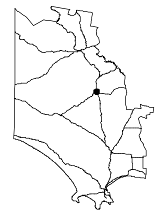
DIGBY
TOWN REPORT

March 2009



INTRODUCTORY COMMENTS

Digby is a small town (~100 people). Hamilton is 49km (37 mins) to the east, Merino 13km (10mins) to the north, Casterton 38km (30 mins) to the north and Portland 65km (49 mins) to the south. Services include electricity but there is no reticulated water or sewerage. There is a post office/general store and community hall with a public toilet. Digby is too small to be documented as a town by the ABS so no census statistics are available. Perusal at air photos (Map 1) reveals that much of the town is undeveloped so if the drivers that might make Digby attractive to outsiders were to emerge, there is potential for much development in this town.

The terrain around Digby varies slightly. The Tpd geology is an undulating plateau and the Klp geology that dominates the town would best be described as having moderate-to-gentle slopes. Drainage features surround the town. Tpd (AsNZs category 5a soils) consist of shallow topsoils an overlaying iron-cemented hard layer over yellow brown mottled clay. These soils are subject to seasonal waterlogging. Klp (AsNZs category 6a soils) have sandy loam topsoils resting abruptly on heavy yellow-brown clay subsoils and are also prone to seasonal waterlogging.

Digby's planning zones are shown in map 2. There are 46 properties (109 parcels) in the township zone and 32 properties (113 parcels) in the immediate surrounding farming zone. There is much potential for additional dwellings in the area. Blocks in the town are typically large.

Considering the density of development in Digby, it is our opinion that there are no immediate wastewater problems there that would stem from the ability of the local soils to receive wastewater. However, it is likely that the majority of wastewater systems there are old. Digby is probably dominated by systems that treat blackwater only and dispose of greywater to a ditch or gutter. There may also be some all-waste systems in the town. Where such systems have been maintained they are likely to continue working effectively for many years to come.

WASTEWATER MAPPING

In the following text we relate the AS/NZS and Septic Tank Code Of Practice to Digby. Map 3 through map 10 (present for the towns of Allestree / Dutton Way, Cape Bridgewater, Nelson and Narrawong) were not produced for Digby.

The category ranges in map 11 and map 12 were formulated to reflect the capability of the local soils to deal with domestic wastewaters onsite and do not consider setbacks. In order to gain a strategic understanding of the implications of existing and future development in Digby, table 1 has been formulated to compliment map 11 and map 12. These incorporate an allowance of 450m^2 for impervious surfaces and a reserve field where appropriate.

For each technology (trench and irrigation), the map showing properties (map 11) and table 1 can be used to represent the ability of the local soils to deal with wastewater onsite if no further development were to ever occur in the town. In contrast, the map showing parcels (map 12) and table 1 can be used to represent the ability of the local soils to deal with wastewater onsite if the town were to be fully developed at some point in the future.

Table 1: The implications of the disposal area requirements for Digby's soils. Comments relate to the shading in map 11 and map 12.

Soil and technology	Loading rate (l / pp / day)	(a) Impervious surface allowance	(b) Required disposal area (3br home)	(c) Required reserve area	(a+b+c) Minimum block size required	In map 11 and map 12, closer scrutiny is required on blocks shaded…
5a: Trench (existing)	140	450	1169	1169	2788	Pink, orange, light green
6a: Trench (existing)	140	450	1414	1414	3278	Pink, orange, light green, some dark green
5a:Trench (new)	115	450	973	973	2396	Pink, orange
6a:Trench (new)	115	450	1169	1169	2788	Pink, orange, light green
5a: Irrigation	115	450	281	0	731	Pink
6a: Irrigation	115	450	357	0	807	Pink

Trench performance

Map 11 and map 12 illustrate where trench technologies would be sustainable in the long term, and the extent of problems that might arise should Council continue to approve trench systems. The maps give some indication how existing systems might be performing in terms of surface runoff potential but do not account for impacts on groundwater. Concerns for properties that seem to have minimal ability to adequately deal with their wastewater onsite need to be tempered by the comments relating to blackwater-only systems in the report introduction.

Present sustainability: There are a number of properties that are unsustainable for a 3 bedroom house using trench systems (map 11 and table 1). Some of these are developed.

Potential sustainability: The entire town emerges as a concern if Digby was allowed to be fully developed using traditional trench technologies (map 12 and table 1).

Irrigation performance

In map 11 and map 12, only three blocks identified as being constrained when trench systems are used, are also a concern when irrigation technologies are used. These blocks are colored pink and all are less than half the minimum size requirement shown in table 1.

In the long term, if irrigation technology was to be adopted for all developments in Digby, there is no reason why onsite wastewater systems would not be a long term sustainable option for development throughout the town.

RECOMMENDATIONS AND CONCLUSIONS FOR IMPROVING SUSTAINABILITY

Failing or inappropriate onsite wastewater systems create concerns for human health and the health of the environment.

Towns of Digby's age tend to use trench systems. Where these are all-waste systems, in some areas there is potential for surface runoff, and where they are blackwater only, grey-water is being disposed of as street drainage. Neither situation is acceptable either from a health or an environmental perspective. Nobody knows for sure the extent of the various types of wastewater systems being used in Digby, whether they have been appropriately maintained, or how they are performing. The establishment of baseline information in order to understand this issue should be a high priority for council.

If all properties were to have well maintained all-waste systems with trench disposal, aside from two properties, it is unlikely that there would be any soil capability related wastewater problems in Digby (table 1 and map 11).

If at some point in the future Digby were to be fully developed, map 12 and table 1 indicate that irrigation systems would be required throughout the town. With this approach, there is no reason why the town could not be fully developed within the present subdivision pattern without resorting to centralized treatment.

Recommendation: Continue with onsite wastewater treatment. The following actions should be adopted.

- Do not allow the installation of new trench systems on blocks shaded pink or orange in Map 11 or Map 12.
- Permit approval should be used as a trigger to upgrade blocks shaded pink and orange to be irrigation systems.
- Manage remaining problems.

Problems to manage

- Audit of existing systems in areas shaded pink, orange or light green in Map 11.
  - Document onsite technology being used
  - Initial desludging of all tanks
  - Establish system to monitor future desludging
- Begin a community awareness campaign to encourage…
  - The use of water saving devices and practices. The motivation for this is wastewater reduction rather than reduced water consumption.
  - The maintenance and care of septic tanks.
  - Effective operation of trenches through the installation of dosing pumps.
- Full Land Capability Assessment to be undertaken for development proposals that deviate from the wastewater technologies discussed in this document, or are shown to be unsustainable in Map 11 or Map 12.
- Ensure the regular maintenance of AWTS in accordance with certificate of approval.

Notes on upgrading existing septic tank systems

- Irrigation technology is the preferred option and implies the installation of AWTS. Wastewater should be treated to a 20/30 standard.
- A professionally designed and constructed sand filter would be an acceptable alternative technology.
- A dosing pump provides intermittent loading and uniform distribution of effluent. It is a relatively inexpensive option that would give immediate benefit to most blocks. It will not make a trench system more sustainable, but rather will ensure that it is performing the best it possibly can. A dosing pump might be connected to existing trenches or extended trenches.

REFERENCES

Australian / New Zealand Standard, On-site domestic-wastewater management – AS/NZS 1547:2000, 2000

EPA, Guidelines for Environmental Management – Septic Tanks Code of Practice, Publication 891, March 2003

EPA Victoria, State Environment Protection Policy (Waters of Victoria), 2003

van de Graaff & Associates Pty Ltd, Geocode Mapping & Analysis Pty Ltd and Patterson Rural Business Management Pty Ltd, 2006, Glenelg Hopkins Catchment Regional Soil Health Action Plan

ACKNOWLEDGEMENT

Extensive use has been made of an earlier wastewater report produced by Mr Larry White.

DIGBY PREFERRED MANAGEMENT OPTIONS

Table 2: Climatic Regime (mm) – Meteorological Stations: Dartmoor and Merino for rainfall, Mount Gambier and Hamilton for evaporation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Rainfall	32.5	29.8	39.3	59.8	75.4	86.1	94.8	94.5	80.2	68.6	52.5	42.1	754.3
Mean Pan Evap'n	208.9	187.5	150.5	87.9	52.2	35.8	42.3	58.5	77.7	110.0	135.6	176.6	1322.4
Crop Factor	0.7	0.7	0.7	0.6	0.5	0.45	0.4	0.45	0.55	0.65	0.7	0.7	
Mean Pot'l Evapotrans'n	146.2	131.2	105.4	61.5	36.5	25.1	29.6	41.0	54.4	77.0	94.9	123.6	926.2
Water Deficit	113.7	101.5	66.1	1.7						8.5	42.4	81.6	415.5
Water Excess					38.9	61.0	65.2	53.5	25.8				244.4
90-Percentile Rainfall	65.9	62.5	73.8	106.0	125.9	140.4	146.1	142.8	126.1	112.0	93.3	75.2	928.1

The 90-Percentile annual rainfall[1] is the total yearly higher than normal rainfall that on average occurs only once in ten years, and it is made up by some parts of the year having sufficiently higher than average rainfall. It is based on a long historical period of rainfall measurements. This index is used in EPA publications on irrigation of large scale industrial and municipal wastewater and also for grey water re-use schemes. In Digby the 90-percentile high rainfall is about 27% higher than the mean annual rainfall.

During an average rainfall and evaporation year, there will be six months that have more rainfall than will be transpired by a grassed surface. The excess rainfall in these months is about 245 mm. The excess rainfall water will infiltrate into the soil and some of it will be stored in the soil profile, becoming available for use during the six drier summer months when the total deficit amounts to approximately 415 mm. Gypsum applied to the soil may improve permeability and water holding capacity. The potential for irrigated vegetation to use up water and hence take up nutrients is significant only in the period from November to March.

The urban land is almost wholly restricted to the more gently sloping plateau spurs and a very gently sloping alluvial fan contained within these slopes, with very little development on alluvial flood plains. Two main terrain units are distinguished.

- Elevated slightly undulating plateau area to the south of Digby township and mapped geologically as Tpd (Dundas land system in Glenelg Soil Health Strategy(GSHS)). Soil Category 5a.
- Slightly undulating lower slopes below the plateau descending to the Stokes River mapped geologically as Klp (Casterton land system in GSHS); Soil Category 6a.

[1] The 90-Percentile annual rainfall is very much less than the sum of the 90-Percentile monthly rainfalls because the chance of having twelve months in succession each with the 90-Percentile high rainfall is vanishingly small. The chance of any one month having a 1 in 10 month high rainfall is 1:10 or 0.1 per definition. This is true for each month in the year. The chance that in one year two months will each have a 1 in 10 high rainfall therefore is 1:100, or 0.01 or 1 in 10^2. Thus for all twelve months in the year to have a 1 in 10 high rainfall is 1 in 10^{12} or 1 in a trillion years.

Table 3.1 Management for vacant allotments					
Soil Category	Soil, Geology & Topography	Indicative permeability (Ksat)	Waste water management system	Design Loading rate	Area required for waste water management system
5a	Laterite and ferruginous sandstone, sand, clays and ironstone, Tpd [Dundas land system] Shallow soil profile with large amount of buckshot (ironstone nodules) in upper portion and reddish brown structured clay subsoil Gently undulating plateau surface	0.12 – 0.5 m/day	Absorption trenches & beds Standard 0.5 m wide; unit length 10 m; spacing 3 m + 2 m envelope	5 L/m^2.day Special design Water balance	1 br: 230 L/day – 92 m trench, 483m^2 2 br: 345 L/day – 138 m trench, 728 m^2 3 br: 460 L/day – 184 m trench, 973 m^2 4 br: 575 L/day – 230 m trench, 1169m^2
			Evapo-Transpiration Absorption – Seepage Trenches & Beds EPA CA 01.2/3 for annual rainfall 750 mm AS/NZS 1547:2000 Annual rainfall is not a factor for sizing in AS/NZS.	5 L/m^2.day Special design Water balance	Customise to local conditions
			Mounds AS/NZS 1547:2000	5 L/m^2.day on mound basal area	Customise to local conditions
			Irrigation Systems AS/NZS 1547:2000 Secondary treated effluent only 2 m envelope	Irrig'n area DIR = 2.86 L/m^2.day but preferably less	1 br: 230 L/day – 169 m^2 2 br: 345 L/day – 225 m^2 3 br: 460 L/day – 281 m^2 4 br: 575 L/day – 337 m^2
			Irrigation Systems MAV Model for Sensitive Sites Secondary treated effluent only		MAV Spreadsheet; Parameters: Crop N Uptake 150 kg/ha; Crop P Uptake 40 kg/ha; P sorption 400 mg/kg soil; Bulk Density 1.5 c/cm^3; Depth of soil allowing for rock 2.0 m

Table 3.1 Management for vacant allotments - Continued					
Soil Category	Soil, Geology & Topography	Indicative permeability (Ksat)	Waste water management system	Design Loading rate	Area required for waste water management system
6a	Deep duplex soils with tight clay subsoils, buckshot at interface between topsoil and subsoil, prone to perched watertables, Klp [Casterton land system] Subsoil clay may be sodic and dispersive. Permeability will be very low, close to 0.06 m/day. Gently to moderately sloping surfaces.	0.06 – 0.5 m/day	Absorption trenches & beds Standard 0.5 m wide; unit length 10 m; spacing 3 m + 2 m envelope	4 L/m^2.day Special design Water balance	1 br: 230 L/day – 115 m trench, 630 m^2 2 br: 345 L/day – 173 m trench, 875 m^2 3 br: 460 L/day – 230 m trench, 1169 m^2 4 br: 575 L/day – 288 m trench, 1463m^2
			Evapo-Transpiration Absorption – Seepage Trenches & Beds EPA CA 01.2/3 for annual rainfall 750 mm AS/NZS 1547:2000 Annual rainfall is not a factor for sizing in AS/NZS.	5 L/m^2.day Special design Water balance	Customise to local conditions
			Mounds AS/NZS 1547:2000	5 L/m^2.day on mound basal area	Customise to local conditions
			Irrigation Systems AS/NZS 1547:2000 Secondary treated effluent only 2 m envelope	Irrig'n area DIR = 2.14L/m^2.day but preferably less	1 br: 230 L/day – 206 m^2 2 br: 345 L/day – 282 m^2 3 br: 460 L/day – 357 m^2 4 br: 575 L/day – 432 m^2
			Irrigation Systems MAV Model for Sensitive Sites Secondary treated effluent only		MAV Spreadsheet; Parameters: Crop N Uptake 150 kg/ha; Crop P Uptake 40 kg/ha; P sorption 400 mg/kg soil; Bulk Density 1.5 c/cm^3; Depth of soil allowing for rock 2.0 m

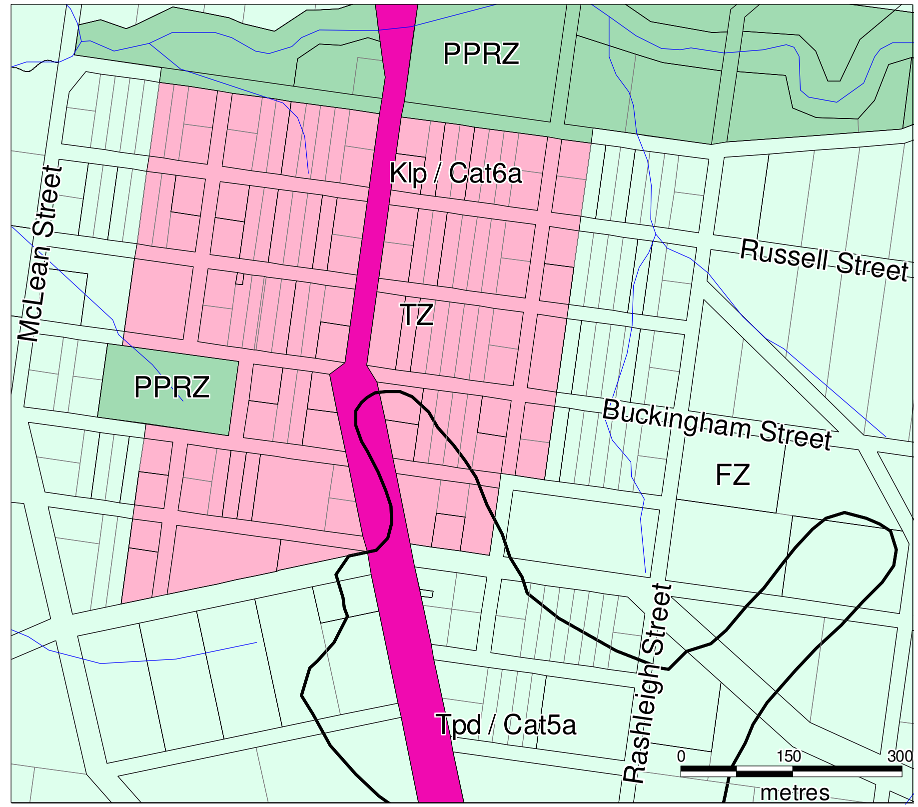
Table 3.2 Management for existing allotments

Soil Category	Soil, Geology & Topography	Indicative permeability (Ksat)	Waste water management system	Design Loading rate	Area required for waste water management system
5a	Laterite and ferruginous sandstone, sand, clays and ironstone, Tpd [Dundas land system] Shallow soil profile with large amount of buckshot (ironstone nodules) in upper portion and reddish brown structured clay subsoil Gently undulating plateau surface	0.12 – 0.5 m/day	Absorption trenches & beds Standard 0.5 m wide; unit length 10 m; spacing 3 m + 2 m envelope		Reduce wastewater generation by water saving appliances and fixtures; consider installing pressurised effluent distribution and/or aerated wastewater treatment system
			Evapo-Transpiration Absorption – Seepage Trenches & Beds EPA CA 01.2/3 for annual rainfall 750 mm AS/NZS 1547:2000 Annual rainfall is not a factor for sizing in AS/NZS.		As above
			Mounds AS/NZS 1547:2000		Customise to local conditions
			Irrigation Systems AS/NZS 1547:2000 Secondary treated effluent only 2 m envelope	Irrig'n area DIR = 2.86 L/m^2.day but preferably less	Extend irrigation area where possible; reduce wastewater generation by water saving appliances and fixtures
			Irrigation Systems MAV Model for Sensitive Sites Secondary treated effluent only		

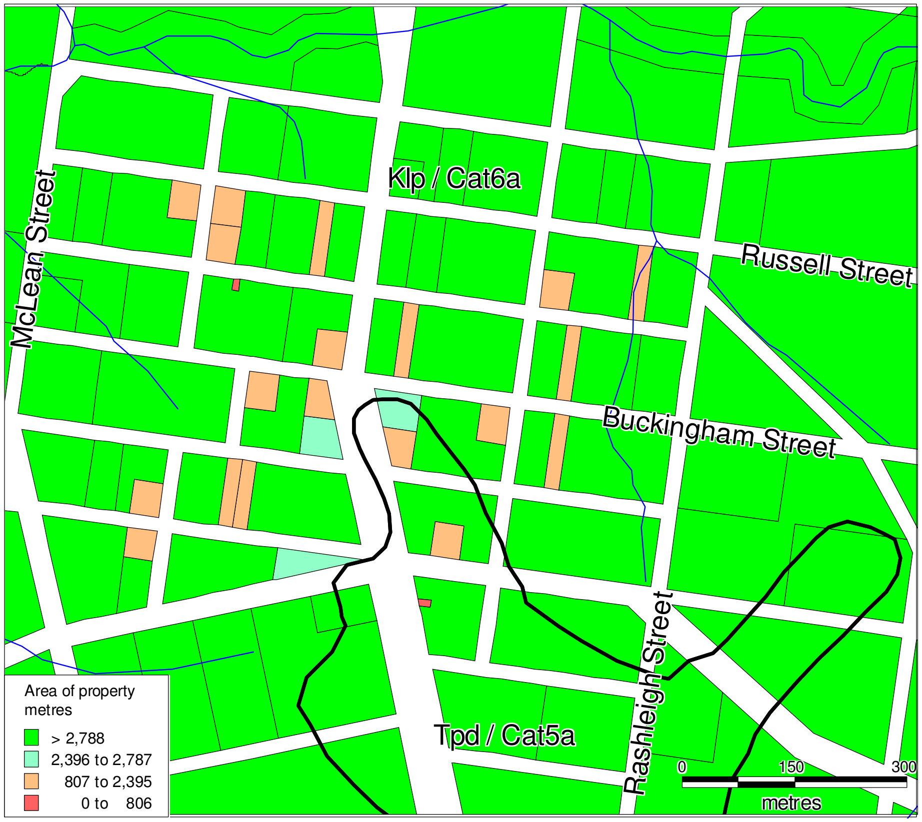
Table 3.2 Management for existing allotments - Continued

Soil Category	Soil, Geology & Topography	Indicative permeability (Ksat)	Waste water management system	Design Loading rate	Area required for waste water management system
6a	Deep duplex soils with tight clay subsoils, buckshot at interface between topsoil and subsoil, prone to perched water tables, Klp [Casterton land system] Subsoil clay may be sodic and dispersive. Permeability will be very low, close to 0.06 m/day. Gently to moderately sloping surfaces.	0.06 – 0.5 m/day	Absorption trenches & beds Standard 0.5 m wide; unit length 10 m; spacing 3 m + 2 m envelope		Reduce wastewater generation by water saving appliances and fixtures; consider installing pressurised effluent distribution and/or aerated wastewater treatment system. Apply gypsum to disposal field.
			Evapo-Transpiration Absorption – Seepage Trenches & Beds EPA CA 01.2/3 for annual rainfall 750 mm AS/NZS 1547:2000 Annual rainfall is not a factor for sizing in AS/NZS.		As above
			Mounds AS/NZS 1547:2000		Customise to local conditions
			Irrigation Systems AS/NZS 1547:2000 Secondary treated effluent only 2 m envelope	Irrig'n area DIR = 2.14 L/m^2.day but preferably less	Extend irrigation area where possible; reduce wastewater generation by water saving appliances and fixtures
			Irrigation Systems MAV Model for Sensitive Sites Secondary treated effluent only		

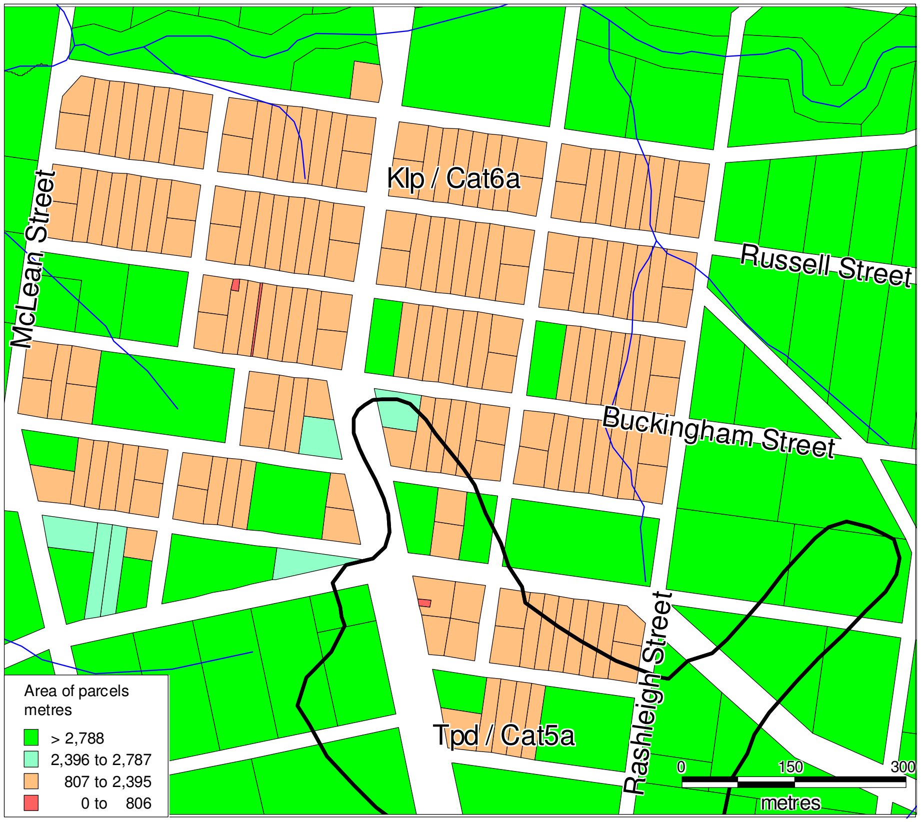
Map 1: Air photo of Digby overlayed with 5m contours. Soils are Tpd and Klp geology (AS/NZS category 5a and category 6a soils)



Map 2: Planning zones in the area are the Township Zone (TZ), Farming Zone (FZ) and Public Park and Recreation Zone (PPRZ).



Map 11: Legend classes are sensitive to soil category area requirements for a 3 bedroom home.



Map 12: Legend classes are sensitive to soil category area requirements for a 3 bedroom home.

Soil and technology	**In map 11 and map 12, closer scrutiny is required on blocks shaded:**
5a: Trench (existing)	Pink, orange, light green
6a: Trench (existing)	Pink, orange, light green, some dark green
5a:Trench (new)	Pink, orange

Soil and technology	**In map 11 and map 12, closer scrutiny is required on blocks shaded:**
6a:Trench (new)	Pink, orange, light green
5a: Irrigation	Pink
6a: Irrigation	Pink