

APPENDIX 7. INVESTIGATIONS – CIVIL ENGINEERING



ENGINEERING

Preliminary Infrastructure Assessment

**550-554 Main North Road, Evanston
Park Code Amendment**

JOB NUMBER:	S55577 - 276553
CLIENT:	Future Urban Pty Ltd
SITE:	550-554 Main North Road, Evanston Park
DATE:	20/01/2023
REVISION:	F

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Document Status

REV NO.	STATUS	AUTHOR	REVIEWED		APPROVED FOR ISSUE	
			NAME	DATE	NAME	DATE
A	For Approval	Ghasem Ashtijou	Jordan Colbert	14.06.22	Jordan Colbert	14.06.22
B	For Approval	Ghasem Ashtijou	Jordan Colbert	18.07.22	Jordan Colbert	18.07.22
C	For Approval	Ghasem Ashtijou	Jordan Colbert	13.09.22	Jordan Colbert	13.09.22
D	Revised to address Council Comments	Ghasem Ashtijou	Jordan Colbert	20.10.22	Jordan Colbert	20.10.22
E	Revised to address Council workshop	Ghasem Ashtijou	Jordan Colbert	20.10.22	Jordan Colbert	20.10.22
F	Revised to incorporate agreed stormwater infrastructure offset projects	Ghasem Ashtijou	Jordan Colbert	20.01.23	Jordan Colbert	20.01.23

Table of contents

Introduction.....	4
Site understanding	5
Main North Road.....	5
Proposed Code Amendment.....	5
Services investigation	6
Stormwater.....	6
Potable water service	18
Sewer	19
Electrical	20
Communications.....	20
Gas	21
Summary	22
Appendix A.....	23
Correspondence from Service Authorities.....	23
Appendix B	24
DBYD extracts	24
Appendix C	25
Concept Plan	25
Appendix D.....	26
Site Survey	26
Figure 1-Site Layout	5
Figure 2- Site Survey & Stormwater Network (GIS)	7
Figure 3-Council Flood Map/Stormwater network	9
Figure 4-Flood Hazard inundation Map – Gawler River Floodplain mapping 2015	10
Figure 5-Flood mapping (SAPPA).....	11
Figure 6 - Excerpts from the Gawler SMP.....	12
Figure 7 - Pre-Development Impervious area assessment Figure 8 - 1% AEP back to 10% AEP pre-development DRAINS Result	13
Figure 9 - 1% AEP back to 5% AEP pre-development.....	13
Figure 10 - As Constructed plans of the existing 800mm diameter drain between 57 First Street and Gawler Racecourse, proposed upgrade extent highlighted in blue	17
Figure 11 - As constructed long section of existing 800mm drain, proposed to be upgraded to 1200mm.	17
Figure 12-SA Water Supply Mains (DBYD).....	18
Figure 13- SA Water sewer mains.....	19
Figure 14-NBN network on Main North Road and Sheriff Street	20

Introduction

FMG Engineering (FMG) has been engaged by Future Urban to undertake a service infrastructure investigation to obtain preliminary, high level assessment of the existing infrastructure in the area to support a proposed Code Amendment and associated deed/infrastructure agreements in respect to land directly opposite the Gawler Racecourse.

This subject site is located at 550-554 Main North Road, EVANSTON PARK, SA 5116 and covers an area of approximately 41000 m², currently occupied by a large commercial facility (Vadoulis Garden Centre) with off-street parking. The site is bound by Main North Road on the West, Sheriff Street on the north, and Residential dwellings and vacant lot on the East and South. An existing Council reserve, which features a stormwater detention basin, is located at the intersection of Sheriff Street and Coleman Parade, directly to the rear of the subject site.

The overall intent of the amendment is to enable the further development of large format employment uses on the land, such as bulky goods outlets and service trades premises. The subject site falls under the jurisdiction of Town of Gawler and will necessitate being rezoned from the General Neighbourhood Zone to an alternate zone, with the Employment Zone considered the most appropriate, noting this zone does not anticipate retail uses which may compete with established centres.

FMG Engineering has prepared this high-level infrastructure assessment by utilising information obtained via Dial-Before-You-Dig (DBYD), and discussion with the service authorities, wherever viable. FMG Engineering has attempted to contact the following service authorities for further information where feasible:

- Town of Gawler (Council)
- SA Water (water and wastewater utilities)
- South Australian Power Networks - SAPN (power authority)
- APA (Australian Gas Network)

The purpose of our investigation is to provide a desktop assessment of the infrastructure currently available to the subject site and to assess the current capacity of the existing infrastructure. We note that some authorities have not provided detailed feedback, however we have utilised our engineering judgement and relevant previous experience to provide context where appropriate.

Site understanding

The subject site is as shown in Figure 1 below.



Figure 1-Site Layout

A review of available topographical data suggests although there are steep hills towards east and south-east, the subject land is relatively flat, with overall grade towards the north west. The land includes a big building with a carpark in its front which has access from Main North Road and Sheriff Street and a couple of small buildings and sheds. Apart from them and the driveway access passes through the site, the rest of the land is grassed/unpaved.

Anecdotal information supplied by Council, aligning with FMG's expectations, is that existing stormwater is discharged to the existing pit/pipe system located adjacent to the site at the junction of Main North Road and Sheriff Street. An existing Council detention basin is located directly to the east of the subject land, as evident from Figure 1.

Proposed Code Amendment

It is proposed to rezone the subject site from General Neighbourhood Zone to the Employment Zone to accommodate future redevelopment as detailed further within the planning report.

A site plan has not yet been confirmed, however it has been estimated from discussions with the Proponent that development could include bulky goods warehouses (in the order of 12,000 m²) and up to two additional smaller tenancies of circa 500 sqm each.

Whilst no development concept has been prepared, initial investigations have resulted in the preparation of a draft Concept Plan for potential inclusion in the Planning and Design Code. The Concept Plan shows various parameters to guide future development including building exclusion areas and landscape areas. This guiding document is included as Appendix C and has been considered as part of our investigations.

Services investigation

FMG has undertaken a Dial Before You Dig Investigation which has located the following utilities adjacent to the site:

- Stormwater
- APA
- NBN Co
- SA Power Networks
- SA Water
- Telstra

Stormwater

Existing conditions

Our understanding of the current site arrangements (GIS map dated 2009 shown in Figure 2) is that two pipes (375mm and 900mm diameter) at the SEPs in the Corner of Sheriff Street & Main North Rd collect runoff from the subject site and surrounding streets and discharge directly into the underground stormwater network. No information or documentation has been reviewed surrounding the existing drainage arrangements within the subject site, however a detailed engineering survey of the site has been undertaken, and is included in Appendix D.

The site survey identifies only minor storm drainage paths from the existing garden centre roofs, towards the private off street carpark located at the subject site frontage to Main North Road. No inlet pits are clearly identified within the survey, with the stormwater scheme assumed to be conveyed entirely as kerb flow, following site levels towards the Sheriff Street vehicle crossover.

Existing contours within the site generally grade towards the north. A densely vegetated low point is observed to the south of the existing garden centre, which appears to collect runoff from a ~0.45ha portion of the site to the south. No outlet is identified and it is assumed this natural basin is managed via infiltration and evaporation. A rough estimate of storage volume within this depression (truncated frustrum, 1.5m deep with plan area storage between 50m and 850m) estimates in the order of 500m³ of runoff could be collected here. Given the lack of outlet, dense vegetation and small catchment area, the natural basin's current impacts on reducing 1% AEP flood risk is considered low, and likely removes only a portion of the basin volume from downstream catchments.

In the north-eastern corner of the site, low spot is also identified, with existing levels reducing to 50.92mAHD and providing approximately 1,400m² of plan area storage to a depth of 50mm before overflowing to Sheriff Street at 50.97mAHD. This overflow path is noted as narrow, with levels increasing to 51.2 m AHD for a 30m wide overflow width. A high level approximation of runoff storage generated by the subject site in this area is estimated in the order of 50-150m³, noting regional flood issues are discussed further in this report below. As previously mentioned, a Council owned detention basin is located directly to the east of the site. Figure 2 shows how this basin connects to the existing infrastructure in Sheriff Street.

A Council wide Flood Study (*Gawler and Surrounds SMP Stormwater Management Plan, Tonkin, 2019*) is currently available for review in a draft format, which covers the subject site and its surrounding catchment, referred to as the First Street Catchment. Runoff from the subject site, and surrounds, drains towards a basin in First Street, ultimately discharged to the west via an existing 1500mm diameter stormwater drain beneath the Gawler Racecourse. Flood modelling of the catchment demonstrates a significant flooding throughout the First Street Catchment, to which the draft SMP provide a number of infrastructure upgrade recommendations to begin to mitigate this issue.

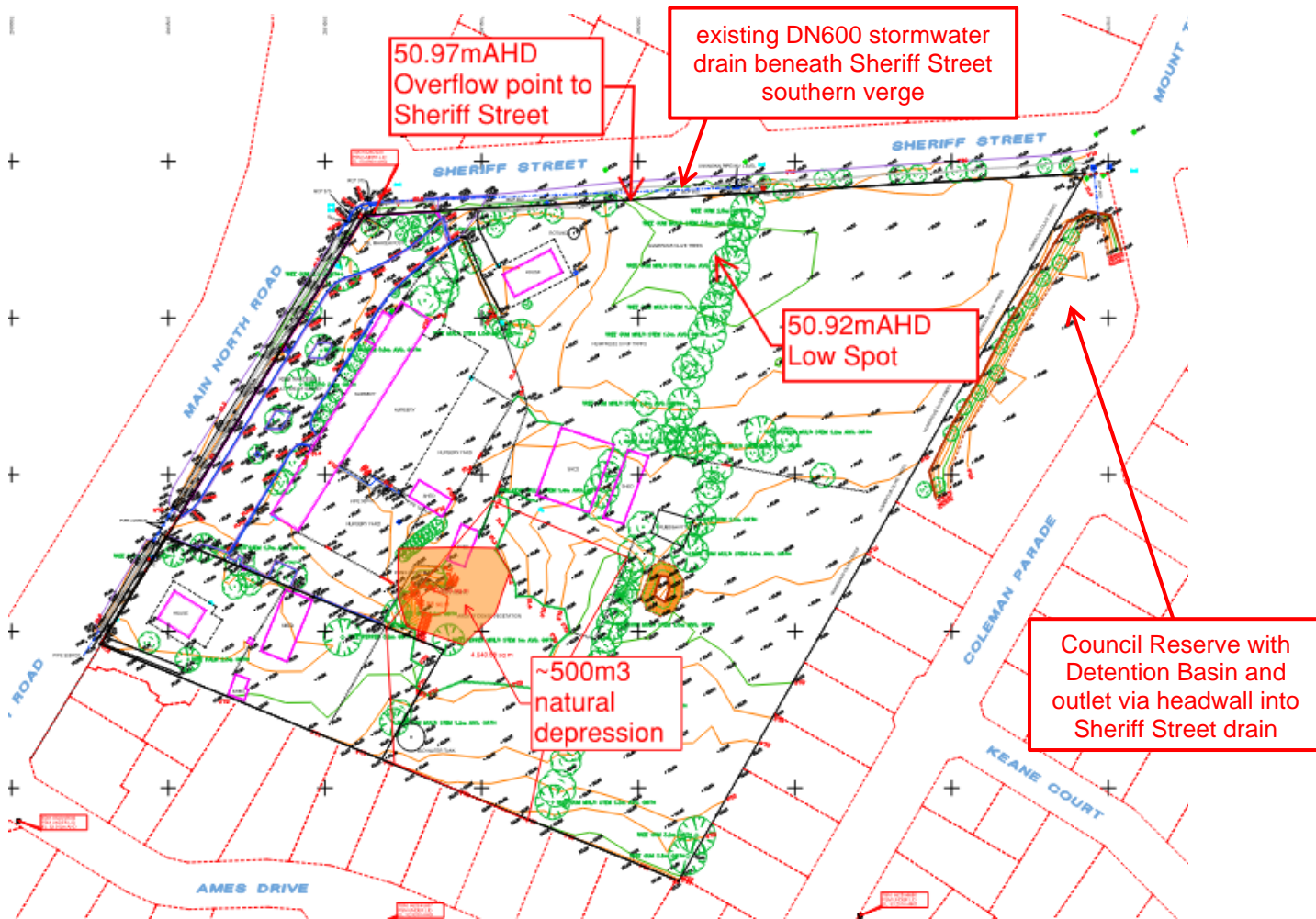


Figure 2- Site Survey & Stormwater Network (GIS)

Council Stormwater Requirements

The points below are the fundamental criteria of the drainage design in accordance with *Land Division Operating Manual Town of Gawler*:

1. *The post development flow cannot exceed that of the pre-development flow;*
2. *Generally the maximum discharge/ pipe design exiting a subdivision drainage system and entering an existing council system cannot be greater than:*

In residential areas - 5yr ARI

In commercial/ Industrial areas – 10yr ARI

In Town Centres - 20yr ARI

3. *Wherever flows exceed these criteria detention must be provided. Further restrictions on discharge may be required dependent on the condition of the existing stormwater system and should be discussed with Council.*
4. *Drains should be provided where any stormwater cannot be drained to the road from the rear of an allotment. Design of pipe to be for a 1:20 year storm. Minimum pipe diameter to be 225mm*
5. *Storms up to and including a 1:100 year event must be contained within the boundaries of the site without causing inundation of the dwelling and surrounding properties until such time as the flood waters can subside.*
6. *With the construction of new public infrastructure any overland flow path or roadway must be designed to convey a 1:100 year event without causing flooding to adjacent properties.*

Suspended solids	80% retention of average annual load
Total phosphorus	45% retention of average annual load
Total nitrogen	45% retention of average annual load
Litter	Retention of litter greater than 50mm, for up to 3 month ARI peak flow
Coarse sediment	Retention of sediment coarser than 0.125mm for up to 3 month ARI peak flow
Oils & grease	No visible oils for up to 3 month ARI peak flow.

Table 2: Requirements for EPA water quality policy (2003)

FMG Engineering has engaged with Council over the last few months to obtain information for the stormwater management required for the subject site. Over this period, the advice has evolved, with the most recent advice provided in response to a review of an earlier iteration of this report.

Some of the matters raised and information supplied by Council include:

- Stormwater run-off must not impact adjacent properties and be contained within the property boundary. It has been noted that the natural contour of the site is towards the west (Main North Road).
- Any design such as GIP's, JB's, crossovers, kerbing etc must be designed as per Council Standard Details. as well as our Standards and Requirements for Development document which outlines are development standards. This must be followed in conjunction with Australian Standards.
- For any pollution control devices/Gross Pollutant Traps (GPT's), the preferred choice is Ecosol
- Post development flow must not exceed that of the pre-development flow. Pre-development flow must not be greater than 10-year ARI (commercial/industrial areas) with post development flow for a 100 year ARI.
- Calculations, plans, and computer models in DRAINS is to be provided to allow for Council Engineering to properly assess design.
- Gawler Flood Map data was supplied and is included in Figure 3.
- An initial suggestion that the stormwater pipe within Sheriff Street is undersized and will need to be upgraded.
- More recent advice pointed towards the Gawler SMP, specifically the First Street catchment which the subject site contributes to.



Flood water management

A review of publicly available flood study data (Waterconnect.sa.gov.au) suggests the site is not subject to known flood risk due to the 1 in 100 chance Gawler River Floodplain (2015 Flood mapping).

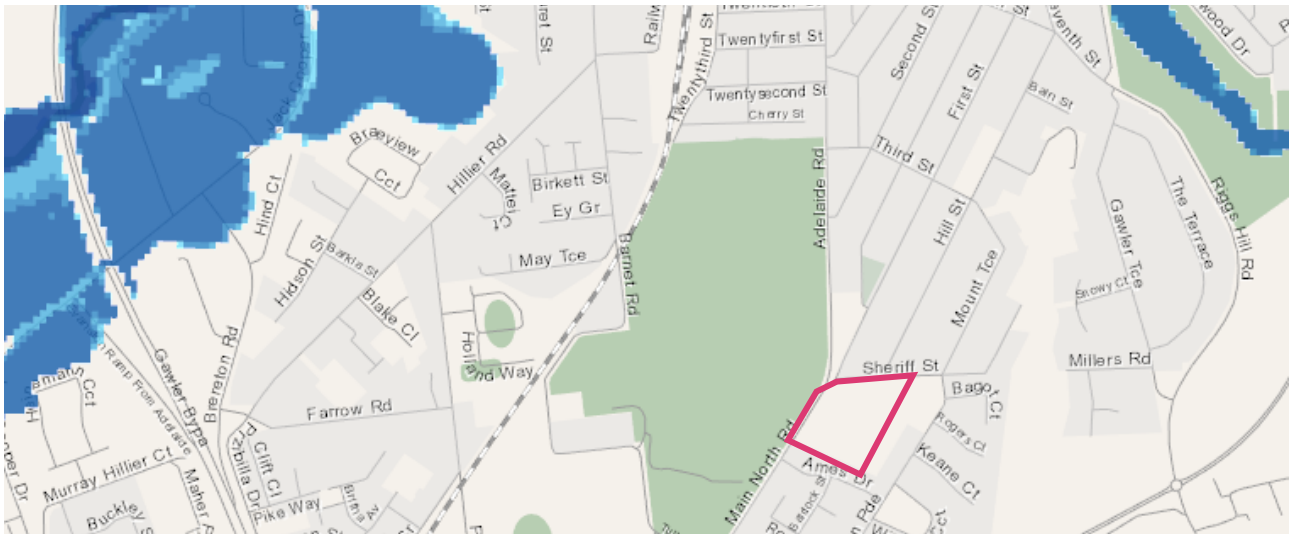


Figure 4-Flood Hazard inundation Map – Gawler River Floodplain mapping 2015

A review of SAPPA database, seen in Figure 7, shows the presence of a Hazard (Flooding – General) Overlay within the subject site, and a Hazard (Flooding) Overlay on the adjacent Council stormwater basin. The Hazards (Flooding – General) Overlay seeks development to be designed and constructed to prevent the entry of floodwaters. This is a critical base case expectation which requires development to protect itself from flooding. It does not oblige development to directly resolve the cause of the flooding, which more often than not is capacity within an existing stormwater network.

Council provided flood mapping suggests that during major storm events, uncontrolled stormwater enters the subject site from the east at two locations, inferred by FMG as following;

- a) Stormwater overflowing from Council infrastructure at the intersection of Keane Court and Coleman Parade, through private property of neighbouring dwellings to the east, and into the subject site.
- b) Stormwater overflowing from Council infrastructure at an existing stormwater basin at the intersection of Sheriff Street and Coleman Parade.

Such would suggest that there is an issue with the Council infrastructure, as it is generally not lawful for stormwater to encroach on land without appropriate infrastructure and easements.

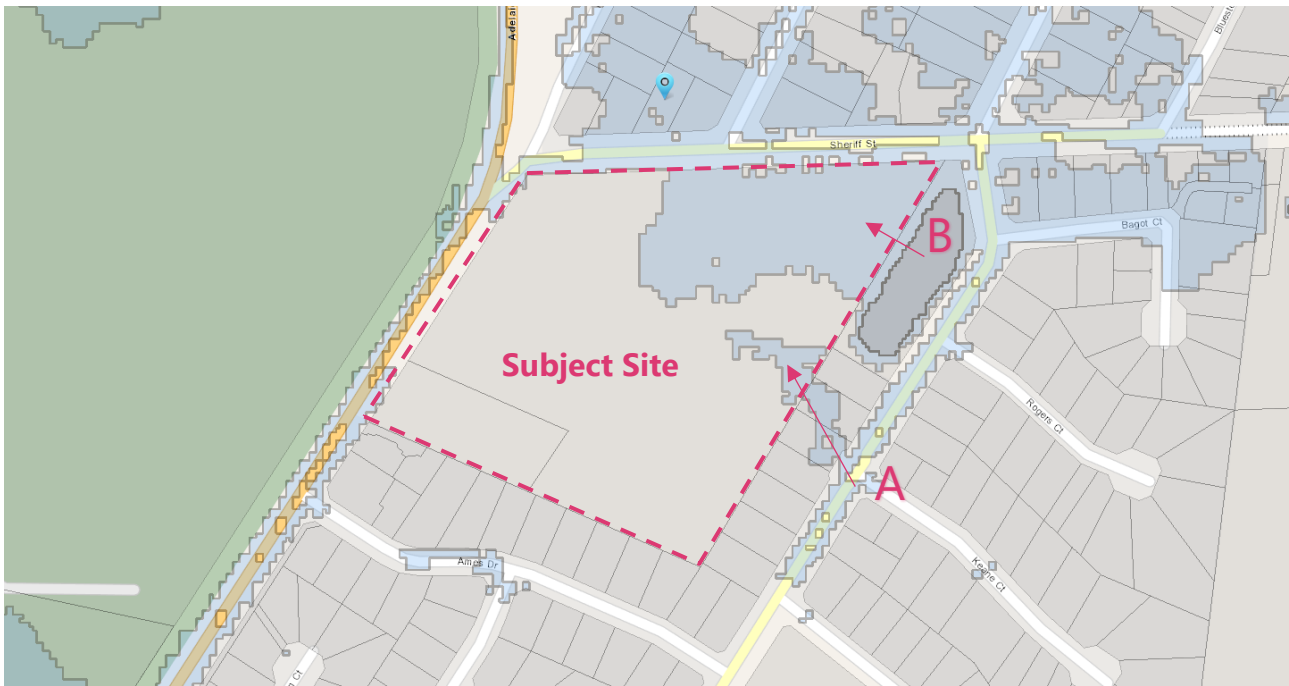


Figure 5-Flood mapping (SAPPA)

The most recent advice from Council highlighting the following;

3.2.3 First Street (Gawler South)

This location is a trapped low spot adjacent the Gawler Racecourse with a predominantly urban catchment of just under 220 hectares. Currently, there is little flooding in the 20% AEP event and only slightly more flooding during the 5% AEP event when stormwater inundates the road. During the 1% AEP event there is significant inundation of the road and surrounding properties (see Figure 3.4), as well as significant sheet flow through properties from Coleman Parade and Mount Terrace. Long-term predictions also show significant inundation and sheet flow through properties during the 5% AEP event.

The primary cause of flooding is the capacity of the pipe system that passes beneath the Gawler Racecourse. This pipe system is the only means of draining the low spot as there are no low-level overland flow routes from this area due to the elevation of the racecourse surface.

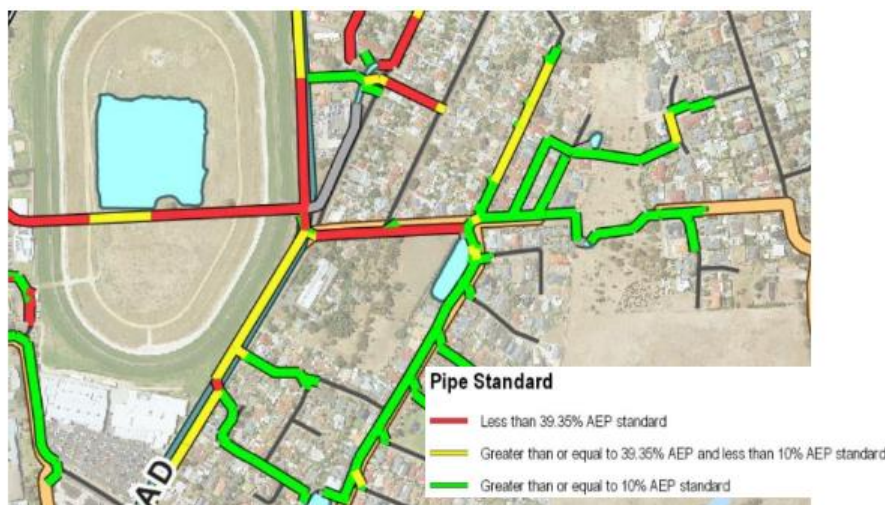


Figure 2.5 Existing Stormwater System Standard Map

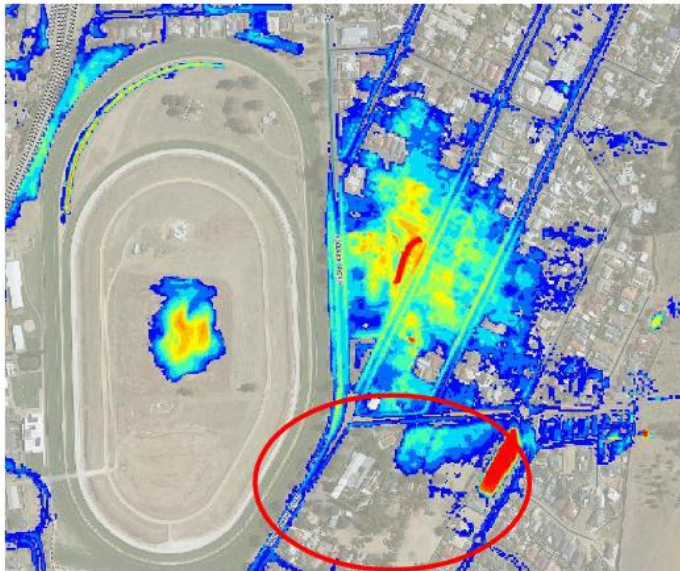


Figure 3.4 Predicted inundation during 1% AEP event (long term development scenario) at First Street

Figure 6 - Excerpts from the Gawler SMP

This commentary suggests that whilst peak flow is of concern with the downstream drainage pipe capacity at a 39.35% AEP (0.5EY) standard, total runoff volume is also a concern as there is no further capacity to store additional runoff within the First Street catchment, upstream of the piped drainage system beneath Gawler Racecourse. Council commentary also noted the depression storage (now addressed earlier in this report).

Detention storage requirements

To comply with Council's minimum detention requirements, stormwater infrastructure within the subject site would need to be provided such that the peak post-development runoff from the 1% AEP (100 year ARI) storm event is restricted back to match the 10% AEP (10 year ARI) storm event.

Further to the minimum requirements, due to existing downstream flood constraints, development could consider limiting peak discharge from the site to a 0.2EY (5 year ARI) flow rate, which would reduce the peak flow of runoff entering the currently overloaded First Street catchment. This is in our opinion a practical solution to address the current Gawler Racecourse constrained catchment, and is recommended as an optimum outcome to form the basis of an infrastructure deed in respect to stormwater management obligations.

An indicative sizing exercise has been undertaken to provide an example of the magnitude of storage which may be required to comply, however this on the basis of typical assumptions;

- Aerial assessment of the existing pervious areas shown in figure 4 (i.e. ~25% impervious area for pre-development, increasing to 80% impervious area for post-development,
- A pump system adopted due to shallow drainage and high receiving tailwater conditions
- No allowance for retention, or modelling of existing storage effects on site

Post-Development Design storm event	Peak flow restricted to	Approximate Detention volume required
All events up to and including the 1% AEP	142 L/s Estimated pre-development 10% AEP (10 year ARI) storm event peak flow	800-900m ³
All events up to and including the 1% AEP	91 L/s Estimated pre-development 0.2EY (5 year ARI) storm event peak flow	1,200-500m ³

The figure consists of two parts. On the left is a schematic diagram of a basin layout. It shows a main channel with a point 'P' and a tributary channel. The main channel has a flow rate of 0.412 at its outlet. The tributary channel has a flow rate of 0.613 at its outlet. The flow rate at point 'P' is 0.142. The flow rate at the inlet of the main channel is 51.00. On the right is a hydrograph plot titled 'Basin1192 Storage Volume - 1% AEP, ...'. The y-axis is labeled 'Volume (cu.m)' and ranges from 0 to 800. The x-axis is labeled 'Time (mins)' and ranges from 0 to 100. The plot shows a single curve that starts at (0,0), rises to a peak of approximately 800 cu.m at 75 minutes, and then declines to approximately 650 cu.m at 100 minutes.

Results for median storm in critical ensembles



Water Quality outcome requirements

Council requires improvement to stormwater quality being discharged from the subject site based on the parameters stated in Table 1. Given the proximity to the Gawler River, the water quality targets are particularly critical, and target achievement will need to be strictly complied with.

Table 1 Council stormwater target improvement for different parameters.

PARAMETER	TARGET REDUCTION
Reduction litter / gross pollutant	90%
Reduction in average annual total suspended solids (TSS)	80%
Reduction in average annual total phosphorous (TP)	45%
Reduction in average annual total nitrogen (TN)	45%

The quality of the runoff discharged from the site can be improved through the installation of proprietary water quality improvement devices or incorporation of biofiltration and raingardens within above ground stormwater basins.

Existing Over Boundary flows

In our opinion, several practical solutions are available to manage and address the existing flood risk and ensuring the principals of the Hazard (Flooding – General) Overlay are adhered to. These constraints and responses all relate to Council infrastructure, which appear to currently present flood risks under existing conditions.

Stormwater constraint	Opportunity	Further considerations
Overflows entering the site at location A – Keane / Coleman intersection	Construct bund at property boundary to ensure runoff does not enter the subject site from neighbours land	Potential to exacerbate ponding within neighbouring properties upstream which are currently discharging over property boundaries (not best practice / generally accepted). Potential requirement to increase stormwater capacity of Coleman Parade basin to reduce the likelihood of public road reserve overflowing into private property fronting Coleman Pde.
	Safely convey overflows through subject site development via pit and pipe	Land management agreement / easement required to formalise upstream overflows through private property
	Increase Council infrastructure sizing to ensure 1% AEP flows can enter back of allotment pipe network	Council / developer cost sharing to be considered given the improvements required to ex. Council infrastructure Requires upgrades to Coleman street basin, Sheriff street drain, and potentially Gawler Racecourse drain to offset
Overflows entering the site at location B – Sheriff / Coleman basin overflow	Increase Sheriff/Coleman basin side levels to ensure runoff does not enter the subject site from adjacent stormwater basin	Overflows which currently divert into private property, would likely be diverted into the Sheriff Street or Coleman parade road reserves. Diverting runoff away from the existing depression storage area observed on the subject site which is estimated to provide 50-150m ³ of flood storage.

		Requirement to increase stormwater capacity of Sheriff Street to ensure flood risk for properties on Sheriff Street is not increased.
	Safely convey overflows through subject site development via pit and pipe	Land management agreement / easement required to formalise upstream overflows through private property Would require significant pipe sizes to provide storage effects given downstream flooding constraints at Gawler Racecourse.
Flood depression storage within the site	Provide low lying landscaped / WSUD wetland areas to offset filling within the subject site and removal of current flood storage	Opportunity to provide this WSUD treatment and storage along the Sheriff street frontage of the subject site given this is the natural low point, which can then also achieve a dual effect of improved amenity, greening the public realm

FMG suggests there are practical solutions available to mitigate the upstream overflow location B, and potentially mitigate the risk of overflows at location A. These flood risks are existing and are presently the responsibility of Council and the private property land owners to ensure runoff is adequately managed and not discharged into adjoining private property. Given that the flood risk exists, it would be prudent for the Code Amendment process to derive a position whereby the future development of the subject land can contribute to, but not fully resolve, the infrastructure upgrades necessary.

Stormwater Summary

Having regard to the nature of development anticipated as a consequence of the Code Amendment, it is evident that the land is of a sufficient size to accommodate on-site detention and management which would comply with Council requirements.

In reflection of the existing catchment wide flooding issues, extra-over detention requirements should be adopted to limit peak discharge for all events up to and including the 1% AEP (100 year ARI) from the site to a 0.2EY (5 year ARI) flow rate, which would reduce the peak flow of runoff entering the currently overloaded First Street catchment. This is considered a practical solution to address the current Gawler Racecourse constrained catchment and exceeds Council's typical requirements. Detention storage in this scenario would be in the order of $>1,200\text{m}^3$.

Implementation of Water Sensitive Urban Design (WSUD) principles such as raingarden and landscaping, or proprietary treatment systems, shall be specified to ensure the specified water quality outcomes are achieved.

Flood Summary

Flood risk applies to the subject site. The resolution of existing overflow paths into the subject site during major storm events requires resolution. Various options exist to deal with this existing issue including upgrading external infrastructure, noting a large proportion of this responsibility rests with Council.

In our opinion a strategic approach would be best to resolve the issue, which may take some time to finalise and establish. A pragmatic solution would be for the Proponent to agree to financially contribute to external infrastructure.

To select an appropriate external infrastructure upgrade, the *Gawler and Surrounds SMP Stormwater Management Plan, Tonkin, 2019* was reviewed, as with additional infrastructure options in adjoining streets to the subject development to identify the best value upgrade to improve flood conditions within the First street catchment.

Initially, construction of a new 900mm diameter drain along Sheriff, and Hill street was considered, which would intercept runoff generated from dwellings on Hill street, and diverting runoff away from the 57 First street triangular reserve. Whilst not outlined within the *Gawler and Surrounds SMP Stormwater Management Plan, Tonkin, 2019*, This would align with what would be considered best practice, as this disperse flows generated by the catchment mitigating the convergence of many sub catchments arriving at 57 First street. The aim of construction of this drain was to mitigate the need to upgrade the existing 800mm diameter pipe from 57 First street, as flows would be diverted away upstream. In practice however, the results of our preliminary stormwater modelling showed only minor improvements from this proposal, due to a lack of fall between Hill street and the downstream connection point, and would not mitigate the need to upgrade the 800mm diameter stormwater pipe.

The *Gawler and Surrounds SMP Stormwater Management Plan, Tonkin, 2019* shows the First street catchment to be heavily inundated during major storm events, where the majority of the catchment is conveyed by combined underground and overland flows towards a small triangular public reserve located at 57 First street. The outlet from this reserve is currently an 800mm diameter stormwater pipe towards the Gawler racecourse, connecting to a 1500mm diameter stormwater pipe beneath the racecourse which drains further west. The long term strategy for the First street catchment includes upgrading the 800mm diameter pipe to a 1200mm diameter pipe, and construction of a large wetland conceptualised for the centre of the racecourse which will facilitate ponding there rather than in and around dwellings in First and Hill Street. It is understood wetland construction is not tabled in the immediate future and requires further review and negotiation with the Gawler Raceclub as this is private land. Regardless of the nature of downstream upgrades, increasing the outlet capacity from the First Street catchment by upgrading the 800mm diameter drain is mandatory to improving flooding conditions.

On the balance of our preliminary assessment, we believe the best value stormwater infrastructure to see tangible improvements to the flooding within the First Street catchment would be to incorporate the SMP recommended upgrade of an existing 600m long, 800mm diameter stormwater drain along First Street, to a 1200mm diameter stormwater drain along the same alignment. This drain is currently constructed at a depth of 5-7m drains the 57 First street public reserve, to the Gawler Racecourse. This approach has a number of key benefits over other options considered, including;

- This option is recommended within the Gawler and Surrounds SMP, and forms a key upgrade in the future mitigation plans should a wetland be constructed within the Gawler Racecourse in the future
- By replacing the existing 800mm diameter pipe along the same alignment, the risk of service clashes or need to relocate existing services is very low.
 - It is noted that a new drain (900mm diameter or larger) could be laid alongside the existing 800mm diameter drain rather than demolishing the existing drain. This option is to be considered at a detailed design stage
- There are understood to be very few, if any, private service crossings along the existing 800mm diameter stormwater main
- Options to beautify or improve the 57 First Street reserve concurrent to these works could also be considered, subject to budget / funding availability.

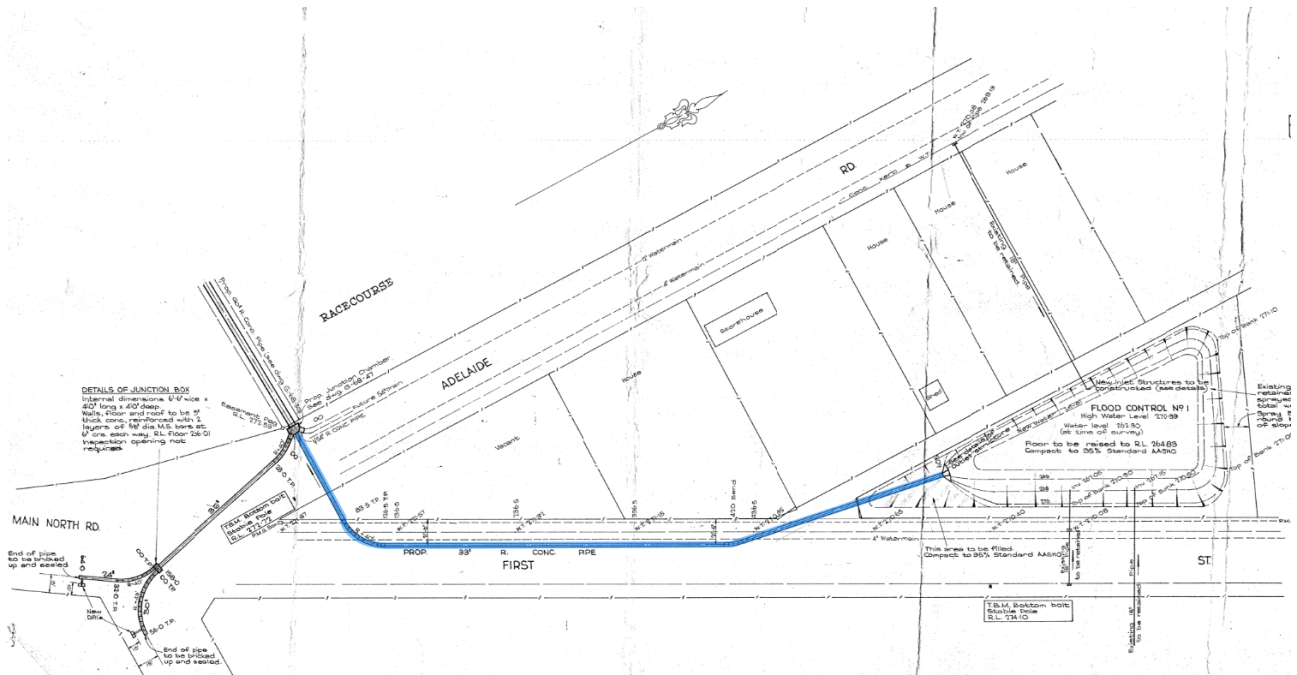


Figure 10 - As Constructed plans of the existing 800mm diameter drain between 57 First Street and Gawler Racecourse, proposed upgrade extent highlighted in blue

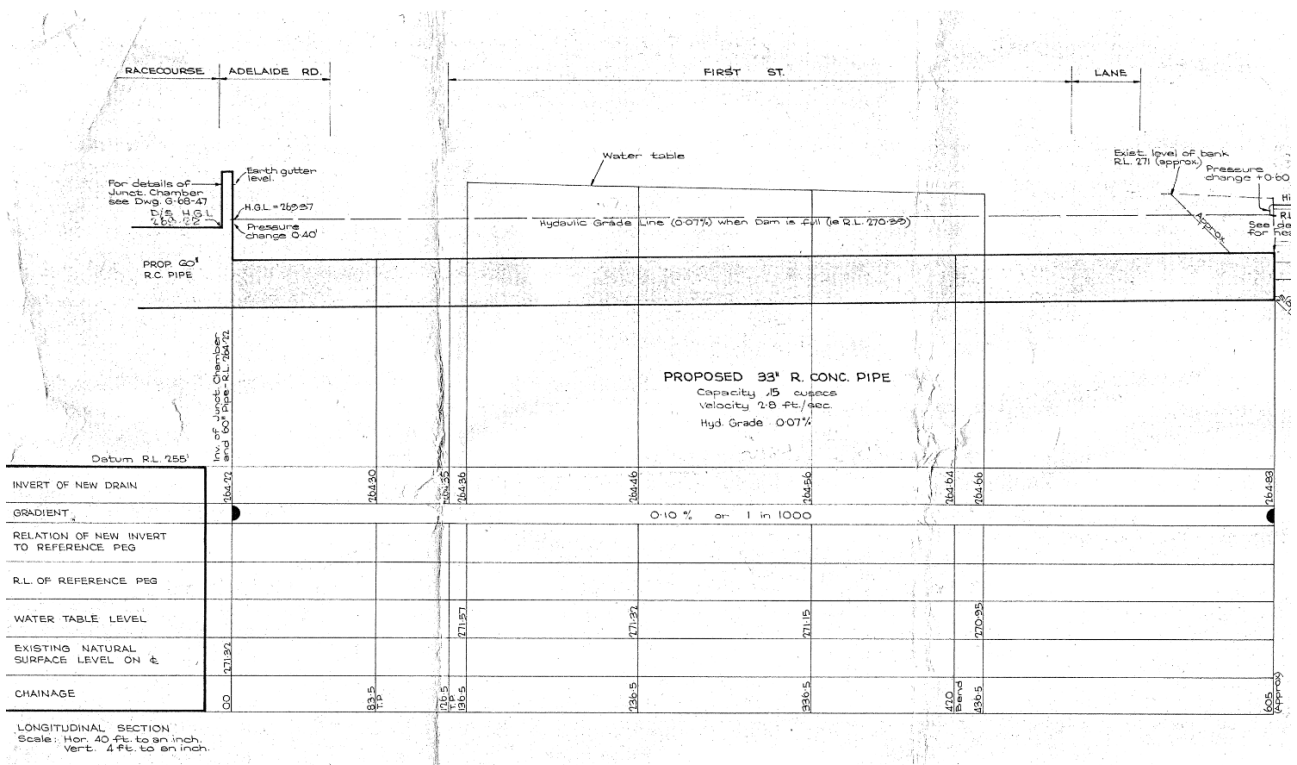


Figure 11 - As constructed long section of existing 800mm drain, proposed to be upgraded to 1200mm.

Potable water service

A review of the Dial Before You Dig investigation indicates that the subject site is surrounded by water mains. A 300 mm diameter supply main pipe (300 CI) and 100 mm diameter supply main pipe (100 AC) is located at Main North Road and Sheriff Street respectively.

Obtaining adequate capacity to service future development will likely be feasible via the existing 300mm water main on Main North Road as there are water valves and water meter supply on this water main alignment adjacent the subject site.

It is possible that there will be a need for booster pumps to assist with the supply demand of water should large development or low flows be encountered. Future development will require new internal water mains reticulation including water connections per building. It is also noted that there may be additional costs / infrastructure to meet fire code requirements.

Future investigations to verify the capacity of the SA Water network at this location would include a flow test at the metered location.

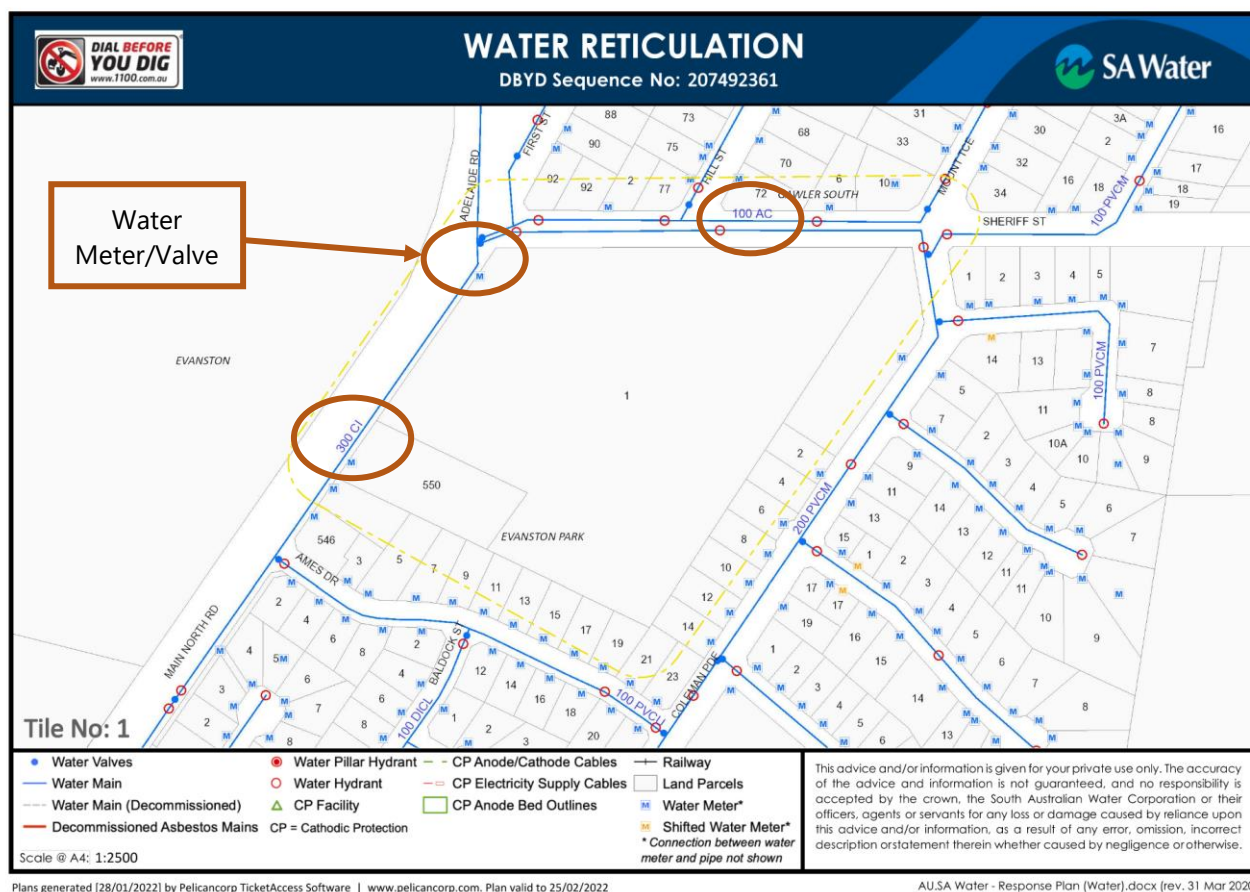


Figure 12-SA Water Supply Mains (DBYD)

Sewer

Information obtained through SA Water indicated that there are 2 major sewer lines servicing the subject site. There is an existing 150 mm PVCU pipe along east boundary of the subject site adjacent to residential house's boundaries at Coleman Parade, however this is located at the high point of the property, and unlikely to be useful for future development.

There is a 150 mm diameter VC (Vitrified Clay) sewer main on Main North Road, as shown on Figure 9 which we believe will be appropriate for the low volume of waste generated by bulky goods stores. This sewer increases to a 225mm main to the north, should there be minimal capacity in the existing 150mm pipe, a small extension of 225mm would likely mitigate this issue.

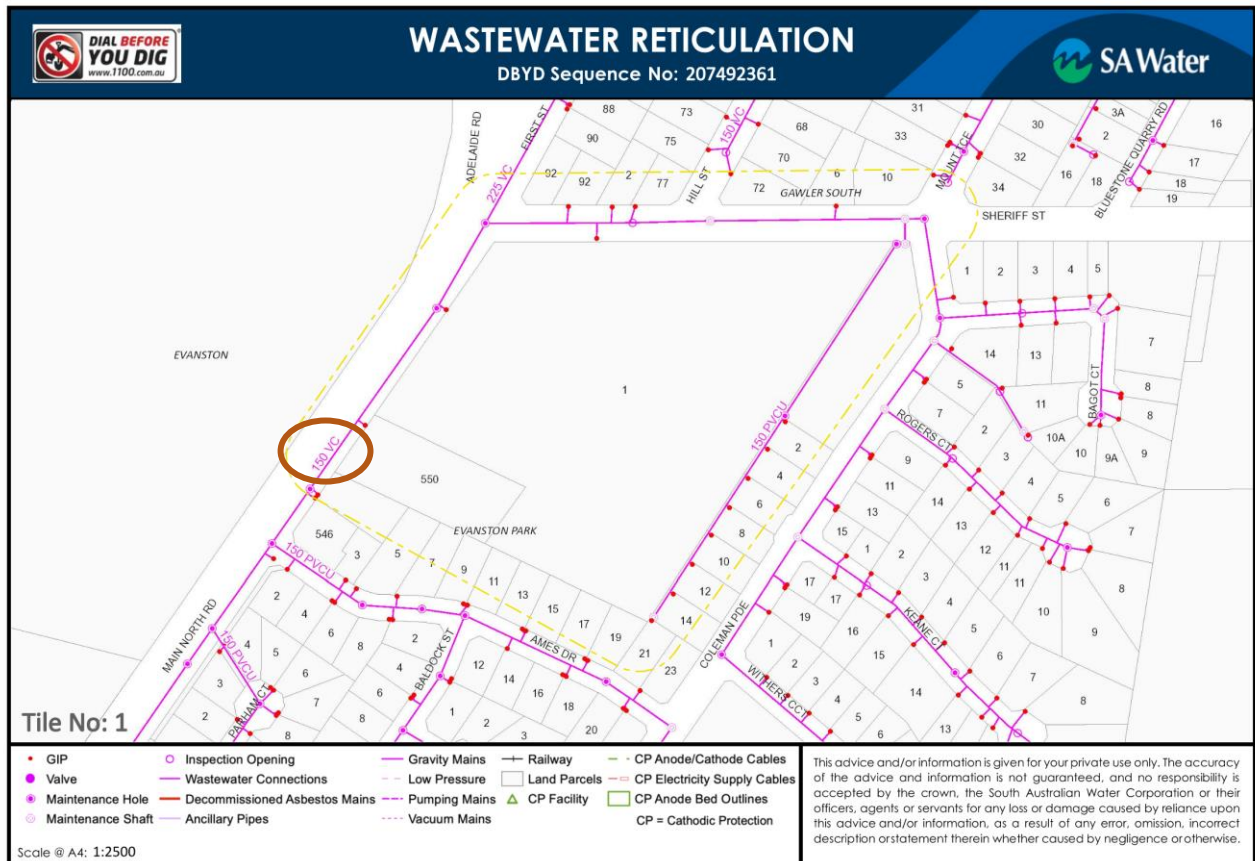


Figure 13- SA Water sewer mains

Electrical

The property is currently serviced by above ground power lines along Main North Road (Electricity Pole) as shown in Appendix B.

FMG have contacted SAPN regional manager for further information on site loading requirements and whether it is likely that further augmentation will be required, however there is insufficient information at this stage for SAPN to provide an indication on the level of network augmentation required.

FMG Engineering does not provide electrical engineering services in house, however, has previously been supplied an approximation of 100VA/m² for commercial spaces. On this basis, the total estimated demand of the existing buildings, and future development are not within the same order of magnitude, hinting that the scale of any augmentation may be required.

It is recommended that an electrical engineer be engaged prior to project inception to provide detailed informed advice on expected demands and liaise with SAPN to confirm site requirements.

Communications

A review of the Dial Before You Dig investigation shows that there is NBN infrastructure within the vicinity of the subject site as shown in Figure 10 and Appendix B. We believe this can be connected to, with new pit and pipe design to supplement this system internally. As per electrical plans, given the current commercial use case of the site, we believe there will be sufficient capacity to service the proposal.

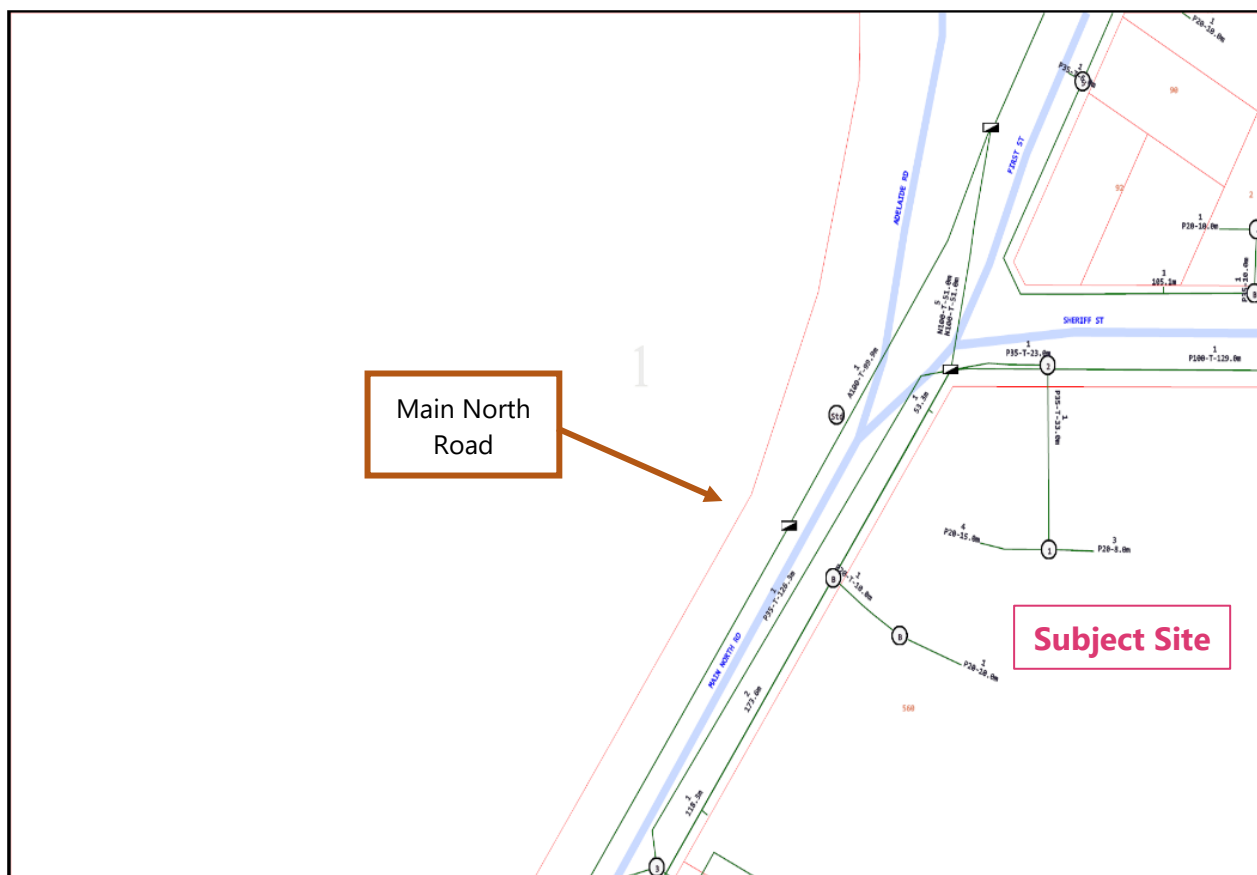


Figure 14-NBN network on Main North Road and Sheriff Street

In addition to the NBN services on site, information obtained via DBYD indicated that there are Telstra and TPG Telecom information (approximate location and details of cable plan and duct plan) in the vicinity of the site as shown in Appendix B.

Gas

Information obtained via DBYD indicated that there is an existing high pressure steel gas main (70-350kPa) adjacent to the site on Main North Road which could potentially be adequate to service the future development. Gas service authorities have not returned comment on the network demand viability of servicing the subject site – however should gas service not be available, alternative power solutions (electrical) are available to service the subject site.

Summary

FMG Engineering had prepared this preliminary services assessment based on the information provided by Future Urban on the Code Amendment, anticipated future development and through desktop investigation (via DBYD, GIS and Aquamap) and discussion with Council and SA Water. At this stage, we believe there to be sufficient capacity in many of the services, however are awaiting final detailed feedback from SA Water and SAPN to verify these assumptions.

We note Council has outlined the below specific elements pertaining to engineering infrastructure which this report has addressed;

Flooding – Determine potential impacts of localised flooding as well as mitigation measures relative to proposed land use;

Stormwater – Determine potential impacts on the localised stormwater network as well as mitigation measures relative to the proposed land use;

FMG has assessed the subject site in accordance with Council stormwater requirements. WSUD and detention principals are to be adopted by any development on the site to ensure no negligible effects on stormwater networks arise as a result of this code amendment.

Given the downstream catchment is constrained to a low level of service, a practical solution to mitigate negative flood impacts on downstream networks could be achieved through restricting and detaining peak outflow further, from 1% AEP back to 0.2EY (5 year ARI) storm events detention systems.

Site levels will be nominated to ensure a minimum freeboard of 300mm above external flood levels and internal site grading will be designed in accordance with relevant Australian standards to ensure adequate levels of service and freeboard will be achieved.

Various options exist to deal with this existing issue including upgrading external infrastructure, noting a large proportion of this responsibility rests with Council. A pragmatic solution is for the Proponent to agree to financially contribute to external infrastructure. Such is to be resolved and confirmed via a Land Management Agreement and Deed. The identified infrastructure upgrade consists of an approximately 600m long stormwater drain to be upgraded from 800mm diameter, to 1200mm diameter, aligning with a key recommendation of the *Gawler and Surrounds Stormwater Management Plan*. The contribution shall be a logical apportionment of responsibility to the Proponent which would supplement the value of other works to be determined and agreed in the broader catchment.

High level Infrastructure (water, wastewater, power etc.) – Determine extent of services available to the site and area more generally

Assessments of DBYD data, contact with service authorities, has confirmed the presence of infrastructure suitable for connection to service the subject site, with augmentation possibly required depending on final development plans.



Appendix A

Correspondence from Service Authorities

Jordan Colbert

From: Daniel Tet <Daniel.Tet@gawler.sa.gov.au>
Sent: Monday, 14 February 2022 9:08 AM
To: Ghasem Ashtijou; Jordan Colbert
Cc: Paul Matthews
Subject: RE: 550-560 Main North Road - Stormwater requirements

Hi Ghasem,

Thank you for your query below. Please see below information which hopefully helps with your high level services assessment of 550-560 Main North Road.

- Along Sheriff Street, there are pits which can be utilised for stormwater discharge. However, please be advised that the 600mm stormwater pipe is undersized. As a part of the proposed development, it will need to be upgraded to comply with standards.
- Confirmation whether this will be a commercial development or split between a residential and commercial development.
- Town of Gawler allows for 3 types of detention systems;
 - o Open detention basins located within Council Reserves.
 - o Underground storage tanks located within Council Reserves
 - o Oversized pipe network located within Council Road Reserves and Reserves.
- Confirmation of any easements located within the property boundaries. From our GIS data, there is an easement located at the south east corner of the development property. Location of this easement is indicated on the attachment.
- Gawler Flood Map Data (100 year ARI) with indicative RL's is as shown on the attached document.
- Stormwater run-off must not impact adjacent properties and be contained within the property boundary. It has been noted that the natural contour of the site is towards the west (Main North Road).
- Any design such as GIP's, JB's, crossovers, kerbing etc must be designed as per Council Standard Details. Refer to link <https://www.gawler.sa.gov.au/your-council/engineering/civil-standard-details> for Council Design details, as well as our Standards and Requirements for Development document which outlines are development standards. This must be followed in conjunction with Australian Standards. Stormwater Drainage Infrastructure design can be found in Section 4 of this document.
- For any pollution control devices/Gross Pollutant Traps (GPT's), the preferred choice is Ecosol for the Town of Gawler Council.
- Post development flow must not exceed that of the pre development flow. Pre development flow must not be greater than 10 year ARI (commercial/industrial areas) with post development flow for a 100 year ARI.
- Calculations, plans and computer models in DRAINS is to be provided to allow for Council Engineering to properly assess design.

If you have any further queries, please don't hesitate to contact myself.

Kind Regards,

Daniel Tet

Development Engineer

TOWN OF GAWLER PO Box 130 Gawler SA 5118

T: (08) 8522 9227 | x227

A liveable, cohesive, active, innovative and sustainable community



FMG Report

P6. No appraisal of existing stormwater arrangements within the site are provided. Is there a basin within the site (south of the main building)? At what location(s) is site stormwater currently discharged from the site / connected to underground drainage, corresponding to which portion of the site?

P8. Detention basin sizing.

The analysis presented is simplistic and potentially under estimates the storage required.

Pre-development impervious assumption of 25% - should be supported by a level of site assessment that delineates the impervious areas that are currently discharged from the site to the Council road / drain system.

Basin performance – the assessment presented assumes a pump station discharge that runs at full flow rate as soon as the event commences. If the system is a gravity system (most likely), discharge rates will build up to a maximum rate at the end of the event, and hence a greater storage volume will be required.

Discharge limit – Some thought should be given to the merit of discharging all events at the “pre-development 10% AEP peak rate”. Given the SMP indicates that the drainage system is under capacity for a 1 in 5 yr event – this would suggest a lower limit should be adopted here.

P10 Flood Hazard Overlay

The commentary on the reason for site flooding is flawed. Comments that Council infrastructure is “undersized” seems strange – it is a 1% AEP flood map, Council infrastructure is not designed for a 1% AEP event. Some flooding should be expected. Prefer the Gawler SMP be referred to order to understand why there is flooding here, Council has highlighted the key item in bold:

3.2.3 First Street (Gawler South)

This location is a trapped low spot adjacent the Gawler Racecourse with a predominantly urban catchment of just under 220 hectares. Currently, there is little flooding in the 20% AEP event and only slightly more flooding during the 5% AEP event when stormwater inundates the road. During the 1% AEP event there is significant inundation of the road and surrounding properties (see Figure 3.4), as well as significant sheet flow through properties from Coleman Parade and Mount Terrace. Long-term predictions also show significant inundation and sheet flow through properties during the 5% AEP event.

The primary cause of flooding is the capacity of the pipe system that passes beneath the Gawler Racecourse. This pipe system is the only means of draining the low spot as there are no low-level overland flow routes from this area due to the elevation of the racecourse surface.

This site is on the fringe / partly within the flood plain described above. A development proposing a high impervious site coverage needs to be very carefully considered here, both with respect to protection of the development itself, and ensuring that the development does not exacerbate risk to adjoining land.

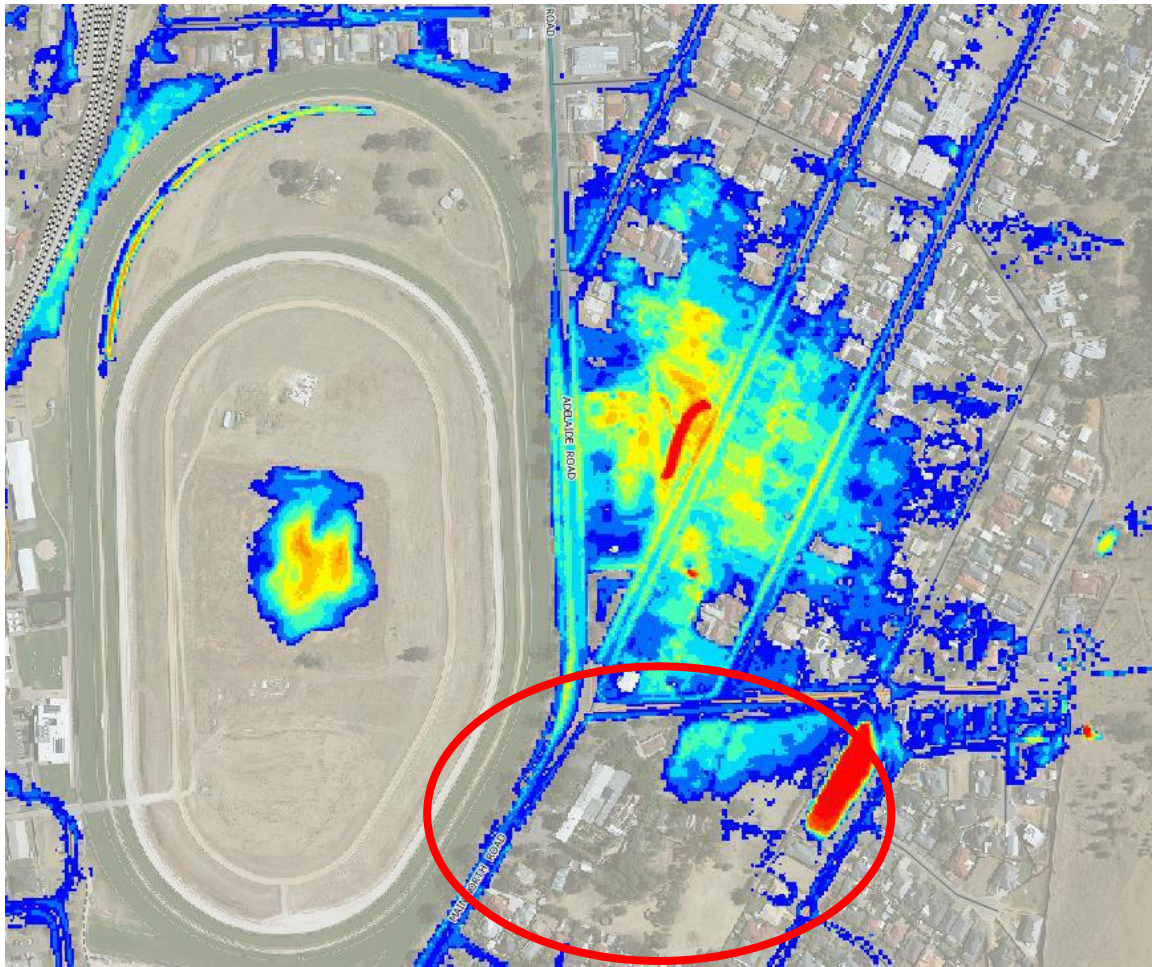


Figure 3.4 Predicted inundation during 1% AEP event (long term development scenario) at First Street

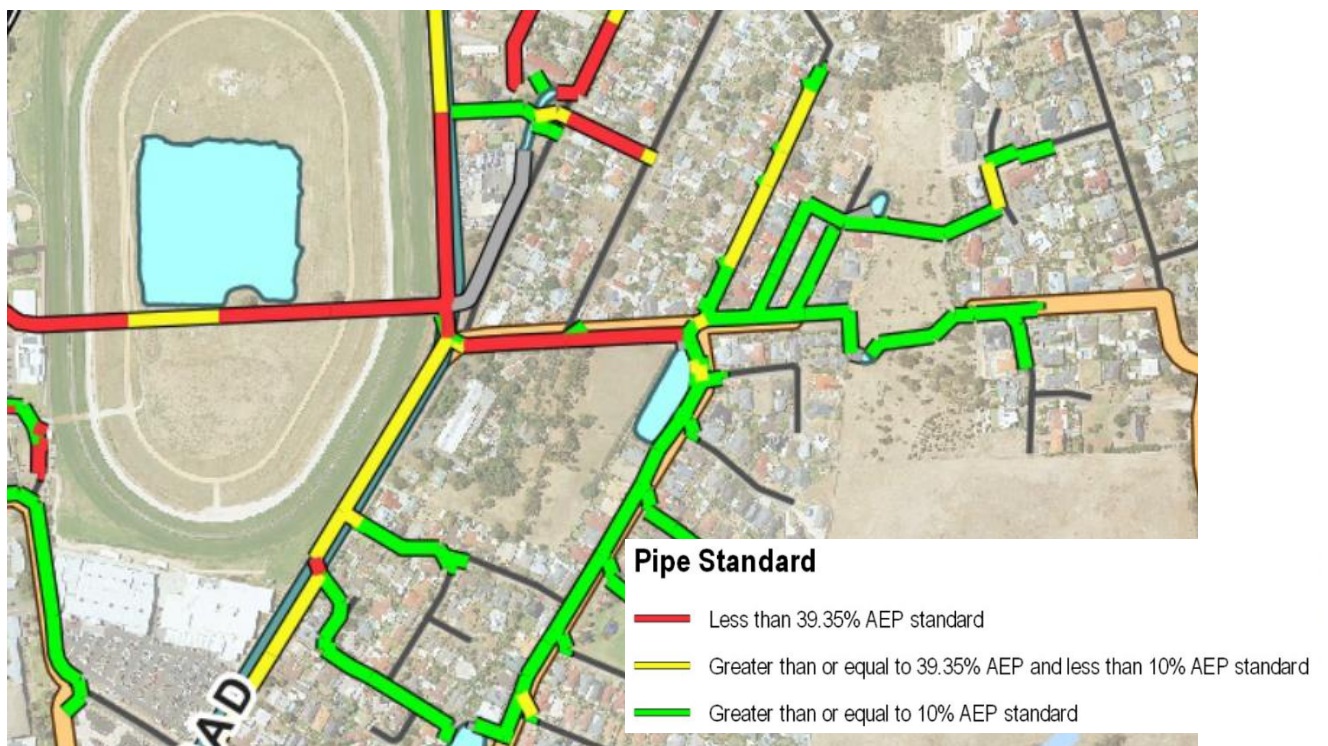
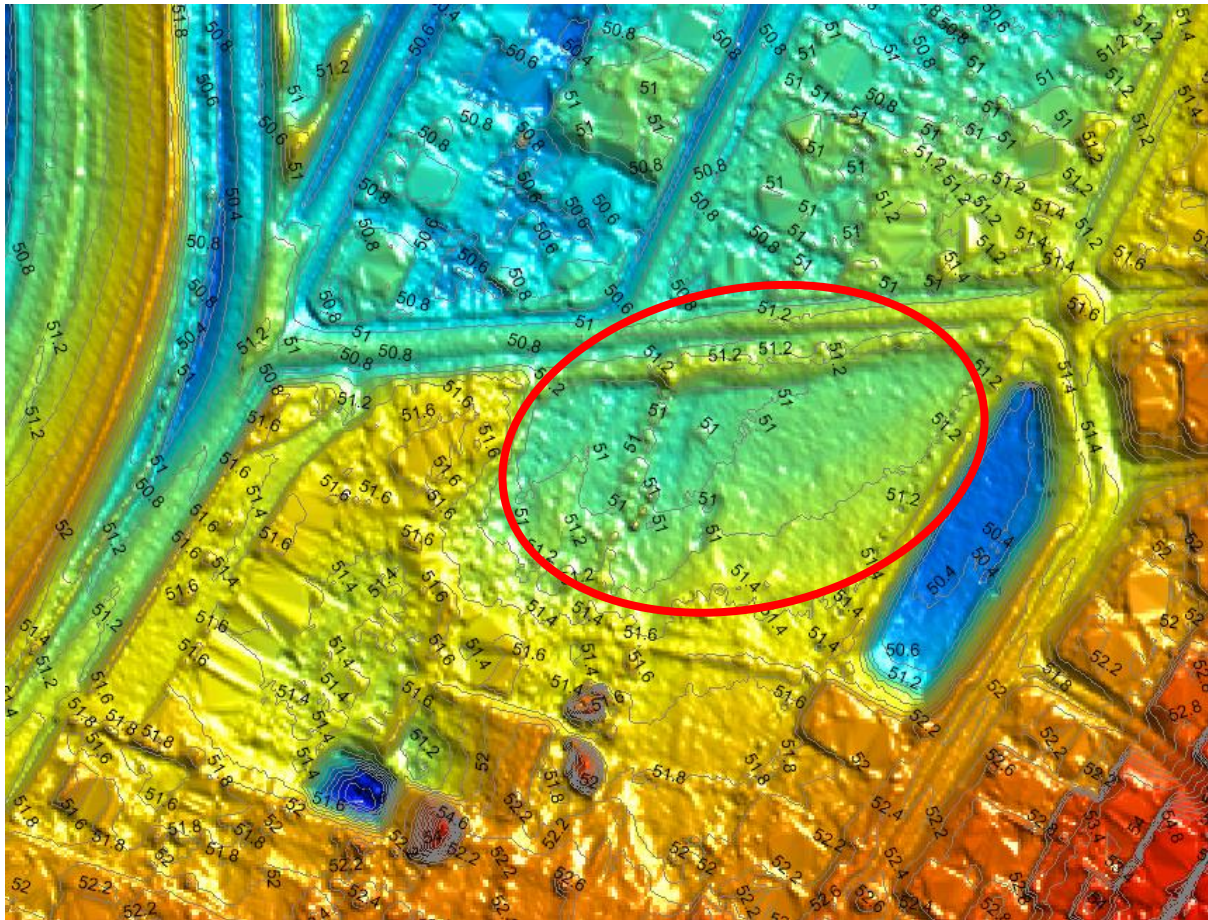


Figure 2.5 Existing Stormwater System Standard Map

“Filling” of this low lying area will need to carefully assess whether this will lead to increases in flood risk to adjoining northern floodplain area.



P10/11 Drainage solutions

P11 Council cost sharing

It is suggested that “cost sharing with Council would be appropriate to resolve existing inadequate Council infrastructure”. This statement is not correct.

Council Requirements issued 14 Feb 2022

It would seem that these requirements were issued on the basis of an initial general enquiry.

As FMG have in part identified, the requirements that Council provided in February 2022 are prepared for residential land divisions – not single allotment large developments of this nature. Many of the requirements listed are not relevant or appropriate, and are confusing with respect to what must be done when the development itself is “private” – i.e. it does not generate assets that will be handed over to Council.

The proposal for a pipe upgrade in Sheriff Street is a Council suggestion. Whether this proposal would be of any benefit to the development site has not been assessed. It can reasonably be expected to have limited benefit, as the receiving drainage system in Main North Road is also under capacity, and hence it would be reasonable to expect that additional surcharge will occur at the Sheriff Street / Main North Road intersection. Council don't have a firm a view at this stage one way or the other, given that the development will create considerable additional impervious area, and is located adjacent to one of Gawler's worst flooding hotspots, any proposal to do things to Council's stormwater system should be based on appropriate assessment. No assessment has been undertaken to date.

Way forward

Suggest either:

- The proponent undertake sufficient technical investigations to support any adjustment with Council's drainage work – ie. That it is feasible, and won't make things worse for adjoining areas. This needs to be scoped to a sufficient level such that it can be referenced in the LMA; or
- Development provide sufficient on-site detention measures so as to not make things worse for the adjoining flood affected areas. Suggest a flow discharge limit from the site no more than the existing 5 year ARI peak flow rate.



Appendix B

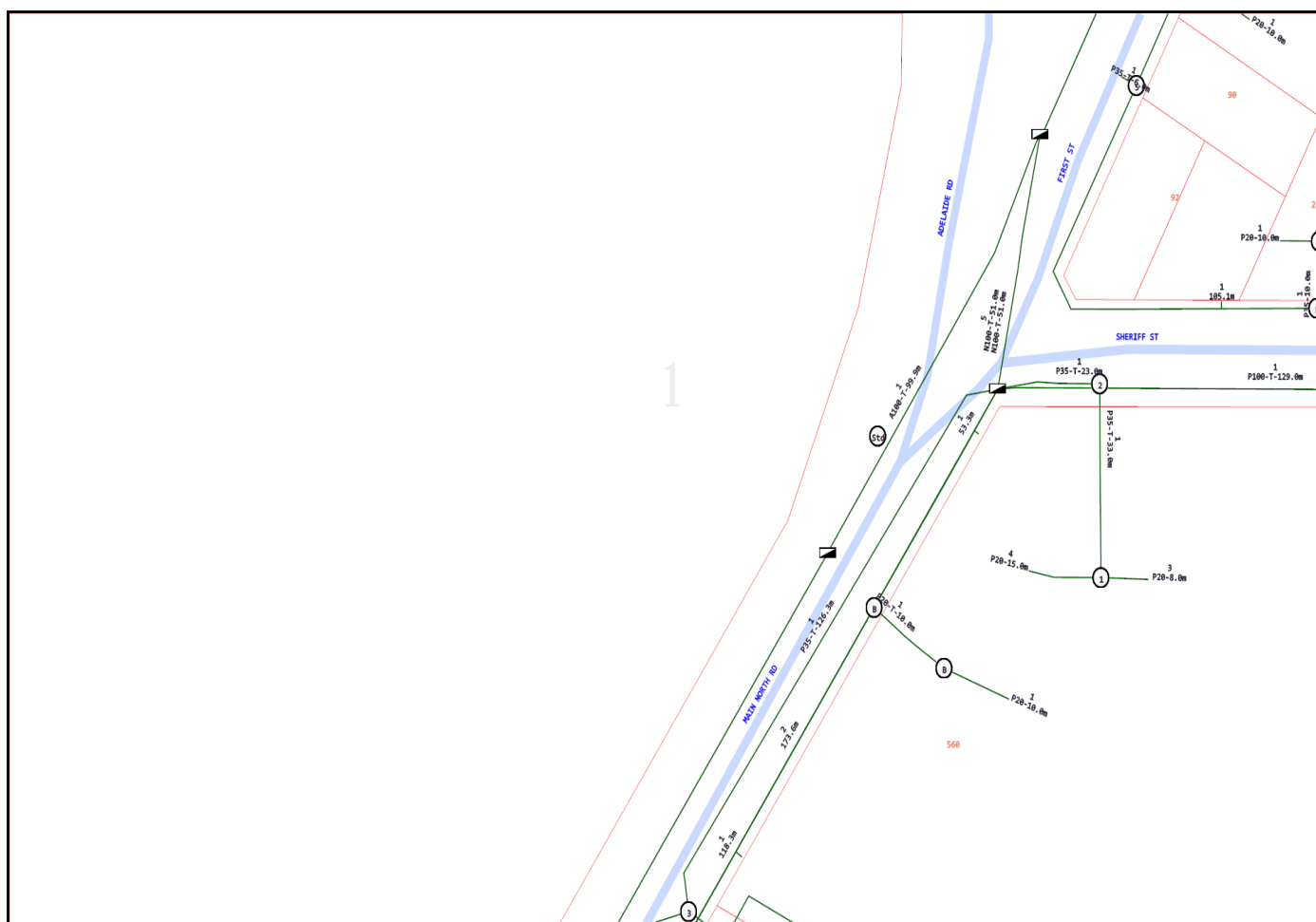
DBYD extracts



LEGEND



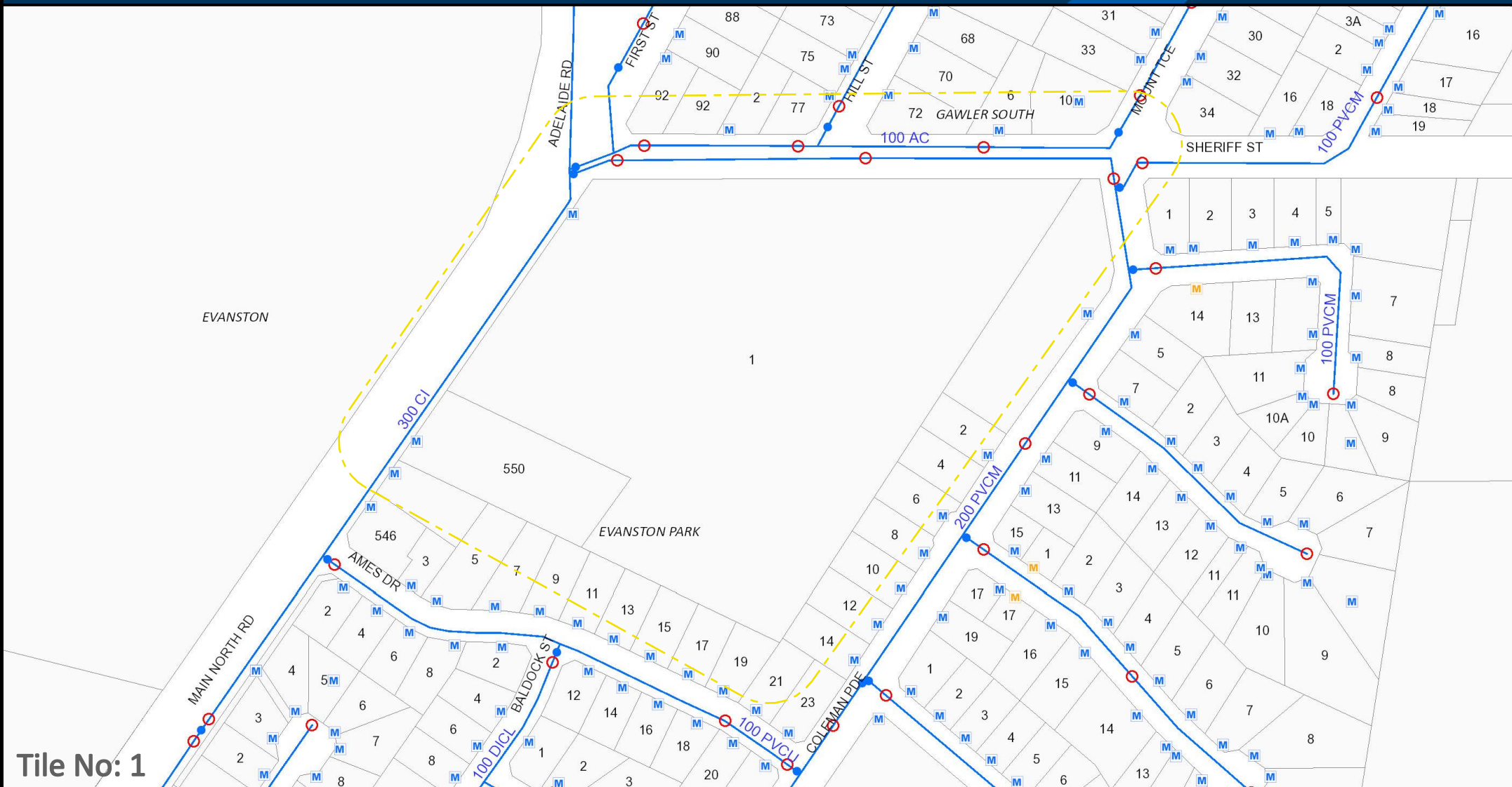
	Parcel and the location
	Pit with size "5"
	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
	2 Direct buried cables between pits of sizes, "5" and "9" are 10.0m apart.
	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m





WATER RETICULATION

DBYD Sequence No: 207492361

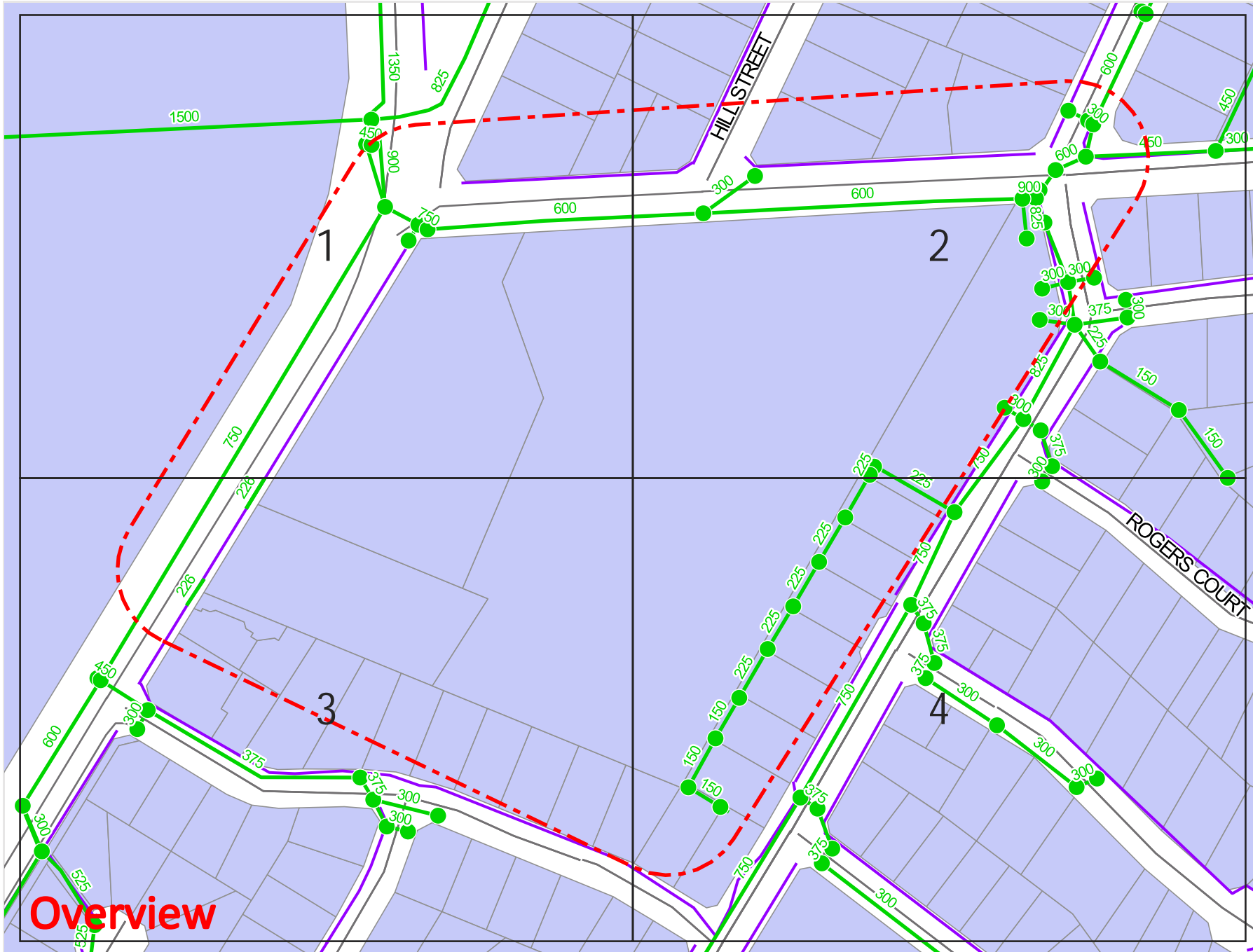


Tile No: 1

- | | | | |
|-----------------------------------|--------------------------|------------------------------------|------------------------|
| ● Water Valves | ⊙ Water Pillar Hydrant | --- CP Anode/Cathode Cables | — Railway |
| — Water Main | ○ Water Hydrant | - - - CP Electricity Supply Cables | □ Land Parcels |
| - - - Water Main (Decommissioned) | ▲ CP Facility | □ CP Anode Bed Outlines | Ⓜ Water Meter* |
| — Decommissioned Asbestos Mains | CP = Cathodic Protection | | Ⓜ Shifted Water Meter* |
- * Connection between water meter and pipe not shown

This advice and/or information is given for your private use only. The accuracy of the advice and information is not guaranteed, and no responsibility is accepted by the crown, the South Australian Water Corporation or their officers, agents or servants for any loss or damage caused by reliance upon this advice and/or information, as a result of any error, omission, incorrect description or statement therein whether caused by negligence or otherwise.

Scale @ A4: 1:2500



Legend

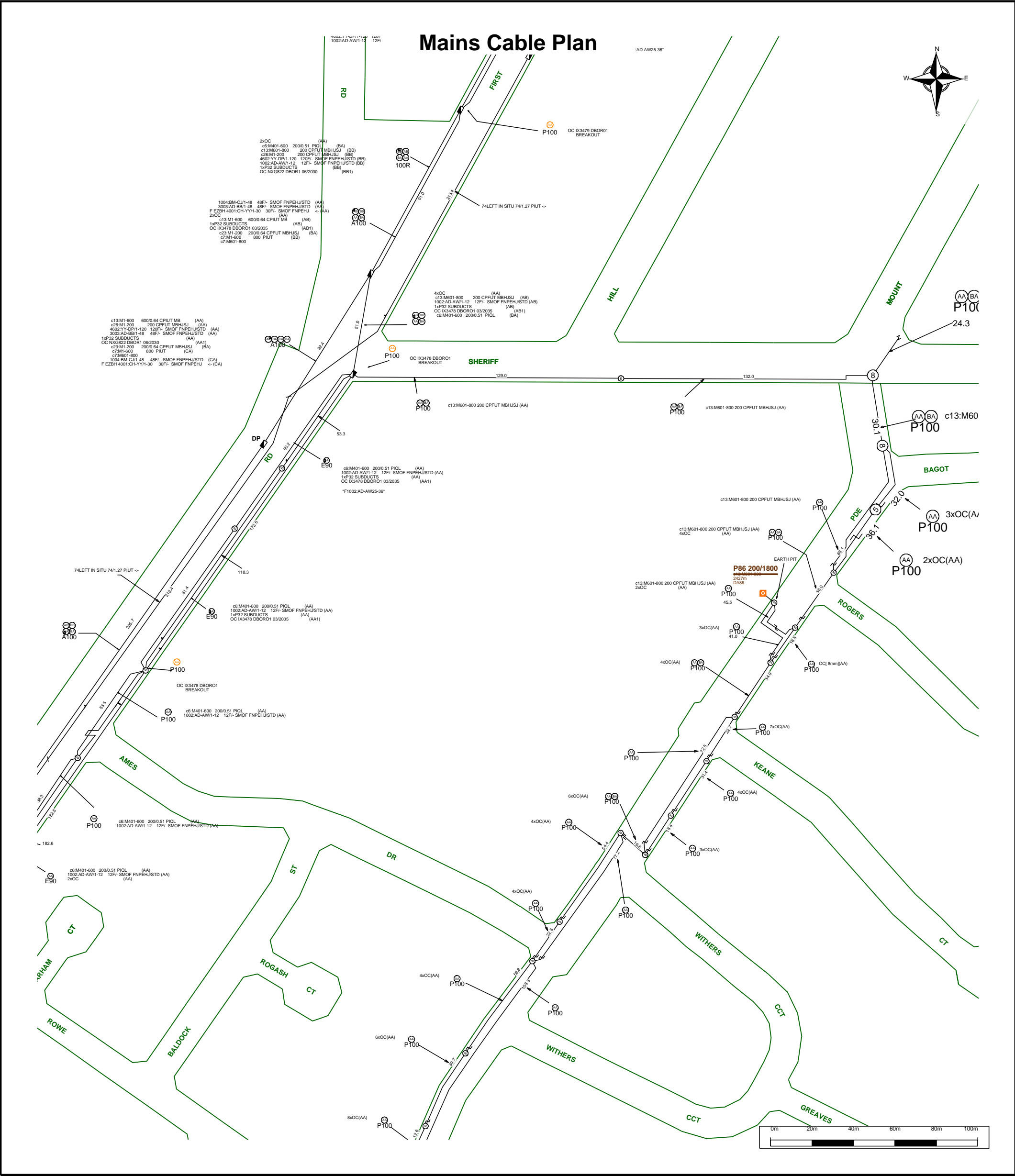
- Stormwater Pits
- Stormwater Pipes
- Footpaths
- - - Area of Enquiry




Scale: 1:2050
Expires: 25 Feb 2022

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Town of Gawler or PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

Overview



	For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)	Sequence Number: 207492360
	TELSTRA CORPORATION LIMITED A.C.N. 051 775 556	CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.
	Generated On 28/01/2022 16:32:04	

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

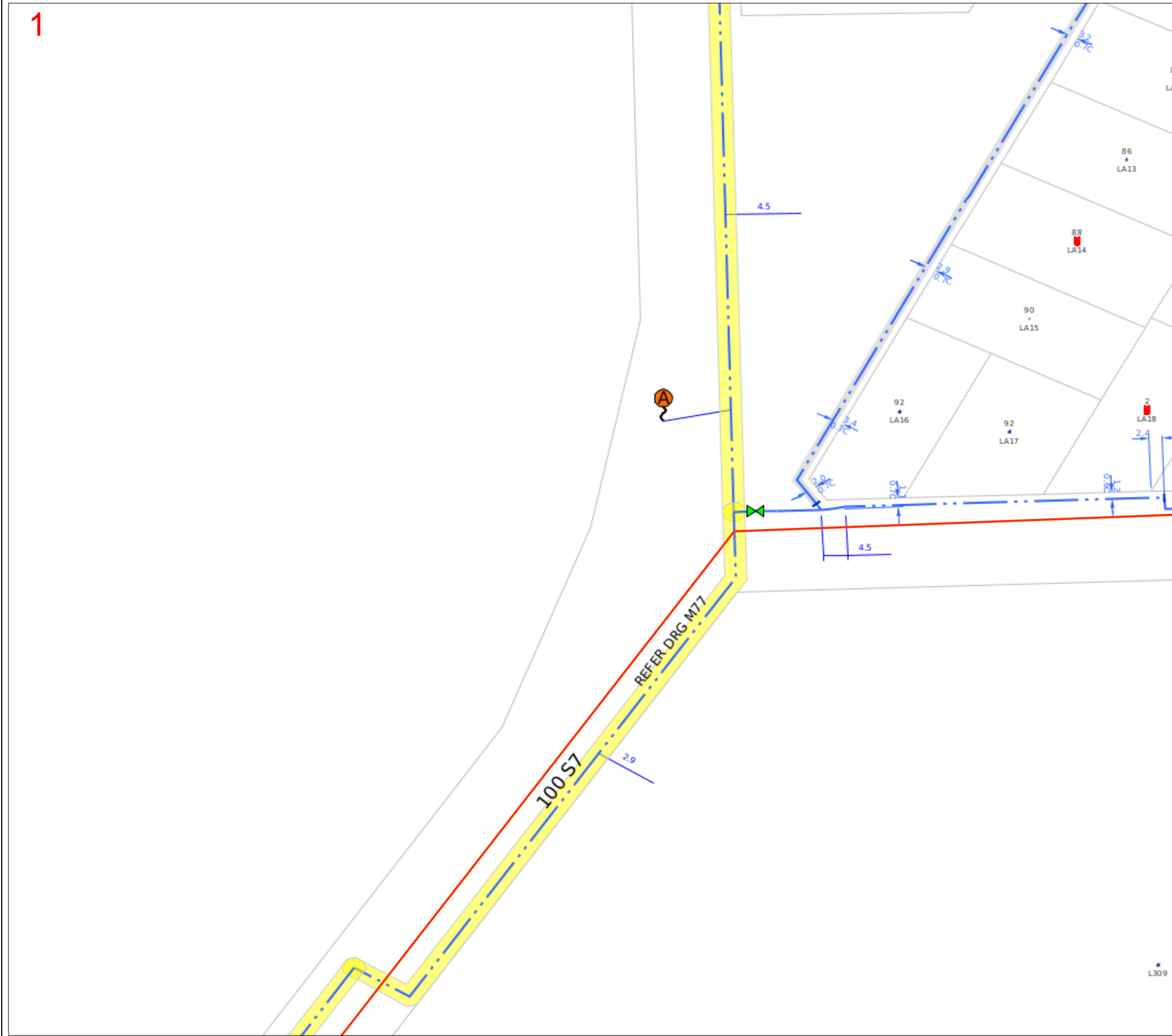
It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Site Address	1 Sheriff Street Evanston Park 5116	Sequence No	207492364
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Before you commence any works you are required to complete the attached 'Work In The Vicinity Of Critical Gas Assets' request form and forward this to APA asap



LEGEND

PIPE AND BOUNDARIES	
LOW PRESSURES	—
MEDIUM PRESSURES	—
HIGH PRESSURES	—
TRANSMISSION PRESSURES	—
PRIORITY MAIN (BEHIND PIPE)	—
PROPOSED (COLOUR BY PRESSURE)	—
LPG (COLOUR BY PRESSURE)	—
ABANDONED	—
IDLE	—
SLEEVE	—
CASING / SPLIT (BEHIND PIPE)	—
EASEMENT/ JURISDICTION	—
EXAMPLES	
40P6 in 80C2	40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing
63S8	63mm Medium Pressure Steel

PIPE CODE / MATERIALS	
C# (e.g. C2)	Cast Iron
CU	Copper
N2	Nylon
P# (e.g. P6)	Polyethylene (PE)
P6,P7,P9-P12	Medium Density PE
P2,P4,P8	High Density PE
S# (e.g. S8)	Steel
W2	Wrought Galv. Iron
W3	Poly Coat Wrought Galv. Iron
Pipe diameter in millimetres is shown before pipe code	
e.g. 40P6 = 40mm nominal diameter	

OBJECTS or TERMS	
VALVES	—
BURIED VALVES	—
REGULATORS	—
GAS SUPPLIED = YES	—
CP RECTIFIER UNIT	—
CP TEST POINT/ ANODE	—
SYPHON	—
TRACE WIRE POINT	—
PIPELINE MARKER	—
NOT TIED IN	N.T.I.
DEPTH OF COVER	C
BACK / FRONT OF KERB	Bok Fok

Map Key

1	3
2	4

Scale 1:700

0 0.008km

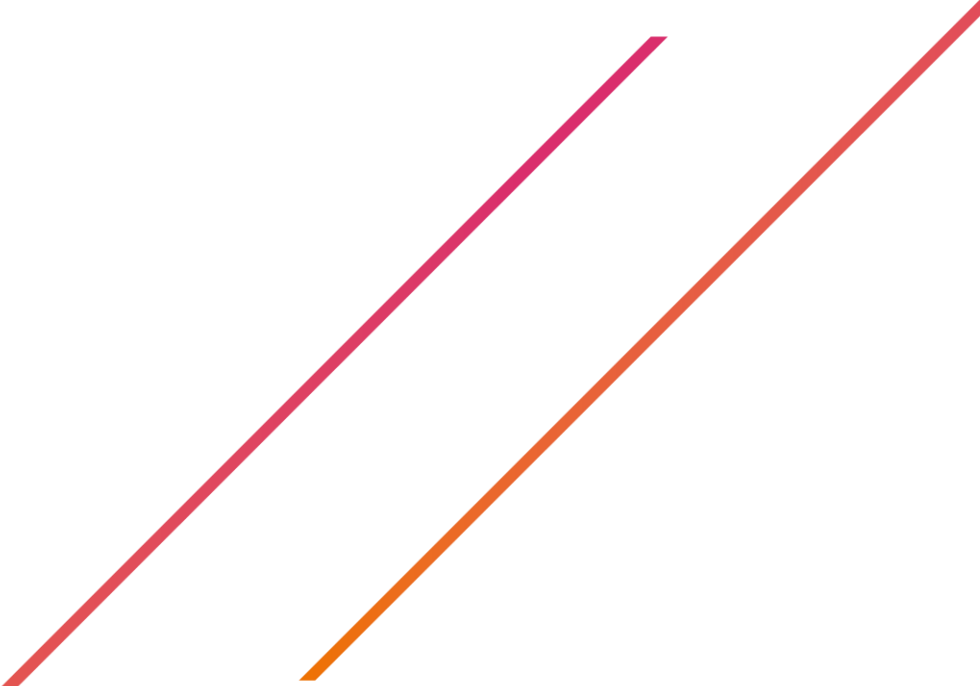


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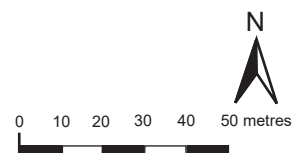
Appendix C

Concept Plan





- Concept Plan Boundary
- No vehicle access
- Landscaping (minimum depth of 1.5 metres)
- Acoustic barrier (on boundary)
- Building Exclusion Area (9 metres from boundary)
- Primary vehicle access
- Secondary vehicle access



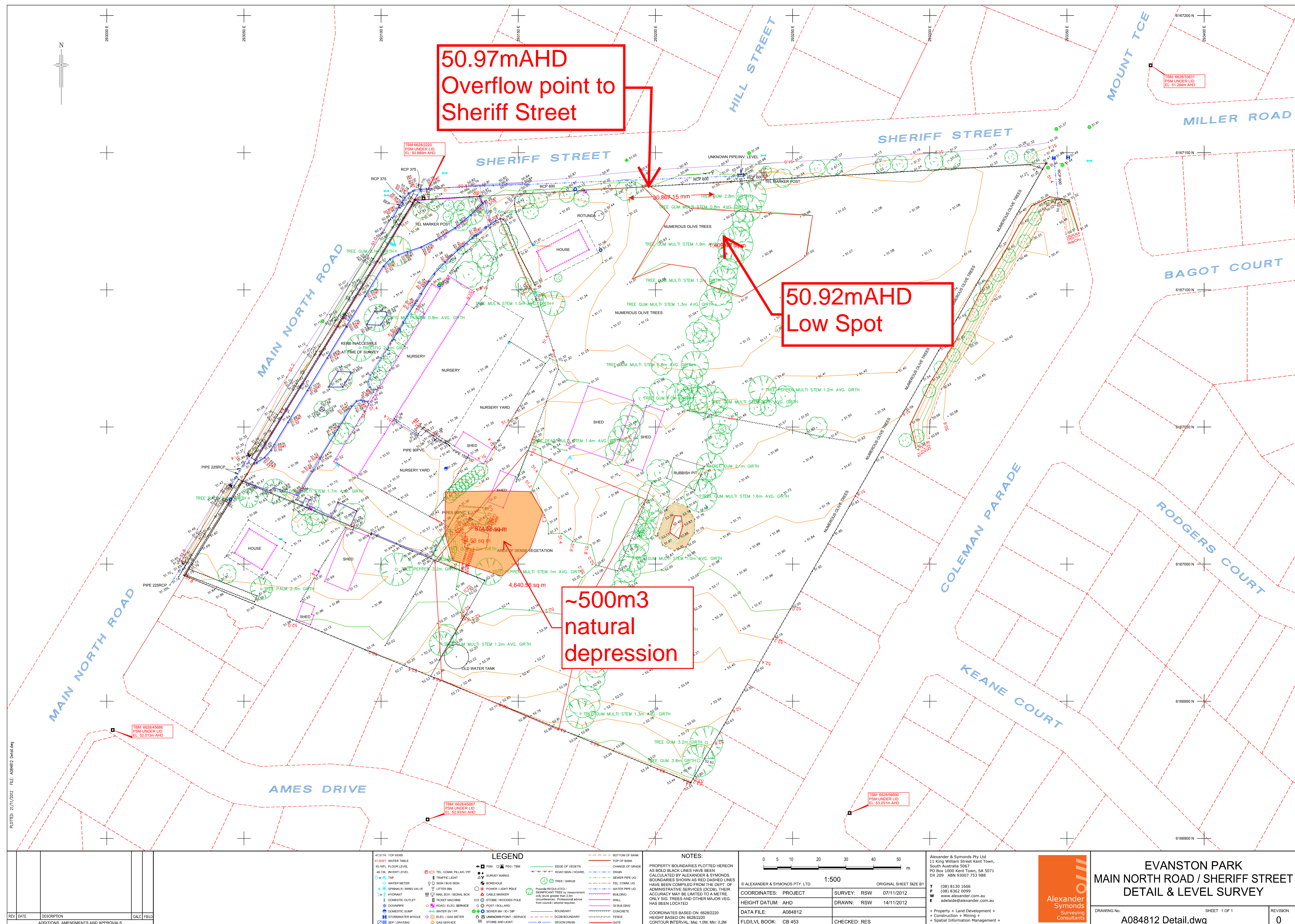
Concept Plan # MAIN NORTH ROAD



Appendix D

Site Survey







ENGINEERING

ADELAIDE

67 Greenhill Road
Wayville SA 5034
Ph: 08 8132 6600

MELBOURNE

2 Domville Ave
Hawthorn VIC 3122
Ph: 03 9815 7600

SYDNEY

Suite 28, 38 Ricketty St
Mascot NSW 2020
Ph: 1300 975 878

ABN: 58 083 071 185