review has resulted in the following recommendations:

- Remove the proposed LSIO on the subject site
- Trim the flood extents to Grant Street/Gisborne Road on the north side of Main Street

1. Report By:

Christopher Mitchell Beardshaw
Principal Engineer
Afflux Consulting Pty Ltd
Emerald, VIC 3178

Qualifications:

- BEnvEng (Hons), Monash University, 2002
- MEngSci, UNSW, 2006
- Graduate Certificate River Health Management, University of Melbourne, 2009

Affiliations:

- Member, Institution of Engineers Australia
- Immediate Past President, Stormwater Victoria Industry Association

Area of Expertise:

Key areas of expertise relevant to this report are summarised below.

- Assessment of flooding, water quality and waterway protection
- Urban and rural river design and management
- Data collection, processing and analysis
- Application of GIS
- 1 and 2 Dimensional Flood modelling

2. Statement of Expertise

With my qualifications and experience, I believe that I am well qualified to provide an expert opinion of flooding issues associated with the site at 92 Main Street, Bacchus Marsh

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Land Development | Project Management
Planning | Urban Design | Civil Engineering

Project No: 11006
Your Reference: C91

17 August 2020

Moorabool Shire Council
PO Box 18
BALLAN VIC 3442
info@moorabool.vic.gov.au

Attention: Rod Davison

Dear Rod

Amendment C91 to the Moorabool Planning Scheme
Submission on behalf of Bodawill Investments and B.R. Griffith

We advise that we act for Bodawill Investments and B.R. Griffith who are the developers of Pentland Park estate. Part of the subject land is proposed to be impacted by Amendment C91 to the Moorabool Planning Scheme. The formal land description is Lot C PS736701P

Proposed Amendment C91 and the subject land

Maps 34 and 35 as exhibited in C91 map the subject land as partly included within the Special Building Overlay (SBO). A representation of the proposed SBO is below:

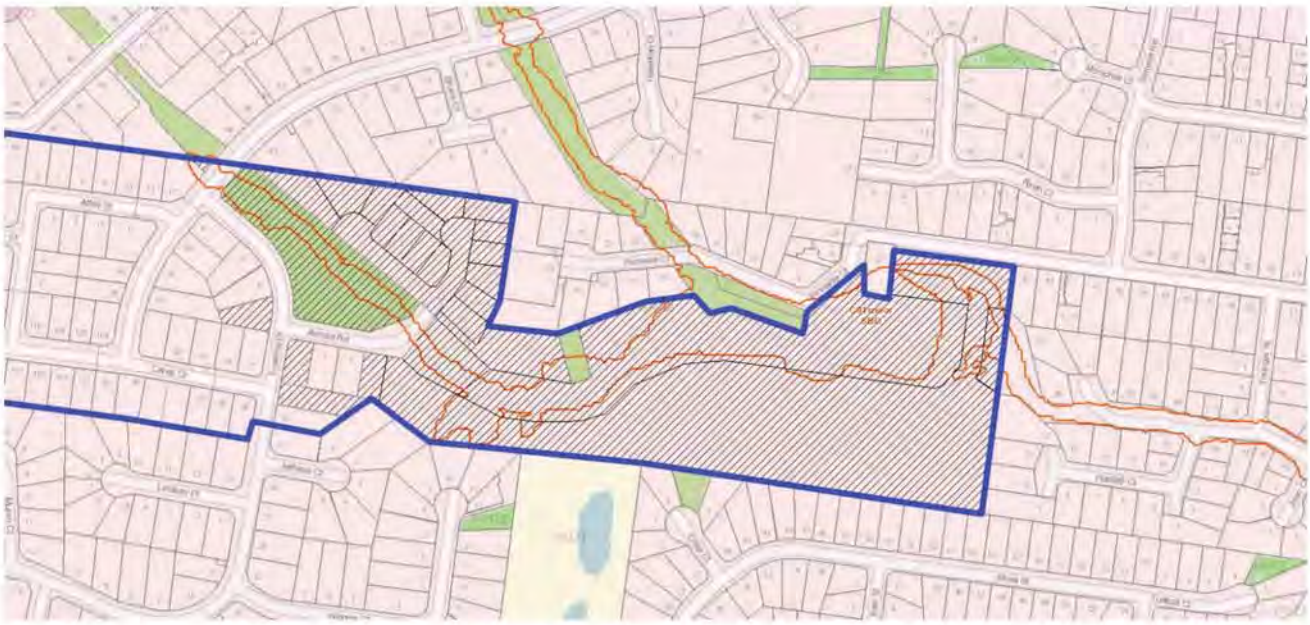

Figure 1: Subject site and the proposed SBO (Source: www.mapshare.vic.gov.au/vicplan)

Amendment C91 proposes to introduce some changes to local planning policy and introduce the Land Subject to Inundation Overlay and Special Building Overlay and relevant new schedules into the Moorabool Planning Scheme.

The proposed changes in Amendment C91 affect the subject land by introducing the Special Building Overlay to areas along the waterway that traverses the site. Some areas of the proposed SBO will impact land that is currently identified to be subdivided into residential lots or identified for medium density development.

Planning and development status of the subject land

The subject land is currently zoned General Residential Zone Schedule 2, with the Design and Development Overlay 15 affecting part of the site. The site has a current planning permit (PA2009222-1) for a staged residential subdivision. Stages 1-3 of the development have been completed. An application for secondary consent is currently being assessed by Council for the development of Stages 4-6 to complete the subdivision of the land (ie. The area of the site that is hatched on the plan above). Stage 4 is due to commence construction once approval of the secondary consent is issued. Stage 4 construction will be closely followed by the retarding basin works that have been approved by Melbourne Water for the site. Stages 5 and 6 include development of the area south of the waterway, which will be completed following construction of the retarding basin.

A copy of the plan currently being assessed by Council is attached, as are the approved plans for the works to construct a retarding basin (as approved by Melbourne Water and Council). Whilst the retarding basin is not yet constructed, it is expected that construction will occur within the next 12 months. These works will ensure that properties alongside the waterway are protected from any potential impacts of future flooding. As such, once constructed, the proposed SBO will become superfluous.

We submit that given the approved waterway works are due for construction in the near future, and are likely to be completed prior to the gazettal of this planning scheme amendment, that the SBO should be reassessed to align with the plans for the retarding basin construction. We would be happy to work further with Melbourne Water and Council to supply information that would assist this process if required. We have enclosed with this submission:

- A copy of the current proposed Subdivision Concept Plan (which has been lodged with Council for secondary consent).
- Documentation confirming Melbourne Water's approval of the functional design for the retarding basin, including:
    - Masons Lane Drain Section 2 plans for the retarding basin.
    - Pentland Park Retarding Basin Design Report prepared by Engeny Water Management November 2019.
    - Confirmed acceptance of MW offer.

We appreciate the opportunity to provide a submission in relation to Amendment C91 and would be happy to assist with anything further to assist assessment of this submission. Please contact Melinda Holloway (ph. [redacted] should you wish to discuss this submission.

Yours sincerely

Melinda Holloway
Principal Urban Designer

Urban Design and Management Pty Ltd

LEGEND

- Site Boundary
- Stage Boundaries
- Reserve
- Contours (1m interval)

Note: This plan has been prepared based on preliminary information only. Detailed site and internal dimensions will need to be confirmed by survey.

The plan is subject to review and approval by relevant authorities, and is subject to change.

UrbanDesign
and management

Land Development | Project Management
Planning | Urban Design | Civil Engineering

0 12.5 25 37.5 50m

Scale: 1:1250 @ A1

N

Subdivision Concept Plan

Pentland Park - Halletts Way, Bacchus Marsh

Plan Ref:11006_SCP Rev:E Date:10 June 2020 Drawn By:MH

www.urbandesignmgt.com.au ABN 62 525 443 156

MELBOURNE WATER CORPORATION
MASONS LANE DRAIN
SECTION 2

GENERAL
1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH LANDSCAPING ARCHITECTS DRAWINGS AND MELBOURNE WATER STANDARD DRAWINGS & SPECIFICATIONS, ANY DISCREPANCY SHALL BE REFERRED TO THE SUPERINTENDENT FOR DECISION BEFORE PROCEEDING WITH THE WORK.
2. ALL PROPRIETRY ITEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
3. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH THE RELEVANT S.A.A.CODES, BUILDING CODE OF AUSTRALIA, AND THE VICTORIA BUILDING REGULATIONS.
4. DRAWINGS ARE NOT TO BE SCALED. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORKS OR MAKING ANY SHOP DRAWINGS.
5. THE SUPERINTENDENT SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY INSPECTIONS REQUIRED IN THESE DOCUMENTS.
6. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND SERVICES PRIOR TO CONSTRUCTION. ALL APPROVALS FROM SERVICE AUTHORITIES SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORKS.
7. THESE DRAWINGS ARE TO MAP GRID OF AUSTRALIA (MGA).ALL LEVELS ARE TO A.H.D.
8. ANY VARIATION TO THE DETAILS SHOWN ON THE DRAWING MUST BE AUTHORISED BY THE SUPERINTENDENT PRIOR TO FABRICATION AND/OR CONSTRUCTION.
9. THE CONTRACTOR SHALL DISPOSE OF EXCESS SPOIL.
10. ALL MATERIAL ASSETS MODIFIED OR DAMAGED BY THE PROPOSED WORKS ARE TO BE REINSTATED TO THE SATISFACTION OF BOTH MELBOURNE WATER AND COUNCIL.
11. CONSTRUCTION WORK SHALL BE CARRIED OUT STRICTLY IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT, 2004.
12. REFER TO MWC OFFER REFERENCE: 193521 - SEMP, WORK METHOD STATEMENT & RISK ASSESSMENT TO BE LODGED WITH MWC.
13. ALL TREES AND IDENTIFIED VEGETATION NO GO ZONES MUST BE PRESERVED AND PROTECTED AT ALL TIMES, IN ACCORDANCE WITH COUNCIL PROCEDURES UNLESS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
14. NO BLASTING IS PERMITTED WITHIN WORKS AREA.
15. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS IN E.P.A. GUIDELINES
    15.A. 1996 - "ENVIRONMENTAL GUIDELINES FOR MAJOR CONSTRUCTION SITES"
    15.B. 1991 - "CONSTRUCTION TECHNIQUES FOR SEDIMENT POLLUTION CONTROL"
16. NO TOPSOIL TO BE REMOVED FROM SITE.
17. ROCK WORK TO BE PLACED AS PER MELBOURNE WATER STANDARDS AND TO MELBOURNE WATERS SATISFACTION.

ROCK WORK
1. AREAS ON WHICH ROCK IS TO BE PLACED SHALL BE TRIMMED AS REQUIRED, ALLOWANCE FOR AN 150mm BEDDING LAYER OF GRADED ROCK (0-80mm) AND PROVIDE A FINISHED SURFACE LEVEL OF ROCK IN ACCORDANCE WITH THE DRAWINGS. ANY SCOURS OR HOLLOWS IN THE SURFACE SHALL BE STRIPPED OF ORGANIC MATTER AND ANY UNSUITABLE BASE MATERIAL AND THEN FILLED WITH COMPACTED CRUSHED ROCK
2. THE GENERAL CONCEPT OF ROCKWORK CONSTRUCTION IS:
- IT SHOULD BE MADE UP OF ANGULAR ROCK (EITHER QUARRIED OR BROKEN UP FIELD ROCK).
- IT MUST BE MADE UP OF WELL SIZED, WELL GRADED, WELL EMBEDDED, WELL INTERLOCKED ROCK.
- ALL VOIDS MUST BE SEALED TO PROVIDE STABILITY AND RESISTANCE TO FLOW VELOCITIES AND INFILTRATIONS/ UNDERMINING.
- IT SHOULD FORM AN INTERLOCKING MASS OF ROCK IN WHICH THE LARGER ROCKS IN THE MIX ARE NOT FREE TO MOVE.
- THE PERIMETER SHALL HAVE EDGE AND TOE ROCK WORK FOR SECURING ROCKS, REFER NOTE 4
3. ALL ROCKWORK SHALL BE DONE TO THE SATISFACTION OF THE MELBOURNE WATER ON-SITE REPRESENTATIVE.
4. TOE AND EDGE ROCKS
   TOE TO EDGE ROCKS ARE ALSO REFERRED TO AS LEADING EDGE ROCKS OR PERIMETER ROCKS. TOE ROCKS ARE SITUATED AT THE BASE OF A ROCK STRUCTURE AND EDGE ROCKS ARE LOCATED AROUND THE REMAINING PERIMETER. THE FUNCTION OF TOE TO EDGE ROCKS IS TO HOLD THE ROCK STRUCTURE TOGETHER AND PREVENT FLOWS FROM UNDERMINING THE STRUCTURE. WITH TOE AND EDGE ROCKS THE FOLLOWING SHOULD BE CONSIDERED:
- THE SIZE OF THE TOE AND EDGE ROCKS WILL DEPEND ON THE SITE AND HYDRAULIC CONDITIONS. EDGE ROCKS ARE GENERALLY SMALLER THAN TOE ROCKS BUT ARE LARGER THAN LINING ROCKS.
- TOE AND EDGE ROCKS SHOULD BE TRENCHED INTO IN-SITU GROUND. GROUND SHOULD BE BOXED-OUT TO ENABLE TOE AND EDGE ROCKS TO BE PLACED BEFORE FILTER LAYER AND LINING ROCKS.
- TOE/EDGE ROCKS SHOULD FINISH FLUSH WITH SURROUNDING GROUND.
5. LINING ROCKS
   LINING ROCK IS THE MASS ROCK MEDIUM CONTAINED BY THE LEADING EDGE ROCK TO ARMOUR/PROTECT THE GIVEN EARTH SURFACE. WITH LINING ROCKS THE FOLLOWING SHOULD BE CONSIDERED:
- A FILTER/EMBEDMENT LAYER SHOULD BE USED UNDERNEATH (REFER NOTE 6).
- LINING ROCKS SHOULD BE WELL GRADED TO FORM A TIGHTLY SEALED ROCK LAYER WHICH IS FREE OF VOIDS AND PROVIDES RESISTANCE TO FLOW VELOCITIES AD INFILTRATION/UNDERMINING AS PER THE GENERAL INTENT OF ROCKWORK MENTIONED IN NOTE 2. IN SEALING VOIDS CONSIDERATION SHOULD BE GIVEN TO USING A SMALLER GRADED ROCK MIX (IE. ALSO REFERRED TO AS AN INFILL MIX). DEPENDING ON THE SIZE OF THE VOIDS, A 0-150mm INFILL MIX MAY BE APPROPRIATE. DEPENDING ON ROCK AVAILABILITY AND CONSTRUCTION METHOD ADOPTED, SEALING OF HE ROCKWORK MAY OCCUR AS A PRE-MIX (IE. INFILL MIX IS COMBINED WITH LARGER LINING ROCKS BEFORE PLACEMENT), OR BY WORKING THE INFILL MIX BETWEEN THE LARGER ROCKS AS THEY ARE LAID.
- THE SIZE OF THE LINING ROCK AND THICKNESS OF THE LINING ROCK LAYER WILL DEPEND ON GENERALLY SMALLER EDGE ROCKS.
- THE CONTRACTOR SHOULD USE METHODS FOR HANDLING AND PLACEMENT OF LINING ROCK THAT WILL AVOID SEGREGATION OF THE ROCK SIZES. ROCKS SHALL BE CAREFULLY PLACED AND POSITIONED, NOT DUMPED DIRECTLY.
6. FILTER/EMBEDMENT LAYER
   FILTER/EMBEDMENT LAYER PROVIDE PROTECTION TO THE UNDERLYING SOIL BASE FROM INFILTRATION OF FLOWS AND PROVIDE A SUITABLE MEDIUM FOR THE EMBEDMENT OF THE OVERLAYING ROCK. GRANULAR FILTER/EMBEDMENT LAYERS ARE USUALLY SUFFICIENT, HOWEVER SOME SANDY, DISPERSIVE SOILS MAY WARRANT THE USE OF A GEOTEXTILE FILTER LAYER IN ADDITION TO THE GRANULAR FILTER LAYER.
   WHERE A GEOTEXTILE FILTER LAYER IS USED, SPECIAL CARE NEEDS TO BE EXERCISED IN THE LAYING OF THE ROCKWORK AND CONSIDERATION GIVEN TO A THINKER GRANULAR FILTER/EMBEDMENT LAYER OVER THE GEOTEXTILE LAYER TO PREVENT DAMAGE TO THE FABRIC. WITH GRANULAR FILTER/EMBEDMENT LAYERS THE FOLLOWING SHOULD BE CONSIDERED:
- LAYER THICKNESS - SHOULD GENERALLY BE 100mm OR THICKER - DEPENDS ON TYPE OF UNDERLYING SOIL (IE. MORE OR LESS DISPERSIVE), ROCK SIZE, AND HYDRAULIC CONDITIONS.
- USE OF GRADED ROCK - SHOULD GENERALLY BE LIMITED TO 0-100mm GRADED ROCK. ONE SIZE BALLAST ROCK IS CONSIDERED INEFFECTIVE AS IT DOES NOT RESIST FLOW INFILTRATION.

DRAINAGE
1. DRAINS AND PITS TO BE CLEANED OUT ON COMPLETION OF ALL SITE WORKS.
2. ALL PITS SHALL HAVE MASS CONCRETE SHAPED BASES TO THE SUPERINTENDENTS APPROVAL.
3. DRAINS TO BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO BACKFILLING UNLESS AGREED OTHERWISE.
4. ALL CONSTRUCTED PIPEWORK SHALL BE FLUSHED AND CLEANED AT THE COMPLETION OF WORKS TO THE SUPERINTENDENTS APPROVAL.
5. PIT COVERS AND GRATINGS MUST MATCH FINISHED SURFACE LEVELS UNLESS OTHERWISE SPECIFIED.
6. ALL SETOUT CO-ORDINATES ARE TO PIPE CENTRELINE INTERSECTION UNLESS INDICATED OTHERWISE.
7. ALL PITS GREATER THAN OR EQUAL TO 900MM DEPTH ARE TO BE PROVIDED WITH STEP IRONS.

CONCRETE
1. ALL PIPE FITTING INTO AND OUT OF PIT STRUCTURES MUST BE SEALED BETWEEN PIPE WALL AND CONCRETE WITH BENTONITE (CJ-0725-3K) OR APPROVED EQUIVALENT. BENTONITE FITTED TO MANUFACTURERS SPECIFICATION.
2. CONCRETE QUALITY SHALL BE:
   GENERAL MINIMUM COMPRESSIVE STRENGTH F'C 25MPA
3. AT MINIMUM STRENGTH DEVELOPMENT TIME (DAYS) 28
   WATER CEMENT RATIO (MAXIMUM) 0.55
   SLUMP (MAXIMUM) 100mm
   AGGREGATE SIZE (MAXIMUM) 20mm
   CEMENT SHALL BE SULPHATE RESISTANT CEMENT.
   WATER TO BE CLEAN AND POTABLE. AGGREGATE TO BE SHARP, CLEAN AND CONTINUOUSLY GRADED. ALTERNATIVELY AN APPROVED WATER REDUCING AGENT MAY BE USED AND THE SLUMP INCREASED TO 120mm. HOWEVER THE CEMENT CONTENT SHALL NOT BE REDUCED.
4. ADDITIVES SHALL NOT BE USED WITHOUT WRITTEN APPROVAL FROM THE SUPERINTENDENT.
5. ALL CONCRETE SHALL BE THOROUGHLY COMPACTED USING MECHANICAL HIGH FREQUENCY VIBRATORS. SURFACE TREATMENT OF EXPOSED CONCRETE SHALL BE WOODEN TROWEL FINISHED.
6. ALL CONCRETE SHALL BE CURED BY KEEPING MOIST FOR A MINIMUM PERIOD OF SEVEN (7) DAYS AFTER PLACING OR BY APPLICATION OF AN APPROVED CURING COMPOUND. IMMEDIATELY AFTER SURFACE HARDENING APPLY WATER TO THE SURFACE AND THEN COVER THE WHOLE OF THE SURFACE WITH P.V.C SHEETING. EXTEND THE SHEETING BEYOND THE EDGES OF THE NEW CONCRETE AND SEAL THE P.V.C. TO THE OLD CONCRETE AND ALONG ALL EDGES AND ALL JOINTS IN THE P.V.C TO PREVENT ANY LOSS OF MOISTURE.
7. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS, REINFORCING BARS ARE TO BE SUPPLIED, PLACED, FIXED AND SUPPORTED IN ACCORDANCE WITH AS 3600-2001 - CONCRETE STRUCTURES CODE AND THE SPECIFICATION WITH SUPPORTS AT 400mm CENTRES.
8. COVER TO REINFORCING SHALL BE A MINIMUM 50mm TOP AND BOTTOM. ALL SPLICES IN REINFORCEMENT SHALL BE LAPPED TO DEVELOP FULL TENSILE STRENGTH IN ACCORDANCE WITH AS 3600-2001, CONCRETE STRUCTURES CODE.
9. FORM UP CONTRACTION AND EXPANSION JOINTS AS AND WHERE SHOWN. ALLOW JOINTS TO THOROUGHLY DRY OUT AND SEAL USING AN APPROVED JOINT SEALANT AS SHOWN IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
10. ALL EXPOSED STEEL SECTIONS CAST INTO CONCRETE SHALL BE HOT DIP GALVANISED.
11. ALL EXPOSED CONCRETE CORNERS TO HAVE 25mm CHAMFER.
12. ALL CONSTRUCTION JOINTS (C.J.) SHALL BE THOROUGHLY SCABBLED AND CLEANED BEFORE CONCRETE PLACEMENT.

SETOUT
1. ALL LEVELS ARE IN METRES TO AUSTRALIAN HEIGHT DATUM (AHD).
2. CO-ORDINATES FOR SETTING OUT ARE TO LOCAL GRID CO-ORDINATES.
3. A 3D CAD FILE WILL BE SUPPLIED TO CONTRACTOR FOR SETOUT PURPOSES, THIS WILL INCLUDE ALL TREATMENT DEVICES, PIPES, PITS AND MAJOR STRUCTURES AND EMBANKMENTS.
4. ALL TBM'S AND CONTROL POINTS ARE TO BE MAINTAINED AND PROTECTED AT ALL TIMES DURING CONSTRUCTION.
5. PRIOR TO COMMENCEMENT OF WORKS THE CONTRACTOR MUST SUBMIT AN SMP TO THE CONSULTANT FOR APPROVAL. THE CONTRACTOR MUST COMPLY WITH THE RECOMMENDATIONS OF THE ENVIRONMENT PROTECTION AUTHORITY PUBLICATION No. 275 "CONSTRUCTION TECHNIQUES FOR SEDIMENT POLLUTION CONTROL". APPROPRIATE SILTATION CONTROL IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD OF WORKS.
6. THE CONTRACTOR SHALL ERECT AND MAINTAIN ALL NECESSARY SHORING, PLANKING, STRUTTING AND DEWATERING SERVICES, BARRICADES, SIGNS, LIGHTS, ETC NECESSARY TO KEEP THE WORKS IN A SAFE AND STABLE CONDITION AND PROTECT THE PUBLIC FROM THE WORKS.

LOCALITY PLAN
NOT TO SCALE

EMBANKMENT
1. 150mm MIN DEPTH OF TOPSOIL TO BE STRIPPED OVER WHOLE OF WORKS AREA AND STOCKPILED. UPON COMPLETION OF EARTHWORKS, TOPSOIL TO BE SPREAD OVER ALL DISTURBED AREAS TO A DEPTH OF 150mm.
2. BATTERS FLATTER THAN 1 in 4 ARE TO BE HYDRO SEEDED UPON COMPLETION OF WORKS.
3. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE TRIMMED AS REQUIRED TO PROVIDE A FINISHED SURFACE LEVEL IN ACCORDANCE WITH THE DRAWINGS. ANY SCOURS OR HOLLOWS IN THE SURFACE SHALL BE STRIPPED OF ORGANIC MATTER AND ANY UNSUITABLE BASE MATERIAL AND THEN REPLACED WITH APPROVED FILL (REFER MELBOURNE WATER STANDARD SPECIFICATIONS).
4. ALL FILLING SHALL COMPRISE SELECTED ONSITE CLAY MATERIAL TO COMPACTION DENSITIES DEFINED BELOW: 95% SMDD AS PER AS 1289, METHOD E1.1
5. UPPER BANK BATTERS SHALL BE ROUNDED, TO AVOID THE APPEARANCE OF UNIFORM BATTER INTERSECTION LINES.
6. FILL MATERIAL AROUND DRAINAGE STRUCTURES TO BE PLACED AS PER GEO-TECHNICAL SPECIFICATIONS. LEVEL 1 COMPACTION REQUIRED TO AS 3798 TO 95% SMDD, MOISTURE CONTENT -1% TO + 2% OMC.
7. FOUNDATION TREATMENT (IF REQUIRED) TO BE ACCESSED AND ADVISED BY GEO. TECHNICAL (YET TO BE APPOINTED)
8. ROCK ARMOURING AT CREST AND SURROUNDING DRAINAGE STRUCTURES TO BE CONCRETE ENCASED/ SLURRY BACK FILLED ROCK LAYER TO A DEPTH OF D50 (250mm).
9. WALLS GRADED AT 1 IN 4.
10. BENTONITE SEALING OF DRAINAGE STRUCTURES TO THE WALL WHERE THE STRUCTURES AND CONCRETE JOIN.
11. 900Ø RCP LOW FLOW OUTLET TO BE RUBBER RINGED SOCKETED PIPE. PLACED ON A SOLID CONCRETE BASE AND ENCASED IN CONCRETE TO THE EXTENTS OF THE TRENCH.
12. 1500Ø RCP OUTLET TO BE RUBBER RINGED SOCKETED PIPE. PLACED ON A SOLID CONCRETE BASE WITH STARTER BARS OR MESH. ENCASED IN MASS CONCRETE AT A GRADE OF 1 IN 8 FROM 100mm ABOVE PIPE TO BASE AND SURROUNDED IN A REINFORCED CAGE.
13. OUTLET PIPE TRENCH WALLS TO REMAIN MOIST AT ALL TIMES PRIOR TO AND DURING LAYING OF PIPE.
14. OUTLET PIPES TO HAVE 2A FILTER CUT-OFF COLLARS INSTALLED AT UPSTREAM END OF PIPES.

LEGEND

168.96	EXISTING SURFACE LEVEL
FS 167.15	FINISHED SURFACE LEVEL
T167.15	TOP/TOE OF BATTER LEVEL
TOK 168.97	TOP OF KERB LEVEL
P 168.37	PAVEMENT LEVEL
EF180.915	EXISTING FILL LEVEL.
—— / ——	EXISTING FENCE
—ExS—ExS—ExS—	EXISTING SEWER
— E — E — E —	EXISTING ELECTRICITY
— G — G — G —	EXISTING GAS
— T — T — T —	EXISTING TELSTRA
— W — W — W —	EXISTING WATER
	EXISTING STORMWATER
	STORMWATER DRAIN & PIT
(1)	PIT NUMBERS
	PROPOSED ROCK BEACHING

WARNING
BEWARE OF UNDERGROUND & OVERHEAD SERVICES
The locations of existing utility services are approximate only and their exact position should be proven on site. No guarantee is given that all existing utility services are shown. Locate all utility services before commencement of works.
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INDEX

PROJECT No.	SHEET No.	REV.	TITLE
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11006-MW-04	4	C	SECTION DETAILS SHEET 1
11006-MW-05	5	C	SECTION DETAILS SHEET 2
11006-MW-06	6	C	DRAINAGE LONG SECTION & DETAILS
11006-MW-07	7	C	GENERAL SECTIONS & DETAILS

No.	REVISION	DATE	DES/DFT	APPROVED
D	Engeny Design Report (November 2019) revisions incorporated.	02.12.20	S.Z	T.P
C	Engeny Design Comments	13.11.15	C.S.	A.G.
B	Amended in line with MW. comments	10.03.15	M.J	AG
A	Issued for Approval	19.06.14	M.J	A.G.

Issued for Approval
Not to be used for construction

MELWAY REFERENCE
MAP 333 G4

UDM. DWG. NO.
11006-MW-01

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Designed
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Checked
A.GRODZKI

Approved
A GRODZKI

Date
JUNE 2014

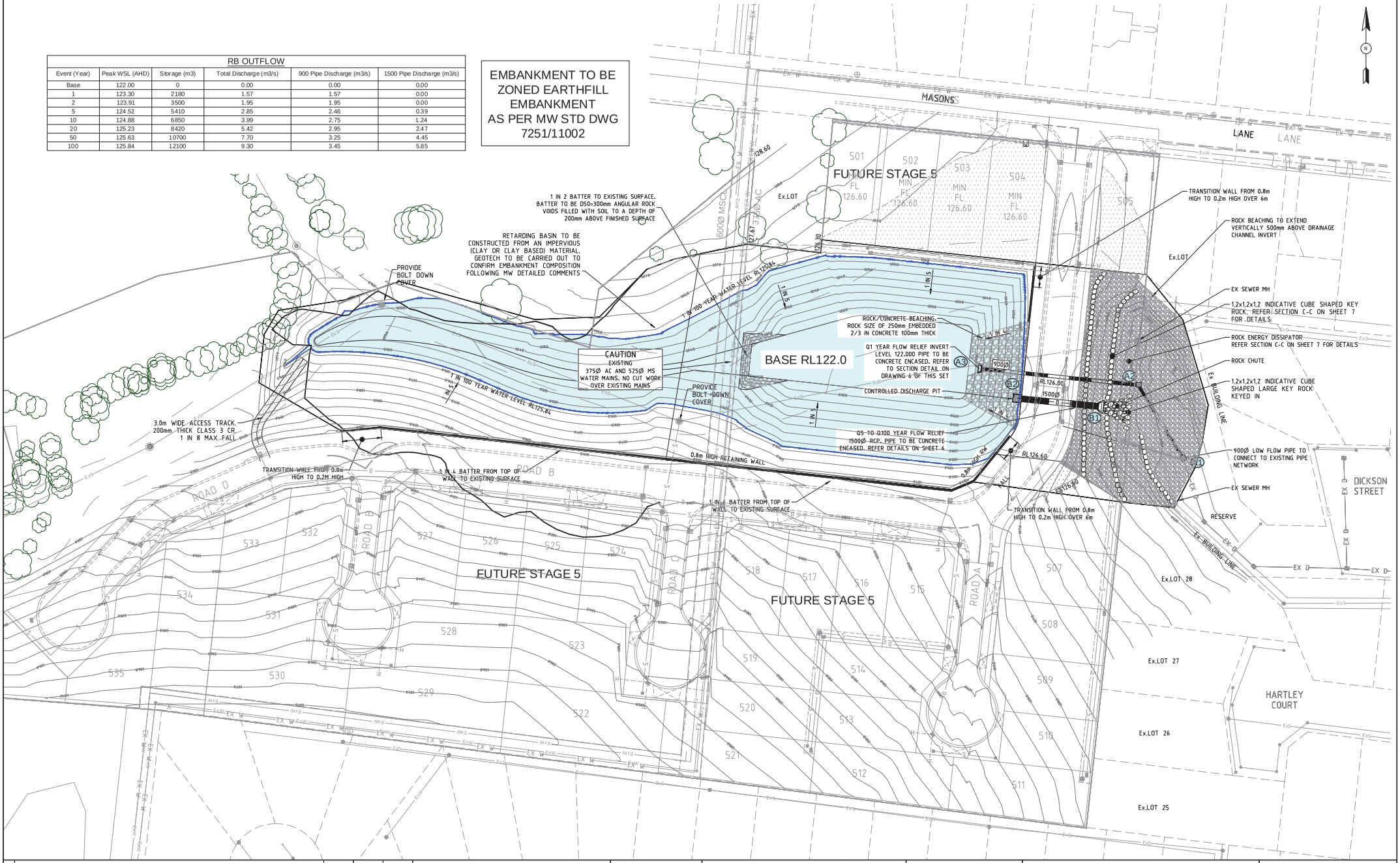
MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK
RETARDATION BASIN
FACE PLAN

Drawing No: 8504/02/01
Revision: D
Sheet No: 1 of 7
Scale @ A1

file name 11006-MW-01.dwg layout name D file location L:\Work\Eng\11006_Pentland Park\Drainage Scheme\Drawings
plotted by Tim Phillips plot date 1/9/2020 12:02 PM

RB OUTFLOW					
Event (Year)	Peak WSL (AHD)	Storage (m3)	Total Discharge (m3/s)	900 Pipe Discharge (m3/s)	1500 Pipe Discharge (m3/s)
Base	122.00	0	0.00	0.00	0.00
1	123.30	2180	1.57	1.57	0.00
2	123.91	3500	1.95	1.95	0.00
5	124.52	5410	2.85	2.46	0.39
10	124.88	6850	3.99	2.75	1.24
20	125.23	8420	5.42	2.95	2.47
50	125.63	10700	7.70	3.25	4.45
100	125.84	12100	9.30	3.45	5.85

EMBANKMENT TO BE ZONED EARTHFILL EMBANKMENT AS PER MW STD DWG 7251/11002



No.	REVISION	DATE	DES/DFT	APPROVED
E	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
D	Water mains Added	24.01.19	R.D.	A.G.
C	Engeny Design Comments	12.11.15	C.S.	A.G.
B	Amended in line with MW comments	10.03.15	M.J.	A.G.
A	Issued for Approval	19.06.14	M.J	A.G.

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Melway Reference: MAP 333 G4

UDM Ref: No. 11006-MW-02

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Date: JANUARY 2019

MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK RETARDATION BASIN DESIGN PLAN

Drawing No: 8504/02/02
Revision: E
Sheet No: 2 of 7
Scale @ A1 1:500 (0 5 10 20)

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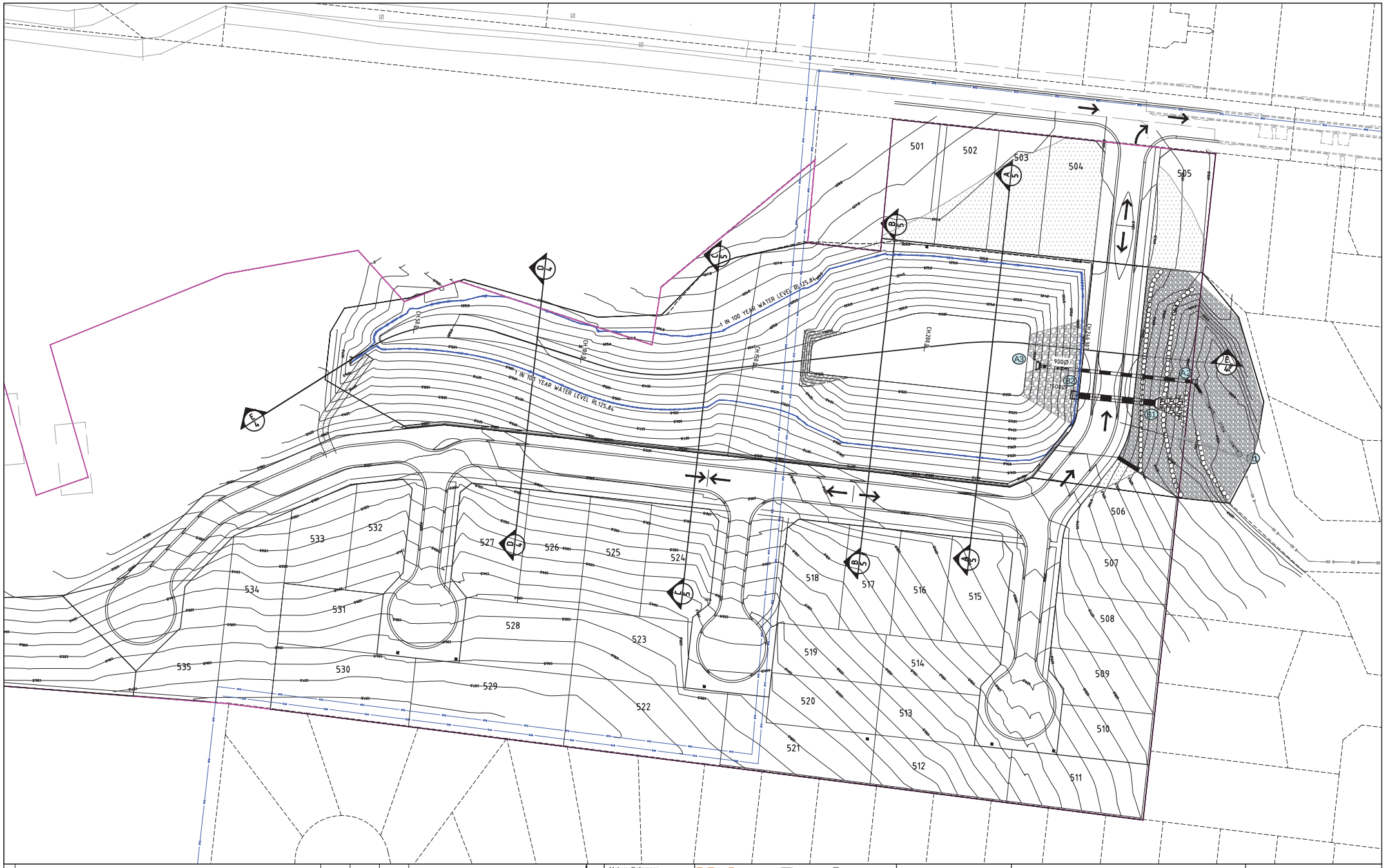

No.	REVISION	DATE	DES/DFT	APPROVED
E	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
D	Water mains Added	24.01.19	R.D.	A.G.
C	Engeny Design Comments	12.11.15	C.S.	A.G.
B	Amended in line with MW comments	10.03.15	M.J.	A.G.
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Urban Design & Management Drawing Number;
11006-MW-03

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Date
JANUARY 2019

MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK RETARDATION BASIN LAYOUT PLAN

Drawing No: 8504/02/03
Revision: E
Sheet No: 3 of 7
Scale @ A1 1:500 (0 5 10 20)

file name 11006-MW-03.dwg layout name E file location L:\Work\Eng\11006_Pentland Park\Drainage Scheme\Drawings
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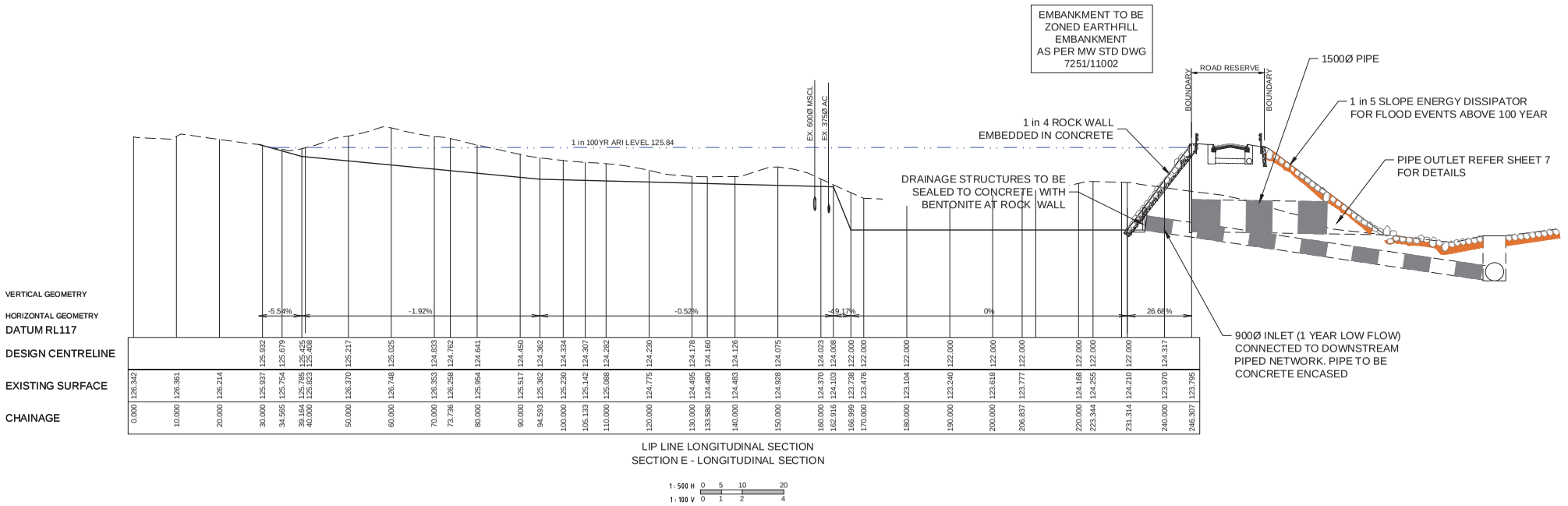

LIP LINE LONGITUDINAL SECTION
SECTION E - LONGITUDINAL SECTION

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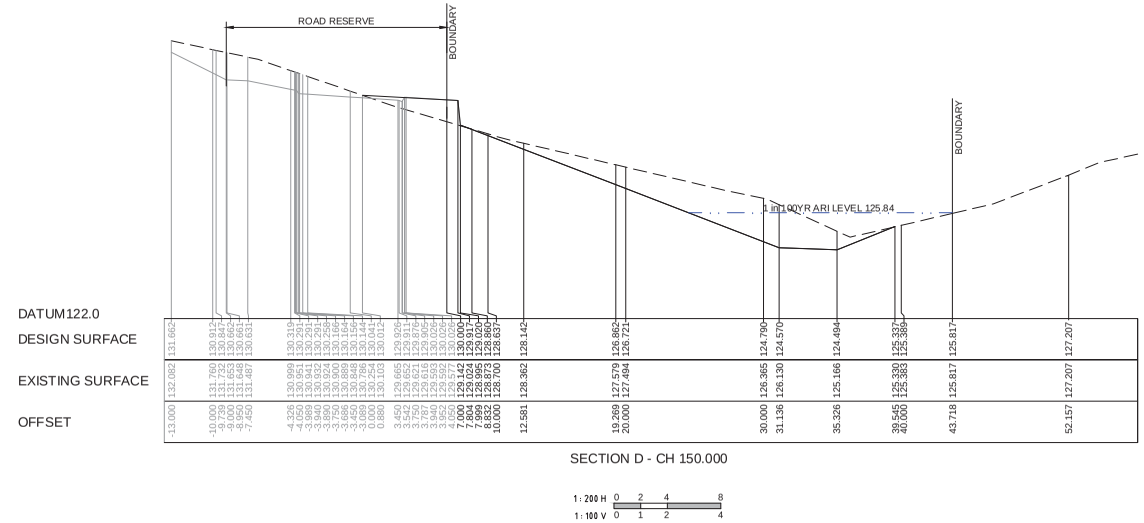

SECTION D - CH 150.000

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No.	REVISION	DATE	DES/DFT	APPROVED
E	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
D	Water mains Added	24.01.19	RD	AG
C	Engeny Design Comments	12.11.15	CS	AG
B	Amended in line with MW comments	10.03.15	MJ	AG
A	Issued for Approval	19.06.14	M.J	A.G

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Melway Reference
MAP 333 G4

UDM Ref: No.
11006-MW-04
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MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK RETARDATION BASIN
SECTION DETAILS SHEET 1

Drawing No: 8504/02/04
Revision: E
Sheet No: 4 of 7
Scale @ A1: As Shown

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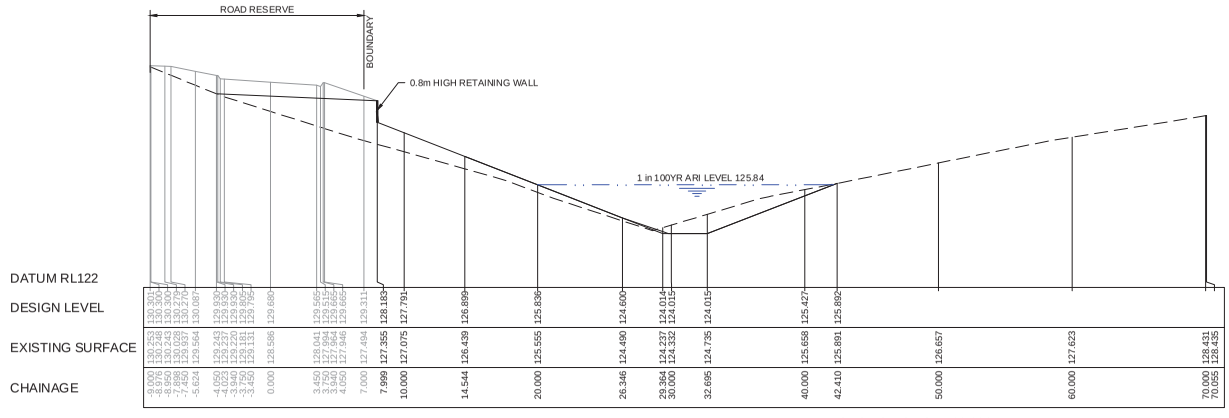
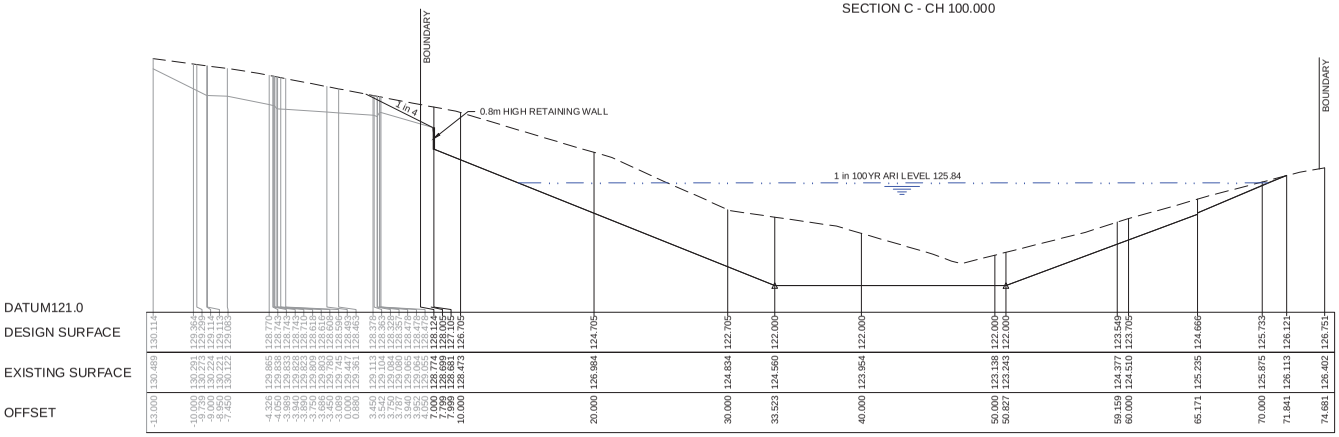
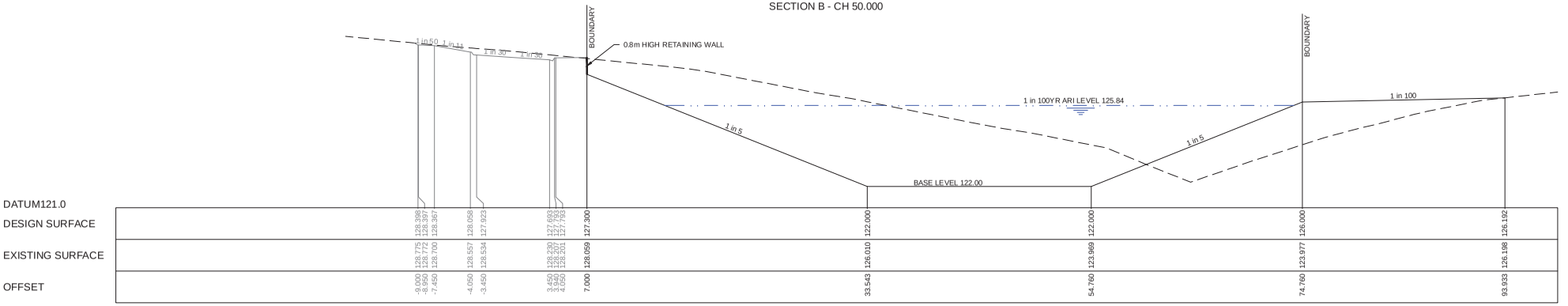


SECTION C - CH 100.000



SECTION B - CH 50.000



SECTION A - CH 18.508

No.	REVISION	DATE	DES/DFT	APPROVED
D	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
C	Engeny Design Comments	13.11.15	C.S.	A.G.
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Checked
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Approved
A GRODZKI

Date
JUNE 2014

MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK
RETARDATION BASIN
SECTION DETAILS SHEET 2

Drawing No: 8504/02/05
Revision: D
Sheet No: 5 of 7
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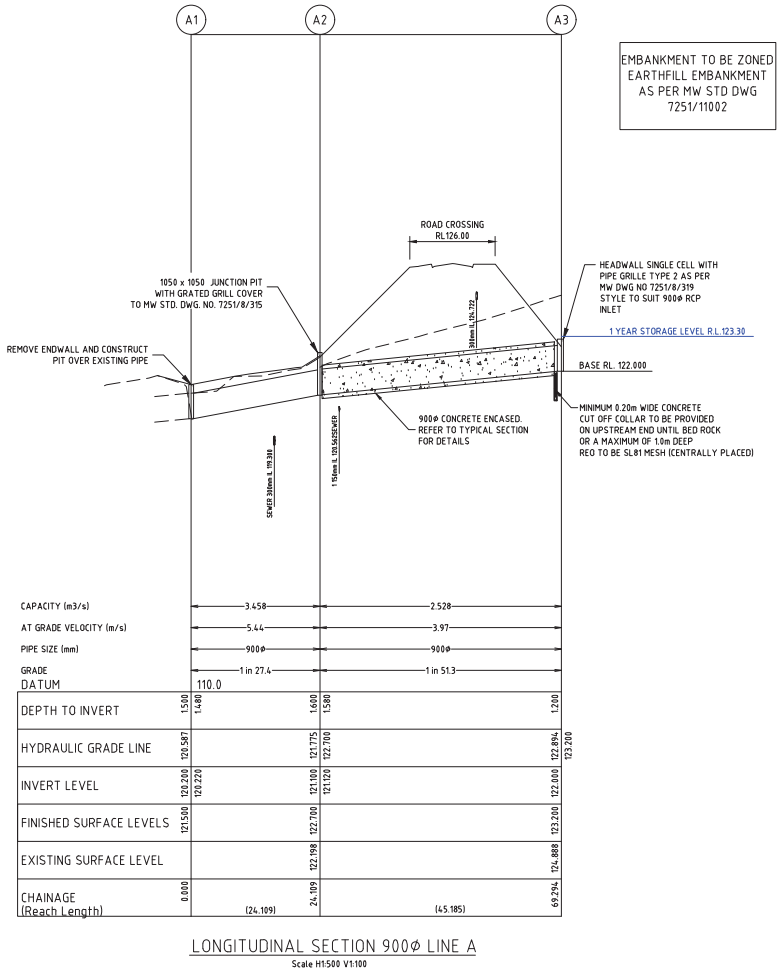
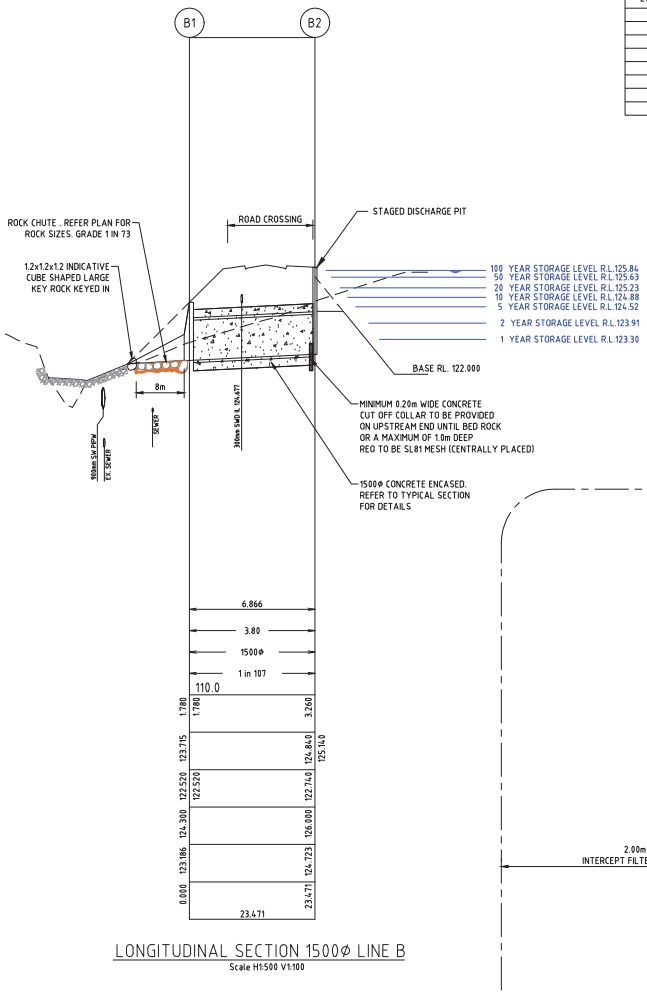


LONGITUDINAL SECTION 900Φ LINE A

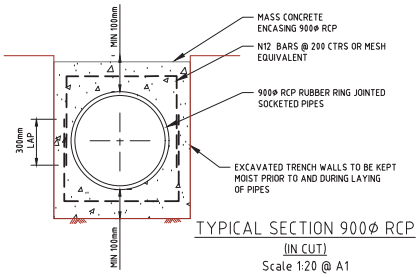
Scale H1:500 V1:100



LONGITUDINAL SECTION 1500Φ LINE B

Scale H1:500 V1:100

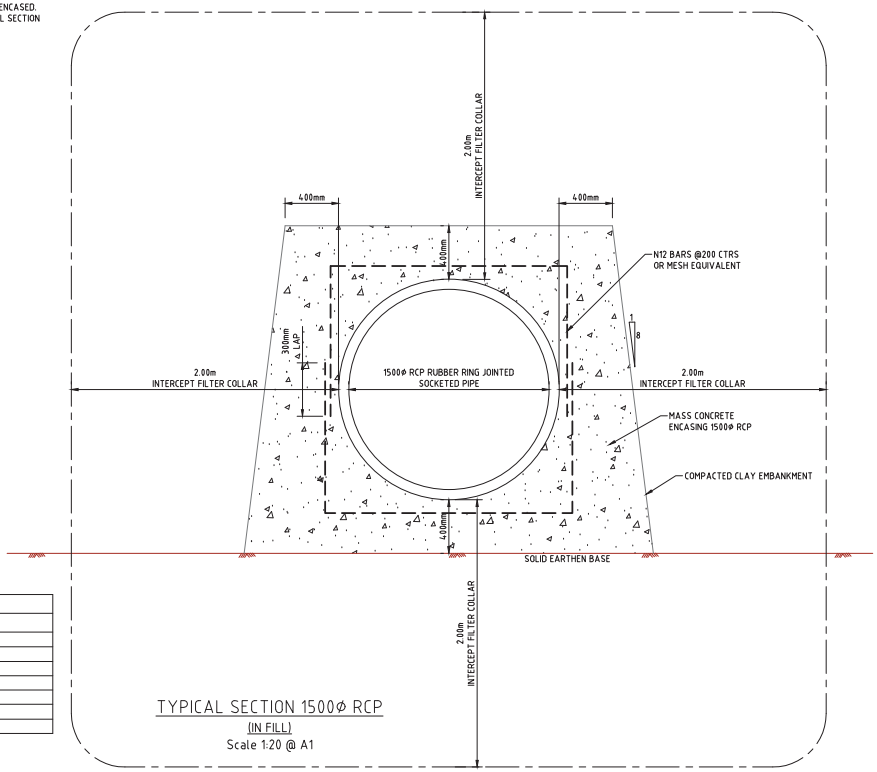
RB OUTFLOW					
Event (Year)	Peak WSL (AHD)	Storage (m3)	Total Discharge (m3/s)	900 Pipe Discharge (m3/s)	1500 Pipe Discharge (m3/s)
Base	122.00	0	0.00	0.00	0.00
1	123.30	2180	1.57	1.57	0.00
2	123.91	3500	1.95	1.95	0.00
5	124.52	5410	2.85	2.46	0.39
10	124.88	6850	3.99	2.75	1.24
20	125.23	8420	5.42	2.95	2.47
50	125.63	10700	7.70	3.25	4.45
100	125.84	12100	9.30	3.45	5.85



TYPICAL SECTION 900Φ RCP

(IN CUT)

Scale 1:20 @ A1



TYPICAL SECTION 1500Φ RCP

(IN FILL)

Scale 1:20 @ A1

PIT SCHEDULE

Name	TYPE	EASTING	NORTHING	INTERNAL		INLET		OUTLET		PIT		REMARKS
				WD	LEN	DIA	INV LEV	DIA	INV LEV	SETOUT RL	DEPTH	
A3	HEADWALL	273536.741	5827919.607	-	-			900	122.000			Standard Humes or Similar Headwall for 900 dia RCP with Pipe Grille Type 2 as per MW Std Dwg 7251/8/319
A2	JUNCTION PIT	273581.692	5827915.012	1050	1050	900	121.120	900	121.100	122.700	0.925	As per M.W. Std. Dwg. No. 7251/8/408 (Unhaunched) with Pipe grill as per M.W. STD. DWG.7251/8/423
A1	GP	273594.379	5827894.512	1200	1200	900	120.220	900	120.200	121.500	1.300	Remove endwall and construct pit over existing pipe
						525	120.220					
B2	JUNCTION PIT	273535.904	5827912.244	2100	2100			1500	122.000	126.000	4.000	As per M.W. Std. Dwg. No. 7251/8/408 (Unhaunched) with Pipe grill as per M.W. STD. DWG.7251/8/423
B1	HEADWALL	273578.041	5827907.927	-	-	1500	121.700			125.000	-	Standard Humes or Similar Headwall for 1500 dia RCP

No.	REVISION	DATE	DES/DFT	APPROVED
D	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
C	Engeny Design Comments	12.11.15	C.S.	A.G.
B	Amended in line with MW. comments	10.03.15	M.J.	A.G.
A	Issued for Approval	19.06.14	M.J.	A.G.

Issued for Approval

Not to be used for construction

Melway Reference: MAP 333 G4

UDM Ref: No.: 11006-MW-06

Water Company Offer No.:

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Date: JUNE 2014

MELBOURNE WATER CORPORATION

MOORABOOL SHIRE COUNCIL

MASONS LANE DRAIN, SECTION 2

PENTLAND PARK

RETARDATION BASIN

DRAINAGE LONG SECTIONS & DETAILS

Drawing No: 8504/02/06

Revision: D

Sheet No: 6 of 7

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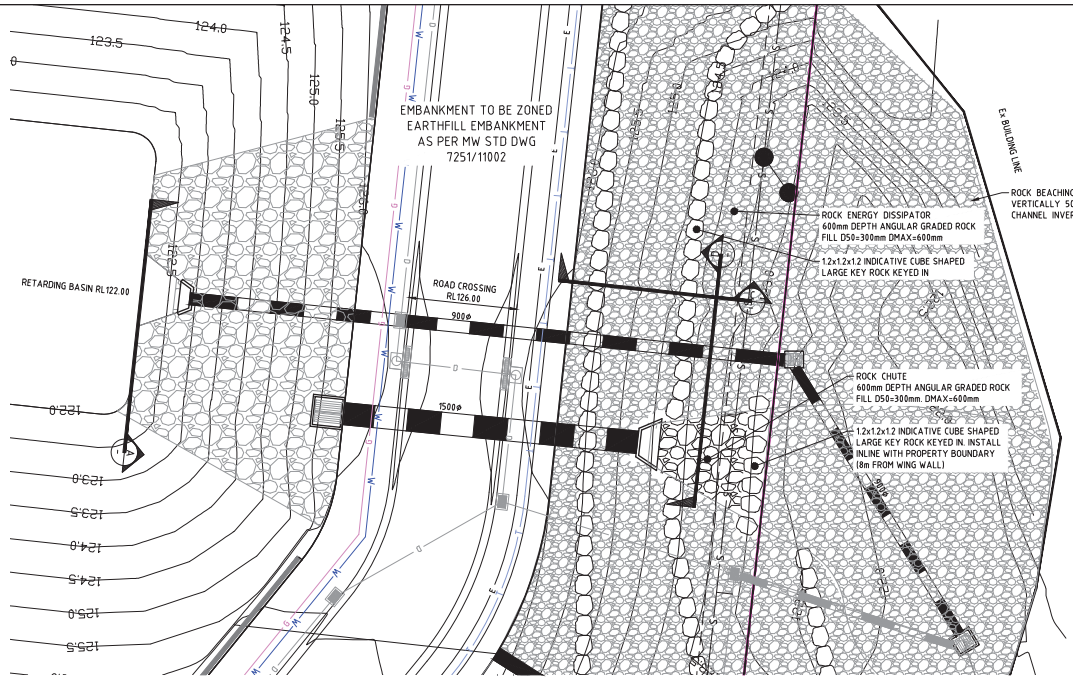

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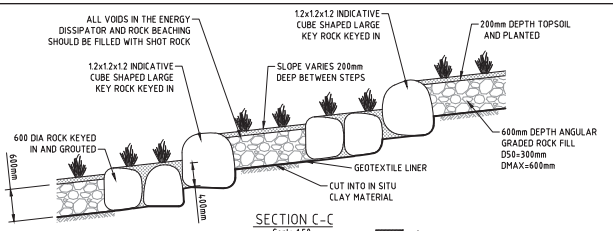

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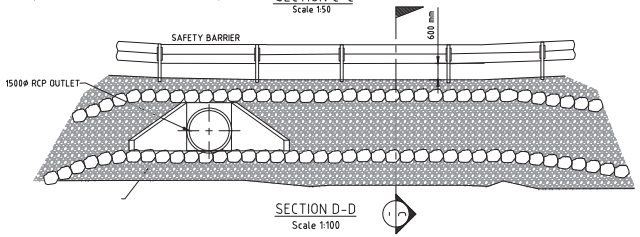

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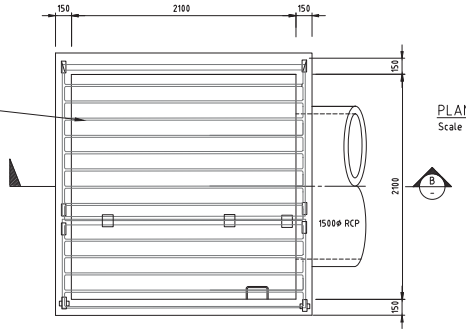

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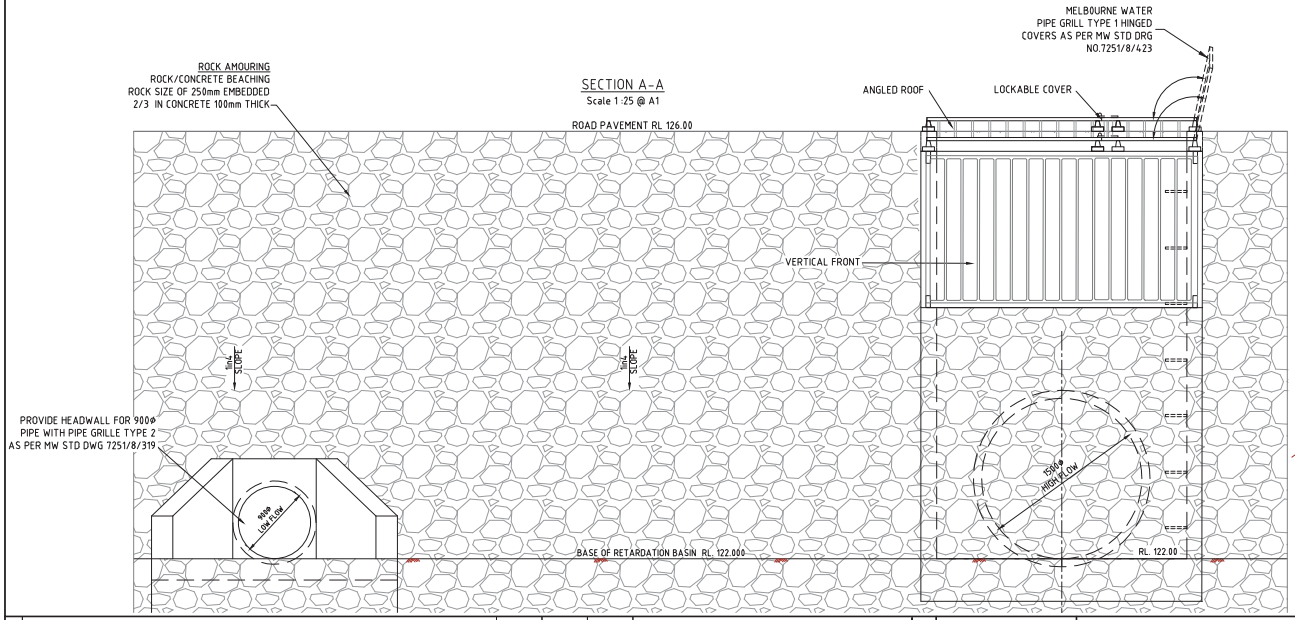

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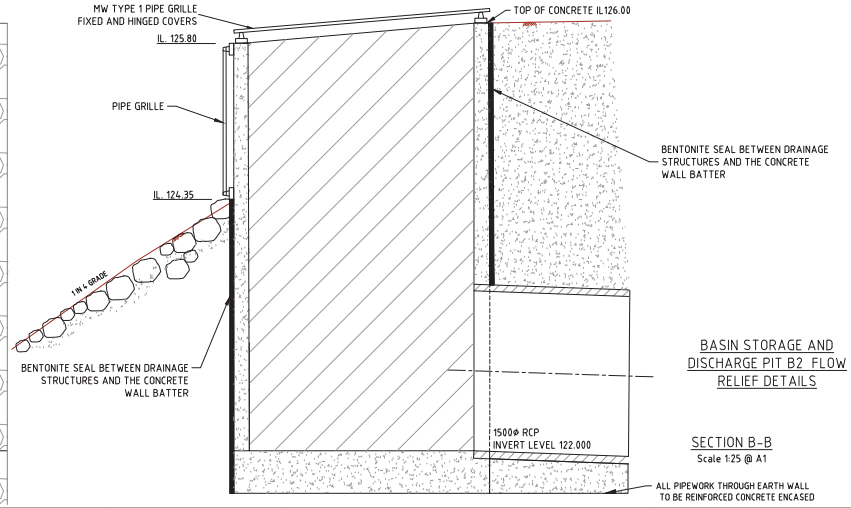

BASIN STORAGE AND DISCHARGE PIT B2 FLOW RELIEF DETAILS

SECTION B-B
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No.	REVISION	DATE	DES/DFT	APPROVED
D	Engeny Design Report (November 2019) revisions incorporated.	02.12.19	S.Z.	T.P
C	Engeny Design Comments	13.11.15	C.S.	A.G.
B	Amended in line with MW. comments	10.03.15	M.J.	A.G.
A	Issued for Approval	19.06.14	M.J.	A.G.

Issued for Approval
Not to be used for construction

Melway Reference
MAP 333 G4

UDM Ref: No.
11006-MW-07

Water Company Offer No.

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JUNE 2014

MELBOURNE WATER CORPORATION
MOORABOOL SHIRE COUNCIL
MASONS LANE DRAIN, SECTION 2
PENTLAND PARK
RETARDATION BASIN
GENERAL SECTIONS & DETAILS

Drawing No: 8504/02/07
Revision: D
Sheet No: 7 of 7
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Pentland Retarding Basin

Design Report




November 2019

V1125_002

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JOB NO. AND PROJECT NAME: V1125_002 Pentland Retarding Basin

DOC PATH FILE: V:\Projects\V1125 Urban Design and Management\V1125_001 Pentland Park RB Design Review\07 Deliverables\Documents\Report\ Engeny Pentland Retarding Basin - Hydraulic Design Report Rev 1

REV	DESCRIPTION	AUTHOR	REVIEWER	APPROVED BY	DATE
Rev 0	Client Issue	Nick Andrewes	Glenn Ottrey	Andrew Prout	18/12/2015
Rev 1	Client Issue	Nick Andrewes	Paul Clemson	Paul Clemson	18/11/2019
Signatures					

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1. INTRODUCTION

1.1 This report

The purpose of this report is to present the functional design parameters for the retarding basin proposed for construction as part of the Pentland Park residential development in Bacchus Marsh.

Engeny Water Management (Engeny) has been engaged by Urban Design and Management (UDM) to review and revise (as required) the existing functional design plans for the retarding basin (drawing set 11006-MW). This revision of the report describes the design that was revised following changes to the retarding basin storage profile made by UDM. All the information presented in this report represents the revised retarding basin design.

The Pentland Park retarding basin is located on the Masons Lane Drain and forms part of the Masons Lane Drain Development Services Scheme (DSS)

1.2 Data

The following reports, plans and models were supplied by UDM and used to inform the design review:

- functional design drawings (Issued For Approval) - 11006-MW PLANS (UDM, 2015). The drawings were provided to Engeny by UDM on the 21st of October 2019.
- site plan (UDM)
- Masons Lane Drain Development Services Scheme Report (PB, 2009)
- Masons Lane DSS RORB models
  - Masons Catchment model_developed_design.catg
  - Masons Catchment model_developed_existing RBs.catg
  - Masons Catchment model_existing.catg
  - Masons Catchment model_rural.catg.

2. LOCATION & BACKGROUND

2.1 Location

The Pentland Park retarding basin is located within the Pentland Park development in Bacchus Marsh (Melway map 333 G4).

The Pentland Park development is situated between Hallets Way and Dicksons Street and contains 5 development stages totalling an area of approximately 15 hectares, which includes:

- low density residential housing (8 ha)
- medium density residential housing (1.3 ha)
- roads (3 ha)
- reserves (2.7 ha).

The development layout is shown in Figure 2.1.

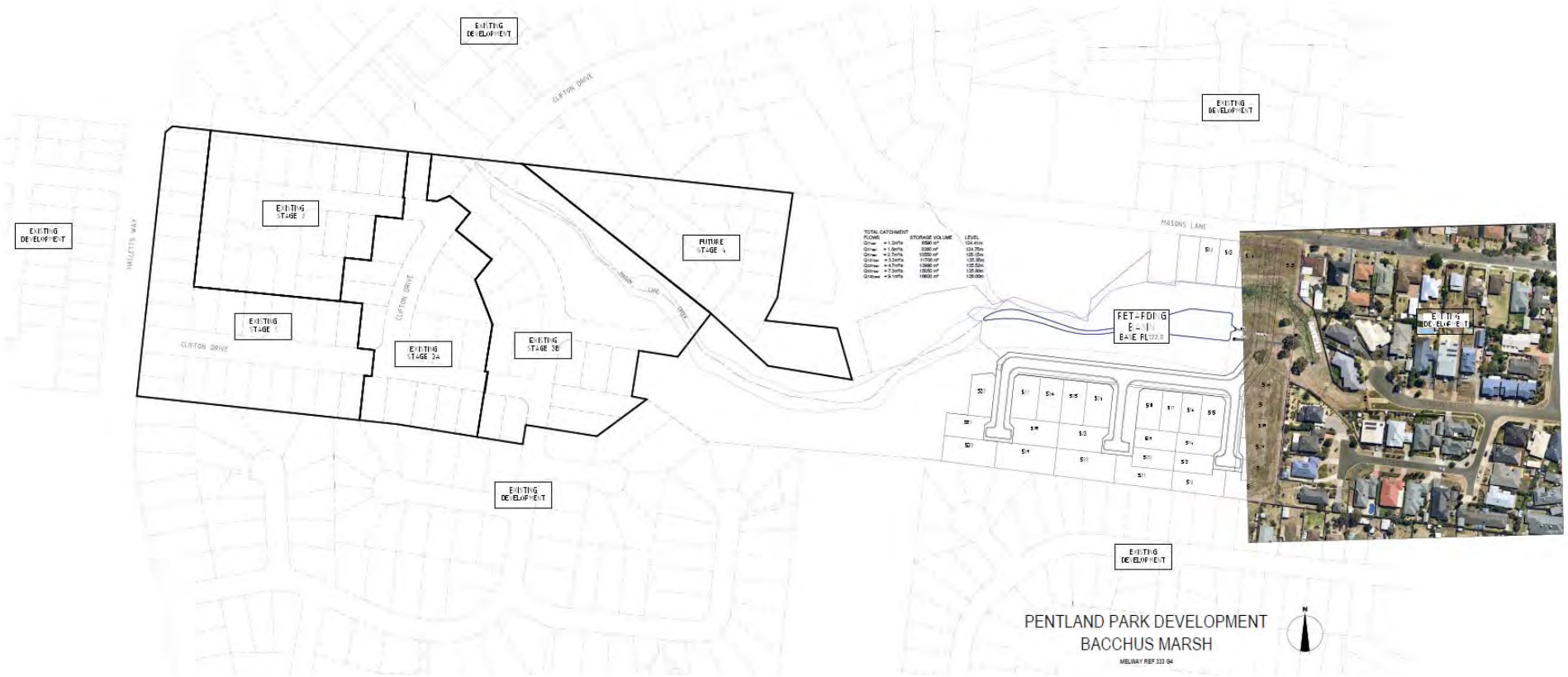

Figure 2.1 Pentland Park Development (UDM)

2.2 Design Intent

The intent of the Pentland Park retarding basin is to mitigate increases in peak stormwater flows that result from residential development in the upstream Masons Drain DSS catchment area. The basin forms part of a mitigation strategy for the DSS that includes a number of other retarding basins located upstream.

2.3 Design Objectives

The basin has the following design objectives:

1. Achieve a maximum outflow that is less than or equal to the maximum pre-developed conditions flow for the 5 year ARI and 100 year ARI events. This objective was set based on discussion with Melbourne Water.

2. Achieve the design requirements of the *Guidelines for the Design and Assessment of Flood Retarding Basins* (MWC, 2010).

3. Conform with dam safety requirements as per the Australian National Committee on Large Dams (ANCOLD) guidelines.

3. CATCHMENT DETAILS

3.1 Description

The total Masons Lane Drain catchment area is reported as 269 hectares in the DSS report (PB, 2009). The catchment area discharging to the retarding basin is approximately 150 hectares, which includes the 15 hectare Pentland Park development.

The catchment area discharging to the retarding basin is shown in Figure 3.1, which is an excerpt from figure 3-1 of the DSS report. The figure shows the RORB subcatchments, reaches and nodes for the catchment area upstream of the Pentland Park retarding basin, which is located adjacent to the label “J4”.

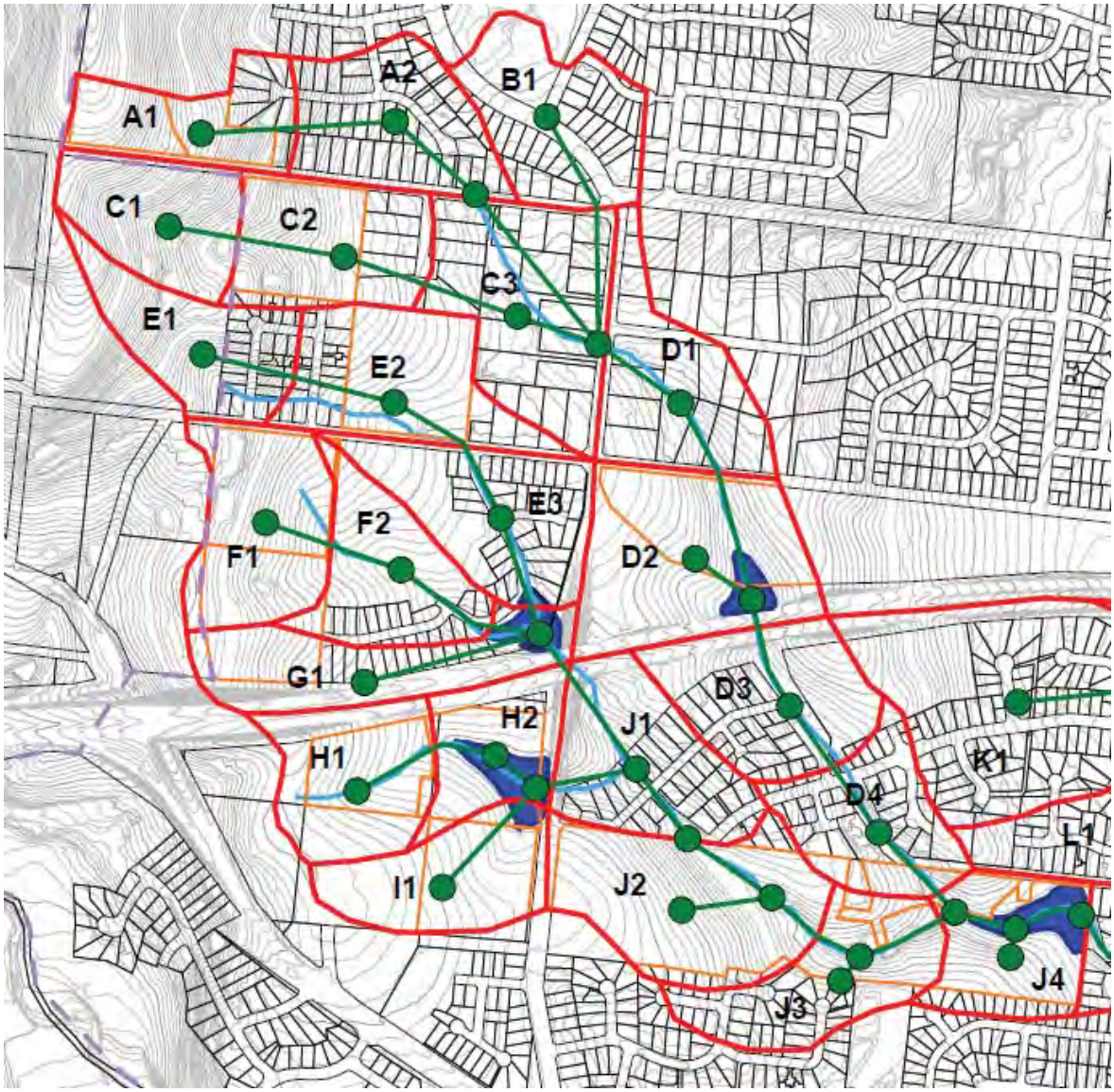

Figure 3.1 RORB subcatchments, reaches and nodes
(Source: Masons Lane Drain DSS report, PB 2009)

4. HYDROLOGY

4.1 Modelling methodology

Hydrological modelling in RORB was used to determine pre-developed, developed and mitigated developed conditions catchment flows. The RORB models developed for the Masons Lane Drain DSS were adopted as a basis for the retarding basin design investigations.

The Pentland Park retarding basin outlet configuration was sized using RORB. The retarding basin was represented in the RORB model with a storage versus discharge relationship developed using an 1D EPA SWMM model and a stage versus storage relationship of the proposed retarding basin design (as per the retarding basin profile provided by UDM).

4.2 Flows

Flow estimates on the Masons Lane Drain and upstream tributaries were undertaken for existing conditions and developed conditions for the Masons Lane Drain DSS (PB, 2009).

Table 4.1 presents the existing and developed conditions flow estimates from the DSS report for the location reported as, “Upstream of Dickson St”. This location was understood to be the “Masons Lane Drain Inlet” print out location defined in the RORB model.

Table 4.1 Existing conditions flows “Upstream of Dickson St”

(Source: Masons Lane Drain DSS report, PB 2009)

Event (ARI)	Scenario		
	Pre-developed Flow (m3/s)	Developed Flow (m3/s)	Developed Mitigated Flow (m3/s)
1	1.40	2.15	1.57
2	1.96	2.69	1.95
5	2.87	5.53	2.85
10	3.80	7.34	3.99
20	5.45	9.61	5.42
50	8.05	12.51	7.70
100	9.79	15.56	9.30

5. HYDRAULICS

5.1 Modelling methodology

The Masons Lane Drain DSS RORB model and a 1D EPA SWMM model were used as the basis for defining the retarding basin outlet configuration. Scour protection design, the ANCOLD consequence of failure assessment and verification of the retarding basin performance was undertaken using a 1D/2D TUFLOW model.

The TUFLOW model was developed based on earlier modelling work undertaken by Engeny in this catchment for Melbourne Water. The original model was part of the Lower Lerderderg catchments flood modelling package of works. The model was trimmed down and updated for use in the ANCOLD assessment.

The dam failure was simulated assuming that it was triggered by an overtopping of the dam wall due to partially blocked culverts. This scenario was run through all standard durations between 10 minute and 12 hour to determine the peak inundation extent. It was assumed that the embankment wall failed to the existing natural ground surface level. The failure was assumed to occur relatively quickly over a 15 minute period with a total opening width of 8 m. The width and failure times are consistent with the USACE and FERC methods of estimating failure. The consequence of failure assessment was not updated for Revision 1 of this report as it was considered that the changes made to the retarding basin design would not result in a change to the consequence category.

6. RETARDING BASIN DESIGN

6.1 Physical Details

Table 6.1 presents the physical details of the Pentland Park retarding basin. The information presented in Table 6.1 and subsequent tables presented in this section are intended to address the information requested in Appendix A of Melbourne Water's flood retarding basin design and assessment guidelines.

Table 6.1 Retarding basin physical details

Retarding Basin Dimension	Value
Maximum Length	215 m
Maximum Width	70 m
Maximum Embankment Crest Height	4.0 m
Maximum Embankment Crest Height above NSL	2.7 m
Embankment Crest Level	126.6 m AHD
Top Water Level to Spillway Crest	126.0 m AHD
Capacity to Spillway Crest	13,180 m^3
Capacity to Spillway Crest above NSL	7,280 m^3
Capacity to Embankment Crest Level	18,330 m^3
Capacity to Embankment Crest Level above NSL	11,930 m^3
Water Surface Area at Spillway Level	7260 m^2

Table 6.2 presents key parameters that describe the retarding basin normal outlet configuration.

Table 6.2 Retarding basin normal outlet configuration

Normal Outlet	Value	Comment
Type	Staged pipe outlets with flow control inlet.	1 no. low flow 900 mm RCP 1 no. high flow 1500 mm RCP with staged inlet control
Invert Level	1 no. 900 mm RCP @ 122.0 m AHD 1 no. 1500 mm RCP @ 122.0 m AHD with grated inlet pit @ 124.35 m AHD and angled roof grate between 125.80 – 126.00 m AHD.	
Low Flow Capacity	Up to the 10 year ARI event before the high flow outlet engages	
Discharge with water at Spillway Crest	10.65 m^3/s	
Discharge with water at Embankment Crest Level (without spillway)	11.55 m^3/s	

Table 6.3 presents key parameters describing the retarding basin spillway configuration.

Table 6.3 Retarding basin spillway configuration

Spillway	Value	Comment
Type	Road to act as weir spillway for flow above the 100 year ARI.	
Crest Level	126.0 m AHD	
Crest Length	64 m	@ 126.6 m AHD
Spillway capacity with water at Embankment Crest Level	32.05 m^3/s	(Total capacity of pipe and weir at 44.75 m^3/s)

6.2 Flood Performance

Flood performance of the retarding basin was assessed using the RORB hydrologic model. Table 6.4 presents the hydraulic performance of the retarding basin for the range of events between the 1 and 100 year ARI. Inflows are presented for the critical duration for the retarding basin level and outflow.

Table 6.4 Pentland Park retarding basin hydraulic performance

Event (ARI)	Scenario				
	RB Inflow (m^3/s)	RB Outflow (m^3/s)	Peak WSL (m AHD)	Volume (m^3)	Critical Duration
1	2.15	1.57	123.30	2180	9h
2	2.94	1.95	123.91	3500	9h
5	5.19	2.85	124.52	5410	2h
10	6.48	3.99	124.88	6850	2h
20	8.28	5.42	125.23	8420	2h
50	11.07	7.70	125.63	10700	2h
100	14.05	9.30	125.84	12100	2h

The flood extent for the 100 year ARI event modelled in TUFLOW is presented in Figure 6.1.

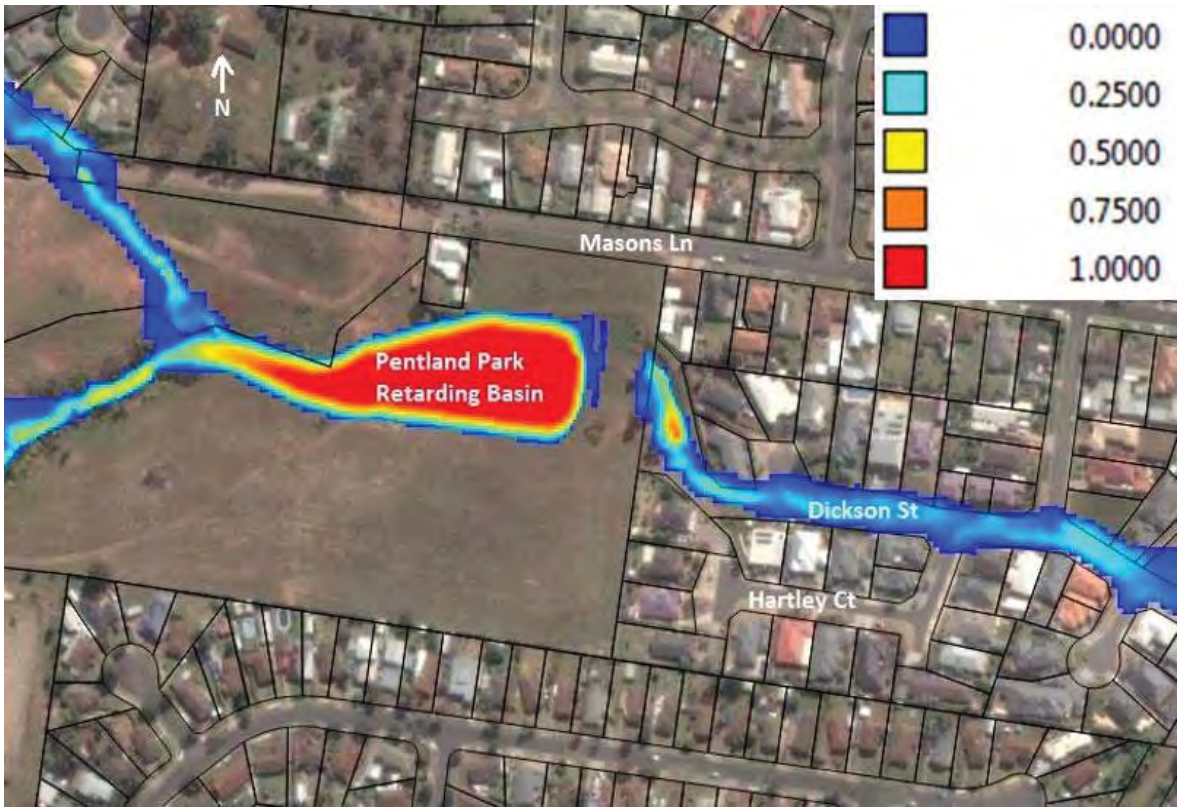

Figure 6.1 100 year ARI flood depth

Additional sensitivity analysis using the RORB model was undertaken to determine the sensitivity of the retarding basin to blockage. Table 6.5 presents the hydraulic performance of the retarding basin for unblocked (0% blockage), 50 % and 90 % blockage of the 1 no. 1500 mm RCP and 1 no. 900 mm RCP normal outlets.

Table 6.5 Pentland park retarding basin sensitivity

Performance	Value	Comment
Average Recurrence Interval (ARI) Assuming 0% Normal Outlet Blockage	100 year ARI	Spillway not engaged.
ARI Assuming 50% Normal Outlet Blockage	20 year ARI	Spillway engagement occurs at an event between the 20 year ARI and 50 year ARI. 50 % blockage assumed for all pipe outlets
ARI Assuming 90% Normal Outlet Blockage Outlet Blockage	1 year ARI	Spillway engagement for the 1 year ARI event (30 hour duration) 90 % blockage assumed for all pipe outlets

Based on the above results, additional pit outfall capacity to the 1500 mm pipe was provided to reduce the occurrence of overtopping due to partial blockage. The pit outfall was also designed with a vertical face and sloping roof to reduce susceptibility of the structure to blockage.

6.3 Risk Assessment

An ANCOLD dam break risk assessment was undertaken by Engeny and is presented in **Appendix A**. The consequence of failure assessment was not updated for Revision 1 of this report as it was considered that the changes made to the retarding basin design would not result in a change to the consequence category.

Table 6.6 presents a summary of the ANCOLD risk assessment findings.

Table 6.6 ANCOLD dam break risk assessment summary of outcomes

Spillway	Value
Dam Break Analysis Type	Intermediate Assessment with
Downstream Assessment Distance	800 m (landuse past this point is farmland)
Total Population at Risk	85
Severity of Damage and Loss	Medium
ANCOLD “fallback” required spillway ARI	10,000 year ARI
ANCOLD Hazard Category	High C

6.5 Design Requirements

Table 6.7 presents a summary of the retarding basin design requirements.

Table 6.7 Retarding basin design requirements

Spillway	Value
Embankment Type	Zoned compacted clay core with chimney intercept filter.
Soil test results	To be confirmed at detailed design
Compaction requirements	To be confirmed at detailed design
Embankment stability information	To be confirmed at detailed design
Embankment design characteristics	Energy dissipation drop structures on the downstream embankment to cater for the 1 in 10,000 year ARI flow. Sacrificial grass overlaying rock armouring to provide visual amenity. Grass and top soil may require replacement following an overtopping event (>100 year ARI).

7. QUALIFICATIONS

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8. REFERENCES

Australian National Committee on Large Dams (ANCOLD) (2012). "*Guidelines on the Consequences Categories of Dams*".

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APPENDIX A

Pentland Park Retarding Basin

ANCOLD Consequence of Failure Assessment

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Urban Design & Management

Pentland Retarding Basin

ANCOLD Consequence of Failure Assessment




December 2015

V1125_001

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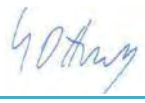
REV	DESCRIPTION	AUTHOR	REVIEWER	APPROVED BY	DATE
Rev 0	Client Issue	Glenn Ottrey	Nick Andrewes	Andrew Prout	18/12/2015
Signatures					

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1. INTRODUCTION

Engeny Water Management (Engeny) has been engaged by Urban Design and Management (UDM) to complete an Australian National Committee on Large Dams (ANCOLD) assessment of the consequence of dam failure and hazard category of the retarding basin proposed for the Pentland Park Development in Bacchus Marsh.

The basis for the ANCOLD assessment was the functional retarding basin design drawings prepared by UDM (drawing set: 11006-MW Rev B) with updates to the outlet configuration provided by Engeny (Engeny, 2015). The retarding basin is to have a 4.0 m embankment wall that will be constructed across the Masons Lane Drain. A road located on the top of the embankment will provide traffic access to development areas located on the south side of the drain. The embankment has a low flow and high flow outlet and is proposed to be constructed as a zoned earth fill embankment.

This assessment was completed according to the ANCOLD *Guidelines on Consequence Categories for Dams (2012)* (the Guidelines).

This report details the assessment process and findings.

1.1 Background Information

The retarding basin is located at the eastern (downstream) edge of the approximately 15 hectare Pentland Park development. The basin has been designed to mitigate the increase in peak flows to pre-developed conditions that will be derived from all future development located within the total upstream catchment area of 269 hectares. The retarding basin is located on-line to the Masons Lane Drain, a Melbourne Water asset that discharges to the Lerderderg River which is situated approximately 1.6 km east of the basin.

The retarding basin outlet configuration and other design parameters presented in Table 1.1 and Table 1.2.

Table 1.1 Retarding basin physical details

Retarding Basin Dimension	Value
Maximum Length	215 m
Maximum Width	70 m
Maximum Embankment Crest Height	4.0 m
Maximum Embankment Crest Height above NSL	2.7 m
Embankment Crest Level	126.6 m AHD

Top Water Level to Spillway Crest	126.0 m AHD
Capacity to Spillway Crest	16,600 m^3
Capacity to Spillway Crest above NSL	10,700 m^3
Capacity to Embankment Crest Level	22,000 m^3
Capacity to Embankment Crest Level above NSL	15,600 m^3
Water Surface Area at Spillway Level	8560 m^2

Table 1.2 Retarding basin normal outlet configuration

Normal Outlet	Value	Comment
Type	Staged pipe outlets with flow control inlet.	1 no. low flow 900 mm RCP 1 no. high flow 1500 mm RCP with staged inlet control
Invert Level	1 no. 900 mm RCP @ 122.0 m AHD 1 no. 1500 mm RCP @ 123.34 m AHD with grated inlet pit @ 125.05 m AHD	
Low Flow Capacity	Up to the 10 year ARI event before the high flow outlet engages	
Discharge with water at Spillway Crest	8.4 m^3/s	
Discharge with water at Embankment Crest Level (without spillway)	10.3 m^3/s	

2. SCOPE OF WORK

Engeny have completed an intermediate ANCOLD assessment of the proposed retarding basin Masons Lane Drain Retarding Basin as defined by the ANCOLD guidelines.

The following was undertaken to complete the assessment of the retarding basin:

- collected information relating to the retarding basin and surrounding area
- developed existing conditions and dam break flood model using Tuflow modelling package
- based on the above, assessed the consequences of a failure of the dam
- determined the flood hazard categories for the dam
- determined the required flood capacity to satisfy the fall back criteria defined in the ANCOLD *Guidelines on Selection of Acceptable Flood Capacity for Dams (2000)*.

3. SITE DESCRIPTION

The Masons Lane Retarding Basin is located adjacent to Masons Lane in Bacchus Marsh, just upstream of Dickson Street. Figure 3.1 shows the location of the retarding basin with respect to the surrounding roads and houses. The catchment inflows occur at the western end of the retarding basin, with the outflows occurring to the east.

Figure 3.1 Locality Map

Directly east and downstream of the retarding basin is Dickson Street and a number of residential properties. There is also a small retarding basin located adjacent to Dickson Street, near the intersection with Gisborne Road, however it is sized only for small rainfall events.

The catchment upstream of the retarding basin consists of predominantly developed land, mostly at standard residential levels (block size ~600 m^2) although there is some lower density development on the hills.

4. CONSEQUENCE ASSESSMENT

To determine the hazard category of the retarding basin, an assessment of the consequences of failure was completed. Based on preliminary design information provided of the basin, topographic information, downstream information, and services/business abutting the lake, it was decided that an 'Intermediate Assessment' described in the Guidelines would be appropriate for assessing consequences of a failure at the lake. An intermediate assessment was used as it provides a higher level of detail than an initial assessment. This higher level of detail was deemed necessary as there are a number of properties downstream of the basin which could potentially be impacted.

The Intermediate Assessment to determine the consequences of failure involved:

- estimating the inundation area using TUFLOW
- estimating damages/losses
- estimating the persons at risk
- considering itinerant population and weighted time of exposure.

4.1 Estimating Inundation Area

TUFLOW modelling was undertaken to determine the extent of inundation expected in the event of the retarding basin wall failing. According to the Guidelines any dwellings (whether these are occupied or unoccupied) as well as any infrastructure such as bridges, roads, railway lines, power lines should be considered in the assessment.

Figure 4.1 shows the modelled effect of the floodwaters resulting from a retarding basin wall failure. The blue extent represents any area considered as hazardous flooding, where the total depth of flooding is greater than 0.35 m, the velocity is above 1.5 m/s or the depth velocity product is above 0.35 m^2/s.

The depth threshold for hazardous flooding was adopted based on the ANCOLD guidelines recommendation as the depth relevant to estimating the Persons At Risk (PAR). The velocity and flood hazard (velocity depth) thresholds were defined using Melbourne Water's risk of hazardous flooding criteria for safe development on floodplains. The red outlines highlight the private properties which are at risk of hazardous flooding.

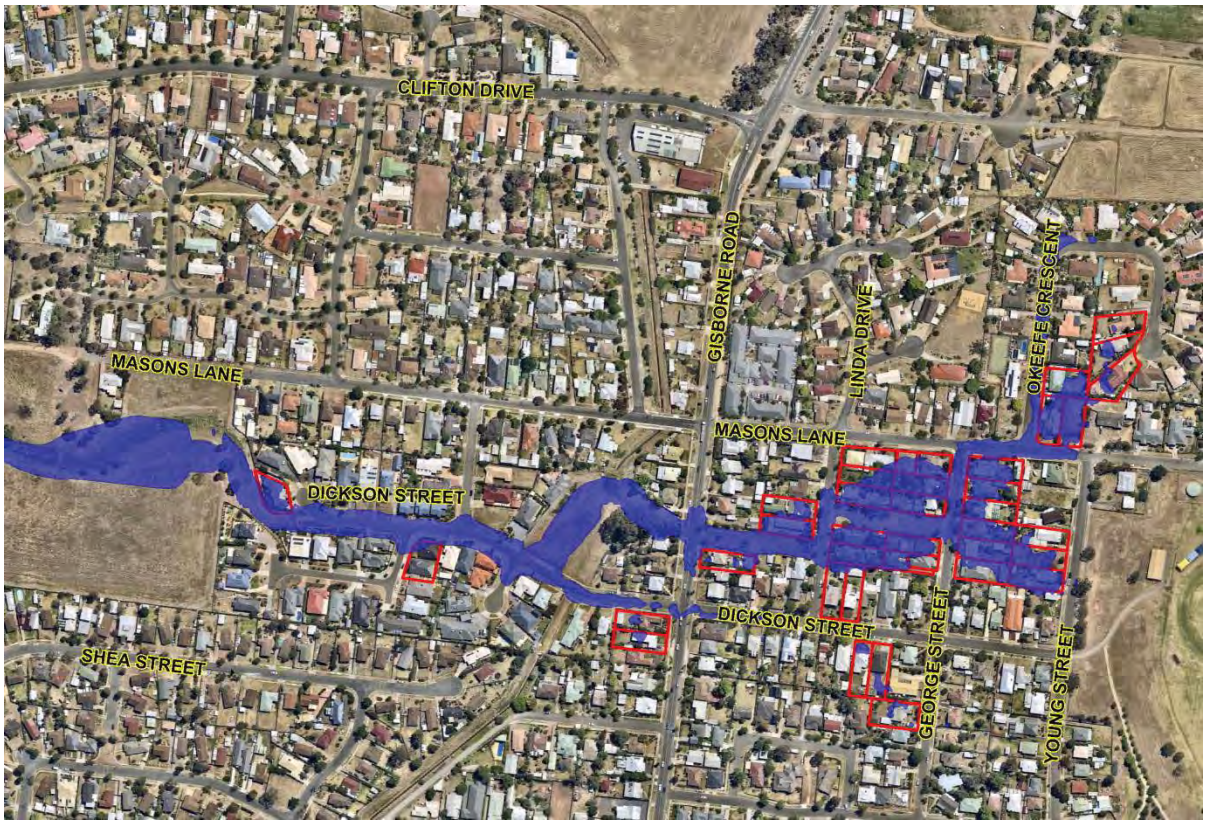

Figure 4.1 Estimated Area of Inundation

4.2 Potential Damage and Losses

The Guidelines group the potential damages and losses into like consequences – estimated costs, service and business, social and natural environment. The level of severity of each of these damages and losses has been established using the table provided in the Guidelines and replicated in Table 4.1. As the table shows the severity level is medium, based on the number of people who would potentially need to relocate due to damaged houses and also due to the impact on the credibility of the dam owners business.

Table 4.1 Severity and Damages of Losses

Damage and Loss	Estimate	Severity Level			
		Minor	Medium	Major	Catastrophic
Total infrastructure costs					
Residential	Damage 39 houses	✓			
Commercial	No Commercial property affected	✓			
Community Infrastructure	Roads	✓			
Dam repair or replacement cost		✓			
Impact on dam owner's business					
Importance to the business		✓			
Effect on services provided by owner		✓			
Effect on continuing credibility			✓		
Community reaction and political implications			✓		
Impact on financial viability		✓			
Value of water in storage		✓			
Health and social impacts					
Public health		✓			
Loss of services to the community		✓			
Cost of emergency management		✓			
Dislocation of people			✓		
Dislocation of businesses		✓			
Employment affected		✓			
Loss of heritage		✓			
Loss of reservoir recreational facility		✓			
Natural Environment					
Stock and fauna		✓			
Ecosystems		✓			
Rare and endangered species		✓			
Highest damage and loss severity level =			✓		

4.3 Estimating Persons at Risk (PAR)

The Guidelines define the PAR as being 'all those persons who would be directly exposed to flood waters within the dam break affected zone if they took no action to evacuate'. The PAR is considered where the depth of flooding is greater than 350mm, or the flow velocity is greater than 1.5 m/s or the velocity depth is greater than 0.35 m^2/s (refer to Section 4.1 for more details).

Should a failure occur in the dam wall while the basin was full, the people at risk would be located in the private properties on Dicksons Street, Gisborne Road, George Street, O'Keefe Crescent and Masons Lane. For the residential properties an average population per house of 2.6 people has been assumed based on data from the 2011 Census.

The PAR may vary according to the time of day and day of the week and even the time of year. Subsequently an 'exposure factor', based on the amount of time per week people may be within the dam break zone and the total number of hours in a week, has been applied to the people using the facilities described above. Table 4.2 provides a summary of the expected PAR based on the weighted exposure factor.

Table 4.2 Expected Flood PAR

Facility	Number of People	Exposure Factor	Persons At Risk
Dicksons Street	4	Low traffic on road, all vehicles on Dicksons Street at time of failure would be impacted, estimated 4 cars impacted	4
Gisborne Road	2	Moderate levels of traffic on road, estimated up to two cars impacted before traffic stopped	2
George Street	1	Low traffic on road, estimated only 1 car impacted	1
Masons Lane	1	Low traffic on road, estimated only 1 car impacted	1
OKeefe Crescent	1	Low traffic on road, estimated only 1 car impacted	1
Residential Properties	39 properties at risk, assume 2.6 residents per property	Assumed not all residents at home 24/7, assume on average dwellings are unoccupied 1/4 of the time	76
TOTAL			85

A sunny day failure was not considered as there is no water stored in the retarding basin on a permanent basis. A flood failure was considered as a failure when the retarding basin was full during a rain event.

5. HAZARD CATEGORY

Based on the information in Section 4 above, and Table 5.1, which has been replicated from the Guidelines, the hazard rating of the retarding basin has been determined to be and **High C** for a flood failure given that the PAR is 85 and the damage and loss category is medium. Given that the basin does not hold permanent water there is no risk of a sunny day failure.

Table 5.1 ANCOLD Hazard Categories

Population at risk	Severity of Damage and Loss			
	Minor	Medium	Major	Catastrophic
0	Very Low	Low	Significant	High C
1 to 10	Significant (Note 2)	Significant (Note 2)	High C	High B
11 to 100	High C	High C	High B	High A
101 to 1000	(Note 1)	High B	High A	Extreme
>1000		(Note 1)	Extreme	Extreme

Note 1: With a PAR in excess of 100, it is unlikely damage will be minor. Similarly with a PAR in excess of 1,000 it is unlikely damage will be classified as medium.

Note 2: Change to “High C” where there is the potential of one or more lives being lost

6. ACCEPTABLE FLOOD CAPACITY

The assessed hazard category for a flood failure mode for the retarding basin is **High C**. Based on the ANCOLD *Guidelines on Selection of Acceptable Flood Capacity (2000)*, the fallback flood capacity for a High C hazard dam is 1 in 10,000 year Annual Recurrence Interval (ARI) to Probable Maximum Precipitation (PMP) design flood, or 1 in 100,000 year ARI with a pre flood lake level assumed to be at the full service level. The proposed outlet arrangement for the retarding basin has been designed to convey the 100 year ARI flow. The road which tops the embankment will act as a weir in larger events and has been designed to withstand erosion in a 1 in 10,000 year ARI event. The expected velocities over the embankment in the 1 in 10,000 year ARI event were determined using the TUFLOW model of the catchment.

7. CONCLUSION

An intermediate assessment was undertaken to determine the sunny day and flood hazard categories for the Masons Lane retarding basin Bacchus Marsh.

The population at risk comprised of both permanent and non-permanent groups of people and as such the population at risk was determined using a time weighted exposure factor.

A High C hazard category was determined for the flood failure event. This high rating is largely due to the potential displacement of people from damaged houses, damage to reputation of the organisation responsible for maintaining the dam and also the population at risk.

The proposed outlet structures for the retarding basin are design to convey the 100 year ARI flows through culverts under the dam wall. The dam embankment wall has also been design to survive the overtopping which would occur in events up to the 10,000 year ARI event, which is considered an appropriate to satisfy the fallback flood capacity for a High C hazard dam.

The retarding basin should be managed and maintained in accordance with the requirements for a High C hazard dam.

8. QUALIFICATIONS

a. In preparing this document, including all relevant calculation and modelling, Engeny Water Management (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

b. Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

c. Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

   (i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

   (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

d. Engeny does not give any warranty nor accept any liability in relation to the completeness or accuracy of the works, which may be inherently reliant upon the completeness and accuracy of the input data and the agreed scope of works. All limitations of liability shall apply for the benefit of the employees, agents and representatives of Engeny to the same extent that they apply for the benefit of Engeny.

e. This document is for the use of the party to whom it is addressed and for no other persons. No responsibility is accepted to any third party for the whole or part of the contents of this report.

f. If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

g. This report does not provide legal advice.

9. REFERENCES

Australian National Committee on Large Dams (ANCOLD) (2012). "*Guidelines on the Consequences Categories of Dams*".

Australian National Committee on Large Dams (ANCOLD) (2003). "*Guidelines on Dam Safety Management*".

Australian National Committee on Large Dams (ANCOLD) (2000). "*Guidelines on Selection of Acceptable Flood Capacity for Dams*".

Pattle A. and Kroop B. (1998 ANCOLD Conference). *A Risk Based Approach for Optimising Dam Monitoring.*

Melbourne Water
Enhancing Life and Liveability

31 October 2019

Bodawill Investments & BG Griffith
C/o Julian Farrugia
Urban Design and Management
Email: [redacted]

Melbourne Water Ref: [redacted]

Dear Julian

Property:	Pentland Park
Drainage Scheme:	Masons Lane (8504) DSS
Council	Moorabool Shire Council

Thank you for your application for Conditions of Agreement for the Provision of Drainage Facilities with the above details.

In this letter words shown italicised have meanings which are defined in Melbourne Water's 'Standard Conditions for Provision of Drainage Works by Agreement' (the Standard Conditions).

1 INTRODUCTION

This letter sets out an *Offer* of proposed Conditions of Agreement (the *Offer*) applicable to your development. In this Offer, italicised words have the meanings given to them in clause 1.1 below. The letter must be read in conjunction with the *Standard Conditions* which are available on the Melbourne Water website under the heading 'Conditions and policies'.

All parties acknowledge that the terms of this Offer override the Standard Conditions to the extent of any inconsistency.

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Printed on 100% recycled paper

VICTORIA State Government

1.1 Definitions

In this *Offer*, unless the context otherwise requires:

Consultant means Urban Design and Management.

Contractor means the *Owner* appointed civil or landscape main contractor undertaking the Works.

Owner means Bodawill Investments & BG Griffith

Plan means the plan attached to this Offer which depicts the proposed Works

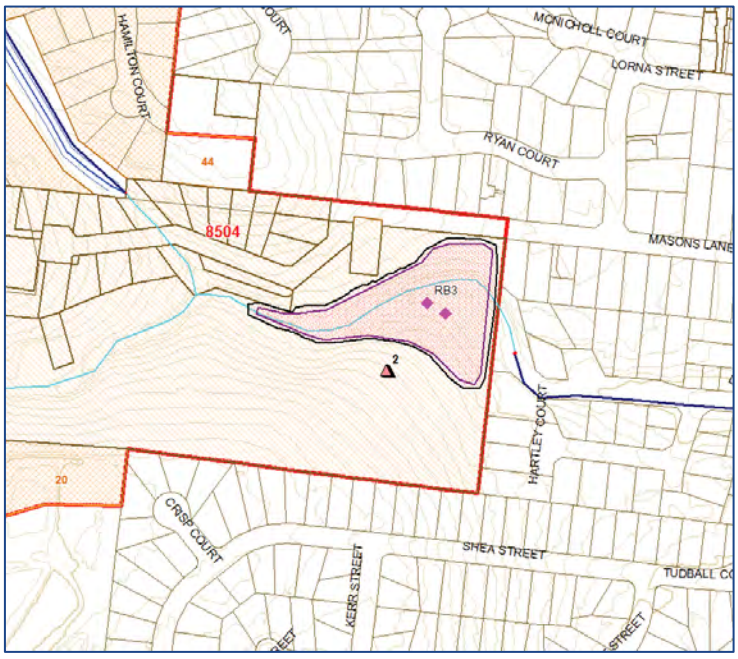
Standard Conditions means Melbourne Water's Standard Conditions published at www.melbournewater.com.au

Valid Acceptance means the acceptance of the Offer by the Owner and Consultant outlined above as per Condition 4.3.1 and within 3 months of the date of this Offer or prior to commencement of Works, whichever is earlier.

Works means Masons Lane Drain, Section 2 consisting of a Melbourne Water retarding basin

2 SPECIAL CONDITIONS

The property is within Melbourne Water's Masons Lane Development Services Scheme. Melbourne Water requires the construction of a Melbourne Water retarding basin. The node reference for the Melbourne Water retarding basin to be constructed is RB3 as indicated on the attached plan.



The following table identifies the future asset ownership and maintenance responsibility status for the stormwater assets discussed in this document:

Component of the Works	Asset Ownership	Maintenance
Retarding basin	Melbourne Water	Melbourne Water

2.1 Works to be maintained by Melbourne Water

- Retarding basin (RB3)

2.1.1 These works are to be maintained by Melbourne Water and must be designed and constructed in accordance with Melbourne Water's standards.

2.1.2 The project is to be titled "Masons Lane Drain, Section 2" and drawing numbers to be labelled "8504/02/X" where X is the sheet number.

2.2 General Conditions

2.2.1 Prior to completion of the Functional design, Melbourne Water requires the following:

- Re-modelling of the Retarding Basin storage to confirm if the existing Water Mains can be retained or are required to be relocated.

2.2.2 The Retarding Basin must be designed by a suitably qualified and experienced dams engineer in accordance with the ANCOLD definition of Dams Engineer. Please refer to the Retarding Basin Design and Assessment Guidelines in our Planning and Building Website for more information.

2.2.3 Prior to the commencement of *Works* an Assessment of Consequences of Dam Failure must be completed on the retarding basin design and be submitted to Melbourne Water for review.

2.2.4 The detailed design of the Retarding Basin shall be in accordance with 'Melbourne Water Retarding Basin Design and Assessment Guidelines'. Appendix A of the guidelines is to be submitted to Melbourne Water as part of the (detailed/functional) design submission https://www.melbournewater.com.au/sites/default/files/2017-09/Retarding-Basin-Design-Assessment-Guideline.pdf

2.2.5 The land containing the Melbourne Water retarding basin shall be set aside as a municipal reserve in favour of Moorabool Shire Council. A drainage easement (Memorandum of Common Provisions – MCPAA2741) in favour of Melbourne Water shall be created over the municipal reserve area. Melbourne Water requires the MCP easement to be shown on the certified plan of subdivision.

2.2.6 Melbourne Water requires the submission of flood mapping information of 1% Annual Exceedance Probability (AEP) flood levels and extents associated with the *Works*. The plans must show 1% AEP flood levels and extents on layout plans, cross sections and longitudinal sections. The flood mapping information must be submitted in one of the following electronic formats:

- .tab (mapinfo)
- .mif/mid (mapinfo interchange)
- .dxf (autocad)
- .gml (OS mastermap)

2.2.7 Prior to commencement of construction of the retarding basin Melbourne Water requires the following:

- Functional Design Acceptance
- Detailed Design Acceptance
- Pre-commencement Meeting

2.2.8 Prior to commencement of works a Works Method Statement to include construction

procedures must be submitted to Melbourne Water's satisfaction, outlining the general construction techniques to be adopted. The statement must address the following:

- Process for machinery to access the area adjacent to existing residences;
- OH&S measures in place to reduce risks;
- Diversion of flows for low and high flows;
- Evacuation procedure during times of high flows.

2.2.9 Prior to the issue of a consent to Statement of Compliance for any stages adjacent and/or linked to the works, the following will need to be to Melbourne Water's satisfaction:

- Lots to be flood free and meet freeboard requirements
- Site safety measures
- Free draining outfall
- Environmental Management Controls
- Works progressed to the satisfaction of Melbourne Water

2.2.10 Should a request for early consent to the issue of Statement of Compliance be sought by the *Owner*, prior to completion of all Works under this Offer, then Melbourne Water reserves the right to introduce Bank Guarantee holds or other holds as required on the project.

2.2.11 Prior to the issue of a consent to Statement of Compliance for any stages adjacent and/or linked to the works, a safety fence is to be erected around the entire retarding basin works area if the planting isn't established or alternatively the development site.

2.2.12 Prior to the removal of the safety fencing, an agreement by Council and Melbourne Water or an independent safety audit is required to demonstrate the works have been constructed to a safe standard for public access.

2.2.13 The *Works* may impact on native flora and fauna or trigger requirements. You are advised to contact the relevant Council and the Department of Environment, Land, Water and Planning (DELWP) to determine potential impacts and any legislative requirements. You may be required to obtain approvals under environmental and planning legislation, including but not limited to: the 'Planning and Environment Act 1987 (Vic)'; the 'Flora and Fauna Guarantee Act 1988 (Vic)'; the 'Environment Protection and Biodiversity Conservation Act 1999 (Cth)'.

2.2.14 In the event that environmental or planning approval is required, you are advised that the application must be developed in **consultation** with Melbourne Water, as it must make due allowance for future maintenance of any new infrastructure or land to be vested to Melbourne Water. Furthermore, you are reminded that the onus to undertake due diligence for any environment and planning legislative requirements remains with the project proponent and not Melbourne Water. Melbourne Water accepts no responsibility for any delays to the proposed *Works* as a result of other agency approvals not being arranged by the project proponent in a timely manner.

2.2.15 The *Works* area may be located within an area of sensitivity in relation to Cultural Heritage (Aboriginal and non-Aboriginal). You are advised to contact Melbourne Water Heritage Services Team for preliminary advice. In relation to Aboriginal cultural heritage specifically, you may be required to undertake a Cultural Heritage Management Plan (CHMP) in accordance with the provisions of the 'Aboriginal Heritage Act 2006'.

In the event a CHMP is required, you are advised that the CHMP must be developed in **consultation** with Melbourne Water Heritage Services Team as it must make due allowance for future maintenance of any new infrastructure to be vested to Melbourne Water. Furthermore, you are reminded that the onus to operate in accordance with any legislative requirements concerning the management of cultural heritage remains with the project proponent.

2.3 Occupational Health and Safety

IMPORTANT NOTES:

Melbourne Water promotes a healthy and safe workplace for anyone who enters our work areas and operates within current Legislative frameworks, as would other entities engaged in developer works. Although the contractor is responsible for the management of the secured site, Melbourne Water will check that there are no health and safety risks to the public as part of its quality checks.

A publically available Risk assessment for safety and security fencing on construction sites is available to download and use to check if the proposed fencing is adequate.

The *Contractor* is responsible for implementing, maintaining and updating the Safety Coordination Plan throughout the construction period. The *Contractor* is to be reminded of Melbourne Water's requirements in regards to work in and connections to our live assets, in particular confined space entry – see below.

A Melbourne Water Work Permit will only be required if the *Contractor* is required to enter confined space on an existing Melbourne Water asset, for example a live pipeline or pit structure. Permits will be issued by Melbourne Water's surveillance officer at the pre-construction site meeting for the project. To obtain a Melbourne Water Work Permit, the *Contractor* must have completed Melbourne Water's permit recipient training course and be able to demonstrate an understanding of Melbourne Water's construction requirements. Training can be requested through our online portal.

2.3.1 The *Owner* must strictly comply, and must ensure that its officers, agents, contractors, and employees comply, with any law in respect of workplace health and safety and hazard management, including but not limited to the Occupational Health and Safety Act 2004 (Vic). Further, the *Owner* must not engage in any act, nor make any omission that puts Melbourne Water or the *Owner* in breach of such a law.

2.3.2 The *Owner* acknowledges that it has management and control of all sites on which the *Works* are being carried out until Melbourne Water issues a Certificate of Completion to the *Owner* and is responsible for complying with any obligation on persons with management or control of a workplace.

2.3.3 The *Owner* must ensure that the *Works* will be carried out in a safe manner, and will only engage suitably qualified and competent persons with the necessary expertise to comply with the *Owner's* obligations under this clause, so that no injury is caused to any person or damage is caused to any property.

2.3.4 The *Owner* must immediately notify Melbourne Water of all workplace health and safety and hazard management matters arising out of or in any way connected with the *Works.*

2.3.5 To the maximum extent permitted by law, and without prejudice to any other right of

indemnity, the *Owner* indemnifies and must keep indemnified Melbourne Water and Melbourne Water's officers, agents, contractors and employees against all claims, demands, actions, costs (including legal costs), charges, expenses, damages, loss, penalty, fine or other liability (including without limitation in tort) arising from or in connection with a breach of the *Owner's* obligations under this clause by the *Owner* or the *Owner*'s officers, agents, contractors or employees.

2.4 Quality Assurance

2.4.1 The *Works* are to be designed and constructed in accordance with the Quality Assurance arrangement with Melbourne Water, as outlined in Melbourne Water's Planning and Building page at www.melbournewater.com.au.

2.4.2 Prior to calling tenders to undertake the works, the *Consultant* must obtain Melbourne Water's written acceptance of:

- Detailed design plans and specifications.
- A draft Site Management Plan.
- A written undertaking, where necessary, that Council will accept maintenance responsibility for those local drainage works identified above.
- Detailed landscaping/planting plans.

2.4.3 An offer acceptance form, signed by the *Owner* and *Consultant*, must be provided to Melbourne Water at least 1 (one) week prior to the pre-commencement meeting.

2.5 *Tenders*

IMPORTANT NOTES:

Refer to the Tendering of Works section in Melbourne Water's Planning and Building page at www.melbournewater.com.au for Tendering of Works requirements and information.

2.5.1 The lowest acceptable tender will form the basis of any reimbursement. The *Owner* may elect to use other than the lowest tender, but will receive no additional payment from Melbourne Water.

2.5.2 All tenders must be lodged in accordance with our conditions of tendering. Tenderers should read the annexure to the conditions, which outline any special requirements relating to the tender. You must lodge your bid electronically on the Tenders VIC website (https://www.tenders.vic.gov.au) by the tender closing time and date stated in the tender documents. Please allow yourself enough time to lodge your bid and take note of the instructions in the tender documents and the eLodgment tips and eLodgment file convention notes on the Tenders VIC website. If you have any problems lodging bids or queries relating to the process please contact the Tenders VIC help desk on +61 (03) 9651 1674 or email tenders@dtf.vic.gov.au

2.5.3 Tenders must be submitted to Melbourne Water at least 4 (four) week prior to the pre-commencement meeting.

2.5.4 Tender documentation must be supported or structured in such a way that items understood to be funded by Melbourne Water are clearly identified.

2.6 Site Management

2.6.1 During construction, measures must be taken so that no polluted and/or sediment-laden runoff will be discharged directly or indirectly into Melbourne Water's drainage system. To minimise adverse effects during construction, it will be necessary to develop appropriate environmental site management measures to ensure that potential risks, which may impact upon the drainage system, have been identified and addressed.

2.6.2 To manage risks, and in accordance with Melbourne Water's Environmental and Public Health Management System, a Site Management Plan (SMP) must be developed and clearly indicate measures to be employed during construction for the management of the site.

2.6.3 The *Consultant* is responsible for the preparation of the SMP and supervising works in accordance with this plan. If the *Contractor* is required to contribute to the contents of the SMP, the *Consultant* is to endorse any additions or changes to the plan.

2.6.4 The following issues are to be addressed within the SMP, along with other items identified by the *Consultant* during the design phase:

- Soil erosion
- Management of contaminated soils
- Management of foreign soil brought on site
- Increased runoff
- Protection of Aboriginal archaeological sites (approval from AV may be required)
- Protection of cultural, religious, archaeological sites, heritage trees or other features of interest to the community (approval from Heritage Victoria may be required)
- Protection of significant flora and/or fauna
- Protection of areas of natural habitat (native vegetation management approval may be needed)
- Increased pollution (e.g. fumes, dust or smoke), odour, traffic and noise
- Effects of hours of operation on persons near the activity
- Disruption to service utilities
- Protection of visual, landscape and recreational values
- Protection from flooding
- Protection of existing drainage infrastructure

2.6.5 The SMP must be prepared and submitted to Melbourne Water at least 2 (two) weeks prior to the pre-commencement meeting. It is suggested that Melbourne Water's Site Management Plan Kit, available from the Planning and Building page at www.melbournewater.com.au. This kit outlines minimum requirements for the preparation of a SMP.

2.6.6 Melbourne Water in partnership with Statewide River and Stream Management have developed training in Site Environmental Awareness for site managers, personnel, contractors, consultants and developers working on or near Melbourne Water Assets. This training will need to be completed in order to commence work as outlined in Melbourne Water's Planning and Building page at www.melbournewater.com.au.

2.7 As-Constructed drawings

2.7.1 Following the completion of the W*orks* "as-constructed" drawings must be submitted to Melbourne Water. Please use the checklist located in the building and planning website in the forms and guidelines section on the Planning and Building page at www.melbournewater.com.au. The checklist is provided to help facilitate the provision of plans with the appropriate information. Please provide a copy of the completed checklist when submitting as-constructed drawings.

2.8 Defect Liability Period/s, Maintenance Periods & Assurances

2.8.1 The defect liability period for the civil component of the works shall be 12 months from the date of issue of a Certificate of Practical Completion. This includes the retarding basin. It does not include plantings and grassing of the works.

2.8.2 The defect liability period for the landscape plantings, including grassing, shall be for a period of not less than two years from the date of issue of a Certificate of Practical Completion for these works, occurring after the establishment of the plants (minimum 3 months after planting). If after an inspection by a Melbourne Water Officer, the plantings are not to our satisfaction and resetting is required, Melbourne Water reserves the right to extend the defect liability period.

2.9 *Maintenance Agreement/s and Access*

2.9.1 Maintenance access including tracks and/or designated access points to the *Works* shall be provided in accordance with Melbourne Water standards.

2.9.2 A Maintenance Agreement and Maintenance Plan are to be established with Moorabool Shire Council and Melbourne Water prior to the completion of the construction of the *Works*. The agreement must clearly identify the physical areas and activities for which each party is responsible, the agreed level of service and life of the Maintenance Agreement. The maintenance plan, as a minimum, must include the design intent, a schedule of all maintenance activities for the assets including civil structures, vegetation and landscaping, the frequency of all maintenance activities and an estimated annual cost profile for the life of the asset.

2.9.3 Please use the Maintenance Agreement Kit located in the 'Standard Conditions' section on the Planning and Building page at www.melbournewater.com.au.

2.10 ***Operational Plans***

2.10.1 Prior to the issue of a Certificate of Practical Completion, an Operation Plan specifying the hydraulic function of the asset as well as the access instructions is required to be submitted to and accepted by Melbourne Water.

2.10.2 Please refer to the Operation Plan templates located in the 'Standard Conditions' section on the Planning and Building page at www.melbournewater.com.au.

3 FINANCIAL CONDITIONS

IMPORTANT NOTES:
Masons Lane Development Services Scheme Contributions are not applicable to this Agreement, however contributions are applicable to the development. Contributions will be applied in separate agreements linked with individual stages and/or Plans of Subdivisions of the development and the payment of contributions will be required prior to the consent of the issue of Statement of Compliance for each stage of the development.

The *Owner* must pay applicable fees and must initially fund the *Works*. After the *Works* are completed, Melbourne Water will reimburse an amount towards the cost of the *Works*.

The basis for the timing and amount of reimbursement is set out in the *Standard Conditions* on Melbourne Water's Planning and Building website. The *Works* which will form the basis for reimbursement are described in Section 3.2 below.

3.1 Reimbursement by Melbourne Water

3.1.1 The *Works* should not commence until Melbourne Water has provided written advice as to the approved reimbursement amount and timing.

3.1.2 The amount to be reimbursed by Melbourne Water to the *Owner* will be determined following completion of design and receipt of a minimum of three (3) acceptable tenders (generally based on the lowest acceptable tender). Preliminary calculations suggest reimbursement will be based on the construction of:

- A 1.3ha Retarding Basin

3.1.3 Reimbursements for the civil components of the works shall be paid in the following manner:

- 90% of the reimbursement amount shall be paid after the issue of a Certificate of Practical Completion.
- 10% of the reimbursement shall be paid after the issue of a Certificate of Completion

3.1.4 Reimbursements for the landscape components of the works shall be paid in the following manner:

- 50% of the reimbursement amount shall be paid after the issue of a Certificate of Practical Completion.
- 50% of the reimbursement shall be paid after the issue of a Certificate of Completion.
- Melbourne Water may consider a progress payment during the defects liability period of up to 25% of the reimbursement amount upon application by the developer.

3.1.5 The Engineering fee reimbursement is to be based on Melbourne Water's rates for "works of average complexity" as endorsed by ALDE and the UDIA. The fee reimbursement will be calculated following completion of the design and determination of the construction reimbursement.

3.1.6 Unless tender variations and the associated costs are approved by Melbourne Water in writing prior to construction it is not guaranteed that Melbourne Water will meet

any additional costs.

3.1.7 It is the responsibility of third party providers of taxable supplies (eg: tenders) to include any applicable GST in costs reimbursable by Melbourne Water.

3.1.8 Subject to the works being in compliance with this Offer, Melbourne Water will pay correctly rendered invoices within 30 days of the end of the month in which the invoice is received.

3.2 Recipient Created Tax Invoices

With regard to the following transaction that may result from acceptance of the *Offer*:

- The offsetting of any amounts payable by the *Owner* against Melbourne Water reimbursements.

The *Owner* must agree for GST purposes not to issue a tax invoice but instead agree to Melbourne Water preparing a Recipient Created Tax Invoice (RCTI).

Melbourne Water is authorised to prepare RCTIs under ATO ruling GSTR 2000/10 in order to comply with tax requirements where transactions include non-cash components.

Please complete the attached Recipient Created Tax Invoice Agreement and return it with the Offer Acceptance / Remittance form.

4 KEY CONDITIONS OF AGREEMENT

Melbourne Water's *Standard Conditions* must be read in conjunction with this *Offer* and are proposed to form part of the *Agreement*. Your attention is particularly drawn to summarised key provisions of the *Standard Conditions* set out below.

4.1 Agreement between Owner and Melbourne Water

The *Agreement* referred to in this letter is an *Agreement* under the provisions of the *Water Act.*

4.2 Responsibilities of the parties to the Agreement

The *Owner* is expected to engage a qualified engineering consultant (*Consultant*) acceptable to Melbourne Water to project manage the provision of the *Works*.

The *Owner* and Melbourne Water are all parties to the *Agreement.* Both parties and the *Consultant* have responsibilities within it.

4.3 Acceptance of Conditions of Agreement

4.3.1 If acceptable to the *Owner*, written acceptance of the Conditions of Agreement (including the Standard Conditions) must be provided to Melbourne Water, using the Acceptance Form contained herein. The Acceptance Form must be signed and returned to Melbourne Water prior to the commencement of construction or within 3 months of the date of this *Offer*, whichever is earlier.

4.3.2 If this *Offer* is accepted but payment is not made within three months from the date of this letter, contributions will be calculated at the rates current at the time of payment. As the rates are subject to periodical review, the future rate may be

higher than the current. For registered users, two months' notice of any change in rates will be provided on Melbourne Water's Planning and Building page at www.melbournewater.com.au.

4.3.3 The payment of contributions defined in this *Offer* does not constitute a *valid acceptance of the Offer*. The Offer may be invalid if condition 4.3.1 is not met and if all requirements of a Valid Acceptance is not met. See 1.1 Definitions for more information.

4.4 Expiry of Offer

This *Offer* is open for three months from the date of this letter and will expire if not accepted within this time. A new *Offer* application will be required for any expired Offers. New applications will be subject to Melbourne Water's 60 day processing timeframe.

4.5 Works to meet Melbourne Water's requirements

The *Works* to be provided must meet Melbourne Water's requirements.

4.6 Indemnities and Insurance requirements

4.6.1 The *Owner* indemnifies and keeps indemnified Melbourne Water against any liabilities, losses, costs, expenses, claims and proceedings of any kind whatsoever in respect of:

- destruction or damage to property (real or personal); and
- personal injury to or the death of, any person whether arising under statute or at common law,
- that may be sustained or incurred by Melbourne Water as a result of or in connection with the execution of the *Works*.

4.6.2 The *Owner* must comply with the insurance requirements in the Standard Conditions and ensure that the following insurance policies are in place:

- liability for damage to property;
- liability for injury to persons;
- public liability insurance;
- professional indemnity insurance;
- contract works – material damage; and
- WorkCover.

4.6.3 The *Owner* must ensure that the *Contractor* is registered as an employer for WorkCover, at all relevant times including at all times during construction and until a Certificate of Completion is issued.

4.7 Date for completion of the Works

The *Agreement* may be terminated if the *Works* are not completed within eighteen months.

4.8 Issue of Melbourne Water consent to Statement of Compliance

Melbourne Water will issue a consent to Statement of Compliance when ***ALL*** applicable conditions of the *Agreement* have been complied with.

4.9 Vesting of the Works in Melbourne Water

Other than works serving a local drainage function, the *Works* will vest in Melbourne Water after the completion of a Defects Liability Period.

5 FURTHER INFORMATION

The Special Conditions and Financial Conditions set out above, and the '*Standard Conditions'* are the basis of the *Agreement* between the *Owner* and Melbourne Water. It is important that you understand the conditions and in particular, the responsibilities of the parties to the *Agreement* as outlined in Attachment 1. Therefore, you are encouraged to discuss the proposed *Agreement* and the *Works* with your *Consultant*. If any issues are not clear, it is suggested that you or your *Consultant* should seek further clarification from Melbourne Water.

6 ACTION NOW REQUIRED

If you wish to accept this *Offer* and proceed with the *Works*, the attached Acceptance Form should be completed, signed by both the *Owner* and the *Consultant*, and returned to Melbourne Water with any necessary payment/s. A copy of the Acceptance Form can be located at the Application forms page of the Planning and Building section of www.melbournewater.com.au.

In accepting this *Offer*, the *Owner* is asked to acknowledge that it has received or is aware of and accepts the *Standard Conditions*. Once Melbourne Water has received a correctly completed Acceptance of *Offer*, an *Agreement* incorporating the terms of the *Offer* and the *Standard Conditions* will exist.

Yours sincerely,

Nathan Hardwick
Urban Growth Officer
Urban Growth Services

David Reginato
Acting Team Leader
Urban Growth Services

Enquiries
Telephone: 9679 7531
Email: Nathan.Hardwick@melbournewater.com.au

ATTACHMENT 1: GENERAL RESPONSIBILITIES

Owner

The *Owner* must:

- Enter into an Agreement with Melbourne Water for the acceptance of surface and stormwater runoff from the development into Melbourne Water's drainage and waterways systems and the provision of waterway and drainage Works to service the development, (unless the lots are Stage Lots on the plan of subdivision). The Agreement will facilitate and require provision of Works and payment of Contributions
- Ensure that the Works provide drainage services in accordance with the following documents:
  - The Agreement, including any Special Conditions
  - These Standard Conditions
  - All relevant policies, procedures and technical guidelines and requirements contained in the Melbourne Water Planning and Building website
  - Any other documents related to the construction of Works which form part of the Agreement
- Comply with all relevant laws, regulations and by-laws
- Obtain all necessary permits for the Works
- Give notice and pay fees as required by relevant laws, regulations or by-laws affecting the Works
- Ensure that any necessary Works not specified in the Melbourne Water Planning and Building website are carried out under separate specifications approved by Melbourne Water
- Engage a Consultant to take responsibility for the design, contract administration and supervision, certification and recording of the Works (unless specified to the contrary in the Agreement)
- Agree to accept advice from the Consultant in regard to the design, installation and quality of the Works
- Supply all materials and carry out all Works unless otherwise specified on the design drawings and in the Special Conditions in the Agreement
- Agree to pay Melbourne Water costs or expenses associated with specific inspection, audit or surveillance activities specified in the Special Conditions of the Agreement. These costs may include the cost of intensive audits by Melbourne Water (Intensive audits are carried out where Melbourne Water does not have confidence that its requirements can be met by relying on the Consultant's quality management system alone)
- Give Melbourne Water written notice of the name of the appointed Consultant on the application for the Offer
- Give Melbourne Water written notice if a new Consultant is appointed during the term of the Agreement. This notice must include the name of the new Consultant and be given no later than five (5) working days after the appointment is made
- Give Melbourne Water written notice if the whole of the land subject to the Agreement is sold or transferred before the Works are complete. This notice must be given no later than five (5) working days after the Agreement or contract to sell the land is signed
- Supply the local council and relevant authorities with a copy of the drawings submitted to Melbourne Water
- Obtain all necessary permits
- Give all notices and pay all fees as required by relevant laws, regulations and by-laws.

Consultant

Unless otherwise specified in the Agreement, the *Consultant* is responsible for the design, construction, recording and certification of Works on behalf of the Owner. The *Consultant* must:

- Operate under an effective documented quality management system, which is currently third party certified as meeting the requirements of AS/NZS ISO 9001 – 2000
- Conform to Melbourne Water quality acceptance requirements (see Part I – Quality Management))
- Facilitate any quality audits and surveillance activities by Melbourne Water
- Retain all records and documentation to demonstrate conformance to Melbourne Water quality requirements for the duration of the Agreement and five (5) years after the Works are vested in Melbourne Water
- Respond within five (5) days to any request by Melbourne Water for additional information
- Co-ordinate the design of the drainage, waterway, floodway, water quality Works, and the environmental management of the Works with any other works, operations and services involving Melbourne Water
- Co-ordinate the design with councils, other authorities and individuals that may have a direct or indirect interest in the location, design and construction of the proposed Works
- Satisfy Melbourne Water insurance requirements
- Accept the period of responsibility as from the agreement date until two years after the date of issue of a Certificate of Completion

Melbourne Water

Melbourne Water is responsible for:

- Establishing functional design criteria and/or requirements for drainage, waterway, floodway, water quality Works, and environmental management of the Works, as part of an overall catchment strategy or drainage scheme
- Providing information relevant to the design, construction and recording of the Works to the Consultant in a timely manner
- Determining the standards for design, construction, performance and recording of the Works
- Determining the quality management requirements for the Works (including quality assurance and/or quality control requirements and associated reporting arrangements)
- Undertaking or arranging quality audits, surveillance and inspections
- Providing acknowledgment after receiving a Certification Statement from the Consultant
- Providing a Certificate of Practical Completion and a Certificate of Completion when appropriate

RECIPIENT CREATED TAX INVOICE AGREEMENT

This agreement is made between Melbourne Water (ABN 81 945 386 953) (the recipient) and Bodawill Investments & BG Griffith (ABN _____) (the supplier) for works carried out under MWA-1067915 and M10925 in order to comply with the requirements of the Goods and Services Tax (GST).

Both parties hereby agree that:

a) The recipient can issue Tax Invoices in respect of the items supplied under the Agreement;
b) The supplier will not issue Tax Invoices in respect of the supplies under the Agreement;
c) The supplier acknowledges that it is currently registered for GST and that it will notify the recipient if it ceases to be registered;
d) The recipient acknowledges that it is currently registered for GST and that it will notify the supplier if it ceases to be registered for GST; and
e) The recipient must not issue a document that would otherwise be an RCTI, on or after the date when the recipient or the supplier failed to comply with any of the requirements of the determination.

_____ _____

Name: Nathan Hardwick

On behalf of

Melbourne Water
Date 30/10/2019

Name:

On behalf of

_____

Date / /

Land Development - Acceptance of Offer of Conditions of Agreement for the provision of Drainage Facilities

To Melbourne Water:	
Job description:	Masons Lane Drain, Section 2
Municipality:	
Owner:	
Consultant:	
Consultant Ref. No.:	
Melbourne Water Ref.:	MWA-1067915

Owner's Acceptance

NOTE: *Items marked * below are not applicable to acceptance of a Non-Works Offer*

As the Owner/s of the land referred to in the Offer of Conditions from Melbourne Water dated _____/_____/_____ , Reference No. _____ ,

I/we:

- accept the conditions under which drainage Works will be constructed to service that land
- *authorise _____ *[Consultant's name]* of _____ to act on my/our behalf in all matters to do with the planning, design, construction and *'As-Constructed'* survey of the Works
- *agree to accept advice from the Consultant about quality and installation of the Works
- *request any reimbursement by Melbourne Water under the terms of the Agreement, to be made to:

  _____

  _____
- *agree to pay any costs incurred by Melbourne Water if the Works are not completed by me/us or my/our representative/s in accordance with the Agreement.
- *agree to pay to Melbourne Water any intensive audit fee in accordance with the Standard Conditions for Provision of Drainage Works by Agreement.

Signature of Owner(s): _____

_____

Date: _____/_____/____

Office use only:	Amount	Centre No.	Account No.
Development Services Scheme Contribution:	$0	DS8504	5414
Other :	$		

Consultant's Acceptance

***Note:** *Consultant's Acceptance is not required for acceptance of a Non-Works Offer*

As the Owner's nominated Consultant, I/we:

- agree to manage this project under a quality management system which is currently third party certified as meeting the requirements of *AS/NZS ISO 9001 – 1994*,
- accept Melbourne Water as a quality auditor,
- accept responsibility for the design, contract administration and supervision, and provision of *'As-Constructed'* survey information for the Works,
- agree to pay for rectification works resulting from non-compliance with Melbourne Water's requirements or the requirements of the above quality management system,
- agree to comply with the requirements of Melbourne Water's *Standard Conditions for Provision of Drainage Works by Agreement,*
- have read and understood all relevant Melbourne Water Land Development documentation without limitation, concerning provision of the Works by Agreement, and
- acknowledge that the signatory below binds me/us to the terms and conditions of this Acceptance Form.

***Signature of Consultant:* _____

*On behalf of:*_____ Date: ___ / ___ /

Melbourne Water
Enhancing Life and Liveability

Land Development - Acceptance of Offer of Conditions of Agreement for the provision of Drainage Facilities

To Melbourne Water:	
Job description:	Masons Lane Drain, Section 2
Municipality:	Moorabool Shire Council
Owner:	Bodawill Investments
Consultant:	Urban Design & Management
Consultant Ref. No.:	11006-MW
Melbourne Water Ref.:	MWA-1067915

Owner's Acceptance

NOTE: *Items marked * below are not applicable to acceptance of a Non-Works Offer*

As the Owner/s of the land referred to in the Offer of Conditions from Melbourne Water dated 31 / 10 / 19, Reference No. MWA-1067915 & M10925,

I/we:

- accept the conditions under which drainage Works will be constructed to service that land
- *authorise Anthony Grodzki *[Consultant's name]* of Urban Design & Management to act on my/our behalf in all matters to do with the planning, design, construction and *'As-Constructed'* survey of the Works
- *agree to accept advice from the Consultant about quality and installation of the Works
- *request any reimbursement by Melbourne Water under the terms of the Agreement, to be made to:
  Bodawill Investments
  John Griffith
- *agree to pay any costs incurred by Melbourne Water if the Works are not completed by me/us or my/our representative/s in accordance with the Agreement.
- *agree to pay to Melbourne Water any intensive audit fee in accordance with the Standard Conditions for Provision of Drainage Works by Agreement.

Signature of Owner(s): John Griffith Brendan R Griffith

Date: 24 / 01 / 2020.

Office use only:	Amount	Centre No.	Account No.
Development Services Scheme Contribution:	$0	DS8504	5414
Other :	$		

Consultant's Acceptance

***Note:** *Consultant's Acceptance is not required for acceptance of a Non-Works Offer*

As the Owner's nominated Consultant, I/we:

- agree to manage this project under a quality management system which is currently third party certified as meeting the requirements of *AS/NZS ISO 9001 - 1994*,
- accept Melbourne Water as a quality auditor,
- accept responsibility for the design, contract administration and supervision, and provision of *'As-Constructed'* survey information for the Works,
- agree to pay for rectification works resulting from non-compliance with Melbourne Water's requirements or the requirements of the above quality management system,
- agree to comply with the requirements of Melbourne Water's *Standard Conditions for Provision of Drainage Works by Agreement,*
- have read and understood all relevant Melbourne Water Land Development documentation without limitation, concerning provision of the Works by Agreement, and
- acknowledge that the signatory below binds me/us to the terms and conditions of this Acceptance Form.

**Signature of Consultant:* _____

On behalf of: _____ Date: 24 / 01 / 20

From: Tim Phillips
To: Melinda Holloway
Cc: Anthony Grodzki
Subject: FW: MWA-1067915 & M10925 & MWA-1102351
Date: Monday, 27 July 2020 1:52:34 PM
Attachments: image002.png
image003.png
image004.png
image005.png
Engeny Pentland Retarding Basin - Hydraulic Design Report Rev 1.pdf
200109 11006 MW Plans.pdf
WO Acceptance.pdf
8504 02 Pentland Park RB WorksOffer Oct19.pdf

Hi Mel,

Below is the approval from MWC of the RB along with the current plans attached.

Regards

Tim Phillips
Project Manager
E [redacted]
T [redacted]

UrbanDesign
and management
Land Development | Project Management
Planning | Urban Design | Civil Engineering

[redacted]

From: Nathan Hardwick [redacted]
Sent: Monday, 30 March 2020 11:02 AM
To: Tim Phillips [redacted]
Cc: [redacted]
Subject: RE: MWA-1067915 & M10925 & MWA-1102351

Hi Tim,

Sincere apologies for the delay, this has been internally discussed for some time and can now provide a response.

Melbourne Water has reviewed and have no objections to the functional design submission with following reference details; "Masons Lane Drain Section 4 Pentland Park Retarding Basin, Revision E, 2/12/2019", subject to the following:

- Compliance with all previous advice and conditions provided by Melbourne Water;
- Formal functional/detailed design acceptance from Council;
- Formal detailed design acceptance from Melbourne Water, according to the standards applicable at the time of design;
- Formal landscape design acceptance from Melbourne Water.

Please note: This in-principle functional design acceptance of the proposed Asset does not supersede the requirement for subsequent formal detailed design acceptance from Melbourne Water for the Asset as required by Melbourne Water's Quality Management System, according to the standards applicable at the time of design.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services, Development Services | **Melbourne Water**
T: (03) 9679 7531 | 990 LaTrobe Street, Docklands, VIC 3008 | PO Box 4342 Melbourne VIC 3001 |
melbournewater.com.au

Enhancing Life and Liveability

From: Tim Phillips [redacted]
Sent: Wednesday, 11 March 2020 3:43 PM
To: Nathan Hardwick [redacted]
Cc: David Reginato [redacted]; Anthony Grodzki [redacted]; Julian Farrugia [redacted]
Subject: RE: MWA-1067915 & M10925 & MWA-1102351

Hi Nathan,

Would you mind letting me know if the design is OK for us to start tender preparations

Regards

Tim Phillips
Project Manager
E [redacted]
T [redacted]

UrbanDesign
and management
Land Development | Project Management
Planning | Urban Design | Civil Engineering
[redacted]

From: Nathan Hardwick [redacted]
Sent: Friday, 14 February 2020 1:24 PM
To: Tim Phillips [redacted]
Cc: David Reginato [redacted]; Anthony Grodzki [redacted]
Subject: RE: MWA-1067915 & M10925 & MWA-1102351

Hi Tim,

To provide an update on the submitted RB design, we are currently at the last stages of the review and can expect a response in the next week.

In regards to the requirement for Stage 4 SOC, Melbourne Water will consider an early release of the stage with the RB works sufficiently progressed but not completed if it can be demonstrated that there is no increase in flows downstream by the development, safety, environmental measures and free draining outfall is in place to the satisfaction of Melbourne Water and Council.

Please note all other appropriate conditions that will also need to be satisfied as per the issued non-works offer attached.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services, Development Services | **Melbourne Water**
T: (03) 9679 7531 | 990 LaTrobe Street, Docklands, VIC 3008 | PO Box 4342 Melbourne VIC 3001 |
melbournewater.com.au

Enhancing Life and Liveability

From: Tim Phillips [redacted]
Sent: Thursday, 13 February 2020 1:54 PM
To: Nathan Hardwick
Cc: David Reginato; Anthony Grodzki
Subject: MWA-1067915 & M10925 & MWA-1102351

Hi Nathan,
MWA-1067915 & M10925

We are looking to start Pentland Park Stage 4 civil works and I see condition 4 within this stage (MWA-1102351) requires the construction of the RB prior to the completion of this stage.

With this have you had time to review the RB design submitted below and advise if acceptable to we can progress to tender.

Due to all the back and forth with the approval of the RB we may be looking at completing stage 4 before completing the RB. Would MWC be in a position to provide SoC to Stage 4 while the RB civil works are being constructed?

Regards

Tim Phillips
Project Manager
[redacted]

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and management
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[redacted]

From: Tim Phillips
Sent: Thursday, 9 January 2020 1:26 PM
To: 'Nathan Hardwick' [redacted]
Cc: 'David Reginato [redacted] ; Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nathan,
Happy 2020! All the best for the year.

Please find attached the revised report completed by Engeny along with the amended drawings for your approval.
The Works offer is currently with the client for acceptance. Please advise If acceptable and we will finalise the tender schedule and a contract to tender out the works.

Regards

Tim Phillips
Project Manager
[redacted]

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and management

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Planning | Urban Design | Civil Engineering

[redacted]

Please consider the environment before printing this email

From: Nathan Hardwick [redacted]
Sent: Thursday, 17 October 2019 2:46 PM
To: Tim Phillips [redacted]
Cc: David Reginato [redacted]; Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Tim,

Thank you for your email.

We have reviewed internally and Melbourne Water agree to the further investigations as proposed by Engeny.

Also, I have been notified the issued Works Offer (attached) has now lapsed as Melbourne Water has not received acceptance within 3 months of the letter date. If you have any queries on the conditions in the attached Works Offer please advise as a revised Offer will be required to be prepared and issued.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services | Waterways and Land | Service Delivery Group | **Melbourne Water**
[redacted] | 990 Latrobe St Docklands 3008 | PO Box 4342 Melbourne VIC 3001
melbournewater.com.au

Enhancing Life and Liveability

From: Tim Phillips [redacted]
Sent: Monday, 14 October 2019 11:00 AM
To: Nathan Hardwick
Cc: David Reginato; Anthony Grodzki
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nathan,

Engeny have provided the below fee proposal to undertake the re-modelling and revisions to the report including.

- Investigate an alternative configuration for the pit and pipe outfall to achieve peak flow objectives for the 5 yr and 100 yr events (using the established EPA SWMM and RORB models).
- Documentation of the updated configuration within the report.

Additional fee: $3,980 excluding GST

Please review and advise of your acceptance to these additional works.

Regards

Tim Phillips
Project Manager
[redacted]

UrbanDesign
and management

Land Development | Project Management
Planning | Urban Design | Civil Engineering

[redacted]

Please consider the environment before printing this email.

From: Nathan Hardwick [redacted]
Sent: Tuesday, 8 October 2019 3:53 PM
To: Anthony Grodzki [redacted]
Cc: Tim Phillips [redacted]; David Reginato [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Anthony,

Following up on our phone discussion last week on your concerns of the additional investigations, we have the belief the additional investigations proposed by Engeny to satisfy the pre-developed low flows (Q1-Q10) target will not require the alteration of the RB design footprint or significantly impact the embankment structure. We believe that this work is a 'few weeks' worth of work. To confirm, these new investigations undertaken by Engeny for the RB outlet will be reimbursable by Melbourne Water (subject to review and acceptance of quote).

In regards to your query on going to tender early, please note the Melbourne Water cannot stop you from tendering the project, but the financial risk is with the developer when going to tender whilst the design scope is still being resolved. Any changes to the scope may reduce the maximum reimbursement value for items that are yet to be confirmed following tender acceptance, such as a RB pipeline outlet of a different size to that tendered.

Please do not hesitate to contact me if you wish to discuss.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services | Waterways and Land | Service Delivery Group | **Melbourne Water**
[redacted] | 990 Latrobe St Docklands 3008 | PO Box 4342 Melbourne VIC 3001
melbournewater.com.au

Enhancing Life and Liveability

From: Nathan Hardwick
Sent: Tuesday, 24 September 2019 9:38 AM
To: Tim Phillips
Cc: Anthony Grodzki; David Reginato
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Tim and Anthony,

Apologies for the delayed response, unfortunately some internal staff changes has caused the review to be delayed further than expected.

Melbourne Water have reviewed the Engeny advice, including increase in existing low flows (Q1-Q10) based on the reduced storage, and will consider the additional investigations proposed. Can you please advise a quotation for the further investigations for Melbourne Water's internal consideration?

Please contact me if you have any further queries or wish to discuss.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services | Waterways and Land | Service Delivery Group | **Melbourne Water**
[redacted] | 990 Latrobe St Docklands 3008 | PO Box 4342 Melbourne VIC 3001
melbournewater.com.au

Enhancing Life and Liveability

From: Tim Phillips [redacted]
Sent: Tuesday, 17 September 2019 4:19 PM

To: Nathan Hardwick
Cc: Anthony Grodzki
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nathan,
Can you let me know where we got to on this one.

Regards

Tim Phillips
Project Manager
[redacted]

UrbanDesign
and management
Land Development | Project Management
Planning | Urban Design | Civil Engineering
[redacted]

From: Nathan Hardwick [redacted]
Sent: Friday, 16 August 2019 2:41 PM
To: Anthony Grodzki [redacted]
Cc: Tim Phillips [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Anthony,

We are discussing internally on this and will provide a response next week.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services | Waterways and Land | Service Delivery Group | Melbourne Water
[redacted] | 990 Latrobe St Docklands 3008 | PO Box 4342 Melbourne VIC 3001
melbournewater.com.au

Enhancing Life and Liveability

From: Anthony Grodzki [redacted]
Sent: Friday, 9 August 2019 4:12 PM
To: Nathan Hardwick
Cc: Tim Phillips
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nathan,

Do you have an update on this one? We're in a holding pattern until further advised.

Cheers,
Anthony Grodzki
Director
[redacted]

UrbanDesign
and management

Land Development | Project Management
Planning | Urban Design | Civil Engineering

[redacted]

From: Nathan Hardwick [redacted]
Sent: Monday, 15 July 2019 3:44 PM
To: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Anthony,

Thank you for your email and update on the project.

Melbourne Water will review the advice from Engeny internally, noting relevant staff are currently on leave and will be returning in the next week or so, and provide a response following the internal discussions.

Kind Regards,

Nathan Hardwick | Urban Growth Officer, Urban Growth Services | Waterways and Land | Service Delivery Group | **Melbourne Water**
[redacted] | 990 Latrobe St Docklands 3008 | PO Box 4342 Melbourne VIC 3001
melbournewater.com.au

Enhancing Life and Liveability

From: Anthony Grodzki [redacted]
Sent: Monday, 8 July 2019 11:08 AM
To: Nathan Hardwick
Cc: Tim Phillips; Julian Farrugia; David Reginato
Subject: FW: Engeny Pentland Retarding BasinDesign Report

Hi Nathan

See below advice from Engeny when reviewing modifications to the RB. In short the reduced capacity will work with the 100yr flow however all flows sub 20 yr are greater. Can you please review and advise if MW wish to continue with exploring options noting that modifying the outlet will change the 100yr levels which will then require full review of the embankment overtopping.

Regards,
Anthony Grodzki
Director
[redacted]

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[redacted]

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From: Nick Andrewes [redacted]
Sent: Monday, 17 June 2019 5:20 PM
To: Anthony Grodzki [redacted]
Cc: Tim Phillips [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Anthony,

As previously discussed, we have updated the EPA SWMM and RORB models with the revised Pentland Park retarding basin storage. The storage volume is reduced compared to the previous retarding basin configuration and as a result yields higher peak flows at the outlet (see table 4.1. of the report for flows associated with the previous basin) .

As part of this investigation some minor modifications were made to the outlet (primarily adjusting inlet levels and inlet capacity) to improve the performance of the retarding basin with respect to the existing conditions peak flow objectives. The results are shown in the table below which compares flows downstream of the retarding basin in existing and developed conditions.

Event	Existing Flow	Developed Mitigated Flow
ARI	m3/s	m3/s
1	1.4	1.6
2	1.96	2.14
5	2.87	3.41
10	3.8	4.35
20	5.45	5.63
50	8.05	7.51
100	9.79	8.83

The results show:

1. The 100 year ARI (1% AEP) flow downstream of the retarding basin is lower than existing conditions and therefore this criterion is achieved.
2. The 5 year ARI (20% AEP) flow downstream of the retarding basin is higher than existing conditions and therefore this criterion is **not** achieved.

The results also show that there some additional scope to increase the developed conditions peak 100 year ARI flow as it is significantly (0.94 m^3/s) lower than the existing conditions peak flow at the retarding basin outlet. Modification of the retarding basin outlet by reducing the discharge capacity at flood levels below the 50 year ARI and increasing it at higher flood levels is recommended to improve the basin performance for the 5 year ARI event. Note that any modifications would still need to ensure that the 100 year ARI flow objective is achieved and it cannot be guaranteed that there is sufficient volume in the revised retarding basin design to achieve both objectives.

I note that as part of our original fee allowance we haven't allowed for any additional investigations to reconfigure the retarding basin outlet to achieve the existing conditions flow objectives. However this could be completed by Engeny, if required, for an additional fee.

Please feel free to give me a call to discuss any aspect of our investigation.

Kind regards

Nick Andrewes
Principal Water Resources Engineer
Associate BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

ENGENY
WATER MANAGEMENT
LinkedIn profile

[redacted]

From: Anthony Grodzki [redacted]
Sent: Friday, 14 June 2019 3:06 PM
To: Nick Andrewes [redacted]
Cc: Tim Phillips [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nick,

I was in at MWC earlier this week and mentioned we'll get back to them with some commences on the Q5. Have you had a chance to draft an email?

Cheers,
Anthony Grodzki
Director
[redacted]

UrbanDesign
and management
Land Development | Project Management
Planning | Urban Design | Civil Engineering
[redacted]

From: Nick Andrewes [redacted]
Sent: Wednesday, 15 May 2019 5:17 PM
To: Tim Phillips [redacted]
Cc: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Tim,

By way of an update, we've undertaken modelling of the updated retarding basin design in EPA SWMM and RORB.

- Initial results showed the retarding basin would overtop unless modification without modification to the outlet.
- Modification to the outlet was made to allow more flow out at a lower level and we managed to achieve:
  - A peak flow that is lower than existing conditions for the 100 year ARI event.
  - A peak water level that is lower than the 126mAHD road crest level (i.e. no overtopping for the 100 year ARI event).
- The issue now is that the 5 year ARI objective is not satisfied (see table below comparing existing conditions flows with the updated flows).

	Existing	**Developed Mitigated**

Event	Flow	Flow
ARI	m3/s	m3/s
1	1.4	1.6
2	1.96	2.14
5	2.87	3.41
10	3.8	4.35
20	5.45	5.63
50	8.05	7.51
100	9.79	8.83

Perhaps you can give me a call to discuss when you have a moment.

Kind regards

Nick Andrewes
Principal Water Resources Engineer
Associate BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

ENGENY
WATER MANAGEMENT
LinkedIn profile

[redacted]

From: Tim Phillips [redacted]
Sent: Wednesday, 17 April 2019 4:27 PM
To: Nick Andrewes [redacted]
Cc: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report [Filed 09 May 2019 12:02]

Hi Nick,

Is the attached finished surface triangles what you are after.

Regards

Tim Phillips
Project Manager
[redacted]

UrbanDesign
and management

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[redacted]

Please consider the environment before printing this email.

From: Nick Andrewes [redacted]
Sent: Wednesday, 17 April 2019 4:23 PM
To: Tim Phillips [redacted]
Cc: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Tim,

Further to my last email, I will be away next week. If you are able to provide the 12daz today we may be able to provide some indicative results tomorrow, otherwise I expect it will be on the week starting the 29th of April.

Kind regards

Nick Andrewes
Principal Water Resources Engineer
Associate BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

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[redacted]

From: Nick Andrewes

Sent: Wednesday, 17 April 2019 10:35 AM
To: Tim Phillips [redacted]
Cc: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Tim,

Thanks for your email. We can have a look at it this week for you if you are able to provide the 12daz today?

Cheers

Nick Andrewes
Principal Water Resources Engineer
Associate BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

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[redacted]

From: Tim Phillips [redacted]
Sent: Wednesday, 17 April 2019 10:18 AM
To: Nick Andrewes [redacted]
Cc: Anthony Grodzki [redacted]
Subject: RE: Engeny Pentland Retarding BasinDesign Report

Hi Nick,

MWC have approved your fee to undertake the be below redesign works of the RB.

Can you let me know what you need from us to proceed with these works. Do you require the 12d finished surface triangle file.

Regards

Tim Phillips
Project Manager
[redacted]

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[redacted]

From: Nick Andrewes[redacted]
Sent: Friday, 8 March 2019 3:15 PM
To: Tim Phillips[redacted]
Cc: Anthony Grodzki[redacted]
Subject: FW: Engeny Pentland Retarding BasinDesign Report

Hi Tim,

As discussed earlier today, the following tasks are required to check the impact of the revised retarding basin volume on peak water levels in the basin:

1. UDM to provide 12daz of revised retarding basin (invert to top of bank).
2. Input the revised retarding basin to 1D EPA SWMM hydraulic model to establish stage discharge relationship.
3. Input stage discharge relationship from 1D EPA SWMM model to the RORB model to estimate revised peak flood level in basin for the 1% AEP event (Q100).
4. Report results back to UDM by email / telephone.
5. Update Table 6.1 and 6.2 of the report and re-issue.

Our fee for undertaking the above tasks is $1650 ex GST.

Exclusions:

- The outcomes of the assessment may find that the revised retarding basin spills for the 1% AEP event which is unlikely to be acceptable to MW. Should this occur then further investigations may be required to establish a suitable design solution (no allowance has been made for this as part of the proposed fee).
- The revised design may also have an impact on the findings of the consequence of failure assessment which MW may require to be revised for consistency with the updated design (no allowance has been made for this).

Please give me a call if you would like to discuss any aspect of the above in more detail.

Kind regards

Nick Andrewes
Principal Water Resources Engineer
Associate BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

ENGENY
WATER MANAGEMENT

Linked in profile

[redacted]

From: Tim Phillips [redacted]
Sent: Thursday, 7 March 2019 4:55 PM
To: Nick Andrewes [redacted]
Cc: Anthony Grodzki [redacted]
Subject: Engeny Pentland Retarding BasinDesign Report

Nick,

In working in with Melbourne Water we may have to reduce the storage area of the RB to retain 2 existing large diameter water pipes (MW are reluctant to pay for there relocating)
In reviewing your report we are hoping we can keep all RLs the same and only change the storage levels as noted;

- Previous volume to 100yr RL 125.80 = 15,200m3
- Current volume to 100yr RL 125.80 = 12,000m3
- Current volume to spillway crest RL 126.00 = 13,400m3

Can we discuss what is involved to update the tables in chapter 6.
Note we don't wont to change any pipe diameters or RLs if possible

I will give a call tomorrow to discuss.

Regards

Tim Phillips
Project Manager
[redacted]

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and management

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[redacted]

From: Nick Andrewes[redacted]
Sent: Friday, 4 March 2016 1:36 PM
To: Tim Phillips[redacted]; Anthony Grodzki[redacted]
Subject: WSUD report - Stages 1 to 4

Hi Tim/Anthony,

Please find attached the report for the Pentland Park Estate report for WSUD (stages 1 – 4).

Please give me a call if you would like to discuss anything.

Kind regards

Nick Andrewes
Senior Water Resources Engineer
BE(Env) Hons, BSc (Atmospheric and Oceanic Science)

ENGENY
WATER MANAGEMENT
LinkedIn profile

[redacted]

Submission #34

M K & J B Righetti

8 Ellerslie Court

Bacchus Marsh 3340

File No. 13/06/093

17 August 2020

Attention: Strategic Planning Development Unit

Re MOORABOOL PLANNING SCHEME AMENDMENT C91 – FLOOD OVERLAYS

In relation to the C91 amendment we provide the following comments:

We have resided at 8 Ellerslie Court Bacchus Marsh for the past 38 years and have experienced a number of floods in the Werribee River, notably the most significant flood event was in 1995, also mentioned in the flood study.

We note the area of inundation shown affecting this area of Bacchus Marsh appears to be predicated on a shallow sheet flow break away west of Grant Street at the river bend near Peppertree Park to flow over Grant Street and overland towards the Ellerslie Court area.

Our property is shown as partly inundated only, by a small section of the property along its northern boundary, making it subject to the flood overlay.

Please note that our property has never been inundated in any way by any flood event since we have lived here for the past 38 years. Additionally, flood waters have never entered, backed up into, or come near to Ellerslie Court. The extents of inundation shown on the Planning Scheme maps relating to the Ellerslie Court area are not consistent with observed areas of inundation in the 1995 event. Also, from local knowledge of the preceding 26 years before we arrived, sheet flows have never been known to inundate and flow across the land immediately to the west of Ellerslie Court. So it appears the land area immediately west of Ellerslie Court has not flooded in any way over the past 64 years.

It seems incongruous that properties on the opposite side of Ellerslie Court, being lower than our property, are not affected by the flood overlay. It appears this is modelled on the basis of the road acting as a cut off point for assumed shallow sheet flows.

We note that the section of the Werribee River adjacent our area, upstream of and below the Fisken Street bridge and beyond, is in an extremely overgrown, unmaintained and neglected state.

In a flood event, it is fundamental hydraulics that river flows obstructed by overgrown vegetation within the river banks are slowed down resulting in raised flood levels. It appears that adopted data used to calculate flood levels is conservatively allowing for a level of overgrowth of vegetation in the Werribee River and a lesser or inadequate level of river maintenance.

We strongly object to the flood overlay in its current form being placed on our property given the flood overlay calculations appear to be based on an allowance for overgrowth of vegetation in the Werribee River. It would seem to be critically important to properly maintain the section of the Werribee River bed and banks adjacent to the town residential areas to allow unobstructed flows in a flood event.

Surely it is reasonable for residents to expect the body responsible to for future maintenance of the river to keep the waterway clear of overgrowth and obstructions. This should be attended to on a regular basis with an adopted maintenance schedule and standard to an acceptable level to prevent or limit flood damage to the town.

We would like the opportunity to discuss this further.

Regards

M K & J B Righetti

DOCUMENT (Inbound)

Summary	Objection to Amendment C91 - Flooding Controls - Linden McDowell
Information	
Comments/Notes	

DETAILS

Status	New	**Deadline**	03/09/2020
Priority	Medium	**Received**	20/08/2020 08:16:55 PM
Type	Email	**Ref**	IN20/572AD557

RELATED DOCUMENTS

PEOPLE (2)

Owner	Rod Davison
Manager	Sarah Kernohan
Reader	

CONTACTS ()

Name	
Company	
Email	
Phone	

FOLDER (1)

Number	Par	Name	Organisat	Uni
13/06/093	1	Planning and Land Use\Mooraboo...\Amer C91 - Flood Controls	Mooraboo Shire Council	Rec

WORKFLOW

No records found.

CONTENT

Attachments:

File Name	Size (kb)	Atta by	Attached On
No records found.			

Links:

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No records found.			

From: Linden McDowell[redacted]
Date: Thu Aug 20 08:16:55 PM AEST 2020
To: Info<Info@moorabool.vic.gov.au>;
CC:
BCC:
Subject: Objection to C91 proposal

I totally object to the C91 proposal as I do not believe that flooding is a possibility in my area due to the fact that I am on higher ground! The surrounding suburbs are more likely to be affected! Due to your proposal my insurances will increase and any future planning on my land will be affected! Overall I am not happy or in any way agree with the proposal! As a matter of fact I am quite disappointed in council for not looking after its members best interests!

Linden McDowell

Department of Environment, Land, Water and Planning

[redacted]

Our ref: SP470848
Your ref: C91

31 August 2020

Henry Bezuidenhout
Strategic Planning
Moorabool Shire Council
PO Box 18
BALLAN VICTORIA 3342

Dear Mr Bezuidenhout

Moorabool Planning Scheme Amendment C91

Thank you for your notice of preparation for an Amendment to the Moorabool Planning Scheme (amendment) which was received by the Department of Environment, Land, Water and Planning (DELWP) on 5 March 2020. DELWP has reviewed relevant details of the amendment and offers the following comments.

The amendment proposes to modify the Local Planning Policy Framework Clauses 21.02 (Natural Environment) and 21.11 (Reference Documents), as well as the addition of Clauses 44.04 (Land Subject to Inundation Overlay [LSIO]), 44.05 (Special Building Overlay [SBO]) and applicable schedules. It is also noted that the schedule to Clause 72.03 (What does this planning scheme consist of?) will be amended and relevant MPS maps updated to reflect the amended overlays.

DELWP notes that the amendment affects public land parcels which have been identified as subject to inundation within the catchments of the Werribee River, Lerderderg River and Little River. DELWP does not oppose the proposed new overlays which will affect these public land parcels.
The amendment documentation recognises the incidental positive biodiversity impacts likely to occur with the introduction of the LSIO and SBO. DELWP concurs that the potential biodiversity benefits align with the amendment objectives and are generally consistent with Victorian flora and fauna policy. DELWP confirms its support for the amendment on the noted biodiversity grounds.

For any further queries, you are welcome to contact Carly Kuczer on [redacted] or contact us by email to [redacted] for any planning and approvals matter.

Yours sincerely

EZAZ SHEIKH
Senior Planning and Approvals Program Officer
Grampians Region

VICTORIA State Government