

Civil



TaylorThomsonWhitting

Sutherland Hospital Planning Project State Significant Development Civil Engineering Design Report

for Health Infrastructure

Issue P2 - 9 April 2015

141061

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1.0 EXECUTIVE SUMMARY

This report addresses the Civil engineering preliminary requirements of the Secretary's Environmental Assessment Requirements (hereafter SEARs) Section 78A (8A) of the Environmental Planning and Assessment Act.

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

The planning approval will seek approval for a two storey building. To support the building there will be a new roads, car parking, ambulance drop off and plant. There will also be refurbishment within the existing hospital. The works are proposed by NSW Health Infrastructure.

This report will assess the requirements of the relevant SEAR's and review civil engineering issues such as: erosion and sediment control, stormwater, Onsite Stormwater Detention (hereafter OSD), pollution and litter control, existing service relocation and modifications.

1.1 Existing Site

The development site is part of the existing grounds of Sutherland Hospital.



Figure 1 – Existing Sutherland Hospital

1.2 Stormwater Design

The hospital site is located on the crest of a localised hill, which is divided into two main catchments being north and south. The north catchment drains into the Kingsway; while the south drains to Karimbla Road.

The stormwater design including the on-site detention (OSD) is designed in accordance with Sutherland Shire Council's DCP Chapter 8 Ecological Sustainable Development Section 5e "Onsite Detention".

Initial basin estimates using DRAINS stormwater modelling program indicates that 25m³ OSD volume is required for the northern catchment; where 15m³ OSD volume is required for the southern catchment.

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.

Schematic Stormwater plans are included in Appendix A.

2.0 INTRODUCTION

As part of the Sutherland Hospital development, Taylor Thomson Whitting has been engaged by Health Infrastructure to investigate and report on civil engineering aspects of the project.

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

2.1 RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Item	SEARs Key Issues – Civil	Civil Comments
1	General	The study has been carried out with consideration to relevant guidelines and planning documents including: Sutherland Shire Council planning documents including flood maps and Sutherland Shire Council Development Control Plan and relevant Council documents, Australia Standards, Australian Rainfall & Runoff, Managing Urban Stormwater – Soils & Construction Volume 1 2004 (Landcom), and NSW Floodplain Development Manual (2005)
6	Ecologically Sustainable Development Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.	This report comments on water sensitive urban design measures available to the site with respect to captured stormwater.
9	Sediment, Erosion and Dust controls (Construction and Excavation) Detail measures & procedures to minimise & manage the generation & off-site transmission of sediment, dust & fine particles. Relevant Policies & Guidelines: • Managing Urban Stormwater – Soils & Construction Vol 1 2004 (Landcom) • Approved Methods for the Modelling & Assessment of Air Pollutants in NSW (EPA)	An erosion and sedimentation plan has been prepared in accordance with Councils requirements, Landcom's 2004 publication. See sections 4.3 of this report for additional detail. An Schematic Erosion and Sediment Control plan is provided in Appendix A .
10	Utilities Prepare an Integrated Water Management Plan detailing any proposed alternative water supply, proposed end users of potable and non-potable water, demonstration of water sensitive urban design and water conservation measures.	This report comments on water sensitive urban design measures available to the Hospital site with respect to captured stormwater.

13	Drainage Provide details of the drainage associated with the proposal, including stormwater, drainage infrastructure and OSD, which shall be designed in consultation with Byron Shire Council and must avoid any adverse impacts on downstream properties.	TTW has prepared schematic drainage design in accordance with Sutherland Shire Council DCP, AS3500, and Australian Rainfall and Runoff. The proposed hospital redevelopment will reduce or maintain stormwater flows for the 5-year through to the 100-year ARI storm events and will have no negative downstream impact. See sections 4.4 of this report for additional detail. A Schematic Stormwater plan is provided in Appendix A.
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2.2 The Existing Site

The main hospital buildings at the Sutherland Hospital sit centrally on the site with the Main Entry to the north and are accessed from the Kingsway road. The hospital is surrounded by an access ring road with car parking typically located to the north-west and south-east corners of the site, with a new car park at the north eastern corner of the site currently under construction. The Emergency Department is to the western edge of the hospital and ambulances can enter either from the Kingsway or from Kareena Road. A separate building housing the Ambulance maintenance is sited opposite the ambulance drop off.

The site slopes generally from north to south with a small area to the north of the site falling north towards the Kingsway. A building basement at Level 1 cuts into the slope and tying in with the natural ground levels to the south end of the hospital. The maintenance; engineering and loading dock zones are located to the south with direct access into the basement at Level 1 and these services zones take up the entirety of Level 1. The basement extends underneath the existing ED and partially out under the adjacent car park. Redundant services tunnels and basements are also assumed to be located under the car parks to the front of the site due to previous buildings in this location.

2.3 Existing internal Carpark and Roads

The road network in the vicinity of the Main Works is an 'L' shaped concrete road connecting Kingsway to Kareena Road. The road is to cater for patient drop off at the main entry and access to the northern and western car parks. The road also connects to the ring road around the whole hospital. The ring road connects to ambulance parking, loading area and car parking both on grade and multi-storey to the south of the site.

The 'L' shaped road is constructed of rigid pavement where the car parks and ring road is constructed of flexible pavement. The condition of the pavement for the internal roads and car parks appear to be satisfactory and there appeared to be no pavement failures in the vicinity of the project site.



Figure 1 - Aerial Photo Existing

2.4 Existing Infrastructure

As the hospital as a whole is located on the crest of a localised hill, the site drains to the north and south. The public car parks fronting Kingsway and the main access road drain to the north while the public car parks fronting Kareena Road and the medical car park (car park 4) drain to the south through the current ambulance drop off to the ED and down to Karimbla Road.

The existing stormwater pipes in the Kingsway are Council owned pipes while the pipes draining through the ambulance drop off are owned by the Hospital.

From Dial Before You Dig information, there are a number of services which will need to be relocated such as stormwater, water, electrical for carpark lighting and communications. There has been an in ground services survey completed by LTS Lockley dated July 2014.

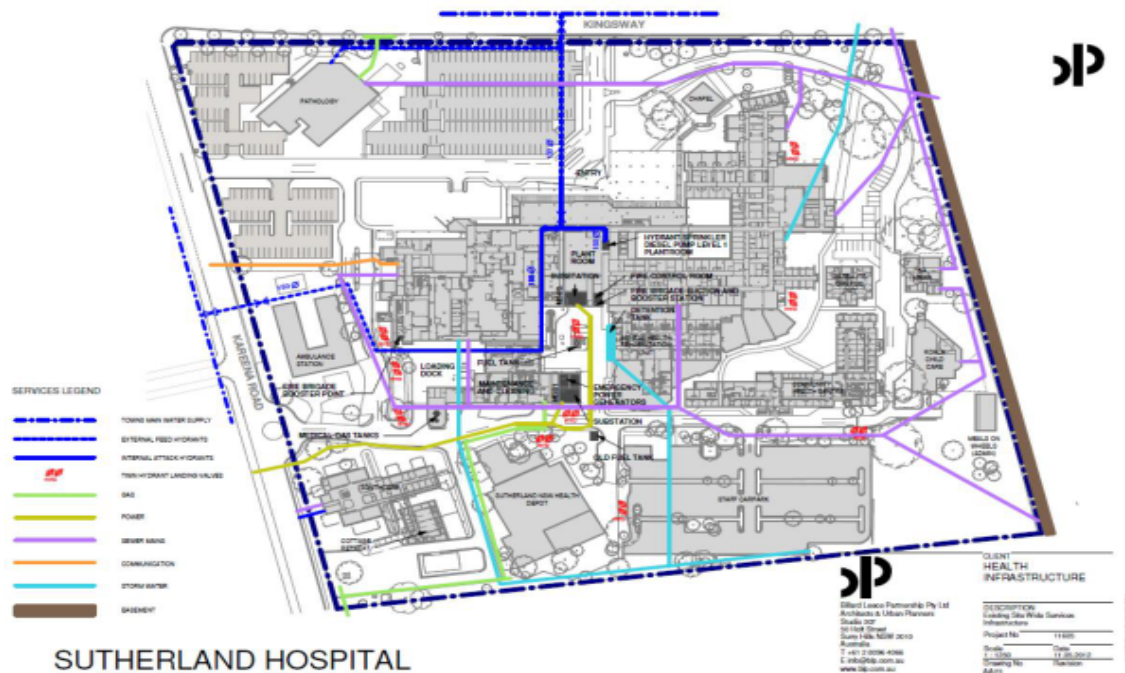


Figure 2 - Existing Site Services

2.5 Existing Stormwater

The hospital site is located on the crest of a localised hill, which is divided into two main catchments being north and south. The north catchment drains into the Kingsway; while the south drains to Karimbla Road.

The north catchment is mainly impervious with the buildings, access road and car parks. The stormwater is collected from the roofs via gutters and downpipes to the in-ground system; where the ground surface water is collected to the in-ground system via stormwater pits. The in-ground system is connected to the Kingsway using a 450 diameter pipe.

The south catchment is also mainly impervious with buildings, access road and car parks. The stormwater is collected from the roofs via gutters and downpipes to the in-ground system; where the ground surface water is collected to the in-ground system via stormwater pits. The in-ground system is Karimbla Road using a 525 diameter pipe. The southern catchment has an on-site detention tank in the loading area assisting in controlling the stormwater discharge.

3.0 PROPOSED DEVELOPMENT

3.1 New Building

- a new 2 storey building plus plant and minor expansion of basement at the northwest corner of the existing building,
- reconfiguration of northern and western carpark
- new patient drop off for the new building,
- new ambulance drop off to the ED and ambulatory access,
- earthworks for the new building,
- stormwater drainage re-routing, on-site detention storage and water quality treatment,
- Coordination of overland flow paths with building entry points and pedestrian zones,
- Coordination with service routes and future development stages.

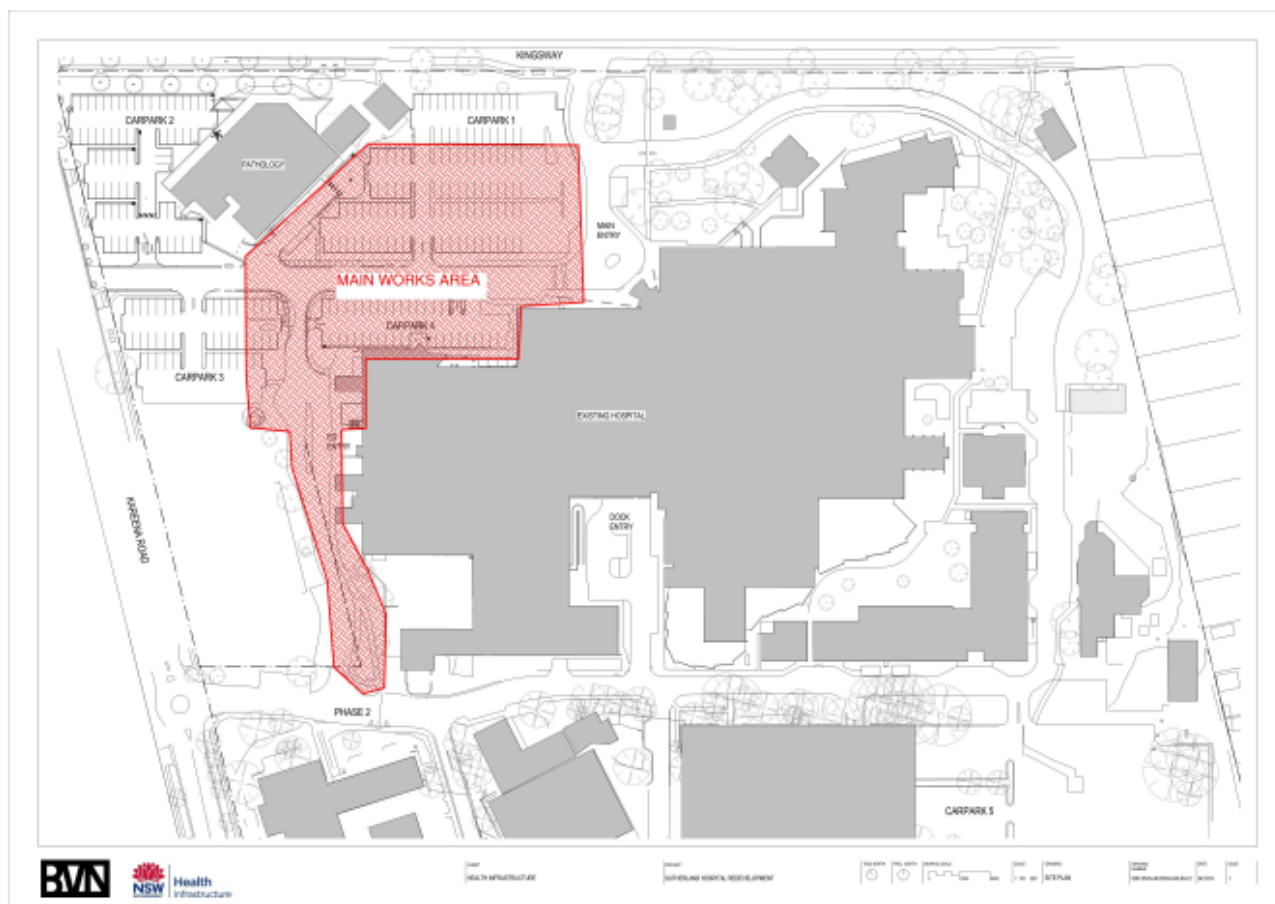


Figure 3 – Proposed Civil Works Extent

4.0 CIVIL ENGINEERING

4.1 ENVIRONMENTALLY SUSTAINABLE DESIGN

4.1.1 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.

4.1.2 PVC

The aim of the GBCA Mat-6 PVC Credit is to reduce the environmental and health impacts of Polyvinyl Chloride (PVC) by encouraging the use of PVC material which adheres to best practice guidelines. Up to two points are available and they can be achieved by:

- One point is available where at least 60% of the common uses of PVC products in the buildings (by cost) complies; and
- An additional point is available where at least 90% of the common uses of PVC products in the buildings (by cost) complies.

4.1.3 Stormwater

The aim of GBCA Emi-5 Stormwater is to encourage and recognise the minimisation of peak stormwater flows and the protection of receiving waters from pollutants. Up to three points are available and they can be achieved by:

- The post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge from site does not exceed the pre-development peak 1.5 year ARI event discharge; and
- For One point, all stormwater discharged from the site meets the pollution Reduction Targets in Column A of Table Emi-5.1;
- For Two points, all stormwater discharged from the site meets the pollution Reduction Targets in Column B of Table Emi-5.1;
- For Three points, all stormwater discharged from the site meets the pollution Reduction Targets in Column C of Table Emi-5.1;

Pollutant	Reduction Target (% of the typical urban annual load)		
	A	B	C
Total Suspended Solids (TSS)	80%	80%	90%
Gross Pollutants	85%	90%	95%
Total Nitrogen (TN)	30%	45%	60%
Total Phosphorus	30%	60%	70%
Total Petroleum Hydrocarbons	60%	90%	90%
Free oils	90%	90%	98%

Table Emi- 5.1 Pollution Reduction Targets

Columns A, B and C are a range of pollution reduction targets set by the GBCA to assist in the designer in determining the appropriate stormwater quality management systems to achieve the necessary Green Star points.

From the calculations, the post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge from site does not exceed the pre-development peak 1.5 year ARI event discharge area. This is achieved through a reduction in impervious areas, rainwater harvesting, introduction of the swale along the east and west boundaries.

However Sutherland Shire Council's DCP 2006 Chapter 8 Ecological Sustainable Development Section 5f "Water Quality Control" requirements are between Columns A & B. Sutherland Shire Council's aim is to reduce pollutants and sediments in stormwater discharge from development sites.

To achieve this, TTW will set up a 'MUSIC' model (Model for Urban Stormwater Improvement Conceptualisation) to determine each device required to achieve the above targets for the Main Works. The MUSIC model predicts the performance of stormwater quality management systems. It is intended to help plan and design appropriate urban stormwater management systems for their catchments.

It is proposed to meet these pollution control criteria by passing the stormwater through pollutant control devices to remove: oil and silt, nitrogen, phosphorous and gross pollutants. In addition to the Water Sensitive Urban Design (WSUD) devices mentioned at section 4.2, trash screens, gross pollutant traps, oil & silt arrestors, and litter baskets will be incorporated into the design as required.

4.2 Water Sensitive Urban Design

The stormwater design is to utilise WSUD measure to reduce peak outflows, a variety of detention systems may be used such as below ground detention basins, above ground storage ponds, permeable paving and/or water quality control ponds.

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.

Refer to the pollution and litter control section below for how stormwater contaminants are treated. In addition, WSUD devices, such as bioretention swales & basins, landscape buffers will be considered for incorporation where public health and safety are not compromised.

4.3 Erosion and Sediment Control

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.

4.4 Stormwater

The proposed development stormwater will be picked up and conveyed via pipe, and overland flow to the OSD tank for each catchment.

All proposed roofs will collect stormwater via gutters and downpipes and be connected to the in-ground system. All roads and car parks will collect stormwater via kerbs and gutters and be connected to the in-ground system through stormwater pits.

Stormwater pipes and pits will be in accordance with AS3500 - National Plumbing and Drainage Code Sutherland Shire Council Stormwater Drainage management guidelines.

A stormwater schematic design plan for the Main Works is shown in **Appendix A**.

4.4.1 On-Site Stormwater Detention

The stormwater design including the on-site detention (OSD) is designed in accordance with Sutherland Shire Council's DCP Chapter 8 Ecological Sustainable Development Section 5e "Onsite Detention".

OSD will be required for Main Works. 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. As the site is divided into two catchments, two OSD tanks will be required.

The detention tanks for the Main Works are proposed to be placed at a location which is beneficial to the catchment. The location for the OSD in the northern catchment is towards the northern boundary adjacent to the main entry road; where the location of the OSD tank for the southern catchment is adjacent to the ambulance drop off. Both these detention tanks are proposed to be constructed in concrete and block walls.

Initial basin estimates using DRAINS stormwater modelling program indicates that 25m³ OSD volume is required for the northern catchment; where 15m³ OSD volume is required for the southern catchment.

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.

4.5 Pollution and Litter Control

Sutherland Shire Council SS DCP 2006 is applicable to the hospital site. Chapter 8 within the DCP covers Stormwater Management. These DCP sections are read in conjunction with council's environmental specification 2009 (the specification). As advised by council when there is a discrepancy between the specification and the DCP; the DCP is to take precedence. As such the pollutant control parameters required are as shown in Figure 4.

It is proposed to meet these pollution control criteria through a gross pollutant trap system. This will ensure the criteria is met to Sutherland Council Requirements. Wherever possible Water Sensitive Urban Design (WSUD) principles and devices will be incorporated into the design. TTW note the opportunity for these is limited due to the constrained nature of the site.

5.f.2 Controls for all Development Excluding Dwelling Houses and Dual Occupancies

1. Development must achieve a minimum of 80% retention of the Suspended Solids (SS) average annual load.
2. Development must achieve a minimum of 40% retention of the Total Phosphorus (TP) average annual load.
3. Development must achieve a minimum of 40% retention of the Total Nitrogen (TN) average annual load.
4. Development must achieve a total retention of litter and organic matter greater than 50mm for storm events of up to 1 in 3 month ARI.
5. Development must achieve a total retention of oil and grease for storm events of up to 1 in 3 month ARI.
6. Where trash racks are installed, the gaps between the bars shall be 60mm.
7. Where litter booms are installed, they are to be placed only where normal flow velocities are low and must incorporate a trap where they are used in tidal waterways.
8. Where stormwater pit litter baskets are installed, they shall not exacerbate flooding and must incorporate a bypass.
9. Where sand filters are used they shall be restricted to urbanised catchments smaller than 2 hectares. The entry of sediment and oil to the filtration media shall be controlled and a sediment trap provided upstream for pre-treatment. Developments with large concentrations of oil and litter, which could potentially block the sand filter, should be avoided. A suitable grain size, which maintains percolation rates, shall be used. Sand replacement schedules shall be provided.
10. Provision must be made for convenient and safe regular inspection and periodic cleaning of water quality control measures.

Figure 4: Sutherland Council DCP Chapter 8 Extract, Water Quality Parameters

5.0 CONSULTATIONS

TTW contacted Sutherland Shire Council's Stormwater and Waterways Manager Guy Amos in April and October 2014 to discuss Council's stormwater requirements. Mr Amos advised that:

- Council's stormwater requirements are based upon Council's DCP 2006 Chapter 8 and the stormwater management specification 2009;
- As the site was mainly impervious already, the amount of On-site Detention (OSD) required would be determined by determining if there is a peak flow with the new build greater than the current peak flow. This would have to be assessed for all storm events from 5 to 100 year storm events.
- In regards to water quality, there may not be required as the project is removing the potential of polluted water by removing the car park and replacing it with clean water from the roof. However further discussions with Council will be required to confirm this.

Please note the comments on the OSD and water quality from Council are only preliminary and may vary once Council has reviewed the documentation once it is submitted.

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Associate Director

Authorised by:
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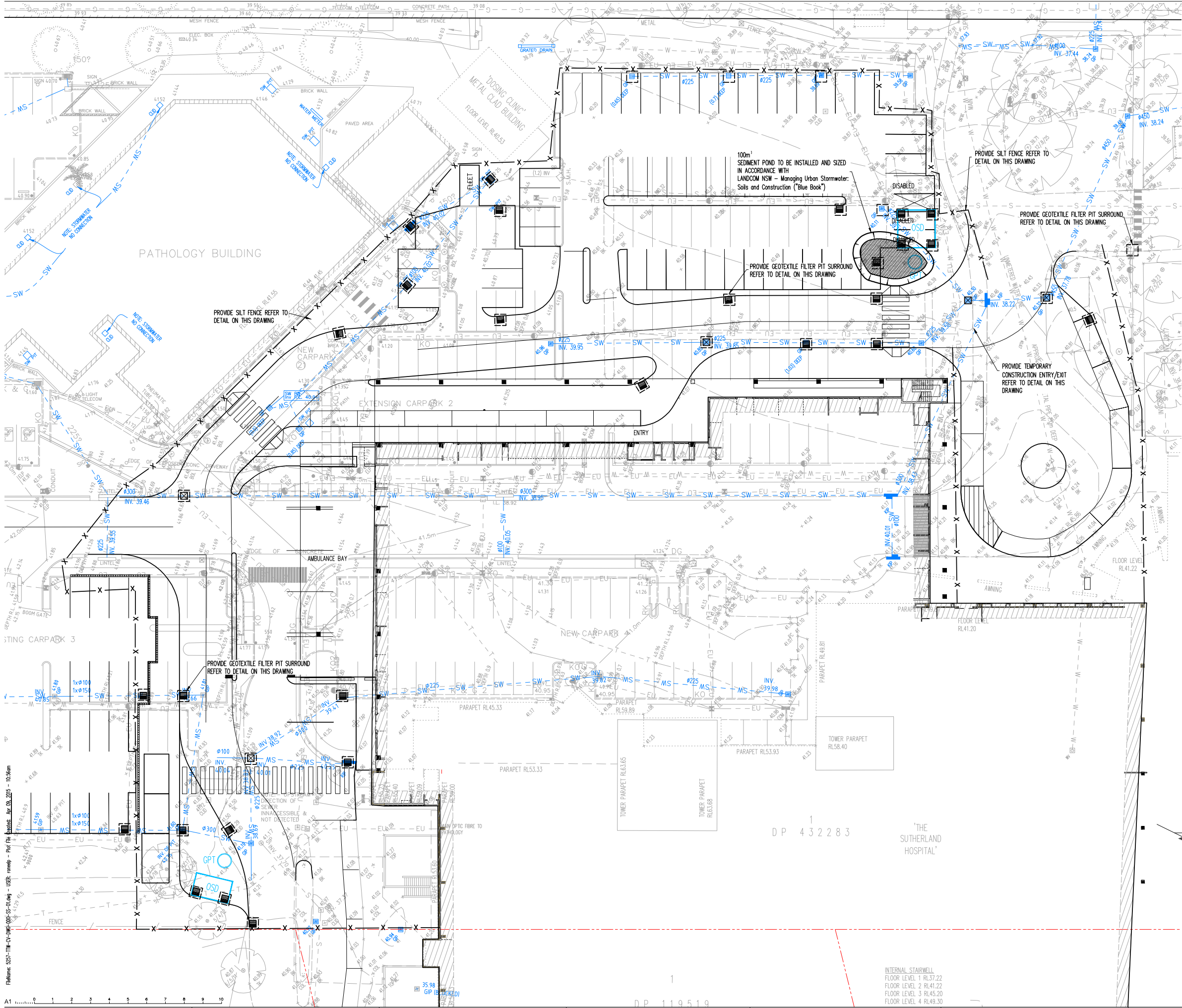


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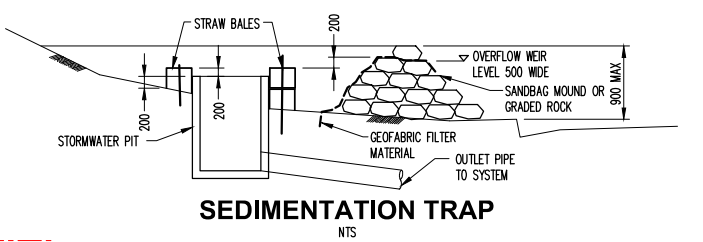
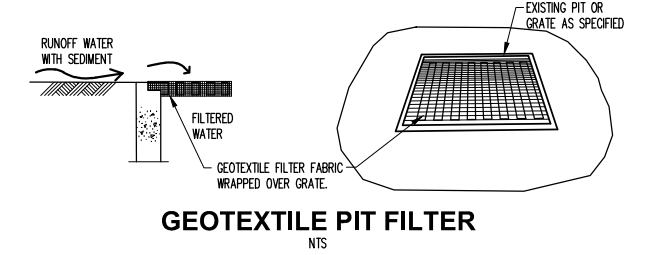
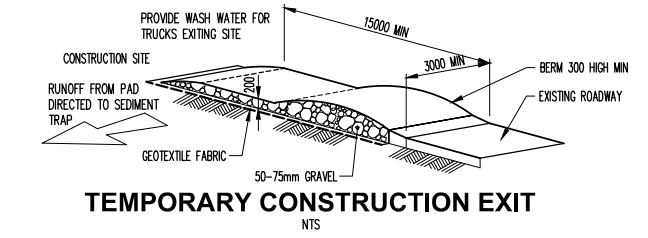
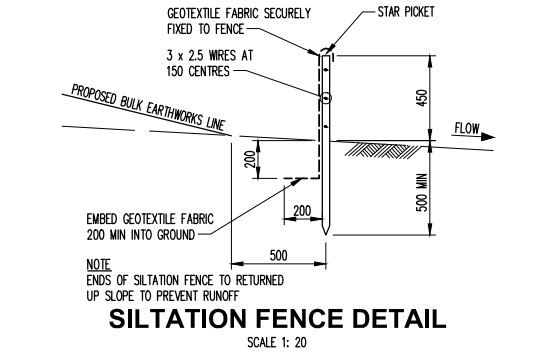
APPENDIX A

Schematic Stormwater Design Plan and Schematic Erosion and Sediment Control Plan



EROSION AND SEDIMENT CONTROL LEGEND

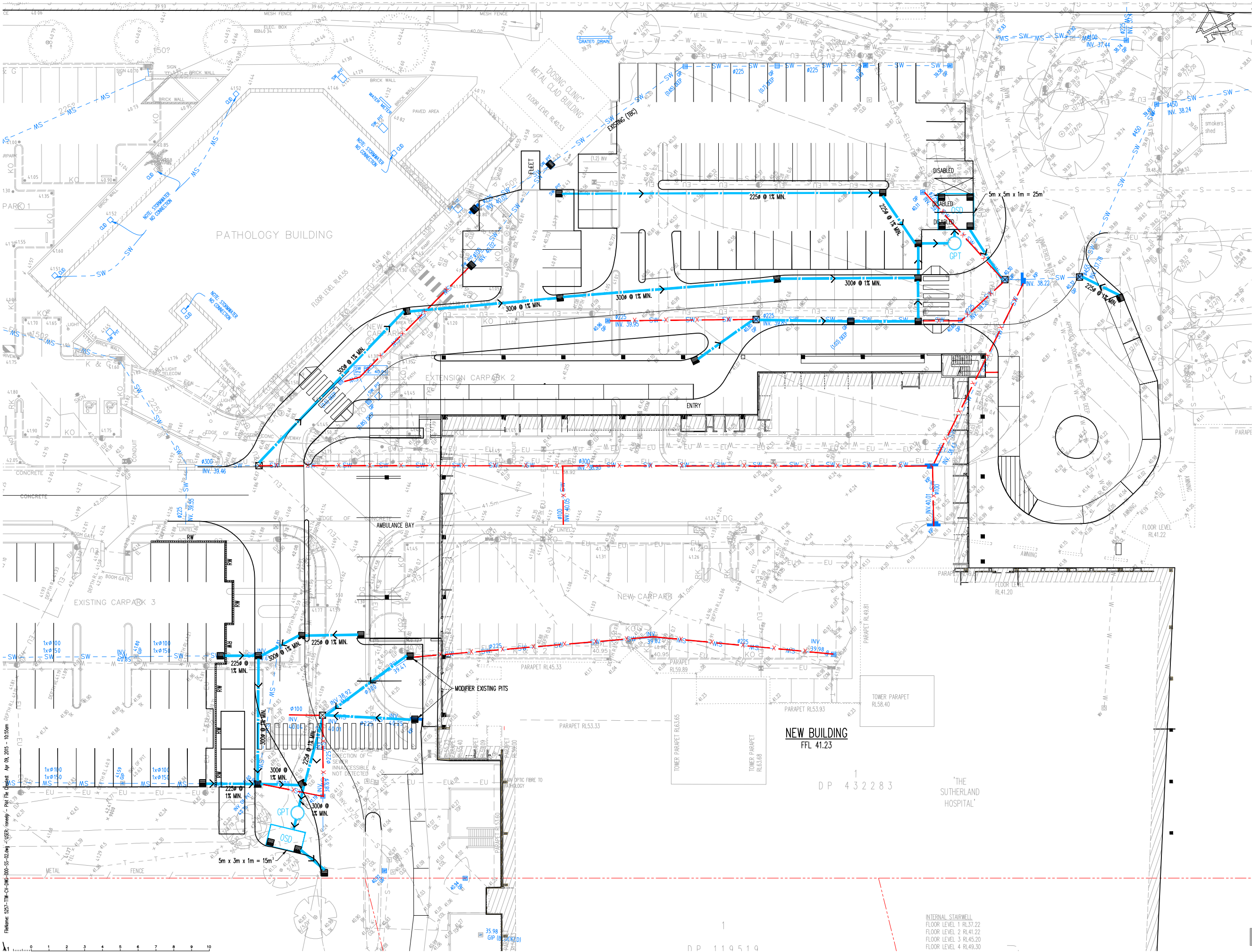
	Batter
	Siltation fence
	Stormwater pit with Geotextile filter surround
	Hay bale barriers
	Sandbag sediment trap
	Catch drain
	Overland flow path



PRELIMINARY

A1 0 1 2 3 4 5 6 7 8 9 10			DP 119519			DP 432283			DP 119519		
Rev Description			Eng Draft Date			Eng Draft Date			Eng Draft Date		
02 PRELIMINARY			PL RP 09.04.15			PL RP 09.04.15			PL RP 09.04.15		
01 PRELIMINARY			PL RP 27.02.15			PL RP 27.02.15			PL RP 27.02.15		
Rev Description			Eng Draft Date			Eng Draft Date			Eng Draft Date		

Architect	Architect	Project	Scale : A1	Drawn	Authorised
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			Plot File Created: Apr 09, 2015 - 10:56am		



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LEGEND

- Kerb line
- Stormwater pit, and flow direction on stormwater pipe
- Stormwater pit, and pipe to be removed
- Retaining wall

02	PRELIMINARY	PL	RP	09.04.15
01	PRELIMINARY	PL	RP	27.02.15
Rev	Description	Eng	Draft	Date

Rev	Description	Eng	Draft	Date
Rev	Description	Eng	Draft	Date
Rev	Description	Eng	Draft	Date
Rev	Description	Eng	Draft	Date

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Project
**SUTHERLAND HOSPITAL
EXPANSION - EARLY WORKS**

Sheet Subject
**SCHEMATIC
STORMWATER PLAN**

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