

**ENGINEERING SERVICING
AND
STORMWATER MANAGEMENT REPORT**

**PLANNING AND ENVIRONMENT ACT 1987
WHITEHORSE PLANNING SCHEME**

**This plan is approved pursuant to Clause 43.04
Schedule 6 of the Whitehorse Planning Scheme.
This document forms part of the Development Plan
FOR THE for the former brickworks site at
78 Middleborough Road Burwood East.**

PROPOSED DEVELOPMENT

**No. of pages: 80
Document: 4 of 8 in Volume 2
Signed: Allison Egan
Date: 14/12/2022**

78 MIDDLEBOROUGH ROAD, BURWOOD EAST

CLIENT: FRASERS PROPERTY AUSTRALIA PTY LTD

REF: 22355E ISSUE 16

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ANNEXURES

- 1 Development Master Plan**
- 2 Yarra Valley Water Preliminary Servicing Information dated 03/02/2014 and Email correspondence 22nd September 2015**
- 3 Preliminary Site Design Finished Level Contour Model**
 - 4a. Melbourne Water Correspondence dated 26/08/14 original**
 - 4b. Melbourne Water Correspondence dated 19/12/16 (RORB, RB Update)**
 - 4c. Melbourne Water Acceptance of Wetland Relocation to Eley Road Retarding Basin**
 - 4d. Melbourne Water Approval Letter for RORB modelling 18 May 2017**
 - 4e. Melbourne Water Endorsement of Incitus SWMS Report (Stormwater Quality related)**
 - 4f. Melbourne Water Letter of Support for SWQ Offsets in Lieu of Eley Road RB Wetland**
- 5a. Technical Information Provided to Council September/October 2014**
- 5b. Council Endorsement of Incitus SMWS Report (Drainage related)**
- 6a. Functional Design Plan - Central RB Design Plan**
- 6b. Functional Design Plan - Overall Site Drainage and Catchment Plan**

1 INTRODUCTION

This report has been prepared on behalf of Frasers Property Australia Pty Ltd in support of the Burwood East Planning Scheme Amendment to provide a preliminary engineering assessment and overview of the availability and requirements of servicing infrastructure necessary for the development of the Former Brickworks Site.

The subject site is proposed to be developed into a multi-use development comprising a varied density residential area and commercial / retail precinct in accordance with the proposed development Master Plan contained in Annexure 1 of this report.

The information contained in this report is based on investigations by Reeds Consulting that have been facilitated by our inquiries and dealings with the Whitehorse City Council and other servicing agencies including Yarra Valley Water and Melbourne Water. The information contained herein is subject to review and written confirmation at the time that the development proceeds.

2 GENERAL

The subject land is irregular in shape with an area of approximately 20.50 hectares. It is located on the northern side of the Burwood Highway extending north to Eley Road and also has frontage to the east side of Middleborough Road, adjoining the RSPCA site. The site is bounded by existing residential subdivision along its eastern boundary and in part at the western and northern boundaries.

The site has varying topography and features due its previous use and falls generally from the south west corner to the north east corner at Eley Road with an elevation difference of approximately 22 metres between the highest point at Burwood Highway and the lowest point at Eley Road. Refer Figure 1 for Aerial site plan showing existing contours and general features.

The site was previously used as a brickworks facility and the remnant quarry base from the original operations has been partly filled by the previous owner and will be further filled as part of the redevelopment, generally in accordance with the proposed preliminary finished surface model provided in Annexure 3 - 'Preliminary Site Design Finished Level Contour Model' plan.

Currently the majority of stormwater runoff is contained within the site due to its current form and the site is in part traversed by existing drainage pipeline infrastructure which conveys drainage from the immediate external catchment on the south side of Burwood Highway and part of the southern end of the site to the Melbourne Water Eley Road Retarding Basin that is situated immediately adjacent to the north east corner of the site.

Figure 1 Aerial Site Plan and Existing Contours (Pre-Earthworks)



3 SERVICES

3.1 ROADWORKS

The internal roadworks for the proposed development will be designed in accordance with the agreed road cross section and functional requirements detailed in Traffic Group Report / Integrated Transport Plan and Whitehorse City Council standards. All roads will be fully sealed with approved surfacing, kerb and channel, footpaths, drainage and also incorporate underground power and other services.

External roadworks, including the proposed upgrade of intersections at the Burwood Highway and Middleborough Road and Eley Road and associated turning lanes will be subject to a detailed traffic impact report and functional design by the consulting traffic engineer to the requirements and approval of Vic Roads.

3.2 POTABLE WATER RETICULATION

Yarra Valley Water is the Water Supply Authority for the Burwood area including the proposed development.

Yarra Valley Water has provided 'Preliminary Servicing Advice' in relation to the provision of water supply and sewerage facilities in correspondence dated February 2014 and subsequent email dated 22 September 2015. This advice is included in Annexure 2 of this report.

The advice confirms that potable water supply is available to the proposed development from the existing mains in Eley Road, Middleborough Road and Burwood Highway.

The key water supply main required for the development is the construction of a 150 mm diameter main along the main road network to link the existing 150mm diameter main on the west side of Middleborough Road to the existing 150 mm main on the south side of the Burwood Highway. Otherwise the development will typically require the construction of normal developer funded 100mm and 150mm diameter water reticulation mains within the development to service the proposed lots plus payment of New Customer Contributions.

3.3 RECYCLED WATER

Yarra Valley Water advises there is no requirement to provide recycled water (third pipe) facilities for the development, nor is there an established authority based public recycled water system within the region, however opportunities for water reuse will be explored as part of the Water Quality / ESD review for the development – refer also section 5.4 Water Sensitive Urban Design.

3.4 SEWERAGE RETICULATION

Yarra Valley Water (YVW) is the Sewerage Authority for the subject land and surrounding area.

Yarra Valley Water provided its original 'Preliminary Servicing Advice' in relation to the provision of water supply and sewerage facilities in correspondence dated February 2014. This advice is included in Annexure 2 of this report.

In this advice Yarra Valley Water advised there are two sewer points available for the connection of sewerage flows from the development, being manhole ELY28 located in Eley Road adjacent to the north east corner of the Site and manhole STS7-103 located to the west of Middleborough Road within Worrall Street opposite the Site.

The existing sewer in Eley Road at ELY28 in Eley Road is currently at capacity and will not be able to cater for flows from the development until it is upgraded. The existing sewer in Middleborough Road/ Worrall Street was assessed by Yarra Valley Water to have a spare capacity of 17 litres per second (peak wet weather flow).

Following the preparation of a detailed sewer strategy and hydraulic assessment, it has been determined and agreed by Yarra Valley Water that the initial stages of the development, including part of the southern residential and apartment precinct and the retail development area will be able to sewer to the existing Worrall Street sewer. A short section of existing sewer main within Worrall Street will need to be upsized to a 225mm diameter sewer to cater for flows from the proposed retail development.

The 'Eley Road Branch Sewer' located near the north east corner of the site off Eley Road has very limited capacity and YVW has advised that this sewer must be upgraded. Yarra Valley Water (YVW) has agreed that the upgrade of the Eley Road Branch Sewer would be brought forward on its capital works program and is scheduled for completion at the end of 2017. YVW referenced the Emergency Relief Structure as one of three upgrade options; however this option and others have been superseded by the planned upgrade by YVW of the Eley Road Branch Sewer which is now scheduled for the end of 2017. The upgrade of the Eley Rd Branch together with the existing Station Street Branch Sewer will cater for the full sewerage flow requirements of the ultimate development proposed in the development plan. Refer also Annexure 2 which contains copy of email correspondence from YVW advising timing of proposed servicing.

Accordingly the development will be able to progress in a planned and logical sequence without the need for major on site temporary infrastructure facilities and if required, temporary management of sewer flows by education based on a specific education management plan can be implemented subject to specific the requirements and approval of Yarra Valley Water.

Gas check manholes will be required off each connection to the existing sewers to control odour. Otherwise the development will typically require the construction of normal developer designed and constructed 150mm and 225mm diameter sewerage reticulation mains within the development to service the proposed lots plus payment of New Customer Contributions.

3.5 ELECTRICITY / STREET LIGHTING

United Energy is the electrical company responsible for supply to the Burwood area and the proposed development.

The existing overhead and underground electricity assets located within the Burwood Highway road reserve, Middleborough Road and Eley Road together with the existing substations currently servicing the existing business and residences will form the basis of the infrastructure required to supply to the proposed development.

Underground power HV and LV cables and suitably located kiosk substation facilities will be masterplanned for the overall development at an early stage. The detailed design of electrical works, cabling, lighting and the final siting of kiosk substation/s will be undertaken on a stage by stage basis in accordance with the proposed network scope and general requirements of United Energy.

The installation of electricity conduits, service pits, trenching and backfill works will be carried out by the developer's civil contractor and the cabling and jointing will be undertaken by an approved electrical contractor under the project management and auditing requirements of the electrical company. Street lighting and in particular the type of pole and light fittings internal to the development will be subject to approval of Council and United Energy and externally, in the arterial road network, lighting will require Vicroads' approval.

Consistent with 'The Whitehorse Sustainability Strategy (2008 – 2013)' the development will include energy conservation measures to reduce greenhouse gas emissions and provide long term energy savings in its infrastructure. The public lighting design of the roads within the development will specify the use of energy efficient street light fittings such as 'T5' twin fluorescent lamps or Compact Fluorescent (CF) lamps, subject to the approval of Council and United Energy. Also where applicable, lighting within parks can be based on LED lighting technology subject to ultimate design review and approval by Council.

3.6 TELECOMMUNICATIONS

NBN Co, as the responsible agency, will determine the requirements for initial and ultimate fibre optic based telecommunication services to the proposed development. Application and registration requirements for the provision of telecommunication services to the proposed development will be made through NBN Co. An approved NBN Co provider will design and install the infrastructure within the development on a staged basis and also install the extension of the network or backhaul to the development as required. The cost of network extension, if applicable, is subject to various factors including the access, distance and capacity of an exchange. NBN Co subdivision provisioning requirements will apply, requiring that the developer is responsible for installation of pits and conduits within the development to NBN Co standards in a co-ordinated manner with the other civil works. Telstra has various existing assets within the surrounding road network abutting the subject land and these assets will form the basis of supply for the proposed NBN network for the development.

3.7 GAS SUPPLY

Multinet Gas is the gas company responsible for gas supply to the proposed development and the surrounding Burwood area. Multinet Gas has existing high and medium pressure gas mains located in Burwood Highway and Middleborough Road and an existing medium pressure main located in Eley Road. It is expected these mains will form the basis of gas supply for the proposed development. Multinet Gas will provide gas reticulation to the development on a stage by stage basis, generally at no cost to the developer. It is proposed that the gas works will be constructed concurrently with the water supply works and the developer will be required to provide trenching and backfill requirements to the gas company's current requirements.

4 EARTHWORKS & FILLING

The site is being substantially remediated, filled and shaped to the proposed preliminary finished surface levels that are shown on the Preliminary Site Design Finished Level Contour Model plan contained in Annexure 3 of this report. We advise that the proposed finished design model is preliminary only and is subject to review and possible minor changes as the engineering design is developed through the functional and detailed design phases.

In this instance the geotechnical and environmental testing, reporting and monitoring requirements associated with the execution of the site remodelling and remediation, including dealings with the EPA's appointed Land Auditor, are being co-ordinated and undertaken by the same consultant.

The earthworks and filling on the site will be carried out to be in line with Golders Geotech Framework Aug 2014 and will be undertaken by an experienced contractor under the full time and direct supervision of a qualified geotechnical consultant to ensure that the required compaction levels are achieved and reported accordingly to Level 1 earthworks supervision standards.

The relevant Australian Standards (AS3798 and AS1289) requires a minimum 95% Standard Compaction Test Density to be attained on the filling of the residential development areas and 98% Standard Compaction Test Density for the commercial development area. Filling of proposed road reserve areas will also require specific control and testing based on the requirements of the Australian Standards and also Council requirements. These issues are to be addressed in the report/s of the responsible environmental and geotechnical consultants.

Where applicable all existing open drains, dams, areas requiring fill for drainage or environmental purposes will be appropriately breached, cleaned out and filled with compacted selected quality site material under the supervision of a geotechnical and where applicable by the appointed environmental consultant in accordance with the above mentioned Australian Standards, progressively with the subdivision of the land.

5 STORMWATER DRAINAGE MANAGEMENT PLAN

5.1 GENERAL

A fundamental requirement of the proposed Development Plan is the management of the stormwater including the control and regulation of flows and the water quality of runoff from the proposed development. This section of the report sets out the Stormwater Drainage Management Plan (SDMP) for the proposed development, recognising the relevant requirements of the drainage authorities in relation to stormwater management and also the principles and policy requirements for Ecologically Sustainable Development (ESD) under the policies of 'The Whitehorse Sustainability Strategy (2008 – 2013)', 'Plan Melbourne' and Clause 56 of the Planning Scheme.

Stormwater management of the site will be in accordance with the endorsed Incitus Stormwater Management Strategy Report. Information in Incitus Report is to take precedence over drainage and water quality aspects of this document.

As part of the SDMP the proposed development will incorporate on-site integrated Water Sensitive Urban Design (WSUD) measures to achieve partial on-site Best Practice performance objectives for stormwater quality. Balance of stormwater quality treatment will be achieved via payment of stormwater quality offsets contributions by the developer in accordance with Melbourne Water advice provided in Annexure 4F. It is noted that the retarding basin is a requirement of Melbourne Water to limit the discharge from the site due to the limited capacity of the downstream Melbourne Water system. Melbourne Water has set an on-site detention requirement to ensure no adverse effects on downstream drainage system as a result of increased stormwater runoff from the subject site.

A range of options were considered to satisfy the Melbourne Water requirement to provide an on-site retarding basin. These options included multiple smaller detention facilities and separating the stormwater detention and stormwater treatment facilities. Upon careful consideration of various options, a single stormwater detention and decentralised stormwater treatment facilities providing partial stormwater treatment are deemed best option to service the development for reasons outlined below:

- Application of multiple detention facilities introduces inefficiencies in land use and the unnecessary and costly duplication of risk, safety and maintenance requirements associated with each facility.
- It is actually the levels of the drainage system which determine the normal water level of any water body – whether that be a wetland or ornamental lake this sets the level of the base storage facility, hence if there were to be a series of detention systems, their base levels would be driven down by the same controls and not provide a more efficient or better amenity outcome.
- An open water body, whether it is a wetland or an ornamental lake body requires the adequate recharge and turnover to maintain water health; the proposal put forward for the integrated ornamental pond in the base of the internal stormwater detention basin will achieve this.

5.2 CATCHMENT / HYDRAULIC CONSIDERATIONS

The Whitehorse Council and Melbourne Water are responsible in their capacity as the managers of the local drainage network and the regional drainage catchment respectively for the drainage of the site and the proposed development.

The site is located within a sub catchment of the Melbourne Water Eley Road Retarding Basin drainage control area of approximately 300 hectares. Other characteristics of the Melbourne Water retarding basin are:

- Q (100 yr) Inflow: 30 Cumecs
- Outflow (100yr) : 8.75 Cumecs
- Storage Volume (100yr) approx. 55,000 Cubic metres
- Top of Water Level / TWL (100 yr) - RL 84.45 m AHD

An external sub catchment area of approximately 22 hectares, made up largely by existing development on the south side of Burwood Highway, is drained via an existing Council drainage pipeline which crosses the Burwood Highway and traverses the eastern portion of the site to then discharge into a connection at the Eley Road RB. The external sub catchment runoff from the 1% AEP storm event (100 yr) is estimated to be in the order of 4.4 cumecs (Refer Annexure 6B). Based on Council drainage records the abovementioned existing Council pipeline appears to cater for the 20% AEP (5 yr) storm event and the excess flow beyond the pipeline's capacity tends to flow overland within the site and in part through the existing development area adjoining the eastern boundary of the site.

The development of the site will require the proper management of the above and any other external flows in addition to the internal stormwater flows to ensure no adverse effects on receiving Melbourne Water and Council drainage systems.

As part of the review of the proposed Master Plan and the draft subdivision layout, the above issues and requirements have been formally investigated and an extensive assessment and hydraulic analysis of the impact of the proposed development on the existing drainage catchment and stormwater system has been undertaken, in consultation with Melbourne Water and Council, including full catchment based flood modelling using the original RORB modelling created by Melbourne Water for the Eley Road RB and also a HEC RAS analysis of overland flow path capacities through the development.

To address Council Resolution item *a) v. "A revised concept for the village green and retarding basin"*. Reeds Consulting undertook design refinement and updates of the internal retarding basin layout and storage characteristics, as well as update of hydrologic (RORB) modelling in consultation with Melbourne Water in late 2016 and early 2017.

Refer collated information in Annexures 4 (MW correspondence), 5 (Council Correspondence) and 6 (Functional Design Plans).

Melbourne Water has independently reviewed the catchment analysis and flood modelling in August 2014, December 2016 and January 2017.

In Melbourne Water's correspondence dated 26 August 2014 (refer to Annexure 4A), Melbourne Water provided its 'in principle' support to the development proposal and noted the effect of the development on the existing system including the minor increases in the flood level and flow at its Eley Road RB which are offset by the reduction of overland flows to the north and north west.

In Melbourne Water's correspondence dated 19 December 2016 (refer to Annexure 4B), Melbourne Water provided "no objection" to the updated hydrologic (RORB) modelling of the overall site drainage as well as the updated detention characteristics of internal retarding basin. Melbourne Water noted no detrimental impacts on flood levels in Eley Road Retarding Basin as a result of refined drainage proposal.

In Melbourne Water's letter dated 17 May 2016 (refer to Annexure 4C), Melbourne Water provided written acceptance of construction of wetland in the base of Eley Road retarding basin for the purpose of treatment of site stormwater runoff.

In Melbourne Water's letter dated 18 May 2017 (refer to Annexure 4D); Melbourne Water provided written advice giving no objection to the drainage proposal based on the RORB modelling above.

A full hydraulic impact analysis of the proposal will be undertaken as part of the planning permit application process.

This included submission of an independent overall Stormwater Management Strategy by Incitus (Incitus Report) to Council and Melbourne Water. Council endorsed the stormwater drainage related aspects of Incitus Report on 12th October 2017 (refer Annexure 5B), and Melbourne Water endorsed the stormwater quality related aspects of the strategy on 18th December 2017 (refer Annexure 4E), including taking responsibility for water quality of the development utilising the Melbourne Water's Eley Road Retarding Basin site as per previous correspondence refer Annexure 4C and 4E.

Subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Water withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

Stormwater management of the site will be in accordance with the endorsed Incitus Stormwater Management Strategy Report. Information in Incitus Report is to take precedence over drainage and water quality aspects of this document.

Subsequently at each stage engineering submissions will include stage-specific catchment plans, drainage computations of minor and major drainage system events to demonstrate development compliance with appropriate flood freeboard and flood safety requirements, and no negative hydraulic impacts on the existing system as a

result of the proposed development. The analysis will be undertaken by a suitably qualified civil engineer, accounting for appropriate blockage scenarios and pit capacities as per the guidelines in Australian Rainfall and Runoff.

5.3 DRAINAGE STRATEGY

Stormwater management of the site will be in accordance with the endorsed Incitus Stormwater Management Strategy Report. Information in Incitus Report is to take precedence over drainage and water quality aspects of this document.

A 'Drainage Strategy Plan' for the proposed development is provided in Figure 2. The strategy plan provides a schematic representation of the key drainage elements including: the external catchment influence; the proposed retarding basin; existing and proposed pipeline systems - noting that the internal stormwater system will be designed to cater for the 10% AEP (10 yr) storm flow for the residential area and 5% AEP (20 yr) storm flow for the commercial/ retail precinct and also the existing and proposed overland flow routes to be integrated with roads, reserves or other dedicated overflow routes which will be designed to cater for the 1% AEP (100 yr) storm requirements.

The upstream catchment drainage will be managed by a combination of a partial upgrade to the existing council drain which will be realigned to suit the development layout, the provision of other new internal drainage pipelines and the provision of overland flow paths along road reserves and open space areas. Further to minimum capacities of the internal stormwater system for residential (10 yr) and commercial (20 yr) areas described above, capacities of individual sections of the internal stormwater system will be increased where necessary, such as in instances where significant external flows enter the site, and/or where design constraints necessitate relatively steep grading of open space areas. Where required, capacities of these upsized sections of stormwater system will be increased up to 100 yr ARI capacity if necessary by increasing the diameters of stormwater pipes and providing additional drainage pits to allow for increased stormwater inflow requirements and pit blockages. This will be done as required to ensure that the resulting 100 yr ARI gap flows (i.e. the difference between total 100yr flows and design capacity of stormwater pipes) comply with freeboard and flood safety criteria throughout the site. Further detail will be required with future planning permit applications and approval required from the relevant authority.

All flows will ultimately be directed to the Eley Road RB, and the proposed finished levels and grading of surfaces within the development area will be designed to not cause adverse impacts on adjacent properties. All flow paths will be designed such that adequate freeboard is provided to all existing and proposed development.

Stormwater detention via the proposed retarding basin will ensure no adverse effects on downstream Melbourne Water and Council drainage systems.

The partial upgrade of the existing Council drain in the north east part of the Site and other works will be undertaken to Council's approval. The design of drainage and other civil works will be reviewed at the functional and detailed design phases as part of the

planning and engineering processes for each stage of the development, and in line with Figure 2 Drainage Strategy Plan.

As highlighted in Figure 2, elsewhere in this report and in previous discussions with Council and Melbourne Water, the commercial / retail site forms part of the drainage strategy of the overall development.

The stormwater discharge from this sub-catchment area will be conveyed to the proposed retarding basin via the proposed internal drainage system; however the water quality treatment for this area will be processed and maintained independently of the rest of the development within its own proposed Title area.

The proposed open space adjacent to Donaldson Reserve (Council's existing park to the east) will be graded and shaped such that the existing reserve does not receive additional stormwater runoff from the development based on functional and detailed designs that will be subject to Council review and approval.

Frasers Property and Melbourne Water have engaged in comprehensive discussion to relocate the wetland component of the proposed integrated retarding basin / wetland open space amenity within the development to the floor of the adjoining Melbourne Water Eley Road Retarding Basin.

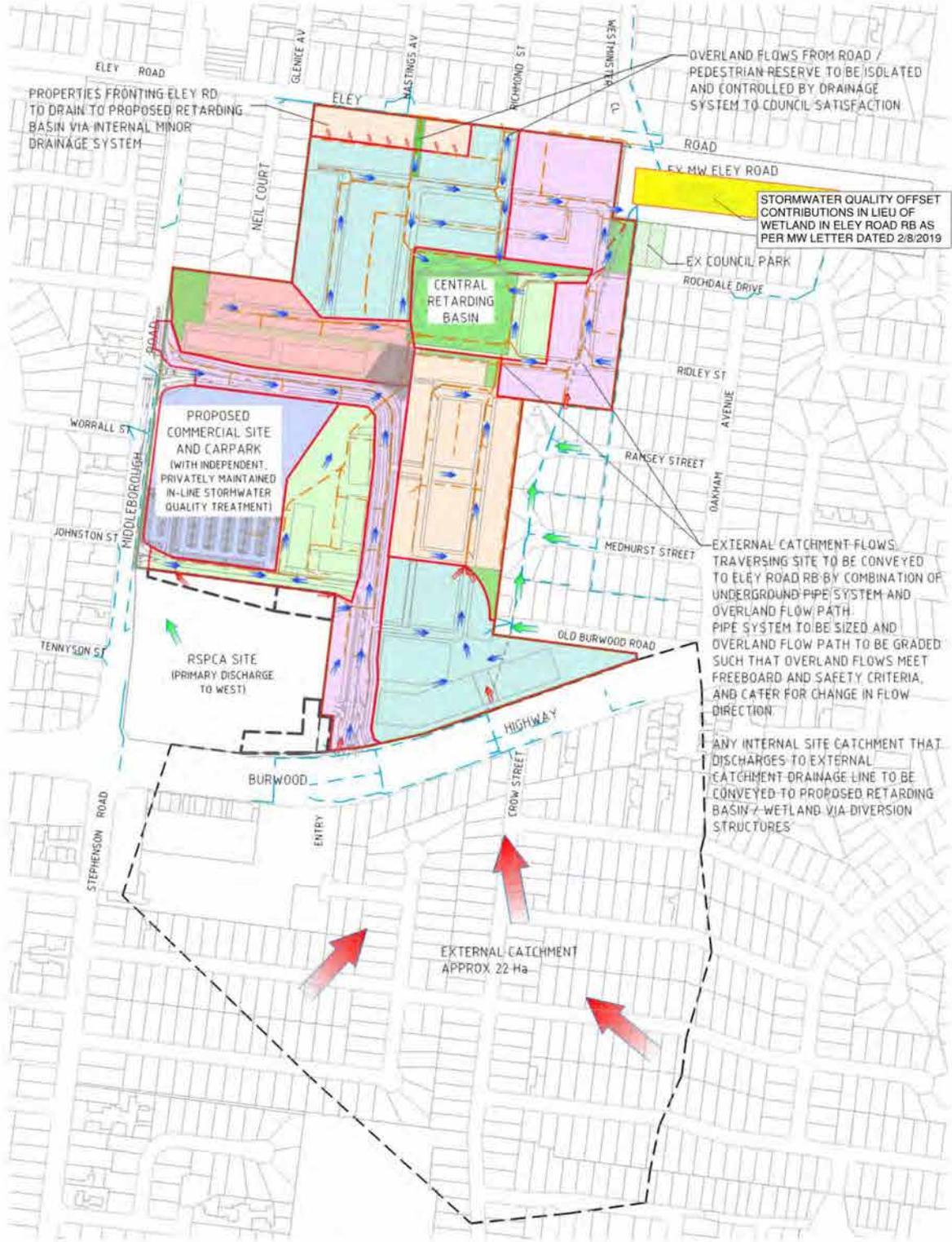
These discussions initially resulted in Melbourne Water's acceptance of the relocation of the stormwater treatment facility from the central reserve into Melbourne Water's Eley Road Retarding Basin, resulting in a significantly better outcome for this key open space and additional usable open space area, provided that the retardation capacity of the existing Eley Road retarding basin was maintained. In other respects, the functional and drainage requirements for the development outside of the retarding basin area would have essentially remained the same. For details refer Annexure 4C.

Melbourne Water accepted the initial technical analysis and the general concept to integrate a wetland within its existing Eley Road retarding basin and to enhance the facility with new paths, viewing deck, seating, fencing and other landscape elements that would provide local residents with additional amenity.

The alternative proposal would have required agreement between Whitehorse Council and Melbourne Water in respect of the maintenance of the 'non – water' elements of the retarding basin such as the paths, fencing and any landscape elements outside the perimeter of Melbourne Water's operational area.

Subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Water withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

Figure 2 Drainage Strategy Plan



- EXTERNAL CATCHMENT FLOWS TRAVERSING SITE #
- OVERLAND FLOW - INTERNAL CATCHMENT #
- OVERLAND FLOW - EXTERNAL AREAS #
- OVERLAND FLOW - MELBOURNE WATER, ELEY ROAD RETARDING BASIN
- OVERLAND FLOW - SURCHARGE OF PROPOSED RETARDING BASIN #
- MINOR FLOWS - LOTS FRONTING ELEY RD

- SITE BOUNDARY
- PIPE SYSTEM PROPOSED DEVELOPMENT
- PIPE SYSTEM CONTROLLED OUTLET FROM RB/WETLAND
- PIPE SYSTEM (COUNCIL / MW EXISTING)
- PIPE SYSTEM (COUNCIL EXISTING) TO BE REROUTED
- INDICATIVE OPEN SPACE
- PRELIMINARY INTERNAL SITE DRAINAGE SUB CATCHMENTS SHOWN

OVERLAND FLOW PATHS - ALL OVERLAND FLOW PATHS WILL BE DESIGNED SUCH THAT ADEQUATE FREEBOARD IS PROVIDED TO ALL EXISTING AND PROPOSED DEVELOPMENT



UPDATED 25.08.2021

5.3.1 Retardation

The preliminary siting and spatial requirements of the internal site "Central" retarding basin and ornamental pond located in the Village Green reserve have been planned in conjunction with the project Urban Designer and Landscape Architect, to integrate this element as a key part of the amenity of the open space reserve having due consideration to the recreation and access uses of the reserve by the public and the proposed drainage function.

Particular regard has been given to the planning of the proposed levels and other aspects of the reserve including assessment and review of the variation in the design flood levels for various storm events, the grading and treatment of the reserve including edge treatments, the nature of planting and landscape, the location of inflow and discharge points, pedestrian movement and access for maintenance and operational requirements for the ornamental pond in the base of the retarding basin.

The future management and maintenance of the retarding basin are subject to further detail and agreement.

The preliminary functional details of the internal retarding basin system required for the overall development including the residential and commercial / retail areas are noted below:

5.3.2 Proposed Retarding Basin Characteristics

Based on 1% AEP / 100 yr storm event

- Peak Inflow: 8.7 cumecs (30min storm inclusive external catchment flows)
- Peak Outflow: 0.29 cumec
- Storage Volume: Approx. 10,100 Cubic metres
- Base: RL 84.8 m AHD (Normal Water Level of Ornamental Lake)
- Top of Water Level (TWL) Q 100: RL 87.51 m AHD

Updated internal Retarding Basin characteristics above have been refined as part of hydrologic design refinements in December 2016 and January 2017 to address Council Resolution item a) v. "A revised concept for village green and retarding basin", and have been independently checked by Melbourne Water in December 2016 (refer Annexure 4B).

Peak inflows into internal Retarding Basin have increased as a result of hydrologic (RORB) model updates by re-routing external catchment upstream Burwood Highway into internal Retarding Basin, resulting in increased peak inflows. Base RL, Top of Water Level (TWL) Q100 and Storage Volume have all been updated based on updated landscape design and RORB modelling. Refer Annexure 6A.

Figure 3 and Annexure 6A show a preliminary design for the internal retarding basin. Redesign of the central open space and retarding basin was undertaken during late 2016 / early 2017 to achieve a more usable, functional and maintainable open space and to ensure that land contributed as open space is not unreasonably floodprone to Council's satisfaction when assessing the suitability of the land as open space contribution.

It is noted that as part of an opportunity pursued by Frasers Property with Melbourne Water, it was agreed to improve the appearance and function of the adjoining Eley Road retarding basin and key elements of the proposal. This resulted in:

- The wetland component from the proposed development being placed within the Melbourne Water retarding basin; and
- Amenity improvements around edge of the Melbourne Water retarding basin.

Subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Waters withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

Figure 3 provides an indicative plan view and section of the proposed open space reserve and the integrated retarding basin elements. The indicative plan also shows the extent of a range of flood events between the 1 yr and 100 yr storm frequencies.

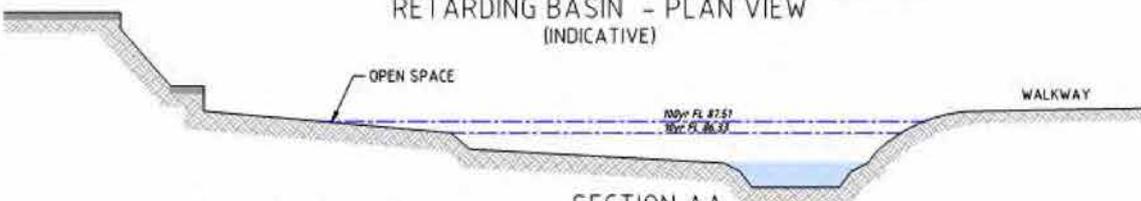
Figure 3 provides a guide to the potential impact on the use of the open space for varying storm events from an amenity and also from a public safety aspect. Previous indicative layouts of this space included a wetland proposal which has since been relocated to Eley Road retarding basin as described above. For system characteristics of the relocated wetland please refer to section 5.4.5.

The use of the open space should not be disrupted during the normal operation of the retarding basin, as demonstrated by the storm frequency and preliminary water level table and other information that has been provided in the update of Figure 3.

Figure 3 Indicative Retarding Basin Layout



RETARDING BASIN - PLAN VIEW
 (INDICATIVE)



CENTRAL RB FLOOD LEVELS
 REFER INCITUS SWMS REPORT

ARI	FLOOD LEVEL (m AHD)	FLOOD SURFACE AREA (m ²)	FLOOD STORAGE VOLUME (m ³)	RB INUNDATION TIME ESTIMATE (hr) *
100YR	87.51	5580	10,100	15.1hr
50YR	87.12	5210	7,980	13hr
20YR	86.68	4830	5770	10.6hr
10YR	86.33	4550	4,110	8.5hr
5YR	86.09	4360	3,100	7.2hr
2YR	85.81	4030	1,900	5.4hr
1YR	85.68	3880	1,440	10.5hr

NOTE: INDICATIVE PARK SCHEMATIC ABOVE BASED ON PLAN 22355_E-R6CD1 - CONCEPT PLAN CENTRAL PARK RB

SECTION AA
 (INDICATIVE, NOT TO SCALE)

LEGEND

- INDICATIVE FINISHED SURFACE LEVELS RL +90.50
- INDICATIVE PIPE ALIGNMENTS (SHOWING DIRECTION OF FLOW) ---
- SITE ACCESS MAINTENANCE →
- MAJOR STORM OVERLAND FLOW PATH →

UPDATED 15.01.2018

In the event of overflow from the retarding basin, the proposed finished design levels and grading of the development, which is reflected in the preliminary site finished level contour model (refer Annexure 3), provides for an overland flow path network to the Melbourne Water Eley Road retarding basin, as shown in Figure 2. Site levels are set to provide protection for allotments in the major 100 year event, overland flow paths will be designed to meet Melbourne Water floodway safety criteria, allowing for blockage of the retarding basin in line with Melbourne Water current practice.

Should the public enter the proposed retarding basin area during a more significant rainfall event; the flat nature of the accessible inundated areas will still provide a “safety bench” in line with Melbourne Water design safety guidelines and requirements.

5.3.3 Retarding Basin Maintenance and Safety Considerations

The concept design makes provision for maintenance access as shown in Figure 3. Drainage infrastructure associated with the proposed retarding basin will be integrated with the surrounding landscape design and will allow safe maintenance access. These will include retarding basin outlet control pits which will be located on the edge of the ornamental pond and integrated into the landscaping design.

A Risk assessment of the retarding basin / open area will be undertaken during the functional design stage to ensure that potential safety risks are identified, assessed and managed to Council satisfaction and in accordance with Melbourne Water design guidelines.

Some of the issues and considerations made in our initial risk assessment of the above area include:

- Publicly accessible areas (including grass cutting areas) will be designed with appropriate safety batters.
- Any areas that exceed maximum slope requirements will be subject to alternative batter treatments to Council’s satisfaction to ensure public and maintenance safety requirements are achieved.
- Retarding basin drainage structures will be designed to ensure safe operation and maintenance.
- Educational and safety signage will be used to provide information and warn the public of potential dangers in a flood situation.
- Landscaping treatments such as retaining walls may be utilised as part of open space and batter design.

The volumetric and surface area requirements for retarding basin storage have been achieved while maximising the duration of availability of usable open space. The useability of the open space for the development is addressed in the landscape strategy.

Temporary retardation and water quality measures will be provided in staged manner as required. Southern portion of the property will be temporary drained to the existing quarry hole to the north which will be partially filled and managed until such time as the proposed retarding basin is constructed.

Until a substantial part of the catchment is developed there will not be adequate flow to maintain RB/Wetland health. During construction all appropriate measures as outlined in contractor's approved Site Environmental Plan will be provided to manage protection of the retarding basin from siltation to Council's satisfaction.

5.4 WATER SENSITIVE URBAN DESIGN (WSUD)

5.4.1 Aims and requirements

As outlined earlier, one of the key objectives of the proposed Development Plan is the sustainability of the development which in this instance can be facilitated by the integration of ESD principles, including Water Sensitive Urban Design (WSUD) in the stormwater management plan for the development.

Stormwater management of the site will be in accordance with the endorsed Incitus Stormwater Management Strategy Report. Information in Incitus Report is to take precedence over drainage and water quality aspects of this document.

The aim of WSUD is to minimise the impact of urbanisation on the receiving waters and natural water cycle and to fulfil these objectives in an integrated development approach directed at:

- Managing the volume, rate and quality of catchment run-off;
- Protecting the aquatic habitats of accepting waterways;
- Providing the safe conveyance of stormwater flows for typical and flood events;
- Providing and promoting stormwater elements as an integral part of the urban form.

The design of WSUD elements is based on MUSIC (Model for Urban Stormwater Improvement Conceptualization, CRCCH) software modelling program and analysed to ensure that the proposed strategy treatment measures for a catchment can achieve the specified reduction targets required under Best Practice Guidelines.

These targets are based on the general Victorian Planning Policy pollutant removal requirements for Total Suspended Solids, Total Phosphorus, Total Nitrogen and Gross Pollutants.

The MUSIC model design simulation requirements adopted for the proposed strategy treatment measures for the proposed development based on current Best Practice requirements are noted below:

Target Reduction Water Quality	% Reduction
Total Suspended Solids (kg/yr)	80%
Total Phosphorus (kg/yr)	45%
Total Nitrogen (kg/yr)	45%
Gross Pollutants (kg/yr)	70%

5.4.2 Proposal for Water Quality / ESD

The review and preparation of the water quality treatment strategy forming part of the Drainage Strategy Plan and outlined in Fig 5: MUSIC model plan, considered a number of different WSUD treatment train elements and various MUSIC trials were run to examine the effectiveness of the various elements.

As also noted in section 5.3.1 of this report, our review of the retardation and wetland located in Melbourne Water Retarding Basin on Eley Road considered various issues including spatial and siting opportunities and restrictions, landscaping proposals including selection of appropriate aquatic planting to the wetland, location of drainage inlets and outlets, simplicity of operation, capital costs, maintenance costs, maintenance and access requirements, existing and proposed site grading and the type of soil and ground conditions including proposed fill areas.

Based on the investigation completed at this time which considered the above and other criteria, the following key WSUD elements were selected and incorporated into the development proposal:

- a) A wetland integrated with the existing Melbourne Water Eley Road retarding basin was explored in collaboration with Melbourne Water and subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Water withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

Gross pollutant control is proposed 'at source' via grated pits within road areas and will prevent gross pollutants from entering the minor drainage system and loading the proposed wetland. In addition to the grated pits, a proprietary Gross Pollutant Trap (or approved equivalent, such as Stormceptor unit referred to by Melbourne Water in Annexure 4C) will be provided upstream of the wetland on Council drainage system as part of requirements imposed by Melbourne Water outlined in letter dated 17 May 2016 (refer Annexure 4C).

- b) A Treatment Train will be integrated within the Retail and Carpark service area providing dedicated water quality treatment of the retail area that will be maintained as part of the retail facility

The Treatment Train for the retail and car park service area consists of two components:

i) SPEL STORMCEPTOR

The Stormceptor Class 1 is a gravity-type, passive, full retention flow process that treats all flows through two chambers. Low velocity laminar flow provides quiescent conditions in the separator enabling the light liquid content of the water to separate and rise to the surface due to the difference in density of the oil and water.

Contaminated water cannot flow directly across the surface before effective separation has taken place. Treatment process involves the 'cleaner' water passing from the primary chamber by underflow into the secondary chamber and finally through a coalescing filter mounted in the secondary chamber to 'collect' smaller droplets of hydrocarbons and encourage larger droplets to form enabling better removal by gravity to the collecting area in the sealed secondary chamber.

The SPEL Stormceptor Class 1 is sized to treat and capture all flows. There is no bypass facility, meaning all pollutants are captured and retained between maintenance cycles. The coalescer (coalescing filter) is a high-reticulated and high-contact surface filter with a minimum life span of eight years. It is mounted into the secondary chamber, providing a coalescing process for the separation of smaller oil droplets. Incorporated in the secondary chamber prevents the coalescer from being blocked in the event of major spillages and large amounts of accumulated hydrocarbon or heavy silt content in the surface water. It can be simply lifted out for cleaning during routine maintenance.

Figure 4a Schematic of SPEL Stormceptor Class 1



ii) SPEL HYDROSYSTEM

The SPEL Hydrosystem is a specialist rainwater filter unit which is widely used in commercial, built up residential and other applications. The filter function is an up-flow process and this allows for a design with a minimal height difference between the inlet and outlet. The runoff is cleaned by the basic operation of the following processes: Incoming rainwater is led down to the basal section of the filter shaft, a hydrodynamic separator built in the base section promotes particulate sedimentation, the water is led into a separator tangentially and

generates a radial flow pattern, the particles settle into the silt trap located below the separation chamber. The system filter requires maintenance once a year.

The output discharge as treated has such a degree of water quality that it can be discharged directly into stormwater or surface waters.

Figure 4b Schematic of SPEL Hydrosystem



Alternative Servicing Strategy is being considered for Retail Site which may include: rooftop rainwater capture, harvesting and re-use in landscape irrigation and toilet flushing and gross pollutant control 'at source' via grated pits within road and car park areas.

Alternative Treatment Train will include filtration via proprietary package or a natural biofilter/bioswale arrangement prior to discharge into the internal site drainage system in Urban Plaza, and detained via central retarding basin as shown in Figure 2 and Annexure 6B.

The ultimately selected treatment train will deliver the Servicing Report objective of an independent on-site treatment to meet best practice stormwater treatment objectives for Retail Stage and Carpark.

- c) Other water related ESD initiatives that are intended to reduce the developments dependency on potable water supplies and further improve the water quality of emissions from the development which will be considered include:
 - (i) The use of captured stormwater for irrigation of the key open space areas within the development;
 - (ii) The use of porous paving and other water quality measures within car parking area and certain road elements;
 - (iii) The use of swales, raingardens and other elements within the various reserve spaces within the proposed development;
 - (iv) The use of rainwater tanks for toilet flushing and garden watering / irrigation in housing and other areas of the development;
 - (v) The use of other water treatment measures such as rain gardens and porous pavement areas in housing and other private areas of the development;
 - (vi) Grey water reuse in housing and other others of development;

- (vii) Planting and landscape in public and private areas designed with water conservation and sustainability objectives as key considerations;
- (viii) Promoting water conservation and waterway health issues and strategies for residents and occupiers of the development via public signage and other promotional and educational material.

The operation and on – going maintenance of the selected water based ESD elements must be simple and economical and based on established principles and maintenance regimes. The integration of the wetland within the existing Eley Road retarding basin provides the most efficient and effective means of achieving the outcomes required.

Subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Water withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

5.4.3 Wetland Maintenance and Safety Considerations

Subsequent to endorsement of this and the Incitus Report, in February 2019 Reeds undertook functional design of the stormwater quality wetland in the base of Eley Road Retarding Basin in consultation with Melbourne Water. Upon comprehensive review of the functional design plans, Melbourne Water withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

5.4.4 Water Treatment – System Characteristics

The preliminary characteristics and functional details of the Retail/Carpark system servicing the site with the exception of Retail Stage are provided below. For further reference and location refer also to Figure 2: Drainage Strategy Plan.

- Water quality treatment train – within Retail and Carpark development area. Characteristics: In-line SPEL Class 1 Stormceptor and SPEL Hydrosystem units for Retail and Carpark area only. Alternative water quality treatment train being considered for Retail and Carpark area may include: rooftop rainwater capture, harvesting and re-use in landscape irrigation and toilet flushing, as well as gross pollutant control ‘at source’ via grated pits within road and car park areas and filtration via proprietary package or a natural biofilter/bioswale arrangement.

The above figures are based on preliminary concept design and other preliminary work and are subject to further review at the functional and detailed design stages.

5.4.5 MUSIC modelling results

The adopted water quality proposal was modelled in MUSIC as part of the SDMP, the modelling confirmed that the proposed wetland and selected treatment train within the retail area, in the context of the proposed Development Plan, would meet and exceed the Best Practice water quality targets and any other proposed WSUD elements would only further enhance the water quality and ESD outcomes of the development.

Subsequent to endorsement of this and the Incitus Report, Melbourne Waters withdrew support for the wetland proposal in lieu of payment of stormwater quality offset contributions, to offset any shortfall in on-site stormwater treatment to best practice requirements, as outlined in Melbourne Water letter dated 2 August 2019 provided in Annexure 4F.

On 19th May 2021 Reeds issued “Music Model Update Summary Report Rev 4” to Whitehorse Council and Melbourne Water to facilitate calculation and payment of stormwater quality offset contributions for the development. This report is available under a separate cover and contains comprehensive details of the updated MUSIC model assessment and relevant stormwater quality offset contributions. Summary of updated MUSIC modelling results and stormwater quality offset calculations is shown below. For further details refer to “Music Model Update Summary Report Rev 4” which is available under a separate cover.

The % Reduction in Table 1 below shows the result of the MUSIC model simulation for the western catchment as per Reeds “Music Model Update Summary Report Rev 4”:

Table 1 – Updated MUSIC Results (Source - Reeds “Music Model Update Summary Report Rev 4)

	Source Load	Residual Load	% Reduction	Best Practice Target	Percent of Best Practice Achieved
Flow (ML/yr)	102	87	15.0%	N/A	N/A
Total Suspended Solids (kg/yr)	19500	6520	66.6%	80%	83%
Total Phosphorus (kg/yr)	40.6	19.4	52.3%	45%	116%
Total Nitrogen (kg/yr)	290	199	31.4%	45%	70%
Gross Pollutants (kg/yr)	4190	651	84.5%	70%	121%

Note: Stormwater Offsets calculated based on proportion of TN removal achieved compared to 45% best practice removal

Figure 5 provides the MUSIC model output which is based on the Reeds “Music Model Update Summary Report Rev 4” available under a separate cover.

Figure 5: MUSIC Model Layout (Source: Figure 1 Reeds MUSIC Model Update report)

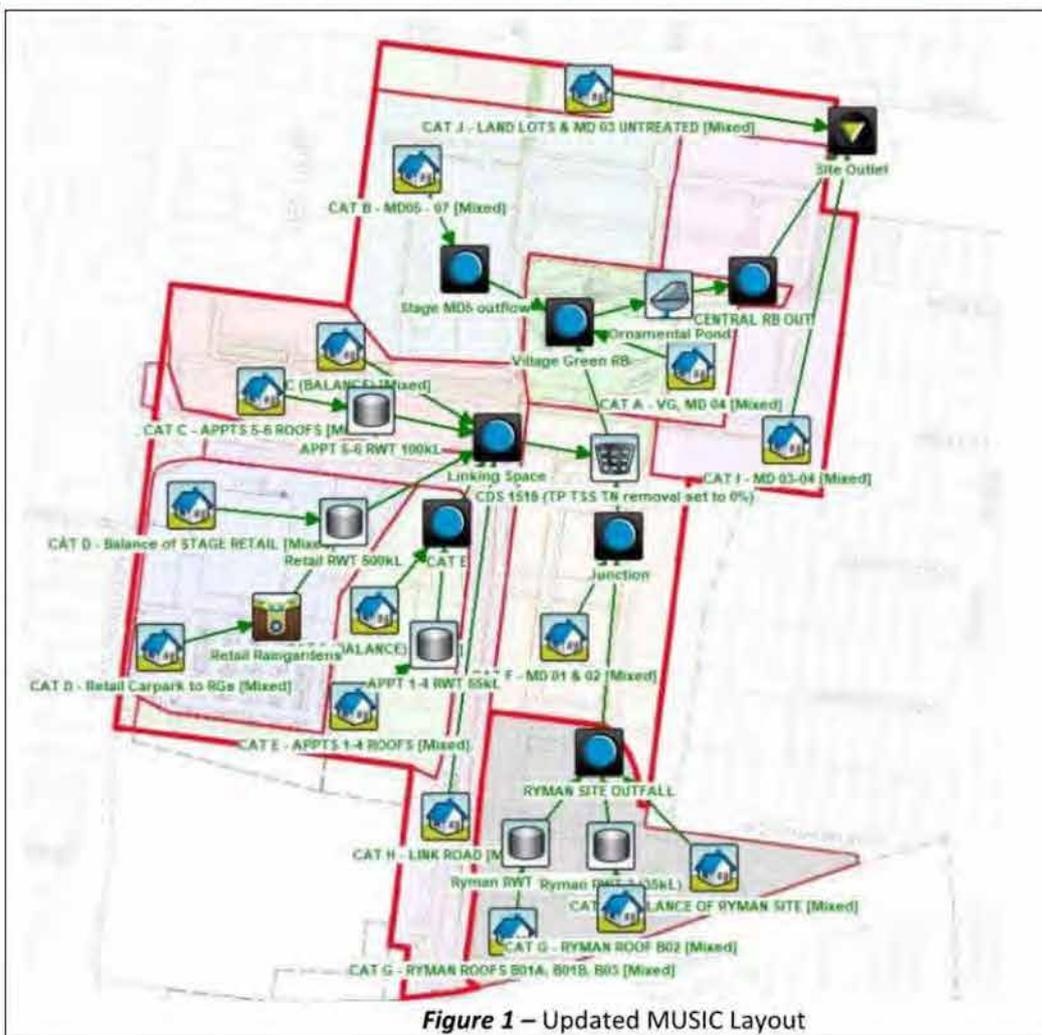


Figure 1 – Updated MUSIC Layout

Updates to the MUSIC model shown in Figure 5 are outlined in Reeds “Music Model Update Summary Report Rev 4” and are also summarised below:

- Proposed wetland inside Eley Road RB has been removed from the model as directed by Melbourne Water according to correspondence in Annexure 4F
- Ornamental pond inside Village Green updated based on current landscape proposals and detailed design
- Proposed GPT location updated to reflect detailed design of Village Green open space
- Stage Retail treatment updated to include 500kL rainwater tank and 5 x bioretention basins inside the car park in accordance with approved internal design
- Stage Apartments 1 – 4 updated to include 55kL rainwater tank in accordance with approved internal design
- Stage Apartments 5 – 6 updated to include 100kL rainwater tank in accordance with approved internal design
- Ryman Site updated to include a 115kL and 35kL rainwater tanks, as per information provided by Ryman and Adams Eng.

The stormwater quality offsets payable are outlined in Reeds “Music Model Update Summary Report Rev 4”, as per the Melbourne Water stormwater offset contribution calculator on Melbourne Water website allowing for 70% best practice treatment of Total Nitrogen (TN). The contribution payment of \$222,783 is based on the Whitehorse City current standard residential rate of \$31,503/ha, allowing appropriate development type as shown in Figure 6 below, allowing for total site area is 20.498ha including Ryman site. For further details refer Reeds “Music Model Update Summary Report Rev 4” available under a separate cover.

Figure 6: Melbourne Water stormwater quality offsets payable (Source: Reeds MUSIC Model Update report)

The screenshot shows a web-based calculator interface. It is divided into two main sections: 'Step 2' and 'Step 3'. 'Step 2' is titled 'Where is your development?' and contains several input fields. 'Step 3' is titled 'Fill in about your development' and includes a dropdown for 'Specify the development for the offset calculation', a 'Development type' dropdown, a 'Development area' input field, and a 'Residential density' dropdown. Below these are checkboxes for 'Are you providing any stormwater treatment on site?' and 'What percentage of full parcel of stormwater treatment are you allowing on site?'. A 'Calculate' button is located at the bottom of the form. At the bottom of the page, a blue box displays the results: 'Your stormwater offset contribution: \$222,783.23'. A red box highlights the 'Payable contribution' and the amount '\$222,783.23'. A small red note at the bottom right states 'The residential contribution offset payable by the developer'.

6 SUMMARY & CONCLUSION

This report has provided an engineering assessment of the key servicing and stormwater management and related civil development issues.

Our investigation has reviewed the availability and requirements for all necessary infrastructure including drainage, water supply, sewerage, utility services including electricity / lighting, telecommunications and gas and also provided an overview of proposed roadworks and earthworks requirements that are further discussed in the specialist consultant's reports forming the proposed Development Plan. All necessary infrastructure is available to the site and the planned upgrade or augmentation of certain services required to meet the demands of the overall development, will be planned manner to suit the proposed staging and timing of the development.

The preliminary assessment undertaken as part of the Stormwater Drainage Management Plan (SDMP) demonstrates that the integration of the key WSUD elements of the drainage strategy, such as the internal retarding basin, can be incorporated effectively into the open space area as part of an overall urban design and landscape approach to provide a high level amenity to the community. The SDMP addresses the stormwater conveyance and management requirements for the development including the provision of the necessary protection requirements of property and the public.

This report, Incitus Stormwater Management Strategy Report and Reeds "Music Model Update Summary Report Rev 4" have also outlined a range of key water quality and associated water conservation elements and also other opportunities for consideration as part the overall ESD initiatives proposed for the development.

Burwood Brickworks Development achieves 31.4% Total Nitrogen removal, which equates to 70% of best practice stormwater treatment targets.

The resulting shortfall in treatment will be offset via a contribution payment of \$222,783 into Melbourne Water Stormwater Quality Offsets Program as outlined in Figure 6, to ensure the development meets its planning permit requirements in accordance with the endorsed Incitus SWMS report, which outlines that *"development can provide on-site treatment to achieve best practice pollutant reduction targets or pay Melbourne Water a stormwater quality offset contribution to help fund alternative treatment in the greater catchment"*.

Based on the investigation and analysis of the engineering servicing and stormwater management issues and proposals, that have been undertaken in conjunction with the preparation of the Planning Scheme amendment, we are able to confirm and conclude that the subject site can be developed in an timely and economic manner, in accordance with the draft concept plan and the conditions and approval processes of the responsible authorities.

Prepared by:
REEDS CONSULTING PTY LTD

Disclaimer

The information contained within this report has been obtained from various servicing Authorities either verbally or in writing however, until such time as formal applications made and the applicable written conditions, statutory permits and all relevant approvals obtained it should only be used as a guide. Any party wishing to use the material contained within this report should make their own inquiries to satisfy themselves to the accuracy of the information.

ANNEXURE 1
Development Master Plan



ANNEXURE 2

**Yarra Valley Water Preliminary Servicing Information dated 03/02/2014 and
Email correspondence 22nd September 2015**

3 February 2014

Australand

Philip David

Application ID: 123876

Property Address: 78 Middleborough Road Burwood East

Preliminary Servicing Advice

The following information is preliminary servicing advice and does not constitute an offer.

This advice lapses within 3 months of the date of this letter.

This preliminary servicing advice is based on the information provided in your enquiry.

This advice may no longer be valid if there are any changes to the information provided.

This advice succeeds any prior written or verbal advice provided by Yarra Valley Water.

If you have any enquiries please email us at easyaccess@yvw.com.au or visit our website yvw.com.au/easyACCESS for further information. Alternatively you can contact us on 1300 651 511.

Yours sincerely,



John Maudsley
Divisional Manager, Development Services

Water Advice:

This Preliminary Servicing Advice hereafter referred to as 'advice' is based on information provided within the developer's application. This advice may no longer be valid if information provided by the developer changes.

The following information is preliminary servicing advice and does not constitute an offer. This advice expires within 3 months of date of letter / advice to customer.

This advice succeeds any prior written or verbal advice provided by YVW. The designer should clarify any discrepancies between this and previous advice with YVW.

Any proposed changes to this advice must be approved in writing by the Manager Water Growth Planning.

To provide water supply, the developer has the choice of either:

1. Installing internal potable water and sewerage infrastructure to AS/NZS 3500 Acceptable Solutions or AS/NZS 3500 Performance Requirements, with the Owners Corporation owning, operating and maintaining the assets within their property. A common tapping off a reticulation main, including meter and backflow prevention device are to be installed to the property boundary and each individual dwelling must also be separately metered; or
2. Installing potable water, recycled water and sewerage infrastructure to WSAA MRWA standards with Yarra Valley Water owning, operating and maintaining the assets. All infrastructure must meet the requirements specified in the servicing guidelines for multi unit developments. All lots/units/town houses shall have separate tapplings from a reticulation main and must be individually metered.

It must be noted that the option selected by the developer must apply to potable water, recycled water and sewerage infrastructure. This advice assumes potable water, recycled water and sewerage to plumbing code. If the developer's preference is for provision of infrastructure under WSA03-2011 Code then the advice will have to be revised."

The designer should note that Clause 1.2.3 of WSA 03-2011-3.1 Melbourne Retail Water Agencies Edition- Version 2 requires the designer to comply with YVW's Water Supply Servicing plans prior to any works.

A Concept Plan in accordance with Clause 1.2.3 of Water Supply Code WSAA 03-2011 3.1 has been provided.

In accordance with clause 8.2.4 of the Melbourne Retailer's edition of the Water Supply Code WSAA 03-2011 3.1 code the designer shall ensure that pipework layout and sufficient divide valves are specified such that Shut Off Block sizes are limited to no greater than 25 dwellings. In the event that this requirement cannot be met with the installation of divide valves an alternate pipework layout will be required. This shall apply to both new and existing properties.

The minimum size reticulation main for industrial and commercial estates is DN150. This is established to ensure adequate flow rates and residual pressures, including a contribution to basic fire fighting capability and is in accordance with clause 3.1.2 of the Melbourne Retailer's edition of the Water Supply Code WSAA 03-2011 3.1

The design of all mains DN225 and greater, or as specifically noted in this offer, are to be submitted to the Land Development Engineer, Asset Creation, for the approval of the Manager Water Growth Planning and the Manager Water Operations.

The design of all mains smaller than DN50 are to be submitted to the Land Development Engineer, Asset Creation, for their approval.

All mains DN375 and greater are strictly non tapping mains (even if parallel duplicate mains are not shown on the plans provided), and shall be isolated from tapping mains via valving as per clause 6.2.5.2. All valves on mains larger than DN375 shall be metal wedge, including offtake valves.

The Manager Water Operations shall be notified 7 days prior to any work on or adjacent to existing mains DN300 or greater.

This advice is given for servicing of superlots only. If the superlots are further subdivided then additional conditions may apply. Any further assets to be constructed will be at the expense of the developer.

In order to service this development a break pressure tank and booster pump may need to be installed in order to provide supply to areas requiring higher than supplied pressure, such as for upper floors of apartments or for fire requirements. Booster pumping direct from the main is not preferred and a separate detailed application must be made to YVW for approval. If booster pumping is required, the development must not be supplied by a dead end main.

POTABLE WATER ADVICE

The TWL for the Water Supply Zone is 157 (m) AHD. Under normal operating conditions the maximum applicable HGRL for the proposed development is 157 (m) AHD and the minimum Dry Summer Day HGRL is 134.45 (m) AHD. For the purpose of water hammer, an additional 20m pressure is to be allowed for in the design of all water assets, including fixtures and thrust blocks.

The maximum allowable flow for the design of fire services is 60 L/s.

Please refer to the attached charts for additional hydraulic information. The hydraulic information provided is for the point marked 'A' on the attached Water Supply Concept Plan.

All properties in this area require a domestic Pressure Reducing Valve (PRV) to be installed to ensure compliance with the plumbing code. A licensed plumber must install the PRV in an accessible location on all water outlets (other than a fire service outlet). The static pressure to this stage of the development is currently or will ultimately be greater than 50m in line with our servicing strategy for the supply zone. Should the developer not install a PRV as part of development works, the contract of sale document for allotments is to include a requirement for the new owner to install a PRV as part of their internal potable water plumbing to ensure compliance with the plumbing code.

This advice is preliminary only and requires further modelling and assessment via application for a Complete Servicing Advice. Works will be required to service this development which will include at a minimum the construction of a DN150 (final sizing to be confirmed) reticulation main from Middleborough Road to either the existing DN150 reticulation main in Old Burwood Rd or Burwood Hwy (see Option 1 and Option 2 text on the Water Concept Plan). Each stage in the

development (1A, 1B, 2, 3, 4, 5 and 6) will each require dual tapplings separated by divide valves as per the Water Concept Plan

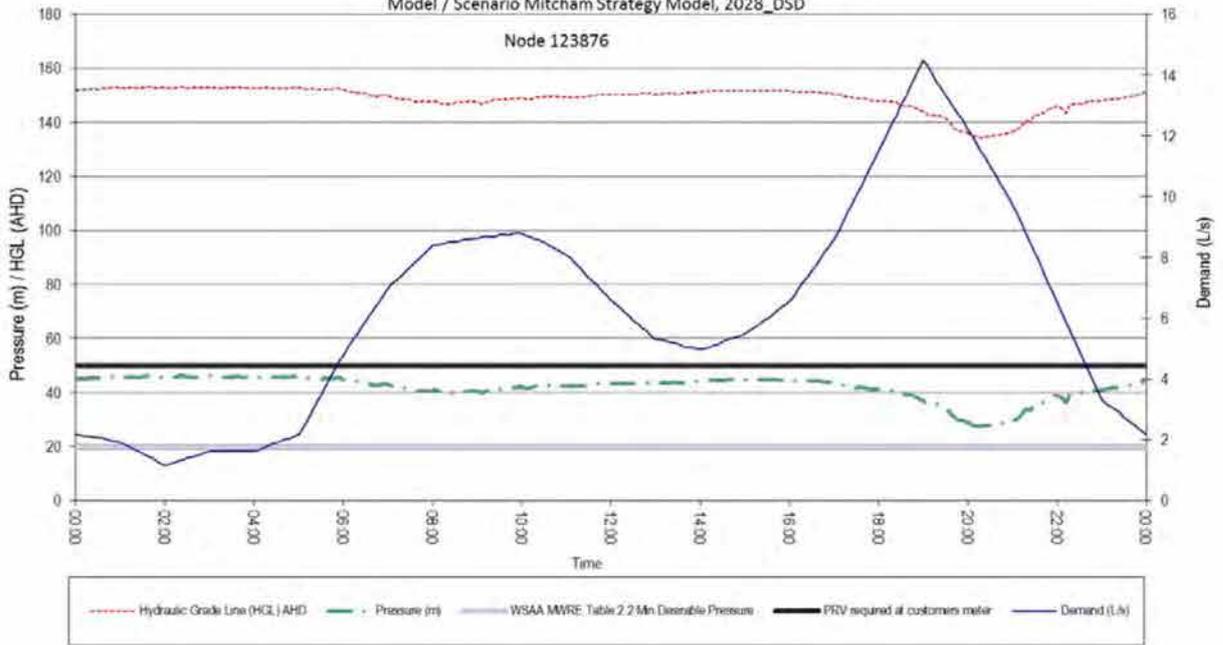
The developer is required to provide more information about the type of development (residential lots, apartments, commerical areas) and proposed site and reticulation layout in an application for Complete Servicing Advice before being permitted to construct any works. Accurate advice can only be given when a detailed plan featuring the number, type and location of residential lots, and size and expected water usage of commercial development is submitted.

All wet tapplings on existing water mains must be undertaken by YVW's own tapping contractor.

A Functional Design Statement will not be provided by YVW for these works.

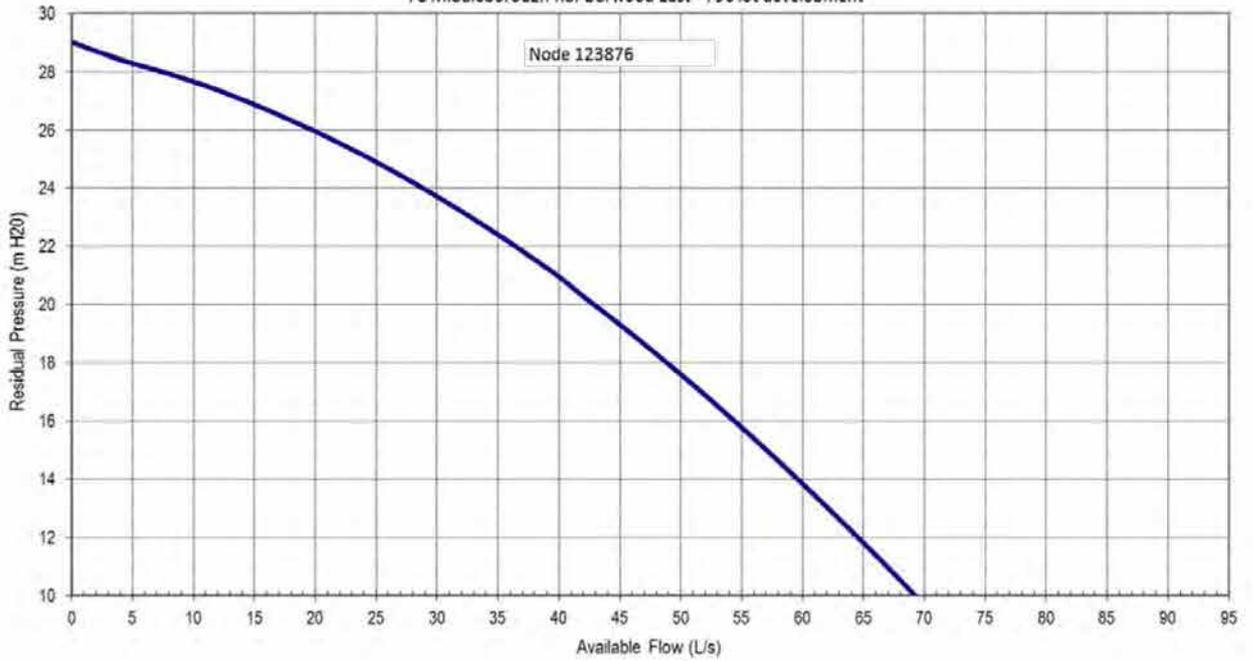
Based on the information provided in your application no Melbourne Water assets are impacted by this proposal.

Potable Water Pressure/Flow Curve
 78 Middleborough Rd, Burwood East - 796 lot development
 Model / Scenario Mitcham Strategy Model, 2028_DSD



Potable Water Hydrant Curve

78 Middleborough Rd, Burwood East - 796 lot development



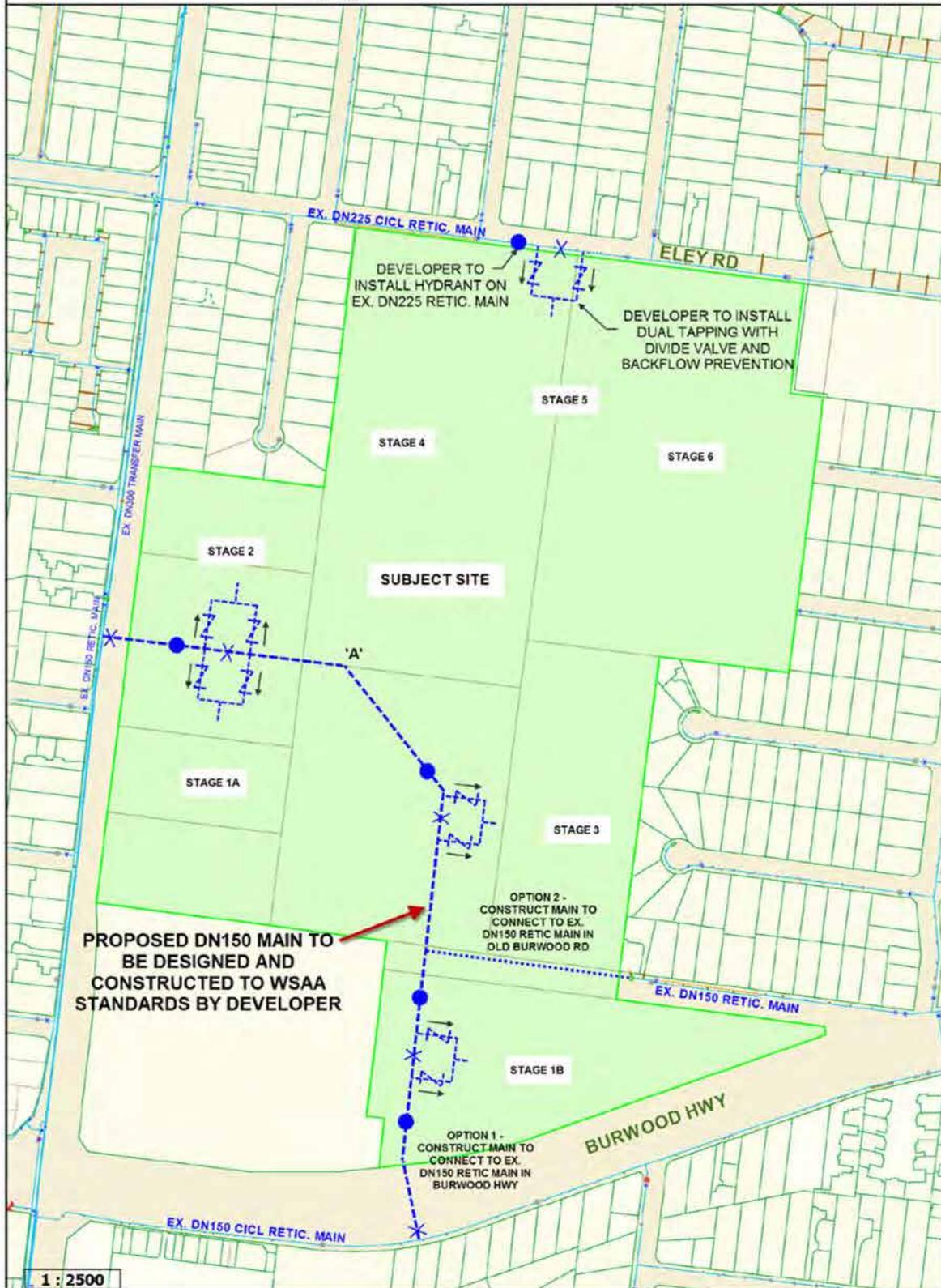


114778 WATER CONCEPT PLAN



© Yarra Valley Water Ltd 1996

This plan is to be used for the location of Yarra Valley Water's assets only and is not to be used for any other purpose.



Sewer Advice:

- This **preliminary servicing advice** (“advice”) is based on the information provided within the developer’s Application and will no longer be valid if the information provided by the developer changes subsequent to this Application.
- This **advice** does not constitute an offer and lapses within 3 months of the date of this letter.
- This advice succeeds any prior written or verbal advice provided by Yarra Valley Water.

Design Standards

- Unless otherwise instructed all works shall be designed in accordance with WSA 02-2002-2.3 Sewerage Code of Australia, Melbourne Retail Water Agencies Edition - Version 1.
- The designer should note that Water Standards Association of Australia WSA 02-2002-2.3 Melbourne Retail Water Agencies Edition 1.3.3 Part (a) requires the designer to undertake the necessary design and produce Design Drawings to comply with Yarra Valley Water’s concept and/or strategy plan and design parameters.

Generic Technical Requirements

- The minimum size sewer for industrial and commercial developments is DN225.
- Average dry weather flows from commercial/industrial development expected to be in excess of 0.25 litres per second per hectare are not permitted without additional approval.
- Construction of works through other properties requires permission from the relevant land owners.
- Unless noted otherwise, internal sewers must be extended to the development’s upstream boundary and be designed and constructed to control upstream catchments.
- All branches not used must be cut and sealed.
- All sewer constructed within private property will require the creation of an easement in Yarra Valley Water’s favour. Easements shall be designed in accordance with WSA02-2002-2.3 Melbourne Retail Water Agencies Edition 1.3.3 – Section 4.2.5 (Easements). Surveyed verification of planned easement offset from sewer shall be submitted to YVW for approval.
- Upon accepting an Offer the Developer is required to inspect the connecting manhole and make an assessment of suitability for connection with regards to access and structural integrity. Any structural defects which the Developer believes will preclude connection must be immediately reported to Yarra Valley Water for rectification. If

connection to the manhole is not possible because of other physical constraints, including but not limited to the arrangement of ladders and/or other existing connections, the Developer will have to fully fund construction of a new and/or additional manhole as the case may be.

Minor Works - Connection Point

- The development areas shown on the attached plan shall connect to manhole ELY28.
- The development areas shown on the attached plan shall connect to manhole STS7-103

Major Works

- The Eley Road Branch Sewer is at capacity and currently experiences a limited number of non-compliant uncontrolled spills. The sewer is on a program to undertake 'Hydraulic Options Assessment' as part of Water Plan 3, with the assessment programmed for the 2017/18 Financial Year. Upgrade works are expected to be undertaken 2 to 3 years post the assessment as part of Water Plan 4.
- It is likely that the addition of this development will provide a significant increase in inflows which could significantly impact on the performance of the sewer network and increase the number of non-compliant spills.
- The hydraulic options assessment planned for the 2017/18 Financial Year would need to be brought forward to assess options to upgrade the sewerage network. The estimated cost to bring forward the hydraulic options assessment is \$50k.
- The hydraulic options assessment would assess upgrade options (at the Developer's cost), which would include:
 - Increasing hydraulic capacity of existing sewer via either upsizing or duplication.
 - Installation of an Emergency Relief Structure (ERS) to provide for a controlled spill point.
 - Installation of an underground detention storage tank.
- The estimated cost for each of the upgrade options would be identified following completion of the hydraulic assessment.
- Should the developer wish to proceed with the development sooner than the planned upgrade of the sewer capacity in Water Plan 4, then the developer may be required to contribute 'bring forward' costs for the upgrade works.
- The 66m section of DN150 sewer located between STS7-103 and STS7-60 does not have sufficient capacity to accommodate the proposed development and is required to be upsized to DN225. The cost to upgrade this sewer will be at the developers cost.

Odour Control

- This development requires a gas-check manhole to be constructed as the first manhole off the existing sewer for each sewer extension.

Partial Lot Control

The sewers servicing each lot within this development must accommodate full gravity drainage of the serviced area of the lot as defined in Clause 4.6.4 of the WSA 02-2002-2.3 Sewerage Code of Australia, MRWA Edition.

Partial lot control will only be allowed where Yarra Valley Water agrees that it is not feasible to provide full gravity control. The judgement as to whether full gravity control is feasible is at Yarra Valley Water's sole discretion.

Privately-owned Pump Stations

Yarra Valley Water only allows the use of privately-owned pump stations to service fixtures below the finished surface level of the allotment (e.g. basements and basement car parks). The pump station must discharge to the internal gravity plumbing prior to the 27A connection point (i.e. the interface point where the private gravity plumbing connects to the Yarra Valley Water property branch).

MH - ELY ZB

ELEY ROAD

MIDDLEBOROUGH ROAD

MH - STS7-103

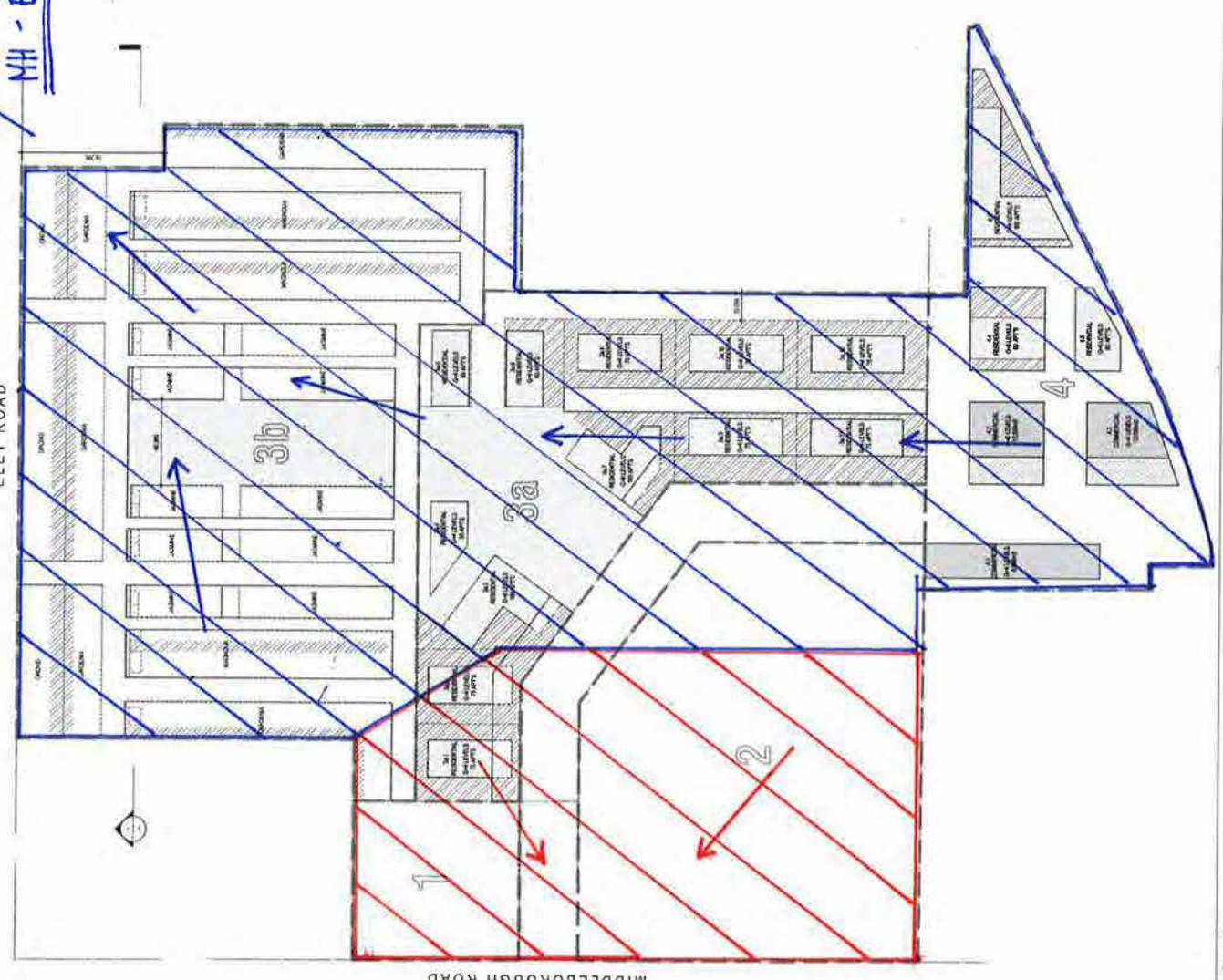
LEGEND

- TOWNHOUSES**
- ORCHID 18
 - 2 LEVEL SEMI-DETACHED HOUSE 71
 - GARDENIA 71
 - 2 LEVEL SEMI-DETACHED HOUSE 77
 - MAGNOLIA 77
 - 2 LEVEL ATTACHED TOWNHOUSE 150
 - JASMINE 150
 - 3 LEVEL ATTACHED TOWNHOUSE 150
- MULTI LEVEL BUILDINGS**
- COMMERCIAL BUILDING
 - RESIDENTIAL BUILDING
 - RETAIL / COMMERCIAL

- OPEN SPACE**
- MALICE OPEN SPACE (APPROX 15,000m²)
 - PERIPHERAL OPEN SPACE (APPROX 5,000m²)
 - PRIVATE OPEN SPACE (INCLUDING POOLIUM DECK)

STAGES

- BY READINGS - RETAIL - 5,000m²
- BY READINGS - RETAIL - 25,000m²
- BY READINGS - FOOD & BEVERAGE - 2,000m²
- BY READINGS - CINEMA - 5,000m²
- BY READINGS - NON RETAIL - 2,500m²
- BY READINGS - COMMUNITY FACILITIES - 1,500m²
- 1010 APARTMENTS 4,200m² RETAIL / COMMERCIAL
- 316 TOWNHOUSES
- 3A4 APARTMENTS 33,400m² COMMERCIAL
- 1,300m² RETAIL / COMMERCIAL



Notes:

- DO NOT SCALE DRAWINGS. METRIC DIMENSIONS GOVERN.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- CONTRACTOR TO VERIFY ALL DIMENSIONS AND LOCATIONS WITH THE WORK CONTRACT DOCUMENTS AND TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES.
- CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY CONTRACT DOCUMENTS, SPECIFICATIONS AND DRAWINGS.
- CONTRACTOR TO PROVIDE THE DESIGNER WITH A DETAILED WORKING DRAWING SET FOR THE PROJECT.

PRELIMINARY

FORMER BRICKWORKS SITE, BURWOOD
SUPERLOTS

1:1,000 Author: KA MAY '19
Scale: A4 Date: 19/05/19

CONRAD

SK20 D

Fees Advice:

Application Fees / New Customer Contribution Fees will be applicable to this development, to view the current fees and charges please visit the 'easyACCESS Knowledge Hub' by following the link:

<http://www.yvw.com.au/easyaccess/knowledgehub/display/LDM/Pricing+Manual>

Build Over Easement / within close proximity to YVW Assets:

Please ensure all necessary clearances are maintained from YVW assets, please follow the link below which will outline all conditions, these should be taken into consideration in the design stage of the development.

A copy of our customer guide for proposed works over assets is available at <http://www.yvw.com.au/yvw/groups/public/documents/document/buildoverguidelines.pdf>.

ANNEXURE 3

Preliminary Site Design Finished Level Contour Model



PRELIMINARY PLAN ONLY
 NOT APPROVED FOR CONSTRUCTION

0 10 20 40
 Scale 1:1000 @ A1

THIS DRAWING IS NOT TO BE COPIED OR SCALED

VERSION	REMARKS	DRAWN BY	DESIGNED BY	CHECKED BY	AUTHORISED BY	DATUM	AND
D	BASE PLAN UPDATED	14.12.17	SJ				
C	SERVICES ADDED & STAGES 3-7 REVISED	22.06.17	PC	MELWAY	61, 66		
B	CONTOURS & LAYOUT REVISED	03.04.17	PC				
A	PRELIMINARY ISSUE	03.12.15	PC				

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 p (03) 8460 3000

CITY OF WHITEHORSE
BURWOOD QUARRY
PRELIMINARY SITE GRADING



DRAWING No.	VERSION
	D
REFERENCE	
22355E	
SHEET	1 OF 1

ANNEXURE 4a

Melbourne Water Correspondence dated 26/08/14 original

Sam Ravida

From: Keith Boniface <keith.boniface@melbournewater.com.au>
Sent: Tuesday, 26 August 2014 2:57 PM
To: Michael McMahon
Cc: rcalandro@australand.com.au; pdavid@australand.com.au; Sam Ravida
Subject: RE: Burwood RORB Eley Rd RB and Catchment REEDS REF 22355E
Attachments: 20140826112510751.pdf

(Renato,
Can you direct this to Council? I do not have a contact email address.)

Michael,
I have had a look at your flow models for before and after development at the Australand brickwork site and am happy to give "in principle" support to the proposal.

I understand that the site lay out may still be subject to change, but providing similar results can be achieved we will be happy to work with you and Council on this.

In the original model the brickworks site was not directed to Eley Road Retarding Basin (RB), with most of the site directed north along Hastings Avenue, and a small portion directed north west out of the catchment, across Middleborough Road (see attached plan for this area). In the model prepared for development of the site, all of the site is directed to Eley Road RB, with the site and portion of the external catchment to the south being routed through a new retarding basin within the development.

The effect of the development as proposed is:

-A minor increase in RB level of 0.04 m in a 100 year event, and an increase in flow of 40 l/s (about 0.5%).

-This is offset by a decrease in overland flows to the north and north west. The model results suggest a large reduction in these flows but the model was not really set up to do these accurately-the quarry hole is ignored and the whole of the site is assumed to contribute to the overland flows. Nevertheless, after development some 0.6 hectares that was directed north, and 1.9 hectares that was directed to the north west, should be directed into the RB. A simple Rational Formula calculation for a two hour event (that is the critical one for the RB) gives flows of 50 l/s to the north west and 20 l/s to the north-so, a reduction of 70 l/s in flows versus the 40 l/s increase from the RB. For a shorter event, this reduction in flows north west and north will be even greater-a 20 minute event would generate flows of 170 and 60 l/s from these areas.

Keith

Keith Boniface | Team Leader Investigations, Waterways & Land Service Delivery Group| **Melbourne Water**

T: (03) 9679 7445 | 990 Latrobe Street, Docklands, VIC 3008 | PO Box 4342
Melbourne VIC 3001 | www.melbournewater.com.au

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PS: Regarding your questions about Fulton Road RB: It is a retarding basin that was built around 2000-02 so is not in the CMPS&F model from 1997, but is in the later GHD model. Flows from Eley Road RB enter downstream of the Fulton Road RB and are not further controlled.

From: Michael McMahon [mailto:michael.mcmahon@reedsconsulting.com.au]
Sent: Tuesday, 19 August 2014 5:38 PM
To: Keith Boniface
Cc: rcalandro@australand.com.au; pdavid@australand.com.au; Sam Ravida
Subject: Burwood RORB Eley Rd RB and Catchment REEDS REF 22355E

Keith,

Attached is update of data relating to Australand site and Eley Rd RB.

I have allowed for a 'worst case' situation where whole of proposed development (now including the central West triangle) will discharge into the Eley RB (mostly detained by proposed RB), as Council has raised matter of restricted outlet to their system.

As previous there seems to be no difference to peak flows resultant from development.

The outlet peak flow from the proposed RB is now approximately 310l/s, but it should be noted that within the model that some areas of the proposed development (within the external surcharge path) as well as the Eley Rd frontage allotments have not been fully detained prior to entry to Eley Rd RB.

RORB as provided - Kc=3.73, IL=15 mm and c=0.6.

Please also refer below for original submission.

I believe that if the proposal is satisfactory to you that you will notify Reeds and Council of your acceptance.

Any queries please call.

Regards,

Michael McMahon
Design Engineer

REEDS
CONSULTING

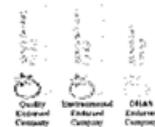
Level 6, 440 Elizabeth St
Melbourne Vic 3000

GPO Box 2240
Melbourne Vic 3001

ph: 8660 3000
fax: 8660 3030

www.reedscon.com.au
engineering@reedscon.com.au

Land Surveyors - Civil Engineers - Development Consultants



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Please consider the Environment before printing this Email.

From: Michael McMahon
Sent: Friday, 15 August 2014 4:58 PM
To: keith.boniface@melbournewater.com.au
Cc: Sam Ravida
Subject: Burwood RORB Eley Rd RB and Catchment REEDS REF 22355E

Keith,

Pre meeting Monday 18th.(apology for short notice)

Attached please find outputs and RORB files relating to the above.

ANNEXURE 4b

Melbourne Water Correspondence dated 19/12/16 (RORB, RB Update)

Meyling Rensford

From: Joe Pang <Joe.Pang@melbournewater.com.au>
Sent: Monday, 19 December 2016 10:53 AM
To: Sasha Jelicic
Cc: Keith Boniface; Sam Ravida; Milan Wickramarachchi
Subject: RE: Burwood Brickworks RORB update - Reeds Ref 22355

Hi Sasha,

Hope you are well on Monday.

From the following information provided by Reed consultant dated 15/12/2016:

- Updated RORB model (plan 22355_RB- RORB_1D)
- Updated Central RB layout (plan 22355_RB -CD1D)
- Summary of RORB flows for internal RB and Eley Rd RB (22355 - CENTRAL RB RORB FLOWS REV 3 - SUMMARY 2016 12 09.docx)
- Updated RORB model and critical 100yr output files (15min, 2hr, 9hr)

Catchment Strategies Investigation Team has undertaken an assessment to ensure there is no adverse impacts of the existing Eley Road RB.

- No increase with the peak elevation
- No increase with the peak outflow

The table below is in comparing existing and proposing condition in 100 year ARI event in different durations (Eley Road RB):

100 year ARI (2hr)	Existing	Proposing
Peak Elevation	84.45m AHD	84.22m AHD
Peak Outflow	8.75 m ³ /s	8.52 m ³ /s

100 year ARI (9hr)	Existing	Proposing
Peak Elevation	84.43m AHD	83.46m AHD
Peak Outflow	7.86 m ³ /s	7.88 m ³ /s

Therefore, as discussed with Keith, Melbourne Water has **no objection** to the updated proposal as per submitted plans and computations.

Happy to discuss if you have any questions.

Regards,

Joe Pang | Catchment Strategies Investigations, Development Services | **Melbourne Water**
T: (03) 9679 7818 | 990 La Trobe St, Docklands VIC 3008 | PO Box 4342 Melbourne VIC
3001 | melbournewater.com.au

[Learn about Melbourne Water's new Strategic Direction](#)

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From: Sasha Jelicic [mailto:Sasha.Jelicic@reedsconsulting.com.au]
Sent: Thursday, 15 December 2016 12:23 PM
To: Joe Pang

Cc: Keith Boniface; Sam Ravida
Subject: FW: Burwood Brickworks RORB update - Reeds Ref 22355

Hi Joe,

This is the latest and greatest model as sent to Keith on Tuesday

Kind Regards

Sasha Jelcic | Design Engineer
T: 0386603000



Level 6, 440 Elizabeth St, Melbourne

This email is subject to conditions. [Click here](#) for details.

From: Sasha Jelcic
Sent: Tuesday, 13 December 2016 10:18 AM
To: Keith Boniface <keith.boniface@melbournewater.com.au>
Cc: 'graham.daff@melbournewater.com.au' <graham.daff@melbournewater.com.au>; Sam Ravida <sam.ravida@reedsconsulting.com.au>
Subject: FW: Burwood Brickworks RORB update - Reeds Ref 22355

Hi Keith

Following from email below, late last week I reshaped the internal RB to maximise usable open space above the 10yr flood level, resulting in minor alterations to the Stage-Storage curve. Updated RORB model attached.

As a result of the reshaping works the internal RB flood levels have changed, but importantly:
- the 100yr outflow of the internal RB is maintained below 300l/s (now 290l/s compared to 270l/s in email below)
- Eley Rd RB peak 100yr flood level (84.22m AHD) and outflow (8520l/s) remain unchanged

List of attachments:

- updated RORB model (plan 22355_RB – RORB_1D)
- updated Central RB layout (plan 22355_RB – CD1D)
- Summary of RORB flows for internal RB and Eley Rd RB (22355 - CENTRAL RB RORB FLOWS REV 3 - SUMMARY 2016 12 09.docx)
- updated RORB model and critical 100yr output files (15min, 2hr, 9hr)

Can you please confirm you are satisfied with the updated proposal as shown in this email. As discussed we are under pressure to lock in the internal RB design, so a prompt response would be most appreciated.

I am happy to come in to MW whenever you are free to run you through the updated modelling if this will assist.

Kind Regards

Sasha Jelcic | Design Engineer
T: 0386603000



Level 6, 440 Elizabeth St, Melbourne

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From: Sasha Jelcic
Sent: Wednesday, 7 December 2016 2:00 PM
To: Keith Boniface <keith.boniface@melbournewater.com.au>
Cc: graham.daff@melbournewater.com.au; Sam Ravida <sam.ravida@reedsconsulting.com.au>
Subject: Burwood Brickworks RORB update - Reeds Ref 22355

Hi Keith

RE: 22355 Burwood RORB model

As discussed please see updated RORB model of Burwood Brickworks. The original model was developed by Michael McMahon in August 2014 and you gave in-principal approval at the time.

I updated the internal site sub-catchments, as well as the internal Central RB stage-storage relationship to reflect the latest landscape proposal.

My updated model shows that we can convey existing external gap flows upstream of Burwood Highway into the Central RB, along with internal sub-catchments A to G, and achieve a peak outflow of 275l/s from the Central RB (was 310l/s in Michael's 2014 RORB model). Note I am thinking about potentially limiting the maximum amount of external gap flows going into the Central RB via a bypass structure, but am still to decide on details.

Sub-catchment I and J outlet directly into Eley RD RB, similar to Michael's original RORB model.

Critically, my updated RORB model shows no difference to peak outflows and levels in Eley Rd RB (peak outflow 8520l/s, peak RB level 84.22m AHD in critical 2hr storm), hence no detrimental impact on downstream drainage system.

LIST OF ATTACHMENTS:

- email with original RORB submission by Michael McMahon from August 2014
- email with your in-principal approval from August 2014
- updated RORB catchment plan (22355_RB_RORB_1C)
- updated RORB catg file
- Critical 100yr output files (15min, 2hr, 9hr)
- batch.out file with all storm ARIs and durations, in original and formatted excel format FYI.

Can you please confirm you are satisfied with the updated proposal so we can continue with design of main drainage system and the Central RB.

Adopted RORB parameters are listed below. They are as per August 2014 RORB model, I only updated to local IFD parameters (original RORB model used Dandenong IFD for some reason)

If you need anything else please let me know

Sasha

ARR IFD Parameters

Parameter file: C:\Program Files\RORBwin\SampleData\ifd_melb.map Browse...

ARR87 Vol 1
Book 1, Fig 2.2

Location	2y1h	2y12h	2y72h	50y1h	50y12	50y72h	Skew	F2 value	F50 value	Zone
City of Whitehorse	18.96	4.18	1.21	37.20	7.22	2.28	0.36	4.26	15.00	1
Dandenong	18.00	4.25	1.20	36.00	7.40	2.35	0.36	4.27	15.00	1

Design Rainfall Specification

Rainfall Intensity Frequency Duration details

ARR IFD User defined IFD [Select/Edit IFD file](#)

Select location: [Edit location details](#)

Storm details

Single design storm Multiple design storms Monte Carlo simulation

Select ARI: to

Select duration: to

Group batch results by ARI or by Duration No. time incs for which calcs. req.

Temporal Pattern details **Areal Pattern details**

Unfiltered patterns Uniform [Edit Pattern](#)

Filtered patterns Non-uniform

Areal Reduction Factor details

ARR87 Bk II (Figs 1.6 and 1.7) Siniwardena and Weinmann [Edit Coeff](#)

Replace total catchment area with value of km²

Loss Factor details

Constant losses Variable losses [ARI factors](#) [Duration factors](#)

Output directory

 [Browse ...](#)

[Cancel](#) [Help](#) [OK](#)

Parameter Specification

Kc = m =

	IL(mm)	PoC
#01: Catchment outlet	15.0	1.00

[Run Model](#)

[Cancel](#) [Help](#) [Plot](#) [Text](#)

Batch Run ARI Loss Factors

	Initial Loss	Prop. Loss
1 year	1.00	0.20
2 year	1.00	0.25
5 year	1.00	0.30
10 year	1.00	0.40
20 year	1.00	0.50
50 year	1.00	0.55
100 year	1.00	0.60
200 year	1.00	1.00
500 year	1.00	1.00

[Cancel](#) [Help](#) [OK](#)

Sasha Jelcic | Design Engineer
T: 0386603000



Level 6, 440 Elizabeth St, Melbourne

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ANNEXURE 4c

Melbourne Water Acceptance of Wetland Relocation (Eley Road Retarding Basin)

17 May 2016

Sam Ravida
Joint Managing Director
Reeds Consulting
Level 6, 440 Elizabeth Street
MELBOURNE VIC 3000

Dear Sam
Eley Road Retarding Basin

Thank you for your emails of the 8th and 17th of April forwarding plans of the proposals to upgrade the Eley Road retarding basin by incorporating a wetland within the floor of the basin and developing the surrounding areas for passive recreation.

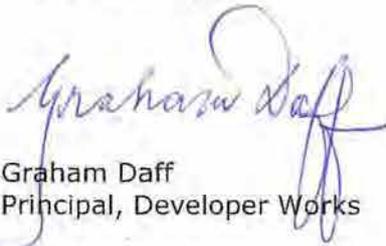
I confirm that Melbourne Water has previously agreed to the general proposal.

I advise that the landscape and maintenance plans that you forwarded are satisfactory subject to:

- The SPeL Stormceptor being located on Council's drainage pipeline entering the basin. The Stormceptor is to be maintained by Council.
- Detailed plans being prepared for the works. The level of the sediment dry out area is likely to be raised so that it is less prone to flooding.
- The formalisation of maintenance plans with Council.

Should you have any queries on the above matter please contact me.

Yours sincerely



Graham Daff
Principal, Developer Works

ANNEXURE 4d

Melbourne Water Approval Letter for RORB modelling 18 May 2017

18 May 2017

Sasha Jelcic
Drainage Engineer
Reeds Consultant
Level, 6 440 Elizabeth Street
MELBOURNE

Formal Approval Letter for Stormwater Management Strategy at Burwood Brickworks Stage 1 prepared by Reed Consultant.

In line with ongoing discussions on this development, the following attachments were submitted by Reeds Consultants for approval:

- Updated RORB model (plan 22355_RB – RORB_1D)
- Updated Central RB layout (plan 22355_RB – CD1D)
- Summary of RORB flows for internal RB and Eley Road RB (22355 – CENTRAL RB RORB FLOWS REV 3 – SUMMARY 2016 12 09. docx)
- Updated RORB model and critical 100yr output files (15mins, 2 hr, 9hr)

We have undertaken an assessment of this information and are satisfied that there are no adverse impacts on Eley Road RB or downstream flows, and that the Central Park RB will function as intended.

Based on these results, Melbourne Water has **no objection** to the updated proposal as per submitted plans and computations.

Yours sincerely,



KEITH BONIFACE
TECHNICAL LEAD
SERVICE DELIVERY - WATERWAYS AND LAND



JOE PANG
DRAINAGE ENGINEER
SERVICE DELIVERY - WATERWAYS AND LAND

ANNEXURE 4e

Melbourne Water Endorsement of Incitus SWMS Report (Stormwater Quality related)

Sasha Jelacic

From: Keith Boniface <keith.boniface@melbournewater.com.au>
Sent: Monday, 18 December 2017 3:52 PM
To: Sam Ravida
Cc: Sasha Jelacic; Sam Ravida; 'cheryl.rossington@whitehorse.vic.gov.au'; 'nina.barich@incitus.com.au'; Raffaella Arico
Subject: RE: Burwood Former Brickworks
Attachments: Former Brickworks SQT 170615.sqz; Burwood Brickworks SWMS review - water quality

Sam,
Melbourne Water has run the Music model prepared by Incitus and can confirm that the results reported in the Incitus report are accurate.

On that basis Melbourne Water has no objection to the water quality strategy proposed for this site and will work with Reeds on the detailed design of the water quality works.

Flow control has been previously discussed and we satisfied with that part of the drainage strategy for the site as well.

There are 16 lots along Eley Road that drain via existing drains and do not receive storm water quality or flow control. This area has been included in both flow and water quality modelling, and the modelling shows the overall flows and water quality for the total subdivision meet our requirements.

The works within the retarding basin will be controlled under the "Works Offer" process with Melbourne Water.

I am happy to discuss this with you or Council if there are any queries on this.

Keith

Keith Boniface | Technical Lead, Waterways & Land Service Delivery Group | **Melbourne Water**

T: (03) 9679 7480 | 990 Latrobe Street, Docklands, VIC 3008 | PO Box 4342 Melbourne VIC 3001 | www.melbournewater.com.au

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From: nina.barich@incitus.com.au [<mailto:nina.barich@incitus.com.au>]

Sent: Thursday, 14 December 2017 3:59 PM

To: Keith Boniface

Cc: 'Sasha Jelacic'; Sam Ravida

Subject: Burwood Former Brickworks

Hi Keith,

I've been asked to forward you the MUSIC model for review for the Former Brickworks site in Burwood. Attached is the MUSIC file together with an extract from the stormwater strategy.

Please let me know if there's anything else you need.

Kind regards,

Nina

Nina Barich

Principal Engineer

BE(Civil)(Hons), MIEAust CPEng, MBA (Tech Mgmt)

INCiTUS

P +61 414 404 730

E nina.barich@incitus.com.au

PO Box 7142 Richmond VIC 3121

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ANNEXURE 4f

Melbourne Water Letter of Support for SWQ Offsets in Lieu of Eley Road RB Wetland

2 August 2019

Tim Davis
Fraser's Property Australia
C/O Sam Ravida
Reeds Consulting

Burwood Brick Works Development: Stormwater Quality Proposal

Thank you for working with Melbourne Water to investigate the proposal to design and construct a wetland in the base of the Eley Road Retarding Basin.

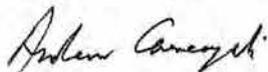
Melbourne Water has reviewed the proposal and has concerns in supporting the proposal into detailed design. This decision is based on the following:

- Constraints of the site (steep batters, existing drainage and sewer infrastructure) would lead to a complicated and high risk design, construction and maintenance regime.
- Council has confirmed that they will not maintain the wetland, therefore the wetland maintenance would rest with Melbourne Water despite the catchment being significantly less than 60ha. This will result in an ongoing maintenance and reinstatement cost burden to Melbourne Water.
- Due to the small catchment and associated small treatment performance, the ongoing commitment to the required funding for maintenance and resetting of this wetland may be comprised in future.
- Potential Stormwater Quality Offset money from the development site will enable the equivalent stormwater quality treatment to be undertaken more strategically to deliver a potentially greater waterway and Port Phillip Bay benefit.

Due to the potential issues with the proposed wetland, Melbourne Water supports the option to pay into the [Stormwater Quality Offsets Program](#) in order to meet the development's stormwater quality requirements.

Please feel free to contact me regarding the above.

Yours sincerely



Andrew Camenzuli
Urban Growth Services
Melbourne Water

ANNEXURE 5a

Technical Information Provided to Council September/October 2014

ANNEXURE 5, PART A - OVERALL RO RB CATCHMENT MODEL - INFORMATION TO COUNCIL SEPTEMBER 2014



Tue 30/09/2014 5:31 PM

Michael McMahon

Brickworks Site Burwood RO RB information Reeds Ref: 22355E

To: Cheryl Rossington (Cheryl.Rossington@whitehorse.vic.gov.au); Jeff Green (Jeff.Green@whitehorse.vic.gov.au)
 Cc: rcalandro@australand.com.au; Sam Ravida; Allison Egan (Allison.Egan@whitehorse.vic.gov.au); Jo Matthews (JMatthews@tract.net.au) (JMatthews@tract.net.au)

This message was sent with High importance.

- Message
- 22355 RO RB H Update 190814.pdf (307 KB)
- 22355 RO RB Output - Australand Included.pdf (667 KB)
- 22355 RO RB Output - Original Catchment.pdf (623 KB)
- 22355_Q&D Part.pdf (169 KB)
- D Mod Eley RB INCL AUSTRALAND SITE Q100.par (16 KB)
- D Mod Eley RB INCL AUSTRALAND SITE.catg (149 KB)
- RE: Burwood RO RB Eley Rd RB and Catchment REEDS REF 22355E (651 KB)
- 22355 RO RB Output - Original Catchment.pdf (623 KB)

Cheryl,

Please find attached the following RO RB data and associated information relating to the proposed retardation with the central area of the proposed development.

- 22355 RO RB H Update 190814.pdf – RO RB Catchment plan Brickyard Site
- 22355 RO RB Output - Australand Included.pdf – General post Development model output (for comparison with 'pre dev' below)
- 22355 RO RB Output - Original Catchment.pdf – General pre development model output
- 22355 Q&D Part.pdf – Plan excerpt showing contours for RB as modelled in RO RB
- D Mod Eley RB INCL AUSTRALAND SITE Q100.par – RO RB Parameter file
- D Mod Eley RB INCL AUSTRALAND SITE.catg – RO RB Catchment file
- RE Burwood RO RB Eley Rd RB and Catchment REEDS REF 22355E.msg – Email from Keith Boniface, Team Leader Investigations, Waterways & Land Service Delivery Group at Melbourne Water. This follows extensive analysis (both by Reeds and MW independently) which led to the updated Melbourne Water RO RB model and Melbourne Water's review and acceptance of the proposal

REFER ANNEXURE 3

If you have any queries regarding this matter please contact myself or Sam Ravida of our office.

Regards,

Michael McMahon
 Design Engineer

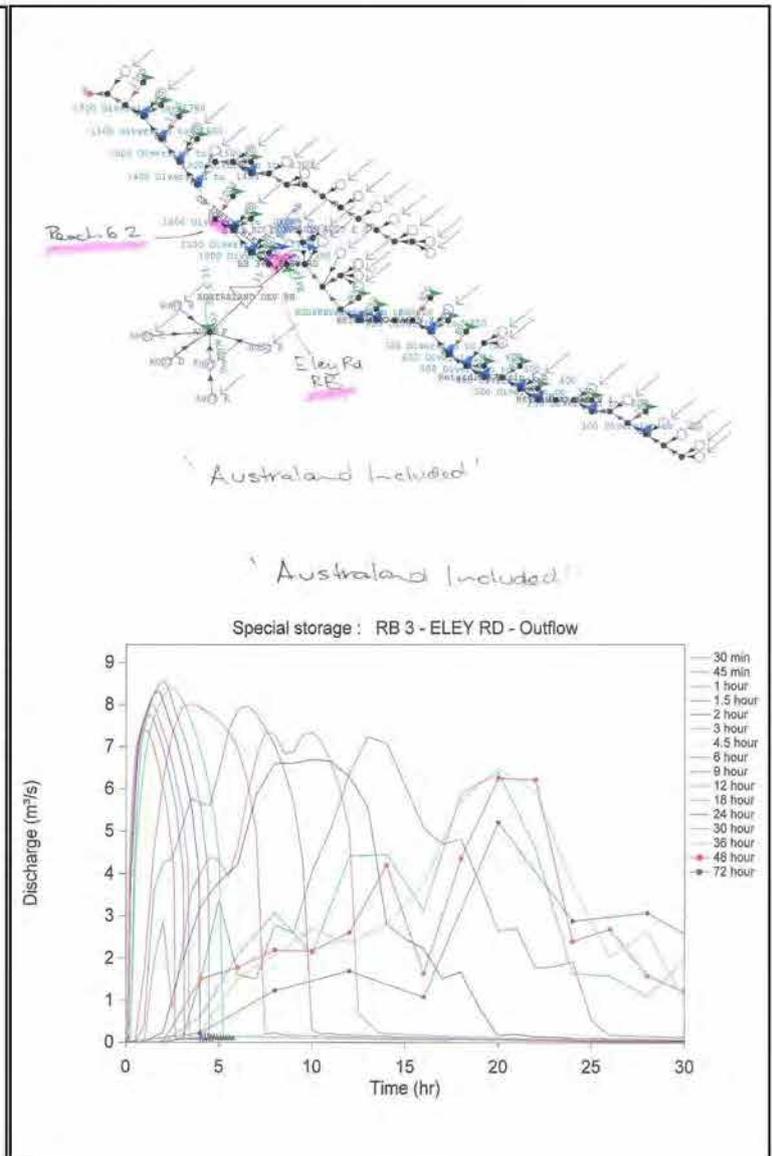
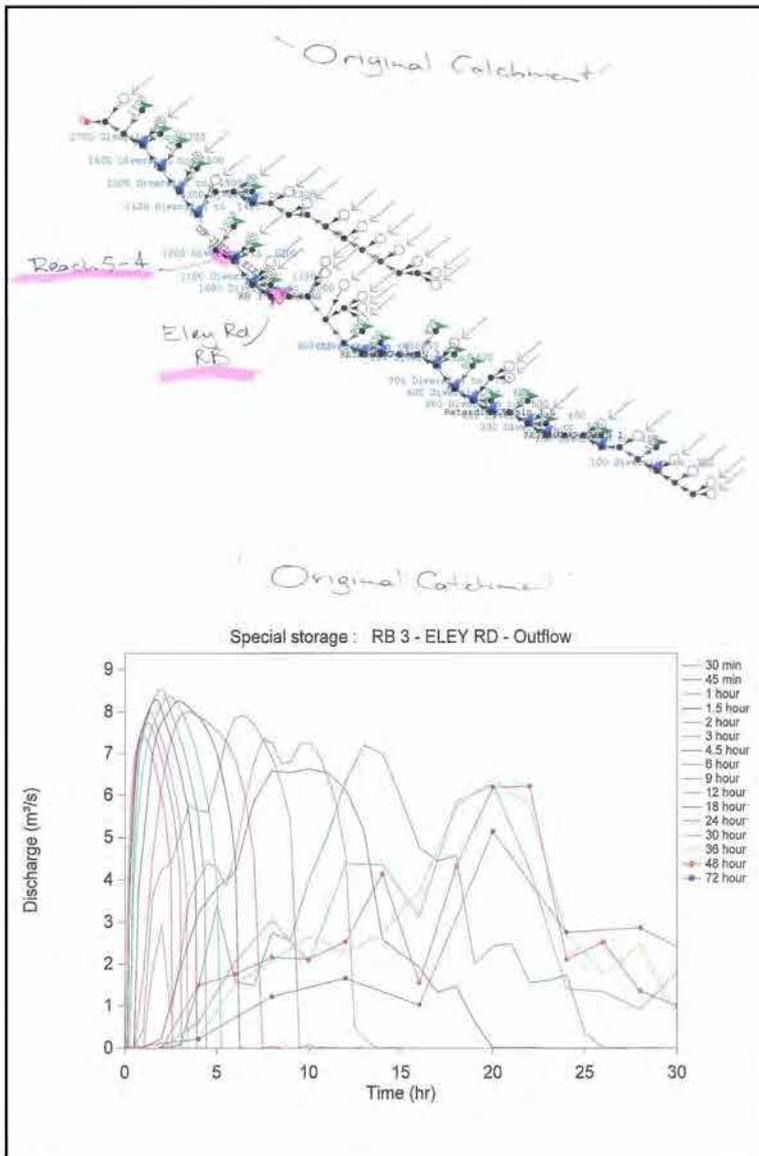
REEDS Level 5, 440 Elizabeth St Melbourne VIC 3000 | GPO Box 2248 Melbourne VIC 3001 | ph: 0460 2009 fax: 0460 2008 | www.reeds.com.au | info@reeds.com.au

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RO RB MODEL - PRE-DEVELOPMENT

RO RB MODEL - POST-DEVELOPMENT





Thu 2/10/2014 10:25 AM

Michael McMahon

Brickworks Site Burwood RO RB information Reeds Ref: 22355E

To: Cheryl Rossington

Cc: Sam Ravida (rcalandro@australand.com.au)

Message D Mod Eley RB INCL AUSTRALAND SITE_12h100y OUTPUT.TXT (88 KB) RO RB Q100 12hr Event H graph and Summary.pdf (470 KB)

Cheryl,

Attached .pdf indicates hydrographs (Q100) for proposed RB, together with excerpt summary of RB characteristics as requested. Also attached is .txt file of the critical event run – Q100 12 hr duration storm.

If you have any queries please call or if suitable you're welcome to come to our office where all files including 3D models are available.

Regards,

Michael McMahon
Design Engineer

REEDS CONSULTING Land Surveyors - Civil Engineers - Development Consultants

Level 6, 440 Elizabeth St Melbourne VIC 3000 GPO Box 2240 Melbourne VIC 3001 ph: 0440 3000 fax: 0440 3030 www.reedsconsult.com.au enquiries@reedsconsult.com.au

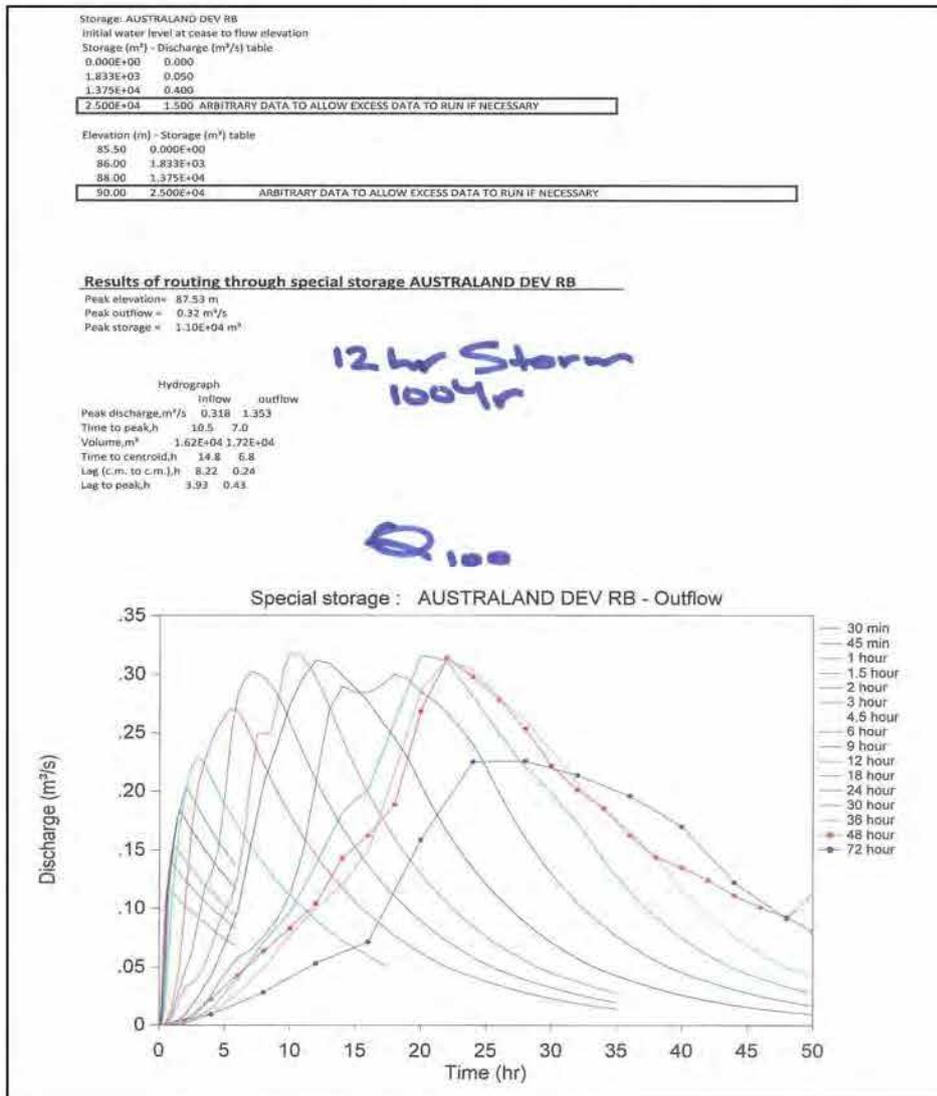
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From: Cheryl Rossington [<mailto:Cheryl.Rossington@whitehorse.vic.gov.au>]
Sent: Thursday, 2 October 2014 8:21 AM
To: Michael McMahon
Subject: RE: Brickworks Site Burwood RO RB information Reeds Ref: 22355E

Hi Michael
Do you have the hydrograph and storage verses elevation graphs for the proposed wetland/basin in the Australand site? 1% AEP would be good.
Regards
Cheryl

From: Michael McMahon [<mailto:michael.mcmahon@reedsconsulting.com.au>]
Sent: Tuesday, 30 September 2014 5:31 PM
To: Cheryl Rossington; Jeff Green
Cc: rcalandro@australand.com.au; Sam Ravida; Allison Egan; Jo Matthews (JMatthews@tract.net.au) (JMatthews@tract.net.au)

RO RB MODEL OUTPUT - 100yr OUTFLOW FROM PROPOSED RETARDING BASIN - 300 l/s



ANNEXURE 5b

Council Endorsement of Incitus SWMS Report (drainage related)

Sasha Jelicic

From: Sam Ravida
Sent: Thursday, 12 October 2017 11:51 AM
To: Theo Della Bosca (Theo.DellaBosca@frasersproperty.com.au)
Cc: Tim Davis (Tim.Davis@frasersproperty.com.au); Sasha Jelicic
Subject: FW: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Theo

Please refer email below from Cheryl Rossington from Whitehorse Council to Nina Barich which confirms that they are happy with the revised stormwater strategy report (revision 4) but the water quality part is still with their planning dept.

Any queries please call or email.

Regards

Sam Ravida | Joint Managing Director
T: 0386603000 | M: 0438625201



Level 6, 440 Elizabeth St, Melbourne

This email is subject to conditions. [Click here](#) for details.

From: Cheryl Rossington [<mailto:Cheryl.Rossington@whitehorse.vic.gov.au>]
Sent: 12 October 2017 10:56
To: 'nina.barich@incitus.com.au' <nina.barich@incitus.com.au>
Cc: Mirjam Fabijanac <Mirjam.Fabijanac@whitehorse.vic.gov.au>
Subject: RE: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Nina

We are happy with the stormwater section of the report (Stormwater Strategy – Revision 4), however the Water Quality part of the document is still with Planning.

Regards

Cheryl

From: nina.barich@incitus.com.au [<mailto:nina.barich@incitus.com.au>]
Sent: Thursday, 12 October 2017 10:44 AM
To: Cheryl Rossington
Cc: Mirjam Fabijanac
Subject: FW: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Cheryl,

I just left a phone message for you. I was hoping that you may have a response to the email below sent 3 weeks ago? Reeds have informed me that they have a meeting regarding this project next week with Council but are hoping that the stormwater strategy is sorted before then.

Kind regards,

Nina

Nina Barich

Principal Engineer

BE(Civil)(Hons), MIEAust CPEng, MBA (Tech Mgmt)

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P +61 414 404 730

E nina.barich@incitus.com.au

PO Box 7142 Richmond VIC 3121

From: nina.barich@incitus.com.au [<mailto:nina.barich@incitus.com.au>]

Sent: 22 September 2017 12:00

To: Cheryl Rossington <Cheryl.Rossington@whitehorse.vic.gov.au>

Cc: Mirjam Fabijanic <Mirjam.Fabijanic@whitehorse.vic.gov.au>

Subject: RE: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Cheryl,

Thanks for your response. I have updated the strategy to reflect your comments. It has been with Reeds for their review and they accept the modifications to the stormwater strategy. The updated strategy is attached.

The strategy does not include a statement that it matches the Engineering Servicing Report as I have been informed that the Engineering Servicing Report will be updated to match the stormwater strategy once the strategy is accepted by Council. A strategy should precede a servicing report and I believe the project team is trying to minimise the amount of rework.

Base on this, we look forward to your acceptance of the strategy at your earliest convenience so we may continue to progress this project.

Please contact me if you have any queries.

Kind regards,

Nina

From: [Cheryl Rossington](mailto:Cheryl.Rossington@whitehorse.vic.gov.au)

Sent: Tuesday, 5 September 2017 10:17 AM

To: nina.barich@incitus.com.au

Cc: [Mirjam Fabijanic](mailto:Mirjam.Fabijanic@whitehorse.vic.gov.au)

Subject: FW: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Nina

Please find attached comments in red. Once these have been completed we can endorse the strategy.

Regards

Cheryl

From: nina.barich@incitus.com.au [<mailto:nina.barich@incitus.com.au>]
Sent: Thursday, 20 July 2017 3:31 PM
To: Cheryl Rossington
Cc: Mirjam Fabijanic; 'Sasha Jelacic'
Subject: RE: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Cheryl,

Thank you for your comments. I have updated the strategy to reflect the comments below. I have had to alter the wording as this is a strategy that sets the intent for the management of stormwater, therefore I can only state that the development is required to provide supporting data or give consideration to these things, not that it has done so already. Council needs to ensure the relevant requirements are met through the detailed design phase.

We seek Council's earliest review and approval of the revised report and I would be happy to meet with you to discuss any remaining queries that you have.

Kind regards,

Nina

Nina Barich
Principal Engineer
BE(Civil)(Hons), MIEAust CPEng, MBA (Tech Mgmt)

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PO Box 7142 Richmond VIC 3121

From: Cheryl Rossington [<mailto:Cheryl.Rossington@whitehorse.vic.gov.au>]
Sent: 18 July 2017 15:01
To: 'nina.barich@incitus.com.au' <nina.barich@incitus.com.au>
Cc: Mirjam Fabijanic <Mirjam.Fabijanic@whitehorse.vic.gov.au>
Subject: 78 Middleborough Road - Burwood - Revision 2 - 4 July 2017

Hi Nina,

We have reviewed the Stormwater Strategy for 78 Middleborough Road and would like to advise the following:

1. Confirmation is required how is the change of the overland flow path for the Age Care site going to be reflected in this Stormwater Strategy (4 July 2017 – Version 2, and also how is that going to be represented in the Engineering Services and Stormwater Management Report (Development Plan – May 2017 – Issue 11). As advised previously, Frasers is requiring the approval of the Development Plan which is not reflecting this change.

The Reeds Engineering Services and Stormwater Management Report and the Incitus Stormwater Strategy Report provide details of the catchment assessment and the relevant design flows (both piped and overland) within and adjacent to the proposed Aged Care site, as part of the wider drainage strategy for the Former Brickworks development. The fact that there is an overland flow that traverses the site between the southern boundary and the northern boundary of the site is clearly documented in the plans forming the reports. The Development Plan from Frasers stands as it is and the reports are appropriate for the Frasers

Development Plan; Council's planning and engineering assessments should at this time be based on the Development Plan submitted. The Ryman proposal has no status at this point in time and must itself go through a planning process to alter the Frasers Development Plan and obtain a planning permit – not the other way around.

The drainage strategy information has been formally provided to the new owner of the site – Ryman and their consultants, and as the owners of the site Ryman are in charge of their proposed development layout and how they will deal with the piped and overland flows within the framework of their future development. The Ryman proposal will obviously be subject to Council planning and engineering review and requirements, including that they will have to demonstrate how they will deal with the overall drainage parameters which have been set. **Ok. Planner to advise.**

2. STATEMENTS TO BE INCORPORATED IN STORMWATER STRATEGY:

- All overland flow calculations have incorporated the criteria for blockage of pits as stated in Australian Rainfall and Runoff. The strategy states the minor system will be designed accounting for the blockages. We don't want the design to be based on a 10% AEP subsurface system that cannot take the 10% AEP design storm because of blockages. That would result in nuisance flooding. The overland flows are what cannot get into the drainage system. I will include a statement, but worded differently. Refer to page 6 in the report. **OK**
 - Consideration has been given to continuity of all overland flow paths for flows up to and including the 1% AEP. Obstructions such as fences, landscaping and buildings must not impede upstream surface flows. A similar statement has been include on page 6. **Page 6, Paragraph 3, Must Read. The development must avoid the obstruction of the flowpath etc.**
 - Suitable escape routes are provided for all flows up to and including the 1% AEP. A similar statement has been include on page 6. **OK**
 - All overland flow paths adhere to the Velocity X Depth criteria set by Melbourne Water. The flow paths should be designed to comply with safety criteria. This is stated in the report on page 14. **OK**
 - The development does not detrimentally increase the potential for flood affectation on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain. A similar statement has been include on page 6. **OK**
 - Fencing will be constructed in a manner which does not affect the flow of floods so as to detrimentally increase flood affectation on surrounding land. A statement regarding fencing has been included with respect to creating an obstruction. **OK**
 - Fencing will be certified by a qualified engineer that the proposed fencing is adequately constructed so as to withstand the forces of floodwaters, or collapse in a controlled manner to prevent the impediment to flood waters. The strategy includes a statement regarding fencing as an obstruction, the construction of the fencing is a building issue, not a strategy issue. **Please include this statement in the Engineering Services and Stormwater Management Report**
 - All proposed habitable floor levels within the subdivisions must adhere to Building Regulation 802. The strategy includes an intent statement regarding minimum freeboard requirements to floor levels. **OK**
3. This modelling has been based on the indicative plans, therefore this needs to be mentioned in the conclusion of the Stormwater Strategy. By accepting the Strategy, Council does not approve any plans that are included in the strategy, and may provide further comments and requirements once full civil design plans are submitted. A statement has been included in the conclusion. **OK**
4. We still have concerns about the open spaces in general, especially in view of the overland flow paths. Detailed modelling can be provided as detailed designs are undertaken. **Noted**
5. The pathway surrounding the on-site detention basin does not comply with V X D criteria. The path within the on-site retarding basin (note that the flows are not being retained, merely held back with a controlled discharge) does not convey flows and therefore the criteria is not applicable. The velocities over these paths would be negligible as the flows are backwatering over the paths. The criteria is set based on conveyance along or across, not backwatering effects. **Please include in the report that appropriate flood warning signs and measures will be required for floodplain safety in further design development.**
6. We can't comment on Water Quality Section, we will refer this to Planning Department. We trust that the Planning Department will accept the stormwater quality treatment proposed for this site as it complies with

the relevant Victorian Planning Provisions and has been accepted by Melbourne Water. **Ok Planner to advise.**

Another major issue is that Reeds needs to clarify with Frasers about referencing this Stormwater Strategy (once it is approved) in the Engineering Services and Stormwater Management Plan (as per Development Plan), and all of the assumptions/ statements/ maps/ figures from this Stormwater Strategy must correspond. **. How will this be achieved? Both the Stormwater Strategy and the Stormwater Management Plan must correspond. This will mean examining both documents to ensure that they correspond. A statement stating that they have been examined and correspond must be shown in both the Strategy and the Plan.**

The latest version of the Engineering Services and Stormwater Management Plan does not relate to the latest version of the Stormwater Strategy. We also want the following statement to be included both in the Engineering Services and Stormwater Management Plan and Stormwater Strategy:

Council requires for any future subdivisions and development applications to include the modelling for the entire site, including the upstream catchments, to show the implications of any changes in the overland flow paths due to obstructions.

This is a Council requirement not a statement for the stormwater strategy. The development should demonstrate any changes in the overland flow paths as they arise on a stage or sub-catchment basis, and the impacts, but to request modelling for the entire site when the design is done in stages is unreasonable as previously discussed. It is not viable to undertake a detailed design upfront. **Noted. This will be required for future subdivisions and is to be undertaken by the developers of these subdivision. We will also recommend for this requirement to be put in as a condition for any future development applications.**

Regards

Cheryl

From: nina.barich@incitus.com.au [<mailto:nina.barich@incitus.com.au>]
Sent: Wednesday, 5 July 2017 10:26 AM
To: Mirjam Fabijanic; Cheryl Rossington
Cc: 'Sasha Jelcic'
Subject: HPRM: Former Brickworks Site Burwood

Good morning Mirjam and Cheryl,

Attached is the updated stormwater strategy incorporating the modifications we discussed in last Thursday's meeting and from the RFI. I have also attached the mock HEC-RAS models for your information, in case you'd like to have a play around with them yourself. And I have attached the A3's a separate documents as well as in the report. Sorry for the file sizes.

Please let me know if you have any additional queries. As you can appreciate, this is delaying progress on the development so attention to this at your earliest possible convenience would be much appreciated.

Kind regards,

Nina

Nina Barich
Principal Engineer
BE(Civil)(Hons), MIEAust CPEng, MBA (Tech Mgmt)

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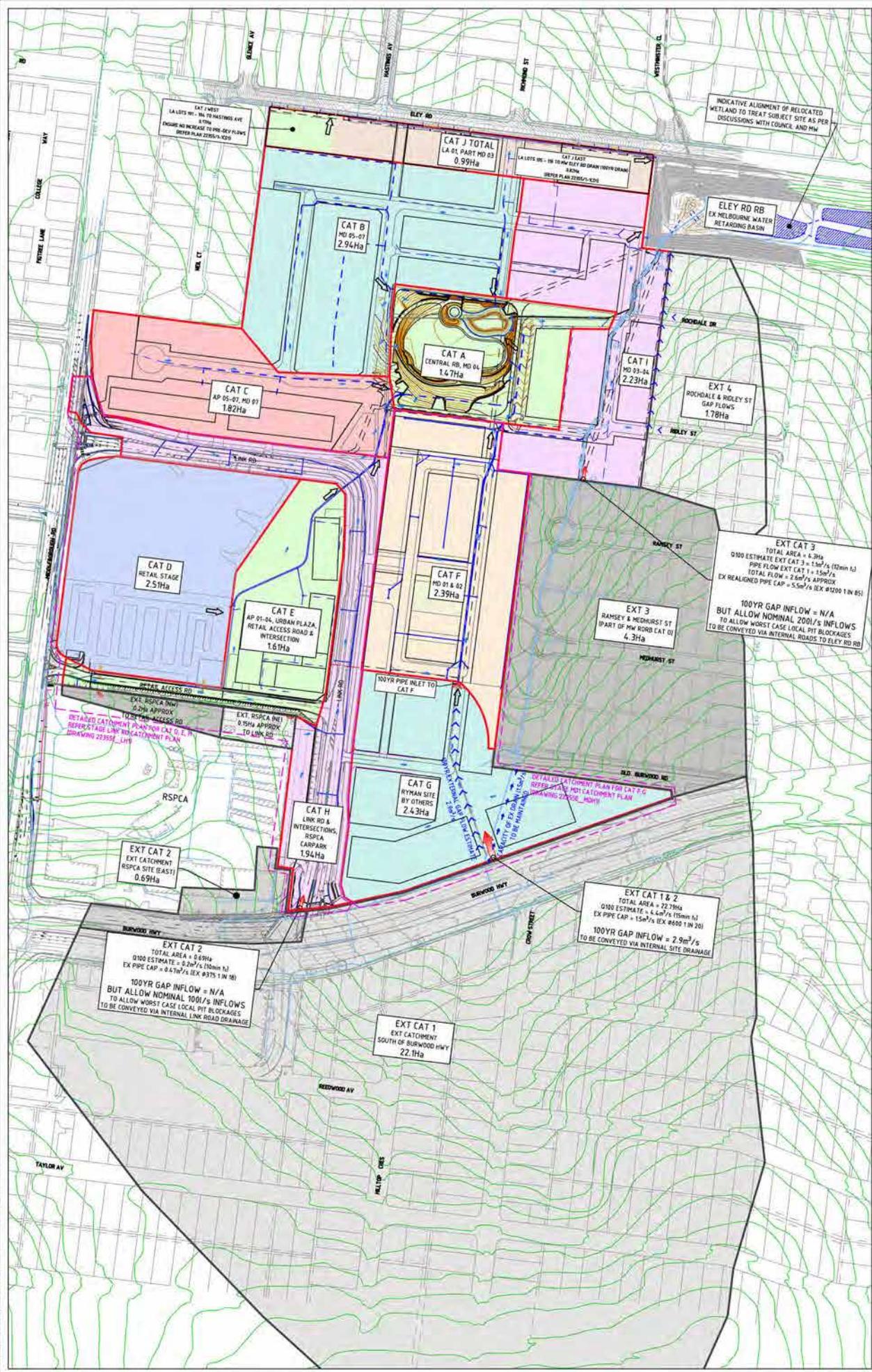
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ANNEXURE 6a

Functional Design Plan - Central Park Retarding Basin Design Plan

ANNEXURE 6b

Functional Design Plan - Overall Site Drainage and Catchment Plan



N

LEGEND

- INTERNAL SUB-CATCHMENT BOUNDARY
- EXTERNAL SUB-CATCHMENT BOUNDARY
- PRELIMINARY ALIGNMENT OF INTERNAL 10YR DRAINAGE
- PRELIMINARY ALIGNMENT OF INTERNAL 10YR DRAINAGE (BY OTHERS TBC)
- CONCEPT ALIGNMENT OF INTERNAL 10YR DRAINAGE
- INDICATIVE INTERNAL OVERLAND FLOW PATH
- ⇨ INTERNAL SUB-CATCHMENT POINT OF DISCHARGE
- >>> EXTERNAL CATCHMENT GAP OVERLAND INFLOW POINT TO BE MANAGED VIA INTERNAL SITE DRAINAGE
- EXISTING COUNCIL DRAINAGE
- PRELIMINARY DESIGN CONTOUR (1m)
- SURVEY CONTOUR BURWOOD HWY (1m)
- EXTERNAL VICMAP CONTOUR (1m)

PRELIMINARY CONCEPT PLAN ONLY
FOR INTERNAL DISCUSSION ONLY

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

PRELIMINARY PLAN ONLY
NOT APPROVED FOR CONSTRUCTION

0 15 30 60
Scale 1:1500 @ A1

THIS DRAWING IS NOT TO BE COPIED OR SCALED

VERSION	REMARKS	DATE	AND	AUTHORISED BY	DRAWN BY	CHECKED BY	DESIGNED BY
F	DEVELOPMENT PLAN UPDATED	16.12.17	SJ				
E	MINOR AMENDMENTS FOR CLARITY	10.04.17	SJ				
D	CAT G AMENDED AS PER STAGE 1 (LAND LOTS) PLANS	16.02.17	SJ				
C	DETAILS ADDED, CAT A, E CONCEPT DRAINAGE AMENDED	10.02.17	SJ				
B	ADJUSTED CATCHMENTS BOUNDARIES (B, D, E, H, J)	16.01.17	SJ				

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LAND SURVEYING
CIVIL ENGINEERING
PLANNING
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CITY OF WHITEHORSE
PROSPECT PARK
STAGE CENTRAL PARK RB
CENTRAL RB - OVERALL SITE DRAINAGE
CATCHMENT PLAN AND MAIN DRAINAGE LINES

DRAWING No.	VERSION
H1	F
REFERENCE	22355E/C RB
SHEET	1 OF X