Appendices

Appendix A Landscape Masterplan

1. Plan showing extent of urban drainage landscape elements within the Central Corridor

LEGEND

- Concept Application Area
- Central Corridor Boundary
- Design Concept Lines
- Major Contours
- Minor Contours
- Proposed Spotlevel

PATHS / ROADS

- Shared Pedetrian/Cycleway 2.5m wide / Insitu Concrete
- 2.5m wide - Vehicular Maintenance Access 1.5m wide - Pedestrian Path Stabilised Blago Gravel
- Path - 1.5m wide Slashed Management Trail
- Cyclepath - proposed
- Timber Boardwalk / Bridge

SURFACES

- Insitu Concrete
- Play Areas - Rubber Softfall
- Boulders
- Areas to Future Development
- Boulder Wall/ Rocks
- District Playing Fields to Council's detail
- Streetscape Vegetation
- Turf
- Slashed Grasses
- Macrophytes
- Permanent Open Water Body
- Treatment Wetland
- Creekline / Drainage Line
- Direction of Drainage Flow

EXISTING VEGETATION / HABITAT

- ① Wallum Froglet Habitat
- ② Coastal Wetland with forest
- ③ Sedgeland with Swamp Mahogany
- ④ Swamp Oak Forest
- ⑤ Open Forest
- ⑥ Sedgeland with forest
- ⑦ Riparian / Drainage Corridor

COMMUNITIES UNDER REGENERATION

- Ⓐ Swamp Sclerophyll Forest
- Ⓑ Subtropical Coastal Forest
- Ⓒ Dry Sclerophyll Forest Tallowwood / Red Mahogany
- Ⓓ Dry Sclerophyll Forest Blackbutt / Red Mahogany
- Ⓔ Swamp Oak Forest
- Ⓕ Mixed wet Sclerophyll Forest
- Ⓖ Native Grasses
- River Flat Eucalypt Forest
- Structured Tree Planting to frame View Corridor

AECOM
Level 8, 17 York St Sydney NSW 2000
T (02) 8023 9333 / F (02) 8023 9399

Landscape Master Plan

Scale:	1:2000 @ A0
Date:	23.06.10
Client:	St. Vincent's Foundation

0 25 50 75 100 125 150 m

Appendix B WSUD Element Maintenance Checklists

Provided from Landcom WSUD Book 4: Maintenance & Monitoring

1. **Bioretention Basins (applicable to bioretention basins and Raingardens/biopods)**
2. **Treatment wetlands**
3. **Sedimentation Basins**
4. **Ponds**

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Water Sensitive Urban Design

Book 4 | MAINTENANCE

DRAFT

Appendix B – Regular Maintenance Checklists

B.1 Bioretention Basins

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comment	Action Processed
		(circle relevant category)				
1	GPT / trash rack/s	GPT clear of litter	GPT 10 percent full	greater than 30 percent full		
2	Inlet structures	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
3	Overflow pits	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
4	Underdrains	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
5	Sediment Forebay	Sediment absent	Sediment accumulation appears excessive	Sediment accumulated to half the basin depth		
6	Erosion	Erosion absent	Erosion damage visible, but function not impaired	Severe erosion. Damage impairing function of device	Location (mark on attached map of bioretention basin)	
7	Sediment accumulation (bioretention basin)	Sediment absent	Sediment accumulation appears excessive in sediment forebay. Fine sediment accumulation apparent on bioretention media surface.	Sediment accumulated to half the forebay depth Coarse sediment or large volumes of sediment accumulation apparent on the bioretention media surface	Location (mark on attached map of bioretention basin)	

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comment	Action Processed
		(circle relevant category)				
8	Compaction of filter media surface	No compaction evident	Localised compaction or subsidence evident. Localised ponding longer than 24 hours after storm event	Water remains ponding longer than 24 hours after storm event	Location (mark on attached map of bioretention basin)	
9	Weeds	No weeds present	Weeds present	Noxious or environmental weeds present, or weed cover more than 25 percent	Location (mark on attached map of bioretention basin) Identify weed species	
10	Plant condition	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Location (mark on attached map of bioretention basin) Identify species requiring replacement	
11	Litter (organic)	No litter visible	Litter visible	Litter thickly covers filter media surface or detracting from visual amenity	Location (mark on attached map of bioretention basin) Note type of litter removed	
12	Litter (anthropogenic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of bioretention basin) Note type of litter removed	
13	Oil spills / inflows	No visible oil	Persistent but limited visible oil	Extensive or localised thick layer of oil visible		

B.2 Constructed Wetlands

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comments	Action Processed
		(circle relevant category)				
1	GPT / trash rack	GPT clear of litter	GPT 10 percent full	GPT / trash rack for than 30 percent full		
2	Inlet pipe	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
3	Pipes connecting macrophyte cells	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
4	Outlet pit	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
5	Erosion	Erosion absent	Erosion damage visible, but structure functional	Severe erosion. Damage impairing function of device	Location (mark on attached map of wetland)	
6	Sediment build-up	Sediment absent	Sediment accumulation appears excessive	Sediment accumulated to half the basin depth	Location (mark on attached map of wetland)	
7	Aquatic weeds (submerged, emergent and floating)	No weeds present	Weeds present	Noxious or environmental weeds present	Location (mark on attached map of wetland) Identify weed species	

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comments	Action Processed
		(circle relevant category)				
8	Terrestrial weeds (e.g. within the batter slopes)	No weeds present	Weeds present	Noxious or environmental weeds present	Location (mark on attached map of wetland) Identify weed species	
9	Algal blooms	No algae apparent	Algae visible	Algal growth prominent or extensive		
10	Plant condition (aquatic macrophytes)	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Note species which require replanting	
11	Plant condition (terrestrial)	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Note species which require replanting	
12	Litter (organic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of wetland) Note type of litter removed	
13	Litter (anthropogenic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of wetland) Note type of litter removed	

B.3 Sedimentation Basin

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comment	Action Processed
		(circle relevant category)				
1	GPT / trash rack/s	GPT clear of litter	GPT 10 percent full	greater than 30 percent full		
2	Inlet structures	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
3	Overflow pits	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
4	Sediment Forebay	Sediment absent	Sediment accumulation appears excessive	Sediment accumulated to half the basin depth		
5	Erosion	Erosion absent	Erosion damage visible, but function not impaired	Severe erosion. Damage impairing function of device	Location (mark on attached map of sedimentation basin)	
6	Sediment accumulation	Sediment accumulated to less than half the basin depth	Sediment accumulated to half basin depth	Sediment accumulation greater than half the basin depth	Note timing since last desilting operation	

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comment	Action Processed
		(circle relevant category)				
7	Weeds	No weeds present	Weeds present	Noxious or environmental weeds present, or weed cover more than 25 percent	Location (mark on attached map of sedimentation basin) Identify weed species	
8	Plant condition	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Location (mark on attached map of sedimentation basin) Identify species requiring replacement	
9	Litter (organic)	No litter visible	Litter visible	Litter thickly covers filter media surface or detracting from visual amenity	Location (mark on attached map of sedimentation basin) Note type of litter removed	
10	Litter (anthropogenic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of sedimentation basin) Note type of litter removed	
11	Oil spills / inflows	No visible oil	Persistent but limited visible oil	Extensive or localised thick layer of oil visible		

B.4 Ponds

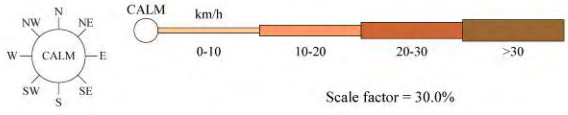
Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comments	Action Processed
		(circle relevant category)				
1	Inlet pipe	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
2	Outlet pipe	Clear and undamaged	Partially Blocked Observed damage	Mostly blocked Severe damage		
3	Erosion	Erosion absent	Erosion damage visible, but structure functional	Severe erosion. Damage impairing function of device	Location (mark on attached map of pond)	
4	Sediment build-up	Sediment absent	Sediment accumulation appears excessive	Sediment accumulated to half the basin depth	Location (mark on attached map of pond)	
5	Aquatic weeds (submerged, emergent and floating)	No weeds present	Weeds present	Noxious or environmental weeds present	Location (mark on attached map of pond) Identify weed species	
6	Terrestrial weeds (e.g. within the batter slopes)	No weeds present	Weeds present	Noxious or environmental weeds present	Location (mark on attached map of pond) Identify weed species	

Item		Performance Target	Schedule Maintenance or Investigation	Immediate Action Required	Comments	Action Processed
		(circle relevant category)				
7	Algal blooms	No algae apparent	Algae visible	Algal growth prominent or extensive		
8	Plant condition (aquatic macrophytes)	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Note species which require replanting	
9	Plant condition (terrestrial)	Healthy vegetation	Poorly growing or visibly stressed	Die back / dead plants	Note species which require replanting	
10	Litter (organic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of pond) Note type of litter removed	
11	Litter (anthropogenic)	No litter visible	Litter visible	Litter blocking structures or detracting from visual amenity	Location (mark on attached map of pond) Note type of litter removed	

NOTE: A check for trash racks / nets has not been included, as the pond should not be designed as a water quality treatment system, but rather to provide storage capacity of attenuation of peak flows to downstream waterways.

Appendix C Wind Roses

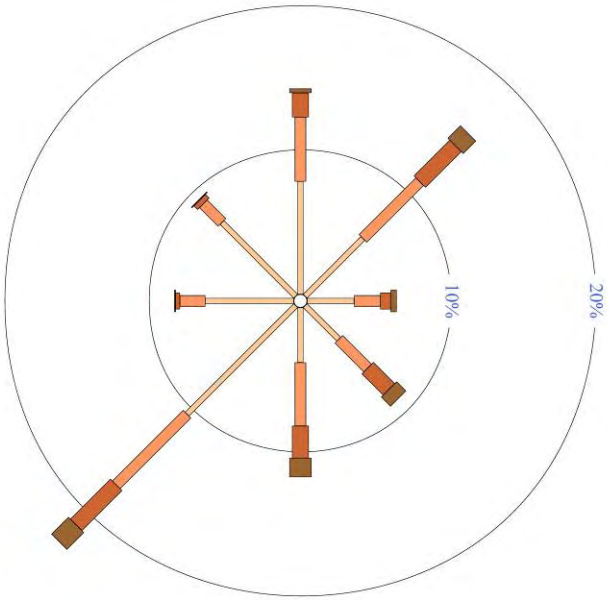
WIND FREQUENCY ANALYSIS (in km/h)
PORT MACQUARIE (HILL ST) STATION NUMBER 060026
Latitude: -31.44 ° Longitude: 152.92 °



Scale factor = 30.0%

9 am Summer
4050 Total Observations (1957 to 2003)

Calm 2%



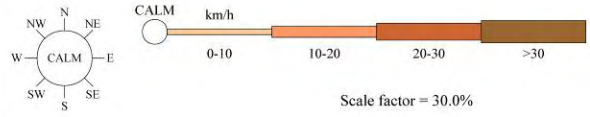
Wind directions are divided into eight compass directions. Calm has no direction.
An asterisk (*) indicates that calm is less than 1% .
An observed wind speed which falls precisely on the boundary between two divisions (eg 10km/h) will be included in the lower range (eg 1-10 km/h). Only quality controlled data have been used.

Australian Government
Bureau of Meteorology

WIND FREQUENCY ANALYSIS (in km/h)

PORT MACQUARIE (HILL ST) STATION NUMBER 060026

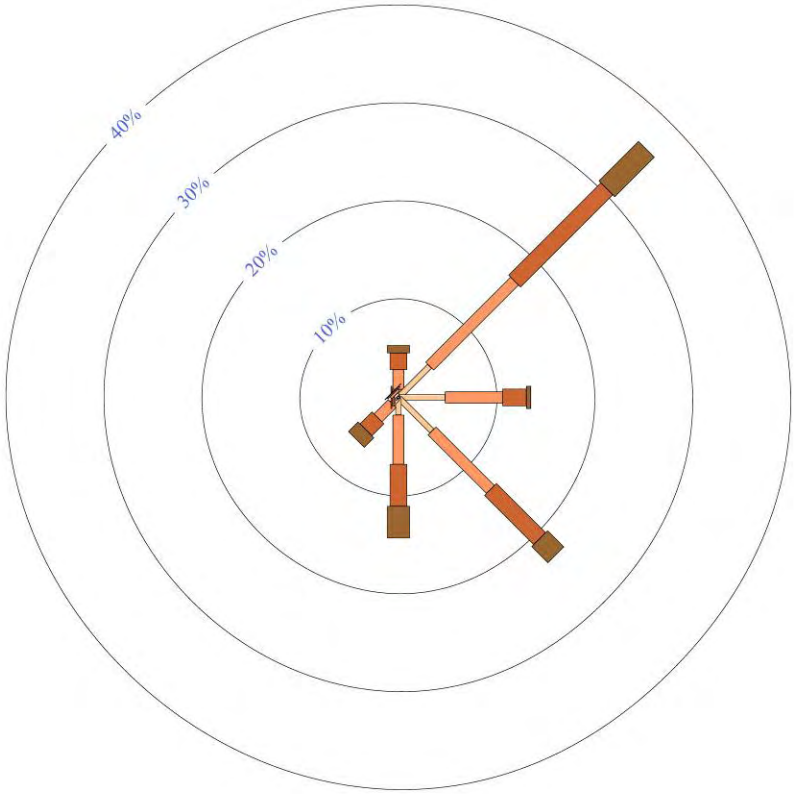
Latitude: -31.44 ° Longitude: 152.92 °



Scale factor = 30.0%

3 pm Summer
4022 Total Observations (1957 to 2003)

Calm *

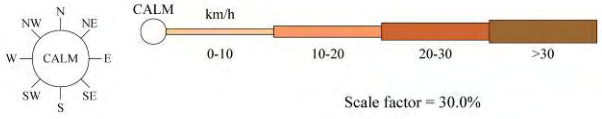


Wind directions are divided into eight compass directions. Calm has no direction.
An asterisk (*) indicates that calm is less than 1% .
An observed wind speed which falls precisely on the boundary between two divisions (eg 10km/h) will be included in the lower range (eg 1-10 km/h). Only quality controlled data have been used.

WIND FREQUENCY ANALYSIS (in km/h)

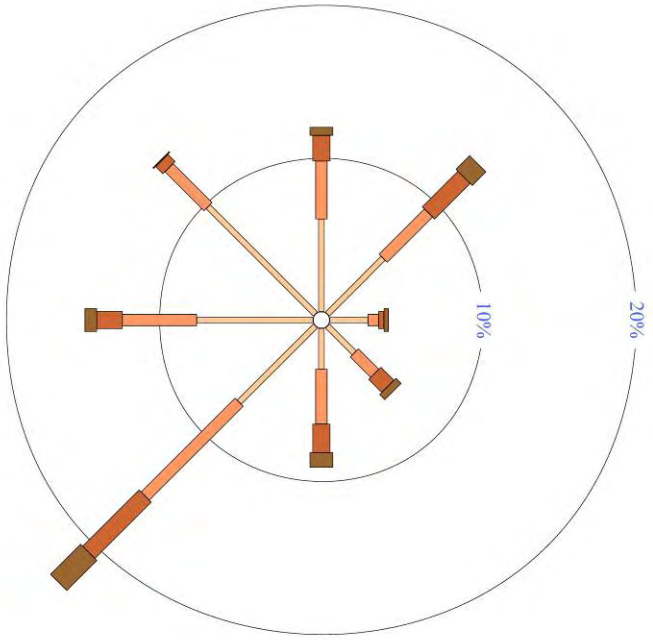
PORT MACQUARIE (HILL ST) STATION NUMBER 060026

Latitude: -31.44 ° Longitude: 152.92 °



9 am Spring
4181 Total Observations (1957 to 2003)

Calm 3%

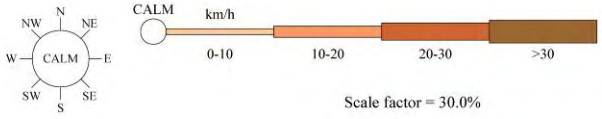


Wind directions are divided into eight compass directions. Calm has no direction.
An asterisk (*) indicates that calm is less than 1% .
An observed wind speed which falls precisely on the boundary between two divisions (eg 10km/h) will be included in the lower range (eg 1-10 km/h). Only quality controlled data have been used.

WIND FREQUENCY ANALYSIS (in km/h)

PORT MACQUARIE (HILL ST) STATION NUMBER 060026

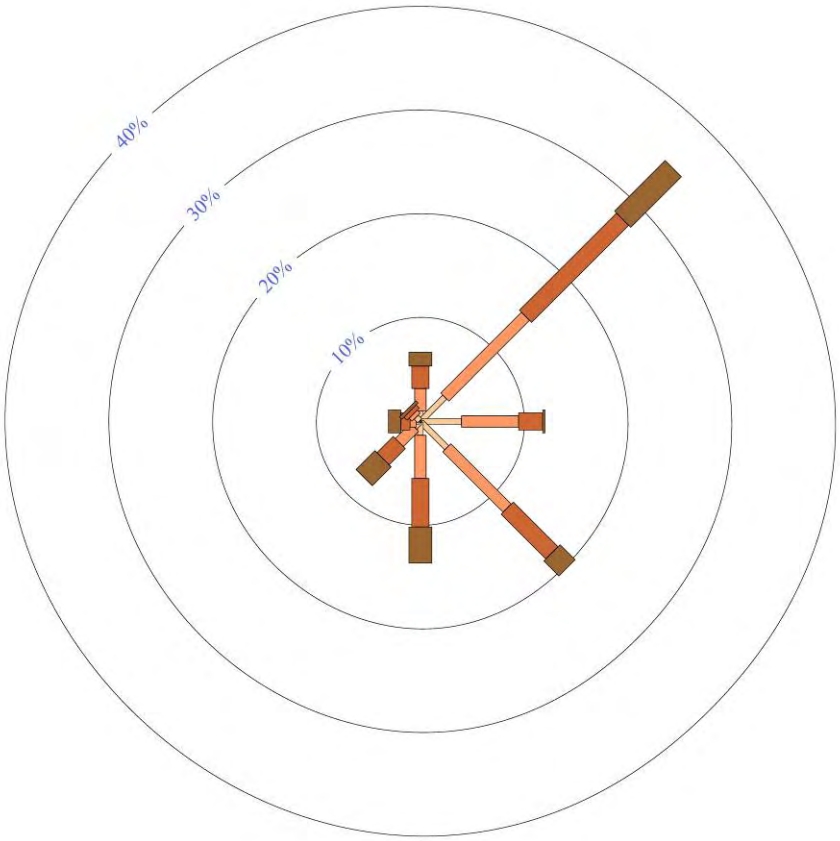
Latitude: -31.44 ° Longitude: 152.92 °



Scale factor = 30.0%

3 pm Spring
4151 Total Observations (1957 to 2003)

Calm *



Wind directions are divided into eight compass directions. Calm has no direction.
An asterisk (*) indicates that calm is less than 1% .
An observed wind speed which falls precisely on the boundary between two divisions (eg 10km/h) will be included in the lower range (eg 1-10 km/h). Only quality controlled data have been used.

Appendix D Agency responses

1. **Letter from DWE 21 May 2009. DWE's technical assessment of WEDGRA (Cardno). DWE request a thorough investigation of potential groundwater impacts.**
2. **Letter from Port Macquarie Hastings Council to TPS dated 21 May 2009. Council's policy on potential potable groundwater resources.**
3. **Letter from Port Macquarie Hastings Council to TPS dated 25 June 2009. Council's response to the draft Environmental Assessment.**

APPENDIX B

COPY

NSW Government
Department of Water & Energy

Mr Alan Bright
A/Director, Coastal Assessments
Department of Planning
GPO Box 39
Sydney NSW 2001

Contact: Rod Browne
Phone: (02) 6740 2347
Fax: (02) 6742 3129
Email: rod.browne@dnr.nsw.gov.au

Our ref: ER 20271
Your ref: MP 06_0085
File: 9049341

21st May 2009

Dear Mr Bright,

MP 06_0085 and MP 07_001, Rainbow Beach, Bonny Hills
Concept Plan, and Open Space Corridor and Constructed Wetland

I refer to previous correspondence from late 2008 and subsequent communications seeking confirmation and clarification of the Department's (DWE's) position on this development proposal. DWE's technical assessment is based on the document, *Rainbow Beach Estate, Bonny Hills – Water Engineering and Environment DGR Assessments*, by Cardno (Qld) Pty Ltd, dated 21 August 2008, hereafter referred to as Cardno report, as well as a site inspection in late 2008.

The first component of the proposal for which approval is being sought at this stage is the Concept Plan which defines the footprint of the residential precincts, a major intersection location, future school sites, the location of a village centre, areas for ecotourism, and the boundaries of the Open Space, Drainage and Wildlife Habitat Corridor. It is understood a comprehensive Environmental Assessment (EA) is yet to be submitted.

The second component is a Preliminary Application for the Open Space, Drainage and Wildlife Habitat Corridor, which includes earthworks for Constructed Wetlands, the creation of fill areas, stormwater treatment and management, and district sporting fields and facilities. There are some significant water management-related issues and potential impacts affecting the drainage, wetland and water treatment components.

DWEs overall assessment comments to be addressed in the EA are provided below:

Excavation for Constructed Wetland

The proposal includes a 10.7 ha Constructed Wetland or lagoon, nominally of 2 m depth and holding around 165 ML at top water level (TWL). Based on an area to volume calculation, the actual depth would average around 1.5 m, but would be 2 m in places. It is to be located downstream of a similar but smaller existing lagoon that has been in place for a number of years, and which is part of the stormwater treatment system for urban development adjacent to the south. The proposed new lagoon, while being a component of the stormwater treatment train, has clearly been sized for the opportunity to gain material for filling various development areas to meet flood height requirements. The Cardno report is not ambiguous about this.

The report provides a reasonable description of the landform, soils and hydrogeology of the development site. The drainage corridor passes through, and the new lagoon is to be located over, a coastal depositional plain which consists largely of a sand profile varying from 0.5 to 5 m in thickness, below which is a denser layer of marine clay. The report indicates, especially when dealing with hydrological matters, that this sand aquifer contains a high quality water source fed by direct infiltration of rainfall, with Standing Water Levels (SWLs) often very close to the surface across the low lying areas. Unfortunately there is no proper groundwater quality investigation included in the report, which makes an adequate assessment of groundwater impacts impossible. However the assumptions about this aquifer seem reasonable and its modelled infiltration and discharge behaviour suggests, from DWE's perspective, that it is a high quality resource, and in line with similar sand aquifer resources along the coastline, deserving of conservation. There are no permanently installed groundwater bores or piezometers across the site to monitor aquifer water levels and quality accurately. Profile information has come from a grid of borehole sampling done to assess the distribution of acid sulfate soils (ASS).

There are a number of groundwater issues requiring comment.

- Impact on aquifer volume

The report, based on the borehole sampling, estimates that the excavated lagoon will be equivalent to a loss in aquifer volume of 7.2%, but which will be replaced by an equivalent surface water volume. DWE does not accept that good quality groundwater resources can be replaced by a surface water storage, particular when it will fluctuate in volume and quality according to seasonal conditions and runoff events. The permanent loss of aquifer volume is not an outcome that is supported, when other options may be available to minimise the impact. The sizing of the lagoon is not based on the scale needed to effectively treat or process stormwater, and thus has an excessive impact on the resource.

- Aquifer interference, dewatering and licensing

The excavation into such an aquifer would normally require licence under the *Water Act 1912* (WA), or an approval under the *Water Management Act 2000* (WMA) if located in an area covered by Groundwater Sharing Plan. In this case the former applies, although the repeal of the WA is expected later this year, transferring all matters to the WMA. DWE will require a more thorough investigation of groundwater impacts for licensing purposes or before endorsing a deemed WMA approval under Part 3A of the *EP&A Act*, and requires a monitoring program in place to measure baseline information.

It is proposed to dewater the aquifer beneath the new lagoon site, for excavation purposes. This requires a volumetric licence under both Acts, and requires an estimate of the quantity of water involved. Both temporarily over the construction period, and permanently if continuing losses are likely. The report suggests that post development SWLs will recover and reach equilibrium with the water level in the lagoons. However, the base of the lagoon will be the natural profile material, that is, sand, and the groundwater modelling parameters assume high vertical and particularly lateral hydraulic transmissivity, suggesting lagoon/aquifer interconnectedness. In other words the groundwater is likely to be in constant flux with water in the lagoon, which will fluctuate with seasonal conditions affecting catchment inflows and evaporation rates. The lagoon will potentially be a source of recharge, and contamination after major runoff events, or a cause of evaporative loss which also reduces water quality.

The destination and quality of dewatering discharge is not addressed in the report, other than it being expected to meet certain discharge requirements, presumably to meet licensing requirements imposed by the Department of Environment and Climate Change (DECC). DWE also has a statutory interest in the receiving water quality.

- Groundwater quality

It is suggested that the new lagoon water quality will be similar to the current wetland lagoon, which is generally of good quality but fluctuates in nutrient, salinity and pH depending on inflow

events. Spikes can occur after significant runoff events. There is no aquifer water quality data provided to allow an assessment of the likely impact of surface/groundwater exchange. A further complication is the presence of high potential ASS, discussed below. This gap needs to be addressed in the EA, and, regardless, the proposal should include the installation of licensed groundwater monitoring bores and an ongoing monitoring program. The report indicates that 4 monitoring sites will be selected, a baseline reference site and 3 bores closer to dewatering activities. The proposed water quality parameters and criteria for groundwater monitoring are similar to those proposed for surface water, some of which appear to be in appropriate. The monitoring program needs to be discussed with DWE.

There is no information presented on the groundwater quality near the existing water treatment lagoon. If the new lagoon is likely to operate in a similar way, then the adjacent groundwater should also be of similar quality.

- Groundwater dependent vegetation and habitat

The report indicates that SWLs across the site, range from 3.2 to 4.7 m AHD, often around 3.5 m. The proposed base of the lagoon will be as low as 1.0 m AHD in places, with water depths of up to 2 m. The overflow weir to Duchess Gully from the lagoon (S4) is to be set at 3.00 m AHD. This suggests there is potential for a general lowering of the water table across the site on average. DWE has a concern that this may affect the condition of native vegetation and habitats, particularly the three Endangered Ecological Communities (EECs) that occur in sections of the site, which are accustomed to a high water table regime.

There are no specific groundwater management measures proposed in the report, other than future monitoring. The preferred approach by DWE to minimise impact and risk on the aquifer is, firstly, for the lagoon to be resized according to the scale and design needed for effective storm water quality treatment, and secondly, for the lagoon to be effectively segregated from the aquifer, typically by lining the bed of the lagoon with a suitable compacted clay material.

ASS Management

The Cardno report indicates that the sand resource beneath the proposed new lagoon contains potential acid sulfate soil (PASS) material. Based on the borehole sampling and analysis, it classifies the material into two distinct layers, low PASS material overlying higher PASS at depth. The low-high PASS boundary varies between 0.1 to 2.0 m AHD, often around 1.25 m AHD.

It is proposed to treat the low PASS material with up to 4 kg/m^3 of lime, including a safety factor, to neutralise it for suitability for landfill. The high PASS material is much more hazardous and the undertaking is to avoid disturbance of this material and to maintain water table levels above it. The bed of the lagoon is supposedly based on the depth of this boundary layer.

Excavation of the lagoon will therefore be a highly technical exercise involving careful testing of the profile to more accurately define the boundary, and control of dewatering activities to ensure the water table remains above it. The report indicates that excavation will take place sequentially in cells, and that each cell will be reflooded once excavation is complete. It is not clear whether this will be rapidly from a source of water, or by gradual recovery of the water table. While the report mentions the treatment of extracted soil in contained areas, the potential requirement to treat any acidic waters, either from dewatering or from treatment area drainage, needs to be addressed also. A more thorough draft ASS Management Plan will need to be included in the EA to address this issue.

In DWE's view, a reduction in the size of the lagoon, particularly depth, would reduce the risk and management challenges imposed by ASS material.

Stormwater Drainage and Watercourses

DWE is not opposed to the general layout of the water treatment and drainage system, but is concerned about the size, depth and unsealed bed condition of the large lagoon (W1). Stormwater treatment ponds W2, W3 and W4 are of much smaller size but presumably of sufficient capacity for effective treatment and appear well located. However, DWE would expect these also to be lined if constructed into the base sands of the profile. The modelling contained in the report reveals that the detention time of flows in the existing lagoon on average is around 30 days, but that the new larger lagoon would increase this to over 60 days. Clearly the sizing of lagoon W1 is based on sand extraction volume rather than water treatment criteria.

Summary

DWE is supportive of the general Concept Plan for the proposed development but has major concerns about the scale and design of the constructed wetlands, because of the potential risk to a high quality coastal sand aquifer. The protection of groundwater resources and associated vegetation and aquatic ecosystems is not something that should be negotiable depending on development cost factors prevailing at the time. The need for lining of excavations for water bodies constructed into good quality coastal sand aquifers is a policy issue that is being reflected in DWE responses to development proposals elsewhere along the coast.

DWE is prepared to engage with the proponent to consider the technical merits of measures to address the above concerns and to assist in fine tuning groundwater investigation and monitoring measures.

Please contact Rod Browne on 6740 2347 if you wish to clarify any of the above or to coordinate inputs from other DWE technical or licensing staff.

Yours sincerely

Mark Mignanelli

Manager Major Projects, Mine Assessments and Planning

PORT MACQUARIE-
HASTINGS COUNCIL

PO Box 84
Port Macquarie
NSW Australia 2444
DX 7415

council@pmhc.nsw.gov.au
www.pmhc.nsw.gov.au

ABN 11 236 901 601

PORT MACQUARIE
HASTINGS

23 October 2009

Mr Brian Tierney
Tierney Property Services
PO Box 493
PORT MACQUARIE NSW 2444

Dear Brian,

**RE: POTENTIAL POTABLE GROUNDWATER RESOURCE
ST VINCENTS FOUNDATION PROPERTY, BONNY HILLS**

Further to your recent enquiry I set out hereunder Council's position regarding the potential use of the aquifer underlying the St Vincents Foundation property at Bonny Hills as a future resource for either potable water or for irrigation purposes.

Council has previously reviewed and discarded the potential for coastal aquifers within the LGA as a source of potable water, in favour of the significant surface water resources that already exist and the potential issues with extraction of groundwater near urban areas. Specifically, Council would not consider groundwater extraction in this area as the aquifer underlying the St Vincents Foundation property is adjacent to Council's Bonny Hills Sewerage Treatment Plant.

Furthermore, Council is well advanced in the establishment of its dual reticulation system using six star rated recycled water (highly treated effluent) throughout the urban areas for use in domestic toilet flushing and garden watering and also irrigation of public and private lands. Council's policy is to encourage residents to use the reticulated reclaimed water for these uses and discourage the extraction of groundwater resources as an alternative.

If you have any further questions, please contact Fiona Conlon, Water Supply Investigation & Utilities Engineer on 6581 8534 or fiona.conlon@pmhc.nsw.gov.au

Yours Sincerely,

for Murray Thompson
Manager Water Supply Services

APPENDIX G

PORT MACQUARIE-
HASTINGS COUNCIL

PO Box 84
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DX 7415

council@pmhc.nsw.gov.au
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ABN 11 236 901 601

COPY

PORT MACQUARIE
HASTINGS

Refers to : Part 3A 2008/0001 &
2008/0002

25 June 2009

Mr J Dunn
Tierney Property Services
PO Box 493
PORT MACQUARIE NSW 2444

Dear James

St Vincents Foundation - Part 3A Major Projects Concept Plan MP 06_0085 & Project Application MP 07_0001 – Open Space Management Strategy & Landscape Master Plan

Thank you for providing copies of the Landscape Master Plan and Open Space, Drainage & Wildlife Corridor Environmental Assessment Reports.

Further to Council's letter dated 17 April 2009, Council has undertaken a review of the Open Space Management Strategy (OSMS) contained in the Water & Engineering Report (Cardno, October 2008) and the Landscape Master Plan (Edaw, March 2009) and comments are provided below.

Separate comments will be provided in response to the voluntary planning agreement (VPA) offer provided by St Vincents Foundation dated 26 May 2009 regarding management of the open space corridor. A VPA for the corridor will refer to an Open Space Management Plan and the Plan will need to be finalised and approved by Council prior to commencement of any works authorised by a Project Application approval for the corridor.

Open Space Management Strategy

It will be necessary for the following matters to be addressed as part of an Open Space Management Plan for the corridor. Please note that comments are based on the current proposal and if the nature of the proposal changes during the course of the assessment process it may be necessary for Council to revise its comments. Council's Acting Manager Parks & Gardens, Liam Bulley and Manager Natural Resources, Tim Molloy would be available to discuss matters referred to below where necessary.

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The following comments are made in relation to the Cardno OSMS.

- The Weed Management Plan is inadequate. The plan needs to address all existing weeds and potential aquatic weeds and refer to the registered application rates of selective herbicides for all listed weed species.
- Bush regeneration works require work sheets / action plan for each precinct detailing current and proposed constructed ecological communities, weed control, planting species and densities. A monitoring and evaluation procedure to enable sign off for each site during the developer maintenance phase is needed.
- It is noted that habitat enhancement is referred to in Section 4.1. The Strategy needs to include a nesting box program to offset impacts of the development.
- Include *Melaleuca biconvexa* into planting list for swamp sclerophyll communities.
- Planting densities to be referenced, as plants per m/2 and performance indicators are needed to reflect success.
- Additional flora and fauna requirements may be necessary if a road is needed to traverse the Open Space Corridor. It is noted that the current Area 14 Traffic Study will assist to determine the need for a road connection through the Open Space Corridor.

Landscape Master Plan

- Council considers there is an opportunity to include part of the Sewage Treatment Plant Buffer (southern part of delineated Eco-Tourist site) as part of the open space, drainage and habitat corridor.
- There is a need to rationalise the number of pathways traversing the open space corridor and duplications on the northern boundary.
- A dedicated maintenance hardstand ramp for boat access is required to allow Council to access the lakes. This ramp needs to be positioned adjacent to a perimeter road.
- There needs to be a 4m (minimum) wide maintenance access path to the turf areas in the southern section of the open space corridor. This path needs to have minimal impact to the vegetation in the open space corridor.
- The APZ on the northern edge of the open space corridor needs to be incorporated into the perimeter road / pathway / housing setbacks, rather than being vegetated open space. Council will not accept responsibility for maintenance of a separate APZ.

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- 'Parkland' is not preferred along the northern edge of the corridor other than the proposed formalised parks due to ongoing maintenance costs. This area could be low shrubland with a pedestrian pathway and be part of the bushland asset.

- The south-western corner of the open space corridor needs to be referred to as an APZ, not as open space and this area will not be maintained as such by Council.

- Rationalise the number of timber structures and observational decks fringing the lakes. Remove the interactive water edge feature from the design.

- Staging of open space and associated infrastructure needs to be commensurate with the staging/progression of the development. Staging of works from the top to the bottom of the catchment is preferred to assist with weed control.

- The main concerns in relation to the smaller proposed wetlands are the ongoing maintenance costs including the potential for water quality problems, algal blooms and aquatic weed proliferation. While it is acknowledged that the Cardno report indicates the existing lake is free of weeds this is unlikely to be the case when development is intensified. The proposed wetland ponds W2 & W3 appear unnecessary and would contribute to further maintenance costs. It is strongly recommended that consideration be given to combining the two existing small systems E1 & E2 with proposed W2 & W3 to provide a single more manageable system. Ultimately three larger systems (E3, W1 & a new combined system) would be cheaper and simpler to maintain financially and practically. Alternatively, all of the proposed small wetlands should be incorporated into part of the existing lake (ie the south eastern end) It may be possible to reduce the footprint of proposed wetland (W1) with this modification to the existing ponds.

- It is noted that the existing water body overflows to a point in Duchess Creek adjacent to the northern boundary of the sewage treatment plant. The alignment of the discharge is restricted by the boundary of the STP site and as such is currently discharging against the flow of Duchess Creek. There are concerns with the hydraulic problems this may have on the Creek and the STP site with additional development. Council's Sewerage Section would be willing to enter into discussions with TPS for an appropriate realignment of this discharge into the creek on the STP site.

- The proposed stormwater quality edge treatment on the northern edge of the lake is not desirable. It is unlikely this narrow strip will function in reality given the likely low detention times and poor hydraulic efficiency. In addition, the layout has ongoing maintenance and access issues. An alternative solution is required.

- The overflow areas between the lakes needs to be bridged to provide adequate pedestrian access (and safety) to a accommodate 1:10 ARI flood event.

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- All overflow or linking channels need to be at least 2.0m wide in the bed if they are to be maintained by mowing/slashing.

- Perimeter road batters are to be 1:6 to allow maintenance by mowing and slashing.

As noted above, Council would be pleased to discuss these matters with Tierney Property Services. Please do not hesitate to contact Vanessa Penfold on (02) 6581 8536 or by e-mail vanessa.penfold@pmhc.nsw.gov.au should you wish to arrange a meeting to discuss the matters referred to above.

Yours sincerely

Matt Rogers
Director Development & Environment

Copy to: Ms Paula Tomkins
Major Assessments Branch
Department of Planning