Addendum to J. Wyndham Prince - Basin 6, Hoxton Park Basin Performance & Channel Options Report (6th May 2010)

Prepared on behalf of Mirvac Projects Pty. Limited

October 2010

ADW JOHNSON PTY LIMITED
SURVEYING ENGINEERING AND TOWN PLANNING CONSULTANTS
ABN 62 129 445 398

central coast
2 bounty close, tuggerah nsw 2259
po box 3717, tuggerah nsw 2259
ph. 02 4305 4300
fax. 02 4305 4399
video. 02 43054374
email. coast@adwjohnson.com.au

hunter region
7/335 hillsborough road, warners bay nsw 2282
ph. 02 4978 5100
fax. 02 4978 5199
video. 02 4954 3948
email. hunter@adwjohnson.com.au

www.adwjohnson.com.au

Document Control Sheet

Issue No.	Amendment	Date	Prepared by	Checked by
1	Draft	12.10.10	HW	PJ
2	RTA comments addressed	25.10.10	HW	HW
3	Part 3A	26.10.10	HW	HW
4	Issue	29.10.10	HW	PJ

Table of Contents

Appendices

1. INTRODUCTION

J Wyndham Prince (JWP) were engaged by HPAL Freehold Pty Limited to prepare a concept design submission and negotiate in principle approval for the Basin 6 through Liverpool City Council (LCC). Basin 6 is required under the Cabramatta Creek Basin Strategy developed in the late 1980's and subsequently updated in line with the development of the M7 Orbital and the impacts on the proposed Basin 6 arrangement.

ADW Johnson (ADWJ) understands that the design report prepared by JWP dated 6th May 2010 – Revision E was accepted in principle by Council.

ADWJ was then engaged by Mirvac to review the basin design with the aim of rationalising and making the design more efficient. Following a revised design process that involved consultation with Council, the RTA and M7, a new concept was established. ADWJ have been subsequently engaged by Mirvac to investigate the impacts of this new concept on the hydraulic performance of Basin 6.

2. BACKGROUND

As part of the design development of Basin 6, Council required that the proposed road 2 as part of the Big W and DSE warehouse development approved under Part 3A connect under the M7 orbital with the subdivision roads within Middleton Grange. Due to the bridge beam soffit heights, the road requires cut beneath the bridge to give the required 4.0m minimum headroom. To ensure flood free status of the proposed roadway in the design 1:100 year ARI, a floodwall was proposed between the road and floodway consisting of a concrete wall.

The basin as proposed by JWP has significant retaining structures associated with accommodating the basin, roadworks and future development precincts of commercial and residential land. For the sake of completeness, the JWP report is presented at Appendix A.

The base computer model files built for the JWP investigation were obtained to use as a base for the revised basin configuration. These files were

- 8240 RA 1.xp – XP-RAFTS hydrologic model of Hinchinbrook Creek catchment
- 8240HR4.prj, 8240HR4.f01, 8240HR4.g02, 8240HR4.p01, 8240HR4.prj – HEC RAS model files for the proposed channel under the M7.

The proposed configuration of the basin and roadway were investigated to refine the JWP design to optimise the utility of the basin and minimise retaining structures from both a capital cost perspective and from ongoing operation and maintenance perspective.

3. METHODOLOGY

The detailed arrangement of the proposed basin was refined and the surrounding area reconfigured. The current proposal is presented in the drawings at Appendix C. This proposal provides the following advantages over the previous concept;

- A basin with internal dimensions suitable to accommodate active sports activities, by others.
- The deletion of all retaining walls thereby reducing long term maintenance and safety issues.
- A road design that accommodates services in a more efficient manner which limits the amount of earthworks required under the M7 corridor
- A road design that accommodates the existing infrastructure.
- A design that negates any affect on adjoining properties e.g. stormwater and retaining walls
- Integration of the M7 spill containment basin into the proposed overall stormwater network
- Drainage facilities to accommodate the trapped low point beneath the M7 overpass
- A design totally integrated with adjoining land development proposals

To assess any impacts that the change in configuration may have on the hydraulic performance of the area, the previous models prepared by JWP were amended to reflect the change in configuration of the basin, outlet structure, road crossing and flood wall beneath the M7.

The revised stage storage and outlet configurations were input into the RAFTS model to determine the impacts on the peak outflow, peak stage and peak volume used in the basin and to confirm that sufficient freeboard is still available to the developable portions of the site. The top water was then used as the downstream boundary condition in the HEC RAS model to determine any impacts on the flooding depths and velocities in the channel under the M7 and any impacts of flooding levels back up toward Middleton Grange residential development.

The new location of the flood wall and road were amended in the model as obstructions to model both the impact on flooding level and to confirm the required elevation of the top of the wall to protect the roadway.

4. MODELLING RESULTS

4.1 Basin performance - RAFTS

The RAFTS model was re run to determine the peak discharge, stage and volume under the new basin scenario. The results along with a comparison with the previous JWP results are presented in Tables 1 and 2 for the critical 1:20 year ARI and 1:100 year ARI modelled events.

Table 1 - Performance comparison 1:20year ARI

Parameter	JWP Result	ADWJ Result	Difference	Percentage difference
Peak Outflow (m^3/s)	3.32	3.32	0	0.00%
Peak Basin Stage (RLm)	44.42	44.42	0	0.00%
Peak Basin Volume (m^3)	93,396	93,955	+559	0.59%

Table 2 - Performance comparison 1:100year ARI

Parameter	JWP Result	ADWJ Result	Difference	Percentage difference
Peak Outflow (m^3/s)	3.99	4	0.01	0.25%
Peak Basin Stage (RLm)	45.34	45.35	0.01	0.02%
Peak Basin Volume (m^3)	136,330	136,827	+497	0.36%

The RAFTS model was also rerun for the PMF discharge determined by JWP of 168m^3/s. Under this approach flow, the modelled peak basin storage was RL46.59. We note that this is different to the quoted JWP PMF flood elevation of 46.31. It is not clear how the JWP flood elevation was arrived at.

4.2 Floodway performance - HEC RAS

The HEC RAS model was re run with the new starting basin TWL from the RAFTS analyses and the new configuration of the floodwall to determine the design flood levels under the new basin scenario. The results along with a comparison with the previous JWP results are presented in Table 3 for the critical 1:100 year ARI modelled event.

Table 3 – 1:100 year ARI HEC RAS Modelling Results

River Station	JWP Modelled Flood elevation (m)	ADWJ Modelled Flood Elevation (m)	Modelled Difference (m)
140	46.11	46.11	0.00
139	46.55	46.55	0.00
120	46.43	46.43	0.00
100	46.21	46.21	0.00
91	46.13	46.14	0.01
90	46.15	46.16	0.01
75	46.09	46.09	0.00
55	46.04	46.04	0.00
54	46.04	46.05	0.01
50	46.01	46.02	0.01
0	46.02	46.03	0.01
-30	45.95	45.95	0.00
-45	45.58	45.58	0.00
-60	45.45	45.46	0.01
-75	45.39	45.40	0.01
-90	45.33	45.34	0.01
-105	45.34	45.35	0.01
-120	45.34	45.35	0.01

5. MODELLING RESULTS

5.1 Basin performance

From the results presented in Tables 1 and 2, the reconfiguration of the basin storage and arrangement has resulted in a modelled maximum flooding increase of 0.01m in the 1:100 year ARI design flood event. This is not considered significant.

The modelled peak water level was determined to be RL46.59. This is approximately 280mm higher than the level quoted by JWP. In reviewing the JWP model, it is not clear how the quoted flood surface elevation was arrived at. In any case, the basin embankments have been redesigned to accommodate this increased peak water level to protect the future residential portion of the site from the PMF and allow for controlled outlet from the basin toward Hinchinbrook Creek.

5.2 Floodway Performance

The results of the amended HEC RAS analysis indicate that there is no significant change is the flooding behaviour of the floodway beneath the M7 due to the reconfiguration of the floodwall. The floodway will still protect the proposed road way beneath the M7 for all storm events up to and including the critical 1:100 year ARI storm.

6. RESPONSES TO RTA/M7 REVIEW COMMENTS ON BASIN PROPOSALS

6.1 General

As part of the development of both the JWP concept design of the basin and the amended ADWJ proposal, the RTA and M7 were consulted in relation to the proposal. Numerous iterations of the design to achieve agreement have been undertaken predominantly between the RTA and JWP. The issues raised in correspondence from the RTA/M7 in their letter of 1st July 2010 are addressed in the following sections with the letter reproduced as Appendix B.

6.2 Basin 6 pipe outlet

Throughout the design development undertaken by JWP, the outlet configuration was presented as a 1500RCP pipe with a 1050mm orifice plate proposed at the outlet of the basin. This was not considered practical and as such the outlet configuration was amended to a 1050RCP pipe only. These changes were introduced into the RAFTS model and are reflected in the discussion of the modelling changes above.

As part of these changes to the outlet arrangements, more detailed consideration of the outlet to Hinchinbrook Creek has occurred and have been reflected on the drawings presented in Appendix C.

6.3 Integration of proposed roadway and shared pathway into existing shared pathway.

RTA/M7 indicated concern as to the practicalities of the proposal in term of integrating the proposed works into the exiting shared pathway. Additional survey of the existing shared pathway has been undertaken and the proposed design presented in the drawings. A small amount of the existing concrete shared path is required to be removed and reconstructed in order to achieve satisfactory gradients

6.4 Flooding status of existing shared pathway

The RTA/M7 advised that the shared pathway would be required to be flood free in at least the 1:2 year ARI flooding event. It is noted that the changes to the existing shared pathway are in the vicinity of the proposed road beneath the M7. Reference to both the JWP studies and the additional ADWJ modelling of the channel indicate that the 1:100 year ARI flood level backwater flooding from the proposed basin adjacent to the cycleway bridge near the proposed pathway amendments is approximately RL 45.95. The minimum elevation of the exiting cycleway bridge deck is RL 46.86 and the proposed pathway realignment minimum elevation is RL 46.04. Accordingly, the existing shared pathway and the proposed amendments are above the critical 1:100 year ARI backwater flooding from the proposed Basin 6.

6.5 Project staging

The RTA/M7 require that the works be staged in such a manner that the stage 1 construction can be self sufficient in the event council abandons the connection of the proposed works across the M7 corridor. A construction staging plan has been developed and is shown in drawing 150136-S75W-027. Stage 1 works include;

- Construction of road pavement from the existing construction to support the former Hoxton Park airport redevelopment to the eastern boundary of the M7 corridor
- Construction of a temporary turning head near the end of the stage 1 roadworks
- Construction of the stormwater drainage line to the eastern boundary of the M7 corridor where it will be capped for future extension
- Construction of an earth berm to direct any overland flows around the proposed roadworks and into Basin 6
- Construction of the required services across the M7 corridor linking Middleton Grange with the future residential development to the north of proposed Basin 6. These services are to be installed at a depth consistent with the future extension of the roadworks across the M7 corridor to be undertaken by Council.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the revised modelling undertaken, the reconfiguration of Basin 6 does not significantly impact on the flooding behaviour of the waterway beneath the M7 in all events up to the critical 1:100 year ARI storm. In the PMF, there is an increase in the top water level in the basin from the JWP reporting. This increase has been ameliorated in the design process with a commensurate increase in the top of embankment levels for the basin.

The configuration delivers significant improvements to the utility and effectiveness of the basin allowing it to be used for active recreation. Accordingly, it is recommended that the detailed design of the Basin 6 be undertaken on the basis of this amended general configuration.