Practice note no. 05

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Lot mix and yield in integrated residential developments

Tannum Blue, Gladstone

This practice note provides background information to the lot yield and mix calculator to help answer the questions:

- What residential yield does a particular lot mix produce?
- What lot mixes can produce a desired residential yield?

The lot yield from an integrated residential development is determined by a number of variables, including lot dimensions and mix, block lengths, proportion of open space and road reserve widths. In addition slope, curved roads and irregular shaped lots reduce design efficiency and yield.

Various lot mixes can achieve the same yield. For example the SEQ Regional Plan minimum dwelling yield can be achieved in a number of ways (refer Table 1).

Table 1 - Lot mixes to achieve 15 dw/ha

Lot size and dwelling type	Lot mix 1	Lot mix 2	Lot mix 3
	Per cent of lots	Per cent of lots	Per cent of lots
600m² detached	20.0	5.0	40.0
450m² detached	30.0	60.0	30.0
300m² detached	50.0	25.0	20.0
250m² detached	0.0	10.0	0.0
450m² attached dwellings (3/lot)	0.0	0.0	10.0
Total	**100.0**	**100.0**	**100.0**

The lot mix chosen for a specific site should be informed by detailed local market assessment.

However, a particular lot mix with known road reserves and open space results in a unique residential yield.

Net residential density of 27 dw/ha, Stages 3 and 4 Fitzgibbon Chase

Lot mix and yield calculator

The lot mix and yield calculator can be accessed at www.dsdip.qld.gov.au/resources/guideline/pda/practice-note-05-lot-mix-yield-calculator.xls

Comments on each of the key inputs are outlined below.

Density

Net residential density is defined in *PDA Guideline No. 1 Residential 30* as:

Net residential density applies to the area of residential lots, local roads and local parks and the number of dwellings in that area. The density is calculated by adding the area of residential lots to the area of local roads and local parks, and then dividing by the number of dwellings or residential lots created. The calculations exclude higher and middle order roads (freeways through to trunk collector), all other types of open space and non-residential land uses, but includes mixed use containing residential.

Diamantina Park, Fitzgibbon Chase

Site area, parks and environmental reserves

The site area is the gross area of the land intended to be developed for residential purposes.

Park types are defined in *PDA Guideline No. 12 Park planning and design*.

Environmental reserves are those areas of land, exclusive of local parks, set aside for environmental purposes.

Superlots

Superlots are lots generally larger than 1,000m² reserved for medium density residential development.

Lot typology

The calculator allows for the input of ten different detached dwelling lot types and one attached dwelling lot type. Note that proportions of urban lots in excess of 5.0 per cent may decrease the accuracy of the calculator due to their depths not aligning with the majority of the lots modelled.

Nominal area vs average area

Typically the average lot area for a specific lot type is greater than the nominal area calculated from the standard lot depth and width. Factors leading to an increase of an average lot size include curved roads, corner lots and irregular shaped lots. For the smaller lots, typically the average lot size is closer to the nominal lot size than for larger lots.

For a design with a rectilinear street pattern, with few odd shaped lots, the actual lot sizes may exceed nominal lot sizes by 10.0 per cent for the larger lots, and 5.0 per cent for the smaller lots.

The calculator allows for the input of correction factors for large detached lots (greater than 450m²), small detached lots (less than 450m²) and multiple residential lots.

Fitzgibbon Chase (stages 3 and 4) desity analysis

Triplex, Stuart Osman Building Designs, Fitzgibbon Chase

Multiple residential lots

Lots that allow a number of dwellings on one site can be included in the model. The two variables able to be input are average lot size and the minimum land area per dwelling.

This approach is suitable where these proposed sites are generally of a uniform size and density.

Larger attached dwelling sites with a variety of areas and densities should be included in the superlot category.

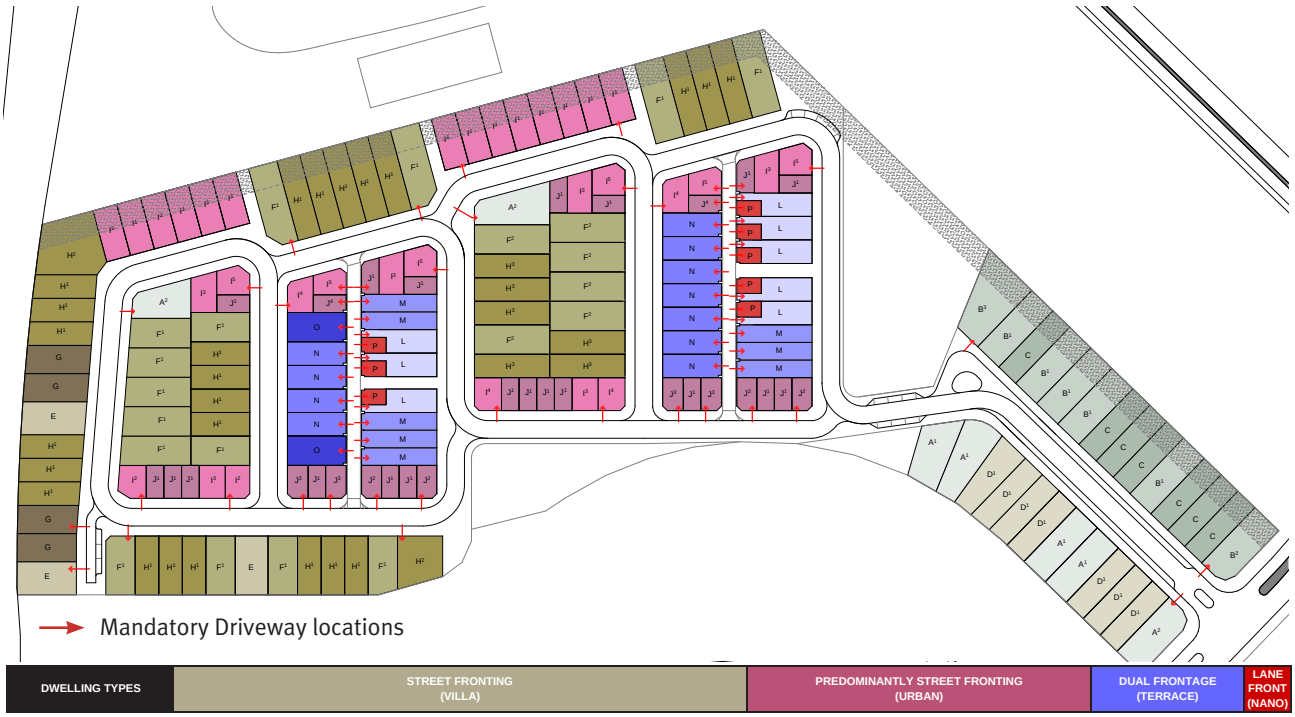
The calculator may be used to include rear lane product with lofts by manually adjusting the resulting site density (dw/ha) for the number of lofts allowed for in the design.

Road percentage

The percentage of a road reserve within a development is dependent upon a number of parameters including:

- The size of the precinct or stage being considered
- The depth of the allotments (grid depth)
- The length of street legs between intersections
- The road reserve width
- The amount of one sided road
- Extent of rear lanes in the design.

Typical road percentages on net residential area range from 28.0 - 43.0 per cent depending on the layout efficiency and has a significant impact on total site yield. The Tannum Blue, Gladstone case study has a road percentage of net area of approximately 30 per cent.



Fitzgibbon Chase, development precinct with net density 23dw/ha and 32.5 per cent road.

In general:

Road reserve width

The road reserve width has a moderate impact on overall road percentage. For each 1.5 metres increase in average road width, the road percentage will increase by approximately 2.0 per cent.

Amount of one sided road

The amount of one sided road has a moderate impact on road percentage. For each 10.0 per cent increase in the percentage of road that is one sided, then approximately 1.0 per cent increase in overall road percentage occurs.

Extent of rear lanes

This parameter has a marginal impact on road percentage. Inclusion of rear lanes (6.5 metres wide) equalling 20.0 per cent of the total road length results in an approximately 1.0 per cent increase. Rear lanes equalling 40.0 per cent of the total road length results in another 1.0 per cent increase.

Depth of allotments (grid depth)

Lot depth has a marginal impact on road percentages with a 25 metre deep lot increasing road percentage by approximately 1 per cent, and a 35 metre lot depth decreasing the road percentage by approximately 1 per cent.

Street leg length

This parameter has a marginal impact on road percentage. Increasing/decreasing this distance by 50 metres either way reduces/increases the road reserve percentage by less than 1 per cent.

Precinct size

Road percentages are also affected by the size of the precinct in that:

- Average road widths will increase as precincts increase in size to allow for higher order roads; and
- For smaller precincts, the relative impact of corner lots, increases road percentages.

For very large projects, it is recommended to deduct the higher order non-access road areas from the site area and use the calculator for the precincts remaining.

For smaller sites, the road reserve percentage should be able to be estimated by other means.

Summary

The estimation of the amount of road reserve to be used in an analysis of a new site is not an 'exact science'. The parameters are such that a range of possible road reserve percentages may result.

It is recommended that a cross check on the road percentage be used by identifying a similar style development to the proposed development.

Case study - lot mix and yield calculator applied to Tannum Blue, Gladstone

LOT YIELD AND MIX CALCULATOR

Key Site Characteristics	
Site Area (ha)	63.701
District/major recreation parks/sports parks/community land/environmental reserves	11.6%
Local, neighbourhood recreation and linear parks	3.5%
Total parks, community and reserves percentage	15.1%
Superlots (ha)	1.624
Site Area net of Open Space & superlots (includes roads and local parks)	54.7
Site Area above less superlots	52.5
Net Saleable area (net of roads and superlots)	33.2

Main Assumptions		Increase in Av. Area over Nominal Areas	
Road Percentage =	30.3%	Detached Lots > 450sqm	5%
Road Area in ha =	19.30	Detached Lots < 450 sqm	5%
Superlot Density dw/ha	25		
Av. No. of Dw's per MFD =	3		
Min. MFD site area/dw =	150	MFD Lots	5%

Note: Multiple Residential refers to sites that allow for multiple attached dwellings.
Urban lot % should not exceed 5% of total mix
Inputs - only in Yellow Cells

Lot Type	Typical Dimensions		Nom. Area	Av. Area	Example Lot Mixes		Trial Scenario 1	
	Width (m)	Depth (m)	(sqm)	(sqm)	All Large	Moderate Mix	Lot Mix	No. of Lots
Detached Lots > 450 sqm								
Premium Traditional 32	20.0	32	640	672	*100.0%*	*60.0%*	6.5%	56
Premium Traditional 25	20.0	25	500	525		*20.0%*	2.5%	21
Traditional 32	18.0	32	576	605			2.0%	17
Traditional 25	18.0	25	450	473			3.0%	26
Courtyard 32	15.0	32	480	504			15.5%	133
				Sub Total	*100.0%*	*80.0%*	*29.5%*	
Detached Lots < 450 sqm								
Courtyard 25	15.0	25	375	394	*0.0%*	*10.0%*	13.5%	116
Premium Villa 32	12.5	32	400	420	*0.0%*	*10.0%*	11.0%	94
Premium Villa 25	12.5	25	313	328	*0.0%*	*0.0%*	10.5%	90
Villa 32	10.0	32	320	336	*0.0%*	*0.0%*	11.0%	94
Villa 25	10.0	25	250	263	*0.0%*	*0.0%*	12.0%	103
Terrace 32	7.5	32	240	252	*0.0%*	*0.0%*	2.5%	21
Terrace 25	7.5	25	188	197	*0.0%*	*0.0%*	3.0%	26
Terrace 20	7.5	20	150	158	*0.0%*	*0.0%*	0.0%	0
5m Terrace 32	5.0	32	160	168	*0.0%*	*0.0%*	2.5%	21
5m Terrace 25	5.0	25	125	131	*0.0%*	*0.0%*	0.0%	0
Urban 18	7.5	18	135	142	*0.0%*	*0.0%*	4.5%	39
Urban 14	7.5	14	105	110	*0.0%*	*0.0%*	0.0%	0
Urban 10	7.5	10	75	79	*0.0%*	*0.0%*	0.0%	0
				Sub Total	*0.0%*	*20.0%*	*70.5%*	
Lots with Attached Dwellings								
Multiple Residential	Varies	Varies	450	473	*0.0%*	*0.0%*	0.0%	0
				Sub Total	*0.0%*	*0.0%*	*0.0%*	
				Total	*100.0%*	*100.0%*	*100.0%*	857

Results			Results
No. of Lots	493	562	858
Av. Lot Size (sqm)	672	590	386
Site Density (lots/ha) Net of Open Space and Superlots but including Roads and Local Parks	9.0	10.3	15.7
No. of Dwellings	493	562	858
Superlot Dwellings	41	41	41
Total No of Dwellings including Superlots	534	603	899
Net Overall Residential Density (dw's/ha) (Net of Open Space) but including Roads , Local Parks and Superlots	9.5	10.7	16.0

Model Notes

Road Percentage varies depending on design efficiency - for initial calcs use 30% as a starting point
% of Open Space and Active Park will vary from site to site. If no Open Space use 10% as Active Park %
Increase in Average area - will vary depending on design efficiency and number of irregular lots
Assumed lot density for superlots
Inputs to be limited to cells highlighted in Yellow

Case study - site characteristics and lot layout for Tannum Blue, Gladstone

Legend

- Site Boundary
- Proposed Stage Boundary
- Proposed Access Easement
- Indicative Footpath Location
- Potential 66KvA powerline location

Residential Allotments

- Urban Allotment
- Freehold Duplex
- Terrace Allotment 32
- Terrace Allotment 28
- Terrace Allotment 25
- Villa Allotment Type 1
- Villa Allotment Type 2
- Premium Villa Allotment Type 1
- Premium Villa Allotment Type 2
- Courtyard Allotment Type 1
- Courtyard Allotment Type 2
- Traditional Allotment Type 1
- Traditional Allotment Type 2
- Premium Traditional Allotment Type 1
- Premium Traditional Allotment Type 2

Land Budget

Land Use	Overall	
	Area	Percentage
Area of Subject Site	**63.701 ha**	**100.0%**
Saleable Area		
Residential Allotments	33.130 ha	52.0%
Balance Allotments	0.706 ha	1.1%
Potential Neighbourhood Centre	0.918 ha	1.4%
Service Allotments	0.036 ha	0.1%
Total Area of Allotments	**34.790 ha**	**54.6%**
Road		
Local Roads	13.968 ha	21.9%
Internal Collector Roads	2.261 ha	3.5%
External Collector Roads	3.095 ha	4.9%
Total Area of New Road	**19.324 ha**	**30.3%**
Open Space		
Active Park	1.731 ha	2.7%
Neighbourhood and Linear Park	7.395 ha	11.6%
Pedestrian Linkage / Landscape Treatment	0.462 ha	0.7%
Total Open Space	**9.588 ha**	**15.1%**