STANDARDS AND REQUIREMENTS FOR LAND DEVELOPMENT / LAND DIVISION

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DOCUMENT CONTROL

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1 INTRODUCTION

This document must be read in conjunction with Town of Gawler's current Development Plan.

Land division constitutes a development and therefore comes under the Development Act of 1993. All applications regardless of size are to conform to this document to obtain development approval from The Town of Gawler.

- If the plan of division proposes more than 20 allotments (including by community title) and one or more of the allotments is less than 1 hectare in area, the relevant authority shall, at its discretion, either:
    - require up to 12.5% of the land being divided to be vested in the relevant Council as open space;
    - require a once-only monetary contribution for each new allotment not exceeding 1 hectare;
    - require a combination of part land and part money in accordance with the formula detailed in section 50(7) of the Act;
- Roads must be designed, constructed and sealed to recognised Australian Standards and be built in accordance with the Town of Gawler technical requirements and standard drawings;
- Footpaths, water tables (kerbs and gutters), culverts and drains must be designed and constructed to recognised Australian Standards and be built in accordance with Council Technical Requirements and Council Standard Details;
- All electricity must be supplied underground unless it is specified by Council that the area does not require underground mains;
- The requirements of public agencies, including Council, shall be met for the supply of water, gas, telecommunications and CWMS or sewerage systems;

- The aim of this document is to provide further information pertaining to Councils expectations regarding these mandatory requirements, specifically relating to the requirements for the development of land and the provision of infrastructure. Key aims are:

1. The Standards and Requirements within this document have been prepared by Council as a reference document to assist Developers, Planners and Engineers involved in the planning and design of land development in the Town of Gawler where there is a requirement to construct infrastructure assets;

2. This document will assist Developers to undertake preliminary planning and design work and to have an understanding of what Councils minimum requirements are to facilitate discussion with Council prior to lodgement of a Development Application;

3. These Standards and Requirements have been prepared with the aim of encouraging “best practice” in the development of new urban areas in the Town of Gawler. It is acknowledged that “best practice” changes over time and reviews will be made to these standards and requirements on a needs basis in order to reflect such changes;

4. This document should be used by Developers for infrastructure planning and design, however, each development site and Development Application will vary from site to site. Accordingly, designers are encouraged to consult with the Council Engineering and Planning Staff and any other relevant authorities prior to or during the preparation of designs;

5. Designers, in addition to the requirements of this document, should ascertain the specific requirements of all authorities as they relate to the proposed designs for the specific development site;

6. This document does not outline the specific information that may be requested by Council in order to make an assessment on the merits of a land use planning development application in accordance with Town of Gawler’s development plan;

7. Development approval will be incumbent on all of the requirements of the Development Act 1993, The Town of Gawler Development Plan and site specific planning conditions being met. This document does not specifically address planning issues and the applicant should contact Councils Planning Department regarding these issues;

8. This Standards and Requirements document shall be used in the planning, design and construction of Direct Infrastructure Assets as identified in Developer Contribution agreements established between Council and The Developer;

Ultimately any proposed development should provide a functional safe environment that meets the needs of the land division and amenity of the surrounding residents. Innovation should not be hampered and council encourages it in the design where it can be demonstrated that the alternative approach is equal to or superior to the standards set out in this document.

2 DEVELOPER RESPONSIBILITY

The developer shall Engage an Engineering Consultant with expertise to undertake and supervise the engineering works. Once the Consultant has been engaged, Council Officers will communicate only with the Consultant.

2.1 SERVICE AUTHORITIES

Developer shall be responsible for all liaisons with the services authorities. These services shall include, but not limited to:

- Water Reticulation
- Electrical Reticulation
- Telecommunications
- Street Lighting
- All conduits and pits
- Gas Reticulation
- CWMS or Sewerage Services
- Stormwater (Council)

The developer is responsible for the easements and internal drainage requirements for water and sewerage services of the SA Water Corporation, if any, being met.

2.2 NATIONAL BROADBAND NETWORK

The governments National Broadband Network (NBN) has targeted Gawler as one of the areas to receive optical fibre broadband coverage. Therefore in accordance with the latest policy provided by the NBN Co. developments of 100 lots or more are able to receive fibre optic cable from NBN Co. The installation of the necessary infrastructure lies with the developer as per NBN Co. policy. For developments of less than 100 lots the developer must request connection from a service provider; however the developer shall install the necessary infrastructure to the standards identified by NBN Co. The developer is to liaise with NBN Co. and be familiar with all current policy.

For more detailed Information refer to the NBN Co. web site
http://www.nbnco.com.au/
Information specific to new developments is available at
http://www.nbnco.com.au/getting-connected/new-developments.html

2.3 DOCUMENTATION

The Consultant is to produce a design based upon the Development Application, Approval Conditions of Consent and this document. The design must be submitted for approval in the form of Drawings, Reports and Specifications.

The consultant should submit the following information for Council review/ approval.

Drawings

- Site Locality Map and Schedule of Drawings
- Master Site Layout
- Soil Erosion and Drainage Management Plan
- Earthwork Plan/ Road Layout Plan showing final formation levels
- Roadwork's Details with typical cross sections
- Roadwork's Longitudinal Sections
- Roadwork's Cross Sections
- Stormwater Longitudinal Sections
- Stormwater Details - Other (Detention Basins, Wet Lands etc.,)
- Traffic Management Plan
- Typical Details – (see Council Standard Details)
- Services. electrical / street lighting details
- Streetscape Plan
- Landscaping Plan

Reports

- Geotechnical
- Environmental Analysis
- Significant Trees
- Historical
- Construction Management and Soil Erosion and Drainage Management Plan
- Traffic Analysis
- Stormwater Management
- Stormwater Quality Management and WSUD

Specifications

- Tendering Conditions
- Contract Conditions
- Technical
- All Software Data

The Consultant will be advised by Council if any amendments are required to the Engineering Plans.

If amendments are required the Consultant should carry out any amendments required by the Council and resubmit the amended documentation.
Council will issue approval for engineering plans when the Consultant completes all amendments requested by Council.

2.4 PRE CONSTRUCTION

Once the approval is granted the Consultant is to submit the following:

- A complete final set of working drawings in A1 and A3, stapled and bound, in hard copy format. Drawings are also to be submitted in electronic format; both PDF and AutoCAD or compatible;
- All modelling data, design calculations, reports, specifications etc. in electronic format;
- A Construction Staging Plan;

2.5 CONSTRUCTION OF WORKS

Council should be given a formal notification in writing at least one week before commencement of construction work.

All construction management as set out in the Consultants Construction Management and Soil Erosion and Drainage Management Plan must be implemented. Construction is not to proceed until site safety fencing, silt control measures, wheel washes and other agreed measures contained in the management plan are installed.

All temporary works and traffic management are to comply with the appropriate Australian Standard and the Consultants Traffic Management Plan.

2.6 INSPECTION OF THE WORKS (Hold Points)

Council should be invited for inspection together with Consultant/ Applicant. At least 24 hours should be given to the Council before the scheduled day of the inspection.

The Consultant will be required to:

1. Fully inspect the construction works and materials to be used in construction to determine the compliance and organize joint inspection works with the Council.
2. The Consultant must satisfy themselves that the work meets the specification required and a joint inspection may be carried out.
3. Certify completion of subdivision construction work.
4. Submit laboratory test results to the Council as and when required.

2.6.1 Road Construction Hold Points

1. Initial walk over before stripping topsoil to ensure that items in the Construction Management and Soil Erosion and Drainage Management Plan have been implemented.
2. Compacted Sub Grade
3. Compacted Sub Base.
4. Final Base Course (prior to surface course).

2.6.2 Stormwater Reticulation Hold Points

The Council shall be notified and invited to:

1. Check bedding, trench width, joints and backfilling.
2. Check pipes and pits sizes and Invert Levels.
3. Compaction test report on trenches (every 50m).

2.6.3 Laboratory Tests Reports

All density testing as required in accordance with the approved specification shall be carried out by a NATA registered Geotechnical Consultant. The frequency of testing is at each $50m^2$. See section 3.3.1 for compaction requirements

2.7 POST CONSTRUCTION

As built drawings are to be submitted following the practical completion inspection and prior to acceptance of the works by council. A set of 'As Built' drawings are to be lodged with council in both hard copy (A1, and A3) and electronic format (pdf and dwg)

The following certification is to be printed to each sheet of the drawings and signed by the relevant Surveyor/ Consultant.

"I hereby certify that engineering works shown on this plan have been constructed in accordance with the details and specification approved by Council."

2.7.1 Bank Guarantees/Bonds

Upon written request by the Developer Council can consider issuing clearance for part or whole of the land division work where outstanding infrastructure items have not reached practical completion (not a community scheme apart from that part of the infrastructure that interfaces with public roads or land). This can be done by the developer submitting a bond and guarantee agreed with by the Council. It should be noted that the decision to accept a bond is at the discretion of council.

The guarantee can be in the form of cash or a guarantee issued by a bank where the Council has the authority to claim the guarantee. The bank guarantee shall have an unlimited time period.

The guarantee is to be forwarded to council with a copy of the bond agreement signed and witnessed by the developer for council to sign. The original bond and bank guarantee are to be kept by Council and a copy provided for the Developer. Should the Council be requested to undertake any works on behalf of the developer then the cost will be at Council's rate at the time of the request. Further 20% of the total cost of the work will be added to cover Council's contract management and supervision cost.

Council will be entitled to recover from the developer the cost of completing the works together with the fees specified above should the sum exceed the guarantee.

2.7.2 Practical Completion Inspection

Practical completion will not be achieved until the Developer has undertaken to complete (in addition to civil construction work):

- Backfilling and Compaction of footpaths;
- Levelling and Compaction of road verges;
- Clearing of Weeds, road sweeping ;
- Removal of debris;
- CCTV reports;

- Cleaning and Flushing of stormwater pits and pipes;
- Stormwater Pits fully grouted and compacted;
- Landscaping Works;

2.7.3 Defects Liability/ Maintenance Period

Upon the issue of practical completion certificate, the constructed civil works including landscaping work will enter the Maintenance period where the Contractor shall be responsible for ongoing maintenance and repair. The Maintenance period shall be for a minimum of twelve months.

2.7.4 Completion of Project

When works have been completed to the satisfaction of the Council, upon written request, the relevant bonds/ bank guarantees would be released. However in certain circumstances, separate bonds needs to be lodged against construction of footpaths, landscaping works etc. in subdivision, and they will be released upon the satisfactory final completion of the approved works.

3 ROAD INFRASTRUCTURE

All roads are to be designed in accordance with:
'AUSTROADS publication – Guide to road design, Part 2: Design Considerations'
'AUSTROADS publication – Guide to road design, Part 3: Geometric design'
'AUSTROADS publication – Guide to pavement technology, Part 2: Pavement structural design'
'APRG21: A guide for the design of new pavements for light traffic'
'AS 1289: Methods of testing soils for engineering purposes'
'DTEI's specification for roadwork's'
AS 3798 Guidelines on earthworks for commercial and residential developments
'DTEI's Pavement Marking Manual'
'DTEI's Standard Specification for Excavation and Reinstatement of Road Pavements'
'AS 1743 Road Signs Specification'
'AS 1742 Manual of Uniform Traffic Control Devices'
AS 1158 Lighting for Roads and Public Spaces
'DoT Code of practice for the installation of traffic control devices in South Australia'
'Council Standard Details'

3.1 DESIGN RESPONSIBILITIES

Prior to Development Application approval the developers proposal must adequately satisfy councils requirements for projected future vehicular traffic and for councils requirements for the provision of any bus lanes cycle lanes and footpaths.

If the interface of a proposed road is with a Department of Transport, Energy and Infrastructure Road (DTEI) owned road then the developer must consult with DTEI to seek their written comments and approval.

3.2 ROAD TYPE AND GEOMETRY

Classifications of roads within a subdivision are to be:

1. Collector Road: - Provides predominantly vehicular connection between local streets and the arterial traffic route;
2. Local Street: - Has a shared residential use between vehicular and pedestrian traffic;
3. Access Road: - Small residential road serving up to 1 to 30 lots;

4. cul de sacs and hammerheads: - Generally no footpaths. Width varies dependent on number of lots served. Cul-de-Sacs are to be designed to accommodate a single unit vehicle such a garbage truck to perform a single or three point turn without restriction;

These Road classifications are for what is considered to be local roads. Roads providing connection across town or connection to other areas should be classed as arterial in accordance with AUSTROADS publication Part 2, T2.2 and are not covered in this document. The standard cross-sections for these road classes are noted in Table 1.

Roads should be designed to ensure safe stopping sight distances. All road geometry to be in accordance with AUSTROADS publication – Guide to road design, Part 3: Geometric design. Stopping distances should be based on the 85^{th} percentile.

Road Classification	Design Speed (km/h)[1]	Reserve width (m)	Verge Width (m)	Footpath Width (m)[2]	Minimum Pavement Width (m)	Dedicated on street Parking (No. of)	Cycle Lane[3]
Collector Road 1	60	25	5	1.5 or 1.8	15	2	dedicated cycle lane
Collector Road 2	60	22	5	1.5 or 1.8	12	2	shared path
Residential Road	50	15.4	4	1.2 or 1.5	7.4	0	carriageway
Access Road	50	11.2	3.70	0 or 1.2	7.0	0	Carriageway
Cul-de-sac	40	40.2	3	0 or 1.2	36	0	Carriageway

1. Design Speed in accordance with AUSTROADS Part 3: 3.3

2. On street parking width 2.3 m in accordance with AS2980.5

3.Cycle lane width 1.5m

Table 1: Standard Road classification requirements

3.3 STRUCTURAL ROAD DESIGN

According to the classification of the road as stated in Table 1 the road designer shall as part of the design provide the expected Equivalent Standard Axles (ESA's) according to lots served, buses, refuse trucks, emergency vehicles etc. Accordingly the design shall be in accordance with AUSTROADS publication, Part 2: Pavement Structural Design and APRG21: A guide for the design of new pavements for light traffic and 'AUSTROADS publication – Guide to pavement technology, Part 2: Pavement structural design'.
The design life of the road should be for:

Local Roads - 20yr minimum
Collector Roads – 30yr minimum

Excavation and filling of land must be undertaken in accordance with AS 3798 - Guidelines on earthworks for commercial and residential developments.

The depth of the pavement build-up should be designed according to the CBR determined from geotechnical surveys carried out across the proposed development. All testing is to be carried out through a NATA registered laboratory.

All pavement design is to allow for construction traffic associated with the development and future works/ stages.

3.3.1 Build-up

Unless otherwise noted in the specification the sub-base and base course shall be compacted in layers no greater than 200mm thick to the following compaction:

- Sub Grade to be compacted to achieve 98% standard compaction to AS 1289
- Sub Base to be compacted to achieve 95% maximum modified to AS 1289
- Base Course to be compacted to achieve 98% maximum modified to AS 1289
  Trenches to be compacted in 200mm thick layers to achieve 95% maximum modified to AS 1289

All materials for the Sub Base and Base Course are to be in accordance with DTEI specification 215.

3.3.2 Surfacing

All minor collector roads, residential roads and access roads are to be surfaced with a minimum 30mm AC10 asphaltic concrete. All major collector roads, intersections and roundabouts are to be surfaced with a minimum 40mm AC14 Asphaltic Concrete.

Concrete Block Pavers shall be 80mm thick, Grade N45 with a minimum abrasion resistance of 1.2m at 28 days and interlocking in design. Pavers to be laid on to the compacted road base and embedded on to a minimum 25mm thick compacted bedding sand. Bedding sand shall comply to Part 215 of DTEI specification, sand type A (PM 64). Sand to be free of contaminates likely to cause efflorescence.

Spray-seal may be used in rural areas.

3.3.3 Road Pavement

Minimum turning circle for Cul-de Sac ends shall be

- For residential – 18.0m radius
- For Industrial – 21.0m radius

Generally the maximum gradient on a relatively flat site for a 60km/h road is to be 6%. On a steeply graded site the maximum grade can be 10%. Steeper sites will require discussion with council.

The minimum longitudinal grade for all roads is to be 0.67%.

3.3.4 Footpaths

Footpath widths are to be typically 1.5m (Minimum width 1.2m following consultation with council).
The cross fall slope is to be a minimum of 2% and maximum 2.5%.
Maximum and minimum grades are to match that of the road pavement.
Minimum slab thickness to be 125mm for Residential and 150mm for Industrial using grade 25MPa concrete. Slab to be reinforced with SL62 mesh with minimum 50mm cover. See Council Standard Detail SK – 200.
Expansion joists to be provided at every third evenly spaced tooled joint. Expansion joints are to be at a 6m longitudinal spacing for 1.2m wide footpaths and 4.5m for 1.5m wide footpaths. See Councils Standard Detail SK – 200.
Block paving shall be 80mm thick, interlocking, laid on a minimum 100mm quarry rubble bed and 25mm bedding sand. See Council Standard Details SK-202.

3.3.5 Corner cut- offs

Corner cut-off shall be minimum 4500mm x 4500mm.

3.3.6 Driveways

Minimum width of driveway to be 3000mm, maximum to be 4500mm.
Maximum gradient to be 20%.
Minimum slab thickness 125mm for Residential and 150mm for Industrial using 25MPa Concrete. Slab to be reinforced with SL62 mesh with a minimum 50mm cover. See Council Standard Detail SK- 302 & 303.
Driveway to be located a minimum distance of 1000mm from an SEP and other services.

3.3.7 Pram Ramps

Pram ramps are to be provided at all crossing points regardless of kerb type.
Tactile surface indicators shall be installed to AS1428.4. See Council Standard Detail SK – 204.

3.3.8 Drainage

Typically concrete kerbs/ kerbs and gutters shall be rollover type kerbs as shown on Council Standard Detail SK-304. Collector roads are to have vertical kerbs as shown on Council Standard Detail SK-305. In general Finished Floor Levels are to be 300mm above the top of kerb fronting the building.

Drainage from a development into the water table should be via a chequer plate drain or 100mm diameter pipe encased in concrete Chequer plate drain or piped drain dimensions and materials are to be in accordance with Council Standard Detail SK-306 & 307.

Spoon drains to be in accordance with Council Standard Details SK-304.

An access driveway must be constructed to provide a minimum 150 mm high barrier to the flow of water from the kerb invert to the property boundary.

3.3.9 Public Lighting

Public Lighting is to be provided in all streets and roads to the boundary of the development. Public Lighting shall also be where access to structures within the park is a feature, or paths within the park form a linear link.

The level and standard of lighting shall be determined according to AS/NZS 1158 series and ETSA requirements.

Lighting is to reflect lighting standards that are energy efficient and environmentally sustainable in accordance with Gawler's Development Plan.

The developer shall be responsible for liaison with ETSA Utilities in respect to both Public Lighting and for the provision of an underground electricity service to all new lots in the Development as noted in 2.1

Trenches in road reserves shall be backfilled in accordance with ETSA Utilities Standard Specifications, so as to avoid future settlement of new road and footpath surfaces. The pavement and surface of trenches in existing road pavements shall be treated in accordance DTEI's Standard Specification for the 'Excavation and Reinstatement of Road Pavements'. Street Lighting columns are to be located in minimum distance of 1m from both existing and proposed driveways and future street tree canopies.

Street light columns will be from ETSA Standard Range of a type approved by Council during the design consultation stage. Column types may vary depending on the hierarchy classification for the road.

Street light columns are to be located wholly in the verge area of the footpath. The absolute minimum distance from column to back of kerb to be 700mm.

3.3.10 Traffic Control

Road designs including all traffic control devices must comply with the following:

- DTEI's Pavement Marking Manual
- AS 1743 Road Signs Specification
- AS 1742 Manual of Uniform Traffic Control Devices
- DoT Code of practice for the installation of traffic control devices in South Australia;

4 STORMWATER DRAINAGE INFRASTRUCTURE

All stormwater drainage is to be designed using:
'Australian Rainfall and Runoff – 87: A guide to flood estimation'
'AS 3500.3: Stormwater drainage'
'The Queensland Urban Drainage Manual'
'DTEI's Standard Specification for Excavation and Reinstatement of Road Pavements'
'Council Standard Details'

4.1 DESIGN RESPONSIBILITIES

The developer is responsible for identifying themselves with the flood risk map to be supplied by the Town of Gawler and liaising with the Town of Gawler at the planning stage on flood levels and proposed remedial measures.
The Developer is required, as a part of DA approval, to submit an overall concept plan demonstrating how flow from the existing pre development catchments affects the site and how the design will cater for them.
The concept plan should show:

- Existing levels;
- Existing catchment areas affecting development;
- Areas of existing flooding and an assessment of properties within flooding zone;
- The concept plan showing drainage design, flood management, basins and flow paths demonstrating the drainage proposal and prevention of flooding of dwellings, council assets and neighbouring properties

4.2 DESIGN CRITERIA

The points below are the fundamental criteria of the drainage design.

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.

4.3 DESIGN SUBMISSION FORMAT

The proposed drainage scheme for a subdivision must be presented in the form of a Stormwater Management Plan. It should be in a report format with appropriate drawings. Typically, but not exclusively, It should include:

- Introduction and description of the site including any existing drainage and easements;
- Narrative on calculation for determining the 1:5, 1:10 or 1:20 year storm, pre-development flow;
- Assessment on the practicalities of including a WSUD system;
- Narrative and calculation of method of drainage and attenuation to prevent exceeding the pre-development flow;
- Narrative and calculation on method of detention within the site for a 1:100 year storm;
- Plans, sections and details;
- Supporting calculations;
- Computer Models;

The size and detail of the SMP should reflect the size of the development but must clearly demonstrate the validity of the design. Council may require and request additional detail if this cannot be demonstrated.

4.4 TECHNICAL CRITERA

4.4.1 Minimum Cover/ pipe diameter/ Grade

Minimum longitudinal Gradient of pipe to be 0.5%. Maximum to be 20%.
Minimum cover to all stormwater pipes to be greater than 600mm. Where less than 600mm protective measures are to be taken.
During construction consideration must be taken into the impact of heavy plant on stormwater pipes. If necessary protective measures must be installed or the pipe class increased.

Minimum pipe diameter to be 300mm under roads, footpaths and reserves. 225mm to rear of allotment drainage.
Minimum box culvert size to be 450mm x 300mm

4.4.2 Pipes/ culverts

Steel Reinforced Concrete pipes (SRC) to be spigot and socket jointed with rubber joints. Pipe class design to be in accordance with AS 3725. Minimum pipe class to be class 2, Class 4 under roads.
Culverts to conform to AS1597.
UPVC pipes shall be SN4 pipe conforming to AS 1260 with solvent welded joints unless shown otherwise on the drawings. UPVC pipes are to be used only in rear of allotment drainage. Where the option for concrete pipe exists UPVC pipe shall not be considered.

4.4.3 Junction boxes and inlet pits

Junction boxes and grated inlet pits shall be in accordance with Council Standard Detail SK-100.
Minimum junction box size to be 600 x 600mm.
Maximum spacing between stormwater manholes/ inlet pits to be 90m.
Pits at intersections are to be located at tangent point of the radius.

4.4.4 Stormwater Pollution Control Devices

Typical forms of control to be used should be trash racks, gross pollutant traps and oil interceptors. On community titles these systems are to be located within the property boundaries of the development and are the responsibility of the developer. On a larger subdivision where roads and drainage are to be adopted discussion on specification of device and access for maintenance is required with council. Ecosol is the preferred choice of Gawler Council for pollution control devices.

4.4.5 Easements

All Drainage easements must be a minimum 3000mm wide with a min 300mm diameter pipe The pipe must be located within the easement a minimum 1000mm from the edge of the easement and be fully accessible to maintenance at all times.
The easement is a corridor and therefore must be able to act as a flow path when flooded with the freeboard able to carry a 1:100 year storm event.

4.4.6 Pumps

While the option for a gravity drain exists pumping shall not be considered.

5 WATER SENSITIVE URBAN DESIGN

Water sensitive urban design (WSUD) is the system in which urban water is collected and managed to provide water saving measures and minimise harmful impacts on the natural water regime and should be integrated with the surrounding environment. WSUD systems should be designed with reference to:

'The Water Sensitive Urban Design Manual for Greater Adelaide'

'EPA Environmental Protection Act 1993 and Water Quality Policy 2003'

'Council Standard Details'

5.1 EVALUATION OF THE PRACTICALITIES OF WSUD

Discussion with Council on the proposal to use a WSUD scheme should begin as soon as possible within the planning process.

At planning the scale of the site, location and therefore the practicalities of using various WSUD elements should be reviewed and the extent of the WSUD scheme considered. Once it has been established that some form of a WSUD system can be used it should be submitted with the DA. It is likely that the WSUD scheme will impact on the landscaping, streetscape and aesthetics of the subdivision and therefore the design should reflect this. Once DA has been given a detailed design is required and should be included as a part of the SMP (see Section 5.3).

5.2 PERFORMANCE OBJECTIVES

The objectives of a WSUD system should be:

- Frequent flow management – Aim to protect in-stream ecosystems from the disturbance associated with increased runoff by capturing the small storm events (1 in 1 year ARI) to predevelopment flow rate;
- Waterway stability management – Aim to prevent in-stream erosion downstream of urban areas by controlling the magnitude and duration of sediment transporting flows;
- Stormwater Quality management – Aim to protect downstream/ receiving water quality by limiting the quantity of key pollutants discharged in stormwater from a typical urban environment. This should be based upon percentage reductions in the loads of sediments and gross pollutants in stormwater runoff;

Table 2 shows treatment objectives for fresh water environments expressed in mean annual reductions of pollutant loads from typical urban areas. In accordance with South Australian EPA water quality policy (2003).

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)

5.3 ELEMENTS OF THE WSUD DESIGN

The elements noted below may be used in combination or isolation when designing a WSUD scheme

5.3.1 Rainwater Harvesting

Rainwater collection tanks should be used on all subdivisions and be able to capture runoff from roofs and discharge at the appropriate storm event as part of the required attenuation. Calculation for sizing of the tanks should be provided as part of the SMP.

5.3.2 Infiltration Systems

Infiltration Basins, Swales and Soak-a-ways may be used where there is a high permeability of underlying soils. Permeable paving should only be used on private land in areas of low traffic flows i.e. car parks and driveways. The design should consider the effect of saturation of the soil on adjacent structures.

5.3.3 Grassed Swales.

Swales are a means of conveyance and should be graded between 1-4%. If it is necessary have a steeper grade rock rip-rap may be considered as lining to prevent scour and check dams to reduce velocity. See Council Standard Detail SK-500. Swales must be grassed to help in the removal of sediment. Maximum grade of slope is to be 5%. Where a driveway crosses a swale Council Standard Details SK-300 & 301 apply.

Fig 1: Grassed Swale with Check Dams
(Virginia Stormwater Management Program)

Fig 2: Roadside Grassed Swale
(land care research, University of Auckland)

5.3.4 Buffer Strips

Buffer strips are primarily intended to remove sediment and should be located 100mm beneath the adjacent pavement level and be fully grassed. Buffer strips should be laid at a reasonably flat grade and if a steep grade is required there should be a gradual transition from the edge of the pavement. A maximum slope grade of 5% with scour protection and check dams should be used if the grade becomes steeper.

Fig 3: Typical grassed Buffer Strip
(Melbourne water)

5.3.5 Detention/ Retention Basins

Basins may be used to attenuate flow prior to it leaving the site. Water entering the basin from a piped system should first pass through a Gross Pollutant trap and enter the basin via a grated headwall. Basins are to be grassed and planted and should be graded no more than 20% with a maximum depth of 1.5m. An appropriate overflow should be provided with a grated headwall. A basin located within a development must be integrated into the community for recreational use as much as possible. An access for maintenance is also required.

5.3.6 Bio-retention

Bio-retention swales, like grassed swales, should be graded between 1-4%, max slope

grade of 5% with scour protection and check dams used if the grade becomes steeper. Generally when used as a part of a swale collection system (but may stand alone) Bio-retention swales should be located downs stream of a grassed swale to provide filtration. The filter medium beneath the swale has 3 layers in increasing levels of porosity.

- Upper layer is to be a sandy loam filter layer with a depth of between 300mm - 1000mm minimum
- Second layer is a transition layer a minimum of 100mm thick coarse sand which captures particles larger than the filter layer to prevent them from being washed through into the drainage layer
- The drainage layer is to be a minimum 150mm thick nominal 20mm no fines gravel with a slotted pipe and filter sock in the centre

Bio-retention swales treat and convey flow and should therefore be lined with impermeable liner. See council Standard Detail SK-500.

Fig 4: Typical Planted Bio-retention Swale.
(University of Nevada)

Fig 5: Bio-retention Swale with Scour protection.
(Melbourne Water)

Bio-retention basins provide water quality treatments to local catchments whilst retaining the water. Treatment of the water is via similar filtration layers as those provided by a bio-retention swale. The addition of a storage layer can be incorporated into the design if required. The treated water in a bio-retention basin is conveyed via the slotted pipes out to the discharge.
In the event of a heavy storm an overflow is required to accommodate the additional water. The depth of the basin cannot be greater than 1.5m and slopes into the basin must be no steeper than 20%. Bio-retention basins are water treatment and not filtration and should therefore be lined with impermeable liner. See Council Standard Detail SK-501.

Fig 6: Typical Roadside Bio-retention Basin

(State of Delaware)

Fig 7: Typical urban Bio-retention Basin

(City of Rhode Island)

Bio-retention cells provide an effective way of placing bio-retention in small areas in the urban area. Typically they are small areas, confined to streetscape and car parks. They are not designed to flood and have an overflow. Usually they have a concrete kerb surrounding them to prevent wheel damage and in some cases form inlets for the street catchment and or prevent flooding.

Fig 8: Bio-retention Cell incorporated into a Streetscape environment

(Low Impact Development centre)

Fig 9: Bio-retention Cell incorporated into a car park

(Low Impact Development centre)

5.3.7 Wetlands

Where Wetlands are to be used they should form the final stage of a WSUD or drainage system. Wetlands should not be confused with Detention and Retention basins which provide attenuation for discharge from a development. A Wetlands is a system where stormwater runoff passes through a purpose built filtration system incorporating natural sustainable processes prior to discharge to an existing water course or aquifer. Wherever possible Wetlands should be incorporated into new Greenfield Developments. They provide an excellent habitat for flora and fauna and can be utilised as recreational areas for residents. Generally wetlands will also add an aesthetic quality to the development. A typical wetlands system typically comprises of 6 elements. The hydraulic and water quality design for Wetlands should be included as a part of the SMP.

1. A Gross Pollutant Trap

A GPT at the inlet to the system is required to remove primarily litter, oils and large sediments.

2. Sedimentation Basins

A sedimentation basin provides a stilling effect on the water by reducing the flow velocity before entry into the macrophyte zone and allows larger suspended solids to settle. A typical sedimentation basin should gradually slope down from the GPT outlet invert to a maximum depth of 1.5m before the crest into the macrophyte zone. Batters to the sides of the basin should be no greater than 20%. Wherever these requirements are exceeded safety measures in accordance with section 5.4 are to be incorporated. Access for maintenance is to be provided.

3. Weir

Connection between the Sediment Basin and the Macrophyte Zone is via a crest set at 300mm above the permanent water level in the macrophyte zone.

4. By-Pass

A high flow By-Pass from Sediment Basin to the outlet is required to bypass and prevent inundation and damage to the Macrophyte Zone for storms exceeding a 1:1 year event.

5. The Macrophyte Zone

This is the planted area of the wetlands. It should be typically 0.5m deep and lined to prevent permeation into the underlying soil. Access for maintenance must be provided and the batters graded at 12% for maintenance access. Specific planting is required to enable removal of pollutants and should be selected accordingly. It should be remembered that during dry seasons some areas of the Wetlands will dry out and hardy species are required.

6. Open Water Zone

A deeper Open Water Zone at the end of the Macrophyte Zone is typically 1.5m deep. Safety measures in accordance with section 5.4 are to be incorporated wherever depths are exceeded.

5.4 SAFETY MEASURES

Inlet/ Outlet pipes of detention basins, swales etc. should be covered with a slanted lockable grating cover to prevent access.

Safety measures around ponds, basins, wetlands and headwalls should be considered when:

- The grade into the basin exceeds 20%
- Where the depth of a water body exceeds 1.5m

- There is a risk of serious injury in the event of a fall (over 0.5m high and too steep to comfortably walk up/ down or the lower surface has sharp or jagged edges)
- There is a high pedestrian or vehicular exposure (on footpaths, near bikeways, near playing/ sporting fields, near swings and playgrounds
- Where water ponds to a depth of greater than 300 mm on a constructed surface of concrete or stone
- Where the water is expected to contain concentrated pollutants

Discussion is required between the Consultant and Council on the use of fencing or planting to act as a barrier.

6 LANDSCAPING

The general aim for landscape design is to incorporate the existing natural character of the site. This includes consideration of specific natural elements on the site and the wider natural environment within which the site is situated.

Landscape design should provide accessible and equitable provision of open space to the community. The configuration of reserves and streetscape should aim to be cohesive and legible within the larger urban design of precincts principles and designed to visually enhance the streetscape. They should also create a ‘sense of place’ within the development, improve visual amenity and enhance public safety.

Landscape plans for developments should look to integrate with the design of the existing buildings and enhance the streetscape. Plantings should be of a suitable scale, and landscape treatments should aim to minimise the impact of the building over the surrounding area.

Typically, landscape design plans will identify:

- Site analysis;
- Existing elements to be removed / retained;
- Site grading and drainage;
- Surface treatments and layout including key spot levels;
- Planting design;
- Construction details;
- Irrigation design;
- A plant schedule listing the botanical name, the container size and the quantity/density of planting;
- A vegetation survey will be required if significant trees are present on the site, undertaken by a suitably qualified person and include a list and location of all;
    - relevant species
    - critical root zones
    - structural Root Zones

Typically, the technical specification will comprise:

- Site preparation and demolition;
- Earthworks and cultivation;
- Irrigation;
- paving;
- Planting schedule and turf specification;
- Park and street furniture and fencing;

- Lighting;
- Maintenance requirements and schedules;
- Landscape work schedules
- All existing buildings and trees on site, including canopy spread and height
- Existing and proposed ground levels

6.1 Landscape Design Principles

Developers will need to consider a range of general design principles when planning streetscapes and open space designs and reference to these principles are included in Gawler's Development Plan. Reference to Councils Water Sensitive Urban Design (WSUD) guidelines will assist designers to meet Council's open space objectives.

6.2 Existing Trees

All works are to be carried out in accordance with AS4970 – Protection of trees on development site.

If identified by Council that the development may impact on significant vegetation, all existing trees on, and within 15 metres, of the development site boundaries (or where requested by Council) shall be the subject of a detailed and accurate survey. An existing tree survey plan must accompany the land division plan and be submitted at the time of lodgement.
The existing tree survey plan may be either:

- A separate plan, or;
- Included within the land division plan.

The potential impact of the land division upon existing trees must be clearly shown on a plan and must contain the following information.

- identification of the species including the botanical name of the tree;
- the location of the tree accurately indicated;
- the height and canopy of the tree and girth of the trunk, and tree health and vigour.

The existing tree survey plan must also indicate whether it is proposed that the tree is to be removed or retained. There should be no net loss of indigenous vegetation (where indigenous vegetation is to be removed it must be replaced with local species and identified in the landscaping plan)

Each significant tree identified on the survey is to be tagged or marked onsite to enable assessment by a Council Officer and will be subject to a separate development application.

Where there are existing trees that have been assessed and warrant being retained on the site the following tree protection measures may be required to be undertaken by the developer (or land owner in the event the developer does not own the land) prior to the commencement of any demolition, development, construction or building works;

- The establishment of a Land Management Agreement (LMA) protecting each tree;
- Each tree is to be physically protected by providing a fence defining the tree protection zone using 1.8 metre high star picketing/chain wire. The fencing shall be located along the tree protection zone and shall remain in place until all works are completed;
- All construction drawings including the landscape design plan, earthworks, and drainage and service drawings shall show the trees to be retained and their protection zones;
- There is to be no storage of materials or machinery or site office/sheds, nor is cement to be mixed or chemicals spilt/disposed of in the area, soil levels altered or excavations undertaken or stockpiling of soil or rubble within the tree protection zone;
- Any works required within the tree protection zone shall be under the direction of a suitably qualified independent Arborist, and to the satisfaction of Council;
- The applicant shall contact Council to arrange a site inspection to confirm the accuracy of tree protection zones required for those trees to be retained;
- The name and contact number of the contractor completing the works, and/or a contact number for enquiries regarding the works shall be provided to Council.

In order to retain any established landscape character, all trees located within the existing road reserves shall be protected and retained, unless approved otherwise by Council.

6.3 Street Trees

Street trees are to be provided in front of all properties at a rate of one (1) per allotment, or at a rate necessary to provide a maximum spacing of twenty (20) meters. Street trees are to be planted within the Council verge.

The species, size, age, method of planting and the location of the street trees will be approved by Council in writing prior to planting. For tree selection guidance please refer to the Town of Gawler for further information.

Trees shall have a minimum height of 2 metres at the time of planting, be double staked with 50mm hardwood stakes installed parallel to the road, loose tied and be planted in a 26lt Greenwell water well or a mulched 1 metre diameter bowl to facilitate watering and water

retention, as per Councils Standard Drawing

The trees shall be maintained in good health by the applicant for a period of 1 year from the date of the issue of a certificate of practical completion. Any dead, diseased, damaged or missing trees shall be replaced during this period. At the discretion of the council trees shall be bonded to allow for replacement trees to be of a larger size to match growth (and height) of the surviving/ existing trees.

A site inspection will be carried out in the presence of a representative of the developer and the Council Officer not less than two months before the expiry of the maintenance period to determine what planting, if any, needs to be replaced. Trees replaced at the end of the 1 year maintenance period may be maintained for an additional period, specified by Council but not greater than 1 year from the date of planting.

The design of the layout of street tree planting should be thematic and consistent with the objective of providing avenues of planting.

Random audits of street trees may be undertaken to assess whether the plant stock and planting method meets Council's requirements.

6.4 Trees in Reserves

Where it is proposed to plant trees in reserves or on any other common land, community land or buffer zones the proposed planting will be included in the landscape concept plan to be submitted to the Council in accordance with the design principles outlined above.
Tree planting in reserves will need to take into account;

- Existing trees on the site;
- Soil stabilisation needs;
- Accessible shade;
- Ease of future maintenance;
- Proximity of fences and pathways (trees should not be planted closer to fences that
- abuts private property than their mature height);
- Lighting considerations where appropriate;
- Bushfire risk minimisation;
- General aesthetic quality.

Tree planting in reserves shall include a mix of native and selected exotic species to reflect existing plantings in nearby and surrounding areas, and shall be designed via consultation with Council. Plants recognised as environmental weeds will not be supported.

6.5 Grassing

All reserves are to be grassed outside of mulched planter beds. Specific requirements include:

- A minimum depth of 100mm of suitable topsoil shall be provided over all reserves to provide a satisfactory growing medium;
- All reserves shall be grassed with drought tolerant kikuyu which is a low water use and frost hardy grass;
- The land should be suitably designed and established for its intended future use and to minimise future maintenance requirements.

6.6 Fencing

Reserves shall be fenced in accordance with the following;

- Fencing of reserves where they abut any allotment not being a road or an existing reserve may require fencing. Alternative high standard fencing may be approved by Council where it is deemed the aesthetic of a steel colour bond fence is inappropriate. To promote 'passive surveillance' adjacent properties may have open fencing to front the reserve. All colour bond fencing must be screened off by an appropriate vegetation buffer determined by Council.
- Fencing of reserves on road boundaries will be the subject of a separate decision of Council but should amongst other things provide for a high degree of visibility into the reserve from the street. Roadside fencing should incorporate a vehicle access gate for maintenance vehicles;
- Where a reserve incorporates a children's playground (0-5 years) a fence shall specifically enclose the playground area and shall incorporate a child proof safety gate and a minimum of 1.2m high tubular powder coated steel fencing.

6.7 Irrigation

An irrigation management plan for the reserves is required by Council prior to installation. The plan needs to encompass water management best practices (for mains and reclaimed water) as outlined in the SA Water Code of Practice for Irrigated Open Space and include requirements as set out in the South Australian Reclaimed Water Guidelines. It should incorporate the following features;

- Irrigation plans;
- Design parameters (flow, pressure, distribution uniformity, precipitation rate);
- Installation specification including component specification to meet appropriate Australian Standards;
- Quality control inspection procedures;

- Water budget;
- Irrigation schedule;
- Best practice water management features and water sensitive design;
- Valves, fittings and backflow prevention devices suitable for automatic operation and, if needed, capable of utilising reclaimed water (class A) and mains water;
- Irrigation of grassed areas to be carried out using pop-up sprinklers;
- Irrigation of planted garden beds to be via subsoil dripper;
- Adherence with the guidelines set out in the Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry to reduce the impact of irrigation water on the stormwater system.

The following requirements need to be addressed;

- A service connection and water meter are required to all open spaces and reserves with backflow devices as per SA Water requirements (to comply with AS 3500.1-2003 section 7);
- One connection is to be provided for each 2000 square metres of the park;
- The installation of an irrigation system to landscaped traffic islands and roundabouts require approval by council.

All Irrigation systems are to be Rain Bird IQ Irrigation Central Control System compatible and are to be installed to Council satisfaction and maintained throughout the defects liability stage (1 year).

6.8 Furniture

Park furniture including seats, tables, litter bins, bike racks, drinking fountains etc will be of a type and manufacture approved by Council during the concept plan design consultation stage and unless otherwise stipulated by Council will be consistently used in all reserve areas.

Information on supplier details to also be forwarded to Council for maintenance record purposes.

7 ENVIRONMENTAL PROTECTION

7.1 Site Control

The developer and contractors shall take all measures necessary to ensure minimum disturbance to the existing environment as a result of the development and shall observe all rules and regulations in force on the site and shall comply with all notices and instructions issued by Council in relation to such rules and regulations. Except as otherwise provided in the contract, space for the storage of materials and for building sheds, offices and workshops will be allowed only as arranged between the developer and Council and must be in accordance with the master development plan and staging plan for the development.
No new tracks shall be formed, existing tracks altered, camps erected, trees or shrubs removed, fences cut, water, sewerage or power lines cut or any other such things done without the prior approval of the Council as well as relevant service provider.
Under no circumstances whatsoever shall fires be lit without the prior approval in writing of the Country Fire Service and notification provided to Council.

7.2 Water Conservation

Water shall at all times be used in a judicious manner to avoid obvious wastage. Temporary devices used to control or shut off water flow whether installed in hose lines or otherwise shall comply with SA Water Corporation requirements.

7.3 Environmental Control

The developer shall be responsible for ensuring that the provisions of this section and any other environmental protection provisions in the contract are complied with and that the requirements of any statute, by-law, standard and the like related to environmental protection are observed.

The developer shall, prior to the commencement of work on the site, submit to the Council their proposals for traffic movement, temporary structures, cleaning up, erosion control and the like. After the proposals have been approved by Council, the developer shall be responsible for ensuring that the approved proposals are observed. Any changes to the approved proposals shall be subject to the prior agreement of Council.

The developer shall carry out the work with reference to the Environment Protection Agency (EPA) Codes of Practice listed below.

1. The developer shall ensure that pollutants such as dust, sediment, litter and wash down water do not leave the site during construction of the works.

2. The developer shall prepare a Soil Erosion and Drainage Management Plan (SEDMP) showing how this is to be achieved. The plan shall include a site layout together with a written procedure and implementation plan, and be submitted to Council prior to work commencing. These shall include all aspects of site management including:
    - Site access from public or private roads
    - Access around the site
    - Areas of earthworks, stockpiles, loading areas
    - Site drainage including all relevant information including sediment collection devices, drainage lines and discharge points and Management of creek or river flows

3. The developer shall ensure that the following principles are included in the SEDMP and achieved on the site throughout the construction period. This will need to be documented in a construction management plan with Council approval being sought before works commence.
    - Limit site access to nominated and controlled locations and ensure that sediment is not transported off the site on vehicles or by vehicle wash down activities
    - Locate all stockpiles away from concentrated water flow paths.
    - Ensure that the least amount of land is exposed to the risk of erosion for the shortest period of time
    - Effectively control surface runoff entering and leaving the site
    - Ensure that erosion control and sediment collection structures are located to maximise their effectiveness and are in place prior to the commencement of site clearing works
    - Locate sediment traps and basins in locations that will not create flood risks to adjoining properties
    - Where control of creek or river flows is necessary, ensure that both low and high flows are managed to minimise erosion. For example if access across a

creek is required construction of a ford may be preferable to construction of a culvert and roadway

- Rehabilitate all disturbed areas, with approved topsoil, as soon as possible including the reinstatement of riparian areas and the installation of ground cover planting progressively as earthworks are completed
- Effectively maintain the erosion control and sediment collection devices and decommission sediment traps and basins only after completion of final works and approved by the Council

7.4 Solid, Liquid and Gaseous Contaminants

The developer shall be responsible for the proper disposal of all solid, liquid and gaseous contaminants in accordance with all statutory and contractual requirements including the provisions of this clause.

Gaseous contaminants shall be discharged in such a manner that they will be sufficiently diluted with fresh air that the toxicity will be reduced to a recognised acceptable level. Subject to statutory and local requirements, liquid contaminants may be diluted with water to a level of quality acceptable in the sewer system or shall be contained in approved vessels for disposal at an approved site.

Solid contaminants shall be disposed of by removal from the site to approved locations or as otherwise directed by Council.

Refuse from construction operations, including food scraps and the like, shall be removed from the site. All hoppers, chutes or buckets for refuse shall be covered or be of such design as to fully confine the material and prevent dissemination of dust.

7.5 Preservation of Flora

The developer shall refrain from destroying, removing or clearing trees and shrubs to an extent greater than the approved plans.
Areas to be cleared shall be inspected by the developer, and approval of Town of Gawler's horticulture team leader obtained before any trees or shrubs are removed, cleared or destroyed.
Keep all construction activities, including storage of materials, vehicles equipment or rubbish, away from existing trees which are to be retained. Do not drive or park vehicles under the crown of existing trees which are to be retained. Before any excavation is carried

out over roots of trees to be retained, obtain a ruling from Town of Gawler's horticulture team leader as to whether the levels in the vicinity of the tree can be adjusted to protect the roots. Where there are existing trees to be retained on the site the tree protection measures indicated in Section 6.2 of this document are to be undertaken by the developer prior to the commencement of any demolition, development, construction or building works. The developer shall ensure that the provisions of the Land Management Agreement (LMA) in respect to trees are complied with.

Council may direct the developer to repair any damage or injury to a tree that is to remain. This work shall be carried out by a tree surgeon engaged by the developer and approved by Town of Gawler. Should the tree not be able to be saved, moneys to fund replacement advanced trees to be planted on the same footprint of the damaged tree will be forfeited by the developer.

7.6 Working Hours

Construction activities on the development site shall be carried out only between the following hours;

Monday to Saturday - 7am to 5pm.

Sunday - no work shall be undertaken other than those necessary for dust control, emergency works or works that cannot be carried out at any other time without causing unnecessary disruption; following approval from council

7.7 Site Access

Where more than one street abuts the development site Council will nominate the location and street from which access to the site is obtained. Developers are required to obtain Council's written consent for the location of working access points to the site.

8 COMMUNITY TITLES

Within the boundary of Community Titles the service infrastructure on the land, including the road, drains and streetscape, are private and therefore not Council's responsibility. Accordingly Council does not enter into any binding arrangements e.g. a community road. Although the services infrastructure within the development is private the interface with council land and drainage is of concern to council and therefore the developer is required to submit:

- A full set of drawings and specifications so council may assess that it is in fact feasible for the community title lots to be adequately serviced. This information also shows the interface between the Community Infrastructure and Council's infrastructure.
- The proposed drainage scheme including calculations and a Stormwater Management Plan in the format as described in section 4.3. The plan is required to demonstrate that the Council's drainage requirements as stated in section 4.2 are met.
- If the developer wishes for garbage trucks to service the Community Subdivision then the design of the road geometry must be as detailed in section 3.2. The developer will also be required to sign an indemnity between themselves and Town of Gawler.

Appendix 1 SPECIFIC REQUIREMENTS FOR KUDLA

In the Development Plan The Rural Zone identifies a locality at Kudla which provides for allotments of 0.9 hectares in size.

The locality comprises a mix of mainly open surface roads with only a few bituminised. All roads have edge swales for stormwater drainage into a system that is partly pipes that eventually drain overland and in pipes to wetlands in the City of Playford.

The majority of applications will involve simple divisions of one into two with vehicular access directly onto the existing road network. Occasionally development will be of a larger scale and involve a new road.

The general provisions of the Development Plan provide that where land is divided there is provision for adequate:

- all weather access;
- stormwater drainage.

COUNCILS REQUIREMENTS FOR A LAND DIVISION

Access

Where access is directly onto the existing road network there will be a requirement for a new standard crossover in accordance with Council Standard Details.

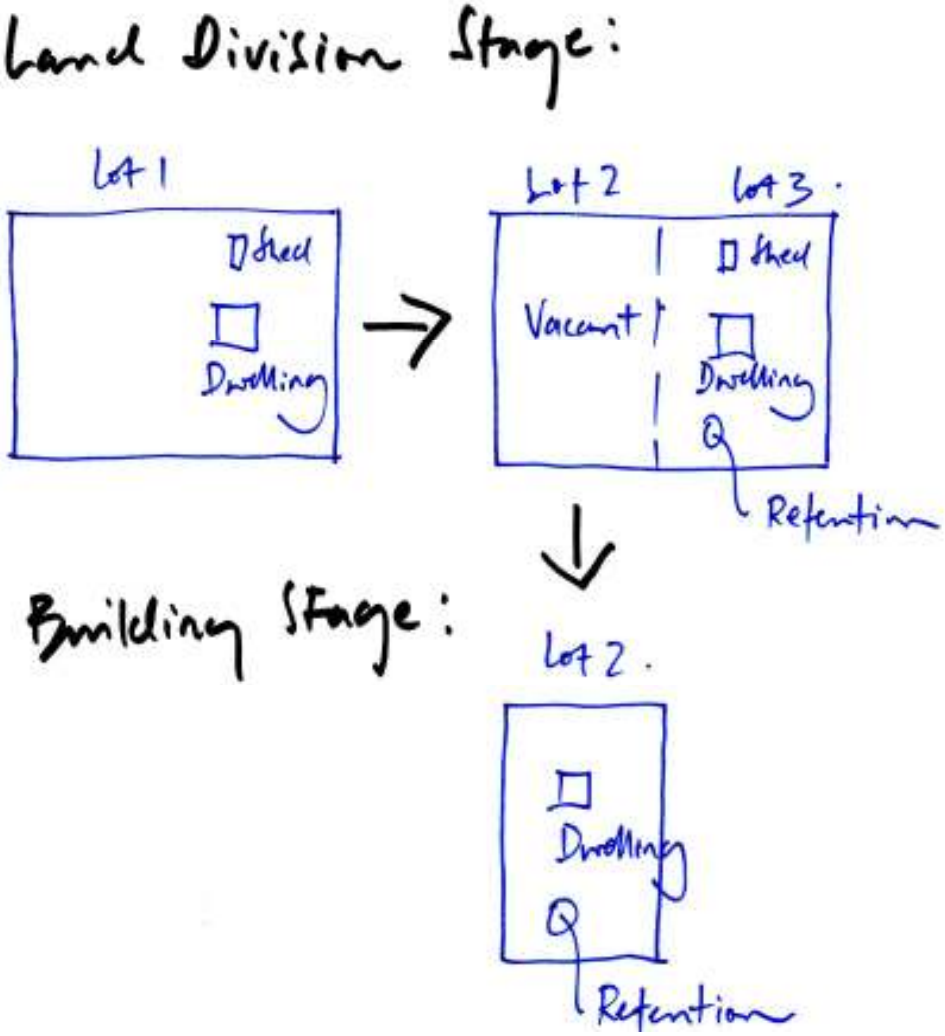
There will be no requirement or contribution to the existing road network for upgrading. This will occur over time as part of Council's general works program which may be funded by a special levy or rate.

Where a new road is proposed as part of the development application, this standard is to be used.

Stormwater

There is considered to be no benefit in upgrading the existing public stormwater system. This means however the additional runoff from new development needs to be managed on-site and add no load to the existing system in storm-events. It is an approach that also supports Water Sensitive Urban Design principles.

Retention of runoff is only practical in relation to existing building development because at the time of a land division application one or more of the proposed allotments are most likely to be vacant (and therefore not contribute additional stormwater runoff). Hence at the stage of the land division the application containing runoff will be directed to the allotment with existing buildings, not the vacant lots. The runoff from the vacant lots will be dealt with when application for buildings are lodged and assessed.



Council's typical requirement for a financial contribution of $1,350 (2010/11) will not apply.

STORMWATER RETENTION STANDARDS

The use of onsite retention devices is restricted to soil types classified as Class A and S or Class M-D as defined in AS 2870. Developer needs to verify the Class of soil before selecting the appropriate detention device.

In terms of detention system, developer can choose to provide soakage trenches, soakage wells, area soakage system or any other devices acceptable to the Council. Detailed engineering calculation/models etc. need to be submitted to the Council to verify the dimensions of system/s proposed.

Storm event up to 20 yr. ARI 30 min duration needs to be detained on site. Accordingly the minimum on site detention requirement is:

Impervious Area (m^2)	Required onsite detention (litres)
250	5,500
300	6,650
350	7,800
400	8,900
450	10,000

Appendix 2 REFERENCES

The latest editions, including all revisions of the following standards are referred to in this Section and shall form the basis for the performance of the work covered.

AS 3600	Concrete structures
AS 3972	Portland and blended cements
AS 1379	Specification and supply of concrete
AS 1012	Methods of testing concrete
AS 2876	Method of forming joints and spacing
AS 1289	Methods of Testing soils for Engineering Purposes
AS 3798	Guidelines on earthworks for commercial and residential developments
AS 2008	Residual bitumen for Pavement
AS 1160	Bitumen Emulsions for Pavements
AS 2150	Asphalt (hot-mixed)
AS 2341	Method of testing bitumen
AS 1742	Manual of Uniform Traffic Control Devices.
AS 1141	Sampling and testing aggregates
AS 2876	Concrete Kerb and Channels – Manually or Machine
AS 3725	Design for the installation of concrete pipes
AS 2566	Buried flexible pipes
AS 3500.3	Stormwater Drainage.
AS 1158	Lighting for Roads and Public Spaces

AUSTROADS publication – Guide to road design, Part 2: Design Considerations

AUSTROADS publication – Guide to road design, Part 3: Geometric design

AUSTROADS publication – Guide to pavement technology, Part 2: Pavement structural design

APRG21 – A guide for the design of new pavements for light traffic

DTEI's specification for roadwork's

DTEI's Specification for Excavation and Reinstatement of Road Pavements

Water Sensitive Urban Design Manual for Greater Adelaide

Australian Rainfall and Runoff – 87: A guide to flood estimation

Appendix 3 LIST OF STANDARD DETAILS

GAWLER COUNCIL STANDARD DETAILS

SK-100	Junction Box/ Grated Inlet Pit
SK-101 A	Side Entry Pit
SK-102	Easement Drainage Connection
SK-103	Pipe Bandage Joint
SK-104	Standard Headwall for Pipes 675 – 1800 diameter
SK-105	Standard Headwall for Pipes 300 – 600 diameter
SK-200 A	Footpath Adjacent Property Boundary
SK-202	Block Paving
SK-203	Asphalt Shared Path and Footpath
SK-204 A	Pram Ramp
SK-205	Pedestrian and Cycle handrail
SK-206	Single and Two Coat Spray Seal
SK-300 A	Forded Driveway
SK-301	Culvert under Driveway
SK-302 A	Vehicle Crossover for Barrier Kerb
SK-303 A	Entranceway for Mountable Kerb and Gutter
SK-304 A	Mountable Kerb and Spoon Drain
SK-305 A	Barrier Kerb and Barrier Kerb & Gutter
SK-306 A	Barrier Kerb Drain Detail
SK-307 A	Drainage Outlet to Mountable Kerb and Gutter
SK-400	Shaker Pad
SK-401	Stormwater Sediment Control
SK-402	Hay Bale Barrier
SK-403	Silt Screen
SK-500	Grassed and Bio retention Swale
SK-501 A	Bio retention Basin/ Cell
SK-600	Collector Road Cross Sections
SK-601	Residential and Access Roads cross Sections
SK-602	Cul-De-Sac Set out
SK-603	Set out for Rural ‘T’ Sections
SK-604	Street Name Signs