Malvern/Ellesmere Area Plans – 5 Waters Review

1 Executive Summary

Opus International Consultants (Opus) was commissioned by the Selwyn District Council (SDC) Planning team to determine the issues, opportunities and constraints posed by the 5 Waters infrastructure across 22 townships, development areas and settlements with the Selwyn District. In order to understand the current issues, constraints and opportunities for potential growth, a review of the latest versions of the Asset Management Plans (AMP) (January 2015) and other documents relevant to the settlement was undertaken. The output from this review is a table of assessment results for each settlement, identifying issues and constraints for each of the 5 waters. These results have been scored, using a traffic light style system, to highlight which are the key constraints to growth for the settlement in relation to the 5 Waters infrastructure only. Based on these assessment results, an overall analysis of which settlements are most suitable for growth in the Malvern and Ellesmere Wards has been conducted.

In terms of the alpine settlements (Arthurs Pass, Bealey Spur, Grassmere, Castle Hill and Lake Coleridge), Castle Hill is the preferred and most likely location for growth. Based on the SDC 5 Waters infrastructure, growth may be possible in Arthurs Pass and Lake Coleridge, however these townships have greater constraints to overcome for growth. In general, the remote location and alpine environment of these townships not only increases operation and maintenance costs and makes access for service difficult, but also makes significant growth less likely.

Amongst the Malvern Ward settlements in or close to the foothills, the townships of Springfield, Sheffield and Waddington are currently the least suitable for growth and are unlikely to be able to sustain any significant growth in the future. However of these three, there is the possibility that Springfield will have some growth capacity but this is dependent on if the water supply resource consent currently applied for is approved. Hororata also has significant water supply constraints. Of the other settlements, Coalgate is the most suited for growth. While Coalgate is subject to the same major constraints relating to water supply as Glentunnel and Whitecliffs, it is a preferred growth location due to the large areas of land within the township which appear to be subdivided and covered by existing services, but which are not yet utilised.

Darfield and Kirwee both have constraints to growth, however these constraints are resolvable with planning and infrastructure upgrades. Due to their location (reasonably close to Christchurch), these settlements are more suited to significant growth than many other settlements in the Ellesmere and Malvern wards and therefore the upgrades required to accommodate this growth may be deemed more worthwhile by SDC.

Of the settlements west of the Selwyn River, Dunsandel is more suited to growth than those located closer to the coast (Leeston, Doyleston and Southbridge). Dunsandel only has a minor constraint relating to water supply, whereas Leeston, Doyleston and Southbridge have medium constraints relating to the interlinked stormwater, land drainage and wastewater systems. In addition, future considerations such as climate cycles and trends and any impact of the Central Plains Water

Irrigation Scheme (CPW) are likely to exacerbate existing issues in these townships, making them more complex and difficult to resolve. Because of this, these three townships are less desirable as growth areas than those further inland with constraints which are easier to mitigate.

Settlement growth mapping has been produced for all the townships and settlements. As part of the constraint assessment, each settlement was also analysed to assess locations where growth was suitable or not based on the presence of the 5 Waters infrastructure and any constraints. The settlement growth maps display this analysis, but do not display the specific settlement constraint (none, minor, medium or major) as often these constraints are not site specific. The aim of the settlement growth mapping is to assist in informing future growth analyses for each township, however, it is based only on suitability in accordance with the 5 Waters infrastructure analysis and has not taken into account the multitude of other parameters which SDC need to consider when deciding where growth for the district is most suited.

2 Introduction

Opus was commissioned by the SDC Planning team to determine the issues, opportunities and constraints posed by the 5 Waters infrastructure across seventeen townships, four existing development areas and one other settlement within the District.

The works are to help provide context to future stages of the development of the Area Plans for the Malvern and Ellesmere Wards of the District, which are looking to set and manage the growth needs for the settlements out to 2031. These works involve the identification of infrastructure servicing constraints that may influence the viability for future growth of these settlements, in advance of open community consultations on how these Wards should grow in light of the Resource Management Act 1991 (RMA) requirements to:

- Ensure sustainable management of the area's natural and physical resources;
- Facilitate the integrated planning of council managed 3 waters services;
- Identify opportunities for land development;
- Provide direction for council's acquisition of strategic land areas; and
- Provide a framework for the collection of development contributions.

3 Methodology

Table 1 outlines the seventeen townships, four existing development areas and one other settlement within the District that the 5 Waters review is being conducted on:

Table 1: List of townships, development areas and settlements included in the study

Malvern	**Ellesmere**
Townships	*Townships*
Arthurs Pass	Dunsandel
Castle Hill	Leeston
Lake Coleridge	Doyleston
Springfield	Southbridge
Sheffield	Rakaia Huts
Waddington	
Whitecliffs	
Coalgate	
Glentunnel	
Hororata	
Darfield	
Kirwee	
Existing Development Areas (EDA)	*Existing Development Areas (EDA)*
Bealey Spur	None
Terrace Downs (appendix 21 of DP)	
Grassmere (appendix 22 of DP)	
Greendale	

Malvern	Ellesmere
Other Settlements	*Other Settlements*
None	Taumutu

In order to understand the current issues, constraints and opportunities for potential growth of the settlements in relation to the 5 Waters (water, stormwater, wastewater, water races and land drainage) a review of the latest versions of the AMPs (January 2015) and other documents relevant to the settlement was undertaken. This strategic level review aided in an assessment of the current capacity for growth in each of these settlements by considering:

- Water Resources, Treatment and Supply Network (including water races);
- Wastewater Network and Treatment; and
- Surface Water Management and Flood Risk (including Land Drainage).

Table 2 summarises which of the SDC 5 Waters services each township, EDA and settlement has, as many of the areas are only serviced by one or two of the 5 Waters. It must however, be noted that many of those townships where no SDC 5 Water's scheme has been indicated, do have a private development scheme or individual private supplies/discharge in operation, particularly for water supply and wastewater services (e.g. private bores, septic systems).

The output from this review is a table of assessment results for each settlement based on our analysis, identifying issues and constraints for each of the 5 waters. These results have been scored, using a traffic light style system, to highlight which are the key constraints to growth for the settlement. Based on these assessment results, an overall analysis of which settlements are most suitable for growth in the Malvern and Ellesmere Wards has been conducted.

Settlement growth mapping has been conducted, which provides a high level identification of the suitability of growth locations within each township based purely on the presence of the existing 5 Waters infrastructure. This mapping has not taken into account the multitude of other parameters which SDC need to consider when deciding where growth for the district is most suited. Areas surrounding (or within) the current settlements have been identified as being suitable or least suitable based on the growth assessment results. The settlement growth maps do not display the specific settlement constraint as often these constraints are not site specific.

3.1 Data Review

Data for the growth assessment has been obtained primarily from the following documents:

- SDC 5 Waters AMP Volumes 1 -6, 2015;
- SDC Growth model from the S2031 document, which forms the basis of the AMP's and LTP. Data has been accounted for where possible, such as during the assessment of water supplies for the larger townships;
- Appendix 21 and Appendix 22 of the SDC District Plan – Rural Volume, accessed April 2015;
- Darfield Water Supply Model Report, Opus, July 2013;
- Southbridge Water Supply Model Report, Opus, May 2013;

- Leeston and Doyleston Water Supply Model Report, Opus, June 2013;
- Southbridge Servicing Assessment for Plan Change 34, Opus, April 2013;
- Leeston Wastewater Treatment Plan Review Options Assessment, Opus, February 2015;
- SDC Water Supply Master Planning Water Balance 2015 – February Update (Opus, 2015), which includes data from New Zealand Statistics High Growth Projections from 2013 to 2041;
- SDC 5 Waters GIS data, accessed April 2015;
- Future for Selwyn Baseline Report, Opus, June 2011;
- Climate Change - An analysis of the policy considerations for climate change for the Review of the Canterbury Regional Policy Statement, ECan, February 2007;
- Climate change impacts on Lake Ellesmere (Te Waihora), NIWA, September 2010.

Table 2: Summary of SDC 5 Water's schemes within each township, EDA and settlement

		SDC 5 Waters Scheme				
Ward Name	**Township Name**	**Land Drainage**	**Stormwater**	**Wastewater**	**Water Supply**	**Water Races**
Malvern	Arthurs Pass	Yes	Yes	Yes (partly)	Yes	No
Malvern	Castle Hill	No	Yes	Yes	Yes	No
Malvern	Lake Coleridge	No	Yes	Yes	Yes	No
Malvern	Springfield	No	Yes	No	Yes	Yes (Malvern WR)
Malvern	Sheffield and Waddington	No	No	No	Yes (Sheffield & Waddington)	Yes (Malvern WR)
Malvern	Whitecliffs	No	Yes	No	Yes (Malvern Hills RWS - Hartleys)	No
Malvern	Coalgate	No	No	No	Yes (Malvern Hills RWS - Hartleys)	Yes (Malvern WR)
Malvern	Glentunnel	No	Yes	No	Yes (Malvern Hills RWS - Hartleys)	Yes (Malvern WR)
Malvern	Hororata	Yes	Yes	No (Septage site nearby)	Yes (Hororata Acheron RWS)	Yes (Malvern WR)
Malvern	Darfield	No	Yes	No (Septage site nearby)	Yes	Yes (Malvern WR)
Malvern	Kirwee	No	Yes	No	Yes	Yes (Malvern WR)
Malvern	Bealey Spur	Private Development – No SDC 5 Water's services				
Malvern	Terrace Downs	No	No	No	Yes (Hororata Acheron RWS)	No
Malvern	Grassmere	Private Development – No SDC 5 Water's services				
Malvern	Greendale	No	No	No	Yes (Malvern Hills RWS - Hartleys)	Yes (Malvern WR)
Ellesmere	Dunsandel	No	Yes	No	Yes	Yes (Ellesmere WR)
Ellesmere	Leeston	Yes	Yes	Yes	Yes	No
Ellesmere	Doyleston	Yes	Yes	Yes	Yes	No
Ellesmere	Southbridge	No	Yes	Yes	Yes	Yes (Ellesmere WR)
Ellesmere	Rakaia Huts	No	Yes	No	Yes	No
Ellesmere	Taumutu	Yes	No	No	Yes	No

Note: Where no SDC 5 Water's scheme has been indicated, there is often a private development scheme or individual private supplies/discharge in operation, particularly for water supply and wastewater services (e.g. private bores, septic systems)

4 Assessment Results

4.1 Constraint Scoring Methodology

Constraints on growth for each of the 5 Waters have been assessed based on the scoring system used in Table 3.

Table 3: Constraint Scoring

Constraint Score	Constraint Status	Description
1	No constraint	No constraints for growth within the 2041 timeframe.
2	Minor constraint	Constraints deemed to be minor and resolvable with appropriate planning and infrastructure upgrades.
3	Medium constraint	Constraints deemed to be substantial enough to delay growth but resolvable with significant planning and infrastructure upgrades.
4	Major constraint	Constraints deemed to be significant enough to delay or halt growth and require considerable or complex planning and infrastructure upgrades.

For each township (including settlements and EDAs), each of the SDC 5 Water's was split into the key infrastructure and regulatory components for constraint assessment. A constraint score and comment regarding the details of any possible constraint were detailed for each of these key components. These key components are outlined below:

- Land drainage – network capacity, structures;
- Stormwater – reticulation, pump station, treatment or discharge location, consent;
- Wastewater – reticulation, pump station, wastewater treatment plant (WWTP) or other treatment, consent, discharge;
- Water supply – consent, source, water treatment plant (WTP), pump station, storage, reticulation;
- Water races – network capacity.

This information was then summarised to give an overall constraint (and comment) for each of the applicable 5 Water's supplies. Appendix A consists of tables detailing the constraint assessment for each of the key components for the 5 Water's supplies.

Information regarding the resilience of the service and key risks associated with the system have been taken into consideration in this assessment where information has been available in the documents reviewed.

4.2 General Constraints and Considerations

- Groundwater zone over-allocation – It has been assumed that despite over-allocation of groundwater, ECan would be required to consider applications for new water consents for public water supplies. However, it should be noted that western settlements (inland) may be hard pushed to gain further consents for water abstraction (specifically from groundwater due to depth) and available surface water resources are wholly dependent on climate and often have quite strict water take restrictions already in place. Applications for more water above allocation limits would likely need to be notified due to cumulative effects, however ECan could still recommend granting such consents given policy direction in their regional policy statement and plans. In the case of surface water, minimum flow restrictions would apply in the form of reducing the take to essential need only. Figure 1 displays water sources and treatment requirements for the water supplies within the Selwyn District. This figure clearly displays the demarcation in the Selwyn District between supplies sourced from groundwater and those sourced from surface water.

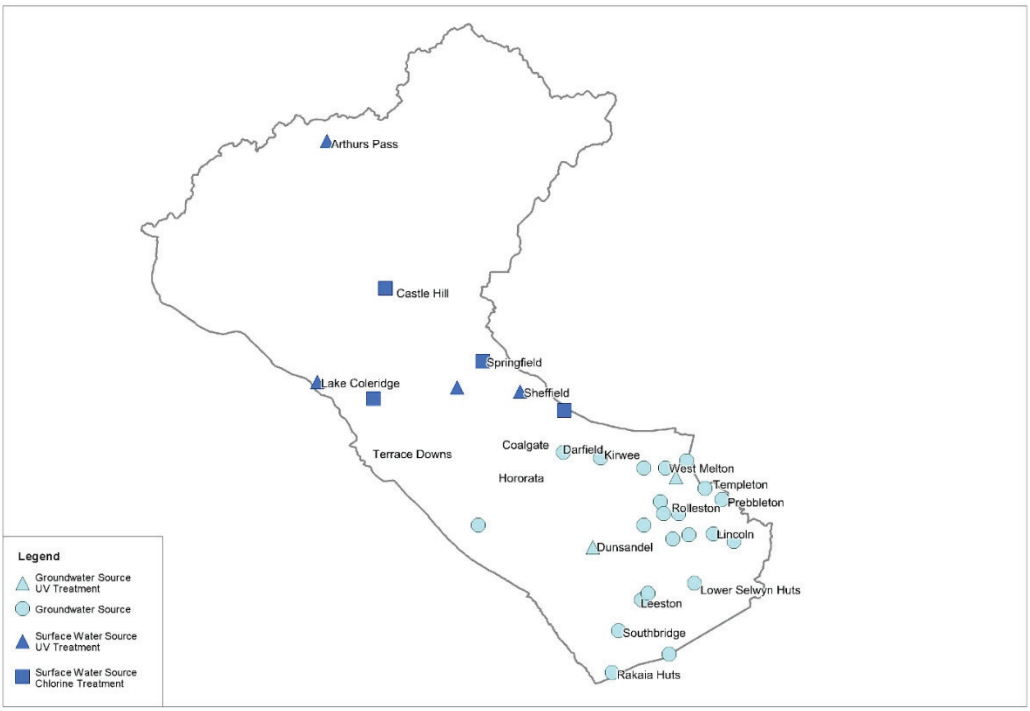

Figure 1: Water Sources and Treatment Requirements with the Selwyn District, figure taken from Future for Selwyn Baseline Report (Opus, June 2011).

- The water supply and wastewater reticulation in the townships may have localised capacity issues, this would need further investigation to identify any upgrades required depending on new supply/treatment/distribution locations.
- Nutrients in groundwater and allocation - Concentrations of nitrate in groundwater are relatively high - higher in the central upper plains area than recorded in deep wells in other parts of Canterbury. This prompted a recent (2012/13) survey of wells in the Darfield-Greendale area by ECan. The survey found that groundwater from several wells had concentrations above 8.4 mg/L (¾ of the Maximum Allowable Value (MAV) for drinking water), particularly in the Darfield-Kirwee area and further up the plain toward Sheffield. The nitrate in groundwater is expected to come from agricultural land use, with the major

land use in this area being crop farming for many years. Septic tanks discharges are also expected to be having a cumulative effect on groundwater nitrate concentrations. Given lag effects, the nitrate concentrations are expected to increase before improving if nutrient reducing regulation and techniques are successful. For community wastewater treatment systems there is a load limit for the Selwyn - Te Waihora catchment in the regional plan (that includes some flexibility for growth) that cannot be exceeded (unless replacing on site domestic systems) and systems need to adopt the best practicable option.

- Private developments such as Terrace Downs Development, Grassmere and Bealey Spur have limited information available and are not contained within the 5 Water's AMPs as SDC currently provide little or no services to these developments. It has been assumed that any growth within these areas will be within the general development area and will be serviced in the same manner as the existing properties.
- The CPW Scheme (refer Figure 2) is currently being constructed and it is possible that this scheme may impact groundwater levels within the Ellesmere Ward. Those townships most likely to be affected are Dunsandel, Leeston, Doyleston, Southbridge and possibly the Rakaia Huts and Taumutu settlements, however the extent of any impact will be unknown until investigations can be conducted once the scheme is operating. These townships all currently experience high groundwater levels (refer Figure 3), especially during large wet weather events.

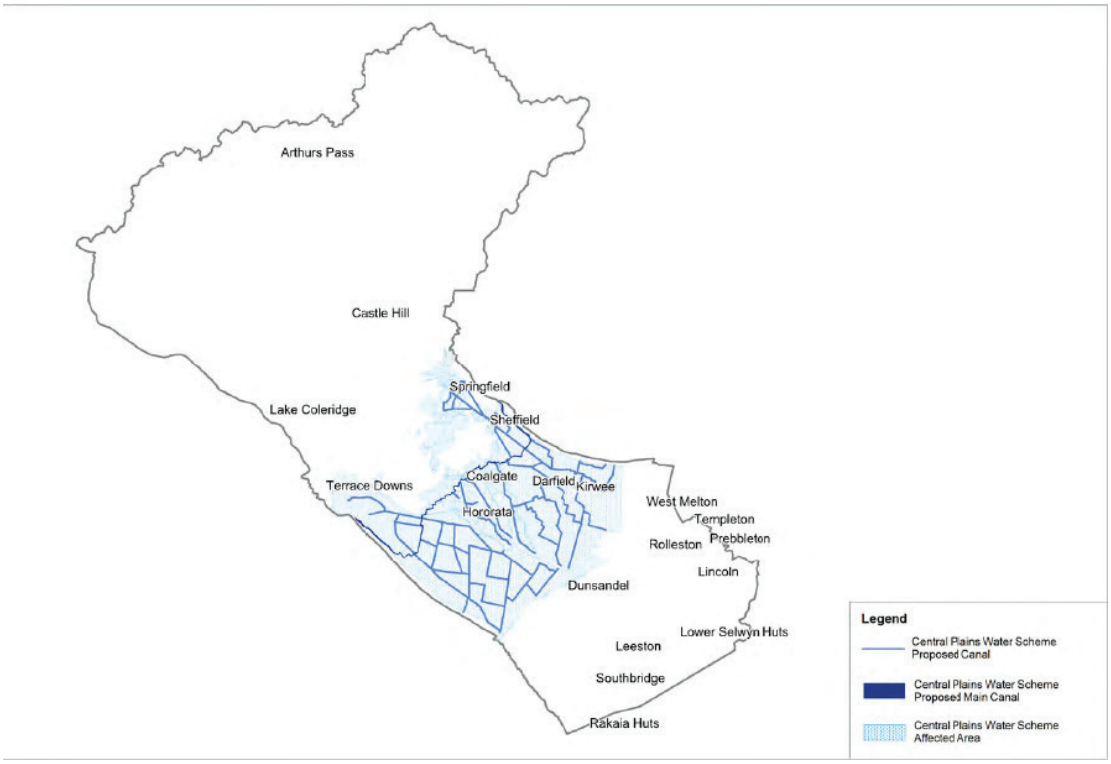

Figure 2: Map of the CPW Scheme, figure taken from Future for Selwyn Baseline Report (Opus, June 2011).

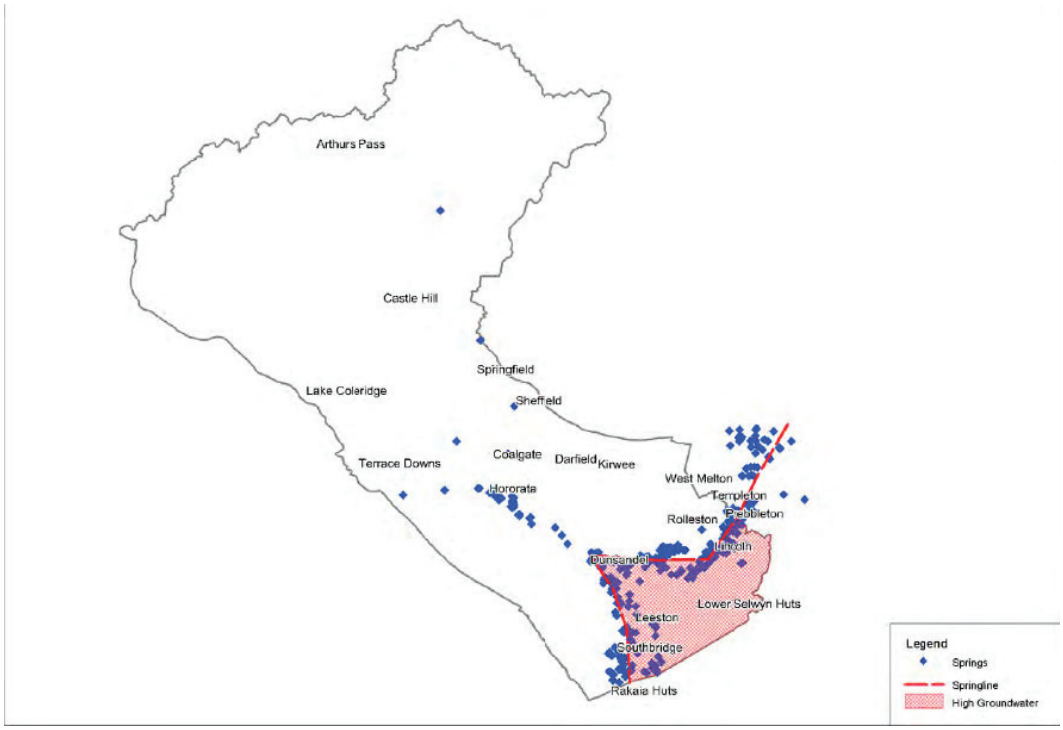

Figure 3: Map of the Selwyn District showing the high groundwater area, figure taken from Future for Selwyn Baseline Report (Opus, June 2011).

4.3 Malvern Area Results

4.3.1 Arthurs Pass

The results of the 5 Waters assessment for Arthurs Pass are displayed in Table 4 and the Settlement Growth Mapping is displayed in Figure 4.

The water supply AMP indicates development in Arthurs Pass is generally constrained by the location of the township within a National Park, so longer-term planning for growth related capacity upgrades is not necessary. However, consideration of the impact of growth on the 5 Water's networks has still been undertaken as Arthurs Pass has high tourist numbers as well as the permanent residential population.

Table 4: Arthurs Pass 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Current peak day and annual demand exceed resource consent capacity despite the full number of allocated connections not yet in use. The treatment system is the primary capacity constraint but upgrades planned for treatment plant and new reservoirs by 2017. Additional upgrades will be required to gain compliance with DWSNZ and fire flow requirements. Location makes access for service difficult.	Locate within or close to areas currently serviced
Wastewater	**No constraint**	Most of township is on septic tanks. A small area to the south is reticulated with septic tank discharge to a small WWTP and sand soakage. This treatment facility is underutilised (and well below consent capacity) even during peak periods. Location makes access for service difficult.	Development in the south near Sunshine Terrace will allow connection to the existing treatment and sand soakage disposal. Elsewhere will require own septic tank.
Stormwater	**Minor constraint**	The soakage trench which the main car parks in town discharge to, has capacity issues during large rain events (flooding also reported elsewhere in town during heavy rainfall). Any new development will require its own stormwater system with soakage to land/streams/river or will require current stormwater disposal methods to be reviewed. Location makes access for service difficult.	Growth in the centre of town would need to consider the risk of flooding.
Water Races	**No constraint**	No water races network in the township.	N/A

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Land Drainage	**No constraint**	Risk of river flooding in the northern end of town, stopbanks and river training are maintained in this area to mitigate this risk.	Avoid the northern part of town to reduce risk from river flooding. Southern part of town has greater protection due to railway embankment.

The main constraint on future growth for the Arthurs Pass township is its remote location within a National Park, which makes growth unlikely and also makes operation and maintenance (O&M) on the 5 Water's schemes difficult and costly. While regular O&M is difficult and costly, the alpine environment also means during extreme weather events, any emergency response by SDC to 5 Water's service issues may be delayed due to limited accessibility.

Planned upgrades to the water supply scheme are likely to help mitigate some of the minor constraints on this supply, including compliance with Drinking Water Standards NZ (DWSNZ) and fire flow requirements, although additional upgrades may be required in the network to gain full fire flow compliance. Resource consent renewal is planned for within the next 10 years as peak day and annual demand exceeds consent capacity. Limitations on growth with regard to the wastewater and stormwater network are mitigated if any new development installs their own stormwater system and wastewater disposal system. Connection into the existing wastewater treatment system at the southern end of town may be possible but would require careful consideration of the original design. The existing system was designed for a high number of people per property (during peak periods) from a small number of properties. Connecting any new properties to this system may require upgrade of the existing infrastructure.

Growth is severely limited by the National Park boundaries and other Department of Conservation (DOC) park areas, with all available land outside of these areas appearing to be developed already. Any growth would therefore need to be infill or re-development of existing sites. It is recommended that any proposed growth be located at the south end of the township where there is greater protection from river flooding. Any new development in the centre of town will need to consider stormwater discharge location, as the existing soakage trench adjacent to the DOC building and toilet parking lot (to which the centre of town discharges to) is currently at capacity and will require upgrading if further catchment is drained to this system.

4.3.2 Bealey Spur (EDA)

No information has been found in any of the 5 Water's AMPs on the EDA of Bealey Spur. Aerial photos of the development indicate this is a small settlement with approximately 30 subdivided lots with no 5 Water's services supplied by SDC, refer Figure 5.

The existing development is bound by State Highway 73, Bruce Stream and surrounding forestry. Any additional development would require significant work to clear land and extend the road.

It has been assumed that any additional growth at Bealey Spur will be an extension of the existing development with no 5 Water's services supplied by SDC.

4.3.3 Grassmere (EDA)

There is limited data on this development area in Appendix 22 of the District Plan. Review of Appendix 22 along with investigation into GIS data indicates that this is a small settlement with maximum 16 residential subdivided lots, plus additional space for tourist accommodation, refer Figure 6. There are currently no SDC services so it is assumed that all required services such as water supply and wastewater disposal are privately serviced. Appendix 22 specifies that growth is acceptable in defined areas only, the grassland area and Mt Romulus are restricted from being developed.

Due to the restrictions outlined in Appendix 22 it has been assumed that any additional growth at Grassmere will be within the existing development currently serviced privately and there will be no 5 Water's services supplied by SDC.

4.3.4 Castle Hill

The results of the 5 Waters assessment for Castle Hill are displayed in Table 5 and the Settlement Growth Mapping is displayed in Figure 7.

The AMP's for Castle Hill Village indicate that this village has not developed to the extent anticipated when the original development and the 5 Water's services infrastructure were constructed. In addition, the New Zealand Statistics High Growth Projections from 2013 to 2041 (2.9% pa) (Statistics NZ), projected population growth predicts no increase in population to 2041. Therefore, the current water, wastewater and stormwater infrastructure can generally accommodate additional growth up to that based on the original design data for full development.

Table 5: Castle Hill 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Treatment plant requires upgrade to fully comply with Health Act and DWSNZ upgrades budgeted in 2015-25 LTP. Location makes access for service difficult.	Locate any growth within currently serviced area which is not fully developed
Wastewater	**No constraint**	No constraints as wastewater scheme designed for full development of town and currently town is not fully developed. Location makes access for service difficult.	Locate any growth within currently serviced area which is not fully developed
Stormwater	**No constraint**	No constraints as assumed the stormwater system is designed for full development of town and currently town is not fully developed. Location makes access for service difficult.	Locate any growth within currently serviced area which is not fully developed
Water Races	**No constraint**	No water races network in the township.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main limitation on growth within the Castle Hill Village appears to be its remote location, this and its alpine environment also make O&M on the 5 Water's schemes difficult and costly. While regular O&M is difficult and costly, the alpine environment also means during extreme weather

events any emergency response by SDC to 5 Water's service issues may be delayed due to limited accessibility. The water, stormwater and wastewater infrastructure has all been designed and built to accommodate full development of the original village design, therefore significant growth in the village can still be accommodated via the existing infrastructure. The water treatment plant requires upgrading to comply with DWSNZ (upgrades budgeted for in 2015-25 LTP) and due to the water source being unprotected surface water from the Thomas Stream (of variable water quality), this may prove difficult to fully comply. The treatment upgrade is currently limited by the fact that there is no power supply to the water treatment and storage location.

Any growth should be located within the currently serviced area in the village, which is not yet fully developed. Castle Hill is the main SDC township in the alpine environment that has capacity for growth.

4.3.5 Lake Coleridge

The results of the 5 Waters assessment for Lake Coleridge are displayed in Table 6 and the Settlement Growth Mapping is displayed in Figure 8.

Table 6: Lake Coleridge 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Renewal of UV treatment to comply with Health Act and DWSNZ is currently budgeted in 2015-25 LTP. Physical distance and remote nature of plant increases operation and maintenance costs and makes access for service difficult.	Locate within or close to areas currently serviced.
Wastewater	**No constraint**	In general, this scheme is underutilised as the occupancy rate within houses that scheme serves is low. Even peak periods well within consented limits. Physical distance and remote nature of plant increases operation and maintenance costs and makes access for service difficult.	Locate within or close to areas currently serviced, the new pipework to east of town near Acheron Ave would be best reticulation to connect into without having to build new pipework.
Stormwater	**Minor constraint**	Small stormwater network which discharges to land or surface water. Ground conditions around Ryton Place found to be poor for discharge to land. Constraint level updated from No to Minor after discussion with SDC.	Anywhere but worth investigating land for ground conditions.
Water Races	**No constraint**	No water race network in the township.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

Lake Coleridge is predominantly comprised of holiday houses and not full time residents, it is in a relatively remote location and is expected to have limited growth. There are minor constraints to growth related to the 5 Water's services in Lake Coleridge, the main constraint is the upgrade of the water supply treatment facility. This upgrade is currently budgeted for in the 2015-2025 LTP. Provision for emergency storage is also required. The remote location however does also makes

O&M on the 5 Water's schemes difficult and costly and the alpine environment also means during extreme weather events any emergency response by SDC to 5 Water's service issues may be delayed due to limited accessibility.

Based on the existing infrastructure, the preferred growth location is to the east of the township, within or close to the currently serviced (wastewater and water) area. There also appears to be some un-utilised land on Kowhai Drive close to services. Ground investigations may be necessary to confirm that growth areas are suitable for stormwater discharge to land.

4.3.6 Terrace Downs (EDA)

There is limited data on this development area in Appendix 21 of the District Plan. Review of Appendix 21 along with investigation into GIS data indicates that The Terrace Downs High Country Resort is a tourist development, built around a golf course and other recreational facilities (or provision for these in the future), refer Figure 9. Appendix 21 clearly outlines restrictions on the number of, location of and types of facilities and dwellings able to be built on the site.

In terms of SDC's 5 Waters, the development is only serviced by a rural water supply. The development has a private wastewater system with treatment and then discharge to land.

The Terrace Downs development is supplied by the Hororata Acheron RWS, from a surface water intake at the Dry Acheron Stream, this is a restricted supply. This scheme also supplies the Tui Creek development, which is adjacent to Terrace Downs on its southern boundary, and other rural connections. The supply peak day demand is approaching the consented capacity. Further investigation and analysis would be required to confirm adequacy of source and distribution capacity if the scheme area or number of connections were to be expanded. The Terrace Downs development is not yet fully utilised, however it has been indicated that there is an old agreement between SDC and the Terrace Downs development (from when this development was built) that this development is to receive supply of a set amount of water. It has therefore been assumed that the Terrace Downs development currently receives the full amount of water as agreed, and that additional utilisation within the development will be accommodated within this current amount.

Growth for this development is restricted to certain locations within the existing development based on Appendix 21 and it is assumed all growth will be within these currently serviced areas.

Growth in region outside of the Terrace Downs High Country Resort will need to be restricted until further investigation and analysis is conducted to confirm the adequacy of the source and distribution capacity for expansion.

4.3.7 Whitecliffs

The results of the 5 Waters assessment for Whitecliffs are displayed in Table 7 and the Settlement Growth Mapping is displayed in Figure 10.

Table 7: Whitecliffs 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Medium constraint**	Source is shallow well at MHRWS Hartleys. Demand is below abstraction and consented capacity so some growth available but after that is reached unsure if water supplies sufficient to allow additional abstraction. Upgrade of treatment to comply with Health Act is currently underway.	Locate within or close to areas currently serviced
Wastewater	**No constraint**	No SDC wastewater network in the township, growth will need to be serviced privately.	N/A
Stormwater	**Minor constraint**	Capacity of current drain network during wet weather does not appear to be sufficient for the upper catchment, resulting in localised and minor flooding in the town. Upgrade of existing system or flood diversion required to resolve issue, along with appropriate discharge consents.	No restrictions on growth, drainage upgrades will likely mitigate any issues.
Water Races	**No constraint**	No water race network in the township.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main limitation on growth within the Whitecliffs township is the water supply, which is supplied from the Malvern Hills Rural Water Scheme (MHRWS) Southern supply area, sourced from the Hartleys Road intake. While the current supply (abstraction and consented capacity) is able to accommodate some growth, there may be constraints on any increase in abstraction in the future as the source is a shallow well adjacent to the Selwyn River and might have water take restrictions applied to it in the future. Upgrades to source treatment is underway.

The current stormwater issues are due to runoff from the upper catchment (hills) behind the town being conveyed through town before discharging to the Selwyn River. Work is required with the community to agree a way forward to mitigating this issue and will likely involve drainage upgrades along with appropriate discharge consents, especially in the event that the township was to grow.

Any growth should be located within or close to the areas currently serviced by the water supply network in the township, to reduce the requirement for new reticulation. There appear to be sections currently within the township which have been subdivided but not yet developed, it is recommended that development of these sites occur first.

4.3.8 Glentunnel

The results of the 5 Waters assessment for Glentunnel are displayed in Table 8 and the Settlement Growth Mapping is displayed in Figure 11.

Table 8: Glentunnel 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Medium constraint**	Source is shallow well at MHRWS Hartleys. Demand is below abstraction and consented capacity so some growth available but after that is reached unsure if water supplies sufficient to allow additional abstraction. Upgrade of treatment required to comply with Health Act is currently underway.	Locate within or close to areas currently serviced
Wastewater	**No constraint**	No SDC wastewater network in the township, growth will need to be serviced privately.	N/A
Stormwater	**No constraint**	Small reticulated and swaled network discharging to Surveyors Gully or the Selwyn River, no known issues identified but no current consent	Locate within or close to areas currently serviced
Water Races	**No constraint**	Water races located to the south of township, with no reported impact of water race on the town or other 5 Water's schemes.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main limitation on growth within the Glentunnel township is the water supply, which is supplied from the MHRWS Southern supply area, sourced from the Hartleys Road intake. The issues and restrictions for the Glentunnel water supply are the same as for Whitecliffs (and Coalgate), with the main constraint being a required upgrade of the treatment system and reticulation network.

Any growth should be located within or close to the areas currently serviced by the water supply network in the township, to reduce the requirement for new reticulation. It must also be noted during considerations regarding growth that the MHRWS is a restricted supply. The southern part of town has a school, campground and golf course so is limited in the development available in this area.

4.3.9 Coalgate

The results of the 5 Waters assessment for Coalgate are displayed in Table 9 and the Settlement Growth Mapping is displayed in Figure 11.

Table 9: Coalgate 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Medium constraint**	Source is shallow well at MHRWS Hartleys. Demand is below abstraction and consented capacity so some growth available but after that is reached unsure if water supplies sufficient to allow additional abstraction. Upgrade of treatment is underway.	Locate within or close to areas currently serviced
Wastewater	**No constraint**	No SDC wastewater network in the township, growth will need to be serviced privately.	N/A
Stormwater	**No constraint**	No SDC stormwater network in the township, growth will need to be serviced privately.	N/A
Water Races	**No constraint**	Water races located to the south of township, with no reported impact of water race on the town or other 5 Water's schemes.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main limitation on growth within the Coalgate township is the water supply, which is supplied from the MHRWS Southern supply area, sourced from the Hartleys Road intake. The issues and restrictions for the Coalgate water supply are the same as for Whitecliffs (and Glentunnel), with the main constraint being a required upgrade of the treatment system and reticulation network.

Any growth should be located within or close to the areas currently serviced by the water supply network in the township, to reduce the requirement for new reticulation. There appear to be quite a large number of sections currently within the township which have been subdivided but not yet developed, it is recommended that development of these sites occur first. It must also be noted during considerations regarding growth that the MHRWS is a restricted supply.

4.3.10 Greendale (EDA)

There is limited data on this development area, GIS data shows two small settlements (approximately 1.5km between them) with approximately 26 smaller residential properties surrounded by farmland, refer Figure 12. The properties are serviced by the MHRWS, Hartleys Road intake, which is the scheme that supplies the townships of Coalgate, Glentunnel and Whitecliffs, refer to these sections for more detailed information about the general constraints on this supply. The MHRWS is a restricted water supply and was designed specifically for a defined area, as Greendale is at the very bottom end of the reticulation for this scheme there may be some difficulty getting sufficient flow out of the existing network at this point for any significant growth. However, an alternative to the existing supply is either a new community bore or individual private bores to provide a second source of water. The location of Greendale is such that good quality and quantity water should be available. Therefore the water supply is deemed to be a minor constraint to growth.

It is assumed that any growth in this area will be serviced via a privately wastewater system and there will be no additional 5 Water's services (other than the existing water supply) supplied by SDC.

Any growth should be located within or close to the areas currently serviced by the water supply network in these settlement areas.

4.3.11 Hororata

The results of the 5 Waters assessment for Hororata are displayed in Table 10 and the Settlement Growth Mapping is displayed in Figure 13.

Table 10: Hororata 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Major constraint**	Shallow water source as part of the Hororata Acheron RWS with demand at consented capacity. Consented water take would require amendment for growth, however SDC indicate there is limited water available. Major upgrades to treatment are planned for the near future.	Locate within or close to areas currently serviced
Wastewater	**Minor constraint**	Currently septage disposal sites have plenty of consented capacity but consent expires 2016 and likely issues with continued use of these sites. Alternative options for community disposal should be found or disposal to SDC Pines or CCC Bromley site may be required at a higher cost.	No restrictions on growth location as wastewater not reticulated, septic tanks used.
Stormwater	**Minor constraint**	Flooding issues due to flows from upper catchment (including abandoned water races) and natural springs after rain. Plans to develop a Master Plan to investigate improving flood flow capacity.	Growth in the north-west of town (north of Cordys Road and west of Hororata Road) with discharge direct to Hororata River, similarly the area south of Bealey Road if discharge is to the Hororata River and not to the road.
Water Races	**No constraint**	Abandoned water races.	N/A
Land Drainage	**No constraint**	Hororata River Drainage scheme, no known issues with the river	N/A

The main limitation on growth within the Hororata township is the water supply, which is supplied from the Hororata Acheron Rural Water Scheme (Hororata Acheron RWS) Hororata supply, sourced from the shallow well adjacent to the Selwyn River. The current supply is at the consented capacity (but the abstraction capacity is much larger) and therefore the consented water take would require an amendment to accommodate growth. There is no data in the AMP's to indicate if the water supply is sufficient to allow additional abstraction but further input from SDC indicates that Hororata has very limited water available to it. Further investigation may also be required to assess

adequacy of distribution capacity for growth. Major upgrades to water treatment are required and planned for in the near future.

The wastewater and stormwater networks also provide minor constraints to growth within Hororata, however these are deemed to be easily resolvable or able to be avoided via preferred growth locations.

Any growth should be located in areas that are not close to or are required to contribute flow to the existing stormwater network, but rather discharge to the Hororata River or to land. Preferred areas for growth therefore north-west of town (north of Cordys Road and west of Hororata Road) with discharge direct to Hororata River, or similarly the area south of Bealey Road if discharge is to the Hororata River and not to the road.

4.3.12 Springfield

The results of the 5 Waters assessment for Springfield are displayed in Table 11 and the Settlement Growth Mapping is displayed in Figure 14.

Table 11: Springfield 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Medium constraint**	Water supplied from a shallow well located adjacent to the Kowai River which has water restrictions when low. New consent recently granted. Major capacity upgrades required to accommodate growth	Locate within or close to areas currently serviced.
Wastewater	**No constraint**	No SDC wastewater network in the township, growth will need to be serviced privately.	N/A
Stormwater	**No constraint**	Stormwater consists of small number of swales to soakholes, no known issues. Growth will need to be serviced privately or new soakholes installed.	Anywhere
Water Races	**No constraint**	Malvern Water Races run through town.	No restrictions on growth areas.
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The Springfield water supply is sourced from a shallow well located adjacent to the Kowai River, which has water restrictions when river levels are low. A new consent has been recently granted. Capital upgrades will also be required to accommodate growth, including treatment plant upgrades, which are budgeted in the LTP. Due to the likelihood of continuing issues in the future with availability of water for this supply, it is unlikely that the Springfield township would be able to sustain significant growth in the future.

If growth was possible for Springfield, the preferred location would be within or close to the existing serviced area. Growth in the area to the west and south-west of town would require extension of the reticulation to service this growth.

4.3.13 Sheffield and Waddington

The results of the 5 Waters assessment for Sheffield are displayed in Table 12 and the Settlement Growth Mapping is displayed in Figure 15.

Table 12: Sheffield and Waddington 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Major constraint**	Part of the Sheffield/Waddington supply, with two shallow wells with peak demands over consented and abstraction capacity. New consent applied for in 2000 but not yet granted due to issues with water supply limitations.	Locate within or close to areas currently serviced or closer to existing wells to the south of the township.
Wastewater	**No constraint**	No SDC wastewater network in these townships, growth will need to be serviced privately.	N/A
Stormwater	**No constraint**	No significant stormwater network in the townships.	N/A
Water Races	**No constraint**	Water races located throughout the Sheffield township, with no reported impact of water race on the town or other 5 Water's schemes. No water races in the Waddington township.	N/A
Land Drainage	**No constraint**	No land drainage network in the townships.	N/A

Growth within the Sheffield and Waddington townships is currently completely restricted due to water take consent issues. The Sheffield/Waddington water supply is sourced from two shallow wells located adjacent to the Hawkins River, with peak demands for the supplied over both the consented and abstraction capacities and water restrictions required in summer to manage peak demands. A new water take consent was applied for in 2000 but is still in progress. Until the water supply issues have been resolved no growth is available, and even once resolved, major infrastructure upgrades will be required to accommodate any growth, these include pump upgrades, mains duplication and treatment plant upgrades which are budgeted for in the LTP. Due to the likelihood of continuing issues in the future with availability of water for this supply, it is unlikely that Sheffield and Waddington townships would be able to sustain any significant growth in the future.

If any growth was possible, the preferred location for growth is within or close to the existing service area or close to the existing wells to the south of the township.

4.3.14 Darfield

The results of the 5 Waters assessment for Darfield are displayed in Table 13 and the Settlement Growth Mapping is displayed in Figure 16.

Table 13: Darfield 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Projected populations will require a new well to meet demand by 2022. Some uncertainty regarding quantity of available water.	Locate at north end of scheme near existing bore to utilise pump pressure and reduce upgrades required, or locate near new bore (location yet to be determined).
Wastewater	**Medium constraint**	Currently septage disposal sites have plenty of consented capacity but consent expires 2016 and likely issues with continued use of these sites. Alternative options for community disposal should be found or disposal to other SDC or CCC sites may be required at a higher cost. Due to the size of the township, future growth and infilling may require consideration of the installation of a reticulated wastewater system, which will be a complex and costly exercise. Future private septic systems may also have additional constraints, however the extent of these have not been considered for this assessment.	No current restrictions on growth location as wastewater not reticulated, septic systems used.
Stormwater	**No constraint**	Limited network with no reported issues, a Stormwater Master Plan to be produced to assess how to account for future growth.	Locate within existing development areas not yet fully developed but which are serviced, or new developments construct own stormwater system and treatment.
Water Races	**No constraint**	Multiple water races through township but no impact on stormwater network or flood risk highlighted in AMP.	No restriction as water races located throughout in all areas of township.
Land Drainage	**No constraint**	No land drainage network in the township or adjoining areas.	N/A

The main constraint on future growth for the Darfield township is the wastewater service. While Darfield does not currently have a reticulated wastewater network, on-site septic tanks for properties require septage disposal to one of two SDC owned disposal sites. These sites are consented until September 2016 and while capacity of these sites is not an issue, the continued use of these sites is limited due to other constraints (heavy metal concentrations). Alternative options for community disposal do not appear to have been confirmed, and there is no indication as to if SDC will be able to obtain a new consent or an extension to the existing consent to continue to use these sites past 2016. However, septage disposal to alternative sites, such as the Eastern Selwyn Sewerage Scheme (ESSS) or Christchurch City Council's Bromley site is possible, albeit at a higher cost.

Growth within Darfield may provide the impetus for SDC to install a reticulated wastewater network in the town, however this will be a complex and costly exercise. Continued requirements for properties to install private septic systems may not be feasible if growth via infill (or just growth with smaller lot sizes) is planned, due to the minimum requirements for property boundary and building setbacks and land application areas. However, SDC have indicated that small lot

developments have been granted ECan onsite wastewater discharge consents, although the durations being granted are being limited to 5 years in some cases when the treatment and land application system are not best practice in terms of removing nutrients. Disposal from any future sewage systems (septic systems or reticulated) will need to be within the nitrate load limits for the Selwyn - Te Waihora catchment provided in the regional plan. In addition, the existing septic system results in a risk area for any new water supply wells for potential cumulative micro-biological and nitrate contamination from the combined septic tank effluent plume.

Proposed growth locations should be concentrated around existing areas of development which have not been fully utilised, or be located at the north end of the township near existing water bores to utilise water supply pump pressure and avoid large upgrades of the existing network.

4.3.15 Kirwee

The results of the 5 Waters assessment for Kirwee are displayed in Table 14 and the Settlement Growth Mapping is displayed in Figure 17.

Table 14: Kirwee 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	A newly obtained variation to the existing water take consent provides some room for growth in the short to medium term, however growth related infrastructure upgrades are required to make use of this consent. UV treatment installation is now complete. Long-term growth requirements still to be investigated	Existing bore is located central, locate growth within existing serviced area, close to existing bore or south of town. Or, as any new bore is likely to be located to north to avoid septic tank plume area, develop area to the north-west of town but ensure development outside of upstream clear zone for existing well.
Wastewater	**No constraint**	No SDC wastewater network in the township, growth will need to be serviced privately.	N/A
Stormwater	**No constraint**	There are limited serviced areas in town, the rest would need to be serviced privately or new system installed	Growth within the existing development area to north of township which is semi-serviced, or around Glen Oak drive. Otherwise needs to be serviced privately or new system installed
Water Races	**No constraint**	Water races located throughout township, with no reported impact of water race on the town or other 5 Water's schemes.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main limitation on growth within the Kirwee township is the water supply. Current peak day demand was over the consented capacity and the scheme required the storage reservoir to buffer these peaks. However, SDC have just obtained a water take consent variation (24 July 2015) which increases both the instantaneous flow rate and daily volume for the existing water supply. This variation provides some room for growth in the existing system in the short to medium term,

however long term growth requirements will still need to be investigated and may still require a new bore. The existing abstraction capacity matches that of the consent prior to the variation and therefore capital upgrades to increase the bore capacity may be required to make full use of this new consent. The installation of a new UV treatment unit is now complete.

As the existing bore is located centrally, and any new bore in the future is likely to be located to the north of the township (to avoid any possible risk of contamination from the septic tank effluent plume and reduce the likelihood of requiring treatment), then the preferred location for growth is within existing serviced area and close to the existing bore (infill) or south of it. Growth to the north-west and west of town is possible, but development in this area will need to be outside of the upstream clear zone for the existing well (to reduce the risk of the existing well getting adversely impacted by the septic effluent plume from new development). There are also existing subdivided developments which do not appear to be fully utilised and it is recommended that development of these sites occur first.

4.4 Ellesmere Area Results

4.4.1 Dunsandel

The results of the 5 Waters assessment for Dunsandel are displayed in Table 15 and the Settlement Growth Mapping is displayed in Figure 18.

Table 15: Dunsandel 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Generally capacity is available, but infrastructure upgrades required (and planned) for resilience and to buffer peak flows, this includes additional storage, a generator and an additional source.	Locate within or close to areas currently serviced but preferably not to the north of the original township due to pressure constraints in the network.
Wastewater	**No constraint**	No SDC wastewater network in the township, septic tanks used.	N/A
Stormwater	**No constraint**	The stormwater system consists of small lengths of piped or swale network discharging to ground or via surface water to land drainage network. Flooding issues experienced during moderate events but only in isolated areas (as indicated by SDC).	N/A
Water Races	**No constraint**	Water races located to the north-west, west and south-west of township, with no reported impact of water race on the town or other 5 Water's schemes.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The stormwater AMP indicates that the limited stormwater network experiences minor flooding issues during moderate rainfall events. However, SDC have indicated this occurs only in isolated areas and should not be considered a constraint for future growth.

Other than the limited stormwater network, the preferred growth location within Dunsandel is only dictated by the water supply network. The water supply system constraints are related to the need for infrastructure upgrades required for resilience and to buffer peak flows, this includes additional

storage, a generator and an additional source. These upgrades are already accounted for in the LTP. Based on the water supply, it is recommended therefore that growth be located within or close to areas currently serviced by the water supply network, but preferably not to the north of the original township. Due to the location of the bore to the south of town, the existing network to the north of the original township has pressure constraints.

4.4.2 Doyleston

The results of the 5 Waters assessment for Doyleston are displayed in Table 16 and the Settlement Growth Mapping is displayed in Figure 19.

Doyleston is a township for which any future growth must consider the influence of climatic cycles and trends. The land drainage network through town discharges to Te Waihora/Lake Ellesmere, but also has the township stormwater discharging to it. Climatic cycles and trends are predicted to generally decrease rainfall in the Canterbury region, however heavy rainfall events are predicted to be more frequent and intense. Current issues within the land drainage and stormwater networks which result in flooding in Doyleston are therefore likely to be exacerbated by climatic cycles. The CPW is an extensive irrigation scheme being developed across much of the inland portion of the Selwyn District. This scheme could potentially result in an increase in the already high groundwater levels in the Doyleston area, further exacerbating the groundwater issues and therefore flooding in Doyleston during rainfall events.

Table 16: Doyleston 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Doyleston is supplied by the Leeston bores. Based on projected populations, new wells required (or development of existing wells) in 2015, 2024 and 2034 - Gallipoli #1 well development planned for 2015 as required. Increased storage required and planned in order to meet forecasted peak day demand.	As Doyleston is supplied by Leeston bores, growth would be preferable in the area between Leeston and Doyleston.
Wastewater	**Minor constraint**	Ellesmere STP has a planned upgrade scheduled for completion by 2019, refer to the Leeston section for further details of constraints regarding Ellesmere STP. The Doyleston scheme occasionally reaches the design flow maximum for the current population, therefore it has been assumed that there is minimal capacity available in reticulation and pump stations and upgrades or new network required to service growth	To west of township as flow needs to be conveyed to Ellesmere STP.
Stormwater	**Medium constraint**	Local reticulation and drains are backwater effected by land drainage network (Drain Road North drain and Boggy Creek), due to high flows and high groundwater table in heavy rain and result in flooding issues in the town. Any development will likely require construction of a new stormwater treatment and discharge system or investigate if there is an alternate discharge location. Exacerbation of the issues due to climatic cycles may also constrain future growth.	Land drainage network of concern is located to both the west and east of existing township so there is no specific area which will be less affected by the land drainage/stormwater issues.

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Races	**No constraint**	No water race network in the township.	N/A
Land Drainage	**Medium constraint**	As per stormwater assessment, Drain Road North drain and Boggy Creek have capacity concerns during heavy rains, which results in issues in flooding from the local stormwater network. Exacerbation of the issues due to climatic cycles may also constrain future growth.	Land drainage network of concern is located to both the west and east of existing township so there is no specific area which will be less affected by the land drainage/stormwater issues.

The main constraint on future growth for the Doyleston township is the stormwater and land drainage networks. The township currently experiences flooding issues during heavy rainfall as the local stormwater network discharges to the land drainage network, which is flowing full, resulting in a backwater effect. A high groundwater table in this area adds to this issue. A project to review options for the flooding in Doyleston is planned, which may help resolve or mitigate the flooding issues. Any growth will likely require construction of a new stormwater treatment and discharge system or investigation into if there is an alternate discharge location.

As the land drainage network of concern essentially surrounds the current township (refer Figure 19) there is no specific growth location which would be less affected by the land drainage/stormwater issues. Therefore, the proposed growth location has been determined based on vicinity to the Ellesmere Sewage Treatment Plant (STP) and water supply network (from Leeston), the areas to the west of Doyleston towards Leeston are deemed most suitable.

4.4.3 Leeston

The results of the 5 Waters assessment for Leeston are displayed in Table 17 and the Settlement Growth Mapping is displayed in Figure 20.

Leeston is a township for which any future growth must consider the influence of climatic changes and trends. The 5 Water's networks in this township are heavily interlinked, with the stormwater discharging to the land drainage network, which often runs full during heavy rainfall, resulting in flooding in the township. In addition, infiltration is a major concern in the Leeston wastewater network and during heavy rain events (and associated high groundwater) the wastewater network can become overloaded from this. During these periods, the Ellesmere STP can be required to pump groundwater to the land drainage network to reduce groundwater levels to an extent that it can discharge treated wastewater to land. Similarly to Doyleston, climatic cycles and trends and the CPW scheme are likely to exacerbate the current issues within the land drainage and stormwater networks which results in flooding in Leeston.

Table 17: Leeston 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Based on projected populations, new wells required (or development of existing wells) in 2015, 2024 and 2034 - Gallipoli #1 well development planned for 2015 as required.	Growth location flexible as new wells can be located anywhere due to high quality and quantity water being available anywhere around township.
Wastewater	**Minor constraint**	High levels of infiltration and inflow cause the network and Ellesmere STP to become overloaded in high rainfall events and associated high groundwater periods. Ellesmere STP has a planned upgrade scheduled for completion by 2019, with the first stage of this upgrade already completed. Maximum population of 5125 people within the townships discharging to Ellesmere STP (Leeston/Doyleston/Southbridge) prior to requiring another upgrade[1]. Pump stations and reticulation are likely to require upgrades or new network to service growth.	Area around Ellesmere STP must be avoided to allow for expansion of site, plus mitigate against reverse sensitivity. North-east of town most suitable due to vicinity to Ellesmere STP and Cunningham pump station (which is newest and largest pump station in town) and as the natural grade of the land runs east to west. West of town may also be suitable but more likely to require new pump station to service growth.
Stormwater	**Medium constraint**	Historic flooding in town due to lack of capacity in Leeston Creek which runs through town and into which stormwater discharges, upgrades are underway to help mitigate this issue. Growth can be accommodated if some form of stormwater management is required as part of development and alternative discharge locations are found. Exacerbation of the issues due to climatic cycles may also constrain future growth.	Avoid north-west of town which is serviced by Leeston Creek. North-east of town could discharge to Volckman Road Drain.
Water Races	**No constraint**	No water race network in the township.	N/A
Land Drainage	**Medium constraint**	Land drainage and stormwater interlinked, with issues in Leeston Creek. Exacerbation of the issues due to climatic cycles may also constrain future growth.	Same as for the stormwater network.

The main constraint on future growth for the Leeston township is the interlinking issues between the stormwater, land drainage and wastewater networks. As outlined previously, the township currently experiences flooding issues during heavy rainfall due to the interaction between the local stormwater network and the land drainage network. A high groundwater table during these events also results in high infiltration in the wastewater network resulting in overloading at Ellesmere STP. SDC do have some projects in place to help mitigate some of these issues, both in the wastewater and stormwater networks.

The wastewater treatment facility at Ellesmere STP is currently being expanded in a project scheduled for 2015-2019, with the first stage of this upgrade already completed. The expansion of the treatment facility will allow for growth in the Leeston, Southbridge and Doyleston townships,

[1] Leeston Wastewater Treatment Plant Review Options Assessment Report. Opus, Feb 2015

with a maximum population growth to a total of 5125 people within these three townships before additional upgrade of the facility is required, based on current population projections this is likely to be required by approximately 2033[2]. Upgrades to the local reticulation and/or a new pump station may be required depending on size and location of growth.

A stormwater bypass in the northern part of the township has also been planned, which should reduce flows to the Leeston Creek at the north-west of the town and thereby reduce flooding issues within the township. However, the impact of an increase in the intensity and frequency of heavy rainfall events due to climatic cycles and also any possible changes to groundwater levels from the CPW scheme are likely to result in an increased risk of flooding within the township in the future.

The areas to the north-east of the existing township are deemed most suitable for growth, much of the land identified is already suitably zoned for development. Proposed growth locations have been determined based primarily on:

1. Vicinity to the Ellesmere STP to the south-east but avoiding development too close to Ellesmere STP to allow room for expansion of this site and mitigate the risk of reverse sensitivity.

2. Avoiding current stormwater and land-drainage issues to the north-west of the township.

4.4.4 Southbridge

The results of the 5 Waters assessment for Southbridge are displayed in Table 18 and the Settlement Growth Mapping is displayed in Figure 21.

Like Doyleston and Leeston, Southbridge is a township for which any future growth must consider the influence of climatic cycles and trends. Southbridge suffers from high levels of infiltration during dry weather flow due to high groundwater levels, and the wastewater network from Southbridge discharges to the Ellesmere STP. In addition, the stormwater network to the west of town, which discharges to a creek running through town, currently experiences flooding issues due to the creek being full during heavy rain from flows in the upper catchment and high groundwater. Climatic cycles and trends are predicted to generally decrease rainfall in the Canterbury region, however heavy rainfall events are predicted to be more frequent and intense. Current issues within the land drainage and stormwater networks which results in flooding in Southbridge are likely to be exacerbated by climatic cycles. The CPW scheme could also potentially have an impact on Southbridge.

Table 18: Southbridge 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Based on predicted population projections a new well is required around 2019. Growth will need to allow for upgrades to local reticulation to maintain pressure / flow level of service.	Growth location flexible as new wells can be located anywhere due to high quality and quantity water being available anywhere around township.

[2] Leeston Wastewater Treatment Plant Review Options Assessment Report. Opus, Feb 2015

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Wastewater	**Medium constraint**	Previous assessment of the wastewater system by Opus for Plan Change 34 indicated that considerable upgrades are required to accommodate this growth and/or any additional future growth. The major constraint in the wastewater network is Southbridge Broad St pump station and rising main.	To south and east of township as closer to Broad St pump station.
Stormwater	**Medium constraint**	Stormwater flooding to the west of the township, SDC have indicated this is in isolated areas. Exacerbation of the issues due to climatic cycles and trends may also constrain future growth. Stormwater master planning is currently underway.	To the north, east or south of township with discharge to streams to the south and east of township to avoid exacerbating current flooding issue.
Water Races	**No constraint**	Water races located to the west of township (obsolete races to the north and south), with no reported impact of water race on the town or other 5 Water's schemes.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main constraint on future growth for the Southbridge township is the wastewater network. While the capacity of the existing infrastructure is not yet fully utilised it is fully (or over) allocated. As per Leeston and Doyleston, the Southbridge wastewater network discharges to the Ellesmere STP and is reliant on an upgrade of this facility, the first stage of which has occurred. The main constraint within the Southbridge wastewater network is the Broad Street pump station and this is then the main constraint to growth within Southbridge. An assessment of the wastewater system for Plan Change 34 (PC34)[3] indicated that considerable upgrades are required to accommodate growth for PC34 and/or any additional future growth in the township. Options for the upgrades include providing storage, duplicating the flush pump at Broad Street pump station, reconfiguration of the existing rising main with an intermediate pump station or construction of a new pump station and rising main.

The preferred growth locations for Southbridge have been determined by the wastewater and stormwater networks. The stormwater network currently experiences issues with flooding during heavy rainfall in the west of the township, which the AMP states is due to discharge to the main creek through town, which runs full in heavy rain. SDC have indicated this flooding is only in isolated areas. Based on this it is recommended that growth should avoid this area and be located to enable stormwater discharge to the stream to the south-east of the township (the Lee River, although little is known about the capacity of this stream). The Waikewai Stream to the east of the township however, is a culturally significant watercourse and heavily protected and therefore discharge to this must be avoided. Locating growth to the south and east of the township also ensures that new developments are close to the Broad Street pump station and will reduce any new infrastructure or upgrades required to convey flow to this pump station.

[3] Southbridge Servicing Assessment for Plan Change 34. Opus, April 2013

4.4.5 Rakaia Huts

The results of the 5 Waters assessment for Rakaia Huts are displayed in Table 19 and the Settlement Growth Mapping is displayed in Figure 22.

The water supply AMP states that it was not intended that the Rakaia Huts water supply area be extended beyond the existing subdivision and similarly the Statistics NZ projected population growth to 2041 predicts no increase in population. However, consideration of the impact of growth on the 5 Water's networks has still been undertaken and is detailed below.

Table 19: Rakaia Huts 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	The water supply was developed with sufficient capacity to serve the subdivision and demand is well below abstraction and consented capacity but unsure if distribution capacity enough to allow growth beyond subdivision.	Locate within or close to areas currently serviced
Wastewater	**No constraint**	No SDC wastewater network in the township, septic tanks used.	N/A
Stormwater	**Medium constraint**	Only part of the village is currently serviced by stormwater, with discharge to the Rakaia River mouth lagoon. Storm surge currently blocks the outlet pipe, however a project to investigate culvert upgrade is planned. The forces of nature and predicted climatic cycles and trends are likely to significantly impact the township via sea level rise, coastal and river erosion and also resulting in increased ponding concerns from changes to the Rakaia River.	North-east of the township to reduce the risk of issues relating to the forces of nature and climatic influences.
Water Races	**No constraint**	No water race network in the township.	N/A
Land Drainage	**No constraint**	No land drainage network in the township.	N/A

The main constraint on future growth for the Rakaia Huts township is the impact of the forces of nature and predicted climatic cycles and trends. The Rakaia Huts settlement is located just north of the Rakaia River mouth on the Rakaia Lagoon. The Rakaia Lagoon is separated from the Pacific Ocean by a shingle spit, with the number of openings and their location along the spit changeable due to the opposing forces of flows from the Rakaia River and ocean wave action. Depending on the number and location of openings, the Rakaia Huts township already experiences issues such as ponding (from the Rakaia River) in resident's properties and coastline erosion from wave action. Climatic cycles and trends are predicted to result in sea level rise and further coastal and river erosion. In addition, increased water abstraction from the Rakaia River for land use results in river level decline, limiting its ability to punch through the shingle spit to create an opening during flood events and resulting in ponding issues in the township.

The water supply network also provides a growth restraint, as almost all water supply connections have been allocated and utilised, however demand is still well below abstraction and consented capacity. However, as the water supply was developed with sufficient capacity to serve the

subdivision, there is some uncertainty as to if the distribution capacity is enough to allow growth beyond this. The constraint therefore is related to capacity in the distribution network.

The preferred growth location for the Rakaia Huts township is within or close to areas currently serviced by the water supply network and to the north-east of the township to reduce the risk of issues relating to the forces of nature and climatic influences.

4.4.6 Taumutu

The results of the 5 Waters assessment for Taumutu are displayed in Table 20 and the Settlement Growth Mapping is displayed in Figure 23

The Taumutu settlement consists of a small settlement at the edge of Te Waihora/Lake Ellesmere the water supply network is fully connected and the AMP states that no additional connections are anticipated at this location. However, consideration of the impact of growth on the 5 Water's networks has still been undertaken and is detailed below.

Table 20: Taumutu 5 Waters Growth Assessment Results

5 Waters	Assessment Status	Key Constraint or Risk	Growth Area
Water Supply	**Minor constraint**	Secure groundwater source, demand at consented capacity and any additional growth is likely to require development of the existing source to increase capacity, upgrades to the distribution network and a new consent.	Locate within or close to areas currently serviced
Wastewater	**Major constraint**	There is no SDC wastewater network in the township, septic tanks are used. Growth is constrained due to the location of the settlement next to Te Waihora/Lake Ellesmere, which is of great cultural and environmental significance and therefore there are significant restrictions on discharge of wastewater to land or water.	All areas within the vicinity of Te Waihora/Lake Ellesmere are under the same strict constraints.
Stormwater	**No constraint**	No SDC stormwater network in the township.	N/A
Water Races	**No constraint**	No SDC water races network in the township.	N/A
Land Drainage	**No constraint**	No SDC land drainage network in the township.	N/A

The constraints on future growth for the Taumutu settlement are the water supply network and more significantly the current private wastewater septic system. Predicted climatic cycles and trends are also likely to impact on the settlement due to its location adjacent to Te Waihora/Lake Ellesmere. Taumutu is a small settlement of 11 water supply connections right at the edge of Te Waihora/Lake Ellesmere. All the connections have been allocated and utilised and water demand is currently at the consented capacity. Any additional growth is likely to require development of the existing water source to increase capacity, a new consent and it may also require some upgrades to the distribution network.

Currently SDC does not operate a wastewater system at Taumutu, with the settlement using a septic system with discharge to land. However, due to the location of the settlement right on the shores of Te Waihora/Lake Ellesmere, which has high cultural and environmental significance, there are significant constraints regarding the discharge of wastewater to land and/or water. These

constraints will restrict growth in the settlement. Connection of Taumutu to the Southbridge wastewater network may need to be considered in the future if growth within the Taumutu settlement is sought after. SDC have indicated that the lack of wastewater service has been identified by the Te Taumutu Rununga in the past as a constraint to establishing additional housing at the settlement and Ngati Moki Marae (located within the Taumutu area).

Predicted climatic cycles and trends are likely to impact on the Taumutu settlement due its location on the banks of Te Waihora/Lake Ellesmere. NIWA have produced a report[4] that indicates some key impacts of climatic cycles are reduced number of lake openings per year and possible changes in the threshold rules for lake openings due to sea level rise. Coastal erosion and subsequent changes to the Kaitorete Spit and lake opening may also occur, all resulting in increased risk to the Taumutu settlement.

The preferred growth location for the Taumutu settlement is within or close to areas currently serviced by the water supply network or closer to the Ngati Moki Marae if a new water supply well source was preferred to increasing the capacity of the existing.

[4] Climate change impacts on Lake Ellesmere (Te Waihora). NIWA, September 2010

4.5 Overall Growth Analysis

Based on the individual settlement assessment results, an overall analysis of which settlements are most suitable for growth in the Malvern and Ellesmere Wards has been conducted. The main constraint(s) and the constraint status for each settlement have been analysed, along with the likelihood of growth for the settlement in terms of its location. Each settlement has then been assigned a growth priority score, which gives a clear indication of which settlements SDC should be directing any growth towards.

Table 21 provides a description of the combined constraint status scoring for the settlements. The combined constraint score/status is dictated by the most severe constraint affecting the 5 Waters infrastructure within the settlement.

Table 22 provides a description of the growth priority scoring used in the overall analysis. This score takes into account the constraint score/status and the likelihood of growth for the settlement in comparison with other similarly located settlements. The results from the analysis are outlined in Table 23.

Table 21: Settlement Combined Constraint Status Scoring

Constraint Status	Description
No constraint	No constraints for growth within the 2041 timeframe.
Minor constraint	Constraints deemed to be minor and resolvable with appropriate planning and infrastructure upgrades.
Medium constraint	Constraints deemed to be substantial enough to delay growth but resolvable with significant planning and infrastructure upgrades.
Major constraint	Constraints deemed to be significant enough to delay or halt growth and require considerable or complex planning and infrastructure upgrades.

Table 22: Growth Priority Scoring Description

Growth Priority Score	Description
1	Minimal constraints, recommended for future growth.
2	Minor or medium constraints which are resolvable, growth preferred in this settlement over similar settlements.
3	Minor or medium constraints and growth requires resolving complex issues. Growth preferred in other similar settlements rather than this one.
4	Major constraints or medium constraints but limited growth possible or likely. Includes private developments with little to no services.

Table 23: Summary of overall growth analysis

Ward Name	Township Name	Main Constraint	Constraint Status	Growth Priority
Malvern	Arthurs Pass	Remote location and alpine environment	Minor constraint	3
Malvern	Bealey Spur (EDA)	Private development with no SDC services	Private development	4
Malvern	Grassmere (EDA)	Private development with no SDC services	Private development	4
Malvern	Castle Hill	Water supply	Minor constraint	2
Malvern	Lake Coleridge	Water supply	Minor constraint	3
Malvern	Terrace Downs (EDA)	Private development, water supply only	Medium constraint	4
Malvern	Whitecliffs	Water supply and Stormwater	Medium constraint	3
Malvern	Glentunnel	Water supply	Medium constraint	3
Malvern	Coalgate	Water supply	Medium constraint	2
Malvern	Greendale (EDA)	Only serviced by water supply	Minor constraint	2
Malvern	Hororata	Water supply	Major constraint	4
Malvern	Springfield	Water availability and supply	Medium constraint	3
Malvern	Sheffield and Waddington	Water availability	Major constraint	4
Malvern	Darfield	Wastewater	Medium constraint	3
Malvern	Kirwee	Water supply	Minor constraint	2
Ellesmere	Dunsandel	Water supply	Minor constraint	2
Ellesmere	Doyleston	Stormwater and Land Drainage	Medium constraint	3
Ellesmere	Leeston	Link between Stormwater, Land Drainage and Wastewater	Medium constraint	2
Ellesmere	Southbridge	Wastewater and Stormwater	Medium constraint	3
Ellesmere	Rakaia Huts	Water supply	Medium constraint	4
Ellesmere	Taumutu (Other Settlement)	Wastewater	Major constraint	4

In terms of the alpine settlements (Arthurs Pass, Bealey Spur, Grassmere, Castle Hill and Lake Coleridge), Castle Hill is the preferred and most likely location for growth. Based on the SDC 5 Waters infrastructure, growth may be possible in Arthurs Pass and Lake Coleridge, however these townships have greater constraints to overcome for growth. In general, the remote location and alpine environment of these townships not only increases operation and maintenance costs and makes access for service difficult, but also makes significant growth less likely.

Amongst the Malvern Ward settlements in or close to the foothills (Terrace Downs, Whitecliffs, Glentunnel, Coalgate, Hororata, Springfield, Sheffield and Waddington), the townships of Sheffield and Waddington are currently not suitable for growth and are unlikely to be able to sustain any significant growth in the future. Springfield has recently been granted a new resource consent for its water take from the Kowai River, so has some growth capacity. However major water supply capacity upgrades are required and due to the likelihood of continuing issues in the future with availability of water for this supply, it is unlikely that the Springfield township would be able to sustain significant growth in the future. Hororata also has significant water supply constraints which will restrict growth. Of the other settlements, Coalgate is the most suited for growth. Coalgate is subject to the same major constraints relating to water supply as Glentunnel and Whitecliffs, however it is a preferred growth location due to the large areas of land within the township which appear to be subdivided and covered by existing services, but which are not yet utilised. There is more suitable land here for development than the other two townships.

Darfield and Kirwee both have constraints to growth, however these constraints are resolvable with planning and infrastructure upgrades. Due to their location (reasonably close to Christchurch), these settlements are more suited to significant growth than many other settlements in the Ellesmere and Malvern wards and therefore the upgrades required to accommodate this growth may be deemed more worthwhile by SDC.

Of the settlements west of the Selwyn River, Dunsandel is more suited to growth than those located closer to the coast (Leeston, Doyleston and Southbridge). Dunsandel only has a minor constraint relating to water supply, whereas Leeston, Doyleston and Southbridge are located in an area of the district which experiences high groundwater and also large flows in the land drainage network during wet weather events. The link between the land drainage and stormwater networks causes flooding issues within the townships and this and the high groundwater levels results in an adverse impact on the wastewater network. Future considerations such as climatic cycles and any impact of the CPW Scheme are likely to exacerbate these existing issues, making them more complex and difficult to resolve. Because of this, these three townships are less desirable as growth areas than those further inland with constraints which are easier to mitigate. However, of the three, Leeston is the most suited to growth due to the fact that it is closest to the existing services (water supply bores and the Ellesmere STP) and land already suitably zoned.

Rakaia Huts and Taumutu are small settlements predicted to have limited growth, irrespective of their infrastructure constraints.

5 Settlement Growth Mapping

Settlement growth mapping has been conducted to provide a high level identification of the suitability of growth locations within each township based purely on the presence of the existing 5 Waters infrastructure. This mapping has not taken into account the multitude of other parameters which SDC need to consider when deciding where growth for the district is most suited. Areas

surrounding (or within) the current settlements have been identified as being suitable or least suitable based on the growth assessment results. The settlement growth maps do not display the specific settlement constraint as often these constraints are not site specific. Figure 4– Figure 23 display the settlement growth mapping for each of the 22 townships, EDAs and settlements.

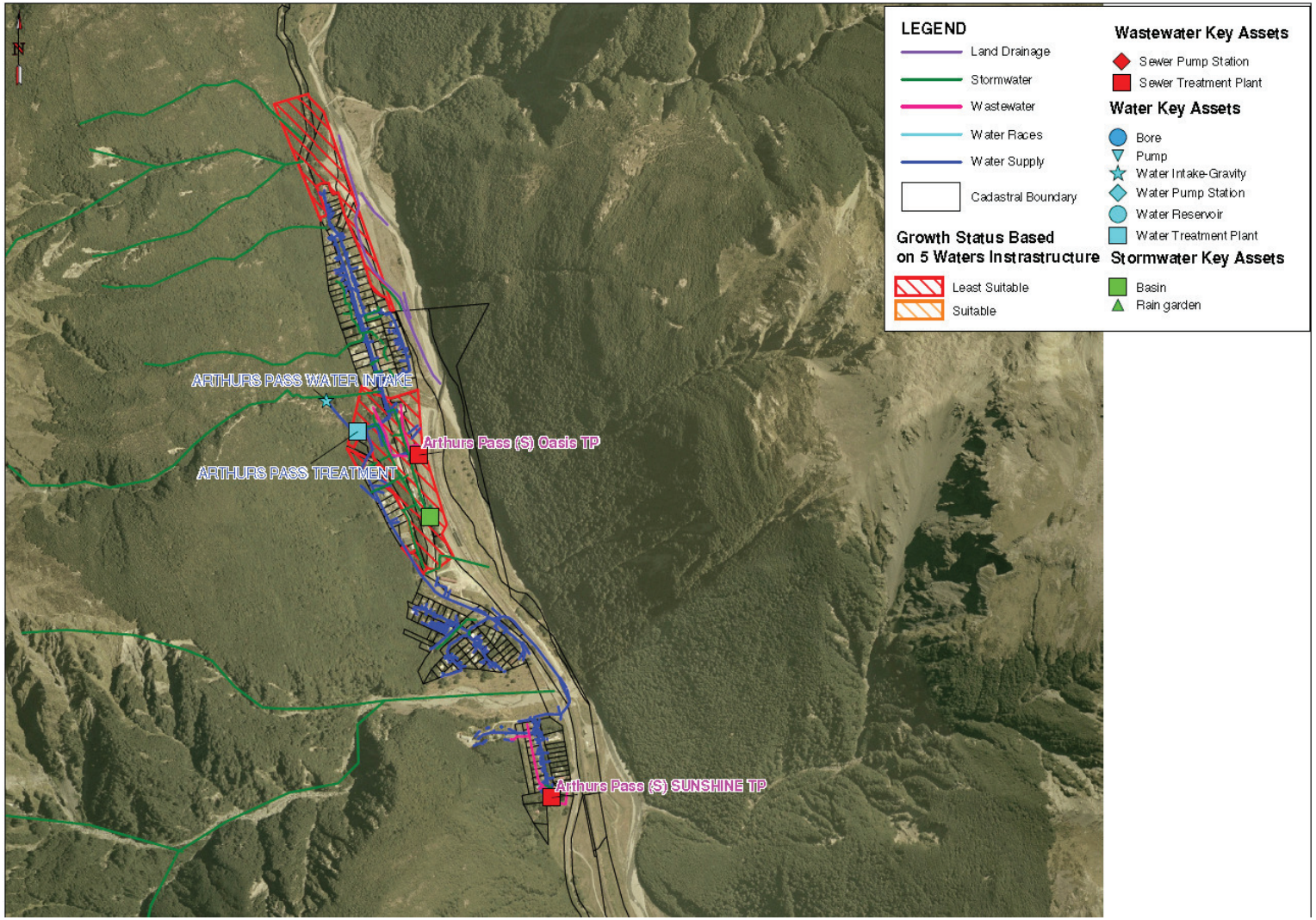

Figure 4: Arthurs Pass Map

Figure 5: Bealey Spur Map

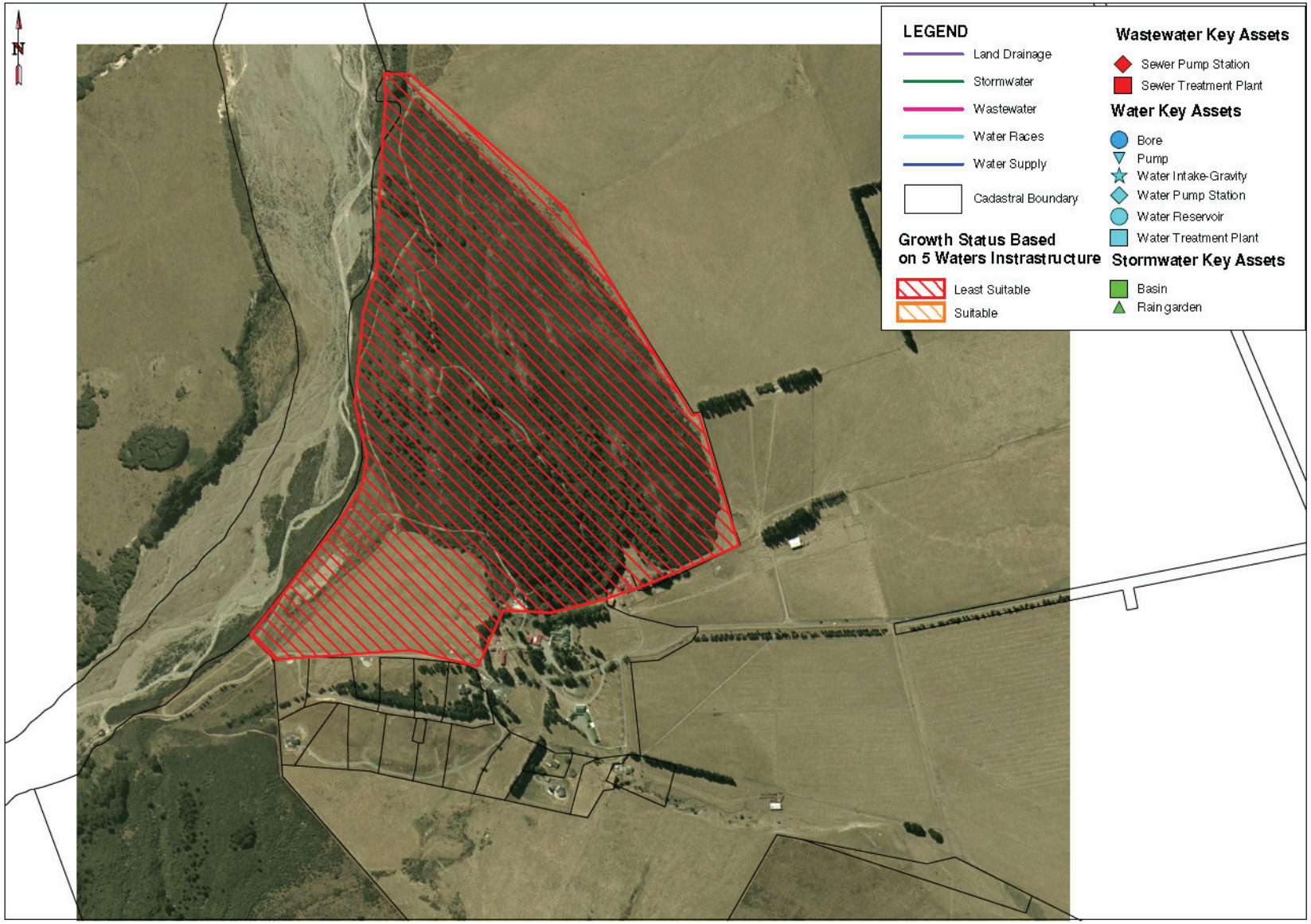

Figure 6: Grassmere Map

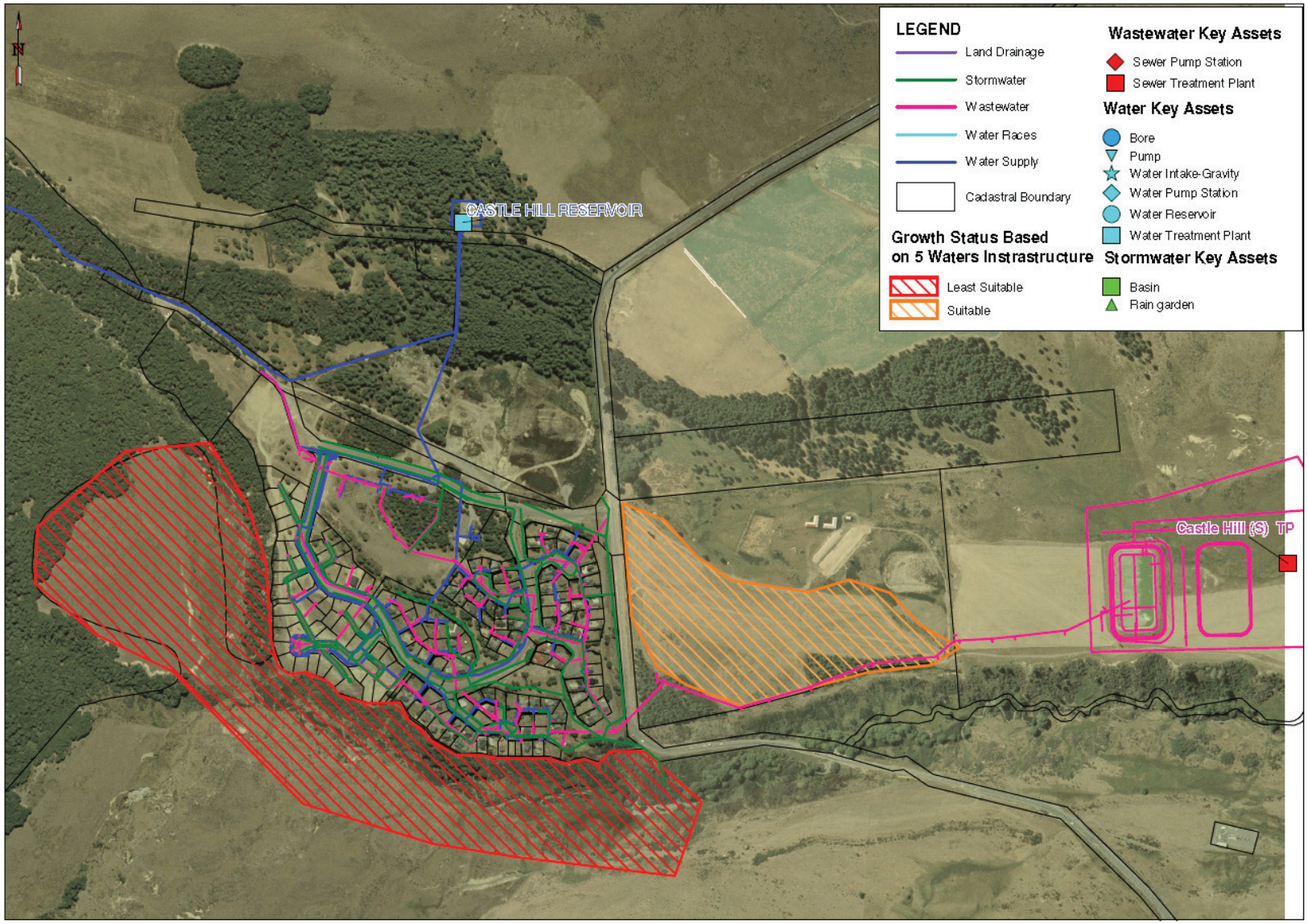

Figure 7: Castle Hill Map

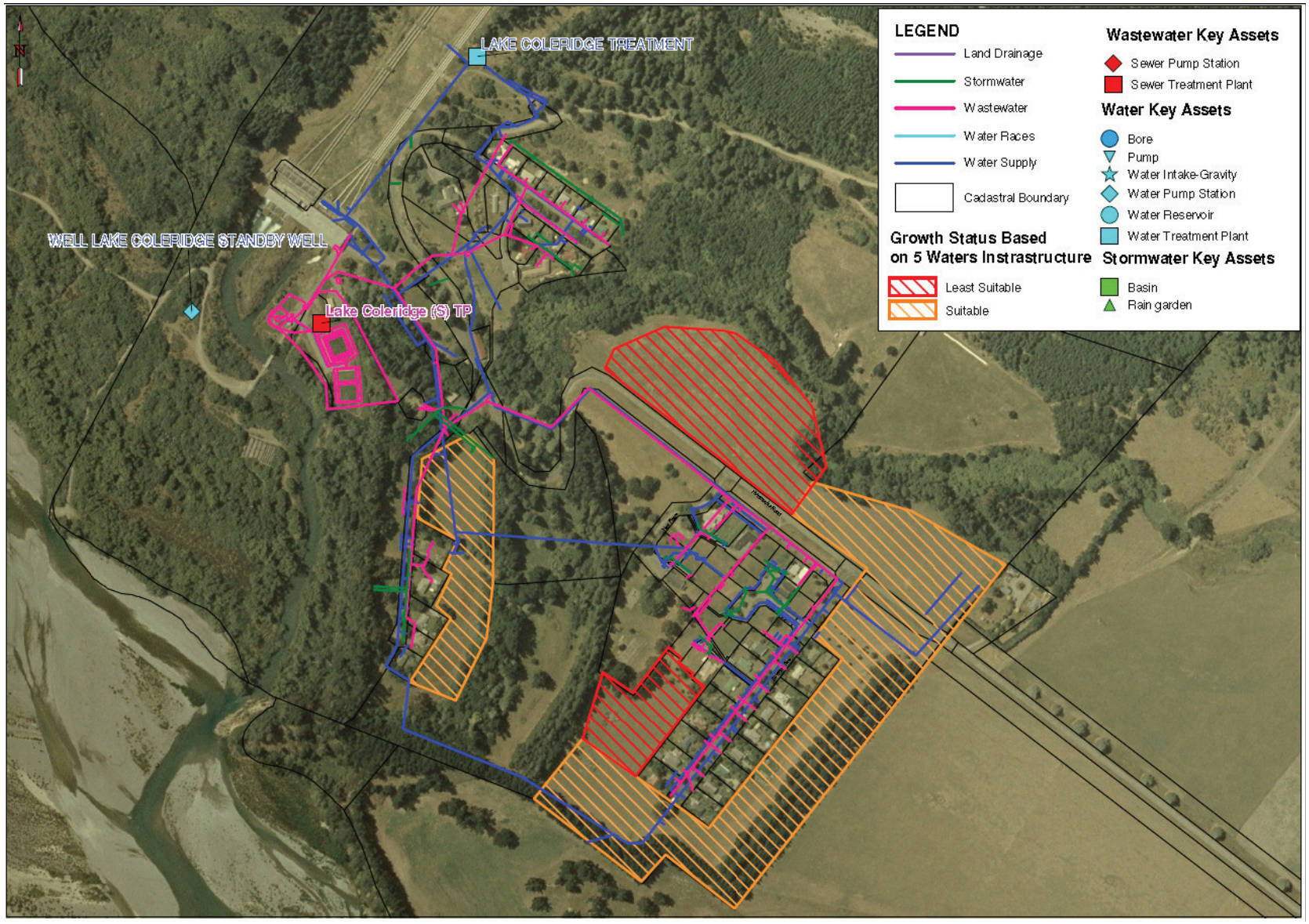

Figure 8: Lake Coleridge Map

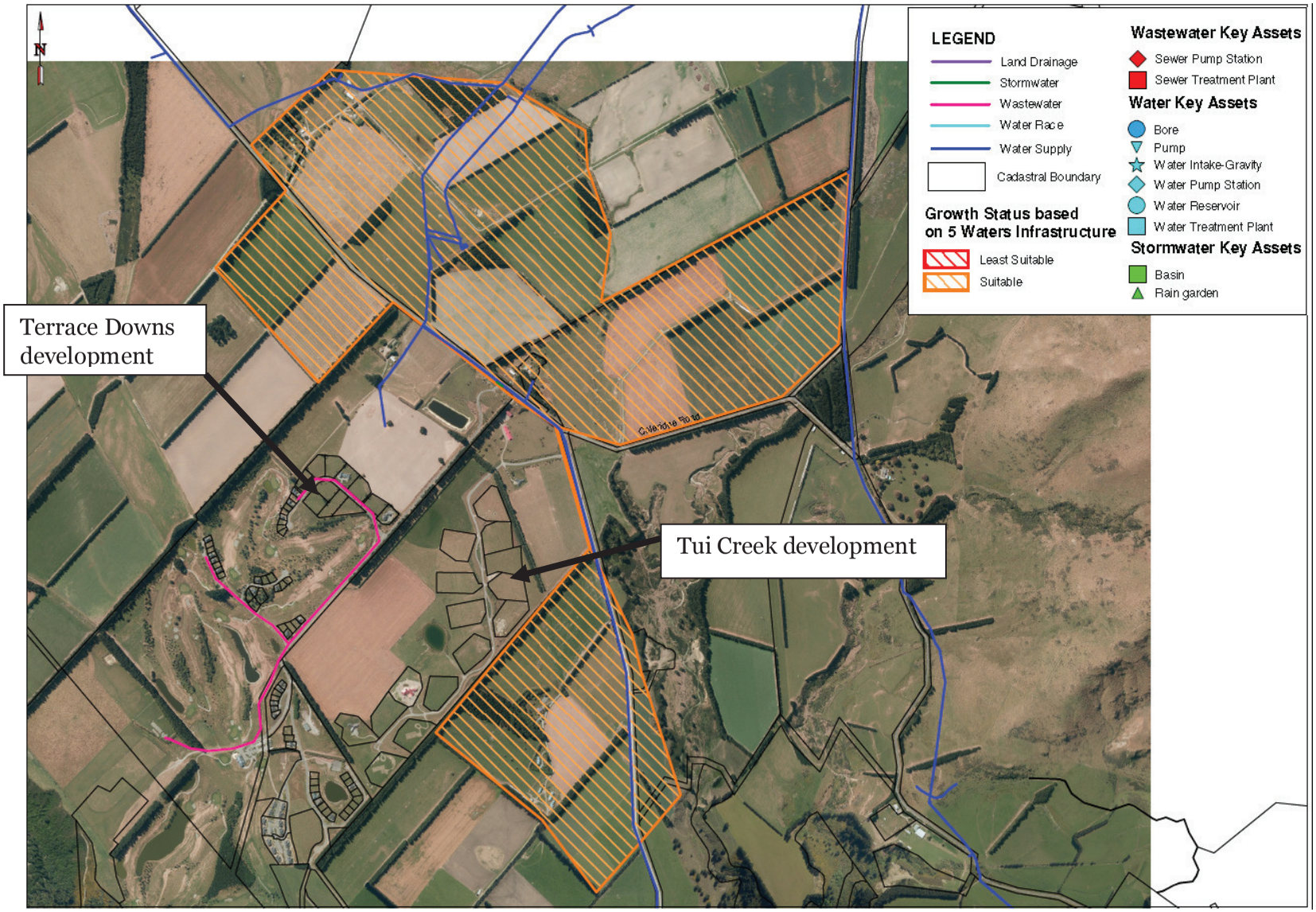

Figure 9: Terrace Downs Map

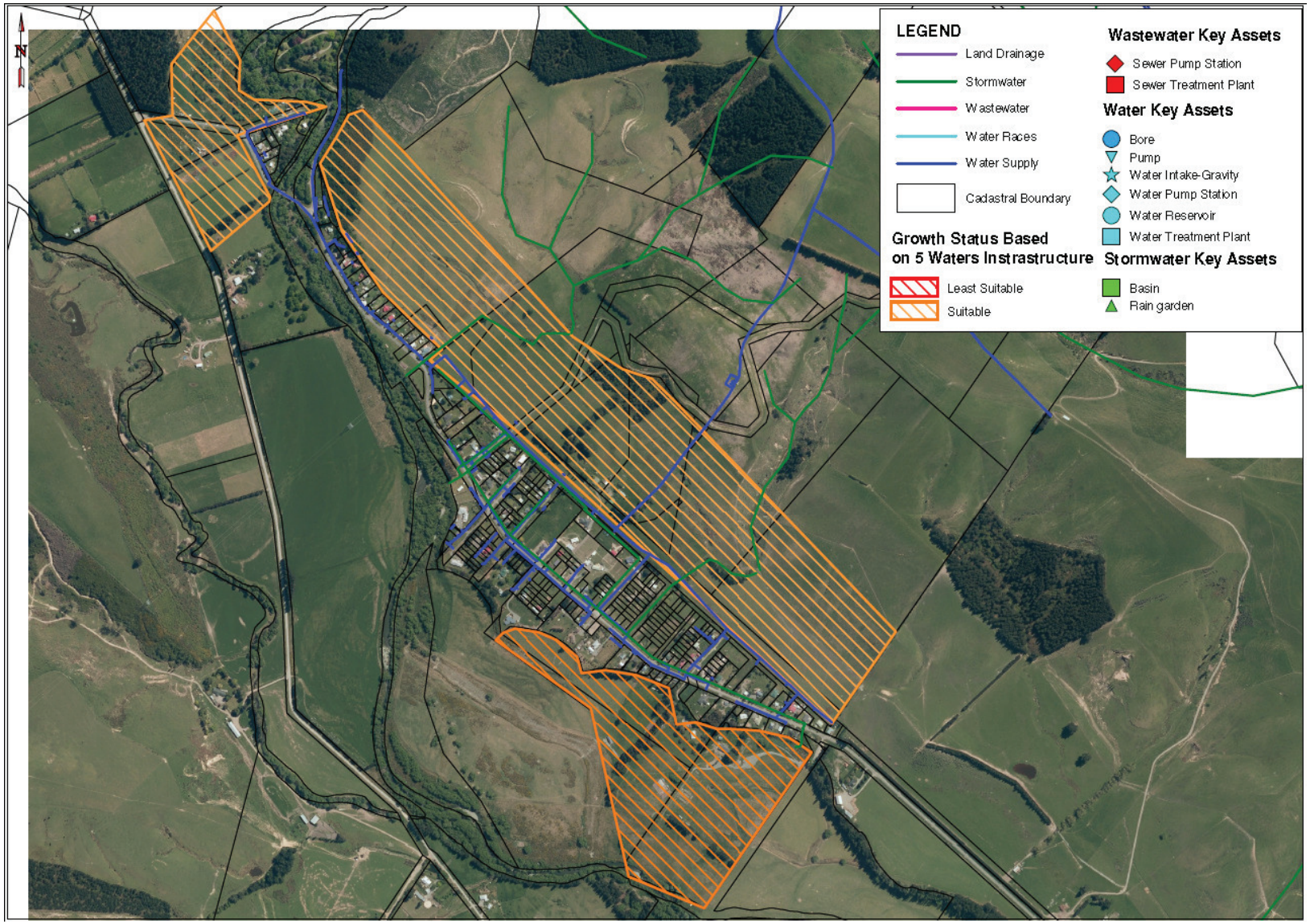

Figure 10: Whitecliffs Map

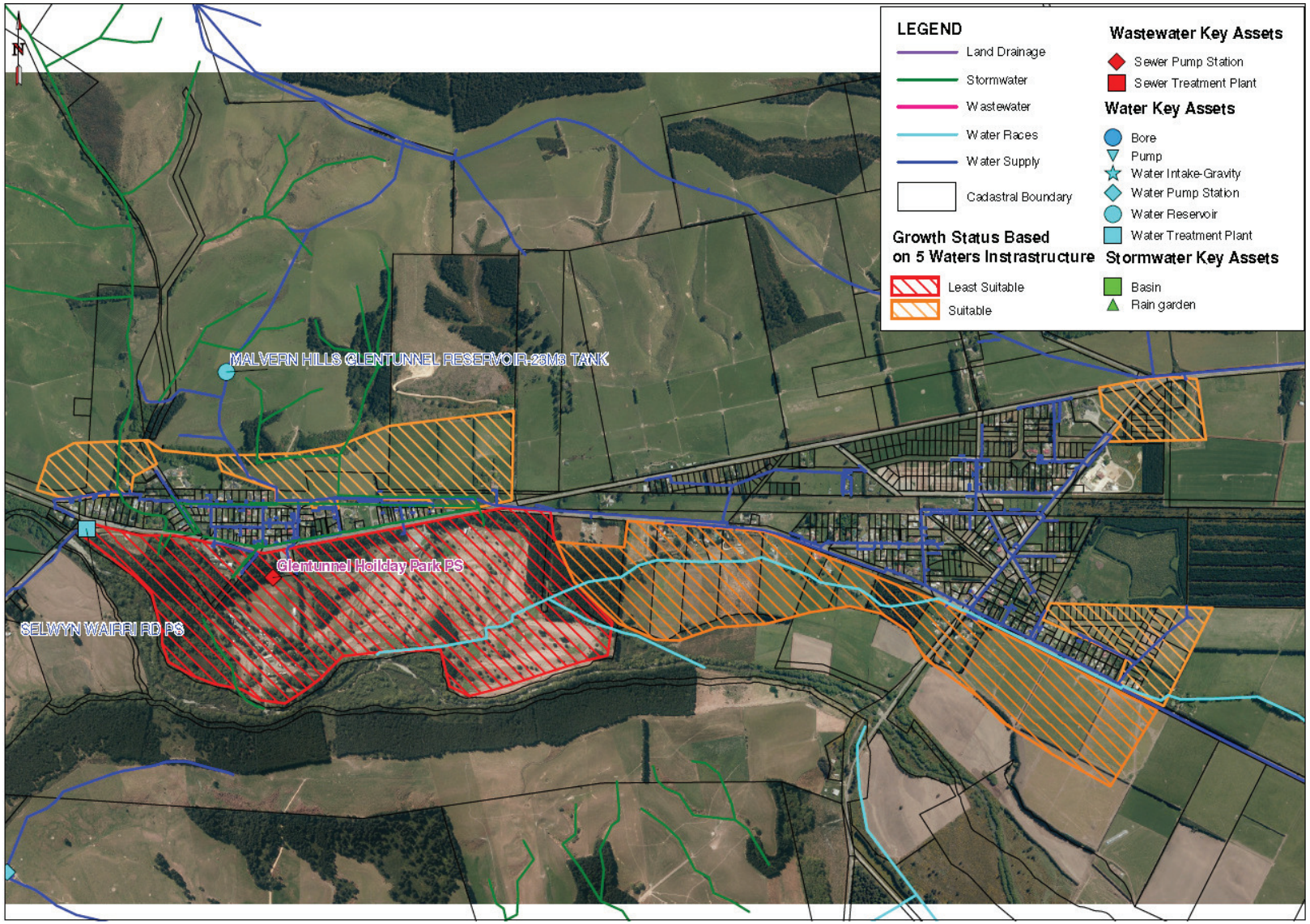

Figure 11: Glentunnel and Coalgate Map

Figure 12: Greendale Map

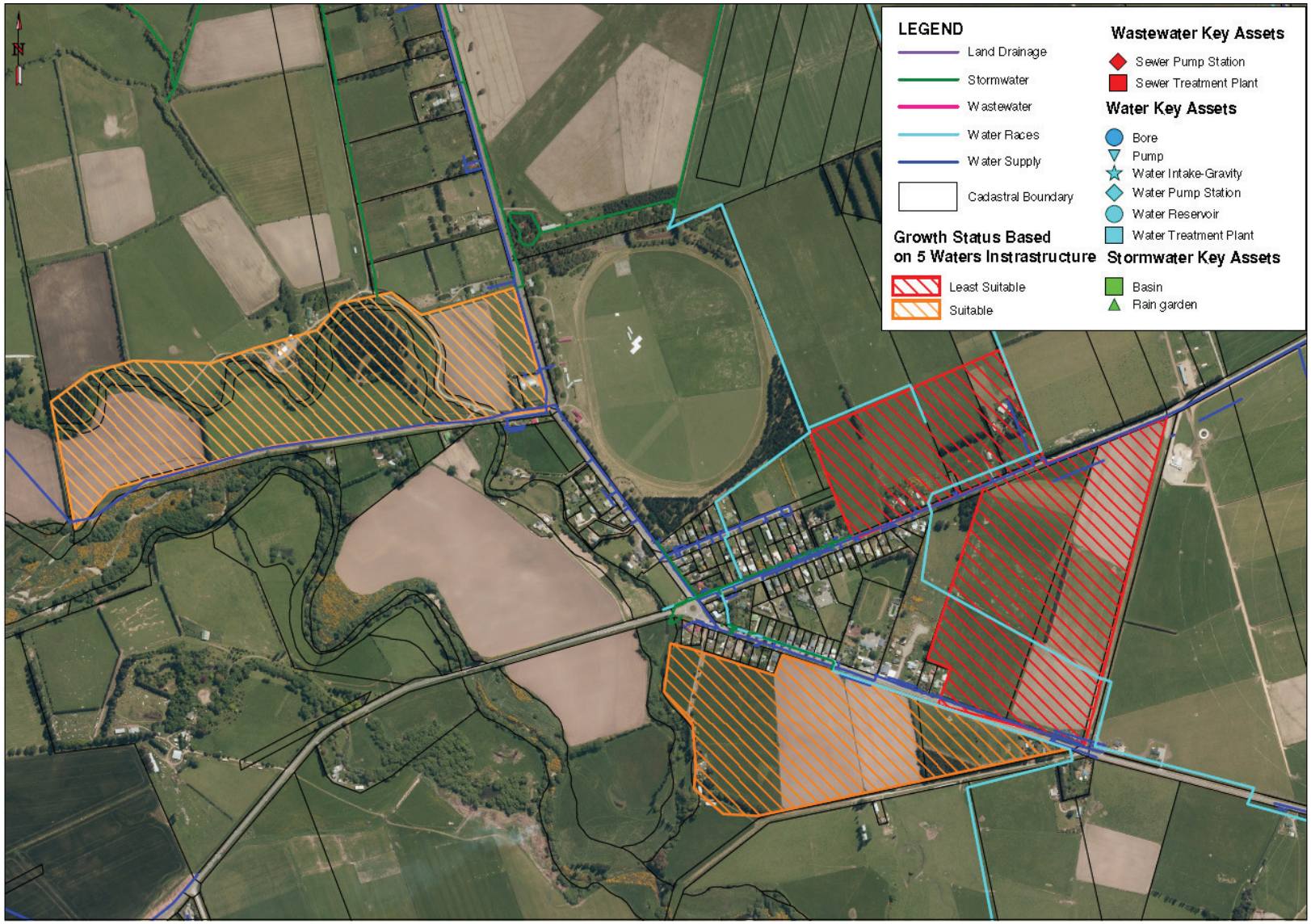

Figure 13: Hororata Map

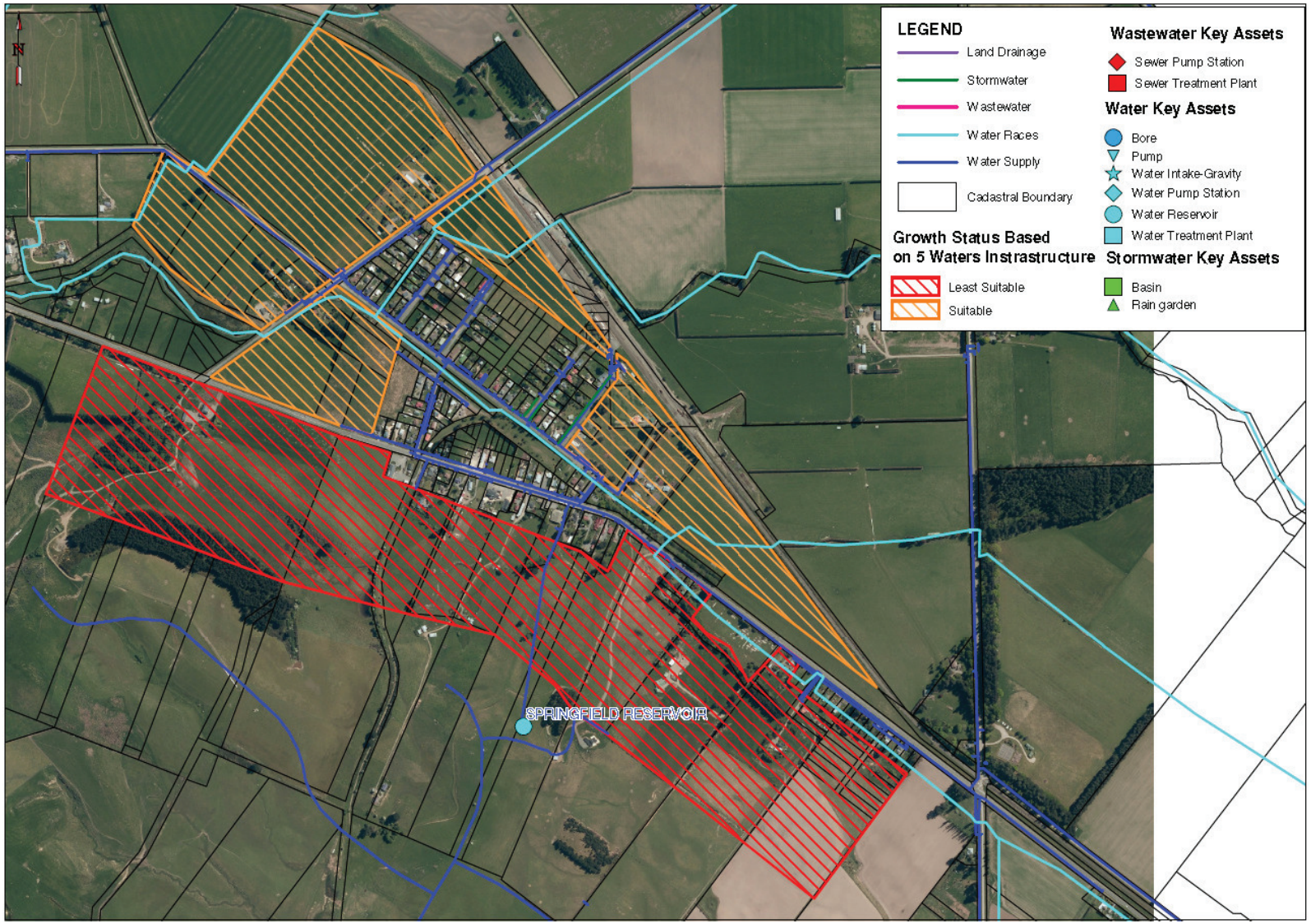

Figure 14: Springfield Map

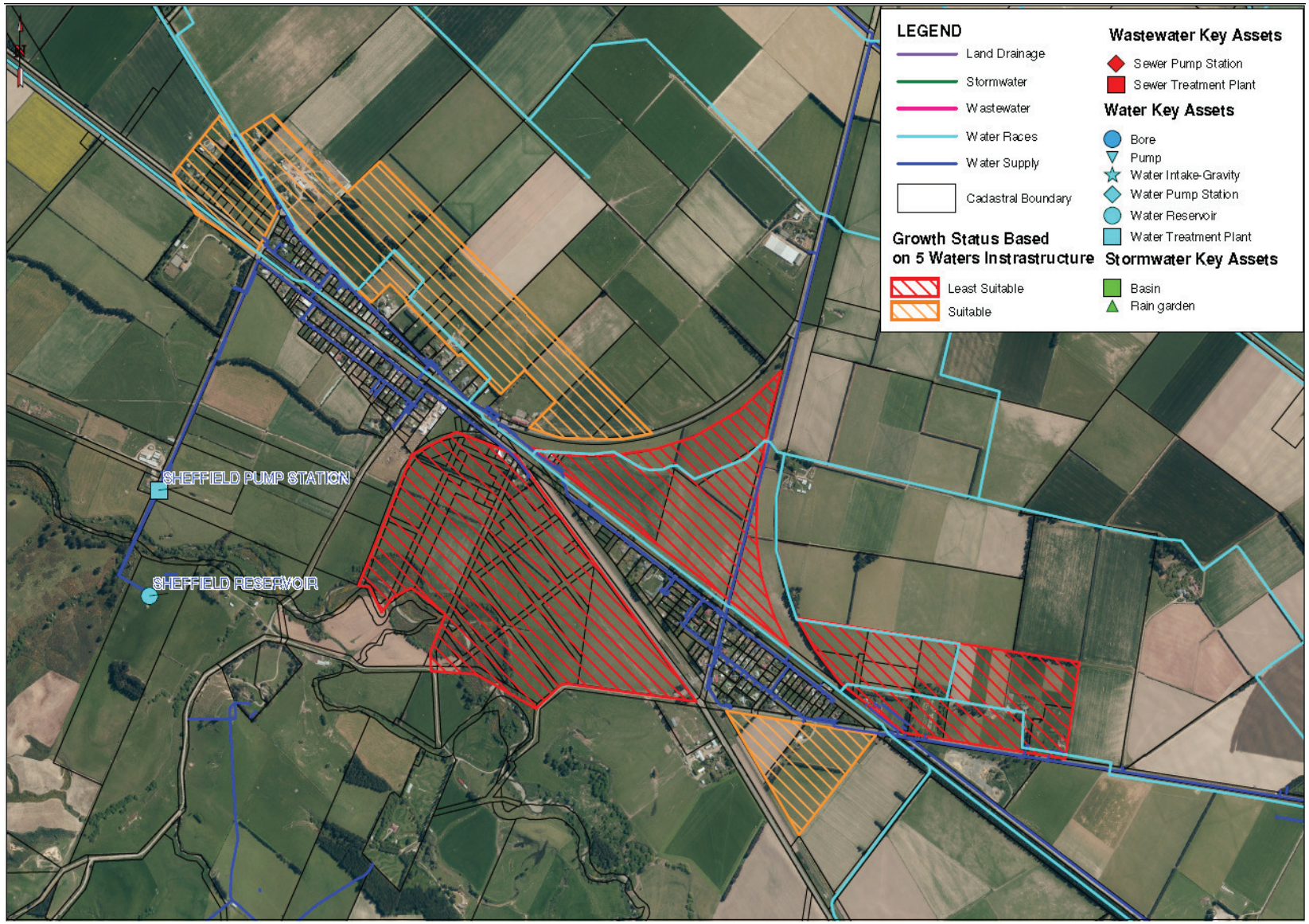

Figure 15: Sheffield and Waddington Map

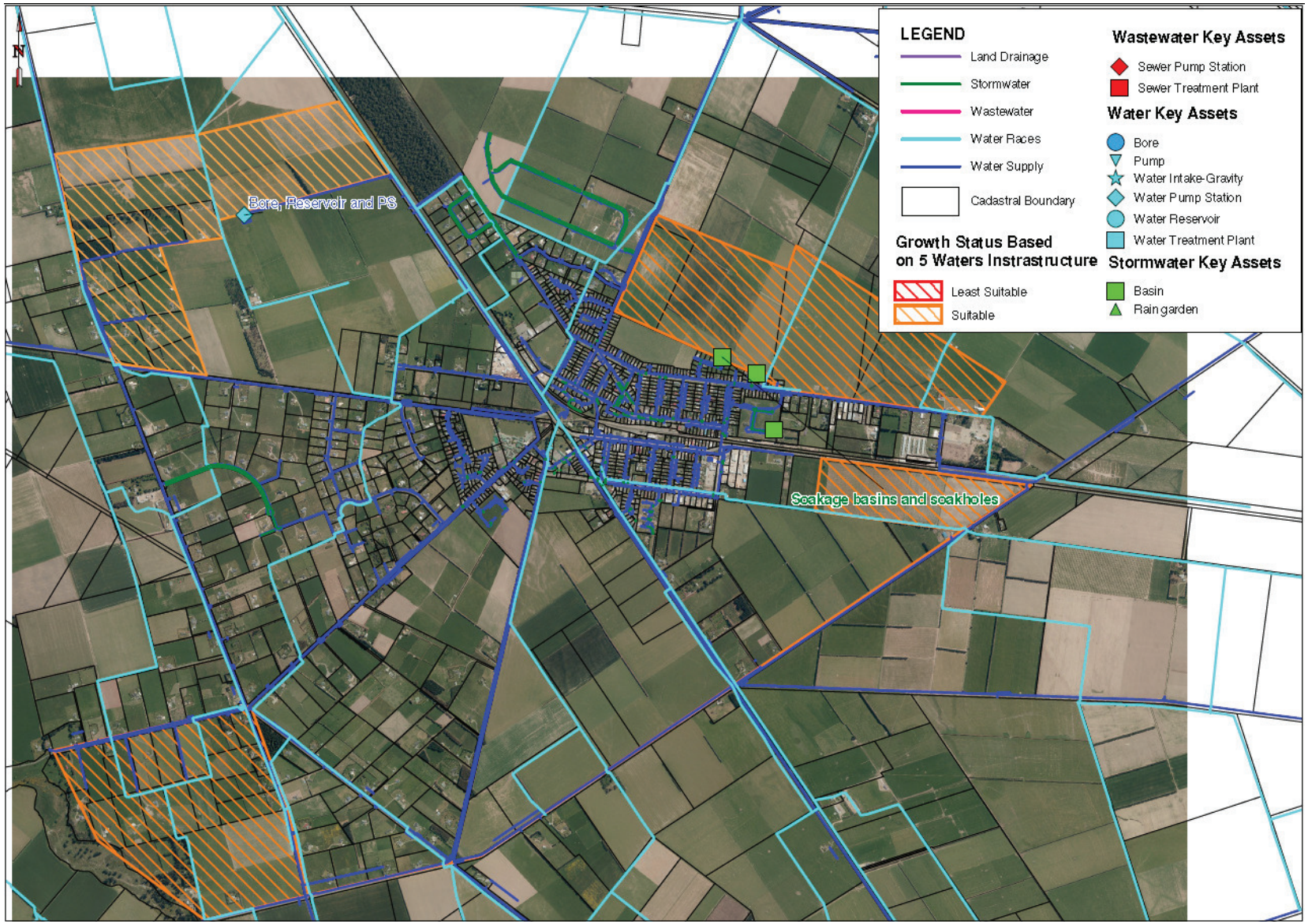

Figure 16: Darfield Map

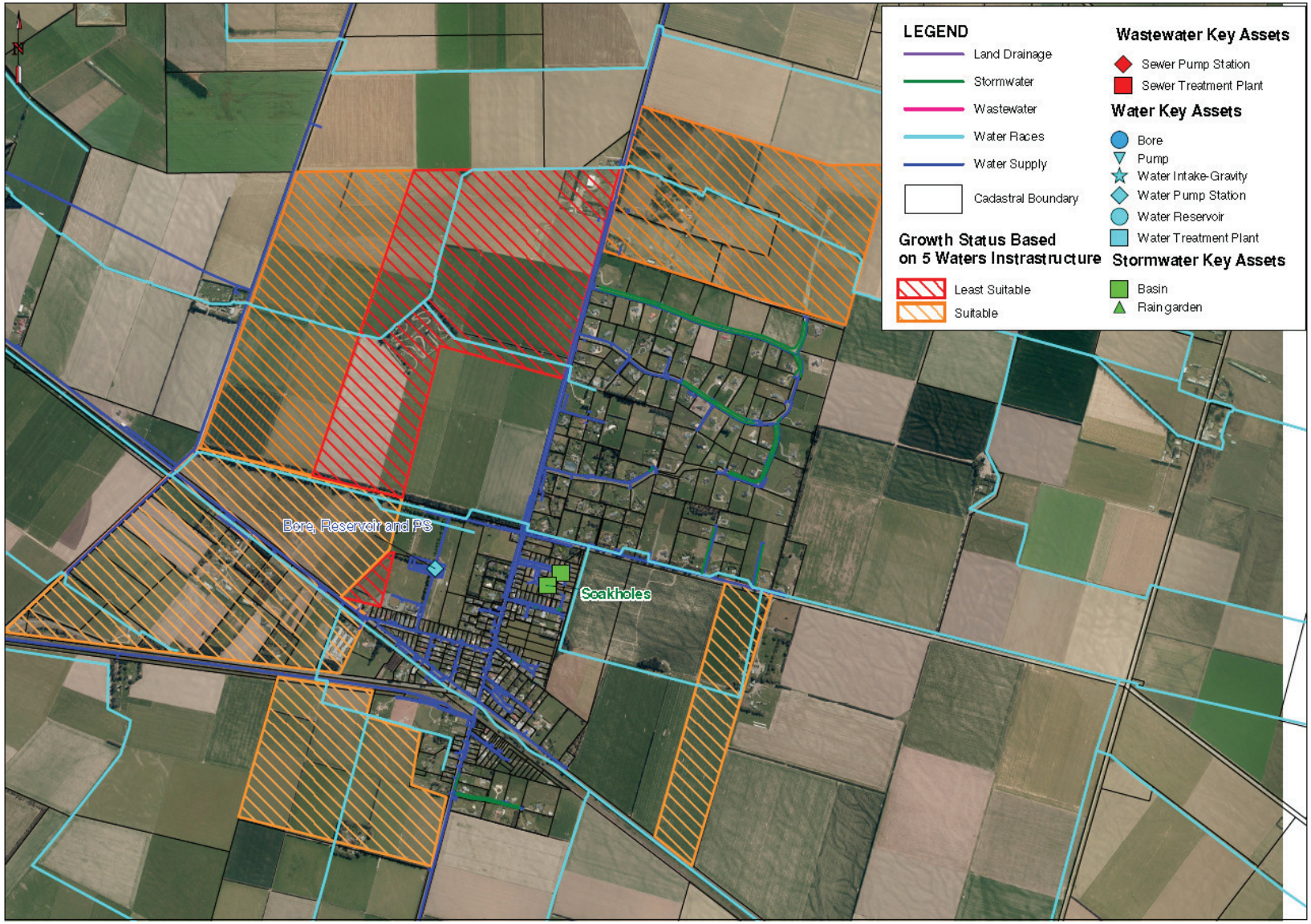

Figure 17: Kirwee Map

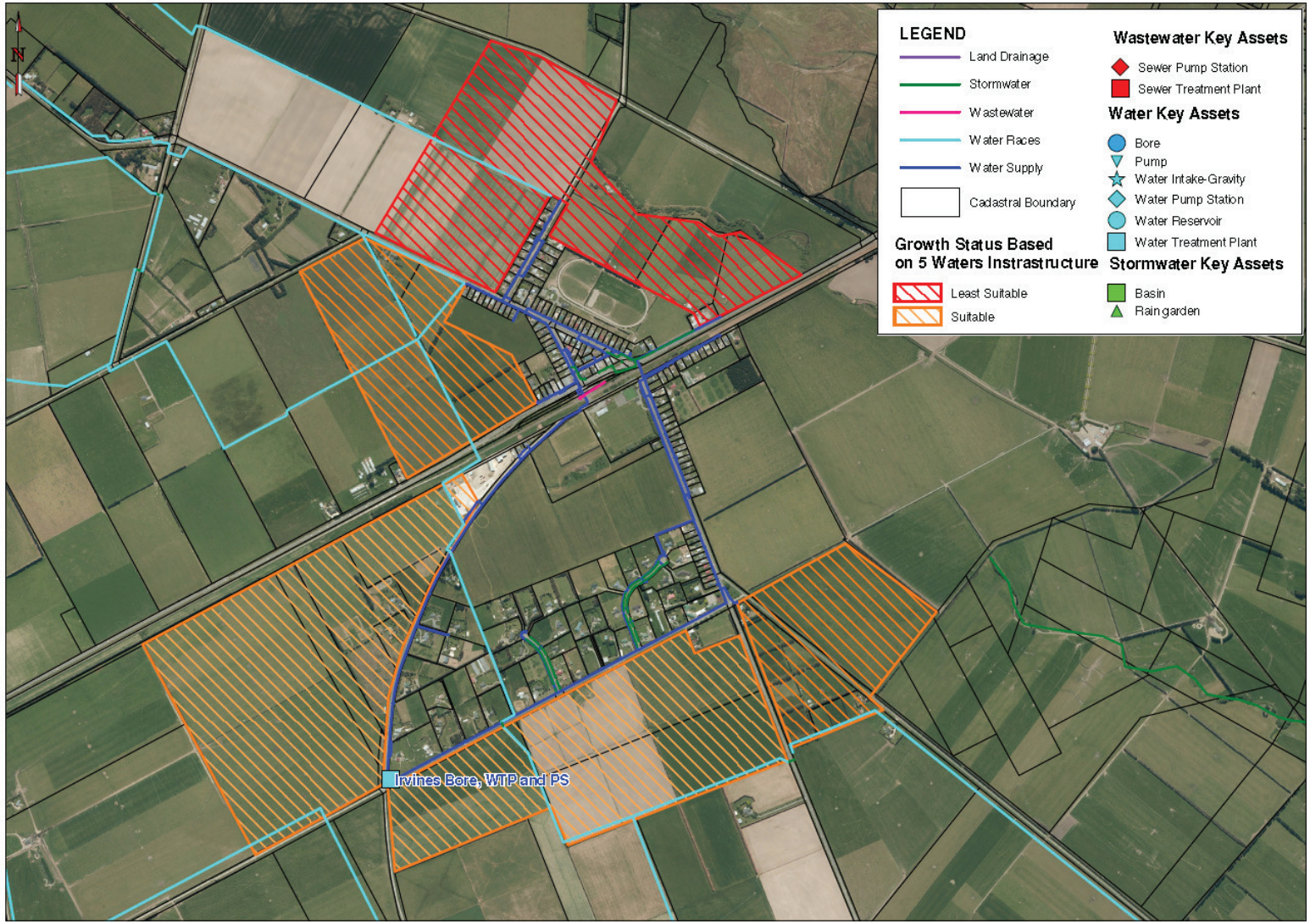

Figure 18: Dunsandel Map

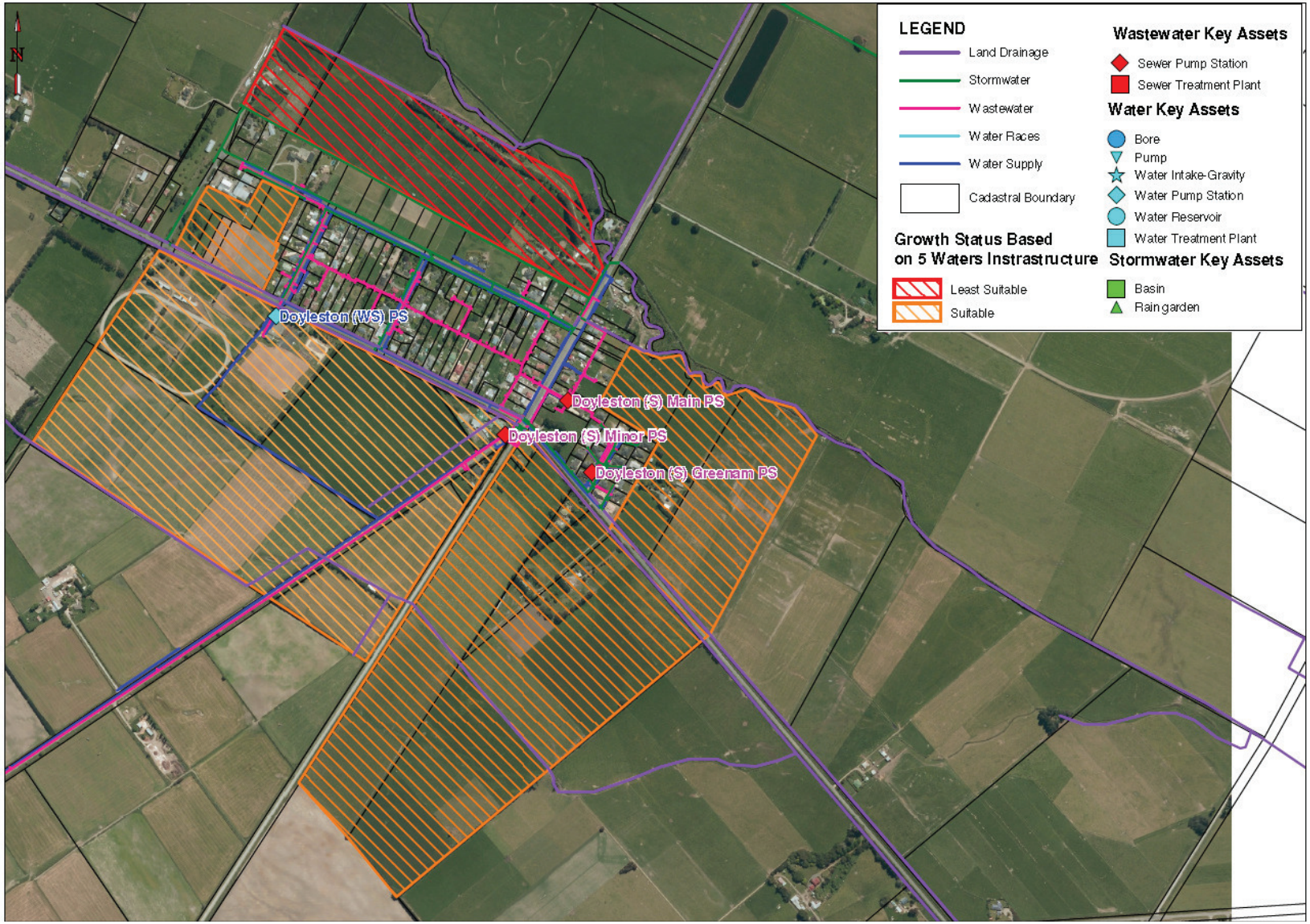

Figure 19: Doyleston Map

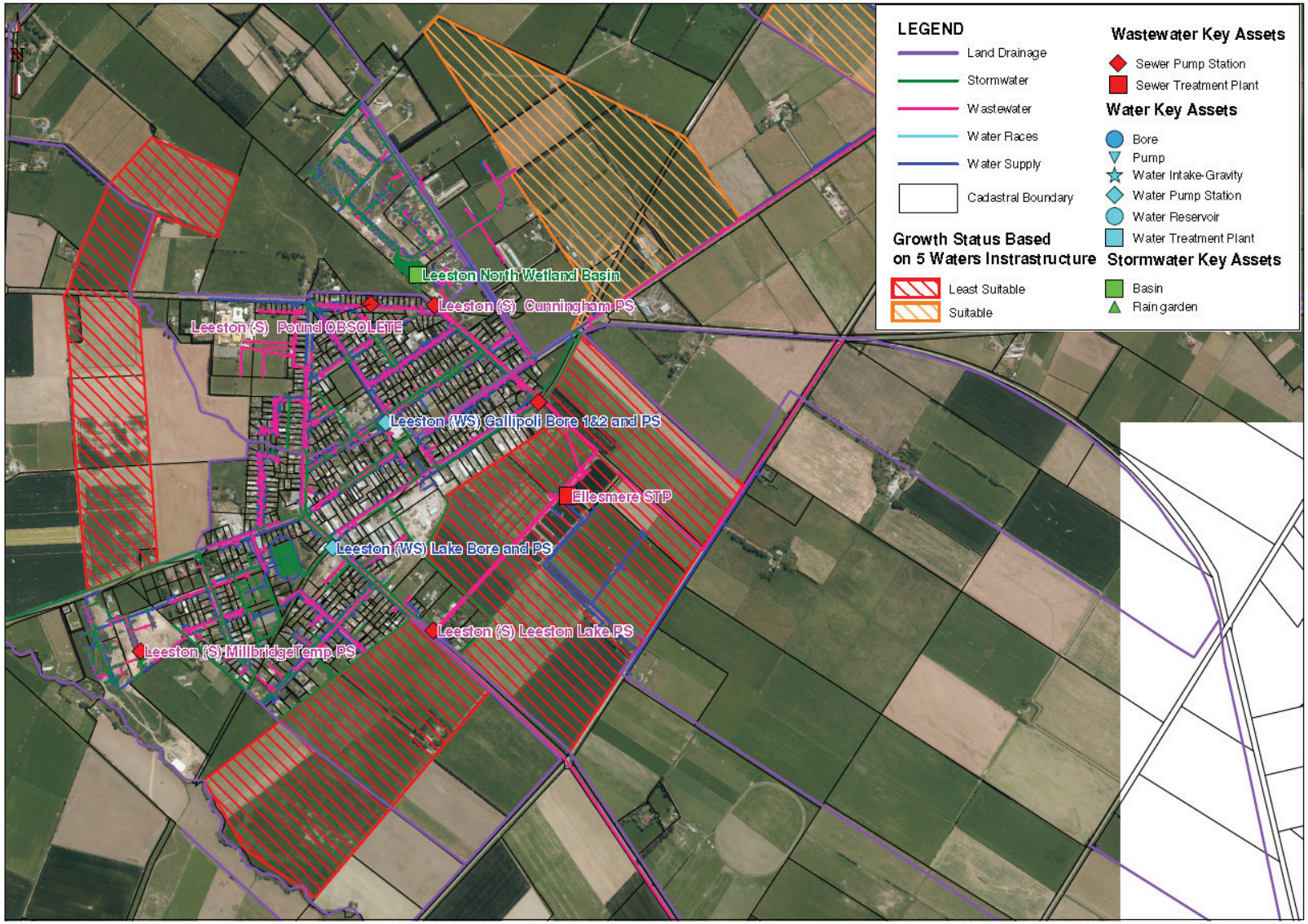

Figure 20: Leeston Map

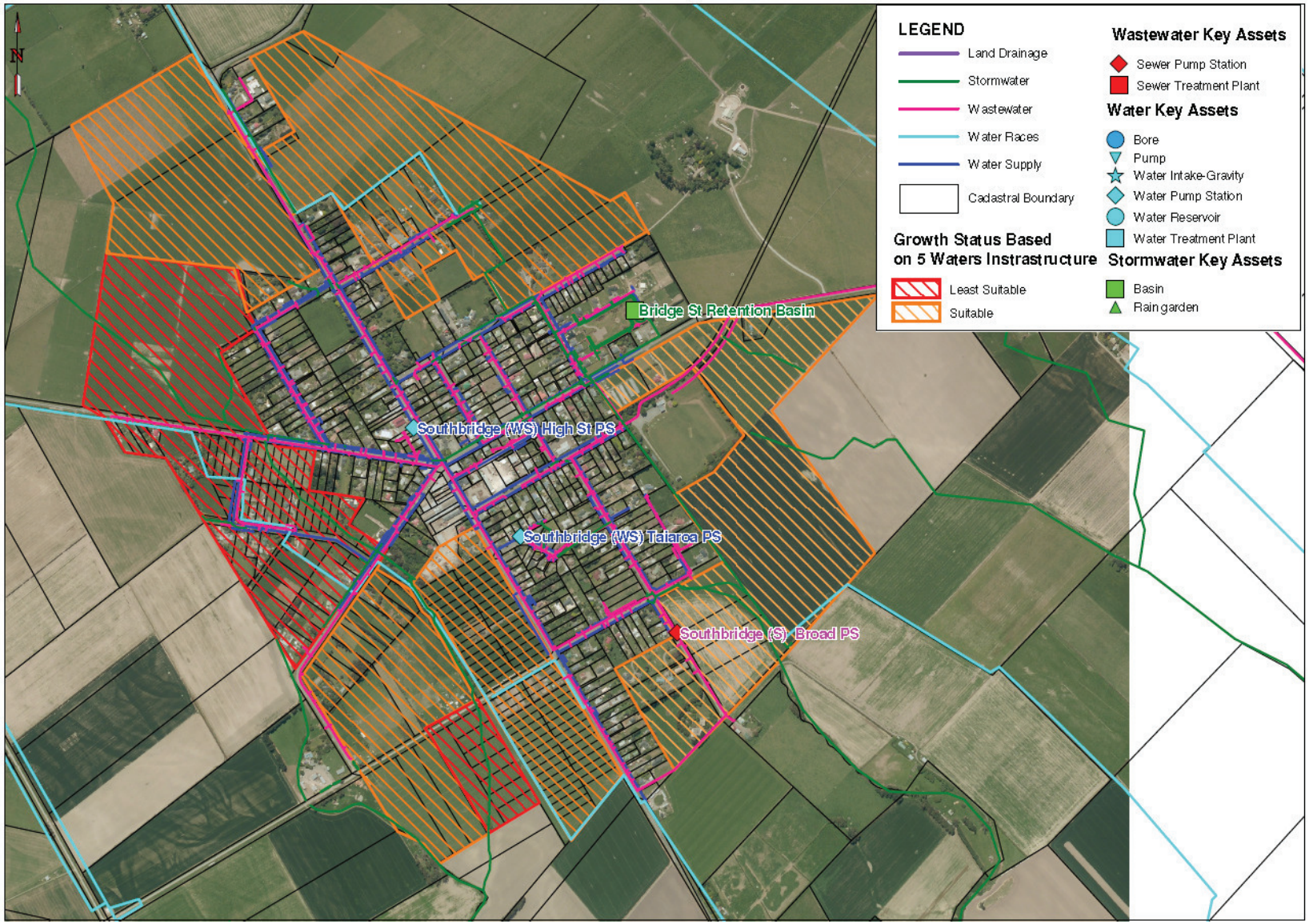

Figure 21: Southbridge Map

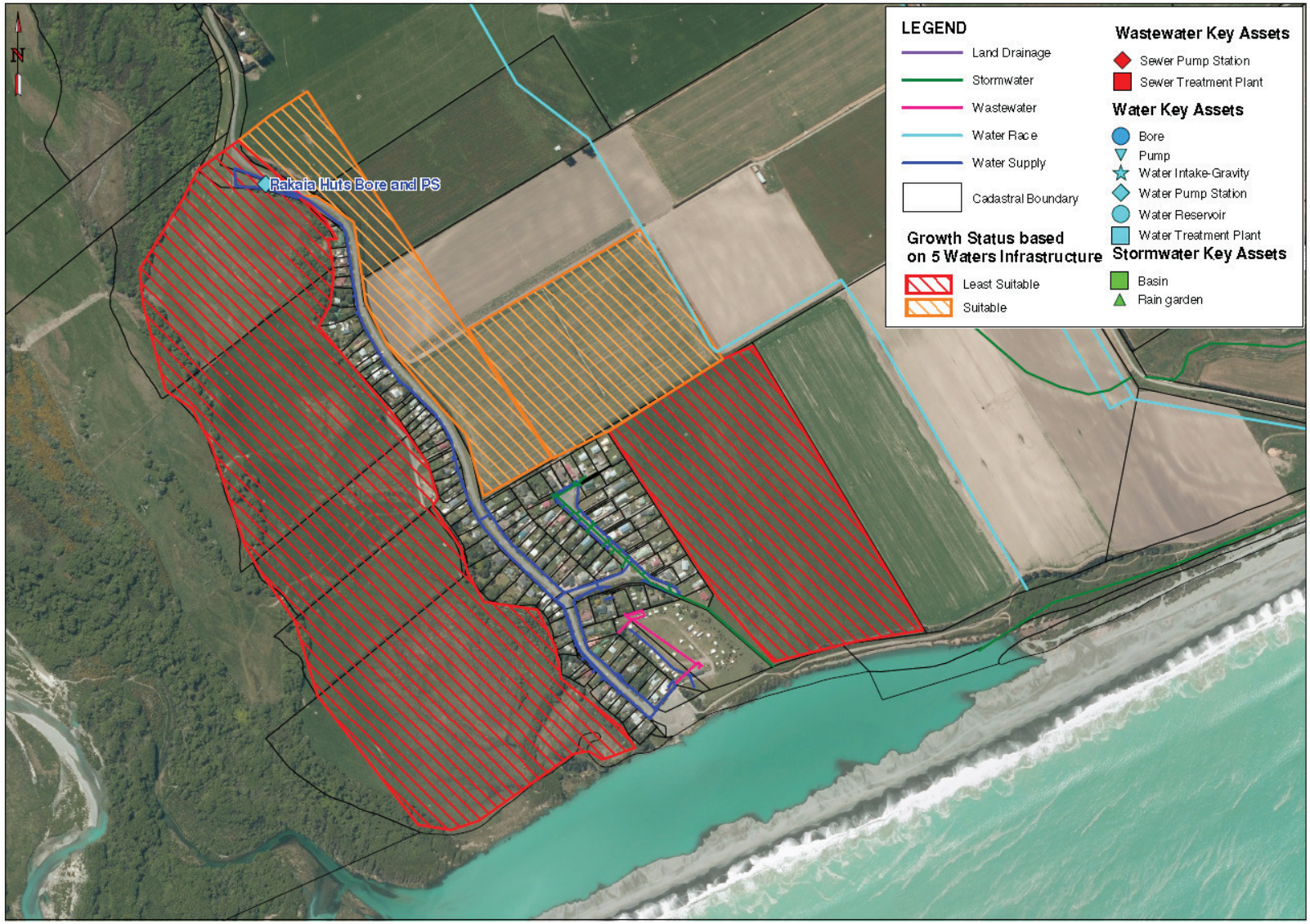

Figure 22: Rakaia Huts Map

Figure 23: Taumutu Map

Appendix A

Constraint Assessment tables for each of the 5 Water's Key Components

Water Supply Assessment

Specific figures relating to predicted populations and subsequent timing of growth have been pulled from Water Supply Model Reports, refer Section 3.1 in this report

CONSTRAINT SCORING	
1	No constraints
2	Minor constraint
3	Medium constraint
4	Major constraint

				WATER															
Opus Area No	Ward Name	Township Name	Major Source Constraint	Consent	Consent Score	Source	Source Score	WTP	WTP Score	Pump Station	Pump Station Score	Storage	Storage Score	Reticulation	Reticulation. Score	Summary of Key Constraints	Summary Constraint Score	Suitable Growth Areas
1	Malvern	Arthurs Pass	Surface water supply not an issue	Current demand (daily and annual volume) exceed resource consent (expiry 2034), new consent required.	2	Surface water source which can supply more than can be treated. Non-secure source with some E.coli transgressions.	1	Treatment capacity (UV component) is the limiting factor in system. Upgrade planned for 2015/16, with reservoir storage to be added 2016/2017. Location makes access difficult for service.	2	N/a		No storage currently, reservoirs planned to be installed 2016/2017 which will also help meet fire flow requirements	2	Reticulation provides sufficient capacity for the current level of development and is sufficient to meet increased demand from allocated connections not yet in use. Upsizing required to meet fire flow requirements	2	Upgrades to treatment and storage planned which will remove these constraints. Exceeding resource consent when the full number of allocated connections is not yet in use is of major concern, new consent may be required. Location makes access difficult for service and O&M costly.	2	AMP indicates development in Arthurs Pass constrained by location within National Park so longer-term planning for growth related capacity upgrades is not necessary
2	Malvern	Bealey Spur	No Public Water Supply															
3	Malvern	Grassmere	No Public Water Supply, District Plan states any private development here must meet DWSNZ and Fire Service Code of Practice.															
4	Malvern	Castle Hill	No power supply for treatment of supply with variable water quality	Village not yet developed fully to extent that is possible and consented	1	Village not yet developed fully to extent that is possible, current headworks infrastructure is sufficient for full development.	1	WTP requires upgrading to comply with Health Act and DWSNZ but upgrade difficult as treatment not adequate for an unprotected source catchment with variable water quality. Location makes access difficult for service.	2	N/a		3x 500m³ timber reservoirs, can store 5 x peak day demand	1	Reticulation provides sufficient capacity for the current level of development and is sufficient to meet increased demand from allocated connections not yet in use.	1	Capacity of infrastructure designed for full development of village, current and future growth likely considerably less than originally allowed for. Only constraints relate to Health Act and DWSNZ but this WTP has difficult access for service. Location makes access difficult for service and O&M costly.	2	Locate within current subdivided and serviced area, or downhill of this to the east to allow gravity feed - but this will require additional reticulation.
5	Malvern	Lake Coleridge	Surface water supply not an issue	Resource consent held by Trustpower and demand does not meet this consent capacity	1	Surface water source with no supply issues.	1	UV treatment will require renewal and emergency storage is being considered as currently WTP is the critical supply asset. Location makes access difficult for service.	2	N/a		None, emergency storage being considered	2	Reticulation provides sufficient capacity for the current level of development and is sufficient to meet increased demand from allocated connections not yet in use	1	Constraint to growth is renewal of UV treatment (only constraints relate to Health Act and DWSNZ) and provision for emergency storage, plus location makes access difficult for service and O&M costly.	2	Locate within or close to areas currently serviced
6	Malvern	Terrace Downs (Hororata Acheron RWS)	Surface water supply, consented water take would require amendment for growth, no data in AMP to indicate if water supplies sufficient to allow additional abstraction	Supplied by Dry Acheron scheme (see Hororata) which is at consented capacity. Consent renewal in 2020/2021.	3	Surface water source, uncertain if any additional abstraction over and above existing consent would be allowed in the future?	2	Chlorination only, may have turbidity issues, unsure if any treatment upgrade planned. Currently waiting for Rural Agricultural DWS to be completed to assess compliance	2	N/a	1	No storage issues highlighted in AMP	1	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth	1	Consented water take would require amendment for growth, no data in AMP to indicate if water supplies sufficient to allow additional abstraction	3	Private development presumed to restrict development within certain areas.
7	Malvern	Whitecliffs (Malvern Hills RWS)	Source is shallow well at MHRWS Hartleys. Abstraction not at consented capacity so some growth available. Unsure if water supply sufficient to allow significant growth though	Peak demand not yet at consent capacity. Consent renewal due 2044.	1	Abstraction capacity is consented capacity but peak demand well below this. Unsure if additional water is available from source to accommodate growth.	3	Chlorination only, seems to have issues with contamination in the reticulation but continual chlorination being looked at. SDC indicated treatment upgrades underway.	2	No mention of issues with booster pump capacity in AMP but may need to investigate further to assess adequacy of distribution capacity for growth	1	No mention of issues with storage capacity in AMP, assumed designed for maximum abstraction capacity, which is consented capacity	1	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth	1	Some growth available as demand below consented capacity but after that is reached unsure if water supplies sufficient to allow additional abstraction	3	Locate within or close to areas currently serviced
8	Malvern	Glenntunnel (Malvern Hills RWS)	Source is shallow well at MHRWS Hartleys. Abstraction not at consented capacity so some growth available. Unsure if water supply sufficient to allow significant growth though	Peak demand not yet at consent capacity. Consent renewal due 2044.	1	Abstraction capacity is consented capacity but peak demand well below this. Unsure if additional water is available from source to accommodate growth.	3	Chlorination only, seems to have issues with contamination in the reticulation but continual chlorination being looked at. SDC indicated treatment upgrades underway.	2	No mention of issues with booster pump capacity in AMP but may need to investigate further to assess adequacy of distribution capacity for growth	1	No mention of issues with storage capacity in AMP, assumed designed for maximum abstraction capacity, which is consented capacity	1	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth	1	Some growth available as demand below consented capacity but after that is reached unsure if water supplies sufficient to allow additional abstraction	3	Locate within or close to areas currently serviced
9	Malvern	Coalgate (Malvern Hills RWS)	Source is shallow well at MHRWS Hartleys. Abstraction not at consented capacity so some growth available. Unsure if water supply sufficient to allow significant growth though	Peak demand not yet at consent capacity. Consent renewal due 2044.	1	Abstraction capacity is consented capacity but peak demand well below this. Unsure if additional water is available from source to accommodate growth.	3	Chlorination only, seems to have issues with contamination in the reticulation but continual chlorination being looked at. SDC indicated treatment upgrades underway.	2	No mention of issues with booster pump capacity in AMP but may need to investigate further to assess adequacy of distribution capacity for growth	1	No mention of issues with storage capacity in AMP, assumed designed for maximum abstraction capacity, which is consented capacity	1	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth	1	Some growth available as demand below consented capacity but after that is reached unsure if water supplies sufficient to allow additional abstraction	3	Locate within or close to areas currently serviced
10	Malvern	Greendale	No details but supplied under MHRSW Hartleys - see Coalgate, Glentunnel, Whitecliffs															
11	Malvern	Hororata (Hororata Acheron RWS)	Shallow bore source, consented water take would require amendment for growth, no data in AMP to indicate if water supplies sufficient to allow additional abstraction. SDC have indicated there is limited water available.	Current both Dry Acheron and Hororata schemes (which supplies Hororata) at consented capacity. Consent renewal in 2020/2021.	3	Shallow bore and surface water sources, uncertain if any additional abstraction over and above existing consent would be allowed in the future. SDC indicated that water supply is a high constraint.	4	Major UV and chlorine treatment upgrades planned for 2017/2018 in AMP. Currently waiting for Rural Agricultural DWS to be completed to assess compliance	2	No mention of issues with booster pump capacity in AMP but may need to investigate further to assess adequacy of distribution capacity for growth	1	Hororata deemed to have insufficient storage capacity but project to assess this is programmed	2	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth	1	Consented water take would require amendment for growth, no data in AMP to indicate if water supplies sufficient to allow additional abstraction. SDC have indicated that water supply is a high constraint.	4	Locate within or close to areas currently serviced
12	Malvern	Springfield	Shallow well located adjacent to the Kowai River which has unachievable water restrictions when low. New consent recently granted. Major capacity upgrades required to accommodate growth, budgeted for in LTP.	Chlorinated surface water from a shallow well adjacent to Kowai River. Water take restrictions when river level is low are unachievable and less than the average winter day demand. New consent recently granted but long-term supply may still be an issue.	3	The water supply has sufficient capacity to meet current demands other than when water levels are low, but will require additional supply to accommodate growth.	3	Major treatment upgrades planned in 2016/2017. Any new source likely to also require treatment	2	Capital upgrades will be required to accommodate growth, budgeted for in LTP.	2	Capital upgrades will be required to accommodate growth, budgeted for in LTP.	2	The water supply has sufficient capacity to meet current demands but capital upgrades will be required if projected growth is to be accommodated.	2	Shallow well located adjacent to the Kowai River which has unachievable water restrictions when low. New consent recently granted but long-term supply may still be an issue. Major capacity upgrades required to accommodate growth, budgeted for in LTP.	3	Locate within or close to areas currently serviced
13	Malvern	Sheffield and Waddington	Two shallow wells with peak demands over consented and abstraction capacity. New consent applied for in 2000 but not yet granted due to issues with water supply limitations. Major infrastructure upgrades also required, including pump upgrades, mains duplication and treatment plant upgrades, budgeted for in LTP.	Resource consent currently being renewed but having major issues	4	Water take consent issues due to water supply, shallow wells on the Hawkins River	4	Major treatment upgrades planned in 2018/2019. Any new source likely to also require treatment	2	Major capital upgrades including pump upgrades required to accommodate growth, budgeted for in LTP.	3	Abstraction capacity below peak demand, will require additional abstraction and/or storage capacity if restrictions are to be avoided. Reasonable use, demand management and leak detection should be considered in conjunction with any upgrade planning.	3	Further investigation and analysis required to confirm the adequacy of distribution capacity for growth but likely mains duplication would be required.	2	Two shallow wells with peak demands over consented and abstraction capacity. New consent applied for in 2000 but not yet granted due to issues with water supply limitations. Major infrastructure upgrades also required, including pump upgrades, mains duplication and treatment plant upgrades, budgeted for in LTP.	4	Locate within or close to areas currently serviced
14	Malvern	Darfield	New bores required, uncertainty regarding quality and quantity of available water	Current consent of 83L/s is reached during peak flow on peak day. Buffered by storage. New bore and consent required 2022	2	Source pump up to 130 L/s, additional bore pump capacity required from 2022	2	No WTP in place, E.coli monitoring continuing to monitor new SH73 bore compliance	2	Distribution pump up to 135 L/s, additional distribution pump capacity required from 2022	2	Storage provides some ability to meet peak hour flow for short durations, but this will diminish as growth increases	2	Local upgrades likely required for maintaining pressure / flow LOS once location of new bore confirmed	2	Up to approx. 3,080 total connections in scheme before new well required in 2022. Reticulation may have local under capacity - needs further investigation to identify any upgrades required depending on new bore location	2	Locate at north end of scheme near bore to utilise pump pressure (assumes new bore in 2022 will be located at / in vicinity of existing SH73 bore)
15	Malvern	Kirwee	Demand management will allow some growth otherwise require capacity increase of existing bore or new bore, both of which have a possibility of having treatment issues. SDC indicated that a water take consent variation has been obtained (July 2015) with increased instantaneous and daily rates/volumes.	Current peak day demand was over consented capacity (requires storage buffer). Demand management may help this or new bore/upgrade capacity but possibility of issues with this. SDC indicated that a water take consent variation has been obtained (July 2015) with increased instantaneous and daily rates/volumes.	1	Non-secure deep bore, abstraction capacity is consented capacity. Upgrade of existing required to meet new consent variation, this or a new bore may both to have treatment but likely to be minor.	2	UV to be installed 2015, treatment required due to risk of contamination from septic tank plume	2	Distribution pumping up to 53 L/s which is well above abstraction but required to buffer peak flows from reservoir.	1	Reservoir is used to buffer peak flows but requires between 50-70% drawdown. Use of demand management to accommodate growth will reduce this buffer drawdown. This situation will be slightly better due to new consent variation.	1	Distribution capacity up to 53 L/s to meet current demand, may require local upgrades to maintain pressure/flow Level of Service	2	Growth related infrastructure upgrades will be required in the next two to five years if growth is to be accommodated without demand management. Capacity increase in existing well may require treatment systems, or a new bore located outside of the risk area for potential contamination from septic tank plume. New consent variation granted in July 2015 will help aid growth but upgrade to increase capacity of abstraction still required.	2	Existing bore is located quite central, locate growth within existing serviced area, close to ex bore or as new bore likely to be located to north to avoid septic tank plume area then develop NW of town
16	Ellesmere	Dunsandel		9 L/s headroom in consent vs. current peak day demand. Adequate for current and 2046 demand	1	Pump can abstract 24.7 L/s, second source required for resilience	2	UV plant currently not compliant, upgrade is programmed for 2015 Intensifying land use and irrigation may increase E.coli occurrence from shallow g/w supply (previously detected in Dunsandel)	2	Pumps can deliver up to 35 L/s, adequate for future peak day flow Generator required for resilience	2	Additional storage required to buffer peak demand and future fire flow	2	Some local upgrades likely required where growth is located	2	Generally capacity is available, but infrastructure upgrades required for resilience and to buffer peak flows: - Additional storage required for buffering peak day demand - UV upgrade for DWSNZ compliance required, generator for PS resilience during power outage (2015) - Additional source required (2019-2025)	2	
17	Ellesmere	Doyleston	High quality and quantity water is available	Approx.. 22 L/s headroom in consent vs. current peak day demand	1	New wells required for future growth, or development of existing wells at 2015, 2024 and 2034 (20 L/s each bore). SDC indicated Gallipoli #1 well development planned for 2015 as required.	2	No water treatment, Gallipoli #1 and #2 not secure (backflow). Intensifying land use and irrigation may increase E.coli occurrence from shallow g/w supply - water treatment may be required in future (not growth	2	No power supply during power outages	2	Increased storage required for peak day demand (additional capacity planned in Year 1 of AMP)	2	Localised upgrades to reticulation likely required	2	New bores required - no growth until bore capacity can meet forecasted demand, SDC indicated Gallipoli #1 well development planned for 2015 as required. Additional storage for forecasted peak day demand also required and planned	2	Generally flexible - new bores can go anywhere around north / north-east boundary. Suggest avoiding existing flood issue areas in west.
18	Ellesmere	Leeston	High quality and quantity water is available	22 L/s headroom in consent vs. current peak day demand	1	New wells required for future growth, or development of existing wells at 2015, 2024 and 2034 (20 L/s each bore). SDC indicated Gallipoli #1 well development planned for 2015 as required.	2	No water treatment, Gallipoli #1 and #2 not secure (backflow). Intensifying land use and irrigation may increase E.coli occurrence from shallow g/w supply - water treatment may be required in future (not growth constraint)	2	Pump control between PS results in some consumers getting below 310kPa LOS supply pressure during evening peak demand	2	No storage, some resilience required?	2	3 hydrants failed FW2 test in hydraulic model (DN50 pipe), general may be upgrades required to existing reticulation depending on location of new bores or redevelopment of existing bores	2	New bores required - SDC indicated Gallipoli #1 well development planned for 2015 as required.	2	Generally flexible - new bores can go anywhere around north / north-east boundary. Suggest avoiding existing flood issue areas in west.

Water Supply Assessment

Specific figures relating to predicted populations and subsequent timing of growth have been pulled from Water Supply Model Reports, refer Section 3.1 in this report

CONSTRAINT SCORING	
1	No constraints
2	Minor constraint
3	Medium constraint
4	Major constraint

				WATER															
Opus Area No	Ward Name	Township Name	Major Source Constraint	Consent	Consent Score	Source	Source Score	WTP	WTP Score	Pump Station	Pump Station Score	Storage	Storage Score	Reticulation	Reticulation. Score	Summary of Key Constraints	Summary Constraint Score	Suitable Growth Areas
19	Ellesmere	Southbridge	High quality and quantity water is available	Approx. 22 L/s headroom in consent vs. current peak day demand. Peak demand not expected to exceed consent until approx. 2034	1	New well (20 L/s), or development of existing well, in 2019	2	Non-secure bores, some turbidity issues, twice weekly sampling undertaken for DWSNZ reporting compliance Intensifying land use and irrigation may increase E.coli occurrence from shallow g/w supply - water treatment may be required in future (not growth constraint)	2	No issues reported	1	No storage, some resilience required?	2	Low pressure reported in DN50 pipe, but scheme designed for water supply purposes and not fire flow. Growth will need to allow for upgrades to local reticulation to maintain pressure / flow LOS.	2	Up to approx. 350 total connections in scheme before new well required in 2019. Reticulation may have local under capacity in some areas (DN50 pipe) - needs further investigation to identify any upgrades required	2	
20	Ellesmere	Rakaia Huts	Groundwater source with no issues with demand exceeding consent	Peak day demand is well below the consented take despite all connections allocated and most utilised	1	Groundwater source with peak demand less than consented and abstraction capacity available	1	No treatment, secure groundwater source	1	No issues reported, water supply was developed with sufficient capacity to serve the subdivision but unsure if distribution capacity enough to allow growth beyond subdivision	2	No issues reported, water supply was developed with sufficient capacity to serve the subdivision but unsure if distribution capacity enough to allow growth beyond subdivision	2	No issues reported, water supply was developed with sufficient capacity to serve the subdivision but unsure if distribution capacity enough to allow growth beyond subdivision	2	Water supply was developed with sufficient capacity to serve the subdivision (most allocated connections utilised) but unsure if distribution capacity enough to allow growth beyond subdivision. AMP states that not intended that this supply area be extended.	2	Locate within or close to areas currently serviced, preferably closer to the PS
21	Ellesmere	Taumutu	Groundwater source, demand at consented capacity but unlikely to have additional growth	Peak day demand was at consented capacity but AMP indicates it has come down a bit recently. Additional growth may require new consent	2	Groundwater sources, unsure if abstraction capacity is same as consented but assume scheme designed to meet existing population only	2	No treatment, secure groundwater source	1	No issues reported, water supply was developed with sufficient capacity to serve existing scheme but unsure if distribution capacity enough to allow growth beyond this	2	No storage	1	No issues reported, water supply was developed with sufficient capacity to serve existing scheme but unsure if distribution capacity enough to allow growth beyond this	2	Water supply was developed with sufficient capacity to serve the scheme which is fully connected and utilised but unsure if distribution capacity enough to allow growth beyond subdivision. AMP states that no additional connections anticipated	2	Locate within existing scheme

WW, SW and LD Assessment

CONSTRAINT SCORING	
1	No constraints
2	Minor constraint
3	Medium constraint
4	Major constraint

		Wastewater								Stormwater								Land Drainage			
Ward Name	Township Name	Reticulation Capacity	Traffic Light scoring	PS Capacity	Traffic Light scoring	WWTP/Treatment Capacity/Consent/Discharge	Traffic Light scoring	Constraints	Suitable Growth Areas	Reticulation Capacity	Traffic Light scoring	PS Capacity	Traffic Light scoring	Treatment or Discharge Location/Consent	Traffic Light scoring	Constraints	Suitable Growth Areas	Reticulation Capacity, Structures	Constraints	Suitable Growth Areas	General Comment
Malvern	Arthurs Pass	Minimal reticulation in network, most houses have own septic tank	1	N/A, pump chamber as part of treatment	1	Capacity at the treatment/discharge at southern end. Rest on septic tanks. Location makes access for service difficult and O&M costly.	1	None - PS and WWTP and consents all deemed to be underutilised even in peak periods. location makes access for service difficult and O&M costly.	South of town seems to have most space and can discharge to existing sand soakage disposal area. Elsewhere will require own septic tank	Assumed ok as issues appear to be due to treatment/discharge rather than the reticulation - but some flooding on private property not within SDC scope	1	N/A	1	Soakage trench has capacity issues during large rain events but this mainly for large impervious areas of carparks. Rest of properties have private system with channels/drains/pipes discharging to land/river, some flooding issues in different places in town	2	No further flow should be directed to soakage trench. Anynew development would need private SW system with soakage to land/streams/river	Avoid centre of town where issues known, otherwise anywhere ok based on constraints	N/A	Area to the north in the village is protected from river flooding by the stopbank. Suggest to minimise growth in the north area where possible	South is better as protected by railway and more of a flood plain, avoid northern part of village	Town can service some growth for SDC network but otherwise private WW&SW are likely, O&M costly for any additional network. Remote, so likely to have limited growth anyway and location makes access for service difficult.
Malvern	Bealey Spur	No WW or SW in this Development Area. GIS shows small settlement with approx. 30 subdivided lots, no services. Growth would require cutting out forestry land as bound to north east by rivers.																			
Malvern	Grasmere	Appendix 22 states that the sewage treatment and disposal needs to be reticulated but no assets in GIS. Assume all private and system designed for full development of residential and tourist area.	N/A	N/A		Assume all private and system designed for full development of residential and tourist area.	N/A	Still appears as if growth in defined residential and tourist areas is possible, assuming private WW system installed which accounts for full development	Residential and tourist development area are already defined, also no development of grassland area or Mt Romulus	N/A		N/A		N/A		Based on plans assume SW treatment and disposal is via landscaping on each lot and no one service.	Residential and tourist development are are already defined, also no development of grassland area or Mt Romulus	N/A	N/A	N/A	Limited data on this Development Area from Appendix 22. GIS shows small settlement with max 16 residential subdivided lots plus space for tourist acme, no SDC services so assume all private. Growth in defined areas only. Grassland and Mt Romulus are no go areas
Malvern	Castle Hill	Assume there is some due to design of other WW components	1	N/A	1	Capacity according to design and consented discharge. location makes access for service difficult and O&M costly.	1	Currently designed for 366 PE but only 100 full and 95 half charges connected, peak flows below consented discharge but higher than expected based on population (O&I a possible issue)	North of current town or exit towards ponds, unsure of reticulation capacity may require new pipework to DN200 trunk down to oxidation ponds. Thomas River to the south is good southern boundary. Current town notat capacity so infill in here first as all serviced up. Difficult access for service.	No known issues, assumed design capacity for fully developed town	1	N/A	1	To swales, open drains, soakage trench or Thomas River	1	Condition of flume (discharge to Thomas River) is moderate. No indication of flooding issues in current swale/drain network	Anywhere within or to the north of the Thomas River to make the most of the existing network and discharge point.				Town is not yet fully developed with plenty of capacity (based on design) left in area that is fully serviced. Remote and unlikely to get many full time residents, more likely additional holiday houses. Location makes access for service difficult and O&M costly.
Malvern	Lake Coleridge	Assume there is some due to design of other WW components	1	Yes	1	Yes. location makes access for service difficult and O&M costly.	1	None - PS and WWTP and consents all deemed to be underutilised even in peak periods. Only issue is difficult access for service and costly O&M.	Anywhere, but based on aerials the new pipework to south-east of town Acheron Ave would be best reticulation to connect into without having to build new	N/A as all small lengths of pipes and discharge to ground/surface water	1	N/A	1	To land or surface water, no restrictions other than ground conditions which are poor draining in some areas. location makes access difficult for service.	2	Ground conditions may be poor in some areas. No consent yet but global consent sought	Anywhere but worth investigating land for ground conditions, avoid close to Ryton Place.	N/A	N/A	N/A	Town can service growth but still predominantly holiday houses here and not full time residents. Remote and likely to have limited growth, difficult to access
Malvern	Terrace Downs	Assumed system designed for full development of Terrace Downs, including all accommodation, lodge, recreational sites. Any new growth areas not included though so will need to service themselves	N/A	N/A		Discharge to land, assumed to be sized based on full development. Any new growth areas not included though so will need to service themselves	N/A	Any growth outside of Terrace Downs development will need to be serviced privately or new system installed	Anywhere	N/A		N/A		N/A		Existing Terrace Downs Development has a lot of lakes and drains, assumed this sufficient for existing treatment/discharge. New growth will require servicing privately	Anywhere	N/A	N/A	N/A	Assumed existing Terrace Downs Development has been designed to service full proposed development of site. Any new growth outside of this will need to be serviced privately or new system installed. Plenty of available farmland.
Malvern	Whitecliffs	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	Flooding issues from upper catchment (hills). AMP states work require with community to assess if upgrade of current capacity required or new flood diversion channel. Unlikely that growth/development in town will increase flows much but any will flows will exacerbate issue	2	N/A		Appears to discharge to Selwyn River, no known issues but no current consent	1	Capacity of current drain network during wet weather does not appear to be sufficient, upgrade or flood diversion required to resolve issue, with appropriate discharge consent.	Anywhere	Wairiri Valley Drainage District does not cover the township	N/A	N/A	No WW, LD services. Existing SW network currently has issues from upper catchment (from hills) and while its unlikely that growth in the town will worsen this to any great extent it is still a constraint. Existing subdivision lots between Cass and Hector St (plus a few more elsewhere) which are not developed so these sites are recommended first
Malvern	Glentunnel	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	No known issues identified, assume capacity of pipes/swale/drains ok	1	N/A		Discharges to Surveyors Gully or the Selwyn River, no known issues but no current consent	1	None	Within catchment serviced by existing network would be recommended	N/A	N/A	N/A	Area to the south has school, campground and golf course so limits development. Some empty lots in town so infill recommended first, then area to north below hills
Malvern	Coalgate	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	N/A	N/A	N/A	Plenty of sections in town which appear to have been subdivided but not yet developed, so infill would be recommended first
Malvern	Greendale	No WW or SW in this Development Area (but has water). GIS shows two small settlements (1.5km between) with approx. 20 subdivided lots, most with a property on it.																			
Malvern	Hororata	Septic tanks		Septic tanks		Septage disposal to 2 sites. Consent expires 2016 and likely issues with re-consenting due to heavy metal concentrations at existing site. Alternative site required or dispose to other SDC or CCC plants	2	Currently disposal site has plenty of consented capacity but this expires 2016. New site is likely to be required from this point. Can use ESSR (SDC) or Bromley (CCC) for disposal for extra cost.	Does not matter as tankered from township to septage disposal site	Flooding issues due to flows from upper catchment and natural springs after rain. Plans to develop a Master Plan to improve flood flow capacity. Some areas could have growth without adding to the problem area. Abandoned water races also adding to the stormwater issue	2	N/A		Discharges to soak/ground pits and Hororata River - no mention of issue with discharge so assume its just in pipes/drains to discharge point	1	Flood flow capacity is an issue, until the Master Plan is completed and improvements made any additional growth is likely to result in additional flooding unless growth to an area not affected.	NW, north of Cordys Road and west of Hororata Road, with discharge direct to Hororata River South of Bealey Road if discharge to Hororata River and not to road.	Hororata River Drainage scheme, no known issues with the river	None	Anywhere	No WW. SW issues but growth can proceed if the area doesn't contribute to existing reticulation/drain/channel network but discharges to Hororata River elsewhere. Good areas include NW, north of Cordys Road and west of Hororata Road, with discharge direct to Hororata River. South of Bealey Road if discharge to Hororata River and not to road.
Malvern	Springfield	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	Small number of swales to soakholes, no known issues	1	N/A			1	Soakholes, maintained by roading, no known issues	Most growth will need to be serviced privately or new soakholes built	Anywhere	N/A	N/A	N/A	There appears to be approx. 20 lots in the village which are subdivided but not built on so infill of these sites is recommended first
Malvern	Sheffield and Waddington	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	N/A	N/A	N/A	No WW, SW, LD services. The appears to be subdivided lots at NW edge of town (west of Queen St) and also in between Sheffield and Waddington which are not developed so these sites are recommended first
Malvern	Darfield	Septic tanks		Septic tanks		Septage disposal to 2 sites. Consent expires 2016 and likely issues with re-consenting due to heavy metal concentrations at existing site. Alternative site required or dispose to other SDC or CCC plants. Future may see restrictions on new private septic systems and SDC may look at reticulating the network.	3	Currently disposal site has plenty of consented capacity but this expires 2016. New site is likely to be required from this point. Can use ESSR (SDC) or Bromley (CCC) for disposal for extra cost. Future may see restrictions on new private septic systems and SDC may look at reticulating the network.	Does not matter as tankered from township to septage disposal site. Future may see restrictions on new private septic systems.	There is limited stormwater network scattered around the township, no known issues with the existing but a SWMP to be completed to assess how to account for future growth	1	N/A		Discharge to soak pits or ground (via swales), all consented and no known issues. SWMP may identify needs for future growth	1	Most developments construct own SW swales/treatment/discharge and this would continue to be the case with SDC then taking over network and consent	Growth within the existing SW swales/treatment area to northwest of township which already has SW network developed or elsewhere with SW to be service privately.	N/A	N/A	N/A	WW to septage disposal, future may see restrictions on new private septic systems and SDC may look at reticulating the network. Existing SW services limited but new developments appear to construct own reticulation/treatment/discharge which then gets taken over by SDC. Area to NW not fully developed and has network, or anywhere else ok if SW serviced privately or new system installed. Domain in centre of town to be avoided.
Malvern	Kirwee	N/A		N/A		N/A		All growth will need to be serviced privately or new system installed	Anywhere	No known issues with ex. swales, soakholes or basins.	1	N/A		No known issues with ex. swales, soakholes or basins.	1	There are limited serviced areas in town, the rest would need to be serviced privately or new system installed	Growth within the existing development area to north of township which is semi-serviced, or around Glen Oak drive. Otherwise needs to be serviced privately or new system installed	N/A	N/A	N/A	No WW, limited SW services. Existing subdivided developments to the north of township and around Glen Oak drive not yet fully developed so recommend these areas first. Elsewhere domain and cemetery take up next most suitable area
Ellesmere	Dunsandel	Septic tanks		Septic tanks		Septic tanks		No data found on the on-site disposal system, just mentioned under the Ellesmere STP that Dunsandel was to continue using its existing system	Anywhere	Flooding during moderate events, assume due to lack of capacity or lack of SW system rather than issues with discharge as discharge is to land/or land drainage network. SDC have indicated only in isolated areas and not really any constraint.	1	N/A	1	Flooding during moderate events, assume due to lack of capacity or lack of SW system rather than issues with discharge as discharge is to land/or land drainage network. SDC have indicated only in isolated areas and not really any constraint.	1	Flooding, so either need to upgrade reticulation or put in new network to resolve flooding - SDC have indicated flooding is isolated and minor so no real constraint.	No restrictions due to SW as flooding is isolated. Assume that any new growth will need new private servicing	N/A	N/A	N/A	Unsure where flooding occurs or why but SWMP might identify issues and options. SDC have indicated flooding is isolated and no constraint to growth, growth can therefore be anywhere as all areas will need new systems
Ellesmere	Leeston	Minimal, AMP indicates scheme occasionally reach the design flow max for the current population, no more details on reticulation	2	Assume minimal extra capacity but not confirmed in AMP. Cunningham PS (north of town) is newer and larger and most likely to have spare capacity	2	Ellesmere STP. No growth possible until after upgrade proposed 2015-2019, then growth allowed for before another upgrade required in 2033	2	- Initial constraint of no growth until after proposed Ellesmere STP upgrade 2015-2019. - Secondary constraint of maximum population growth in Leeston/Doyleston/Southbridge to a population of 5125 before additional upgrade required.	To NE or E of town to be close to STP but not too close. Critical assets to NE so can upgrade these at same time. Cunningham PS to N is one of the largest also so perhaps in this area. Possibly to SW as still close to STP but take PS not as big. New pipework (gravity) and/or new PS may be needed.	Minimal, flooding an issue in the west due to upper catchment, upgrades are underway to mitigate this issue.	3	N/A	1	Main creek through town full during heavy rain due to upper catchment, discharge might be ok downstream of town. SW consenting issues.	3	Land drainage drain that SW discharges to restricts flow, resulting in local flooding	East with a discharge to Vocksted Drain south east of town (backwater effect may still cause issues in town?) or south. Bypass of Leeston Creek (north to south) might be constructed meaning north might be ok too.	Leeston Creek and other LD drains in town undersized for flows from township and upper catchment. Plus addition of flows from Ellesmere STP downstream exacerbates issues.	NE if flows can be conveyed far enough downstream on Voldman Drain to now backwater effect town. Or SW of town, but avoid NW area as this is the area having current issues.	SW mitigation measures required to help alleviate flooding issues	NE of town as close enough to Ellesmere STP and maybe able to discharge SW to LD drain Further downstream on Voldman Rd. Or S W of town. Avoid area NW of town due to LD/SW issues and cannot build too close to STP due to odour and expansion.
Ellesmere	Doyleston	Minimal, AMP indicates scheme occasionally reaches the design flow max for the current population, no more details on reticulation	2	Pump stations are very small, assume minimal extra capacity but not confirmed in AMP	2		2		To west closer to Ellesmere STP but new pipework needed wherever growth is	Minimal, local reticulation/drains backwater effected by LD drains so difficult to tell	3	N/A	1	None, discharge LDs full during heavy rain due to high GW.	3	Land drainage drain that SW discharges to restricts flow, resulting in local flooding, both Drain Road North and Boggy Creek	Possibly west as long as it drains to Osbourne Drain and not as per ex to Drain Road drain or Boggy Creek. BUT unsure if this will also have issues (AMP talks about early warning level transducer in Osbournes Park Drain)	Part of Leeston Rural land drainage scheme. See issues between stormwater and land drainage.	No data supplied on issues in LD other than those from SW AMP	N/A	To west of township as closer to Ellesmere STP and possibly discharge SW to Osbourne Drain (although this may be issue as connects DS with Drain Road drain)
Ellesmere	Southbridge	Minimal, none after 56 lots for PC34	2	Growth accounted for in assessment of PS upgrade required, anything over requires new PS or additional PS	3		2		To east closer to Ellesmere STP but new pipework needed wherever growth is	Minimal, flooding an issue in the west	2	N/A	1	Main creek through town full during heavy rain due to high GW and upper catchment flow. Discharge might be ok downstream of town	3	Creeks that SW discharges to floods due to upper catchment	Probably east as no mention of flooding issues or issues with drains in this area but need to check if able to discharge to here	N/A	N/A	N/A	Main constraint is the WW system and Broad St PS, however flooding issues are also a concern. Best growth location to the east of town to avoid flooding and be close to Broad St PS
Ellesmere	Rakaia Huts	N/A		N/A		N/A		Campground appears to have own septic tank and discharge to land. No other WW system in village so growth would need to be serviced privately, assume other sites on septic tanks?	Anywhere	Only part of village serviced, capacity appears ok as flooding due to river mouth and not reticulation. Unsure if reticulation at capacity or has spare capacity	1	N/A	1	Storm surge blocks pipe, project is scheduled to investigate culvert upgrade. Climate change is likely to result in sea level rise, coastal and river erosion issues and additional issues relating to the Rakaia River. These are high risk issues for this township.	3	Main constraint is predicted issues due to climate change, bigger storms, sea level rise, coastal and river erosion, issues with the Rakaia River.	Position growth as far away from the coast as possible to avoid the risk of coastal and river erosion and ponding when the spit isn't open.	N/A	N/A	N/A	WW is serviced privately, limited SW. Main issue is the forces of nature and predicted climate change
Ellesmere	Taumutu	N/A		N/A		No WW service provided by SDC but likely big issues for septic system due to location close to Lake Ellesmere, both cultural and environmental restrictions. Might look at connecting to WW network at Southbridge.	4	All growth will need to be serviced privately (but difficult due to major constraints) or new system installed to connect to Southbridge	All areas not suitable for additional discharge to land or water.	N/A		N/A		N/A		Some SW channels through farmland which discharge to LD but no data on them. Assume all growth will need to be serviced privately or new system installed but can discharge to SW/LD channels	Anywhere, closer to discharge to SW/LD channels or down by water with discharge direct to Lake Ellesmere	Scheme consists of 4 culverts, no indication that these have capacity issues, upgrade required due to seadamage	Culverts mainly take flow from LD channels across farmland, which are used to drain land to make it productive for use. Growth unlikely to impact on these	Anywhere	Major constraint is location adjacent to Lake Ellesmere which has high cultural and environmental significance and also puts the settlement at risk from climate change effects. The WW network could possibly be connected to Southbridge but likely at considerable cost.