Manly2015 Master Plan and the Manly Oval Car Park

Submission to Manly Council regarding estimated costs for the project and the risks that appear not to have been properly considered in the development of the likely outturn cost and the subsequent assessment of the Project's viability.

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Manly2015 Master Plan and the Manly Oval Car Park -
Submission regarding estimated costs and risk profile

I am a civil engineer with more than 37 years' experience in both heavy construction and design management of major infrastructure works across many parts of eastern Australia. I am also a ratepayer in the Manly LGA.

I am concerned at that aspect of Manly Council's "*Manly2015"* Master Plan relating to the proposed car park beneath Manly Oval, specifically the construction cost estimate adopted by Council and upon which Council has assessed the viability of the Project. I believe Council has not properly considered some specific risks, difficulties and costs associated with the construction of such a car park at the selected site. As a consequence, the construction cost estimate that Council has used to assess the viability of the project is likely to be significantly understated, with the effect that the 1.6% "profit" assessed by Council will be significantly, if not totally eroded.

Executive Summary

The cost estimate of WT Partnership, which Council has adopted for its viability calculations is significantly less than the cost model suggested by KPMG as a "rule of thumb", and even further away from the cost guidelines suggested by the 2013 Edition of Rawlinsons – Australian Construction Handbook.

Manly Oval and much of the low-lying area of Manly LGA sits on the extensive Manly Coastal Sands aquifer. The ground water level at the Manly Oval site is influenced by ground water flows as well as by rainfall and flooding events in the immediate and nearby area and will fluctuate significantly with climate events. As a guide, the depth to the water-table in the Manly Coastal Sand Aquifer ranges between 1 m and 5.8 m below ground level. The depth to the water table as measured in a bore in the Manly Council front lawn was 4.8 m below ground level at the time of recent measuring. The groundwater level beneath Manly Oval will be higher than at Manly Council lawn and well above the base of the excavation for a 2-level underground car park.

To retain the excavated sand face and to minimise water inflow to the site during construction, a retaining wall will need to extend well below the floor of the excavation. Given the proximity of existing facilities (buildings, infrastructure, tennis courts etc), the excavated face will need to be vertical, or near vertical; the depth of the excavation, the type of material to be retained and the variable water level within it, suggest that the most likely method of soil retention would require the construction of a concrete diaphragm wall.

WT Partnership has estimated the base construction cost of the car park at $30.4M. KPMG has advised that the rule-of-thumb cost for a similar car park in Sydney would be $34.2M. The construction industry cost estimating handbook (Rawlinson, 2013) suggests the cost would be about $40M.

Neither the "rule-of-thumb" nor the Rawlinson estimates would include for the site-specific cost of constructing several hundred linear metres of diaphragm wall, or for the cost of constructing the special entrance and exit ramps/tunnels from Sydney Rd into the car-park, or for the cost of re-establishing the first class playing surface of Manly Oval. It does not seem reasonable, given the disparity between WT Partnership's estimate and the other indicative costs, that these site specific costs were included in WT Partnership's estimate either.

KPMG has advised that the estimates for Professional fees and Contingency included in WT Partnership's estimate are at the low end of industry scales. I agree with this sentiment.

I consider, based on this and other factors, that the cost of the car park, including appropriate professional fees and contingency, could reasonably be between $44.7M and $50.6M, compared with the figure of $33.6M adopted by Council.

The following table summarises these estimates:

Item	Council Estimate	KPMG rule-of-thumb	Rawlinsons
Car park base cost	**$30.4M**	**$34.2M**	**$40M**
Sand retention and water table barrier (diaphragm wall)	Presumably included	Excluded, but say **$2M** extra-over the allowance in KPMG "rule of thumb" cost	Excluded, but say **$2M** over the allowance in Rawlinsons' guide
Entry & exit ramps	Presumably included	Excluded, but say **$2M**	Excluded, but say **$2M**
Manly Oval reinstatement	Presumably included	Excluded, but say **$0.3M** over the allowance in KPMG "rule of thumb" cost	Excluded, but say **$0.3M** over the allowance in Rawlinsons' guide
Allowance for 3 lifts	Presumably included	No known if included or not	Excluded, but allow **$0. 5M**
Services diversion	Presumably included	Excluded, but say **$1M**	Excluded, but say **$1M**
SUB-TOTAL	**$30.4M**	**$39.5M**	**$45.8M**
Professional Fees	**$1.4M** (@4.5%)	Excluded, but say **$2.8M** (7%)	Excluded, but say **$3.2M** (7%)
Contingency	**$1.8M** (@6%)	**$2.4M** (@6%)	**$1.6M** (@ 3.5%, as 2.5% included in Base Cost)
TOTAL	**$33.6M**	**$44.7M**	**$50.6M**

KPMG's report tabulates the various changes to the financial model for the carpark from May 2013 to December 2013, and converts the various changes to a change in the Internal Rate of Return (IRR).

Under the Cost Assumptions, KPMG notes that a net reduction of $2.4M in this area is equivalent to an increase in the IRR of 0.8%.

If the Construction Cost were to be in line with KPMG's "rule of thumb" plus the additional allowances noted above ($44.7M), this would indicate a cost increase over

Council's estimate of $11.1M, which, on a pro rata basis, suggests a reduction to the IRR of 3.7%, down from 6.6% to 2.9%. Similarly, if Construction Cost were to be in line with Rawlinsons' cost guide plus allowances ($50.6M), then the IRR might reduce even further, by 5.7%, down from 6.6% to 0.9%. After deducting the cost of funds (5%, according to Council), the IRR under either scenario would be well below zero.

In fact, the Construction Cost would only need to increase above Council's expectations by a mere $4.8M, just ⅔ the difference between Council's cost estimate and KPMG's "rule of thumb" figure with allowances, to reduce the IRR to 5%, equal to the cost of funds, thereby returning zero margin to Council. Any increase in costs above that figure will result in an ongoing loss to Council, requiring top-up funding from the ratepayers.

Background

I refer to the report to Council prepared by KPMG and dated 16 December 2013, titled *"Manly 2015 Manly Oval Car Park - KPMG Financial and Commercial Review of Manly Council Analysis"* and specifically Sections 5.1, 5.2 and 5.3 within that report.

Section 5.1 states, in part:

"We have been advised by Council that the adopted base build assumption of $40,031 per space is supported by the fact that there is limited below ground risk on the subject property."

Section 5.2 states:

*"WT Partnership has adopted **$1,375,000** in total for Professional Fees, which equates to **approximately 4.5%** of construction costs. This rate is at the lower end of what would be considered an appropriate range for Professional Fees, but reflects the relatively simplistic design and delivery requirements."*

Section 5.3 states:

"WT Partnership has adopted a contingency amount equal to 6.0% of construction costs.

Construction contingencies generally range from 5% to 10% of total construction cost depending on the complexity of construction and the perceived risks involved with completing a development. The construction of a car park is relatively straight forward and we have been advised that there is limited risk associated with the proximity of the construction to the water table."

The assumptions stated above, which underpin KPMG's conclusions, and which presumably influenced WT Partnership's estimates, are not valid for the particular site. The following sections of this report identify their shortcomings.

Geology of the Site

Figure 1 below is an extract from the Sydney Geological Series 1:100,000 Sheet 9130. It is clear from this map that the Manly Oval site and the adjacent tennis courts, Belgrave St between Sydney Rd and Raglan St and most of the property to the east of Belgrave St sits neatly on the geological feature referred to as **Qhf**. The southern and northern limits of the Manly Oval site, being Sydney Rd and Raglan St respectively, west of Belgrave St, are annotated as **Rh**. The eastern edge of the **Qhf** zone is bounded by the coastal strip, extending maybe 10 – 20 metres inland and is annotated as **Qhb**. See also Appendix A.

Firstly, by reference to the Legend, **Rh** represents medium to coarse-grained quartz sandstone, very minor shale and laminate lenses; this is an excellent foundation material, strong and stable, although possibly (probably) interspersed with sandy clay seams that would be water charged. This is the material that forms the Sydney Rd and Raglan St hills and Ivanhoe Park to the west and is clearly visible in hills around Manly.

The Legend describes **Qhf** as "Medium to fine marine sand", and **Qhb**, the littoral strip, as "Coarse quartz sand, varying amounts of shell fragments".

In summary, the geology of Manly Oval and tennis courts site is medium to fine marine sand, bounded on the north and south by sandstone, with sandstone also on the west at some indeterminate distance. In other words, it is possible that some or all of the Manly Bowling Club "greens" also overlie the medium to fine marine sand, and, given the surrounding topography, that this sand foundation also extends, to some extent, beneath the block bounded by Kangaroo Lane and Pittwater Road north of Raglan St and, anecdotally, under Sydney Rd east of Eustace Street. Certainly, the eastern side of the oval/tennis court precinct is also medium to fine sand, progressing to coarse sand, **Qhb**, as it nears the coast.

The coarse sand, **Qhb**, is in intimate contact with both the ocean and the waters of Sydney Harbour.

The medium to fine marine sand will be less pervious than the coarse sand on the water's edge, and will dampen the tidal effects to the extent that there is minimal, if any tidal variation in water level under Manly Oval. It will also slow the passage of storm water recharge through it as it drains towards the ocean and harbor. This sand deposit is known as the Manly Coastal Sands, and the aquifer within it is the Manly Coastal Sands Aquifer.

The standing water level within the Manly Coastal Sands Aquifer is between 1 m and 5.8 m below ground level[1] . A recent measurement in the Ground Water Bore located in the front lawn at Manly Council showed the standing water level in the aquifer at 4.8 m below ground level[2].

[1] Regional Groundwater Resource Investigations – Manly, Warringah & Pittwater LGAs. WRL Technical Report 2012/2013, dated Feb 2013, Table 34

[2] ibid

Figure 1 - Geology Map of part Manly area

The ground water level at the Manly Oval site will be influenced by ground water flows from perched water tables within the Hawkesbury sandstone under Sydney Rd and Raglan St and in Ivanhoe Park, all of which drain into Manly Oval, as well as by rainfall and flooding events in the immediate and nearby area. The actual ground water level within the sand will fluctuate in accordance with climate conditions, but would always be higher than sea level. There would be a hydraulic down gradient between Manly Oval and the sea level, which would typically place the standing water level at Manly Oval higher than the standing water level at Manly Council.

The Car Park

The car park will be constructed over 2 levels, suggesting an excavation about 7 metres deep, depending on the thickness of the base and roof slabs and the allowance over the roof for replacement of the underlay and playing surface of Manly Oval. With Manly Oval located at about RL 6-7, this would place the bottom of the excavation well under the surface of the water-table.

Sand would be excavated for the car park to suit the footprint of the car park. Where rock is adjacent to the footprint, the sand would probably be excavated up to the rock face, but where the rock is too far away from the car park footprint or where it is non-existent (such as along the Belgrave St frontage and parts of Sydney Rd and Raglan St), the excavation face will need to be retained. Given the proximity of existing facilities (buildings, infrastructure, tennis courts etc), the excavation face will need to be vertical, or near vertical; the depth of the excavation, the type of material to be retained and the variable water level within it, suggest that the most likely method of soil retention would require the construction of concrete diaphragm walls, although contiguous concrete or grout piles might also be considered.

Diaphragm walls are constructed from the surface prior to any excavation and extend to a significant depth below the proposed floor of the excavation. The wall serves two purposes: firstly, it retains the sand behind the wall (on the non-excavation side), and secondly, by extending well below the base of the excavation, it provides a tortuous path for the ground water to infiltrate the excavation, thereby slowing the rate of infiltration to the excavation and minimising pump-out requirements and water table draw-down on the other side.

Figure 2 is a schematic showing the construction of a diaphragm wall (from Bachy-Soltenache website). The size and spread of equipment can be gauged from the scale of the concrete transit mixers in the sketch.

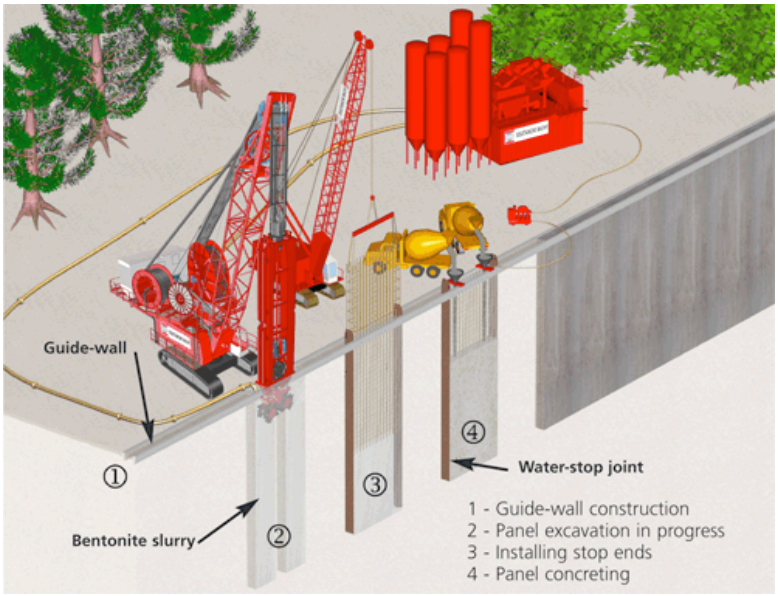

Figure 2 - Diaphragm Wall construction (courtesy Bachy-Soltenache)

The stages of construction of such a feature are broadly as follows:

- A large crane mounted cutting rig will excavate slots to the design depth, replacing the excavated material with a slurry that will ensure the walls of the excavation do not collapse.
- Following completion of excavation, a crane will lower prefabricated steel reinforcement cages into the slurry-filled slot.
- Stage 3 involves the placement of concrete into the slot. As the concrete is pumped into the slot, it displaces the slurry, which is subsequently “cleaned” and reused.

Key Engineering Design and Construction Issues

The problems and issues associated with construction of this specific project are covered in the following sections.

Construction in water bearing sands

The problems with construction in water-bearing sands where the water level is expected to be higher than the floor level of the car park are:

- The water infiltration rate into the excavation can only be estimated in advance by a thorough site-investigation campaign, including the drilling and construction of at least one, and preferably two pumping wells to measure water pump-out rates and hence replenishment rates at various levels below ground level.
- Associated with these pump wells, a number of water level monitoring wells (five to ten for this site) would be required to be drilled. These will measure the level of the water table at a range of distances from the pump well(s).
- Computer modelling of the measured flow rates and draw-down levels will enable the estimation of the required toe level for the diaphragm walls, the construction pumping requirements, and the effect on the water table outside the diaphragm wall.
- The drawn-down water table outside the diaphragm will lead to settlement of the sands in that area. The extent of settlement will be related to the extent of the ground water draw-down. Settlement, and particularly differential settlement over a distance, could impact on any infrastructure, or buildings with shallow foundations within the effective footprint of the draw-down. The effects on the buildings and infrastructure could range from insignificant, to minor cracking, to major cracking and façade damage, or ultimately to leaning of the buildings in the event of one side of the building settling significantly more than the other. The consequence of any settlement will be greater in the case of traditional brick-and-mortar constructions than with reinforced concrete structures.
- While the computer modelling would be state-of-the-art, it is nevertheless theoretical and dependent on the constraints of the site investigations and subject to natural inconsistencies not detected by the site investigation. The effects of the draw-down will need to be closely monitored during construction.

  Mitigative options, such as water-table recharge outside the diaphragm wall or precautionary deepening of the diaphragm wall in advance can be effective, but will delay construction, possibly extensively, and will of themselves carry a significant cost impost.
- Another issue is the potential for the ground water to be contaminated and be not suitable for disposal to the existing stormwater drainage system, or for water-table re-charge, requiring major expense in its collection and treatment and/or removal from site.

The point is that these are not inconsiderable concerns; if not considered adequately during the design phase and built into the project budget and time schedule, they have the potential to cause extensive construction delays and construction cost over-runs. The only effective risk minimisation technique is detailed geotechnical and hydrogeological site investigation and modelling, construction monitoring during excavation and construction of the walls and the car park until the site is backfilled, together with a proper contingency allowance for delays, and the cost of delays.

Other Construction and Design risks

Other concerns and risks with this particular project are:

- An existing 750 mm diameter sewer service across the eastern side of Manly Oval has the potential to require it to be relocated (depending on exact location and depth) or modification of the car park footprint to avoid it.
- A 33kV electricity feeder traversing Sydney Rd will interfere with the east-bound exit ramp and will require re-location to enable construction of the ramp. The cost of this work is estimated at $0.5M.
- A Telstra communications service in Sydney Rd will require relocation to facilitate construction of the entry and exit ramps. The estimated cost of this work is $0.3M.
- A 150 mm Vitreous Clay sewer runs the full length of the west-bound exit ramp in Sydney Rd. This will need relocation and replacement. The estimated cost is $0.2M.
- The design of the west-bound exit ramp is problematic in that it will need to rise more steeply than Sydney Road, which is already near maximum acceptable gradient. I estimate the length of the ramp, if indeed it is constructable at all, would be between 100 and 200 metres.
- The new car park ramps in Sydney Road will all require safety barriers at the surface, which, with an adequate ramp width, will have the potential to compromise the remaining lanes in Sydney Road. The proposed new roundabout at Eustace Street and its proximity to the adjacent ramps and associated lane closures will severely impact on the ability of large vehicles to negotiate this area (e.g. buses turning into West Promenade and garbage trucks and similarly sized vehicles turning out of Eustace St).
- Construction of the west-bound car park exit ramp will require closure of two west-bound lanes for a long period, resulting in single-lane each way traffic in the east-bound lanes.
- Construction of the east-bound car park entry & exit ramps will require closure of at least the kerb-side east-bound lane and the northern footpath for the entire construction duration, and likely the median east-bound lane as well for a considerable period.
- The entire configuration of the proposed roundabout, the traffic calming chicanes, the narrowing of Sydney Rd to a single lane in each direction, the presence of concrete barrier walls in the middle of the street, mixed with the heavy traffic that customarily uses Sydney Road, and its location at the bottom of a steep hill is a nightmarish situation that will require very careful traffic engineering to see if it can even be made workable. This is a high risk area of the project.
- There is a risk that the proposed car park would not comply with the Building Code of Australia, specifically Sections D1.4 and D1.5, as it seems to be a geometric impossibility for any point within the car-park to be not more than 40 metres from the nearest fire-rated vertical exit from the car-park (as required by the BCA) without the use of fire-rated passageways, which would interfere with traffic flow within the car-park and reduce the number of available parking spaces, further reducing the IRR. Compliance without the use of passageways would require the stair-wells to daylight within the playing area of the cricket field

or rugby pitch, clearly an unacceptable solution. The cost of creating fire-proof compartments to achieve compliance with BCA could add $0.3M to the construction cost.

The cost of these mitigation measures should be included in the Project budget.

Costs

Professional Fees

Most underground car parks in Sydney are constructed within sandstone, where hydrogeological issues are generally of little concern. In such instances, the cost of the car park construction is essentially the cost of the excavation plus the cost of building the structure and the cost of some straightforward engineering design and construction supervision.

Sites such as Manly Oval are different for the reasons explained above, and it is incorrect *"that there is limited ground risk on the subject property"* as asserted by Manly Council[3]; the risks are significant, but manageable if recognized and addressed properly in advance.

In addition to the "normal" costs associated with structural, electrical, hydraulic, mechanical, fire, vertical transport, architectural, traffic and landscaping design, the Professional Fees involved in an undertaking such as the *Manly2015* car park should include allowances for:

- Detailed geotechnical and hydrogeological investigation including drilling and construction of the pumping and monitoring wells;
- Computer modeling of the water table draw down and assessment of impacts to the surrounding built environment;
- Detail design of the construction pumping system;
- Design of the diaphragm walls and retention system;
- Design and implementation of and reporting on the monitoring to be implemented during the entire period of water table draw-down;
- Chemical analysis of the ground water and appropriate planning and design for removal and potential treatment of this water from the excavation and from the permanent structure into the long term.

Almost none of these costs would be required for the construction of a conventional underground car park in sandstone.

KPMG notes "*This rate* [4.5% of construction costs in total] *is at the lower end of what would be considered an appropriate range for Professional Fees."*[4] KPMG justifies the rate on the basis that it "*reflects the relatively simplistic design and delivery requirements".*

With the issues I have highlighted above, I believe that the rate of 4.5% for Professional Fees, representing $1.375M, is well under, possibly by a factor of 2, the real costs that would be associated with the site investigation, design and management of such a project in the particular circumstances prevailing at the site.

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[3] KPMG Report, Section 5.1

[4] KPMG Report, Section 5.2

In my analysis, I have adopted a (conservative) figure of 7% of Construction Costs to cover Professional Fees.

Construction Costs

Car Park Structure Costs

In respect of WT Partnership's estimate of the construction cost of the car park of $40,031 per car space, I note KPMG's comment that the estimate *"is generally consistent with KPMG's experience with car park construction and the industry rule of thumb of $45k per space for a sub-grade car park over two levels."*[5]

A colleague, Mr Murray Sharp, an independent Quantity Surveyor and building cost estimator practising in Manly for many years has prepared a separate report that he has submitted to the Manly Councillors. He has provided a copy of his report to me for assistance in preparing this submission.

In his report, Mr Sharp noted his concerns with the figures included with the Cost Assumptions in the KPMG Review. He notes that KPMG's review is based on WT Partnership's cost estimate of:

Base Construction Cost	**$30,400,000** (i.e. $40,031 / space)
Contingency	$ 1,860,000
Car Spaces	760 No

While not questioning the skill or integrity of WT Partnership's calculations, both Mr Sharp and I would be interested to know the basis on which WT Partnership prepared the cost estimate.

Mr Sharp's concerns are based on his experience as a Quantity Surveyor of more than 30 years standing, his experience on another project in the area, and his reading of the 2013 Edition of Rawlinson – Australian Construction Handbook.

In this edition, in regard to Sydney costs, Rawlinson states:

> "10.0 PARKING
> 10.1 Underground
> 10.1.2 – Reinforced concrete construction including deck over, mechanical ventilation, fire sprinklers, landscaping to top of deck, minimal facilities, no lifts
> 10.1.2.2 - two levels **$50 800 – $54 800 / space**"[6,7,8]

Based on the Rawlinson figures and 760 car spaces, the car park base construction cost would amount to somewhere between $38.6M and $41.6M (excl GST), or say $40M, ± 4%.

This is $10M, or about 30%, higher than WT Partnership's base construction estimate adopted by Council.

It is also noteworthy that KPMG suggests that the "rule of thumb" construction cost per car space in Sydney is $45,000, representing a total construction cost of $34.2M, $3.8M or 12.5% higher than WT Partnership's estimate.

Another colleague from a major independent Australian cost estimating firm has provided some benchmark costing to me for such a structure. For a difficult site with

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[5] KPMG Report, Section 5.1

[6] The rates assessed by Rawlinsons EXCLUDE Professional Fees and Legal Fees.

[7] Rawlinsons 2014 edition has revised the rate upwards to $51,600 - $55,600 per car space

[8] Rawlinsons' rate includes 2.5% contingency allowance

water charged sand foundations, their benchmark advice is a rate between $1700 and $2000/m^2 with 17% allowance on top for "preliminaries". The car park is estimated to have a floor area (2 floors) of 22,000 m^2, indicating an outturn cost of $47.6M.

It should be borne in mind that local site conditions and project specific requirements such as lifts within the car park, entry and exit ramps and tunnels, and reinstatement of the playing surface for Manly Oval over the car park roof have not been factored into the Rawlinson figures, and likely have not been included in KPMG's "rule of thumb" guide or my colleague's bench mark rate, further widening the gaps between those estimates and Council's estimate.

The point is that until the actual design is nailed down, cost estimates will always have a wide spread, and for this reason it is very unwise to lock the projects's financial viability to the "low-ball" cost estimate.

Site Civil Engineering Costs

The fact that at least some of the excavation will have to be carried out below the water table, with all excavation in sand, will require extensive and costly shoring and dewatering during the early stages of construction.

In its Review, under "5.1 Base Build", KPMG states *"We have been advised by Council that the adopted base build assumption of $40,031 per space is supported by the fact that there is limited below ground risk on the subject property."*

Firstly, I suggest the "industry rule of thumb" would be based on straightforward construction in Sydney, with, as KPMG notes, *"limited below ground risk on the subject property"*. The same would be true of the Rawlinson estimate. Both sets of estimated costs would include excavation for the car park and WT Partnership's cost estimate could be lower than "rule of thumb" or Rawlinson because of the relatively low cost of excavating sand, the presence of which WT Partnership would have been aware.

However, the size of the estimate and the fact that it is so much lower than KPMG's "rule of thumb" or Rawlinson's estimated construction rate suggests that very little, if any, allowance has been made for the significant civil engineering works that will be required for this particular site.

I do not see how the cost per car space adopted by Manly Council adequately covers the cost of the construction of the diaphragm walls, maintenance of the site during construction and the permanent drainage and pumping system that will be required to keep the car park dry for the long term. Without having carried out any detailed estimate of costs, I suggest these costs could amount to something of the order of $5M+. Conservatively, I have added only $2M to the "rule of thumb" and Rawlinsons' estimates for this additional cost, on the basis that some amount (suggest $3M) is already included in those figures for some system of soil retention.

Access and Egress Works

The concept plans call for vehicle entrance and exit ramps to the car park to connect to the northern kerb-side lane of Sydney Road, east of a new roundabout to be constructed at the intersection of Sydney Rd with Eustace Street, with an additional west-bound exit ramp to be located in the median westbound lane up-hill of the Eustace St intersection.

I do not know to what extent these issues have been considered or costed in WT Partnership's estimate. They have not been included in Rawlinsons' estimate and they are unlikely to fall within the ambit of KPMG's "rule of thumb".

The fact is, they will likely be constructed in sandstone (although this is to be determined) and will need to pass under the footpath in Sydney Road (probably using the cut-and-cover construction technique. The cost of this work and the dive structures to enable the ramps to connect into Sydney Road and the barriers to prevent pedestrians and other vehicles falling into the dives, will be significant and may not have been included in WT Partnership's estimate.

I am not a costing specialist, and have not prepared a detailed estimate for this work, but I suggest the cost for this work could be in the order of $2M, and would require closure of both up-hill lanes in Sydney Road during construction of the west-bound exit, and closure of at least 1 of the 2 down-hill lanes and adjacent footpath for construction of the other entrance/exit structure, with major traffic diversions and traffic controls for the duration, which could be up to 6 months.

Also associated with this work in the diversion of utilities currently located in the road reserve, for which I have been advised to make provision for costs of about $1M.

Manly Oval Restoration Costs

Also important, is the cost of reinstatement of the Manly Oval playing surface. This is not standard car park construction, and would not be covered by the "rule of thumb" figure suggested by KPMG, or the cost guideline offered by Rawlinson.

To provide a proper playing surface fit for 1st grade cricket and rugby, the ground would need to be at least as good as its current condition, albeit with significant improvements to its drainage. I suggest this could require at least 1 metre combined depth of soil and drainage layer and high quality waterproofing of the car park roof. The cost of this could be in the range $0.5M - $1M.

Rawlinsons' guide includes an amount for simple landscaping, as I imagine KPMG's "rule of thumb" does, too. Therefore, I suggest an extra-over allowance of $0.3M, being the possible additional cost between simple landscaping and a full 1st grade sporting field would be appropriate.

Lifts

I presume Council's adopted estimate includes the provision of passenger lifts. I do not know if KPMG's "rule of thumb" figure includes for these elements, and Rawlinsons' guide specifically excludes them. The cost of small lifts, of which possibly 3 would be required, would add a further $0.5M to the cost.

Comment

I find it extraordinary that Council would adopt as the budget capital expenditure for a major project and the basis for assessing the project's viability (which, on the figures used, is marginal at best), a base construction cost estimate that is 11% less than the "rule of thumb" figure, and 25% less than the figure suggested by the industry standard guideline (Rawlinson) while apparently ignoring the site specific constraints that might reasonably be expected to add a further $5M on top of all other estimates.

Further, the construction of these elements will be slow and tedious and will require a longer construction period than provided by Council's timeline. The time related costs should also have been considered.

Contingency

The contingency allowance is another area of concern.

This report has highlighted some of the specific risks and design issues and the consequences of the risks eventuating. The consequences could include:

- Extended construction duration, with associated delay and additional Council supervision costs;
- More extensive barrier/retaining wall works than considered in the concept design, with associated cost and time impacts (see Note below);
- Additional costs for disposal of potentially contaminated ground water, or simply complying with EPA requirements, beyond those, if any, considered in the cost estimate;
- Additional costs for rectification of or reparation for damage to existing infrastructure (e.g. roads, and underground services) and/or privately owned buildings and heritage items as a result of unplanned and unacceptable foundation settlement arising from excessive water-table draw-down;
- Additional site investigation and design costs, over and above those considered within the total of Professional Fees, to permit a properly scoped construction contract that does not leave Council exposed to an extensive list of expensive Construction Cost Variations;
- Reputational risk to Council as a result of any of the above matters eventuating;
- Inability of the project to achieve the financial results upon which its viability depends, resulting in considerable and on-going long-term losses by Council and ratepayers.
- As a subset of the potential for water contamination, there is the possibility of encountering Acid Sulfate Soil/Potential Acid Sulfate Soil (ASS/PASS) in the excavation for the car park. The appendix to this report includes an extract from the Natural Resource Atlas for NSW, published by the NSW Government's Department of the Environment and Heritage. While the map shows the Manly Oval site is classified as "Low probability of occurrence" in respect of Acid Sulfate Soils, it should nevertheless be considered in the cost plan as a cost risk. I cannot determine if it has been, but suspect it has not.

Note: I am not aware of what type and extent of barrier works (i.e. diaphragm wall, sheet piles etc, depth and linear extent) have actually been considered in the concept design or in the briefing paper upon which WT Partnership based its cost estimate, if at all. These are both costly and slow works and it would be unwise to ignore them totally or to pay scant regard to their potential impact in any cost estimate.

KPMG's report advises Council that the contingency amount of 6% adopted by WT Partnership is towards the bottom end of a typical range of 5% to 10% of construction cost. 6% of a construction cost of $30.4M is a mere $1.8M. In the world of major site civil works with dewatering, monitoring and diaphragm wall construction, and major construction within the boundaries of a major road and beneath major in-ground services, the Principal's contingency of $1.8M for the entire project could be consumed stunningly quickly in the context of a project budget that is based on "*limited below ground risk on the subject property"* and *"relatively simplistic design and delivery requirements"* and *"limited risk associated with the proximity of the construction to the water table",* but where the facts do not support these assumptions.

Assessment of Contingency is always a vexed question. While plucking a percentage based on the estimator's experience was once the standard approach, this method has

been overtaken, for all major projects, by a properly constructed *Monte Carlo™* analysis that looks at all the headline risks, their likelihood of occurrence and the consequences (time and cost) if they should occur. Sophisticated computer programs analyse these various factors and arrive at a properly considered risk-adjusted cost estimate. This is an essential element of preparing a project budget.

With respect, I believe there is considerable technical and financial risk associated with construction of this project on the selected site.

Conclusion

1. The stated assumptions underpinning the basic cost estimate of WT Partnership and many of KPMG's conclusions concern me: the inevitable presence of water-charged sands across the entirety of the site and extending to the ocean and the harbour suggest that not only is there not *"limited below ground risk on the subject property"*, but that special consideration must be given to the detailed engineering and construction issues associated with the management of this below-ground risk. This is not "normal" underground car-park design and construction and the cost estimate needs to reflect this.
2. As KPMG notes, a figure of 6% for contingency is at the low end of most such allowances. Real contingency allowances should be risk assessed and priced accordingly. This is an essential element of preparing a project budget. I cannot tell if this has been done, or not, but I suspect, given the presentation of the contingency as a single digit percentage of the capital cost, and its relatively low value given the actual risks involved in such a project, that it has not. Nevertheless, in the absenceof a proper risk-based contingency allowance, I have assumed the 6% factor adopted by WT Partnership in my assessment, but I strongly urge Council and its advisers to carry out a proper risk assessment.
3. The current car park construction cost estimate is $40k per car space, whereas the "rule of thumb" figure for "standard" underground car park construction is, according to KPMG, about $45k per space, but according to Rawlinson, in excess of $50k per space. I can see no reason for the budget cost, based as it is on concept plans only, being so far less than best-practice industry standard guidelines.

   Further, the additional site specific costs for the extensive civil engineering and permanent access and oval restoration works and other items not covered by KPMG's "rule of thumb" or Rawlinsons' price guide, plus a reasonable allowance for Professional Fees and Contingency, could add a further $10.5M on top of industry base cost estimates, resulting in an out-turn construction cost of about $48M [9], 40% higher than the current estimate adopted by Council.

   The following table summarises the various cost estimates and guidelines with additional allowances as appropriate for items not included, or not fully accounted for, in those estimates

[9] Approximate mid-point between KPMG's rule-of-thumb, and Rawlinsons' guide

Item	Council Estimate	KPMG rule-of-thumb	Rawlinsons
Car park base cost	**$30.4M**	**$34.2M**	**$40M**
Sand retention and water table barrier (diaphragm wall)	Presumably included	Excluded, but say **$2M** extra-over the allowance in KPMG "rule of thumb" cost	Excluded, but say **$2M** over the allowance in Rawlinsons' guide
Entry & exit ramps	Presumably included	Excluded, but say **$2M**	Excluded, but say **$2M**
Manly Oval reinstatement	Presumably included	Excluded, but say **$0.3M** over the allowance in KPMG "rule of thumb" cost	Excluded, but say **$0.3M** over the allowance in Rawlinsons' guide
Allowance for 3 lifts	Presumably included	No known if included or not	Excluded, but allow **$0. 5M**
Services diversion	Presumably included	Excluded, but say **$1M**	Excluded, but say **$1M**
SUB-TOTAL	**$30.4M**	**$39.5M**	**$45.8M**
Professional Fees	**$1.4M** (@4.5%)	Excluded, but say **$2.8M** (7%)	Excluded, but say **$3.2M** (7%)
Contingency	**$1.8M** (@6%)	**$2.4M** (@6%)	**$1.6M** (@ 3.5%, as 2.5% included in Base Cost)
TOTAL	**$33.6M**	**$44.7M**	**$50.6M**

Effect on Internal Rate of Return

KPMG's report tabulates the various changes to the financial model for the car park from May 2013 to December 2013, and converts the various changes to a modified Internal Rate of Return (IRR).

Under the Cost Assumptions, KPMG notes that a net reduction of $2.4M increases the IRR by 0.8%.

I have no particular expertise in this regard, but I imagine that had the costs increased by the same amount, instead of decreasing, then the IRR would have reduced by a similar percentage (although I acknowledge the conversion might not be exactly reciprocal).

In broad terms, if the Construction Cost were to be in line with KPMG's "rule of thumb" plus the additional allowances noted above ($44.7M), this equates to a cost increase over Council's estimate of $11.1M, which, on a pro rata basis, suggests a reduction to the IRR of 3.7%, down from 6.6% to 2.9%. Similarly, if Construction Cost were to be in line with Rawlinsons' cost guide plus allowances ($50.6M), then the IRR might reduce even further, by 5.7%, down from 6.6% to 0.9%. After deducting the cost of funds (5%, according to Council), the IRR under either scenario would be well below zero.

In fact, the Construction Cost would only need to increase above Council's expectations by a mere $4.8M, just ⅔ the difference between Council's cost estimate and KPMG's "rule of thumb" figure with allowances, to reduce the IRR to 5%, equal to the cost of funds, thereby returning zero margin to Council. Any increase in costs above that figure will result in an ongoing loss to Council, requiring top-up funding from the ratepayers.

Recommendation

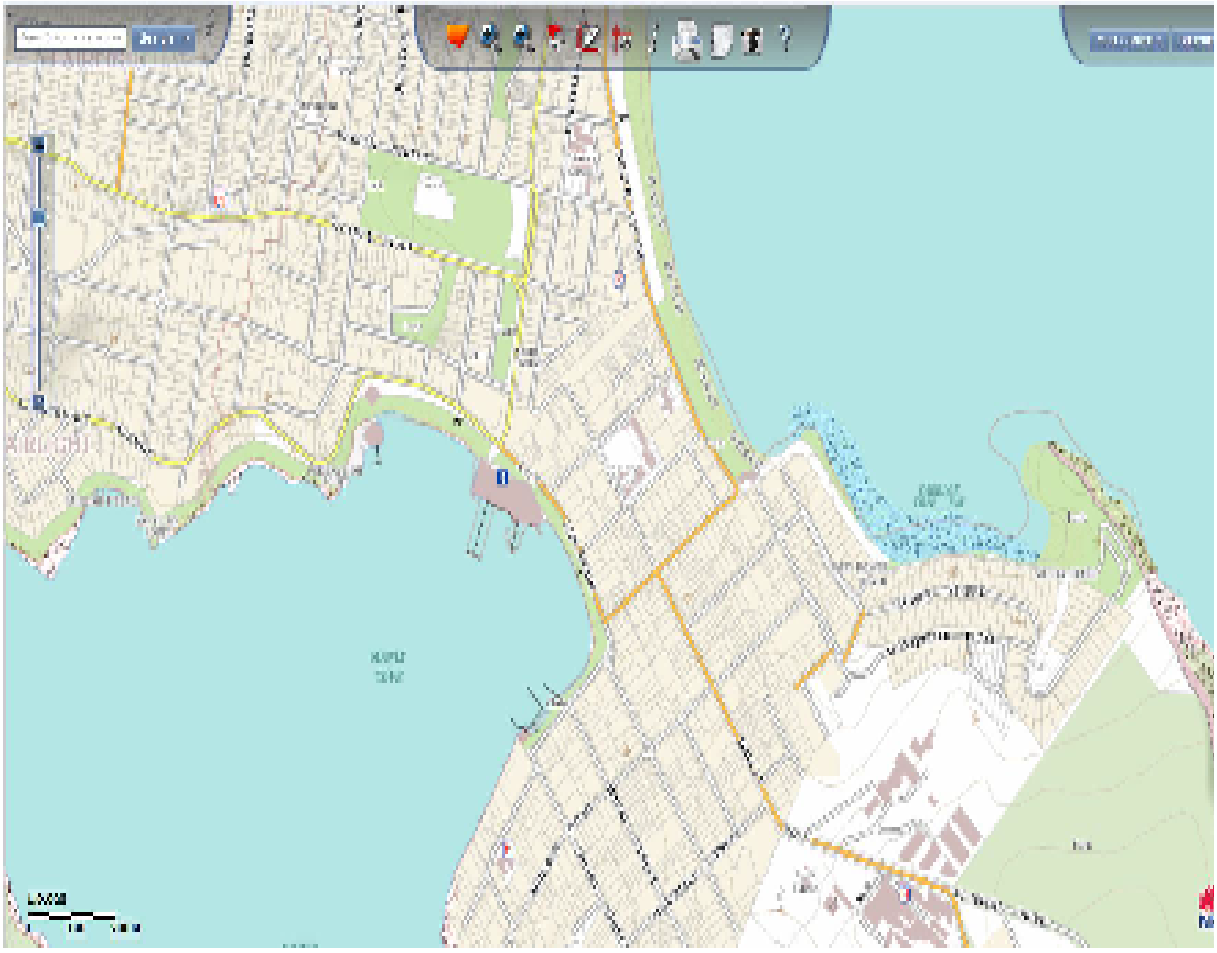
I urge all Councillors and Council Officers to consider these issues appropriately and to re-visit the construction cost estimate prepared to date and to re-evaluate the project's viability accordingly.

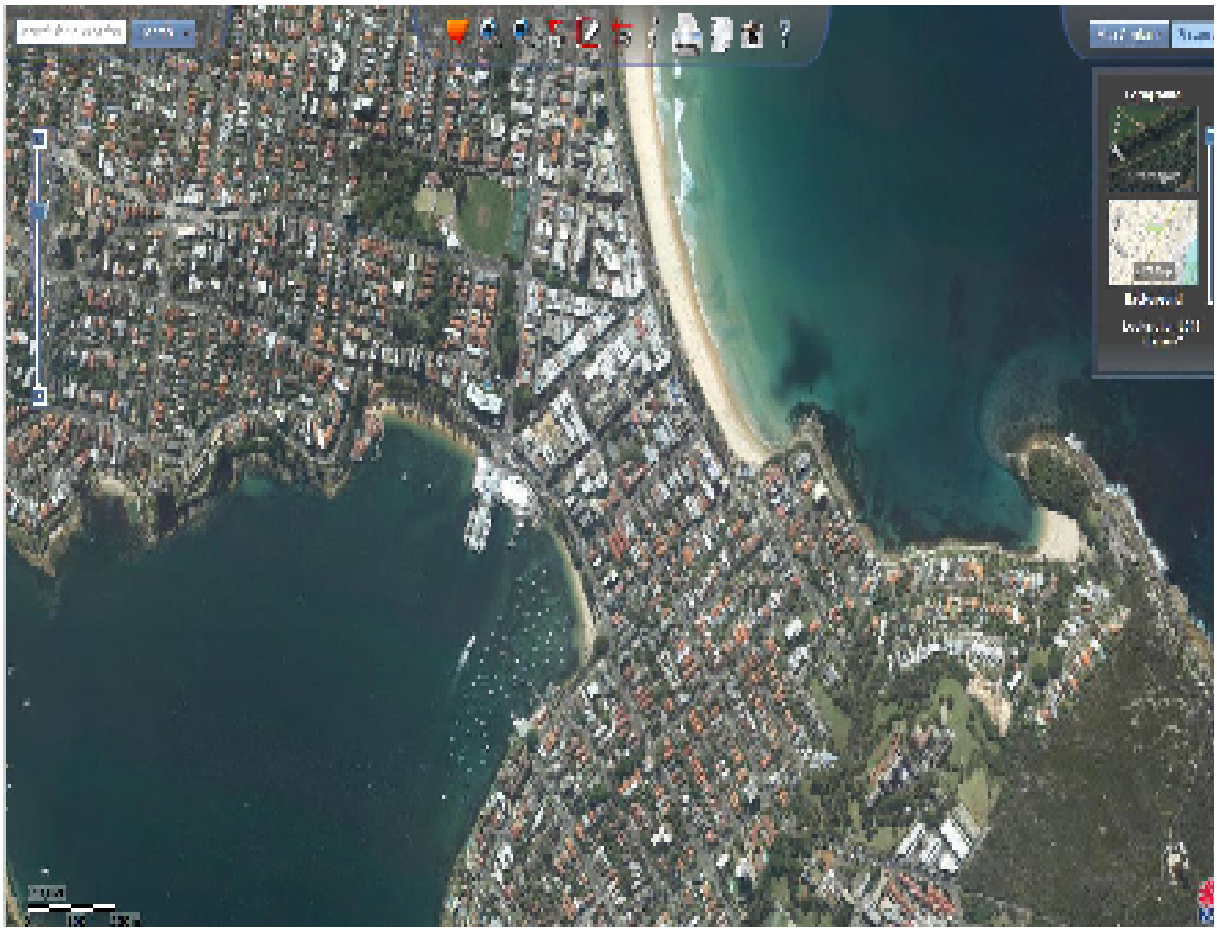
David Wunder
Willyama Avenue
FAIRLIGHT

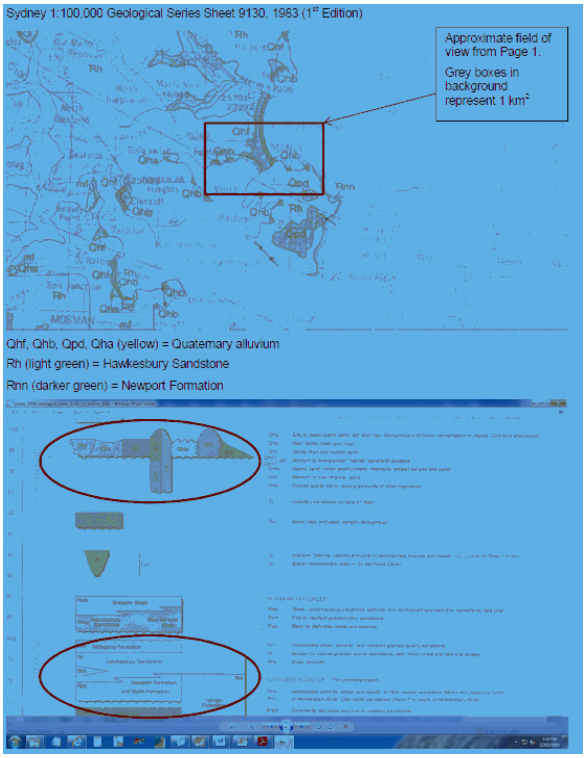
5 March 2014

Appendix A

Map, Aerial Photos, and Geology Legend for the target area






Sydney 1:100,000 Geological Series Sheet 9130, 1983 (1st Edition)
Approximate field of view from Page 1.
Grey boxes in background represent 1 km²
Qhf, Qhb, Qpd, Qha (yellow) = Quaternary alluvium
Rh (light green) = Hawkesbury Sandstone
Rnn (darker green) = Newport Formation