North Byron Parklands

Technical Paper

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On-Site Waste Water Report

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MINISTER FOR PLANNING
NSW STATE GOVERNMENT

ON-SITE WASTEWATER MANAGEMENT LAND CAPABILITY ASSESSMENT

FOR

PROPOSED GATEHOUSE & ADMINISTRATION BUILDING
NORTH BYRON PARKLANDS (PARKLANDS) PROJECT

AT

LOTS 402, 403, 404, 410 DP: 755687
Tweed Valley Way/Jones Road, North Ocean Shores/Wooyung

OWNER
NORTH BYRON SHIRE PARKLANDS

TRINE SOLUTIONS PTY LTD

DATE
5th June 2010

Report No: TS10605

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Illustration 1.1	- Site Location of Gatehouse & Administration Building
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1.0 INTRODUCTION

Trine Solutions has been commissioned by the applicant to prepare an On-site Wastewater Management Assessment Report for a proposed Gatehouse and Administration Building to be constructed in association with the North Byron Parklands development proposal (Parklands) at Lots 402, 403, 404, and 410 DP: 755687 Tweed Valley Way and Jones Road North Ocean Shores/Wooyung.

The proposed location of the Gatehouse and Administration Building are shown on Site Plan – Location of Gatehouse and Administration Building (Illustration 1.1 Event Area and Land Use Structure) as described in the planning report.

The site is not connected to a centralised sewerage treatment system and will require approval for two (2) on-site wastewater treatment systems to service the proposed Gatehouse and Administration Building, ancillary to the current development application.

This report will identify and address the relevant matters for the effective and sustainable management of wastewater generated by the proposed Gatehouse and Administration Building.

The report describes the site conditions as they effect the land application of effluent, presents the results of field testing, provides advice and recommendations on the available options for on-site wastewater management. Calculations for sizing of land area requirements are based on the methods set out in AS/NZ 1547:2000 – 4.2 Land Application Systems

2.0 THE SITE AND SURROUNDING ENVIRONMENT

The site and the surrounding environment is as depicted on the Aerial Photo *Plate 1 (appended to this report)

The physical attributes of this large holding contain low rolling hills associated with the Billinudgel landscape and alluvial plains associated with the Crabbes Creek landscape. The main rural activities are beef grazing (breeding herds) with the alluvial flats generally cleared with improved pasture. There are small stands of timber located on the moderately sloped hills although these are also generally cleared and used as pasture for grazing. Both sites are located above the 1% flood level.

3.0 DESIGN PRINCIPLES OF WASTEWATER MANAGEMENT TRAIN

The design principles adopted for effective wastewater management for the proposed development are:

- Must be energy efficient
- Appropriate for the periodically use of the buildings
- Cost effective
- Sustainable for the life of the development
- Reuse of resources where possible

4.0 SITE ASSESSMENT

The Existing Environment - Gatehouse Location

Plate 1 - Gatehouse

Plate 2 - Gatehouse

The Existing Environment – Administration Building Location

Plate 3 – Administration Building

Plate 4 – Administration Building

5.0 SOIL ASSESSMENT

Hand auger holes were dug for the purpose of percolation testing and classification of the site soils. The soils consist of top soil to a depth of 100 to 300mm and consistent clay loam to a depth greater than 1 metre.
Refer to photo plate:

- Borehole 1 – Gatehouse
- Borehole 1 – Administration Building

The soil classification and profile description is consistent with published works by Morand titled 'Soil Landscapes of the Murwillumbah- Tweed Heads 1:100 000 Sheet'

Soil description

Soil Landscape	Alluvial – Level to gently undulating mid to upper alluvial plains and valley flats of smaller streams draining hills on the metamorphics of the Neranleigh-Fervale Group
Grouping	cr – Crabbes Creek
Description	Deep (>200cm) well drained Brown Alluvial Clays and Clay Loams
Limitations	Flood hazard, localised water logging, stony soils which can be hard setting - *Not noted as this site

Percolation testing was undertaken on 7th June 2010 being a climatic period when results are conservative due to cold temperatures, short sunny days (low exposure) and recent high rainfall.

The results indicated that the soils are not limited for the application of effluent a percolation rate in the order of 0.5m/day can be achieved.

The complete results of the site assessment have been summarized in the table below.

TABLE OF SITE CHARACTERISTICS **: Gatehouse & Administration Building**	
Soil:	Clay Loam
Land area:	Not limited
Flood Potential:	Nil
Exposure	Good wind & sun exposure
Slope %	5% to 10%
Landform	**The sub-soils are well drained**
Run-on and up-slope seepage	Nil
Erosion potential	Nil
Site drainage	Good
Buffer distance	All buffers to be maintained
Depth to bedrock	>3m
Geology/regolith	**The underlying stratum provides good internal drainage**
Exchangeable Sodium Percentage	**Not limiting**
Permeability (Ksat)	0.5m/day

Borehole 1 - Gatehouse

Borehole 1 – Administration Building

6.0 WASTEWATER MANAGEMENT OPTIONS

Treatment standard

The minimum treatment standard considered appropriate for the site is Secondary Treatment. This will ensure the bacterial and nutrient quality will not compromise the soil structure nor will it significantly add to the nutrient mass balance of the existing use of the site. To achieve this standard it is recommended a passive system be installed such as a septic tank with minimum capacity of 5000 litres for each system to ensure sufficient residence period combined with a pressure dosed sand filter. The sand filter is the most appropriate for achieving secondary treatment due to the limited use of the facilities which poses a constraint for say use of an aerated system or constructed wetlands that are dependent on constant supply of sewage to maintain efficient function to prevent die-off of biological mass and plant growth

Land Application Method

No limitation exists for applying effluent to the land as large land areas suitable are available as evident in the photo plates

The recommendation considered appropriate to comply with design principles is bottomless sand filters discharging to the parent subsoil's or alternatively sand filters discharging to ETA beds

The typical land area requirements for each system are detailed below. It should be noted that the hydraulic load generated by the use of the buildings is small as the buildings are occupied during daylight hours only with no overnight accommodation and no laundry facilities

7.0 GATEHOUSE

The gate house is a small building as depicted on Illustration 1.1\c3394713-Gate House (appended to this report). The gate house is manned by 2 staff members periodically and presents a small hydraulic load. For design purposes a load of 300 L/day is adopted incorporating a shock load of 200 litres per day.

Sizing of Application Beds

AS/NZS 1547 2000 Method
Loading Rates for Trenches & Beds AS/NZS 1547:2000 4.2A7.3 and Table 4.2A1 (D.L.R. Secondary treated effluent)
Bed dimensions shall be determined from the relationship
Reference: 4.2A7.3.2 AS/NZS 1547:2000
Soil category 4 – Design Loading Rate (DLR) - 12 mm/day (conservative)

$$L = \frac{Q}{DLR \times W}$$

$$\therefore \quad L = \frac{300L}{12 \times 1}$$

Area required = $25m^2$

8.0 ADMINISTRATION BUILDING

The Administration Building is depicted on Illustration 1.1\c3394713-Administration Building (appended to this report). The building is occupied by 2 staff members and additional staff for up to 20 days per year. No overnight accommodation is proposed. The sewage is generated from toilet and shower use only although some casual washing up of tea and coffee cups is likely. For design purposes a load of 500L/day is adopted incorporating a shock load of 400 litres per day.

Sizing of Application Beds

AS/NZS 1547 2000 Method
Loading Rates for Trenches & Beds AS/NZS 1547:2000 4.2A7.3 and Table 4.2A1 (D.L.R. Secondary treated effluent)
Bed dimensions shall be determined from the relationship
Reference: 4.2A7.3.2 AS/NZS 1547:2000
Soil category 4 – Design Loading Rate (DLR) - 12 mm/day (conservative)

$$L = \frac{Q}{DLR \times W}$$

$$\therefore \quad L = \frac{500L}{12 \times 1}$$

Area required = 42m^2

9.0 SUMMARY AND CONCLUSIONS

The site and soil assessment demonstrates that appropriate sustainable arrangements can be made for on-site sewage management for all wastewater generated from the proposed Gatehouse and Administration Building to be located at the 'Parklands' development proposal. This is based on the following observations and recommendations:

- ✓ Site is not constrained by land area available
- ✓ Suitable soils for wastewater application
- ✓ Low intermittent hydraulic loads
- ✓ Secondary Treatment via Sand filters recommended
- ✓ Passive energy efficient treatment system
- ✓ Sustainable for the life of the development

10.0 REFERENCES

Australian Standard AS/NZS 1547:2000 - On-Site Domestic-Wastewater Management.

Plumbing Code of Australia – December 2004

Crites – Tchobanoglous (1998) - Small and Decentralized Wastewater Management Systems

Metcalf & Eddy – Wastewater Engineering - Third Edition

G. Swarbrick – Short Course in Waste Management – University N.S.W. 1996

Ratcliff (1983) Published Paper

EPA, United States Environmental Protection Agency, Office of Water Washington, D.C. (Sep. 1999) - Wastewater Technology Fact Sheet – Intermittent Sand Filters

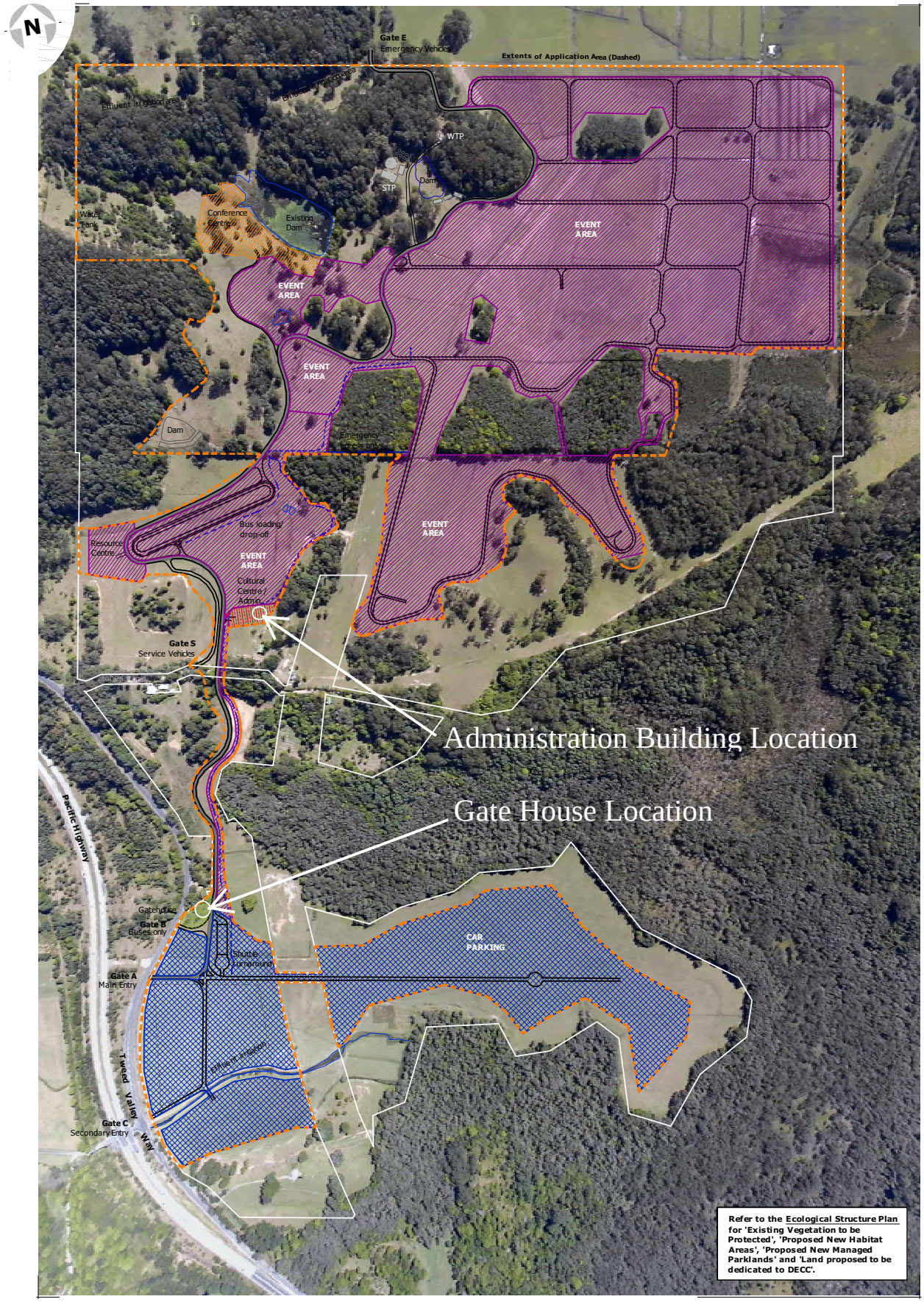
Metcalf & Eddy (1991) Wastewater Engineering 3rd Edition

Morand, D.T. (1994) Soil Landscapes of the Murwillumbah-Tweed Heads 1:100,000 Sheet Report, Soil Conservation Service of NSW, Sydney.

Morand, D.T. (1994) Soil Landscapes of the Murwillumbah-Tweed Heads 1:100,000 Sheet Map, Soil Conservation Service of NSW, Sydney.

End of Report

SITE PLAN - LOCATION OF GATEHOUSE & ADMINISTRATION BUILDING



Legend:

The Site | Extents of Application Area (Dashed) | Car Parking

Event Area | Conference Centre Uses | Cultural Centre/Administration Uses | Gatehouse

Spine Road (7m wide) | Event access lane (6m wide) | Main pedestrian route

North Byron Parklands

0 160m

1:8000 (@ A3)

Date 28.04.10

Author Reference SDR 09_120

IMPORTANT NOTE |
Cadastral information is subject to survey. The alignment of the aerial photograph and vectorial overlays is approximate only. This plan is conceptual only and subject to detailed survey and design.

Sources | Aerial Photography: Bill Mills (2009) | **Cadastre:** Ardill Payne (2009) | Major contour = 5m | Minor contour = 1m

Prepared by

design team ink

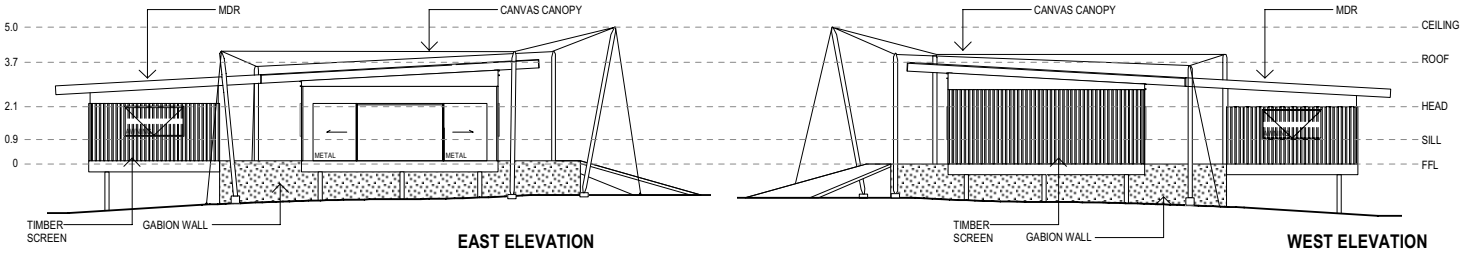
Illustration | **1.1**

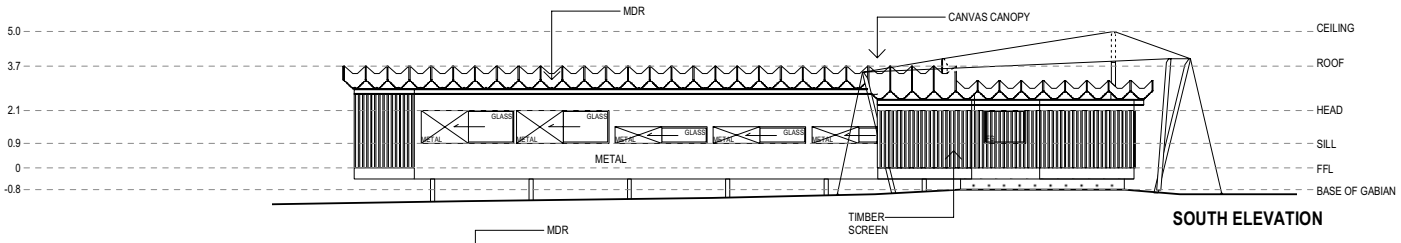
Event Area and Land Use Structure

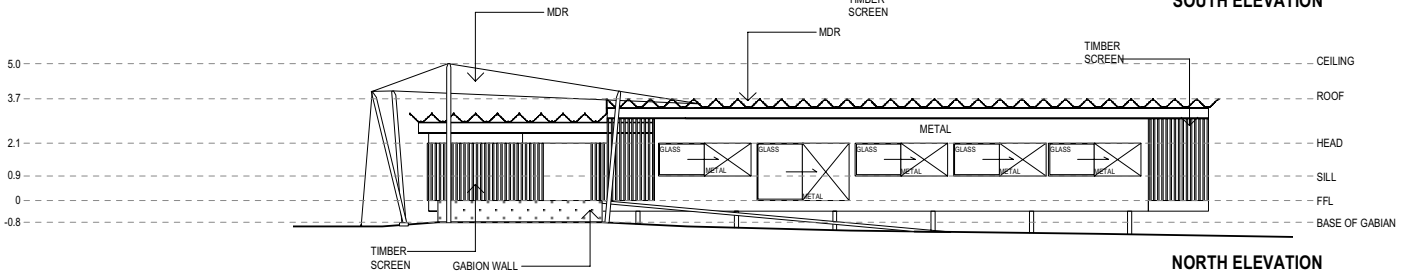
North Byron Parklands | Tweed Valley Way & Jones Road

1334

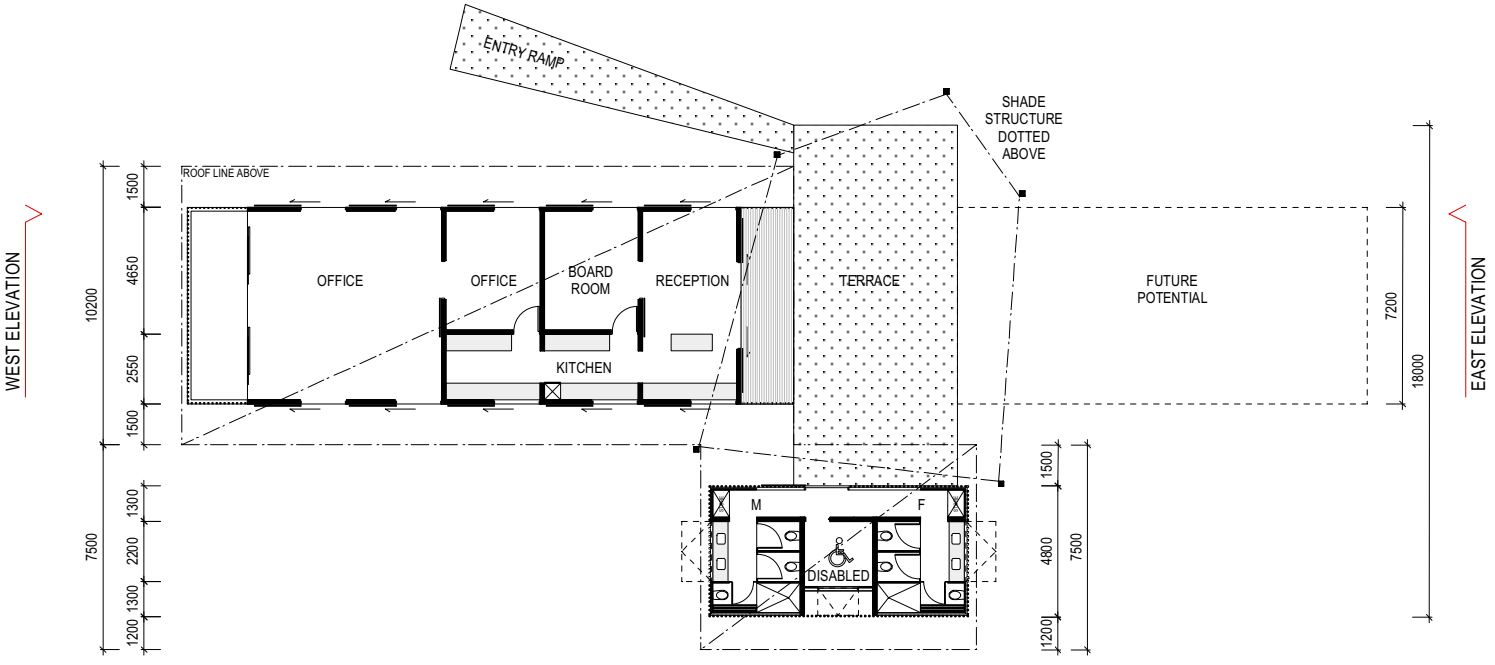
*Plate 1. Aerial Photo of Surrounding Environment







NORTH ELEVATION



PLAN

SOUTH ELEVATION

by

0 4m

1:200 (@ A3)

Prepared

Date 28.04.2010

Author Reference SDR 09_120

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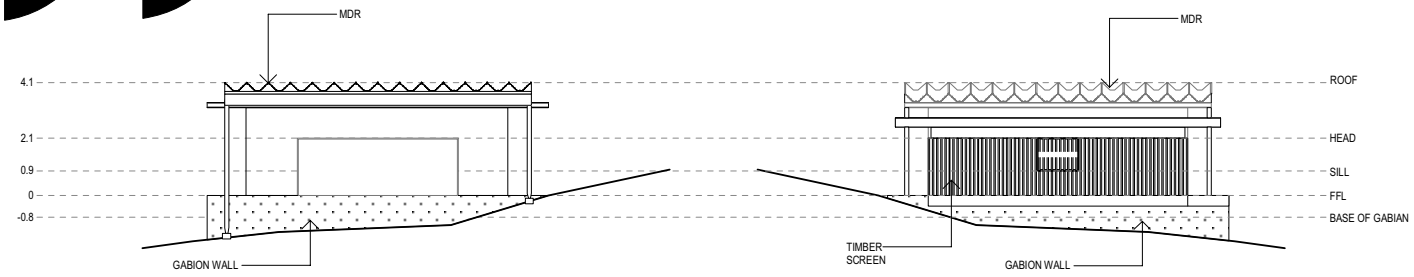
\c16777215;

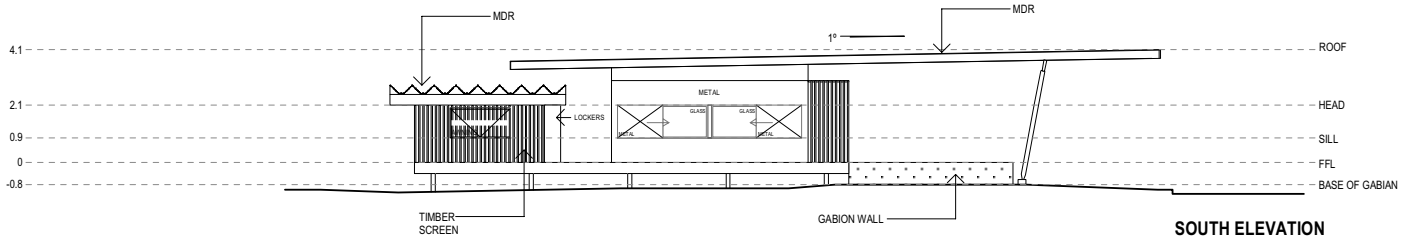
Sources\c10066329; | Aerial Photography: Bill Mills (2009) **| Cadastre:** Ardill Payne (2009) | Major contour = 5m | Minor contour = 1m

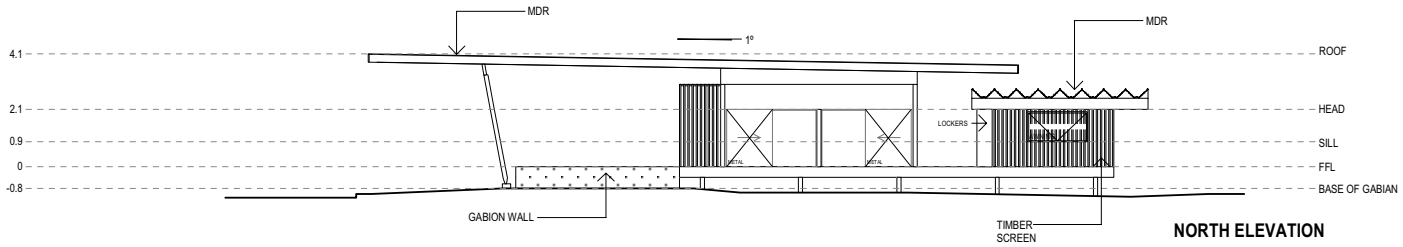
design team ink

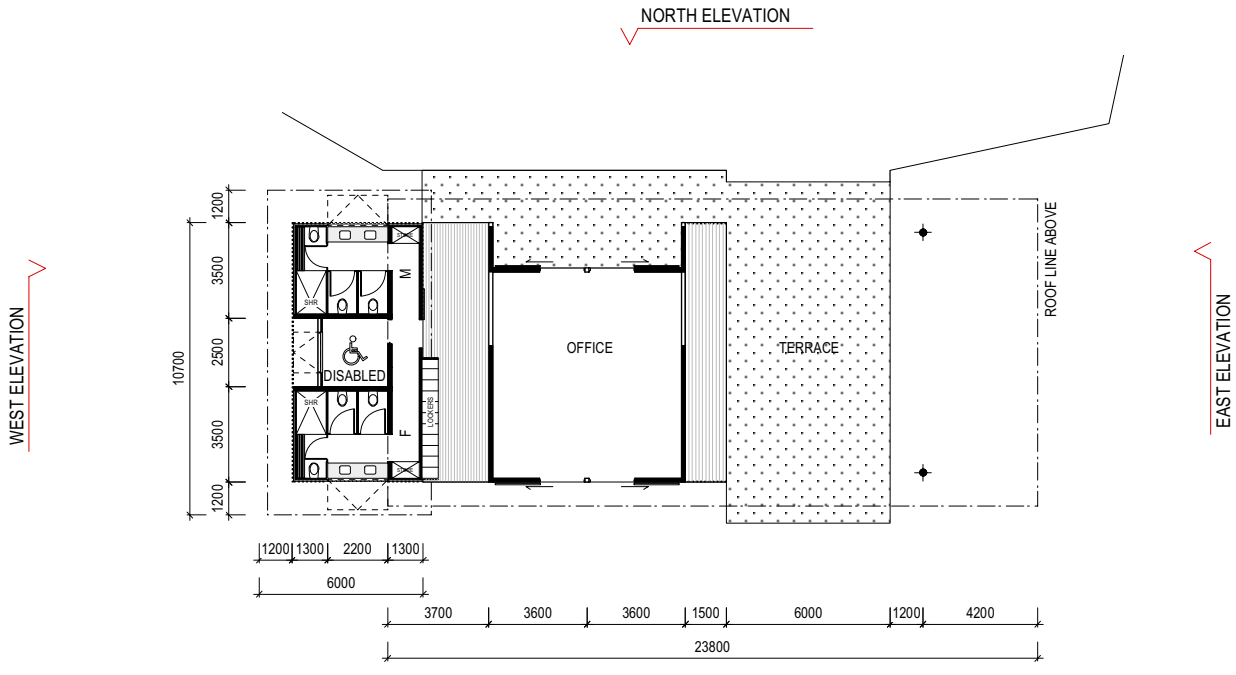
Illustration\c3394713; **\c10040166;| 1.1\c3394713; Administration Building 1336**

North Byron Parklands \c10040166;| Tweed Valley Way & Jones Road









PLAN

by

0 4m

1:200 (@ A3)

Prepared

design team ink

Date 28.04.2010

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Reference 09_120

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Illustration\c3394713; **\c10040166;| 1.1\c3394713; Gate House 1337**

North Byron Parklands \c10040166;| Tweed Valley Way & Jones Road