

Civil

HEALTH INFRASTRUCTURE SCHEMATIC DESIGN REPORT CIVIL ENGINEERING

for Health Infrastructure

31 July 2014

141233

Taylor Thomson Whitting (NSW) Pty Ltd Consulting Engineers ACN 113 578 377
48 Chandos Street St Leonards NSW 2065 PO Box 738 Crows Nest 1585
T 61 2 9439 7288 F 61 2 9439 3146 ttwsyd@ttw.com.au www.ttw.com.au

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1.0 EXECUTIVE SUMMARY

This report addresses the civil requirements of Phase 3 Schematic Design.

As part of the proposed Byron Shire Central Hospital, Taylor Thomson Whitting (NSW) Pty Ltd has been engaged by Health Infrastructure to provide advice on civil aspects of the project.

The project proposal is for three (3) clinical buildings up to two storeys accommodating an emergency department, acute medical beds, maternity services and surgical wards. To support the building there will be roads, carparking, truck loading areas and plant. The works are proposed by NSW Health Infrastructure.

This report will assess civil engineering requirements such as: stormwater, Onsite Stormwater Detention (hereafter OSD), pollution and litter control, flood impacts, earthworks, erosion and sediment control, existing service relocation and modifications for the Byron Shire Central Hospital site including work in Ewingsdale Road's road reserve.

The key issues raised include:

- Size and location of OSD tank
- Vehicle access to the loading dock
- Vehicle access to buildings during construction works

2.0 INTRODUCTION

The Byron Shire Central Hospital site at 54 Ewingsdale Road, Ewingsdale is located about 1km from the Pacific Highway interchange, between William Flick and McGettigans Lanes and approximately 5km from the centre of Byron Bay.

This civil engineering report contains a brief description of the stormwater system proposed. It also covers civil engineering issues such as pollution control, existing services relocation and modification, erosion and sediment control during construction, and flood requirements.

2.1 The Development Site

The northern side faces and is parallel with Ewingsdale Road. Ewingsdale is a two lane rural road with grassed swales and road shoulders.

The property is predominately green field; the Byron Bay Ambulance Building is located on the eastern side of the property. The ambulance station has driveway access off Ewingsdale Road. The land falls at about 5% from west to the eastern boundary.



Figure 1 - Development Site

Beyond the eastern boundary is a perennial tributary of Simpsons Creek and open grassed fields.

Bordering on the southern boundary are Parkway Drive residential properties. The western side shares part of the boundary with paddocks and an energy substation.

3.0 EXISTING CONDITIONS

3.1 Existing Buildings

The only building on the site is the ambulance building. This building is about three (3) years old and will not be modified as part of the hospital works.

3.2 Existing Internal Carpark and Roads

There is a concrete driveway and carpark off Ewingsdale Road which connects to the ambulance parking and loading area. The existing access road and drive entry will be upgraded and modified to suit the hospital development. Work may include increasing the width of the access road to accommodate trucks including Heavy Rigid Vehicles.

The ambulance station provides about 10 parking spaces for ambulance staff / visitors and approximately 3 spaces for ambulances.

3.3 Ewingsdale Road

Ewingsdale Road is a dual lane two way road allowing motorists to access Byron Bay from the Pacific Highway interchange. Ewingsdale Road is sign posted as 60 and 80 km/hr near the hospital site. The 60 km/hr speed limit exists from the Pacific Highway interchange to the western side of hospital site whereby the speed in both directions is 80 km/hr for traffic on the going / coming from the east.

Off Ewingsdale Road is a driveway access for the existing ambulance station.

3.4 Existing Services

The ambulance station has a retention / detention dam, on-site waste water treatment / irrigation system, rainwater reuse tanks and piped stormwater system.

The ambulance building has telecommunication, water and energy supply conduits or overhead cables.

Following the western boundary alignment toward Parkway Drive, service diagrams indicate there are underground electrical conduits from the substation.

On both sides of Ewingsdale Road are power cables (both above ground and buried) with associated poles and stays. Buried in the road boundary are telecommunication, electrical HV and water conduits. The ambulance access has a pipe and head wall conduit which will need to be modified to suit the proposed driveway / access configuration.

A service locator will be required to collect information on the existing services to determine if relocation or modification, due to the hospital works, is required. The intent is to have a minimal impact on existing services. Where required, encasement will be included.

3.5 Existing Stormwater

As mentioned above, there is an existing stormwater and retention / detention dam located between the ambulance station and the eastern boundary. It is envisaged that the dam be increased in size to accommodate the proposed hospital stormwater.

There are 3x900mm diameter pipes that convey the Simpsons' Creek tributary under Ewingsdale Road. Ewingsdale Road is graded so as to sheet flow into grass swales that drain to Simpsons' Creek tributary. Other than pipes / head walls conveying the swale flow under driveways, there is no piped stormwater within the frontage of the hospital site.

Modification to existing pipes and swales will be determined depending on the upgrade requirements for Ewingsdale Road.

3.6 Water Sensitive Urban Design

Stormwater has the potential to be reused onsite provided it is treated to a suitable standard. Reused stormwater can typically be used for flushing toilets, laundry water supply and irrigation of gardens.

The incorporation of water-reuse adds upfront capital and on-going maintenance costs. High level water treatment devices, pumps, storage tanks and additional pipe work add to the capital costs. Maintenance of the supply pipes, treatment devices and pumping system, contributes to maintenance costs.

There is potential for stormwater reuse for irrigation of landscaping and the cleaning of external surfaces.

A wetland to treat stormwater is considered possible as the site is not limited with the amount of open space, setback to neighbouring buildings and proximity to public property. Refer to the pollution and litter control section below for how stormwater contaminants are treated. In addition, Water Sensitive Urban Design (hereafter WSUD) devices, such as bioretention swales & basins, landscape buffers will be considered for incorporation where public health and safety are not compromised.

Refer to Tim Fitzroy & Associates report for an Integrated Water Management Plan.

3.7 Geological Conditions

Refer to geotechnical report by Geotech Investigations Pty Ltd, Project Ref: GI 1375-A 18th July 2012.

Testing by *Geotech Investigations* indicate that there is top soil overlaying silty clay of varying depth up to 4m deep overlaying clayey silt of which is underlain by weathered basalt.

Subgrade strength tests (California Bearing Ratio (CBR) tests) have returned values varying between 7% and 11%. CBR test 1 is located within the proposed loading dock area with a CBR of 7%. This value will be used to design the loading dock, car parks and perimeter road pavements.

Table 1 - Minimum Temporary Batter Slopes (Geotech Investigations 2014)

<u>Material</u>	<u>Short Term (H:V)</u>	<u>Long Term (H:V)</u>
Stiff clay / silts	1.0:1.0	2.0:1.0
Low strength basalt (or better)	0.6:1.0	1.0:1.0
Controlled fill batters	1.2:1.0	2.0:1.0

It is expected that deleterious materials together with topsoils may be encountered within future pavement areas and should be stripped and removed to spoil.

Further testing will be required during excavation.

3.8 Soil contamination

It is not expected that the site has any contamination. Past investigations indicate that the site was used for farming with the only potential for contaminants from a possible sheep dip. As a consequence, the risk from contamination is considered low.

The NSW government Natural Recourses Atlas indicates there is low risk from acid sulphate and dry land salinity on the site.

4.0 CIVIL DESIGN

The site is occupied by the existing ambulance building and carpark which have stormwater and onsite stormwater detention.

4.1 Stormwater

The proposed development stormwater will be picked up and conveyed via pipe, swales, and overland flow to the OSD basin. A larger OSD basin will replace the existing retention / detention dam constructed for the ambulance station. The OSD basin will maintain the discharge point at the Simpsons' Creek tributary.

All proposed roofs will collect stormwater via gutters and downpipes and be connected to the in-ground system.

Stormwater pipes and pits will be in accordance with AS3500 - National Plumbing and Drainage Code and in accordance with Byron Shire Council & Northern River's Stormwater Drainage management guidelines.

A stormwater concept plan is shown in **Appendix 1**.

4.2 Onsite Stormwater Detention (OSD)

In accordance with Byron Shire Council Onsite Detention Policy and Council's Draft DCP, OSD will be required for the development. It is required post development flows are to be reduced to the pre development flow rates for storms including the 5 year ARI up to the 100 year ARI.

Due to the natural fall of the land – west to east, the detention basin is proposed to be on the eastern boundary, reconstructing the existing retention / detention dam.

Initial basin estimates using DRAINS stormwater modelling program indicates that 900m³ OSD volume is required with a footprint of about 1000m².

As stormwater is being retained and released at pre-development rate in accordance with Council's requirements, there will be no increase in stormwater impact on downstream properties and this includes flows in Simpsons' Creek tributary.

Discussions with NSW Office of water indicate that a setback of 40m from the class 1 tributary is required to be observed. Any works undertaken on waterfront land may require a Controlled Activity Approval under the Water Management Act 2000.

4.3 Pollution and Litter Control

Northern Rivers Handbook of Stormwater Drainage Design requires development sites greater than 150m² meet quality targets prior to stormwater discharge. Post-development flow volumes and stormwater quality are controlled to pre-development conditions and are required to achieve neutral or beneficial effect (NorBE).

The site stormwater will pass through pollutant control devices to remove; oil and silt, nitrogen, phosphorous and gross pollutants. In addition to the WSUD devices mentioned at section 3.6, trash screens, gross pollutant traps, oil & silt arrestors, and litter baskets will be incorporated into the design as required.

Pollution control measures will clean the stormwater to the level required prior to discharge from site.

The pollution control devices will require on-going inspection and maintenance as part of the hospital's operations.

4.4 Earthworks

The siting of the building has been carried out to minimise cut and fill. Due to the lower floor level (FFL16.5) and loading dock expected to be about 1-2m below the existing ground levels, additional engineered fill may be required to be stockpiled around the site in lieu of disposing. It is likely that cut material from the site cannot be reused for building platforms due to the high clay content. As a result, engineered material is likely to be required to be brought onto the site. All building slabs will be slab-on-ground construction, no suspended slabs are expected.

Due to the height difference from the ground floor to the existing levels, retaining walls will be required. Where space permits, batters may be able to reduce the amount of retaining walls.

Excavation is expected to be in the clays and possibly weathered basalt, so conventional earthmoving equipment will be utilised.

4.5 Pavements

It is proposed that the construction of the loading dock will be a reinforced concrete pavement. A concrete pavement will be suitable for the expected heavy vehicle loads, torsional stresses from turning manoeuvres and the minimal on-going maintenance in comparison to asphalt pavements.

The perimeter loop road will be constructed from asphalt and designed to accommodate heavy vehicle loads. Concrete is not considered suitable due to the additional cost and construct time in comparison to asphalt.

The carparking area will be made from asphalt to suit car / light loads only.

Asphalt pavements may, over time, become deformed and require repair. Pot hole and crack maintenance / rectification will be required.

All footpaths will be constructed from concrete.

To protect pavements, subsurface drainage will be required in addition to concrete kerbs and edges.

All new pavements require topsoil and deleterious material is to be stripped from the site. Excavated material such as basalt may be able to be reused as engineered fill, provided it complies with the requirements set out in the civil specification

4.6 Services coordination

All hydraulic roof downpipes will be collected by the in-ground stormwater system and connected to the OSD basin.

The gas tank within the loading area will be coordinated with truck turning manoeuvres to ensure vehicles are able to access the service area without any impact.

Proposed and existing services will be coordinated. Where conflict with existing services cannot be avoided, removal, relocation or diversion will be required. It is noted that within the Ewingsdale Road reserve there is located water, telecommunication, and high voltage electrical services. There are no plans to relocate or modify any of the existing services. We have requested levels of existing services – this information is not yet available. An investigation of the conduit depths and alignments is being undertaken after which more information on what degree of service protection will be required. There is risk that encasing, bridging or another method of protection is required especially where the new roundabout, bus lay-by, and shared path are proposed.

Discussions with Rous water and Telstra indicate that reducing cover will require approval and relocation if protection is not suitable. Discussions with Essential Energy and Optus are proposed.

4.7 Ewingsdale Road

Reducing the speed limit along the hospital frontage to 60 km/hr is proposed.

Discussions with Council and the RMS have indicated that a shared path and second access off Ewingsdale Road will be required. Maintaining the ambulance access is required with modifications to Ewingsdale Road to prevent right turn manoeuvres. The second access will be at the western side of the site onto Ewingsdale Road. A seagull or roundabout type arrangement has been discussed. Both options require road widening and land dedication. The amount of land dedication will be determined whether a single or multiple lane arrangement is proposed.

In addition to the second access and shared path along the site frontage, a bus stop / lay-by is required for the local public bus service to drop and collect passengers. Discussions with the local Byron area bus provider - Blanch's Bus Company – indicates that the largest bus is 40 feet or 12.5m long. A bus lay-by of 45m is suitable. Refer to State Transit's Bus Infrastructure Guide (2011) for minimum lengths.

Our proposal is for a single lane roundabout. The final design and location needs to accommodate the possibility of a two lane roundabout.

4.8 Future Expansion Opportunities

The OSD, stormwater, and vehicle access have not been designed to accommodate future works.

There are minimal areas from a civil perspective where future expansion is possible. Additional parking can be added to the green areas that are not developed as part of this project in the future; this will require new pavement, drainage, and kerbing. Any future hard stand area will need water attenuation and pollutant removal devices.

4.9 Existing Ambulance Station

In the north east corner of the hospital site is Byron Bay Ambulance Station. This station is about 3 years old and is not planned to be modified as part of the hospital works.

The station has a sewer treatment and irrigation system as well as on site stormwater detention. Both systems will be modified as part of the hospital works.

The station has an access road, about 10 spaces for ambulance station employees / visitors and approximately 3 spaces for ambulances. Only the access road will be modified as part of the hospital works.

5.0 FLOODING

5.1 Flood Impact

The Byron Hospital site is not known to be located within a flood area. However, the Simpsons' Creek Tributary has been previously assessed (Black Earth Environmental Services, 2010) to have a 1% AEP flood height of RL15.00.

The hospital is required to sit above the 1% AEP flood height plus the required freeboard.

The freeboard as required by Council is 0.5m above the 1% AEP.

Byron Shire Council's Draft Comprehensive Guidelines for Stormwater Management is to be read in conjunction with the Northern Rivers Local Government Development Design and Construction Manuals. The Northern River's Handbook of Stormwater Drainage Design requires that the Probable Maximum Flood (PMF) is investigated.

Council is currently undertaking a flood analysis for Simpsons Creek including hospital's tributary which is due to be finished at the end of 2014. The outcome of the flood analysis may impact on the hospital flood levels.

Investigation into the (PMF) generated by the catchment upstream in the Simpsons' Creek Tributary will need to be undertaken. The PMF height will be considered and safe-guards and mitigation put in place where it is practical. Safe guards that will need to be considered are evacuation plan, bunding and diversion works etc.

6.0 EROSION AND SEDIMENT CONTROL

6.1 Erosion and Sediment Control

A preliminary Erosion & Sediment Control plan has been prepared and is included as **Appendix 2**.

During construction erosion and sediment control measures will be put in place to prevent or ensure any site stormwater run-off is cleaned prior to discharge.

It will be required that dust suppression, construction vehicle inspection and cleaning systems are in place. Further, with regular inspections, maintenance and modifications, erosion and sediment control devices will need to be cleaned out after storm events.

Erosion control and sediment collection devices will need to be modified and adjusted to suit building work as it progresses.

7.0 ENVIRONMENTALLY SUSTAINABLE DESIGN

7.1 Concrete

The aim of the GBCA Mat-4 Concrete Credit is to help reduce greenhouse gas emissions and resource use associated with the use of concrete. Up to 3 points are available and they are achieved as follows;

- Reducing the Portland cement content by at least 30% by mass when measured against a reference case one point is awarded. This is increased to two points when the reduction is at least 40%.
- An additional point is available when at least 50% of the mix water for all concrete is captured or reclaimed water and at least 40% of coarse aggregates is crushed slag aggregates.

7.2 Steel

The aim of the GBCA Mat-5 Steel Credit is to encourage environmentally responsible production, design and fabrication methods that result in efficient use of steel as a building material. Up to two points are available for this credit and the methods to achieve the points depend on whether or not the majority of steel used is in slab reinforcing or structural steel.

When structural steel comprises 60% of the total steel tonnage, up to two points are awarded when higher strength grades are used and the steel has been supplied by an accredited contractor.

For structures where reinforcing steel comprises 60% of the total steel tonnage, one point is awarded when at least 95% of the supplied reinforcement has a strength grade of at least 500MPa and 60% of the reinforcement is produced using energy reducing processes in its manufacture. An additional point is awarded when at least 15% of the reinforcement is assembled using off site optimal fabrication techniques.

Depending on the final quantities of steel used it is likely that 1 point would be available for this credit.

7.3 Excavated material

There is potential to reuse excavated site material as engineered fill and backfill. The benefit of reusing this material would reduce the amount of material sent to landfill. For material to be reused it must conform to the requirements set in the civil specification. It is expected that excavated basalt can be reused whereas clay and topsoil has limitations.

Existing pavement material on Ewingsdale Road has potential to be reused however, the material may be required as in the case of concrete slabs, be broken down to the correct size prior to use. As quality cannot be assured in some materials, reuse is unlikely to be beneficial.

7.4 Stormwater reuse

Due to the potential for contaminants to enter the recycled stormwater network and the sensitivity of the development, being a public hospital, rainwater reuse will not be incorporated in to the building.

Prepared by:
**TAYLOR THOMSON WHITTING
(NSW) PTY LTD**

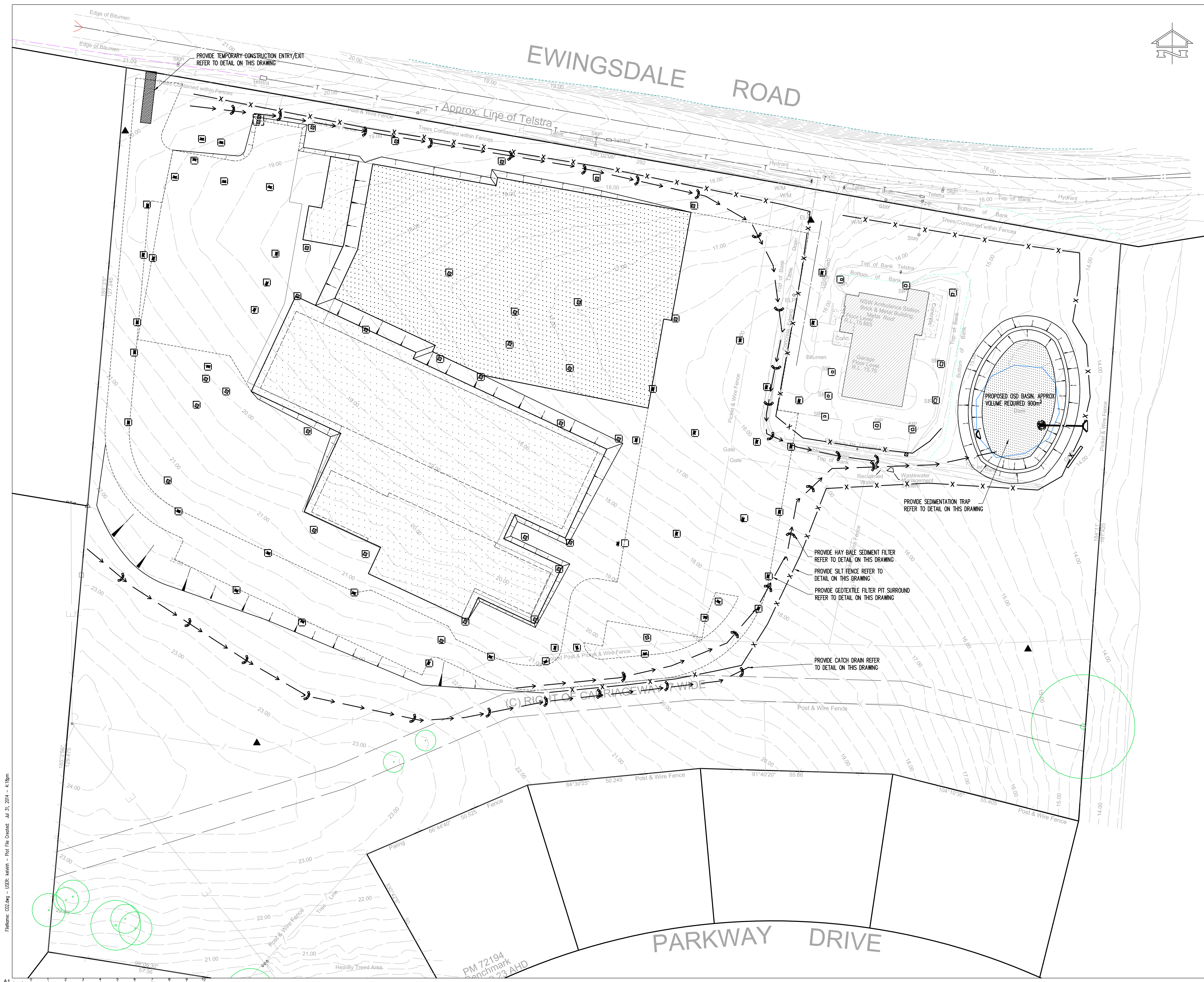
Authorised by:
**TAYLOR THOMSON WHITTING
(NSW) PTY LTD**



KELVIN HOLEY
Senior Civil Engineer

PAUL YANNOULATOS
Technical Director

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Rev	Description	Eng	Draft	Date

Project
Byron Shire Central Hospital
54 Ewingsdale Road,
Ewingsdale

Sheet Subject
Erosion and Sediment Control
Plan

Architect
Woods Bagot

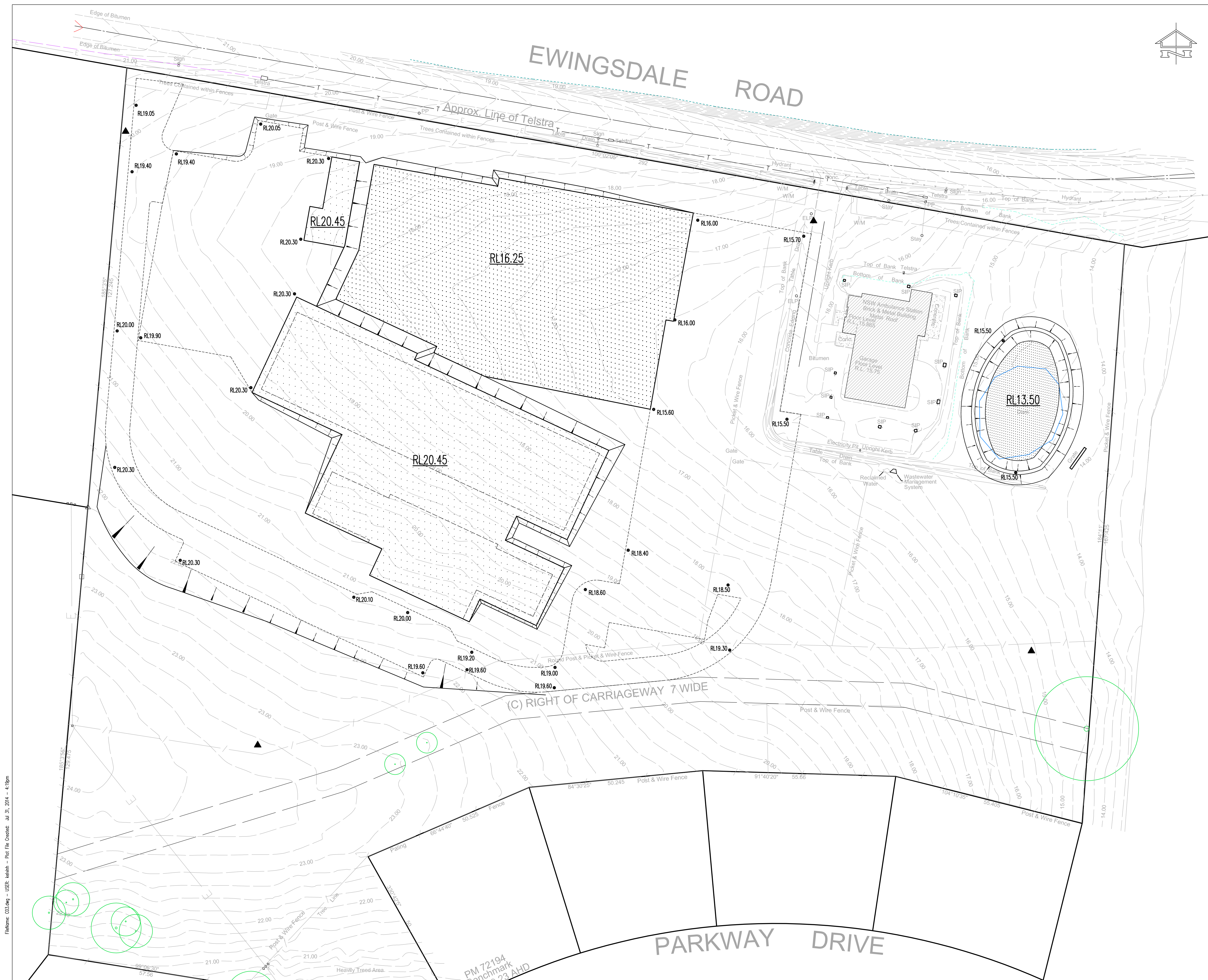


TaylorThomsonWhitting
Consulting Engineers
48 Chandos Street St Leonards NSW 2065
T: +61 2 9439 7288 F: +61 2 9439 3146 ttw@ttw.com.au
Taylor Thomson Whitting (NSW) Pty Ltd A.C.N. 113 578 377

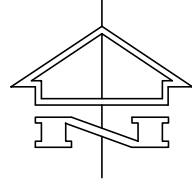
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A	SCHEMATIC DESIGN	KH	KH	31.07.14
Rev	Description	Eng	Draft	Date

Project
Byron Shire Central Hospital
54 Ewingsdale Road,
Ewingsdale

Sheet Subject
Bulk Earthworks Plan

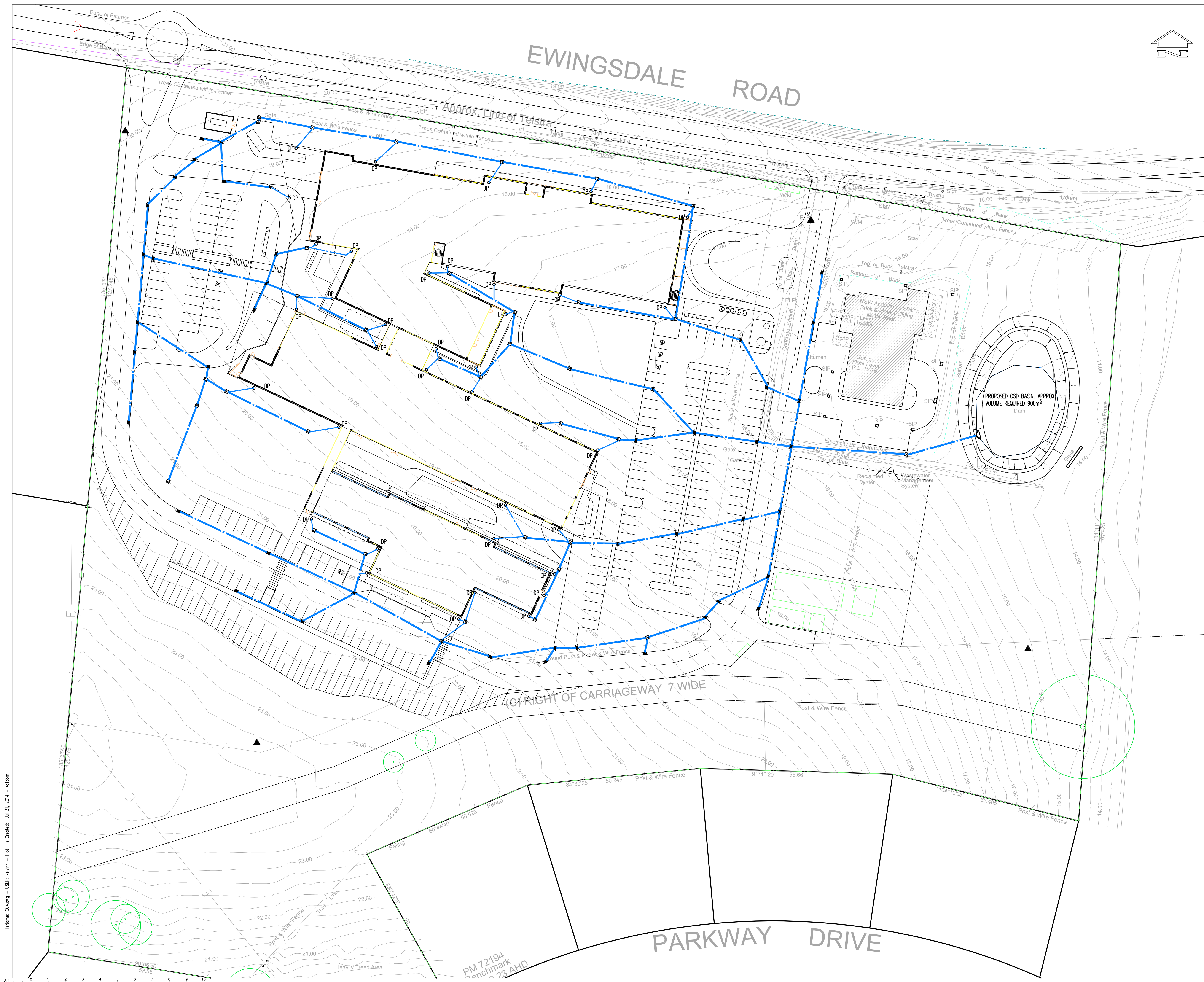
Architect
Woods Bagot

 **TaylorThomsonWhitting**
Consulting Engineers
48 Chandos Street St Leonards NSW 2065
T: +61 2 9439 7288 F: +61 2 9439 3146 ttwsyd@ttw.com.au
Taylor Thomson Whitting (NSW) Pty Ltd A.C.N. 113 578 377

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Project
Byron Shire Central Hospital
54 Ewingsdale Road,
Ewingsdale

Sheet Subject
Stormwater Concept Plan

Architect
Woods Bagot



TaylorThomsonWhitting
Consulting Engineers
48 Chandos Street St Leonards NSW 2065
T: +61 2 9439 7288 F: +61 2 9439 3146 ttw@ttw.com.au
Taylor Thomson Whitting (NSW) Pty Ltd A.C.N. 113 578 377

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