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Engineering

Working Beyond Expectations

Utility Services Report

To accompany a Concept Development Application for the Ivanhoe Estate Masterplan a State Significant Development

Property:
The land currently comprising Ivanhoe Estate, Herring Road, Macquarie Park as well as a portion of Shrimptons Creek and part of Lot 1 in DP 859537

Applicant:
Aspire Consortium on behalf of NSW Land and Housing Corporation

Date:
13th December 2017

Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Initial Draft Issue	27th October 2017	DH	MO
B	Initial Final Issue	17th November 2017	MO	GD
C	Minor Amendment	5th December 2017	BM	MO
D	Minor Amendment	13th December 2017	BM	MO

Executive Summary

ADW Johnson Pty. Limited (ADW Johnson) has been commissioned by Aspire Consortium to liaise with the relevant utility service authorities to determine their ability to service the proposed overall development of Lots 8-20 in DP861433, Lots 5-7 in DP740753 & Lot 100 in DP1223787 known as The Ivanhoe Estate, Ivanhoe Place, Macquarie Park NSW (the Site).

Approval for the overall development is to be sought via consent to a masterplan development application that seeks approval for the maximum building envelopes for future stages of development, the maximum gross floor area (GFA) and land uses for the development. Specifically:

- A mixed-use development involving a maximum of GFA of 281,905m^2, including:
  - Residential flat buildings comprising private, social and affordable housing;
  - Seniors housing comprising residential care facilities and self-contained dwellings;
  - A new high school;
  - Child care centres;
  - Minor retail development;
  - Community uses.

In order to support the proposed overall development, a number of utility services will be required to be delivered to the future premises. These utility services and their relevant authorities, include:

- Potable Water Supply – Sydney Water Corporation (SWC);
- Recycled Water Supply – SWC;
- Sewerage Infrastructure – SWC;
- Electricity Infrastructure – Ausgrid;
- Telecommunications Infrastructure – NBN Co; and
- Gas Infrastructure – Jemena.

All of the abovementioned authorities were contacted to determine their ability to service the proposed overall development and to advise of extent of any likely lead-in infrastructure and/or major upgrades required.

All authorities have advised that they can service the proposed overall development, albeit in some cases, with upgrades to the existing network required. A summary of the capacity of each utility service to service the proposed overall development is provided in Table 1 below.

Table 1: Summary of Existing Utility Services Infrastructure and Upgrades Required

UTILITY SERVICE	UTILITY AUTHORITY CONTACTED	CAN PROPOSED OVERALL DEVELOPMENT BE SERVICED BY EXISTING TRUNK NETWORK? *	DESCRIPTION OF TRUNK UPGRADE WORKS REQUIRED TO SERVICE WHOLE DEVELOPMENT	ARE THE WORKS DEVELOPER FUNDED?	ESTIMATE COST OF DEVELOPER FUNDED WORKS
Potable Water Supply	Sydney Water Corporation	Yes	No upgrades required.	TBC**	TBC**
Recycled Water Supply	Sydney Water Corporation	N/A	N/A	N/A	N/A
Sewerage Infrastructure	Sydney Water Corporation	Yes	No upgrades required.	TBC**	TBC**
Electricity Infrastructure	Ausgrid	No	Three (3) new high voltage feeders required to service the site.	Yes	TBC**
Tele-communications Infrastructure	NBN Co (& Opticomm)	No	New trunk main required to service the site.	Yes**	TBC**
Gas Infrastructure	Jemena	Yes	No upgrades required.	TBC**	TBC**

* Existing capacity and servicing requirements to be re-confirmed with each utility authority as project progresses and in conjunction with detailed design work.
** To be confirmed post obtainment of development consent

The developer has advised that any developer funded works are not likely to present an impediment to the delivery of this project and ongoing consultation will be made with each utility authority to ensure their timely delivery.

Following the delivery of the trunk upgrade works (as identified in Table 1 above) or completion of connections into the existing trunk network, the internal utility services network is expected to be able to be delivered in accordance with the proposed development staging. Addendums to this Utility Services Report will be prepared and submitted as part of future development applications for each stage. These addendums will provide additional servicing advice in relation to each stage, as well as identifying any temporary works required. More detailed information will be provided in conjunction with Construction Certificate documentation for each proposed stage of the development.

Based upon discussions and information provided by the relevant service providers, the provision of utility services is unlikely to pose a constraint to the development of the site.

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APPENDICES

1.0 Introduction

This report supports a Concept Development Application for the Ivanhoe Estate Masterplan, a State Significant Development (SSD) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). It has been prepared for Aspire Consortium on behalf of NSW Land and Housing Corporation.

The purpose of this report is to provide a high-level summary of utility services currently within and surrounding the site, as well as their capacity to service the proposed overall development and a broad description of any upgrade works required.

Further utility servicing details will be provided as addendums to this report, on a stage by stage basis, in conjunction with future Development Applications (DA's).

1.1 BACKGROUND

In September 2015 the Ivanhoe Estate was rezoned by the Department of Planning and Environment as part of the Macquarie University Station (Herring Road) Priority Precinct, to transform the area into a vibrant centre that benefits from the available transport infrastructure and the precinct's proximity to jobs, retail and education opportunities within the Macquarie Park corridor.

The Ivanhoe Estate is currently owned by NSW Land and Housing Corporation and comprises 259 social housing dwellings. The redevelopment of the Ivanhoe Estate is part of the NSW Government Communities Plus program, which seeks to deliver new communities where social housing blends with private and affordable housing, with good access to transport, employment, improved community facilities and open space.

The Communities Plus program seeks to leverage the expertise and capacity of the private and non-government sectors. As part of this program, Aspire Consortium, comprising Frasers Property Australia, Citta Property Group and Mission Australia Housing, was selected as the successful proponent to develop the site in July 2017.

The Masterplan DA is the first step of the planned redevelopment of the Ivanhoe Estate and will create an integrated neighbourhood including social housing mixed with affordable and private housing, as well as seniors housing, a new school, child care centres, community facilities and retail development.

2.0 Site Description

The Ivanhoe Estate site is located in Macquarie Park near the corner of Epping Road and Herring Road within the Ryde Local Government Area (LGA). The site is approximately 8.2 hectares and currently accommodates 259 social housing dwellings, comprising a mix of townhouse and four (4) storey apartment buildings set around a cul-de-sac street layout. An aerial photo of the site is provided at Figure 2.1 below.

Immediately to the north of the site are a series of four (4) storey residential apartment buildings. On the north-western boundary, the site fronts Herring Road and a lot which is currently occupied by four former student accommodation buildings and is likely to be subject to redevelopment. Epping Road runs along the south-western boundary of the site and Shrimptons Creek, an area of public open space, runs along the south-eastern boundary. Vehicle access to the site is via Herring Road.

The site is comprised of 17 individual lots and a part lot and are owned and managed by Land and Housing Corporation. The Masterplan site also incorporates adjoining land, being a portion of Shrimptons Creek and part of the commercial site at 2-4 Lyonpark Road. This land is included to facilitate a bridge crossing and road connection to Lyonpark Road.

Figure 2.1 - Ivanhoe Estate Site

3.0 Proposed Development

The proposed Masterplan is a Concept DA (in accordance with Section 83B of the EP&A Act), which sets out the concept proposal for the development of the site. The concept contained in the Masterplan DA establishes the planning and development framework, which will form the basis for the detailed design of the future buildings and against which the future detailed DAs will be assessed.

The Masterplan DA seeks approval for the maximum building envelopes for future stages of development, the maximum gross floor area (GFA) and land uses for the development. Specifically:

- A mixed-use development involving a maximum of GFA of 281,905m^2, including:
  - Residential flat buildings comprising private, social and affordable housing;
  - Seniors housing comprising residential care facilities and self-contained dwellings;
  - A new high school;
  - Child care centres;
  - Minor retail development;
  - Community uses;
- Maximum building heights and GFA for each development block;
- Public domain landscape concept, including parks, streets and pedestrian connections;
- Provision of the Ivanhoe Estate Design Guidelines to guide the detailed design of the future buildings; and
- Vehicular and intersection upgrades.

The development will deliver an integrated infrastructure solution via 'Real Utilities'. This will consist of a private embedded electrical and hot water network to supply all users across the development. Details of the integrated infrastructure solution are contained within the Ivanhoe Sustainability Report which can be found in **Appendix A**.

An image of the Masterplan DA is provided at Figure 3.1 below, whilst a large version is contained within **Appendix B.**

Figure 3.1 - Ivanhoe Estate Masterplan

4.0 Potable Water Supply

4.1 EXISTING INFRASTRUCTURE

A Dial Before You Dig (DB4YD) search was undertaken and it was found that there are trunk and reticulated water mains surrounding the site within Herring Road and Epping Road, as well as internal reticulation within Ivanhoe Place, Wilcannia, Nyngan, Narromine and Cobar Way. The internal potable water mains currently service the existing dwellings.

The sites current water supply is from a DN500 CICL trunk main and a DN250 PVC Main which run along Herring Road running in a north-easterly direction. From this trunk main, a DN150 DICL reticulated water main extends along the north-eastern side of Ivanhoe Place with DN100 DICL branches supplying Wilcannia, Nyngan, Narromine and Cobar Way. A DN250 CICL water main (Part DN250 uPVC across Lot 1 in DP880284) runs in a south-easterly direction along the north-eastern side of Epping Road. On the south-western side of Epping road there is a DN100/DN150 CICL reticulated water main.

The water supply for Lot 1 in DP859537 is through a connection off the DN250 CICL water main running along Epping Road through a DN150 CICL main which runs through Lot 511 DP1153119 (Optus Drive) then up the south-eastern side of Lyonpark Road with a connection line across Lyonpark road to the subject property.

A visual depiction of the abovementioned trunk and reticulation infrastructure is shown below in Figure 4.1, whilst a larger version is contained within **Appendix C**.

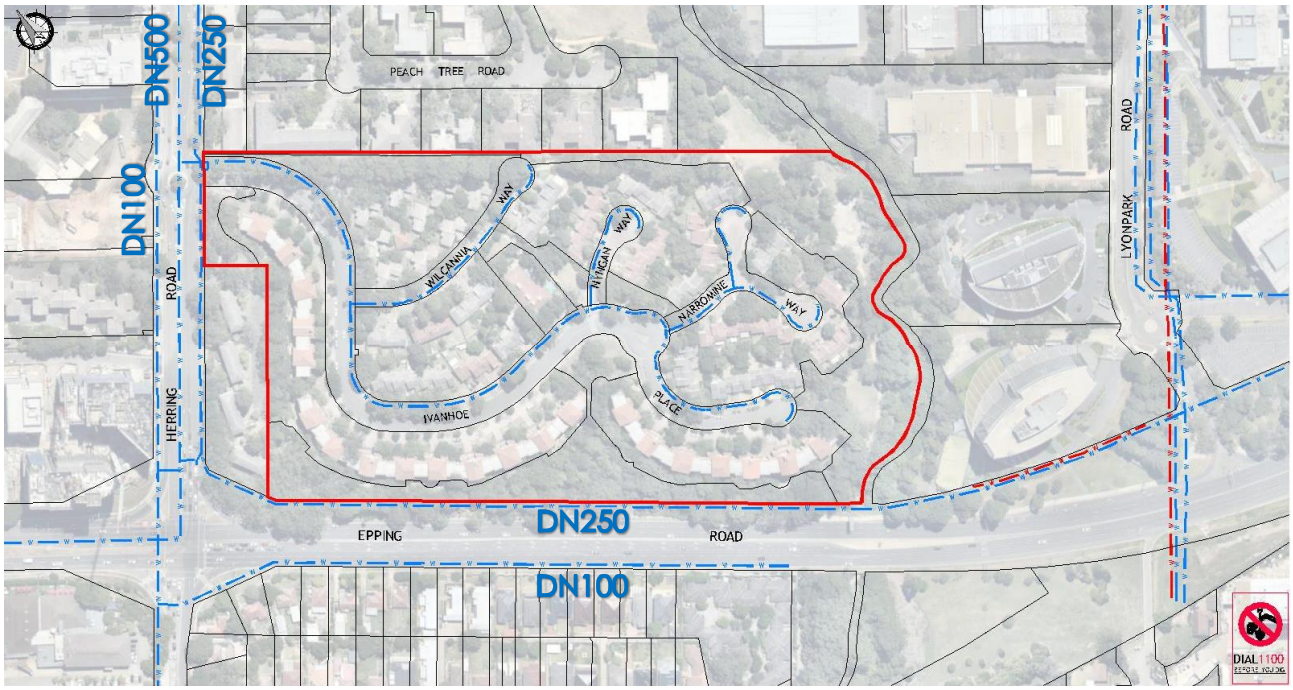


Figure 4.1 – Existing Potable Water Infrastructure

4.2 FEASIBILITY APPLICATION

A feasibility application was lodged with Sydney Water Corporation (SWC) on 16th June 2017. A response was received on 3rd August 2017 which can be seen in **Appendix D**. It is noted that the advice issued by SWC is a guide only and a definitive statement of requirements cannot be obtained until after development consent is issued by the consent authority.

In the response to the feasibility application, SWC indicated that the proposed site is located within the Marsfield water supply zone boundary. There is an existing DN500 trunk water main along Herring Road which has capacity to service the proposed development.

Following development consent, a detailed planning study is to be carried out to determine whether augmentation of existing water infrastructure within the Macquarie University growth precinct is required.

4.3 LEAD IN WORKS

Based upon SWC's advice contained within the response to the feasibility application, the only lead in work likely to be required to facilitate the overall development is a connection into the existing DN500 trunk main located within Herring Road. It is currently envisaged that this connection would be made within the vicinity of the proposed main site intersection and be constructed in conjunction with the upgrading of the existing intersection into Ivanhoe Place.

A secondary connection into the existing DN250trunk main located within Herring Road would be required to ensure security of supply in the event of a failure of the main line.

4.4 INTERNAL WORKS

As part of the development, the existing internal infrastructure is to be removed and likely replaced by new DN200 mains, fed from the trunk mains in Herring Road.

An indicative internal water reticulation layout, prepared by Rose Atkins Rimmer (RAR) (accredited Water Service Coordinators (WSC's) with SWC), is shown below in Figure 4.2.

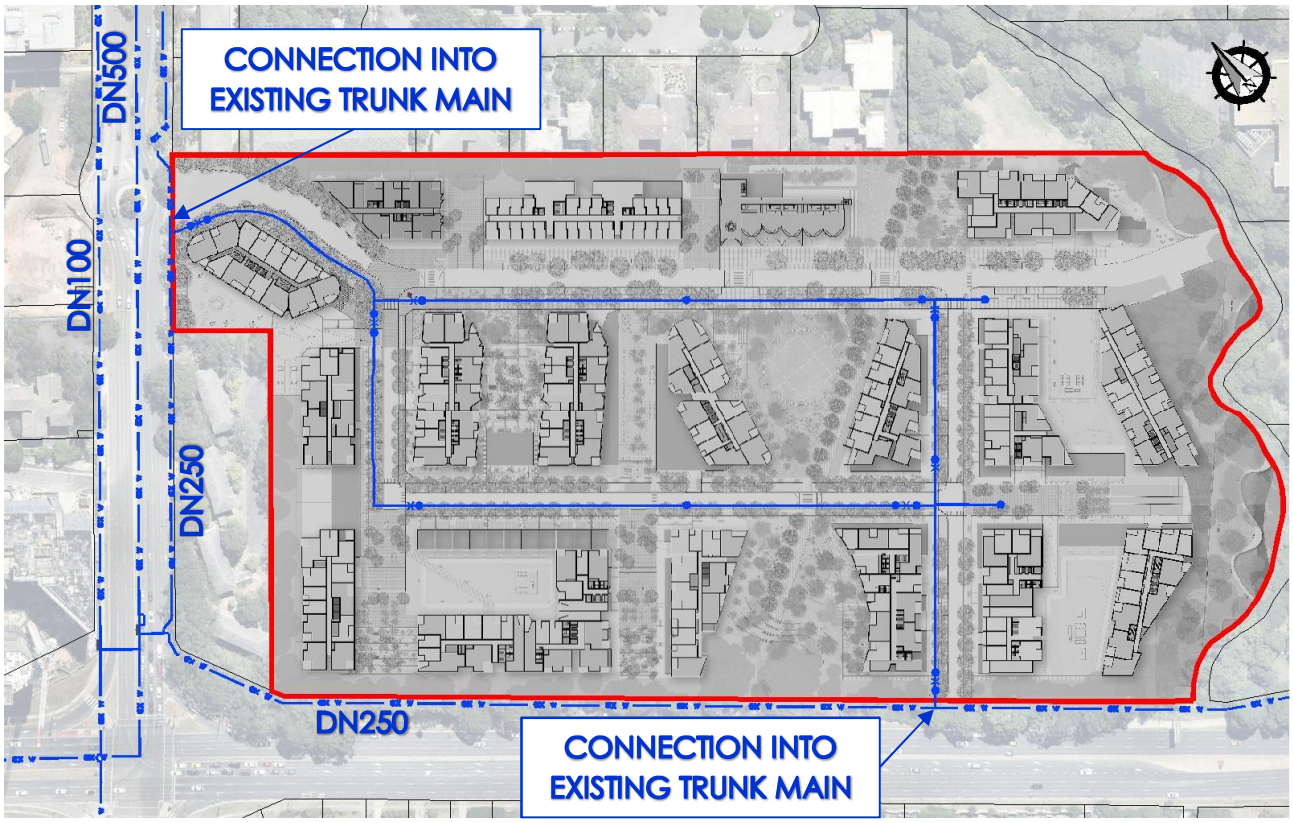


Figure 4.2 – Concept Proposed Water Reticulation Network Design

4.5 POTABLE WATER SUPPLY CONCLUSION

Based upon advice received from SWC, there is capacity within the existing trunk potable water network to service the proposed overall development.

The future internal potable water network should be readily connected into the existing trunk network immediately adjacent to/or within the footprint of the proposed main site intersection off Herring Road. Accordingly, the provision of potable water is not considered to present a constraint to the project.

5.0 Recycled Water Infrastructure

5.1 EXISTING INFRASTRUCTURE

A DB4YD search was undertaken and it was found that there are no recycled water mains located adjacent to or within the site.

5.2 FEASIBILITY APPLICATION

A feasibility application was lodged with Sydney Water Corporation (SWC) on 16th June 2017. A response was received on 3rd August 2017 which can be seen in **Appendix D**. It is noted that the advice issued by SWC is a guide only and a definitive statement of requirements cannot be obtained until after development consent is issued by the consent authority.

Within the SWC's response to the feasibility application, there was no reference to recycled water and any requirement to provide this service within the proposed development. This is not unexpected as SWC typically no longer support the provision of recycled water infrastructure within their network as it is generally not financially viable. The developer then typically satisfies BASIX requirements through delivery of the proposed built form i.e. within the private lot area, through deliver of rainwater tanks or similar.

5.3 LEAD IN WORKS

Given there is no requirement from SWC to provide recycled water reticulation within the development, no lead-in works are envisaged.

5.4 INTERNAL WORKS

It is noted that whilst SWC has no requirement to provide recycled water infrastructure within the proposed development, the developer may still opt to provide a private reticulation network within buildings for sustainability purposes. If this is proposed for the development, further details will be provided with Construction Certificate documentation for each of the proposed stages.

5.5 RECYCLED WATER INFRASTRUCTURE CONCLUSION

There is no requirement from SWC for the provision of recycled water reticulation to the proposed development. Should the developer opt to provide a privatised recycled water solution for the development, then details will be provided as part of construction certificate documentation for each of the proposed stages.

6.0 Sewerage Infrastructure

6.1 EXISTING INFRASTRUCTURE

A DB4YD search was undertaken and it was found that both trunk and reticulated sewer mains are located adjacent to and within the site.

The DB4YD search shows a DN600 Reinforced Concrete trunk wastewater main running from the southern side of Epping Road, then underneath the road, after which point it enters the site and travels in a north-easterly direction, generally following the alignment of the western boundary of Shrimptons Creek.

Internal reticulation within the site consists of two (2) DN225 Vitrified Clay sewer lines with DN150 Vitrified Clay lines generally connecting the individual dwellings.

A visual depiction of the abovementioned trunk infrastructure is shown below in Figure 6.1, whilst a larger version is contained within **Appendix C**.

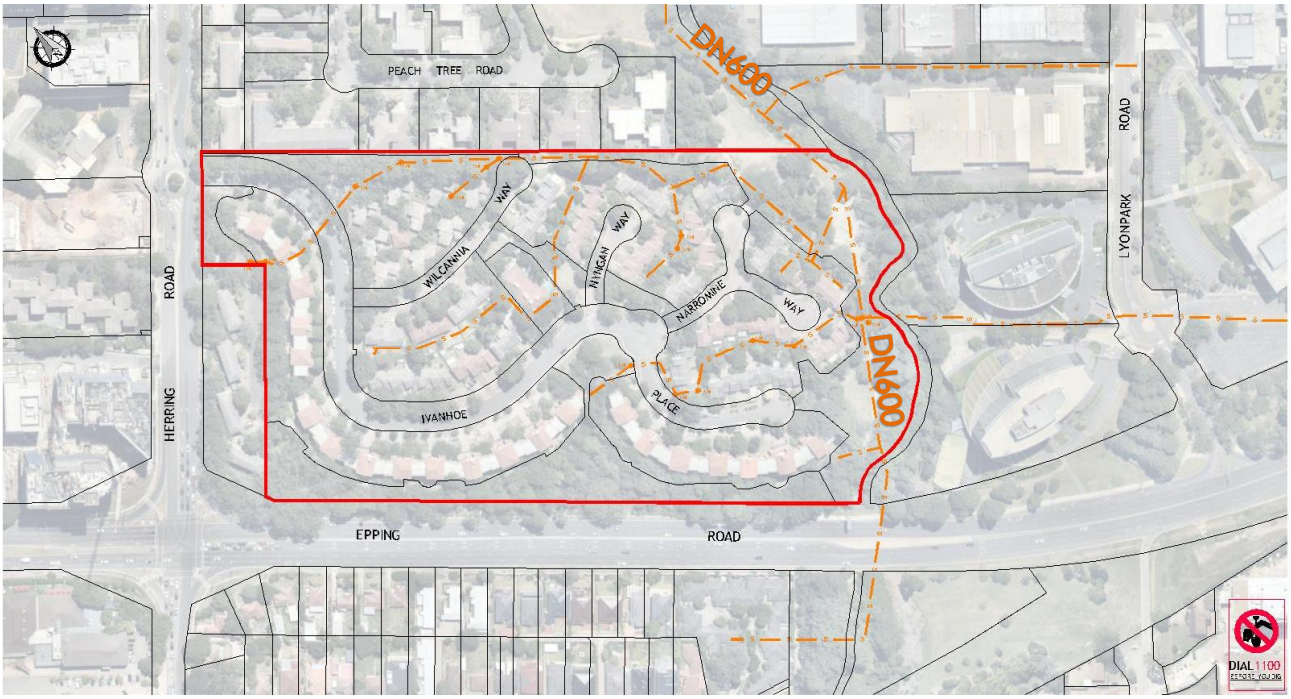


Figure 6.1 – Existing Trunk Sewerage Infrastructure

6.2 FEASIBILITY APPLICATION

A feasibility application was lodged with Sydney Water Corporation (SWC) on 16th June 2017. A response was received on 3rd August 2017 which can be seen in **Appendix D**. It is noted that the advice issued by SWC is a guide only and a definitive statement of requirements cannot be obtained until after development consent is issued by the consent authority.

The feasibility application indicated that the proposed development can drain into the existing North Head system via the existing DN600 Reinforced Concrete trunk wastewater main, located within the site along its frontage to Shrimptons Creek. SWC have advised that this DN600 trunk main has capacity to service the development.

SWC have further advised that, post obtainment of development consent, a detailed planning study is be carried out to determine whether augmentation of existing water infrastructure within the Macquarie University growth precinct is required.

6.3 LEAD IN WORKS

In accordance with the SWC's advice in their response to the feasibility application, there are no lead-in works required to service the proposed development.

The only works required are to connect the development into the existing DN600 trunk main as required.

6.4 INTERNAL WORKS

As part of the development, the existing internal infrastructure is to be removed and likely replaced by new DN150 to DN300 mains, which will connect into the DN600 main adjacent to Shrimptons Creek. The sizing of the new internal mains will be determined following obtainment of development consent and will be based upon the grade of the proposed main, together with the number of dwellings to be serviced.

An indicative internal sewerage reticulation layout, prepared by Rose Atkins Rimmer (RAR) (accredited Water Service Coordinators (WSC's) with SWC), is shown below in Figure 6.2.

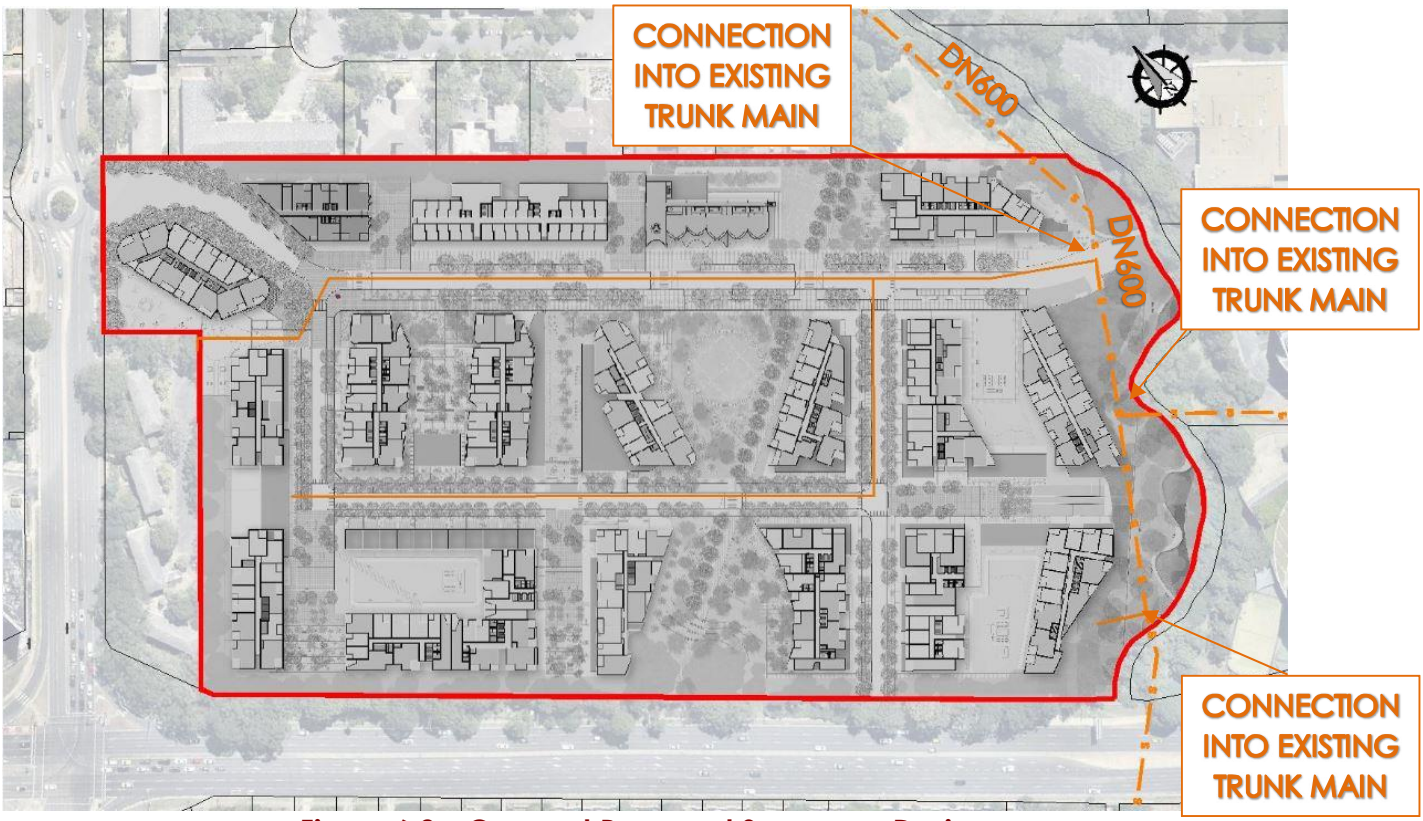


Figure 6.2 – Concept Proposed Sewerage Design

6.5 SEWERAGE INFRASTRUCTURE CONCLUSION

Based upon advice received from SWC, there is capacity within the existing trunk sewerage network to service the proposed overall development.

The future internal sewerage network should be readily connected into the existing trunk network that traverses through the site, generally adjacent to the western boundary of Shrimptons Creek. Accordingly, the provision of sewerage is not considered to present a constraint to the project.

7.0 Electricity Infrastructure

7.1 EXISTING INFRASTRUCTURE

A DB4YD search and review of aerial imagery was undertaken and it was found that both high and low voltage, above and below ground, infrastructure exist within the road reserves adjacent to the site. Within the site, high and low voltage infrastructure exists, however it is located entirely underground.

Based upon review of the DB4YD plans and visual inspections, the site is currently serviced from underground high and low voltage infrastructure, which runs off the existing trunk network within Herring Road. The internal network runs along both verges of Ivanhoe Place, with two (2) existing electrical kiosks existing on the site.

Lot 1 in DP859537 (on the eastern side of Shrimptons Creek, where the proposed road extension to LPR is to be located) is serviced from High Voltage underground cables located within the northern verge of Lyonpark Road. Two (2) electrical kiosks exist within the front eastern corner of the subject property (within the footprint of the proposed road reserve) which provide the property with a low voltage supply via underground cables.

Within the northern verge of Epping Road, the low voltage network and street lighting cables are located above ground.

A visual depiction of the abovementioned trunk infrastructure is shown below in Figure 7.1, whilst a larger version is contained within **Appendix C**.

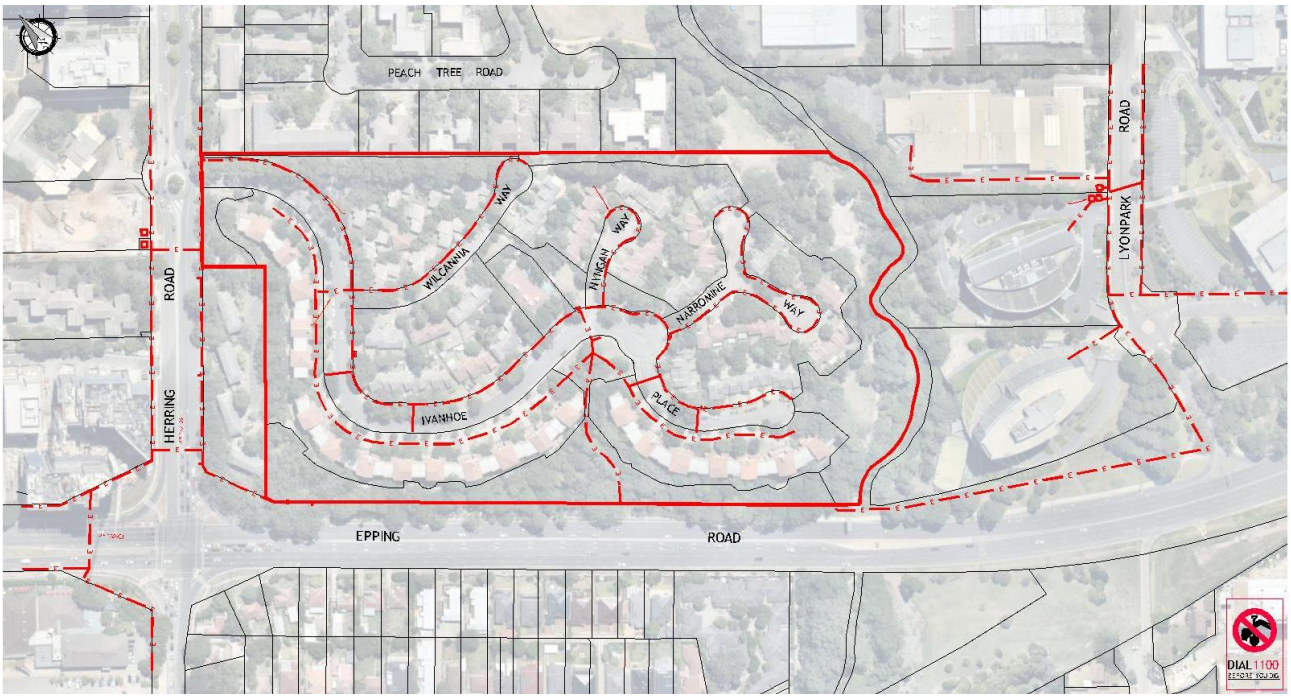


Figure 7.1 – Existing Electricity Infrastructure

7.2 FEASIBILITY APPLICATION

A feasibility application was lodged with Ausgrid on 6th June 1017, with a response being received on 2nd August 2017. A copy of this response is contained within **Appendix E**.

From investigations made by Ausgrid it was confirmed that there are several 11Kv feeders that run past the site which are connected to either Macquarie Park Zone or Epping Zone but these feeders cannot support the requested load without a considerable and uneconomic upgrade of the existing network.

Ausgrid suggested that three (3) additional HV feeders will be required to support the load of the overall proposed development and provided two (2) lead-in route options, which are summarised in Section 7.2 below.

7.3 LEAD IN WORKS

In their response to the feasibility application, Ausgrid proposed two (2) route options for the three (3) HV feeders required to service the overall proposed development. Both of these options are summarised below.

7.3.1 Option 1 – Install New Conduits – Epping Zone

This option is for a complete new cable run and installation of bank of 4x150mm conduits from the Epping Zone substation to the site. Three (3) new 500mm² Al XLPE HV cables are proposed to be installed for the entire run. The conduits may require installation in Thermal Stable Backfill in some areas, which has not been included as part of the cost. Four (4) existing feeders will require consolidation to allow for connection at the zone.

Figure 7.2.1 below shows the alignment of this route, whilst a larger version is provided in **Appendix E**.

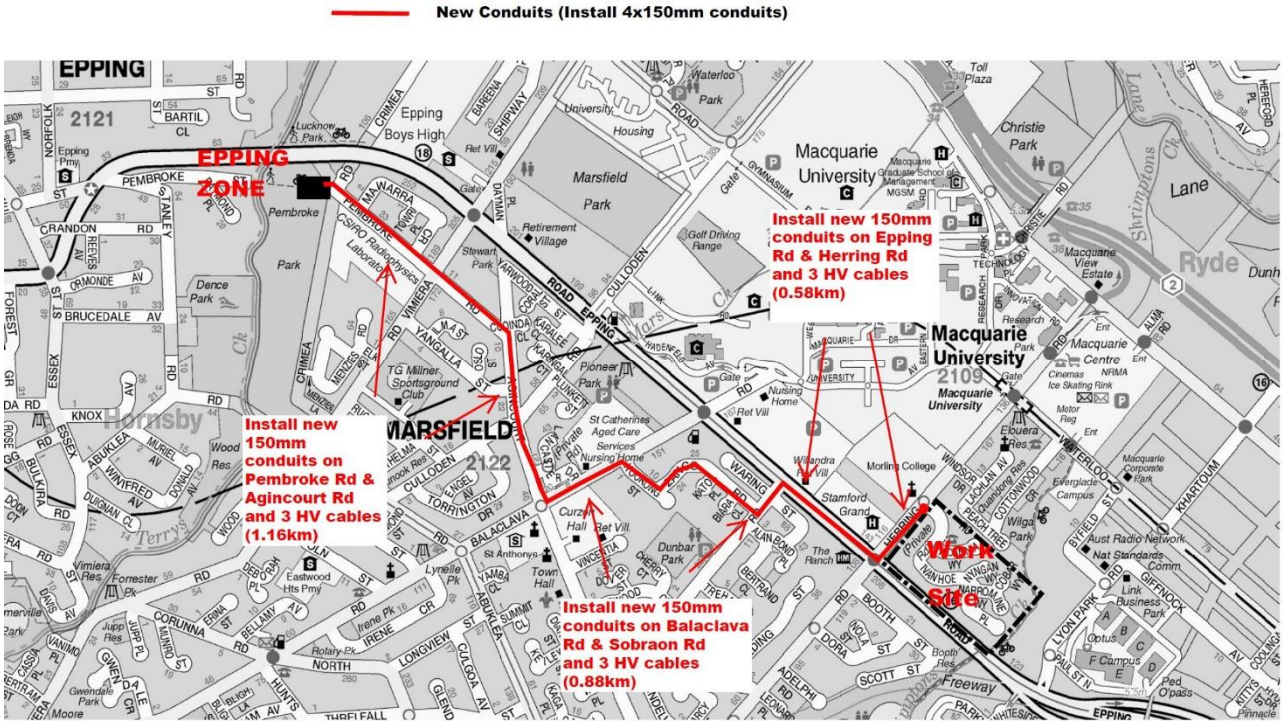


Figure 7.2.1 – Concept Proposed Electrical Design
(image provided by Ausgrid)

Benefit: This is the cheapest option available. It also provides an absolute cost of the final project and uses an alternate route along non-RMS roads.

Distance: 2.62km

7.3.2 Option 2 – Use Existing Conduits Where Possible – Top Ryde Zone

This option looks at running three (3) new 500mm² Al XLPE cables from the Top Ryde Zone substation to the site. The cables are proposed to be installed using some existing conduits and some new conduits as shown on the attached PDF.

Figure 7.2.2 below shows the alignment of this route, whilst a larger version is provided in **Appendix E**.

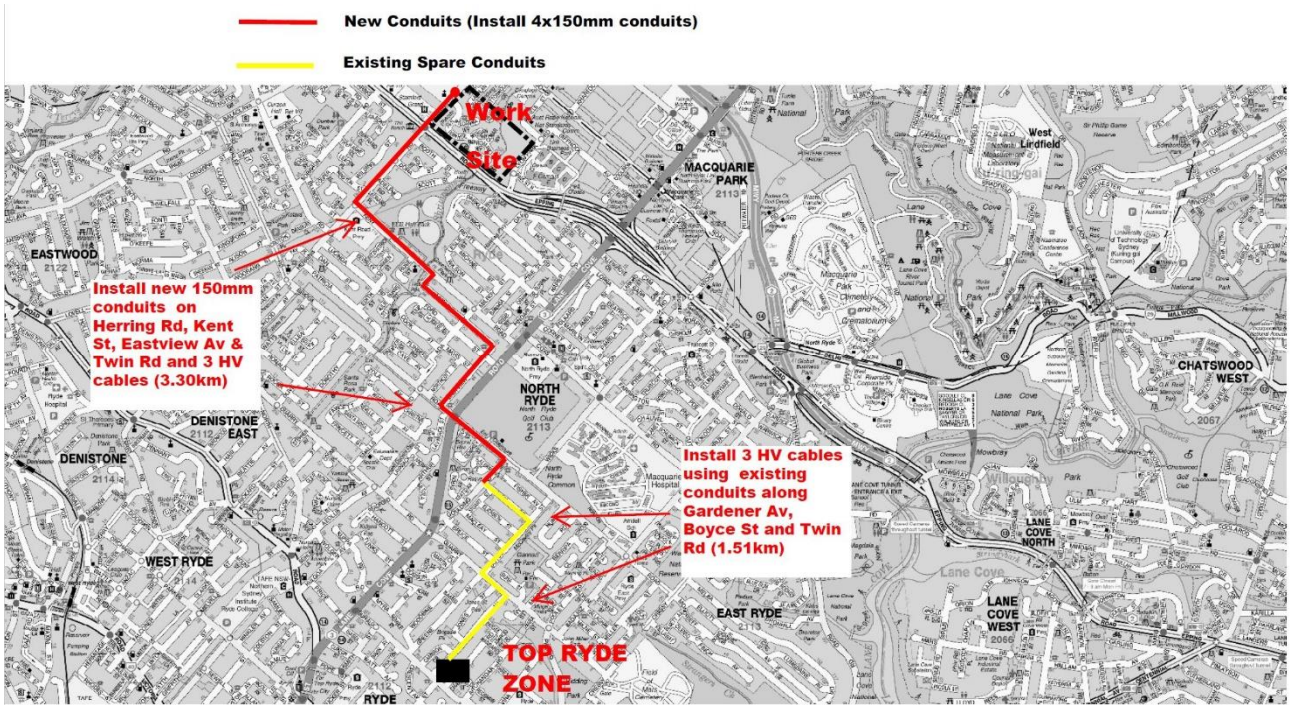


Figure 7.2.2 – Concept Proposed Electrical Design
(image provided by Ausgrid)

Benefit: This is a contingency option in the event that the Epping Zone substation does not have capacity available. It also provides an absolute cost of the final project and uses an alternate route along non-RMS roads.

Distance: 4.81km

7.4 INTERNAL WORKS

As part of the development, the existing internal infrastructure is to be demolished and replaced with a new high voltage network, including mini chamber substations to be installed throughout the site. These mini chamber substations will then feed a low voltage supply to the proposed dwellings and street light network. Shelmerdines (electrical engineers) have prepares a high-level concept overall masterplan electrical design, which is shown below in Figure 7.2.

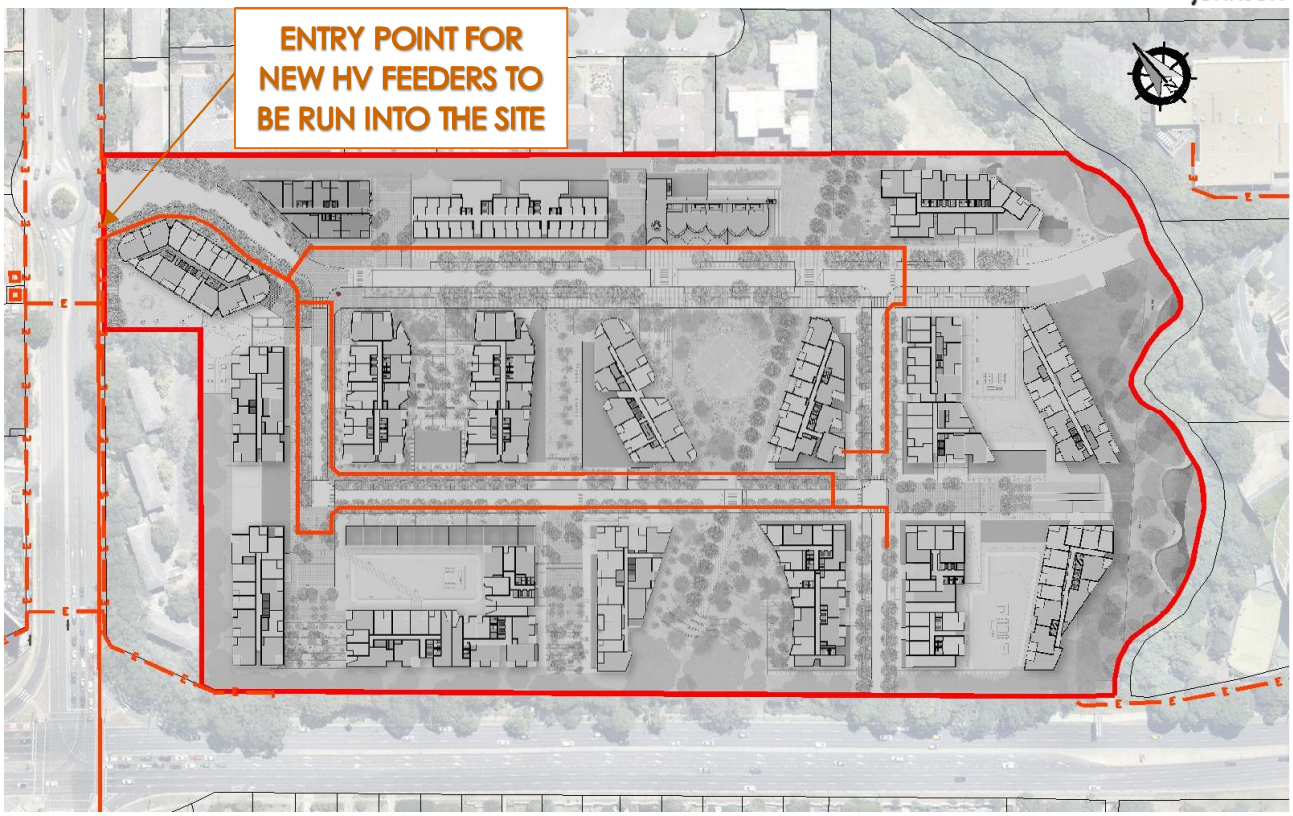


Figure 7.3 – Concept Proposed Electrical Design

7.5 ELECTRICITY INFRASTRUCTURE CONCLUSION

Based upon correspondence with Ausgrid, it is anticipated that there will not be capacity within the existing electrical network to service the proposed development. Ausgrid have advised that three (3) new feeders will be required to service the proposed overall development and have provided two (2) alternate route options for this infrastructure.

The existing electricity network can be upgraded to facilitate the proposed development and is not likely to present a significant constraint to the project. The developer has incorporated timing and cost allowances for this lead-in infrastructure into its development program to coordinate timely project delivery.

8.0 Telecommunications Infrastructure

8.1 EXISTING INFRASTRUCTURE

A DB4YD search was undertaken and it was found that the site is currently surrounded by multiple telecommunication companies including:

- AAPT (Lyonpark Road);
- AARNET (Epping Road and Lyonpark Road;
- NBNCO (Herring Road and Lyonpark Road);
- Nextgen (Epping Road and Lyonpark Road);
- Optus/Uecomm (Epping Road, Herring Road and Lyonpark Road);
- Pipe Networks (Herring Road and Lyonpark Road);
- Telstra local and main network (Herring Road, Lyonpark Road and all internal roads feeding to dwellings);
- Verizon (Lyonpark Road);
- Vocus (Lyonpark Road).

The existing telecommunications infrastructure located adjacent to and within the site is summarised in Figure 8 below, whilst a larger version is contained within **Appendix C**.

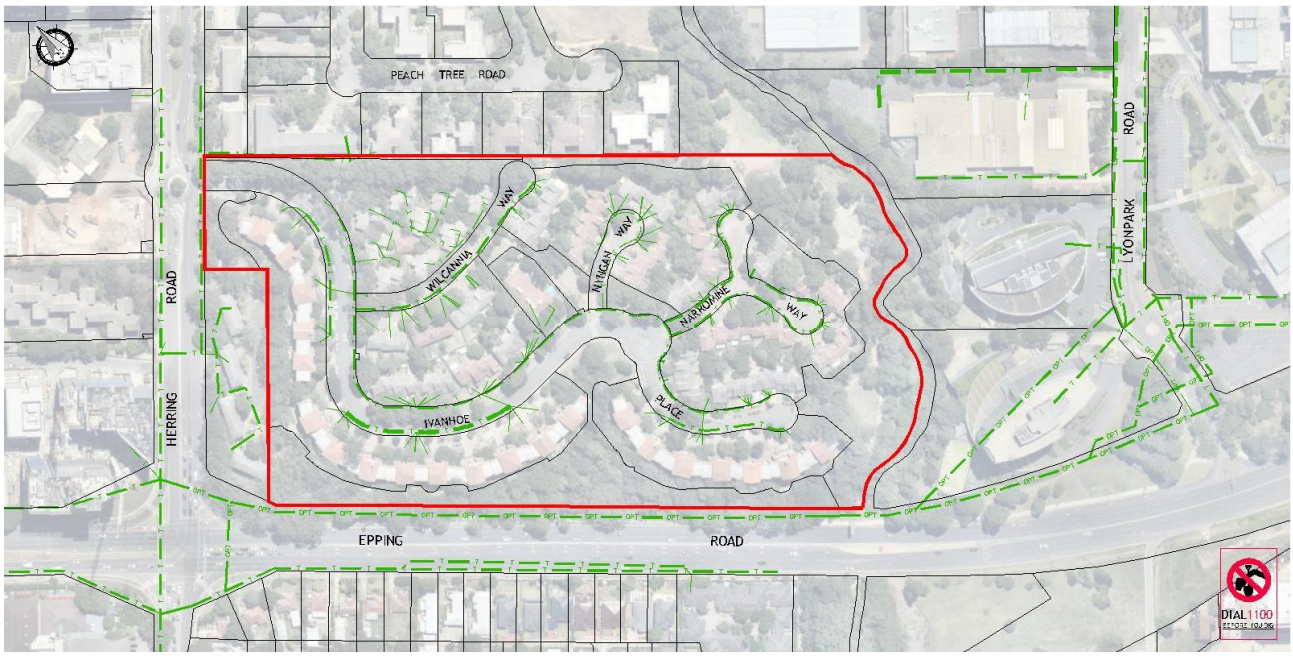


Figure 9 – Existing Communications Infrastructure

8.2 FEASIBILITY REQUEST / PRELIMINARY SERVICING ADVICE/LEAD-IN WORKS

8.2.1 OPTICOMM

A request for preliminary advice was submitted to OptiComm on 10th October 2017, with a response being received on 17th October 2017. A copy of this response is contained within **Appendix F**.

OptiComm has conducted a desktop study of the site and determined that the site can be serviced with superfast Fibre-optic Telecommunications Infrastructure and Services.

Opticomm have suggested that a number of lead-in routes exist for servicing the site, with

the further details to be provided as design work progresses on the project (post development consent being obtained).

Opticomm confirmed that regardless of the final route, there will be no backhaul construction cost to be funded by the developer.

Opticomm also informed that following construction of lead-in works to the site, they would be able to supply an internal telecommunication service to the development.

8.2.2 NBN Co

A feasibility request was lodged with NBN Co on 10th October 2017, with a response being received on 25th October 2017. A copy of this response is contained within **Appendix F**.

NBN Co advised that backhaul lead-in works are required to service the site due to there being insufficient capacity within the existing surrounding network. The lead-in route proposed is from an NBN Co exchange, some 5.2km's away. The alignment of this route is shown in Figure 8.2.2.1 below.

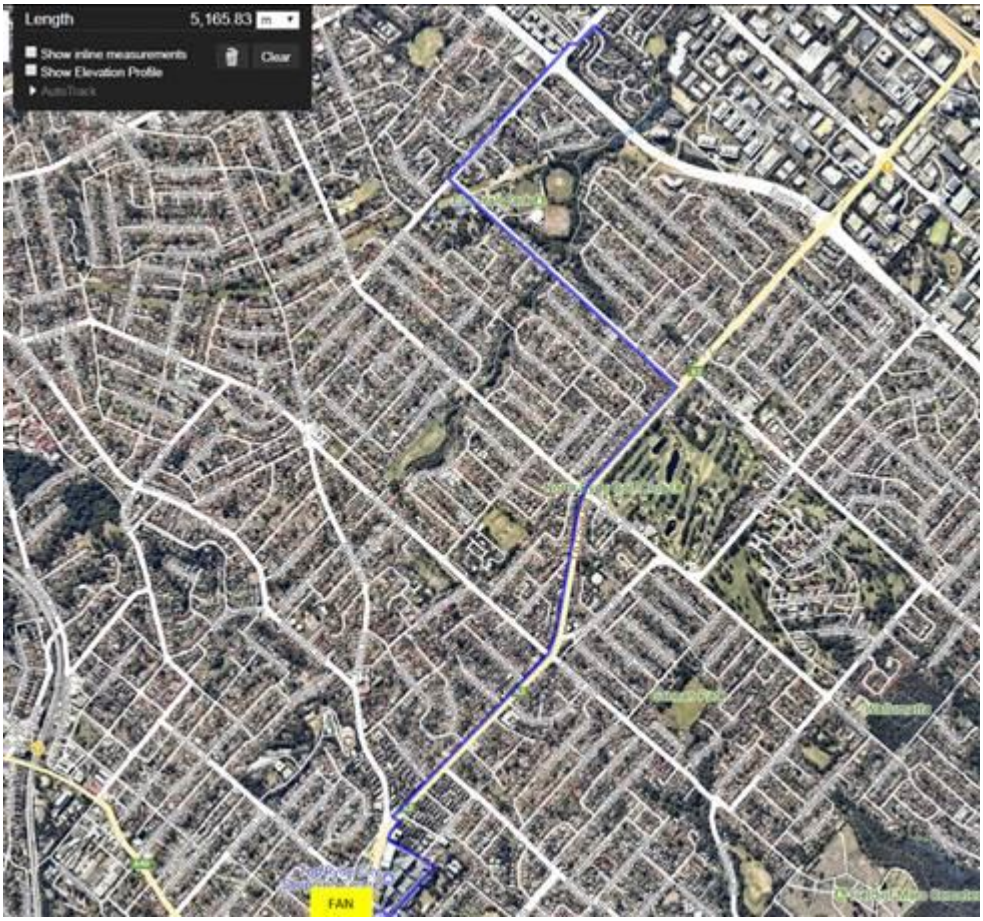


Figure 8.2.2.1 – Preliminary NBN Co Backhaul Lead-In Route
(image provided by NBN Co)

NBN Co advised that developer contributions will be required to assist in funding the backhaul lead-in works, however, the exact amount is subject to confirmation once the developer agrees to enter into a Master Developer Agreement with NBN Co.

NBN Co confirmed that following the construction of lead-in works to the site, they would be able to supply an internal telecommunication service to the development.

8.3 INTERNAL WORKS

Internal telecommunications infrastructure will be generally located within the public road verges or basement carparks/buildings, with necessary easements created. Further details of the internal telecommunications network will be submitted as part of construction certificate documentation with each proposed stage of the development.

8.4 TELECOMMUNICATIONS INFRASTRUCTURE CONCLUSION

Based upon the advice received from both Opticomm and NBN Co, the provision of telecommunication services to the site is not envisaged to present a significant constraint to the project. Both service providers have confirmed that telecommunication services can be provided to the development, with necessary lead-in works coordinated with proposed development delivery timeframes.

The developer will select a preferred telecommunications provider as part of future work on the project, but confirms that the indicative developer funded backhaul fees provided by NBN Co will not significantly impact on the feasibility, or their ability to deliver, the project.

The internal telecommunications network will be incorporated in future design work on the project, post obtainment of development consent.

9.0 Gas Infrastructure

9.1 EXISTING INFRASTRUCTURE

A DB4YD search was undertaken and it was found that gas infrastructure exists in and around the site.

The DB4YD plans show a DN200 pressure secondary main and a low pressure DN110 nylon gas main running along Herring Road. A low pressure DN110 Nylon main extends off the network in Herring Road and runs along the northern verge of Ivanhoe Place, providing the main internal reticulation main within the existing estate. From this main, DN50 low pressure offshoots extend into Wilcannia Way, Nyngan Way, Narrowmine Way and Cobar Way and service existing dwellings.

A visual depiction of the abovementioned trunk infrastructure is shown below in Figure 9.1, whilst a larger version is contained within **Appendix C**.

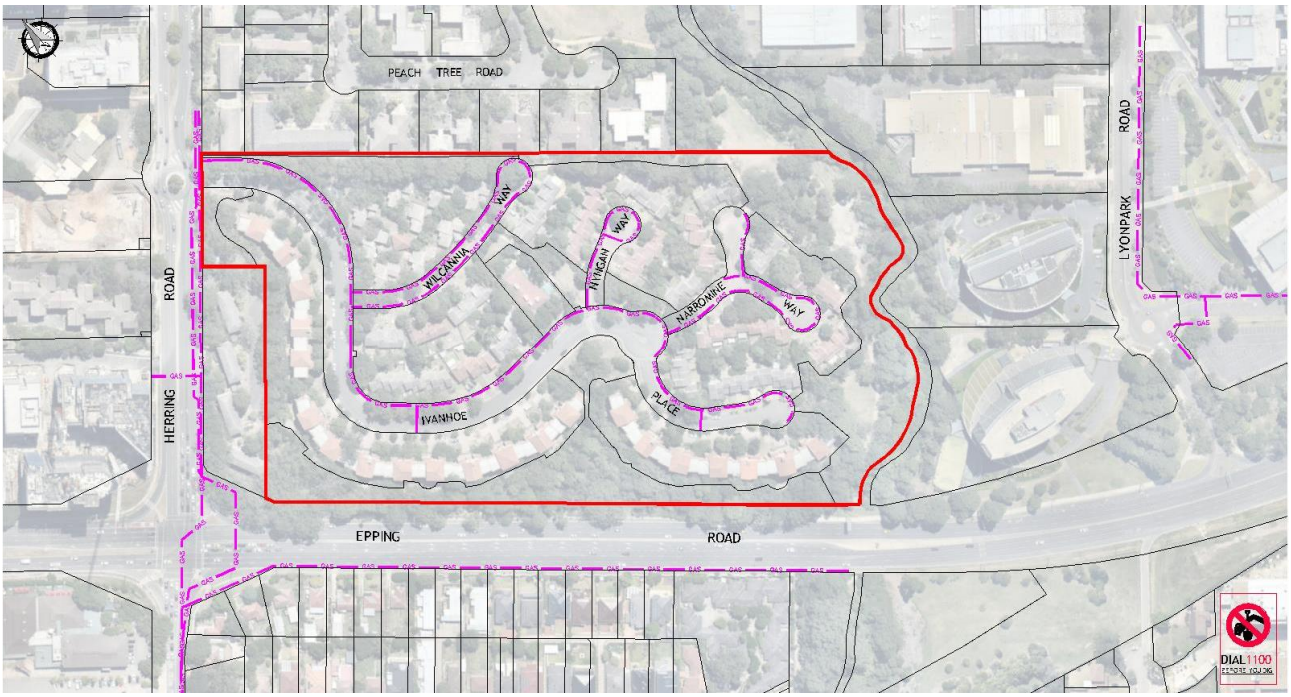


Figure 9.1 – Existing Gas Infrastructure

9.2 PRELIMINARY SERVICING ADVICE

A request for preliminary servicing advice was submitted to Jemena on 10th October 2017, with a response being received on that same day. A copy of this response is contained within **Appendix G**.

The response from Jemena indicates that the existing 210kPa main in Herring Road could be extended through the proposed overall development to service the future premises. Jemena advised that their ability to extend the existing network into the site will be subject to a commercial viability assessment, which would be undertaken post obtainment of development consent and in conjunction with future design work on the project. However, should the site prove commercially viable to Jemena, then it is expected that the developer will supply open trenching and restorations during the construction phase.

It is noted that the advice received form Jemena is typical to that received on other projects, in that Jemena will not commit to the development until after consent to the DA is achieved. Based upon our experience working on similar projects and review of Jemena's preliminary advice, it is our opinion that the provision of gas services is unlikely to present a significant constraint to the development.

7.2 LEAD IN WORKS

Lead-in works are likely to be limited to connection into the existing 210kPa main located within Herring Road. It is noted that this is subject to confirmation from Jemena as part of a future commercial viability assessment to be undertaken once development consent is obtained.

7.3 INTERNAL WORKS

Should Jemena determine that the development satisfies their commercial criteria, it is expected that an internal gas reticulation network would be located within the service allocations within the proposed public road reserves, with any infrastructure within private land covered by suitable easements.

Jemena have initially advised that the main spine of an internal gas network is likely to be a 210kPa secondary gas main.

7.4 GAS INFRASTRUCTURE CONCLUSION

Based upon the advice received from Jemena, the provision of gas reticulation to the site is not envisaged to present a significant constraint to the project, with existing mains located adjacent to the property in Herring Road being capable of feeding the overall proposed development.

The internal reticulation network is likely to be underpinned by a 210kPA secondary main network, which will typically be located within the service allocation within the public road reserve.

10.0 Conclusion

Based upon discussions and information provided by the relevant service providers, the provision of utility services is not envisaged to pose a significant constraint to the development of the site.

The relevant authorities responsible for Water, Recycled Water, Sewer, Electrical, Telecommunications and Gas have been consulted to provide preliminary servicing advice in regards to servicing the proposed overall development.

All authorities have advised that they can service the proposed overall development, albeit in some cases, with upgrades to the existing network required. A summary of the capacity of each utility service to service the proposed overall development is provided in Table 10.1 below.

Table 10.1: Summary of Existing Utility Services Infrastructure and Upgrades Required

UTILITY SERVICE	UTILITY AUTHORITY CONTACTED	CAN PROPOSED OVERALL DEVELOPMENT BE SERVICED BY EXISTING TRUNK NETWORK? *	DESCRIPTION OF TRUNK UPGRADE WORKS REQUIRED TO SERVICE WHOLE DEVELOPMENT	ARE THE WORKS DEVELOPER FUNDED?	ESTIMATE COST OF DEVELOPER FUNDED WORKS
Potable Water Supply	Sydney Water Corporation	Yes	No upgrades required.	TBC**	TBC**
Recycled Water Supply	Sydney Water Corporation	N/A	N/A	TBC**	TBC**
Sewerage Infrastructure	Sydney Water Corporation	Yes	No upgrades required.	N/A	N/A
Electricity Infrastructure	Ausgrid	No	Three (3) new high voltage feeders required to service the site.	Yes	TBC**
Tele-communications Infrastructure	NBN Co (& Opticomm)	No	New trunk main required to service the site.	Yes**	TBC**
Gas Infrastructure	Jemena	Yes	No upgrades required.	TBC**	TBC**

* Existing capacity and servicing requirements to be re-confirmed with each utility authority as project progresses and in conjunction with detailed design work.
** To be confirmed post obtainment of development consent

The developer has advised that any developer funded works are not likely to present an impediment to the delivery of this project and ongoing consultation will be made with each utility authority to ensure their timely delivery.

Following the delivery of the trunk upgrade works (as identified in Table 10.1 above) or completion of connections into the existing trunk network, the internal utility services network is expected to be able to be delivered in accordance with the proposed development staging. Addendums to this Utility Services Report will be prepared and submitted as part of future development applications for each stage. These addendums will provide additional servicing advice in relation to each stage, as well as identifying any temporary works required.

More detailed information will be provided in conjunction with Construction Certificate documentation for each proposed stage of the development.

Appendix A

IVANHOE SUSTAINABILITY REPORT

IVANHOE SUSTAINABILITY REPORT

DECEMBER 2017

Rory Martin
Sustainability Manager, Residential

1 INTRODUCTION

This report supports a Concept Development Application for the Ivanhoe Estate Masterplan, a State Significant Development (SSD) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). It has been prepared for Aspire Consortium on behalf of NSW Land and Housing Corporation.

Background

In September 2015 the Ivanhoe Estate was rezoned by the Department of Planning and Environment as part of the Macquarie University Station (Herring Road) Priority Precinct, to transform the area into a vibrant centre that benefits from the available transport infrastructure and the precinctôs proximity to jobs, retail and education opportunities within the Macquarie Park corridor.

The Ivanhoe Estate is currently owned by NSW Land and Housing Corporation and comprises 259 social housing dwellings. The redevelopment of the Ivanhoe Estate is part of the NSW Government Communities Plus program, which seeks to deliver new communities where social housing blends with private and affordable housing, with good access to transport, employment, improved community facilities and open space.

The Communities Plus program seeks to leverage the expertise and capacity of the private and non-government sectors. As part of this program, Aspire Consortium, comprising Frasers Property Australia, Citta Property Group and Mission Australia Housing, was selected as the successful proponent to develop the site in July 2017.

The Masterplan DA is the first step of the planned redevelopment of the Ivanhoe Estate and will create an integrated neighbourhood including social housing mixed with affordable and private housing, as well as seniors housing, a new school, child care centres, community facilities and retail development.

Site Description

The Ivanhoe Estate site is located in Macquarie Park near the corner of Epping Road and Herring Road within the Ryde Local Government Area (LGA). The site is approximately 8.2 hectares and currently accommodates 259 social housing dwellings, comprising a mix of townhouse and four storey apartment buildings set around a cul-de-sac street layout. An aerial photo of the site is provided at **Figure 1** below.

Immediately to the north of the site are a series of four storey residential apartment buildings. On the north-western boundary, the site fronts Herring Road and a lot which is currently occupied by four former student accommodation buildings and is likely to be subject to redevelopment. Epping Road runs along the south-western boundary of the site and Shrimptons Creek, an area of public open space, runs along the south-eastern boundary. Vehicle access to the site is via Herring Road.

The site is comprised of 17 individual lots and a part lot and are owned and managed by Land and Housing Corporation. The Masterplan site also incorporates adjoining land, being a portion of Shrimptons Creek and part of the commercial site at 2-4 Lyonpark Road. This land is included to facilitate a bridge crossing and road connection to Lyonpark Road.

Figure 1- Ivanhoe Estate site

Overview of the Proposed Development

The proposed Masterplan is a Concept DA (in accordance with Section 83B of the EP&A Act), which sets out the concept proposal for the development of the site. The concept contained in the Masterplan DA establishes the planning and development framework, which will form the basis for the detailed design of the future buildings and against which the future detailed DAs will be assessed.

The Masterplan DA seeks approval for the maximum building envelopes for future stages of development, the maximum gross floor area (GFA) and land uses for the development. Specifically:

- A mixed use development involving a maximum of GFA of 281,905m^2, including:
  - residential flat buildings comprising private, social and affordable housing
  - seniors housing comprising residential care facilities and self-contained dwellings
  - a new high school
  - child care centres
  - minor retail development
  - community uses
- maximum building heights and GFA for each development block;
- public domain landscape concept, including parks, streets and pedestrian connections;
- provision of the Ivanhoe Estate Design Guidelines to guide the detailed design of the future buildings; and
- vehicular and intersection upgrades.

An image of the Masterplan DA is provided at Figure 2 below.

Figure 2- Ivanhoe Estate Masterplan

Aspire Sustainability Commitments

The three key sustainability commitments for Ivanhoe are:

- Deliver 5 Star Green Star Design & As Built v1.1 minimum for all buildings
- Deliver 6 Star Green Star Communities v1 for the Ivanhoe precinct
- Deliver an integrated infrastructure solution via ôReal Utilitiesô

The individual commitments identified within Aspireôs Form 7 of the bid submission are captured within at least one of the above key commitments so that the sustainability vision from the original proposal is maintained throughout the life of the development from conception to completion. How the original commitments fit within these three key headings is outlined further.

Regarding Aspireôs Green Star commitments, this plan has been developed to allow maximum flexibility in achieving the above ratings, regardless of any potential changes to Green Star or its rating system over the life of this project. It has been designed to cater for the potentially different building designs and variables that may materialise in the realisation of the development, yet still achieve the high levels of outcomes envisioned for the precinct.

NSW Secretary's Environmental Assessment Requirements (SEARS)

The Aspire sustainability commitments incorporate the principles of ecologically sustainable development as defined by the EP&A Regulation 2000, namely:

- Application of the precautionary principle and assessment of risk-weighted consequences of options
- Intergenerational equity and conservation of biological diversity and ecological integrity
- Improved valuation, pricing and incentive mechanisms including life cycle costs, use of natural resources and waste disposal
- Establishment of environmental goals and associated mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problem

2 FRASERS PROPERTY SUSTAINABILITY PHILOSPHY AND APPROACH

Philosophy

At Frasers Property Australia, we believe that Sustainability isnôt just about the environment. Itôs about creating communities and places that help real people live, play, shop and work in better ways. Itôs about being a resilient and responsible business, creating more diverse opportunities for our employees and customers, efficient spaces that allow businesses to thrive, and communities that genuinely serve the needs of residents - as well as the planet. Itôs about minimising our environmental impact in everything we do, and maximising the social and economic benefits for all.

This philosophy is underpinned by ñA Different Wayò(Refer Appendix 6B), our sustainability strategy launched in 2016. A Different Way is our real commitment to creating places where resources are reused, recycled and restored, where new ideas are fostered for everyoneôs benefit, and where people can lead better, healthier lives.

Approach

Our approach for Ivanhoe addresses the broader definition of sustainability. It acknowledges that a sustainable organisation not only addresses its environmental impact, but also addresses the communities it develops and interacts with, its people and the marketplace. We believe we are well placed to design and deliver an exemplary community that will achieve in a range of leading sustainability performance indicators. Our recent sustainability achievements include:

- **Nine** Registered **Green Star Communities** projects, **the most of any organisation**. These include the Fairwater community in Blacktown NSW, which is on track to be one of Australiaôs most sustainable master planned communities and has already received UDIA and Green Globe awards.
- Developing approximately **1.3 million m2** of buildings that are certified or registered under **Green Star**.
- **86,000 people** live, work and shop in our **Green Star Buildings and Communities**
- Over **18,000 homes** that will be **Green Star Certified** or located within Green Star Certified Communities
- Ongoing commitment to supporting the environment and disadvantaged youth through the **Frasers Property Foundation**. Turning 10 years old this year, the Foundation provides a bank of 500 staff volunteering days per annum and is matched with a donation budget of approximately $150,000 per annum to identify and support charities and activities in which staff can participate.
- Industry support ï Frasers Property has supported the Green Building Council of Australia through involvement in technical and advisory groups as well as **sponsorship of several Green Star rating tools**. We are also represented on the GBCAôs Green Star Steering Committee and Property Council of Australiaôs National Sustainability Roundtable.
- Frasers Property is undertaking the **Living Building Challenge** for the Burwood East Brickworks Retail Centre VIC which, when completed, will be the worldsômost sustainable retail centre.
- Frasers Property **benchmarks all community projects against the Green Star Communities** tool with a minimum internal target of 5 stars.

As recognition of our leadership in sustainability and demonstrated ability to implement sustainability principles, Frasers Property has been named a **Regional Sector Leader in the 2017 Global Real Estate Sustainability Benchmark (GRESB) Survey**, the international property marketôs most prestigious and credible measure of commitment to sustainability performance.

3 SUSTAINABILITY BENCHMARK 1

Commitment: **Deliver 5 Star Green Star Design & As Built minimum for all buildings**

Method: **Using the Green Building Council of Australia's current rating tool "Green Star – Design & As Built v1.1" and subsequent releases as appropriate**

Our built environment is currently the world's single largest contributor to greenhouse gas emissions, and also consumes around a third of our water, and generates 40 per cent of our waste. From individual buildings to entire communities, Green Star is transforming the way our built environment is designed, constructed and operated. Launched by the Green Building Council of Australia in 2003, Green Star is Australia's only national and voluntary rating system for buildings and communities. Green Star is helping to improve environmental efficiencies in our buildings, while boosting productivity, creating jobs and improving the health and well-being of our communities.

Green Star ï Design & As Built assesses the sustainability outcomes from the design and construction of new buildings or major refurbishments, across nine holistic impact categories.

Ivanhoe Estate aims to set new Benchmarks in Sustainability under these categories as follows (Note; further commitment details are listed after):

Management
Ivanhoe Estate will utilise practices and processes that support best practice sustainability outcomes throughout the different phases of a projectõs design, construction and ongoing operation. These practices will include exploring amongst others:

- A comprehensive Occupants User Manual
- Building Operations ï namely Performance, Commissioning and Tuning
- Building Specific Climate Resilience Strategies

Indoor Environmental Quality
Through initiatives that enhance the comfort and well-being of occupants Ivanhoe Estate will look to address issues such as air quality, thermal comfort and acoustic comfort. Areas of comfort being investigated include:

- Thermal comfort via NatHERS and BASIX commitments
- Visual comfort via extensive landscaping and visual connection
- Indoor Air Quality via ventilation and the provision of outdoor air to apartments

Energy
Built Form at Ivanhoe Estate will be designed and constructed to reduce overall greenhouse emissions from operations by addressing energy demand reduction, use efficiency and generation from alternative sources. Multiple proposed initiatives will be investigated to address this including, but not limited to:

- Bid commitments around NatHERS and BASIX targets
- Inclusion of an integrated infrastructure solution (Real Utilities)
- Efficient building systems and Carbon Neutrality in operations

Transport
Ivanhoe Estate will look to reduce the dependency of private car use as an important means of reducing overall greenhouse gas emissions, as well as encouraging the provision of alternative forms of transportation. Some of the initiatives being explored include:

- Provision of ñGoGetòcar sharing facilities for residents
- Extensive end of trip facilities for residents
- Electric Vehicle infrastructure

Water
Built form at Ivanhoe Estate will aim to reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building systems and water re-use. Some of these initiatives maybe achieved through;

- Bid commitments around NABERS and BASIX targets
- 5 Star WELS appliances and fixtures
- Rainwater Harvesting

Materials
Ivanhoe Estate will aim to address the consumption of resources for the project, by encouraging the selection of low-impact materials. Areas of investigation to support this include:

- Utilisation of sustainable materials
- LCA Modelling
- 1% construction waste to landfill

Land Use and Ecology
A key focus of Ivanhoe Estate is to reduce the negative impacts on the sites' ecological value as a result of the development. We aim to minimise harm and enhance the quality of local ecology, particularly around the Turpentine Ironbark Forest along Shrimptons Creek. Initiatives to enable this currently include:

- Protecting the existing Turpentine Ironbark Forest
- Maintaining functional connection to Shrimptons Creek riparian habitat

Emissions
Ivanhoe Estate aims to reduce its environmental impacts from 'point source' pollution and reduce their effects on the atmosphere, watercourse and native animals. We are currently exploring a number of enablers for this including:

- Ensuring WSUD (Water Sensitive Urban Design) principles are applied throughout the precinct
- Reducing the impacts of light pollution from up-lighting

Innovation
Implementation of innovative practices, processes and strategies that promote sustainability in the built environment will occur throughout the lifetime of the development ensuring that Ivanhoe Estate is recognised as one of the most progressive projects in the country. A number of innovative concepts currently being explored on the project include;

- Transparent financial reporting on sustainability initiatives
- Nominal to no cost heating for social housing residents
- Carbon Neutral buildings in operations
- A strong focus on community health and wellbeing

As part of Aspireõs Sustainability Benchmark 1 we will look to incorporate the following initiatives;

5 Star Green Star Design and As Built Rating Targets	
5 Star Green Star Design & As Built v1.1 for all buildings (including building by other within precinct) including:	
Process	Develop a comprehensive occupantõs manual including user-friendly information on environmental features of the systems, building and facilities and advice on how to optimise performance and running costs.
Energy and Green House Gas Emissions	BASIX 45 energy ratings (on average across the development)
	6 star natHERS ratings (on average across the development)
	BASIX 45 water rating (on average across the development)
	Energy efficient equipment, lighting and appliances to be best practice (5-star energy ratings, LED lighting)
	Gas-boosted solar hot water or heat pumps for all domestic hot water needs
	Optimised integrated infrastructure solution
	Carbon Neutral in operation
	Reduction in embodied carbon (aligned with the materials commitments below and subject to LCA modelling)
	1.5MW Solar PV system covering approximately 50% of site roof space. The balance of roof space will be green roof and open space.
Water	BASIX Water 45 for all apartments (on average across the development)
	NABERS 5-star Water for all commercial buildings (where applicable)
	Water fixtures 5-star WELS
	Water appliances 5-star WELS
	Maximise the use of non-potable water for irrigation and car washing (Rainwater from building rooftops will be collected and reused on site)
	Optimised integrated infrastructure solution
Transport and Connectivity	Provision of 50 GoGet spaces
	A connected and permeable site to encourage active transport and use of public transport
	At least one bicycle parking space to be provided for each dwelling (>3,500) and at least 200 provided for visitors
	Electric vehicle ready
	End of trip facilities for non-residential buildings
	Future proofing for autonomous vehicles (designing for potential alternate use of basements and street parking)
Materials and Waste	15-20% Supplementary Cementitious Material (SCM) average in concrete mixes across site
	20% Recycle Asphalt Pavement (RAP) warm-mix asphalt
	ASI sustainable steel
	Recycled concrete in place of crushed rock where available
	Best environmental practice PVC
	FSC certified timber
	Embodied carbon reduction target Life cycle assessment will be used during detailed design to optimise for low carbon design. The project will target a substantial reduction in embodied GHG emissions through design and material selection. Carbon offsets will be purchased to meet the target if required
	Maximum 1% construction waste to landfill

4 SUSTAINABILITY BENCHMARK 2

Commitment: **Deliver 6 Star Green Star Communities for the Ivanhoe precinct**

Method: **Using the Green Building Council of Australia's current rating tool "Green Star – Communities v1.1" and subsequent releases as appropriate**

Green Star ï Communities assesses the planning, design and construction of large scale development projects at a precinct, neighbourhood and/or community scale. It provides a rigorous and holistic rating across five impact categories.

Ivanhoe Estate aims to set new Benchmarks in Sustainability under these categories as follows (Note; further commitment details are listed after):

Governance
Ivanhoe Estate will look to demonstrate leadership within the industry by establishing and maintaining strong governance practices. This will occur through engagement, transparency, as well as community and industry capacity building. We will look to ensure that the Ivanhoe Estate development is resilient to a changing climate. Some of the initiatives being explored include:

- Transparency via design reviews with independent sustainability experts
- Inclusive and comprehensive stakeholder engagement process
- Site Specific Climate Resilience Strategies

Liveability
We aim to deliver a safe, accessible and culturally rich community at Ivanhoe Estate. Accordingly we will focus on the development of healthy and active lifestyles, and look to create a community with a high level of amenity, activity, and inclusiveness. Areas of investigation currently include:

- Health and Fitness classes for all residents
- A safe, walkable and accessible community
- Dedicated Community Development Managers

Economic Prosperity
Ivanhoe Estate will look to promote prosperity and productivity through the creation of equitable living and housing, through investment in education and skills development, and through community capacity building. Current initiatives being explored include:

- Provision of digital infrastructure
- On site energy generation
- Community infrastructure investment

Environment
Reducing the impact of urban development on the local ecosystem is an important objective for Ivanhoe Estate. Resource management and efficiency will be carefully considered through promoting infrastructure, transport, and buildings that have reduced ecological footprints. Accordingly, we will seek to reduce the impacts of this project on the local land and aquatic environments. Ideas currently under consideration include:

- Ensuring WSUD (Water Sensitive Urban Design) principles are applied throughout the precinct
- Urban Heat Island reduction and mitigation strategies
- Waste management strategies

- Life Cycle impacts analyses of materials used on site
- Maximising the ecological value of site to be close to or exceeding existing

Innovation
Implementation of innovative practices, processes and strategies that promote sustainability in the built environment will occur throughout the lifetime of the development ensuring that Ivanhoe Estate is recognised as one of the most progressive projects in the country. A number of innovative concepts are being currently explored on this project including;

- Transparent financial reporting on sustainability initiatives
- Contractor education on sustainability
- Innovative use of technology through an integrated infrastructure solution (Real Utilities)

As part of Aspireôs Sustainability Benchmark 2 we will look to incorporate the following initiatives;

6 Star Communities Rating Targets	
6 Star Green Star Communities v1.1 including:	
Sustainable Site	Maximise the ecological value of site to be close to or exceeding existing (biodiversity, permeable surfaces, urban greening) 1. Protect the existing Turpentine Ironbark Forest 2. Maintain its functional connection to Shrimptons Creek riparian habitat through the site and with fauna crossings at road intersections. 3. Mitigating the urban heat island effect with extensive landscaped public domain, green roofs, low-SRI roofs and solar PV.
	Mitigating the urban heat island effect with extensive landscaped public domain, light coloured roofs, green roofs and solar PV.
	Employ Water Sensitive Urban Design Manage stormwater 1. Manage urban stormwater with water sensitive urban design including rainwater tanks, gross pollutant traps, underground detention tanks, swales/permeable detention basins/bio-filters as appropriate
Transport & Connectivity	A connected and permeable site to encourage active transport and use of public transport
	At least one bicycle parking space to be provided for each dwelling (>3,500) and at least 200 provided for visitors
	Provision of 50 GoGet spaces
	Electric vehicle ready
	End of trip facilities for non-residential buildings
Community Health and Happiness	To fully quantify and track tangible health and well-being metrics through programs and partnerships including Live Life Get Active and Mission Australiaôs Strengthening Communities amongst others.
	Public domain that encourages social interaction, has activated street frontages, is adaptable and comfortable, and is pedestrian-oriented
	We also commit to a minimum 200 volunteer hours on various community activities specifically for Ivanhoe Estate.
Living Costs	Development reduces average living costs for households, and average operating costs for businesses, compared with business as usual
	Whole of life affordability strategy considering: 1. Housing 2. Utilities 3. Food 4. Transit
	The CCAP Precinct report indicates in excess of a 40% reduction in living costs.
Local Economy	Integrate commercial opportunities within precinct, including spaces suitable for small business or home business operations and / or work from- home 1. Community Hub ï fitted out with offices and session rooms for the delivery of MAôs tenant support programs and also drop-in offices for the delivery of community services 2. Social Enterprise Space ï opportunities for social enterprise development in conjunction with the community.
	The Strengthening Communities program will deliver opportunities that MA and MAH can create through the operation of the residential community such as: 1. Landscaping 2. Common area maintenance 3. Administration of the Community Hub 4. Live Work Dwellings are incorporated in buildings along the main street which will be suitable for small business or home business

5 SUSTAINABILITY BENCHMARK 3

Commitment: **Deliver an integrated infrastructure solution via 'Real Utilities'**

Method: **Aspire will develop and deliver a private embedded electrical and hot water network to supply all users across the precinct. On the back these embedded networks we will improve their efficiencies by incorporating the following strategies:**

1. **Installation of solar PV to reduce electrical peak demand and greenhouse emissions;**
2. **Use of high efficiency centralised hot water;**
3. **Installation of smart metering technology to allow efficient demand management;**
4. **Minimise use of onsite gas;**
5. **Provision of low-cost heating to the social housing;**
6. **Acquire certified carbon offsets (if required) to ensure that 100% of energy supplied through Real Utilities is NCOS carbon neutral certified.**

Community Energy Networks

Private ï or ñEmbeddedòï energy networks are increasingly commonplace on new retail, residential and mixed-use developments in Australia. While the distinguishing feature of a Private Network is the establishment of a gate ï or ñparentòï meter that separates energy users within a new development from the external grid, Private Networks come in many flavours.

Traditional providers of energy have a clear profit motive ï the more energy consumed, the more revenue they receive ï with little attention to energy efficiency. Increasingly they are participating in the Private Network market, but with little benefit to end-users.

Frasers Property Community Energy Network

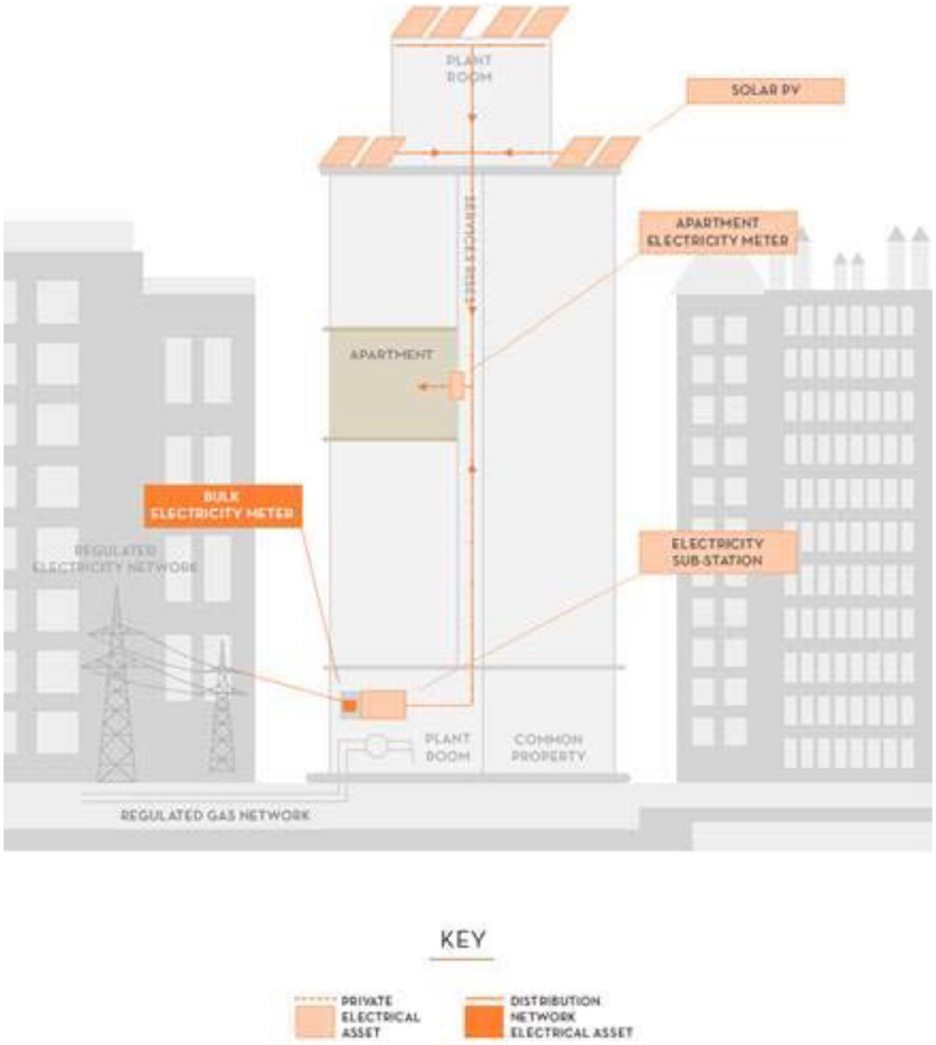
In recently establishing an embedded network division, Real Utilities, Frasers Property has the ambition to be the leading provider of energy on new developments in Australia. In addition to a commitment to establishing Private Networks on all its new retail, residential and mixed-use developments, Real Utilities is also in the process of obtaining a Retail Electricity license.

This capability will allow Frasers Property to provide a real difference on the Ivanhoe Estate development with the potential for the following benefits to the people who live and work in those developments to be realised:

- **Lower cost energy.** Real Utilities will match or better the lowest prices of the major electricity retailers. Moreover, it will ensure this is an enduring benefit by constantly resetting prices to be below the best discounted tariff of the three major electricity retailers in the area, without lock-in contracts or honeymoon periods
- **Carbon neutral power.** Frasers property and Real Utilities will supply certified carbon neutral power through maximising solar PV installation to the available roof-space, and acquiring certified carbon offsets for 100% of the grid sourced electricity and greenhouse gas emissions within its Private Networks. The power will be certified carbon neutral under the Australian Governmentõs National Carbon Offset Standard (NCOS)

- **Greater demand management by end-users.** Frasers Property and Real Utilities will install the latest smart meter technology within its Private Networks to provide residents with usable access to their energy consumption data and to time of use energy tariffs

These benefits will have greatest impact on reducing energy demand and the costs of energy consumed will contribute to a reduction in the financial stress that underlies utility disconnections.



As part of Aspireôs Sustainability Benchmark 3 we will look to incorporate the following initiatives;

Integrated Infrastructure Solution (Real Utilities) Targets	
Provide an optimised integrated infrastructure solution	
Private wire electricity supply	Real Utilities will establish the precinct with one or more private wire networks by installing gate meters
	These private networks allow for: 1. The purchase of grid electricity at bulk, with savings passed on to the residents and businesses 2. The optimal integration of renewable energy generation on site 3. Implementation of energy efficiency measures at scale 4. 100% of power supplied by Real Utilities will be NCOS carbon neutral certified 5. Continued Government concessions and subsidies to Social housing residents by Real Utilities
Smart metering and energy monitoring	Without charge to any of the precincts residents, Frasers Property and Real Utilities will install the latest smart meter technology which will give residents access to: 1. Time of use energy tariffs 2. Their energy consumption data so they may make better energy use decisions
On-site renewable energy	Ensure that on-site renewable energy generation from Solar PV is maximised wherever possible
	Based on the current site density and restricted roof space available, this is estimated to be near 1,500 kW, which will be increased wherever feasible
100% Carbon Neutral power	Without charge to any of the precinctôs residents, Real Utilities will supply 100% certified carbon neutral power. The energy will be certified under the Australian Governmentôs National Carbon Offset Standard
	Based on current projected energy loads Frasers Community Utilities will procure offset certificates for the precinctôs approximately 12,000 tonnes of CO2 emissions each year
	To ensure the durability of this feature, Frasers will acquire at least the first 5yearsô worth of certificates at or prior to completion of each building
Affordability	Real Utilities will provide all residents with electricity cost savings, at tariffs which better those of the 3 major electricity retailers in the area.
	The benefit delivered by Real Utilities will be achieved by constantly resetting prices at below the best discounted rate of the major electricity retailers, without lock-in contracts or honeymoon periods.
	Real Utilities will provide affordable heating to the social housing residents via a radiant heating system, & will be provided at a nominal to zero cost
Centralised hot water	Frasers Property will provide residents with centralised hot water
	The energy component of hot water will be invoiced Real Utilities, while the water component of the hot water will be invoiced by the water provider
	Hot water tariffs will set at below standard tariffs
Electric/ induction cooktops	Frasers Property will provide electric / induction cooktops for residents
	Electric cooktops are preferred by Frasers Propertyôs social housing bid partner
Energy efficient cooling and heating	Frasers Property will procure energy efficient split air-conditioning systems for the non-Social housing dwellings
	The base solution for Social housing residents is ceiling fans and provisions for future spilt system air conditioners
	Heating will be provided to social housing residents via a radiant heating system, which will be provided at a nominal to zero cost

APPENDICES

A. EXPERT SUSTAINABILITY CERTIFIER SUPPORT LETTER

Our ref: PS107138-171211-PR-SUSTAINABILITY LETTER.docx

By email
Rory.Martin@fraserspropery.com.au

11 December 2017

Rory Martin
Sustainability Manager - Residential
Frasers Property Australia
Level 9, 484 St Kilda Road, Melbourne, VIC, 3004

Dear Rory

Ivanhoe Estate | Sustianability Statement

This letter provides a certificate of review for the Ivanhoe Sustainability Report (November 2017 against the Sustainability Benchmarks identified within the Ivanhoe PDA.

The benchmarks are:

1. **Commitment 1**: Deliver 5 Star Green Star Design & As Built minimum for all buildings using the Green Building Council of Australia's current rating tool "Green Star – Design & As Built v1.1" and subsequent releases as appropriate
2. **Commitment 2**: Deliver 6 Star Green Star Communities for the Ivanhoe precinct using the Green Building Council of Australia's current rating tool "Green Star – Communities v1.1" and subsequent releases as appropriate
3. **Commitment 3**: Deliver an integrated infrastructure solution via 'Real Utilities' with the development and delivery of a private embedded electrical and hot water network to supply all users across the precinct. On the back these embedded networks we will improve their efficiencies by incorporating the following strategies:

- Installation of solar PV to reduce electrical peak demand and greenhouse emissions;
- Use of high efficiency centralised hot water;
- Installation of smart metering technology to allow efficient demand management;
- Minimise use of onsite gas;
- Provision of low-cost heating to the social housing;
- Acquire certified carbon offsets (if required) to ensure that 100% of energy supplied through Real Utilities is NCOS carbon neutral certified.

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The Sustainability Report demonstrates the approach to compliance for each of these benchmarks, supported by the associated reports for the planning submission and the following documents:

- Green Star D&AB Scorecard;
- Green Star Communities Scorecard;
- Real Utilities Proposal.

Subject to the implementation of the stated initiatives that correspond with these scorecards, over the course of the design and delivery phases of the project, the benchmark commitments can be considered to achieved for this stage of design.

Kind regards

Richard Palmer
Director - Sustainability

B. GREEN STAR COMMUNITIES INDICATIVE SCORECARD

Green Star Communities scorecards are appended to this report to demonstrate that the initiatives identified are able to meet the benchmark requirements. As the project proceeds through planning, design and construction, the balance of initiatives and credits targeted will likely change based on design, predicted performance and whole-of-life cost. The flexibility to changes to the individual credit strategies is an important aspect of the Green Star rating tools, providing opportunities for an optimised sustainability strategy that achieves equivalent performance, provided the total points and certified rating are maintained.

CATEGORY / CREDIT	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
GOVERNANCE				
Green Star Accredited Professional	1.0	Green Star Accredited Professional	1	1
Design Review	2.1	Site Planning and Layout	4	4
	2.2	Urban Design	4	4
Engagement	3.1	Stakeholder Engagement Strategy	3	3
	3.2	Strategy Implementation	3	3
Adaptation and Resilience	4.1	Climate Adaptation	2	2
	4.2	Community Resilience	2	2
Corporate Responsibility	5.1	Corporate Responsibility	1	1
	5.2	Sustainability Reporting	2	2
Sustainability Awareness	6.1	Community Users' Guide	1	1
	6.2	Sustainability Education Facilities	1	0
Community Participation and Governance	7.1	Community Facility Management	1	1
	7.2	Community Program Management	1	1
Environmental Management	8.1	Environmental Management System	1	1
	8.2	Environmental Management Plan	1	1
Total			**28**	**27.0**

LIVEABILITY				
Healthy and Active Living	9.0	Minimum Requirement - Footpaths	-	Complies
	9.0	Minimum Requirement - Footpaths	-	Complies
	9.1	Active Lifestyle	2	2
	9.2	Recreational Facilities	2	2
	9.3	Healthy Places	1	1
Community Development	10.0	Minimum Requirement - Community Development Plan	-	Complies
	10.1	Community Development Officer	1	1
	10.2	Community Group	1	1
	10.3	Community Events	1	1
	10.4	Community Information	1	1
Sustainable Buildings	11.1	Certified Non-Residential Buildings	-	
	11.2	NatHERS and Livable Housing Australia	4	1

Culture, Heritage and Identity	12.1	Understanding Culture, Heritage and Identity	1	1
	12.2	Enhancing Community Culture, Heritage and Identity	2	2
Walkable Access to Amenities	13.1	Walkable Access to Amenities	2	2
Access to Fresh Food	14.1	Access to Fresh Food	1	1
	14.2	Local Food Production	1	1
Safe Places	15.0	Minimum Requirement - Visibility	-	Complies
	15.1	Design for Safety	2	2
Total			**22**	**19.0**

ECONOMIC INVESTMENT				
Community Investment	16.1	Community Infrastructure Investment	4	4
Affordability	17.1	Residential Affordability Strategies	4	4
	17.2	Non- Residential Affordability Strategies	-	
Employment and Economic Resilience	18.1	Net Percentage Increase of Local Jobs	1	0
	18.2A	Diverse Local Employment – Performance Pathway	-	
	18.2B	Proximity to Major City – Prescriptive Pathway	1	0
	18.2C	NCC Class mix – Prescriptive Pathway	-	
Education and Skills Development	19.1	Higher Education Facilities	1	1
	19.2	Skills Development Programs	1	1
	19.3	Industry Capacity Development	1	
Return on Investment	20.1	Analysis of Direct Costs and Benefits	1	
	20.2	Analysis of Indirect Costs and Benefits	1	
Incentive Programs	21.1	Residential Incentives	2	2
	21.2	Non-residential Incentives	-	
Digital Infrastructure	22.1	High-speed Broadband	1	1
	22.2	Wireless Local Area Network	1	1
Peak Electricity Demand	23A	Reduced Peak Electricity Demand - Performance Pathway	-	
	23B.i	On-site Generation – Prescriptive Pathway	2	
	23B.ii	Energy Storage – Prescriptive Pathway	-	
Total			**21**	**14.0**

ENVIRONMENT				
Integrated Water Cycle	24A.1	Stormwater – Performance Pathway	2	2
	24A	Water Sensitive Urban Design – Performance Pathway	5	2
	24B.1	Alternative Water Sources - Public Open Spaces	-	
	24B.2	Alternative Water Sources - Buildings	-	
	24B.3	Stormwater Peak Discharge	-	
	24B.4	Stormwater Quality	-	

Greenhouse Gas Strategy	25A	Greenhouse Gas Strategy – Performance Pathway	6	6
	25B.1	Energy Efficiency - Infrastructure Lighting	-	
	25B.2	Energy Efficiency - Existing Buildings	-	
	25B.3	Renewable Energy Production	-	
	25B.4	District Heating and Cooling	-	
Materials	26A	Life Cycle Assessment (LCA) – Performance Pathway	-	
	26B	Life Cycle Impacts – Prescriptive Pathway	3	1.5
Sustainable Transport and Movement	27A	Sustainable Transport and Movement: Performance Pathway	3	3
	27B	Sustainable Transport and Movement: Prescriptive Pathway	-	
Sustainable Sites	28	Conditional Requirement	-	Complies
	28.1	Previously Developed Land	1	1
	28.2	Best Practice Site Decontamination	1	
Ecological Value	29.1	Change of Ecological Value	1	0
	29.2	Biodiversity Enhancement	1	0
Waste Management	30.1	Construction, and Demolition Waste	1	0.7
	30.2	Operational Waste	1	1
Heat Island Effect	31.1	Heat Island Effect	1	1
Light Pollution	32.1	Light Pollution	1	1
Total			**27**	**19.2**

INNOVATION				
Innovative Technology or Process	33A	Innovative Technology or Process	10	
Market Transformation	33B	Market Transformation		1
Improving on Green Star Benchmarks	33C	Improving on Green Star Benchmarks		
Innovation Challenge	33D	Innovation Challenge		2
Global Sustainability	33E	Global Sustainability		
Total			**10**	**3**
		TOTALS	**AVAILABLE**	**TARGETED**
		CORE POINTS	**100**	**79.2**
		CATEGORY PERCENTAGE SCORE		**79.2**
		INNOVATION POINTS	**10**	**3.0**
		TOTAL SCORE TARGETED		**82.2**

C. GREEN STAR DESIGN AND AS BUILT INDICATIVE SCORECARD

Green Star Design and As Built scorecards are appended to this report to demonstrate that the initiatives identified are able to meet the benchmark requirements. As the project proceeds through planning, design and construction, the balance of initiatives and credits targeted will likely change based on design, predicted performance and whole-of-life cost. The flexibility to changes to the individual credit strategies is an important aspect of the Green Star rating tools, providing opportunities for an optimised sustainability strategy that achieves equivalent performance, provided the total points and certified rating are maintained.

CATEGORY / CREDIT	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
MANAGEMENT				
Green Star Accredited Professional	1.0	Accredited Professional	1	1
Commissioning and Tuning	2.0	Environmental Performance Targets	-	Complies
	2.1	Services and Maintainability Review	1	1
	2.2	Building Commissioning	1	1
	2.3	Building Systems Tuning	1	1
	2.4	Independent Commissioning Agent	1	1
Adaptation and Resilience	3.1	Implementation of a Climate Adaptation Plan	2	2
Building Information	4.1	Building Operations and Maintenance Information	1	1
	4.2	Building User Information	1	1
Commitment to Performance	5.1	Environmental Building Performance	1	1
	5.2	End of Life Waste Performance	1	1
Metering and Monitoring	6.0	Metering	-	Complies
	6.1	Monitoring Systems	1	0
Construction Environmental Management	7.0	Environmental Management Plan	-	Complies
	7.1	Formalised Environmental Management System	1	1
Operational Waste	8A	Performance Pathway - Specialist Plan	1	1
	8B	Prescriptive Pathway - Facilities	-	
Total			**14**	**12**

INDOOR ENVIRONMENT QUALITY				
Indoor Air Quality	9.1	Ventilation System Attributes	1	1
	9.2	Provision of Outdoor Air	2	2
	9.3	Exhaust or Elimination of Pollutants	1	1
Acoustic Comfort	10.1	Internal Noise Levels	1	1
	10.2	Reverberation	1	0
	10.3	Acoustic Separation	1	0
Lighting Comfort	11.0	Minimum Lighting Comfort	-	Complies

	11.1	General Illuminance and Glare Reduction	1	1
	11.2	Surface Illuminance	1	1
	11.3	Localised Lighting Control	1	1
Visual Comfort	12.0	Glare Reduction	-	Complies
	12.1	Daylight	2	0
	12.2	Views	1	1
Indoor Pollutants	13.1	Paints, Adhesives, Sealants and Carpets	1	1
	13.2	Engineered Wood Products	1	1
Thermal Comfort	14.1	Thermal Comfort	1	
	14.2	Advanced Thermal Comfort	1	
Total			**17**	**12**

ENERGY				
Greenhouse Gas Emissions	15A.0	Conditional Requirement: Prescriptive Pathway	-	
	15A.1	Building Envelope	-	
	15A.2	Glazing	-	
	15A.3	Lighting	-	
	15A.4	Ventilation and Air-conditioning	-	
	15A.5	Domestic Hot Water Systems	-	
	15A.6	Building Sealing	-	
	15A.7	Accredited GreenPower	-	
	15B.0	Conditional Requirement: NatHERS Pathway	-	
	15B.1	NatHERS Pathway	-	
	15C.0	Conditional Requirement: BASIX Pathway	-	Complies
	15C.1	BASIX Pathway	16	9
	15D.0	Conditional Requirement: NABERS Pathway	-	
	15D.1	NABERS Energy Commitment Agreement Pathway	-	
	15E.0	Conditional Requirement: Reference Building Pathway	-	
	15E.1	Comparison to a Reference Building Pathway	-	
Peak Electricity Demand Reduction	16A	Prescriptive Pathway - On-site Energy Generation	-	
	16B	Performance Pathway - Reference Building	2	
Total			**18**	**8**

TRANSPORT				
Sustainable Transport	17A.1	Performance Pathway	10	0
	17B.1	Access by Public Transport	0	
	17B.2	Reduced Car Parking Provision	0	
	17B.3	Low Emission Vehicle Infrastructure	0	
	17B.4	Active Transport Facilities	0	
	17B.5	Walkable Neighbourhoods	0	
Total			**10**	**4**

Water				
Potable Water	18A.1	Potable Water - Performance Pathway	0	
	18B.1	Sanitary Fixture Efficiency	1	1
	18B.2	Rainwater Reuse	1	1
	18B.3	Heat Rejection	2	2
	18B.4	Landscape Irrigation	1	1
	18B.5	Fire System Test Water	1	1
Total			**6**	**6**

MATERIALS				
Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment	0	
	19A.2	Additional Life Cycle Impact Reporting	0	
	19B.1	Concrete	3	0
	19B.2	Steel	1	1
	19B.3	Building Reuse	4	0
Responsible Building Materials	20.1	Structural and Reinforcing Steel	1	1
	20.2	Timber Products	1	1
	20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1
Sustainable Products	21.1	Product Transparency and Sustainability	3	1
Construction and Demolition Waste	22A	Fixed Benchmark	-	
	22B	Percentage Benchmark	1	1
Total			**12**	**9**

LAND USE AND ECOLOGY				
Ecological Value	23.0	Endangered, Threatened or Vulnerable Species	-	Complies
	23.1	Ecological Value	3	1
Sustainable Sites	24.0	Conditional Requirement	-	Complies
	24.1	Reuse of Land	1	1
	24.2	Contamination and Hazardous Materials	1	
Heat Island Effect	25.0	Heat Island Effect Reduction	1	1
Total			**6**	**3**

EMISSIONS				
Stormwater	26.1	Reduced Peak Discharge	1	1
	26.2	Reduced Pollution Targets	1	1
Light Pollution	27.0	Light Pollution to Neighbouring Bodies	-	Complies
	27.1	Light Pollution to Night Sky	1	1
Microbial Control	28.0	Legionella Impacts from Cooling Systems	1	1
Refrigerant Impacts	29.0	Refrigerants Impacts	1	0
Total			**5**	**4**

INNOVATION				
Innovative Technology or Process	30A	Innovative Technology or Process	10	1
Market Transformation	30B	Market Transformation		
Improving on Green Star Benchmarks	30C	Improving on Green Star Benchmarks		
Innovation Challenge	30D	Innovation Challenge		5
Global Sustainability	30E	Global Sustainability		
Total			**10**	**6**

		TOTALS	**AVAILABLE**	**TARGETED**
		CORE POINTS	**100**	**58.0**
		CATEGORY PERCENTAGE SCORE		**58.0**
		INNOVATION POINTS	**10**	**6.0**
		TOTAL SCORE TARGETED		**64.0**

Appendix B

PROPOSED DEVELOPMENT MASTER PLAN


B1.1
B1.2
B2 - School
B3
A1
A2
A3
C1
C2
C3
C4
D1
D2
D3
D4

Appendix C

DIAL BEFORE YOU DIG PLANS