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Infrastructure Capacity Review

CLAREMONT TOWN CENTRE ACTIVITY CENTRE PLAN

Town of Claremont

JDS191761

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INTEGRITY

We are open, honest, and consistent in our principles and conduct, so we're able to build trusted relationships with our clients and partners.

RESPECT

We treat everyone with respect and dignity and develop relationships founded on understanding and trust.

ACCOUNTABILITY

We always assume responsibility for our actions and make decisions in line with our economic, social, and ethical obligations.

EXCELLENCE

We pursue excellence in everything we do, challenging ourselves to look beyond the obvious and ensure ongoing improvement.

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Table of Contents

Appendices

1 Introduction

JDSi Consulting Engineers have been commissioned by the Town of Claremont to undertake an Infrastructure Capacity Review to inform the development of the Claremont Town Centre Activity Centre Plan (ACP). This report summarises the results of a review of the existing infrastructure to support the proposed development on the subject site.

The Town of Claremont's the key objectives of this report were for JDSi to undertake:

- Assessment of the current quality and capacity of infrastructure servicing the Claremont Town Centre to service development growth.
- High Level assessment of the geotechnical capability of land within the Town Centre to support increased development and sub-terrain development. Identify where sub terrain development may be limited.
- Identification of current or potential issues/constraints to service infrastructure provision and broad solutions suitable for the Town to manage/progress.
- Broad identification of infrastructure or geotechnical issues could be a barrier to future growth.
- Consultation with service utility providers and government authorities on matters relative to service infrastructure.

2 Proposed Development

The Town of Claremont has divided the proposed redevelopment area into a number of precincts and sub precincts which are indicated below:

Figure 1: Proposed Redevelopment Precincts

The Town of Claremont has also provided expected development yield scenarios which we have simplified and summarised below. Note, only an overall commercial area has been provided at this stage. This has been apportioned on a pro-rata basis across the precincts, based on an earlier breakdown configuration provided by the Town of Claremont:

.	Residential (No.)		Commercial Area (m2)	
Sub-Precinct	**Min**	**Max**	**Min**	**Max**
C1	32	72	464	668
C2	61	73	2,510	3,256
C3	49	101	585	954
C4	96	112	995	1,284
C5	99	178	829	1,486
C6	54	73	1,393	1,948
C7	49	61	873	1,321
C8	102	276	1,218	1,837
C9	50	50	804	1,211
C10	30	44	687	1,016
C11	75	92	656	1,033
C12	84	142	809	1,185
Precint C sub-totals	**781**	**1,274**	**11,822**	**17,197**

E1	74	96	1,051	1,725
E2	47	61	329	657
E3	0	66	1,070	4,219
Precinct E sub-totals	**121**	**223**	**2,450**	**6,601**
S1	56	62	1,662	2,282
S2	0	0	1,487	1,938
S3	103	154	243	478
Precinct S sub-totals	**159**	**216**	**3,392**	**4,699**
W1	72	155	953	995
W2	73	154	954	996
W3	62	82	607	892
Precinct W sub-totals	**207**	**391**	**2,515**	**2,883**
N1	46	96	57	348
N2	110	110	0	0
N3	16	16	0	0
N4	0	0	0	0
N5	54	110	155	808
Precinct N sub-totals	**226**	**332**	**211**	**1,156**
TOTALS	**1,494**	**2,436**	**20,390**	**32,536**

Table 1: Redevelopment Yields

Refer ***Appendix A*** for Full Concept Master Plan and Full Development Yield Tables.

3 The Study Area

The site is known as the Claremont Town Centre and has an area of approximately 29ha. The Claremont Town Centre currently supports considerable and significant heritage offered by Bay View Terrace built form and various landmark buildings/sites listed with the National Trust, on the State Register of Heritage Places and on the Town of Claremont Local Government Inventory. The Town Centre currently supports shop/retail, office/business, residential, service industry, entertainment, recreation, health and welfare as well as other retail uses. Both existing public and private car parking is available throughout the Town Centre.

Figure 2 – ACP Area

3.1 Topography

The majority of the site is populated with existing roads and buildings with considerable elevation differences throughout. South of Stirling Highway, the area grades from 16m AHD at Queenslea Drive to 8m AHD at Bernard Street. North of Stirling Highway, the eastern portion of the site grades in a northerly direction from 9m AHD to 17m AHD at Gugeri Street, whereas the western portion of the site has minor elevation differences with the majority around 15m AHD.

3.2 Groundwater

The Perth Groundwater Atlas indicates groundwater levels at the end of summer 2003 were approximately 1m AHD across the site. This equates to approximately 7.0m to 15.0m below existing

ground levels. Therefore, it is anticipated that dewatering will not be required unless significant underground structures such as carparks are built as part of the redevelopment.

Figure 3 – Groundwater Levels

3.3 Desktop Geotechnical Review

The Desktop Review undertaken indicates that the subject site is located on the Swan Coastal Plain within the Spearwood dune system. The Spearwood system has a core of sandy aeolianite with a capping of secondary limestone overlain by yellow brown siliceous sands with weak podzol development. The system is characterised by an undulating surface, with some higher ridges and hills, and hollows representing dune swales.

The under lying sand is expected to be pale and olive yellow, medium to coarse-grained, sub-angular to sub-rounded quartz. It typically has some ability to attenuate pollutants due to small clay content and usually has considerable depth to the water table due to topography.

Tamala Limestone itself is light, yellowish brown, fine to coarse-grained, sub-angular to well rounded, quartz trace to feldspar. It has variable bearing capacity dependent on the degree of cementation. Solution cavities and fissures can lead to settlement under load and offer an easy path for pollutants down to the water table.

Approximately 90 – 95% of the site is anticipated to comprise sand derived from Tamala Limestone. The remainder of the site, the north-west pocket, is anticipated to comprise Tamala Limestone.

Most areas of the Spearwood dunes can support either urban or rural residential development. The limestone is an adequate foundation for most structures and, with compaction, the sands are also suitable.

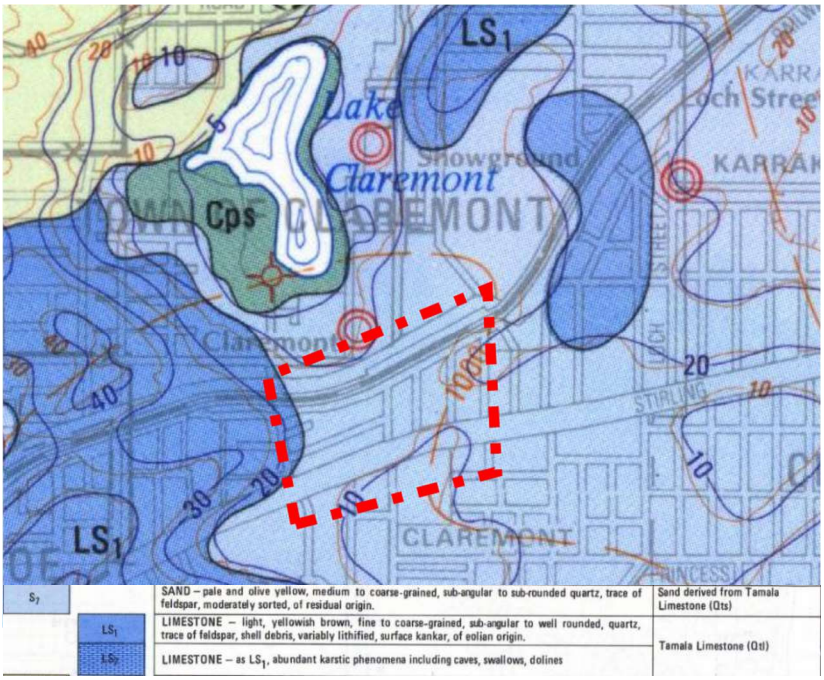

Figure 4 – Geological Context

3.4 Acid Sulphate Soils

Acid Sulphate Soil mapping compiled by Department of Water and Environmental Regulation indicates that the site is classified as having no known risk of Acid Sulphate Soils. Therefore, an Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) are considered necessary for the redevelopment works.

4 Earthworks

Earthworks for the redevelopment are expected to be undertaken on an as-needed basis for individual lots. Given the expected sand conditions of the site, it is anticipated a minimal amount of earthworks will be required to facilitate the redevelopment works.

The proposed earthworks strategy for the site will need to be based on a number of elements including:

- Providing flat sand building pads of sufficient elevation to accommodate drainage and sewer servicing.
- Retention of existing access points.
- Finished floor levels at least 0.3m above the 1% AEP flood level of the urban drainage system and roads.

Geotechnical investigations will be required to inform any detailed design works over the site. In particular, detailed advice will be needed for the required site preparation measures which are likely to include the following;

Site Stripping

Where required, all debris, and vegetation and significant tree roots (i.e. larger than 50 mm in diameter) should be stripped from the proposed development areas of the site.

Proof Rolling and Compaction

Following site stripping, the site should be proof rolled with a smooth drum roller of say 15 tonnes deadweight. Vibrating mode should be used with caution within 20 m of existing services or buildings.

Compaction control of sand could be carried out using a Perth sand penetrometer (PSP) test in accordance with test method AS 1289.6.3.3.

Any areas that show signs of excessive deformation during compaction should be compacted until deformation ceases or, alternatively, the poor-quality material should be excavated and replaced with suitable structural fill and compacted.

Import Filling

If required, imported filling should comprise free draining, cohesionless, well graded sand that:

- contains less than 5% by weight of particles less than 75 microns in size
- contains no particles greater than 150mm in size; and is free of organic & other deleterious materials

5 Wastewater

The Water Corporation owns and maintains all sewerage reticulation systems in and around the area. The surrounding catchment includes residential developments to the south, east, west and north. The catchment discharges in a north-westerly direction to the Swanbourne Wastewater Pumping Station on Fern Street.

According to the Water Corporation's records there are currently 2,896 existing services within the Town of Claremont with a further 57 unserved vacant lots.

Table 2 below outlines the existing infrastructure available to service each precinct. Precincts have been grouped according to serviceability from existing infrastructure, with existing infrastructure then checked for capacity and proposed upgrades identified where required. This assessment is limited as we note existing flows in and around the development area are unknown at this stage, so it is unclear if the infrastructure is adequately sized to cater for the additional flows when existing upstream flows are considered. Also, the design life, alignment relative to the development sites and depth of the infrastructure has not been taken into account. However, for the purpose of this assessment it gives an indication of any upgrades required:

		Capacity Check	
Precinct	**Street Name**	**Existing Pipe Size (mm)**	**Proposed Upgrades**
E1	Adjacent Leura Avenue	150	Nil
E2 - E3	Adjacent Mary Street	150	Nil
C2 - C5	Walt Drabble Lane	150	Nil
C1	Adjacent St Quentin Avenue	150	Nil
C6, C7, S1, S2	Stirling Highway	150	Nil
S3	Bernard Street	150	Nil
C8 - C10	St Quentin Avenue	150	Nil
W1 - W3	Chatsworth Terrace	150	Nil
N1, N5	Shenton Road	225	Nil
N4	Shenton Road	150	Nil
N2	Adjacent Claremont Crescent	150	Nil
N3	Shenton Road	610	Unknown
C11, C12	O'Beirne Street	305	Unknown

Table 2: Wastewater Capacity Assessment

Should any upgrades be required to infrastructure greater than diameter 300mm, Water Corporation will undertake as part of their Capital Investment Program as and when required. Any minor reticulation works (pipework less than 300mm diameter) required as part of the development are to be funded by developers.

When upgrades are required, Water Corporation typically recommends a consolidated approach to the requesting and programming of works to minimise disruptions and maximise cost efficiencies, however, due to the fragmented land ownership of the area this will likely be problematic.

6 Water Supply

The Water Corporation also owns and maintains the water reticulation system around the site. Pipework relevant to servicing the redevelopment is summarised in Table 3 below.

Precinct	Street Name	Existing Pipe Size (mm)
E1	Mary Street	75 Cast Iron
E2 - E3	Mary Street	75 Cast Iron
C2 - C5	Walt Drabble Lane	150 Ductile Iron
C1	Gugeri Street	150 Cast Iron
C6, C7, S1, S2	St Quentin Avenue	150 Steel
S3	Stirling Highway	760 Steel
C8 - C10	St Quentin Avenue	150 Reinforced Concrete
W1 - W3	Stirling Road	100 Cast Iron
N1, N5	Shenton Road	100 Cast Iron
N4	Stirling Road	100 Cast Iron
N2	Claremont Crescent / Stirling Road	100 Asbestos Cement
N3	Shenton Road	75 Cast Iron
C11, C12	O'Beirne Street	100 Asbestos Cement

Table 3: Existing Water Infrastructure

Until design plans are prepared for the site which details the number of fittings etc. for each building it is difficult to determine the potable water demand. However, JDSi have calculated anticipated demand for the redevelopment based on the maximum yields provided. Calculations are based on Table 3.2 – Probable Simultaneous Demand for Multiple Dwellings from AS3500.1 – Plumbing and Drainage part 1. A table outlining these calculations can be found below:

	Residential		Commercial			Total
Precinct	Proposed No. Dwellings[1]	Post Development Flow (L/s)	Area (m^2)[1]	Proposed No. Commercial Units[2]	Post Development Flow (L/s)	Total Flows (L/s)
E1	96	7.3	6,228	13	2.0	**9.4**

E2 - E3	157	10.4	17,604	36	3.8	**14.2**
C2 - C5	464	23.7	25,194	51	4.8	**28.5**
C1	72	6.0	2,411	5	1.2	**7.2**
C6, C7, S1, S2	196	12.3	27,037	55	5.0	**17.3**
S3	154	10.3	1,726	4	1.0	**11.3**
C8 - C10	370	19.9	14,670	30	3.4	**23.3**
W1 - W3	391	20.7	10,407	21	2.7	**23.5**
N1, N5	206	12.7	4,174	9	1.6	**14.4**
N4	0	0.0	0	0	0.0	**0.0**
N2	110	8.1	0	0	0.0	**8.1**
N3	16	2.3	0	0	0.0	**2.3**
C11, C12	234	14.0	8,008	17	2.4	**16.4**
		147.7			**28.0**	**175.7**

Table 4: Probable Simultaneous Demand by Precinct

We cannot determine what capacity the current infrastructure network has without pressure and flow tests or network modelling being undertaken by the Water Corporation. Should any upgrades be required to infrastructure greater than diameter 300mm, Water Corporation will undertake as part of their Capital Investment Program as and when required. Any minor reticulation works (pipework less than 300mm diameter) required as part of the development would be funded by developers.

When upgrades are required, Water Corporation typically recommends a consolidated approach to the requesting and programming of works to minimise disruptions and maximise cost efficiencies, however, due to the fragmented land ownership of the area this will likely be problematic.

7 Power Supply

The Claremont Town Centre is supplied with electricity from the existing Western Power distribution network shown below. The existing underground and overhead distribution network in the area represents a key technical interface between the 11,000 volt system fed from the Cottesloe Zone Substation and the older 6,600 volt system fed from the Nedlands Zone Substation. The Western Power 66,000 volt and 132,000 volt transmission network also passes through the Claremont Town Centre.

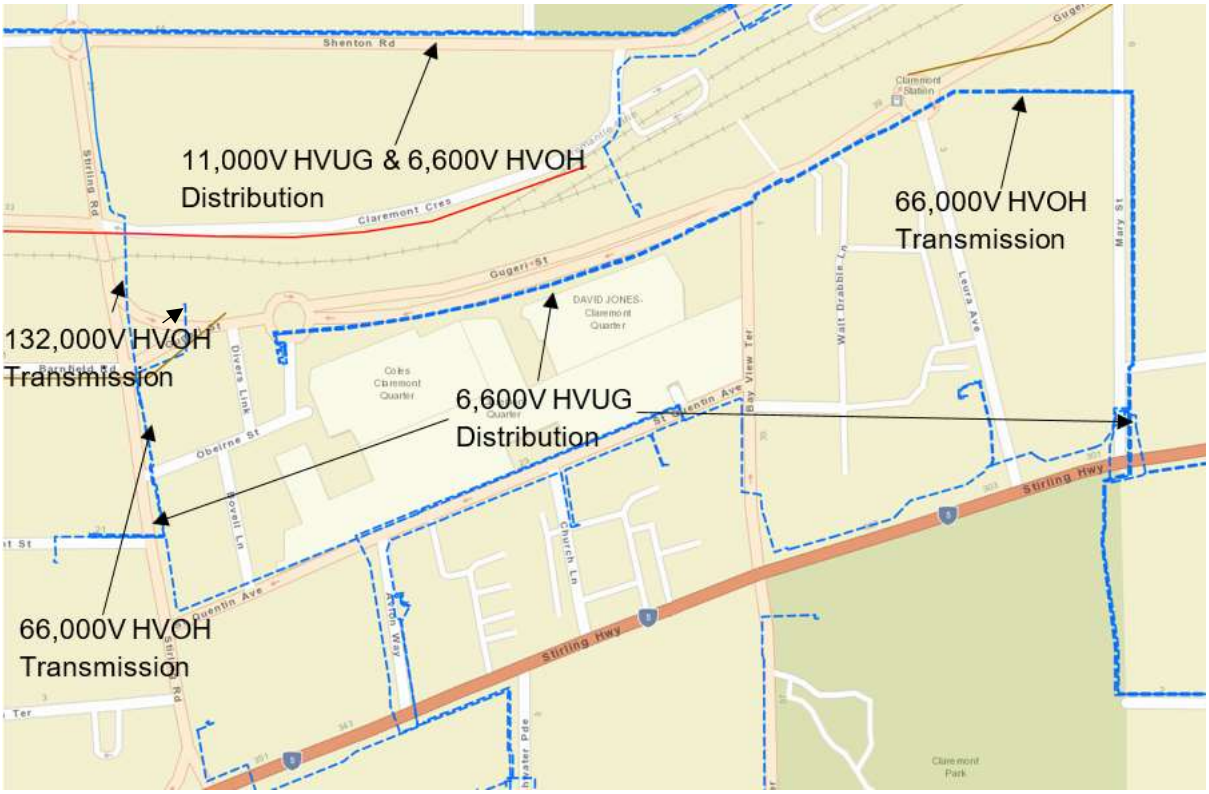

Figure 5: Existing Underground and Overhead Distribution Network

The maximum yield scenario requires a significant increase in electricity demand which is unlikely to be met by the existing 6,000 volt system currently feeding the town centre from the Nedlands Substation. The increase in electricity demand will likely be augmented by Western Power from the Cottesloe Zone Substation 11,000 volt system capacity, however this would be subject to the outcome of a feasibility study by the Utility.

The Western Power Network Capacity Management Tool indicates the current spare capacity available from Cottesloe for future development to be 20 MVA until 2026 and thereafter, 15 MVA until 2031. The forecast maximum demand for the proposed redevelopment is summarised in the table below and indicates a final power requirement of 13.8 MVA, within Western Power's forecast network capacity to 2031.

The calculations in table 5 are predicated on a power allowances of 20 Volt-Amps (VA)/Square Metre (sqm) for each square metre of commercial floor space and 5.4 kVA per residential dwelling in accordance with Western Power's Design After Diversity Maximum Demand (DADMD) Calculator. The 5.4 kVA allowance is for dwellings in the suburb of Claremont built on lots with a proposed use of more than 10 units with expected prices per dwelling in the maximum range for the area.

Claremont Activity Centre Maximum Electricity Demand Summary		
Type of Use	Area (sqm)/No. Dwellings	Maximum Demand (kVA)
Commercial Floorspace (sqm)	32,536	651
Residential Dwellings (No.)	2,436	13,155
Total kVA		**13,806 (13.8 MVA)**

Table 5: Forecast Maximum Demand

It should be noted the calculated 13.8 MVA power requirement is in addition to:

- The Claremont Quarter development
- The existing development at the intersection of Stirling Road and Stirling Highway.
- The Freshwater development on Stirling Highway
- Any other buildings shown as retained in the Town of Claremont's modelling.

Given Western Power does not reserve electricity network capacity for developers, it is recommended an application to Western Power for a Design Information Package (DIP) and/or a Network Feasibility Study is made as soon as practical by the Town of Claremont.

8 Gas Supply

JDSi has approached ATCO Gas to determine the capacity of the existing gas infrastructure for the proposed development area. Based on modelling undertaken using the yields provided, ATCO have advised that the existing network has the capacity to supply a total load of 954.55 SCMH at the development site without any reinforcement. This is believed to be adequate to supply the residential and commercial demands.

9 Telecommunications

JDSi approached the national broadband installation initiative, NBN Co. to determine the feasibility of the area being serviced with a high-speed internet connection. NBN Co. advised that fibre optic cables are in the area and given the size of the development, they are likely to be able to provide Fibre to the Premises (FTTP). However, until an application is put into their system they cannot confirm exactly what upgrades / relocations are required.

Given the fragmented land ownership and anticipated sporadic development of the activity centre, any costs attributed to the redevelopment would be applied at an individual development level.

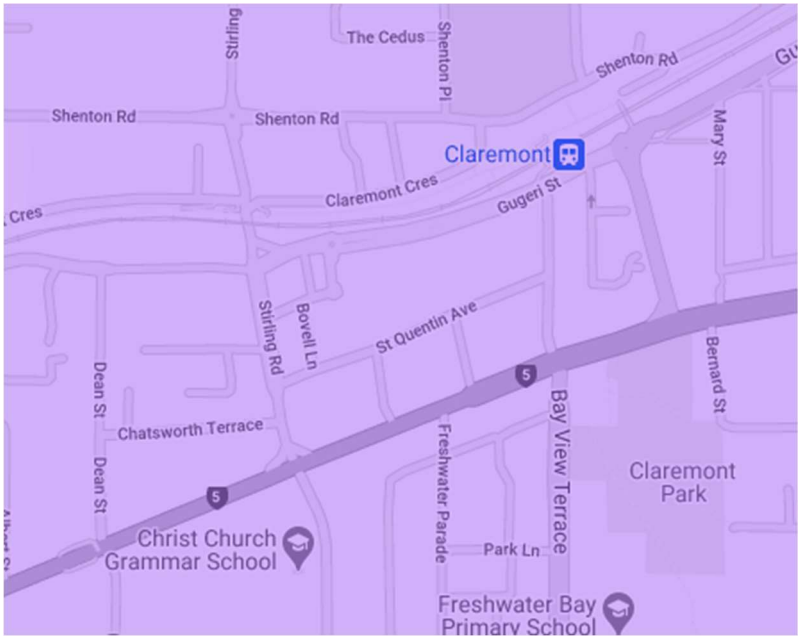

Figure 6 – NBN Coverage

10 Stormwater Drainage

Existing drainage infrastructure is present throughout the development area with a pit and pipe system utilised to drain the road network. It is expected that individual lots will handle their own drainage requirements as part of the redevelopment, however if flows to the existing network are increased a detailed drainage management plan will be required for the redevelopment of the area.

The management plan should be consistent with Better Urban Water Management (WAPC, 2008) and Department of Water and Environmental Regulation (DWER) principles of Water Sensitive Urban Design (WSUD) as described in the Stormwater Management Manual (DoW, 2007).

The key strategies which will likely be adopted should include:

- Maintain pre-development peak flow rates from the site which will likely be achieved with sub surface storage or shallow detentions basins.
- Habitable floor levels at least 0.3 m above the 1% AEP flood level of the urban drainage system and road flood level.
- The stormwater drainage design demonstrates that the land is capable of managing stormwater for all events up to the 1% AEP event.
- Controls used to improve stormwater quality.

11 Disclaimer

JDSi have undertaken this assessment based on limited information and subsequently assumptions have been made which, if incorrect, have potential to impact the development. Major development implications exist through factors which cannot be assured at this time including upgrading and provision of utility services, WAPC conditions of development, Local Authority Scheme Requirements, ground conditions, timing of adjacent developments, etc.

While JDSi has taken all care in the preparation of the likely development requirements and has noted key assumptions, JDSi accepts no responsibility for the accuracy of this report and provides it only as an indicative summary of the known engineering requirements at the time of preparing this report.

If any further information is required or should you wish to clarify any issue, please contact our office.

APPENDIX A
Concept Activity Centre Plan

Claremont AC Sub-precincts for yield calculation