MONTEFIORE AGED CARE FACILITY

SIR MOSES MONTEFIORE JEWISH HOME

100-120 KING STREET, RANDWICK

PART 3A CONCEPT PLAN

STORMWATER DRAINAGE CONCEPT PLAN

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1. INTRODUCTION

This development is for staged extensions to the Sir Joseph Montefiore Jewish Home Aged Care facility (Montefiore) in the Sydney suburb of Randwick. The site is situated at the corner of King and Dangar Streets, Randwick, and covers an area of 2.93 Ha. Montefiore was constructed on land previously used as a transport depot and the initial stages were substantially completed in late 2006.

The initial development comprised construction of about 50% of the total site area and Emerson Associates Pty. Ltd., the writers of this report, designed the detention system and Council diversion pipeline for that original development

The topography of the original transport depot formed a natural drainage path between Govett Lane to the north and King Street to the south and carried a drainage pipe in a Council Easement discharging though the site and through downstream properties to the west.

The immediate downstream property constructed at about the same time as the Montefiore development does not contain an overland flow path and so this site cannot allow for overland flow discharge.

As part of the initial construction, extensive stormwater drainage modeling was carried out on the site and in surrounding streets covering a total catchment area of about 38 Ha. A drainage system, including a Council diversion pipeline through the site, was then designed to meet specific Council requirements including:

- Site discharge limited by detention to the equivalent flow produced by a 1 hour 5 year ARI storm for the undeveloped site assessed at 323 l/sec,
- Combined flow from the site discharge and Council pipeline discharge limited to capacity of downstream pipework assessed at 1030 l/sec,
- Total detention storage to be increased by 50% to allow for the lack of an overland flow path through the downstream property, and
- Council pipeline to be oversized so that flow through the site is capable of being increased in the future if and when downstream pipework in upgraded.

Whilst external roads are subject to overland flow and low points in Dangar Street and Govett Lane are subject to ponding in major storm events, the site itself is not part of an overland flow route and is not subject to external flood threat. Internal overland runoff not within the pipe system travels via the internal road network to the open detention basin at the low part of the site.

2. ORIGINAL DEVELOPMENT

The Council diversion pipeline through the site was installed to run from King Street on the south of the site in a drainage easement along the south and west boundaries, stepping around the existing childcare facility in the south west corner of the site, and to discharge at a point along the western boundary to pipework installed in the adjoining development.

The pipe sizing of the Council pipeline is designed for a flow suitable for its catchment which is greater than the flow limit downstream. Flow is restricted to the downstream pipework by an orifice plate fixed to the outlet of a pit adjacent to King Street with an overflow to pipework in King Street.

The orifice plate can be removed to allow a future increase in flow within the pipeline, and hence reduced overland flow in King Street, subject to future downstream upgrading of the Council pipeline through the bus depot and other downstream properties.

A section of this pipeline downstream of the orifice plate and overflow pit stepping around the existing child-care facility was installed as a temporary pipe within a temporary easement pending redevelopment of the child-care facility, at which time it was proposed to install the final pipe route along the south and west boundaries.

The internal drainage design for the original Montefiore development required strict flow limits as the discharge was into the Council pipeline and the resultant peak flow, when combined with the flow downstream of the orifice plate in the Council diversion pipeline, had to conform to the flow limit placed on the downstream Council pipework.

The flow limit for the downstream pipework was set at 1030 l/sec and the Montefiore site discharge limit was set at 323 l/sec. The flow in the Council pipeline downstream of the orifice plate was set to allow this limit to be achieved with excess flow discharging to King Street.

The Montefiore site has no overland flow path from the lowest portion of the site and Council required 50% additional detention capacity to allow the on-site storage of stormwater in the event of an exceedence of the 100 year ARI design criteria or a blockage or failure in the downstream pipework.

Total detention provided in the original construction was around 1590 cu.m. of primary storage for the 100 year ARI storm event and a further informal 795 cu.m. of storage as air space above the open detention area (R1) near the outlet to allow for the 50% additional detention required in the approval.

All discharge from the site is by gravity to the Council pipeline at the point where it left the site.

3. PROPOSED WORKS

The works proposed under the Part 3A Concept Plan include alterations to existing building 'C', and the new construction of buildings 'D', 'E' and 'F' along the southern half of the site. These buildings will be constructed in 3 stages and so a phased drainage upgrade has been produced to allow for the construction of the buildings in sequence.

The proposed phased drainage works will allow for the following construction works:

- Phase 1 will allow for the construction of Building 'D' and a temporary external car park to the west of building 'C'.
- Phase 2 will allow for alterations to Building 'C' including removal of the existing detention basin 'M-1', the construction of building 'E' and the relocation of the entry road from King Street.
- Phase 3 will allow for the construction of Building 'F' and the removal of the existing detention basin 'M-2'.

The construction in sequence of the proposed buildings will require:

- Phase 1 - no changes to the drainage system;
- Phase 2 - the removal of the detention tank 'M-1' and construction of a new detention tank in the undercroft of building 'E';
- Phase 3 -
    i. the removal of the pipe detention tank 'M-2' near the western boundary and construction of a new structural detention tank under the floor of Building 'F',
    ii. adjustments to the orifice at the main outlet at 'P-4', and
    iii. relocation of the Council diversion pipeline to the southern and Western boundaries after demolition of the existing child care facility.

The detention system will at all times maintain the existing approval conditions. All discharge from the proposed detention system will be by gravity flow.

The relocation to the final easement of the Council pipeline through the site will be carried out in Phase 3 when the existing childcare facility is removed. The orifice plate reducing downstream flow to suit the 1030 l/sec flow limit will be relocated over the new outlet pipe and the new pipework will be installed to the final size of 1200 mm dia. to allow for future removal of the flow restriction by Council if and when required.

PHASE 1 WORKS

This phase allows for the construction of building 'D' and the new temporary external car park to the west of building 'C', and requires no changes to the existing stormwater detention works. The new external car park provided as part of Stage 1 building works does not have a significant influence on the stormwater system. Roofwater from the new building will be taken to the existing detention tank M-1 which already allows for impervious surfaces on this catchment.

PHASE 2 WORKS

This phase allows for the alteration of Building 'C' and the construction of the new building 'E' and includes the removal of the existing detention tank 'M-1' and construction of a new detention tank (called 'M-1A') located under the car park floor of building 'E'. In addition, a new recycle water tank will be provided adjacent to the new detention tank.

All Roofwater from buildings 'C', 'D', 'E' will be directed to the recycle tank which will overflow to the adjacent detention tank when full. The stored water will be used for toilet flush, irrigation, car wash and/or other non-potable uses.

Ground level surface runoff from this catchment will be taken directly to the detention tank as it is unsuitable for recycling. Discharge from this detention tank will taken to the existing detention tank ('M-2') on the western boundary via new pipework in the relocated entry road from King Street.

PHASE 3 WORKS

This phase allows for the demolition of the Childcare facility and construction of building 'F' and includes the removal of the existing pipe detention storage tank, 'M-2', and the construction of a new detention tank under the floor of Building 'F'(called 'M-2A').

The detention facility proposed includes the installation of a structural storage tank under the car park floor of proposed building 'F' with access from the car park. The proposed tank will have a depressed open base to allow soakage into the sand below the outlet level and in order to increase headroom for man access for maintenance. This will also allow a horizontal bottom water level to increase usable storage volume. The stored water below the outlet level will soak away into the sand after the storm is finished and is not relied upon in the detention calculations.

The discharge from this detention system will discharge via existing pipework parallel with the Council pipeline easement along the western boundary to the site outlet control pit 'P- 4'.

Because the new 'M-2A' detention tank is directly connected to the outlet control pit 'P-4' and the invert level of this new detention tank will be similar to that in the outlet control pit 'P-4", this tank and the detention facility at 'P-4' will act together hydraulically during the detention process.

'P-4' is a high early discharge (HED) detention facility and, because of the interconnected detention systems, special modeling procedures are required to correctly simulate the detention process. To this end, specially modified in-house software has been used to determine top water levels and flow rates during operation.

Open detention basin 'R-1' is also affected by the construction of building 'F' and must be reduced in size by about 10% to accommodate the building footprint. This reduced size basin is labeled 'R-1A' and is taken into account in the determination of water levels and flow rates in this phase of the works.

The Council pipeline will also be relocated to its final location and size in this phase of the works. The orifice plate will be relocated over the new outlet and the existing disused bypass pipeline will be discarded.

4. DESIGN CRITERIA

The following design criteria were used for the analysis of the proposed new works:

- Plan area of new detention tank 'M-1A' in stage 2 assumed to be 200 sq.m.
- Outlet control orifice diameter for tank 'M-1A' assumed to be 180 mm and the centre of the orifice to be at RL 38.00 AHD.
- Plan area of new detention tank 'M-2A' in stage 3 assumed to be 817 sq.m. with an invert at RL 37.00 AHD.
- Detention tank 'M-2A' in stage 3 assumed to be controlled by Outlet Control Pit 'P-4'.
- Outlet Control Pit 'P-4' to be re-calculated in stage 3 to limit discharge to 323 l/sec for the 100 year ARI storm event based on final catchment areas and basin volumes, and a taking account of the existing pit and orifice dimensions.

5. ANALYSIS RESULTS

Because there is no overland flow path from the site, the proposed detention system for the Part 3A Concept Plan was designed for the 100 year ARI rainfall event and checked using the PMP (Probable Maximum Precipitation) rainfall event. In addition, 50% reserve volume is allowed in the open detention basin ('R-1' for stages 1 and 2, and 'R-1A' in stage 3) over the

volume required for the 100 year ARI design to cater for partial blockages in the system or limited exceedence of the 100 year ARI rainfall rate.

Naturally, during the PMP event, pipework designed for the 20 year ARI or 100 year ARI rainfall events and detention basins designed for the 100 year ARI rainfall event will overflow to the low point on the site where they are contained in the open detention basin ('R-1' in stages 1 and 2, and 'R-1A' in stage 3).

The following table shows the peak water levels in the open detention basin during these events.

	Basin R-1 or R-1A Peak Water Level (m AHD)			
Storm Event	**Existing**	**Stage 1**	**Stage 2**	**Stage 3**
100 year ARI	37.17	37.19	37.18	37.18
+ 50% volume	37.59	37.61	37.71	37.73
PMP	38.06	38.17	38.06	38.10

Note that the lowest habitable floor levels in the development are at RL 41.30 AHD whilst the lowest car parking level is at RL 38.00 AHD in the proposed building 'F'. The sunken loading dock road level in the existing building is at RL 37.27 AHD with the dock floor level at RL 38.30 AHD. Lift foyer levels in level 1 of the existing building are also at RL 38.30 AHD and hence clear of all calculated peak water levels.

The plant room level in Buildings 'E' and 'F' are both RL 38.00 AHD and both buildings have lift foyers at this level. These would be at risk during a PMP rainfall event but safe at the 100 year ARI event and with the 50% volume allowance.

The existing landscape level along the western boundary against the adjoining downstream property is approximately RL 38.00 AHD which protects the property from flooding at the 100 year ARI event and with the 50% volume allowance. An existing masonry boundary wall above this level would also prevent damage during the highly unlikely PMP rainfall event.

6. CONCLUSION

This stormwater concept plan conforms to Randwick City Council's Private Stormwater Code (1992) and to conditions imposed for the original development in 2005 and 2006.

The proposed design arrangements and analysis show that the existing discharge restrictions and 100 year ARI plus 50% additional storage requirements can be accommodated during the staged construction for the proposed Part 3A Concept Plan Building works at the site.

The performance of the proposed system during the extreme PMP rainfall event was checked and found to be satisfactory with possible minor floor level over-topping in plant

rooms and a car park deck in buildings 'E' and 'F' in stages 2 and 3. As this is not a design criteria and the site does not have an overland flow path, it is a remarkably good result.

Replacing the existing basins 'M-1' and 'M-2' with new basins and re-contouring of the landscape for basin 'R-1' can be carried out to future designs in building stages 2 and 3 respectively to suit the building works, landscape objectives and detention requirements whilst achieving the required discharge limits and storage volumes.

Roofwater recycling will be implemented with a rainwater storage tank beneath building 'E' and will be for non-potable uses such as toilet flush and irrigation. This will supplement existing stormwater recycle storage located near the northern boundary of the site which would be suitable for irrigation with adequate filtration.

The Council pipeline will also be completed to its final locations and diameter as part of the proposed stage 3 works.