Griffith City Council

Lake Wyangan Masterplan
Basis of Design Report

June 2020

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1. Introduction

1.1 Project Background

Griffith City Council (Council) has engaged GHD Pty Ltd (GHD) to prepare a masterplan to guide residential development at Lake Wyangan, NSW.

The masterplan addresses land between Smeeth Road in the north and Mallinson Road and Scott Road to the south, both to the east and west of Boorga Road.

The master plan addresses proposed subdivision layouts, recommended road and infrastructure layouts.

1.2 Purpose of this report

GHD has prepared this report for Council to set out the rationale for the planning and design principles used in developing the Lake Wyangan Masterplan.

1.3 Scope and limitations

This report: has been prepared by GHD for Griffith City Council and *may only be used and relied on by Griffith City Council for the purpose agreed between GHD and the Griffith City Council as set out in section 1.2 of this report.*

GHD otherwise disclaims responsibility to any person other than Griffith City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD as described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Griffith City Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Design Principles

2.1 Study Area

The study area is located to the east and west of Boorga Road, Lake Wyangan. The Study Area extends between Smeeth Road and Scott Road on the eastern side and between Todd Road and Mallinson Road on the western side. Refer drawing 23-16709-C005 Masterplan.

The masterplan area covers the majority of the Urban Release Area and shown on Griffith Local Environmental Plan 2014 Urban Release Area Map – Sheet URA_003. The area defined in Council's brief for this project excluded the established residential village area north of Todd Road and west of Boorga Road. The masterplan area defined in GCC's brief includes additional land areas outside the defined URA extending south to Mallinson Road, areas between McCarthy Road and Scott Road and areas between Smeeth Road and McCarthy Road.

2.2 Desired character and controls

The stated intent expressed by Council's senior planning staff has been to provide mainly for conventional residential development of generally affordable character, to provide for traditional single freestanding houses on separate residential lots.

The GLEP 2014 prescribes a minimum lot size of 700 m^2 for standard residential lots. This lot size has been adopted as a minimum standard across the study area, with larger lots proposed in some areas to address significant site constraints.

For the purpose of providing some diversity in subdivision offerings, areas of larger lots have been proposed at 2,000 m^2 minimum size. These larger lots serve as a transition to the existing lower density development to the south, and areas of land that will be marketed at a higher price point. Notwithstanding, if preferred by Council these areas could be developed to the standard residential density.

Larger lots around 72 - 82 m deep are proposed adjoining the surrounding rural land acting as buffer zones, allowing effective separation of future dwellings from the impacts of the agricultural activities on this surrounding land.

Multi-unit housing blocks of varying sizes have been allocated throughout the Study Area. These are largely positioned adjacent to major drainage corridors where minimum sized lots are not desirable.

All new lots will be serviced with normal urban utility services and road access.

The Council's *Engineering Guidelines*: *Subdivisions and Development Standards* dated December 2008 sets out design standards for road widths and provision of water, sewerage and stormwater infrastructure. It is proposed that residential lots will be serviced for electricity, gas and telecommunications to normal residential standards.

The Master Plan sets out the proposed development framework. Individual landholdings will be subject to detailed design development and separate development approval processes. These may result in some variation from the details contained in the Masterplan.

2.3 Existing framework

The existing pattern of landholdings within the Study Area is largely defined by the existing road network and Murrumbidgee Irrigation (MI) supply and drainage infrastructure corridors.

2.3.1 Road network

The study area is currently serviced by a simple and legible established road network.

Boorga Road is the central major road link connecting between Griffith City to the south and the existing rural and lower density residential areas to the north. Other residential precincts have been proposed to the north of the Study Area. Boorga Road functions as a Local Distributor road. It is understood that the through traffic includes some freight vehicles, particularly related to agricultural land uses in the surrounding areas.

McCarthy Road, Smeeth Road and Scott Road run to the east of Boorga Road. Mallinson Road, Druitt Road and Todd Road run to the west of Boorga Road. These existing roads serve as Local Access streets.

Druitt Road and McCarthy Road join Boorga Road at a well-defined crossroad intersection.

Todd Road and Smeeth Road intersect Boorga Road as simple tee junctions.

Scott Road connects to Boorga Road as a conventional crossroad junction with Abattoir Road, with Mallinson Road connecting to Abattoir Road less than 50 metres from Boorga Road. The dominant traffic movements appear to favour Mallinson Road over Abattoir Road, currently resulting in unsatisfactory traffic controls at that junction.

It is also observed that the road reserve width of Scott Road is too narrow to contain the road formation in use.

2.3.2 Murrumbidgee Irrigation

There is an existing network of MI raw water supply infrastructure and drainage channels servicing the Study Area. In recent years, the supply infrastructure has mostly been converted from open channels to buried pipes. The drainage channels remain, also serving to drain stormwater flows.

There are corridors of land owned by MI criss-crossing the study area, containing the supply infrastructure and drainage channels. Some of these corridors run alongside public road reserves.

2.4 Existing landholdings

There are over 30 landowners within the study area. Whilst the majority of existing lots are owned separately, some adjoining lots are identified from Council's records as being in the same ownership. It is assumed that those in the same ownership will be planned and developed together. Other landholdings all have separate legal access and their own potential to develop independently of their neighbours, provided that necessary utility services are available.

It is preferred that landholdings are capable of being developed independently of the adjoining properties, subject to provision of necessary services.

The boundaries of existing lots are shown in red on drawing 23-16709-C006 Lot Layout Plan.

2.5 Key constraints

The main constraints for development of the study area are the extent of flood-affected land and the need to provide effective buffers between residential and agricultural land-uses.

2.5.1 Flooding

The Council's *Lake Wyangan Floodplain Risk Management Study and Plan* dated August 2013 details floodway and flood fringe areas within the Study Area. The floodways correspond to the main drainage paths, and the flood fringe areas have relatively lower flow velocities and

shallower depths. The Masterplan proposes that there is no development of buildings within the floodway areas. Subject to suitable minimum floor levels, buildings can be considered within the flood fringe areas. The Masterplan proposes that lots can extend into the flood fringe and floodway areas, provided that suitable building sites are defined outside the floodway and with suitable controls on minimum floor levels. Council must manage compliance with these standards to minimize Council's residual liability. Most lots extending into flood fringe areas are proposed as larger lots identified for medium density development, allowing some scope for the design of residential development to address flood related issues.

Refer to drawing 23-16709-C035.

This drawing plots the floodway and flood fringe areas from Council's *Lake Wyangan Floodplain Risk Management Study and Plan* dated August 2013. It should be noted that the urbanization of the catchment and the proposed upgraded drainage infrastructure will change the extent of floodway and flood fringe affected areas once the development of the Study Area is undertaken.

2.5.2 Land Use conflict

There is potential for significant ongoing conflict between residents within the proposed development and the continuing agricultural use of surrounding lands. These conflicts can arise from noise (frost fans), dust, chemical spray drift and farm related traffic. It is expected that these issues will continue and perhaps become more acute with an increase in residential development.

A partial mitigation of these conflicts is to provide some separation between the residential and agricultural land-uses. The Masterplan proposes creating strips of large lots (approximately 72 - 82 m deep and/or approximately 3000 m^2 in area) around the inside of the Study Area boundary. This allows for new houses to be positioned at least 30 m from the adjacent agricultural land and reduces the number of houses in proximity to the continuing agricultural uses.

2.5.3 Existing residential development

There are some existing smaller lots within the Study Area that contain existing houses and other buildings. This existing pattern of development effectively constrains further subdivision. These lots remain within the Study Area but without realistic prospects for further development. Some of these are located close to adjoining agricultural land. As these already exist, there is no new conflict arising.

2.6 Stormwater flows

Stormwater from the Study Area flows into Lake Wyangan.

Urban development typically results in increased hard surfaces and impervious areas, which shed stormwater with increased velocity than pre-development agricultural land. The end results in significant increased peak flowrates downstream.

The works proposed in the masterplan area include the formation of upgraded drainage swales to convey stormwater flows in defined open space corridors. These swales and drainage structures at road crossings have been sized to accommodate the post-development stormwater flows. Detailed design of these works will be required before construction.

Refer to drawings 23-16709-C015, C016 and C107.

There are existing houses located alongside main drainage channels west of Boorga Road and north of Todd Road in particular that would likely be severely affected by significant increases in the stormwater runoff flow rates unless these channels are upgraded to increase capacity

before the urban development proceeds across the study area. There may be other properties that would be adversely affected if the proposed drainage upgrade works are not undertaken.

2.7 Development sequencing

The proposed residential development of the Study Area will be dependent on the orderly provision of utility services, drainage and roads infrastructure. The main constraint is the provision of sewerage and water infrastructure in advance on each development being occupied.

The existing sewage pump station adjoining Smeeth Road will be retained to service the entire catchment within the Study Area.

Areas to the south and east of the existing sewage pump station can be serviced by conventional gravity sewerage lines. The gravity sewer line along Boorga Road near the school will be up to approximately 5 metres deep.

Other areas will require pressure sewerage systems, where each residential property is serviced by pump system connection through a network of pressurised pipelines laid along the road network. Refer to drawing 23-16709-C020 Sewer Plan.

As sewerage mains are extended further upstream from the existing sewage pump station, land can then be serviced by the sewerage system. This factor sets the development sequence flowing from the pump station at the northern part of the Study Area, progressively working towards the south.

Most of the main sewerage lines are proposed within existing public roads and existing MI corridors, enabling construction by Council (or its agents) at a program to suit available funding and resources.

It is expected that these works will be funded by developer contributions.

The proposed development sequence is set out in drawing 23-16709-C007 Development Sequencing Plan.

2.8 Opportunities

The development of the Study Area will result in a significant increase in the population. This will increase demands upon the local school population and demands on recreational space. Similarly, there will be value in providing space for a local shopping precinct for convenience items.

The northern part of the current Council-owned site to the north and east of the school is well located to fulfill these functions.

It is understood that Council had previously purchased this site for Council to undertake residential development itself. There is a potential conflict of interest for Council as both the planning authority controlling development in the Study Area and simultaneously being a developer in competition with other landowners wanting to develop. If Council makes some of its landholding available for community uses and possibly for expansion of the school, Council will be able to recover some of the land value and the cost of capital works as part of the overall developer contributions scheme for the provision of infrastructure for the Study Area.

The Masterplan identifies an area for public recreation (and stormwater detention), for school expansion and for a local shopping precinct with the Council owned land. The areas allocated to each of these uses could be negotiated further as the development proceeds.

2.9 Developer contributions

The development of the Study Area will require the developers of each landholding to undertake the detailed design and construction of the subdivision works within their own lands. This is normal for land development.

There are numerous parts of the development works that need to be undertaken at a scale and sequence that suits the development of multiple landholdings. These works are best undertaken by Council using contributions levied on the development of the proposed subdivisions.

These development contributions will need to cover the following works:

- Upgrading of Boorga Road, including intersection upgrades
- Upgrading of McCarthy, Druitt, Todd and Smeeth Roads and realignment of the intersection of Mallinson Road with Boorga Road
- Construction of main sewerage network
- Upgrading of main water reticulation network
- Upgrading to stormwater infrastructure as required
- Upgrading of existing shared bicycle/pedestrian paths
- Provision of new shared bicycle/pedestrian paths
- Upgrading of main electrical infrastructure to service the study area
- Provision of public recreation facilities

Water, sewerage and stormwater contributions must be levied pursuant to s64 of the *Local Government Act 1993*. Contributions for other infrastructure can be levied under Division 7.1 of the *Environmental Planning and Assessment Act 1979* (formerly section 94 contributions).

The determination of contribution amounts and preparation of contributions plans are outside the scope of this report.

2.10 Infrastructure

2.10.1 Roads

Refer to drawing 23-16709-C010 Roads Hierarchy Plan.

The road classifications are as outlined in Council's *Engineering Guidelines for Subdivisions and Development Standards, Part 2 Roads Design – Adopted 8 December 2008.*

Figure 1 Roads Design

Table 1 –Road Standards for the Urban Street Network specific to **Griffith City**

Classification of Road	Local Distributor	Collector	Local Access	Cul-De-Sac & minor access
Maximum traffic Volume (vehicles/day)	5000-7000	3000	1000	150
Maximum Number of dwellings	500-750	300	100	15
Carriageway Width (m)	13	11	9	8
Footway Width (m)	2 x 5.5	2 x 5.5	2 x 4.0 or 2x 5.5	2 x 4.0
Road Reserve (m)	24	22	17 or 20	16
Lane Provision	2 Moving Parking	2 Moving Intermittent Parking	2 Moving Intermittent Parking	2 Moving Intermittent Parking
Maximum desirable speed (km/h)	60	50	50	50
Maximum design speed (km/h) (for sight distance calculations)	60	60	50	50
Footpaths	Both sides	To be advise by the Authority	To be advise by the Authority	Not required
Cycle Ways	2.5m wide shared cycleway footpath on one side	To be advise by the Authority	To be advise by the Authority	On road shared
Kerb and Gutter	150 mm high integral barrier	150 mm high integral barrier	150 mm high integral barrier	Fully mountable

Roads used as bus routes are usually designed to Collector standard 11-metre carriageway width.

Standard road widths are measured between kerb inverts as shown on the standard drawings.

It is proposed that the existing road network is retained and enhanced to become the main traffic corridors through and within the Study Area.

Boorga Road provides a significant north-south transport corridor. It is proposed that this is upgraded to a Local Distributor road standard, with a 13-metre carriageway. An off-road shared bicycle path currently runs along Boorga Road. Some upgrading of the condition of this shared pathway will be required. Direct driveway access to Boorga Road have been limited to the few existing driveways that cannot be realistically relocated as part of the planned subdivision works.

McCarthy Road and Druitt Road will be retained and upgraded to Collector Road standard with 11-metre wide carriageways. Direct vehicular access from lots to these roads is accepted.

The number of properties utilising Todd Road and Smeeth Road will not exceed 100 lots, allowing these roads to be upgraded to Local Access standard, with 9-metre carriageways.

The total traffic utilising Mallinson Road approaches the 100-lot level, however a significant proportion of this traffic arises from areas outside the Study Area. It is suggested that Mallinson Road is not included in upgrading works associated with the development of the Study Area, apart from the relocation of the intersection of Mallinson Road with Boorga Road.

The traffic generated by the proposed development onto Smeeth Road does not exceed the 100-lot threshold. There are safety benefits in widening the existing pavement to include sealed shoulders. The provision of a shared pathway is valuable for connecting pedestrian and bicycle traffic between proposed residential developments and the proposed public recreation facilities, shopping precinct and the local school. The flood-affected land along Smeeth Road effectively restricts residential development directly adjoining Smeeth Road.

Scott Road will be upgraded to a Local Access street (9 m carriageway) while retained with its direct connection to Boorga Road. The narrow road reserve requires widening to allow the formation of a conventional verge treatment adjoining the residential development, with kerb and gutter, footpath and normal underground utility services.

All existing landholdings enjoy access to the existing road network. This allows each landholding to be developed without being dependent upon development by other landholdings. Some landholdings consist of two adjoining lots.

The Masterplan proposes connections across the proposed subdivisions to create a legible and permeable road network that is mutually beneficial.

Road corridors provide important connectivity for utility services in addition to providing for vehicular and pedestrian traffic. These connections are important for connecting water and electrical reticulation works to efficiently service the overall development pattern.

The overall layout of the proposed road network is clearly defined in the Masterplan with a commitment that all road connections proposed will be delivered and not significantly changed as the area is subdivided and developed.

The internal roads within the subdivisions will be designed and constructed by the developers as part of the subdivision works required. The new road network will be comprised mostly of Local Access streets (9 m carriageway) with streets servicing up to 15 lots provided as Cul-de-Sacs.

The standard verge width is 4 metres. Wider verges allow improved street tree planting along higher trafficked streets and improve the residential amenity of adjoining lots. The additional width also aids in providing space for some traffic calming measures on longer straight streets.

2.10.2 Footpaths

Council's *Griffith Pedestrian and Bicycle Strategy* dated May 2018 outlines the intention for pedestrian and cycleway infrastructure to be constructed to provide direct and safe access for pedestrians and cyclists around Griffith.

An existing shared pathway lines the western side of Boorga Road, linking the City with northern sections of the Lake Wyangan area. This pathway will be retained and upgraded to accommodate increased pedestrian and bicycle activity within the Study Area.

The Masterplan proposes new footpaths are constructed along Collector and Local Access roads within the Study Area. New footpaths have been located on the inside of road curvatures and in locations where road crossings are minimized so as to reduce the total footpath lengths required.

New shared pathways are proposed along Druitt, McCarthy and Boorga Roads, as well as through major drainage corridors. Refer drawing 23-16709-C012 Footpath Network Plan.

2.10.3 Murrumbidgee Irrigation infrastructure

The Murrumbidgee Irrigation supply and drainage infrastructure is proposed to be retained. This infrastructure is important for the continued agricultural uses around the Study Area. The bulk of this infrastructure is contained within land corridors owned by MI.

The existing MI drainage network defines the flow paths for stormwater runoff from the Study Area. It also provides an effective basis for draining the proposed urban subdivisions.

In some parts of the Study Area, the MI land corridors provide effective avenues for main sewerage lines. Like stormwater, gravity sewer lines must be graded to provide a continuous gradient downstream and so naturally follow the drainage network.

The corridors of MI land provide opportunities for installing sewerage infrastructure in advance of the development of individual land holdings, so that individual landholders developing more slowly cannot frustrate the orderly development of the Study Area.

For the purpose of this masterplan, it has been assumed:

- The MI infrastructure will remain for the purpose of servicing surrounding users
- The MI land corridors will remain, except where specifically no longer required
- It is acceptable to open new public roads crossing the MI land
- The MI land corridors will remain as open space, breaking up the residential development and allowing informal pedestrian access, and
- Raw water will not be supplied to each residential lot.

It will be practical for the proposed public recreation facilities to be irrigated with raw water from the MI system.

2.10.4 Stormwater drainage

The main stormwater drainage necessarily follows the drainage paths occupied by the MI drainage channel system.

Urban development of any rural catchment results in significant increases in the hard surface areas and consequently increases the rate that rainwater runs off the site.

Council has directed that stormwater is to be conveyed to Lake Wyangan, and the planning for stormwater infrastructure is not to include provision for detention storage of peak flows across the Study Area,

The Masterplan proposes significant upgrades to existing MI drainage channels as major drainage corridors located within floodway areas to contain flood flows. High level modelling has calculated the 1% AEP surface water flow captured within the drainage channel linking Boorga with Todd Roads and McCarthy with Smeeth Roads to be in the order of 9.5 m^3/s and 12.4 m^3/s respectively.

An existing MI drainage channel is located behind the village linking Boorga Road with Lake Wyangan. Stormwater modelling indicates that 1% AEP surface water flow for this channel, when taking into account the contribution from upper catchments, will be in the order of 33.6 m^3/s.

Major upgrades to existing and provision of new drainage structures beneath Boorga, Smeeth, Druitt and Todd Roads will be required where the major drainage corridors link.

Additional drainage works will necessarily be provided along the new roads and upgraded existing roads, within and adjacent to the Study Area.

2.10.5 Sewerage

The Masterplan assumes that all residential lots in the Study Area will be connected to the Council sewerage system.

The existing sewage pump station located near the junction of Boorga Road and Smeeth Road will service the entire Study Area.

The north-eastern portion of the Study Area will be serviced by a gravity sewer system that drains directly to the existing pump station. The southern and western parts of the study area cannot directly drain to this pump station due to the constraints of the landform and required minimum pipe gradients. This will require on-site low pressure systems to be installed and connected to new pressure sewer mains that will link to the existing pump station. A sewer rising main exists in Druitt Road that could form part of this system.

Some small existing properties on the edges of the study area can be connected to the new sewer systems, or can retain their existing on-site systems.

It is proposed that Council provide the sewerage reticulation network within the existing public road network and the MI land corridors in return for contributions levied per lot across the serviced area. Developers will construct the sewer network within their individual subdivisions. This approach means that the provision of the network is not dependent on any owners developing in the preferred sequence. This approach requires Council to “bankroll” the provision of the early infrastructure.

The sequence of development across the study area is constrained by the provision of the main sewer network. Construction must proceed from the pump stations upwards, towards higher areas so that there can be a continuous pipe network flowing down to the pump stations, for the system to operate.

2.10.6 Potable Water

There are existing potable water mains along the existing road network.

This layout will form the main distribution network within the study area, but will require significant upgrading to meet the increased demands. The upgrade works are most efficiently undertaken as part of the road upgrade works.

As with the sewerage network, it is proposed that Council undertake the upgrading of the main distribution network with developer contributions and that the internal mains within each subdivision are provided by the developers as part of their subdivision works.

2.10.7 Electricity

The following advice was prepared assuming a potential yield of around 10 lots per hectare across the study area. This potential yield takes account of flood-affected areas and buffer zones.

A development of around 1,280 lots plus up to around 500 medium density dwellings will likely see a distribution network demand of 6-8VMA. This will likely need 2-3 11kV feeders to support the ultimate development and meet redundancy requirements. Some of this is likely to be taken from existing 11kV lines, though this cannot be determined without talking to Essential Energy’s local planner.

There are four zone substations in the area which could potentially supply the development with any shortfall:

1. Nericon ZS – 651 Boorga Road, Nericon (5.5km feeder distance)
2. Beelbangera ZS – 440 Rossetto Road, Beelbangera (9km feeder distance)
3. Tharbogang ZS – 863 Kidman Way, Griffith (7km feeder distance)
4. Griffith ZS – 9 Twigg Street, Griffith (6.5km feeder distance)

These are all a reasonable distance away from the development, noted by the distance of feeder routes in brackets above. They each have some issues making supply not straightforward:

1. The feeder to Nericon is noted as being constrained in the Distribution Asset Planning Report. It is unclear what capacity is available from this, though reference is made to needing a new 33kV feeder from Tharbogang to Nericon. The ZS would also likely need a transformer upgrade to supply the ultimate development.
2. Beelbangera will definitely need a transformer upgrade to supply beyond around 800 houses (the DAPR shows a capacity of around 2.5MVA with the transformer fans going). Also, given the feeder distance is 9km, this is approaching the limit of how far you would run a fully loaded 11kV feeder.
3. Tharbongang looks to be reasonably okay, although a long feeder route would be needed.
4. Griffith looks to be reasonably okay although the feeder route would run through town, increasing the complexity, and cost, of running new feeders.

In short, there is no obvious choice. We would need to have a detailed discussion with Essential Energy to establish potential connections points and feeder capacities in the 11kV network (which is not published information to my knowledge).

The Beelbangera option seems preferable, though this would depend on the funding of the 33kV line. I expect an argument could be made for EE to fund this component as a shared network cost, though it is unlikely they would fund much, if anything on the 11kV side of things. If the 33kV was deemed a developer cost, then I would think the Tharbogang option is probably preferable.

References:

DAPR: https://www.essentialenergy.com.au/-/media/Project/EssentialEnergy/Website/Files/Our-Network/DAPR-2018.pdf?la=en&hash=12E10DC581DAEE38038061F4596C03F6BF2EF874

ZS demands and capacities:
https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUKEwjyicWzye_jAhUa7XMBHcewBjkQFjABegQIARAC&url=https%3A%2F%2Fwww.essentialenergy.com.au%2F-%2Fmedia%2FProject%2FEssentialEnergy%2FWebsite%2FFiles%2FOur-Network%2FDAPR-2018-BSP-ZS-and-Lines-Extract-Summary.xlsx%3Fla%3Den%26hash%3DEC217E835CA796CE026C8C3474C023435FF9A6A9&usg=AOvVaw3ICqvHM-ILLF7Mgf98RYgd

2.11 Landscaping

The Masterplan proposes the provision of landscaping along all new roads and upgraded existing roads within the Study Area. This will be achieved through street tree planting and beautification typically in the frontage of each lot with sufficient clearances for driveways and utility services.

It is expected that landscaping works for the proposed sports complex and upgraded drainage swale corridors will be completed by Council and can be recovered through the developer contributions.