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Utility Services Report

To accompany the Stage 1 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:

5th October 2018

Project Management • Town Planning • Engineering • Surveying
Visualisation • Economic Analysis • Social Impact • Urban Planning

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Document Control Sheet

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F	Minor Wording	3 rd October 2018	BM	MO
G	Image amended	5 th October 2018	BM	MO

Limitations Statement

This report has been prepared in accordance with and for the purposes outlined in the scope of services agreed between ADW Johnson Pty Ltd and the Client. It has been prepared based on the information supplied by the Client, as well as investigation undertaken by ADW Johnson and the sub-consultants engaged by the Client for the project.

Unless otherwise specified in this report, information and advice received from external parties during the course of this project was not independently verified. However, any such information was, in our opinion, deemed to be current and relevant prior to its use. Whilst all reasonable skill, diligence and care have been taken to provide accurate information and appropriate recommendations, it is not warranted or guaranteed and no responsibility or liability for any information, opinion or commentary contained herein or for any consequences of its use will be accepted by ADW Johnson or by any person involved in the preparation of this assessment and report.

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The Client should be aware that this report does not guarantee the approval of any application by any Council, Government agency or any other regulatory authority.

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 and Lot 100 in DP1223787 known as The Ivanhoe Estate, Ivanhoe Place, Macquarie Park NSW (the site).

A summary of each service authority's ability to service the overall development has been provided within the *"Utility Services Report - To accompany a Concept Development Application for the Ivanhoe Estate Masterplan a State Significant Development"* prepared by ADW Johnson, Issue No. D and dated 13th December 2017 (hereafter referred to as: Utility Services Report OMD). This report formed part of the State Significant Development Application (SSDA) for the Overall Masterplan Development (OMD) that was lodged with Department of Planning and Environment (DPE).

The purpose of this follow up report is to support a SSDA for Stage 1 of the OMD and specifically provide additional details in regards to the provision of services within this stage of the development.

The Stage 1 SSDA includes all of the proposed public roads, including the bridge over Shrimptons Creek and extension to Lyonpark Road, as well as built form and landscaping associated with Buildings A1 and C1. Stage 1 is proposed to be further subdivided into Stage 1A, Stage 1B and Stage 1C.

As was outlined within the Utility Services Report OMD that accompanied the OMD SSDA, the provision of key services (i.e. potable water, sewer, electricity, telecommunications and gas) does not pose a constraint to the proposed development and essential lead-in works, which are required for electrical and telecommunications only, can be completed in time to service Stage 1 of the development. Please refer to the Utility Services Report OMD for further information.

In order to provide further details in regards to the internal servicing of Stage 1, a number of subconsultants were engaged to prepare concept designs of the infrastructure required to be installed. A summary of the works to be undertaken for each service within Stage 1 appears in **Table A** on the following page.

Table A: Summary of Servicing Infrastructure required for Stage 1

UTILITY SERVICE	LEAD-IN WORKS	ARE THE LEAD-IN WORKS DEVELOPER FUNDED?	INTERNAL WORKS
Potable Water Supply	STAGE 1A: Connection into existing trunk main within Herring Road only.	Yes	STAGE 1A: Connection to existing trunk main in Herring Road and provision of internal network. STAGE 1B: Extension of internal network. STAGE 1C: Extension of internal network and connection to existing trunk main in Epping Road.
Recycled Water Supply	N/A	N/A	N/A
Sewerage Infrastructure	STAGE 1A: Connection into existing trunk main running on development side of Shrimptons Creek only.	Yes	STAGE 1A: Lead in works and provision of internal network and temporary works to connection point. STAGE 1B: Subject to Stage 1A temporary works. STAGE 1C: No works required.
Electricity Infrastructure	STAGE 1A: Three (3) new high voltage feeders required to service the site.	Yes	STAGE 1A: Lead in works, Internal HV and LV network along with two (2) substations. STAGE 1B: Extension of internal HV and LV network. Multiple new substations. STAGE 1C: Extension of internal HV and LV network. New substation.
Tele-communications Infrastructure	STAGE 1A: New trunk main required to service the site.	Partly	STAGE 1A: Lead in works and provision of Internal network. STAGE 1B: Extension of internal network. STAGE 1C: Extension of internal network.
Gas Infrastructure	STAGE 1A: Connection into existing trunk main within Herring Road only.	Not likely – TBC confirmed by Jemena once development consent obtained.	STAGE 1A: Connection to existing trunk main and extension of new main to the retail centre. Gas will only be available for the retail centre, school and residential aged care facility. STAGE 1B: No works required. STAGE 1C: No works required.

NOTE: All service requirements subject to confirmation with relevant service authorities during the CC phase and therefore, the information contained within Table A may change accordingly.

The provision of key services to Stage 1 of the OMD is not considered to present a constraint to the development.

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APPENDICES

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Appendix C	Dial Before You Dig Plans
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Appendix F	Telecommunication Correspondence
Appendix G	Jemena Correspondence

1.0 Introduction

This report supports a Development Application for Stage 1 of the Ivanhoe Estate redevelopment, 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.

This report should be read in conjunction with the *"Utility Services Report - To accompany a Concept Development Application for the Ivanhoe Estate Masterplan a State Significant Development"* prepared by ADW Johnson, Issue No. D and dated 13th December 2017 (hereafter referred to as: Utility Services Report OMD). This report formed part of the State Significant Development Application (SSDA) for the Overall Masterplan Development (OMD) that was lodged with Department of Planning and Environment (DPE).

The purpose of this follow up report is to support a SSDA for Stage 1 of the OMD and specifically provide additional details in regards to the provision of services within this stage of the development.

As the purpose of this report is to accompany a Development Application (DA) only, it is high-level in nature. Further details will be prepared in conjunction with a future Construction Certificate (CC) application.

1.1 BACKGROUND

In September 2015 the Ivanhoe Estate was rezoned by DPE 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 and Mission Australia Housing, were selected as the successful proponent to develop the site in July 2017.

In September 2017, DPE issued the Secretary's Environmental Assessment Requirements for a comprehensive Masterplan application that will establish the framework for the staged redevelopment of the site. This Development Application for Stage 1 of the Ivanhoe Estate redevelopment represents the first stage of detailed works pursuant to the Ivanhoe Estate Masterplan.

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 2.0** 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 that is currently occupied by four (4) 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.

Ivanhoe Estate comprised of 17 individual lots owned and managed by the NSW 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.



 The Site

 To facilitate road extension to Lyonpark Road

Figure 2.0 - Ivanhoe Estate Site

3.0 Proposed Development

The proposed Stage 1 Development Application seeks consent for the first stage of detailed works within the Ivanhoe Estate, pursuant to the Ivanhoe Estate Masterplan under Section 4.22 of the EP&A Act. The Masterplan establishes the planning and development framework against which this Stage 1 Development Application will be assessed.

The Stage 1 Development Application seeks approval for:

- Site preparation works, including tree removal, demolition of roads, services and earthworks across the Ivanhoe Estate;
- The provision and augmentation of utilities and services infrastructure across the Ivanhoe Estate;
- The construction of all internal roads including public domain within the road reserves, and the bridge crossing and road connection to Lyonpark Road;
- The consolidation of existing lots and subdivision of the Ivanhoe Estate to reflect the revised road layout, open space, and provide superblocks corresponding to the Masterplan;
- The construction and use of Buildings A1 and C1 comprising residential uses (including social housing), a childcare centre, and retail / community spaces.

An image of the Masterplan, identifying Buildings A1 and C1 and illustrating the road network, is provided at **Figure 3.0** below.

The Stage 1 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**.



Figure 3.0 - Ivanhoe Estate Masterplan

3.1 STAGE 1 SEQUENCING

Whilst the Stage 1 development application seeks consent for the provision of services over the entire estate, it is proposed that construction will be completed in multiple stages.

The internal road network and associated services are to be constructed in three (3) Sub-stages 1A, 1B and 1C, however all are contained within the Stage 1 SSDA. The proposed works associated with each sub-stage and any temporary works are outlined in the remaining sections of this report. The extents of each sub-stage can be seen in **Figure 3.1** below, whilst a larger version can be seen in **Appendix B**.

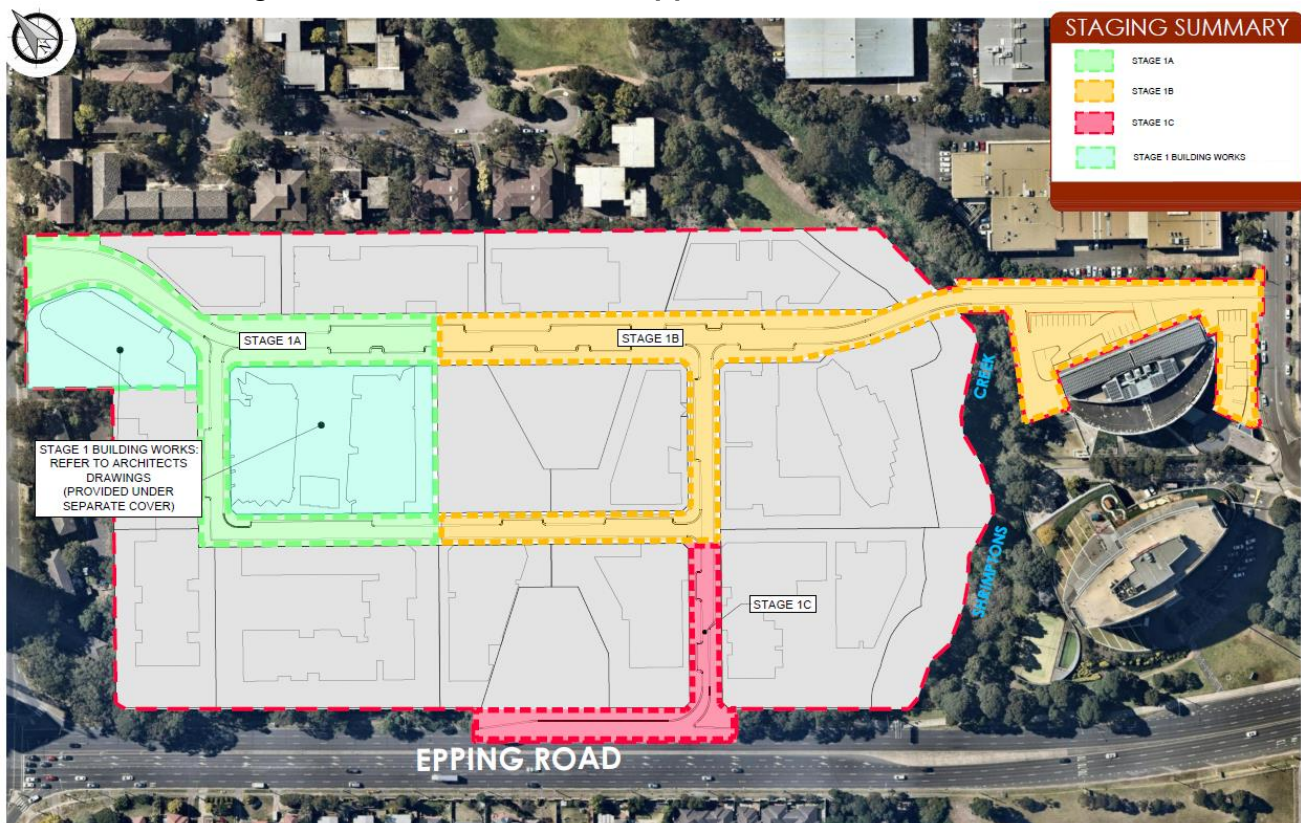


Figure 3.1: Proposed Sub-stages within Stage 1

It is noted that the construction staging may change over the life of the development and therefore the exact extent of works within each sub-stage will be confirmed during the Construction Certificate (CC) application phase.

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 within Herring 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 on site. It is noted that the existing dwellings will be demolished by the Land and Housing Corporation (LAHC) prior to the commencement of Stage 1 construction works and therefore the existing mains will be made redundant.

The sites current water supply is from a DN500 CICL trunk main and a DN250 PVC main which run along Herring Road 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**.

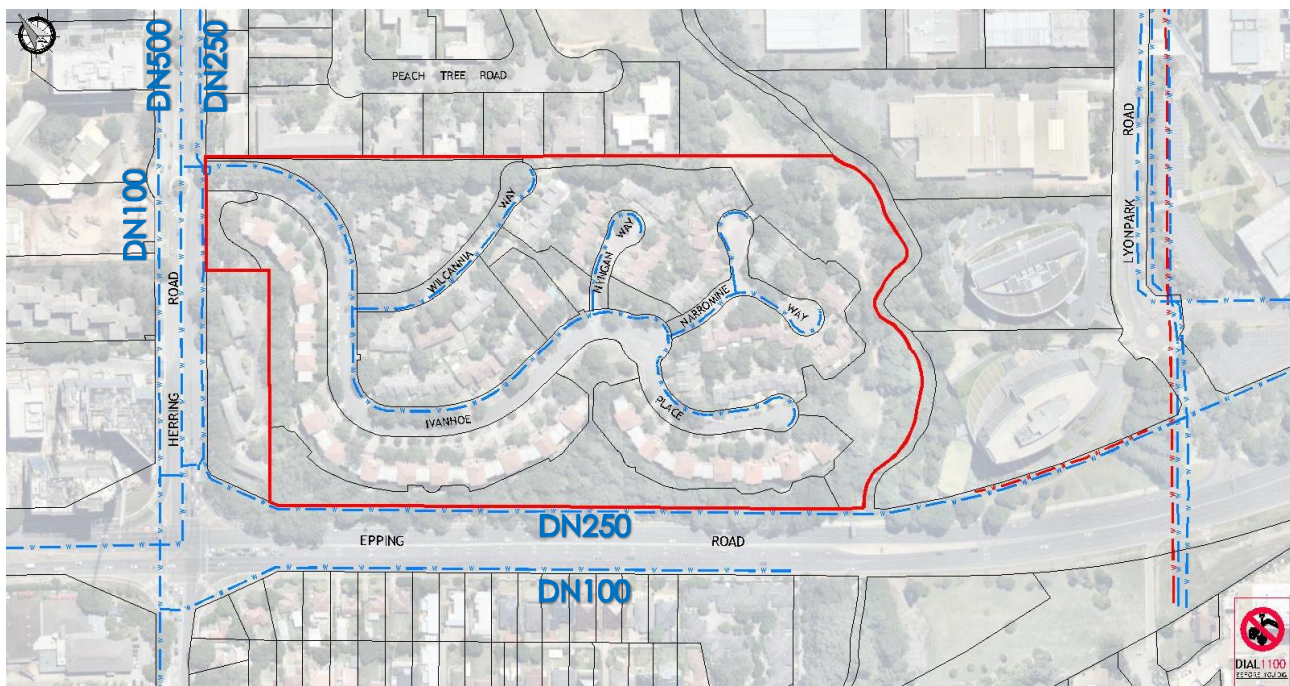


Figure 4.1 – Existing Potable Water Infrastructure in the Vicinity of the Stage 1 DA Works

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.

Subsequent to the feasibility application response, a meeting was held with SWC on the 5th March 2018 to further discuss the stage 1 development application. At this meeting the proposed watermain layout was tabled and discussed, with SWC not raising any issues with the concept design.

4.3 LEAD IN WORKS – TO BE UNDERTAKEN AS PART OF STAGE 1A

Based upon SWC's advice contained within the response to the feasibility application, the only lead in work likely to be required to facilitate Stage 1 works is a connection into the existing DN500 trunk main located within Herring Road. Due to its close proximity to the site and likely easier connection, it is proposed to connect into the DN250 main that runs parallel to the DN500 main.

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. Exact details will be confirmed in conjunction with preparation of CC documentation.

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 for the entire estate, prepared by Rose Atkins Rimmer (RAR) (accredited Water Service Coordinators (WSC's) with SWC), is shown below in **Figure 4.4**.

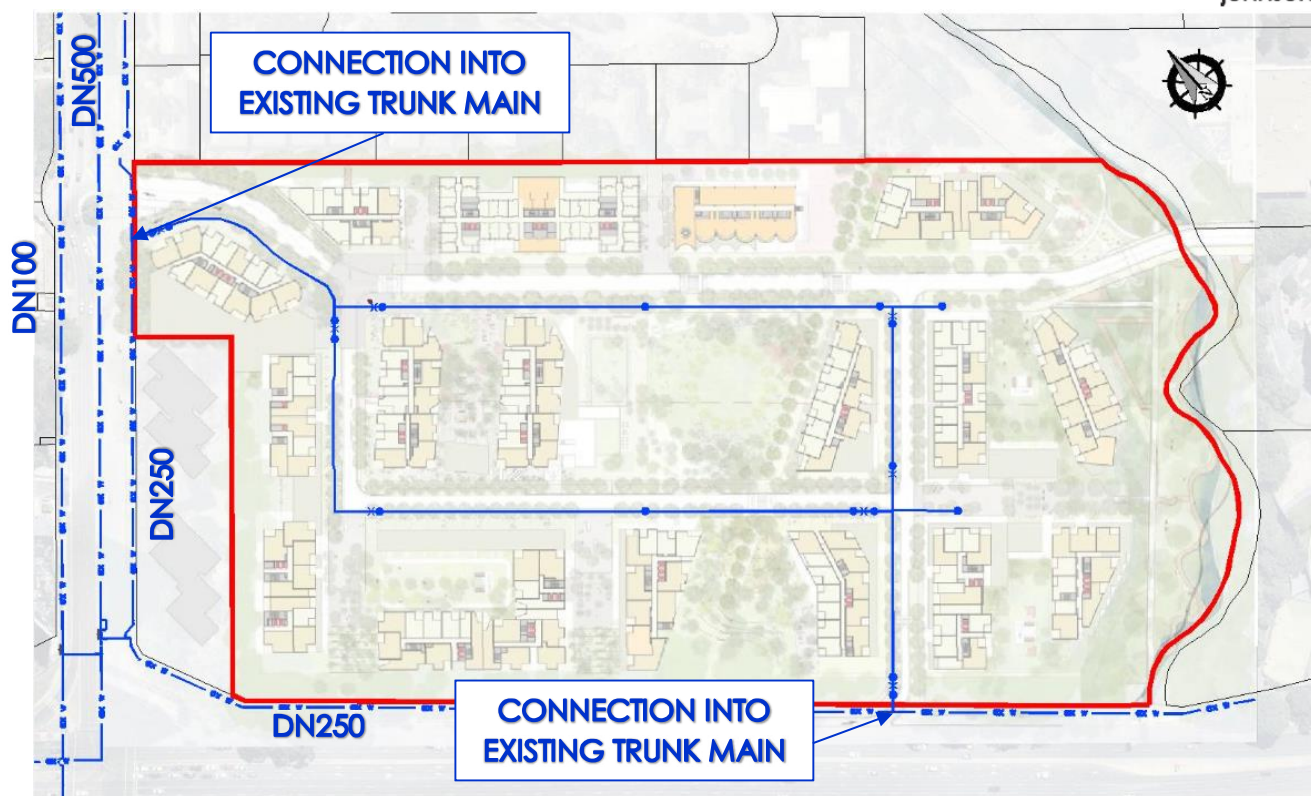


Figure 4.4 – Concept Proposed Water Reticulation Network Design

4.4.1 Stage 1A Works

The stage 1A works will involve connecting into the existing DN250 trunk main in Herring Road, along with the extension of the internal reticulation network into the development site.

The internal reticulation network will be extended into the site in accordance with the concept design and capped for future connection in the vicinity of the Stage 1A boundary. The exact location of the termination point will be determined at the CC stage of the development. The main will be terminated in accordance with SWC's requirements.

Service connections will be provided for all buildings fronting the new mains, including buildings not forming part of the Stage 1 development application. Details of these connections will be provided at the CC stage of the development.

An indicative layout of the Stage 1A works is shown in **Figure 4.4.1** below.

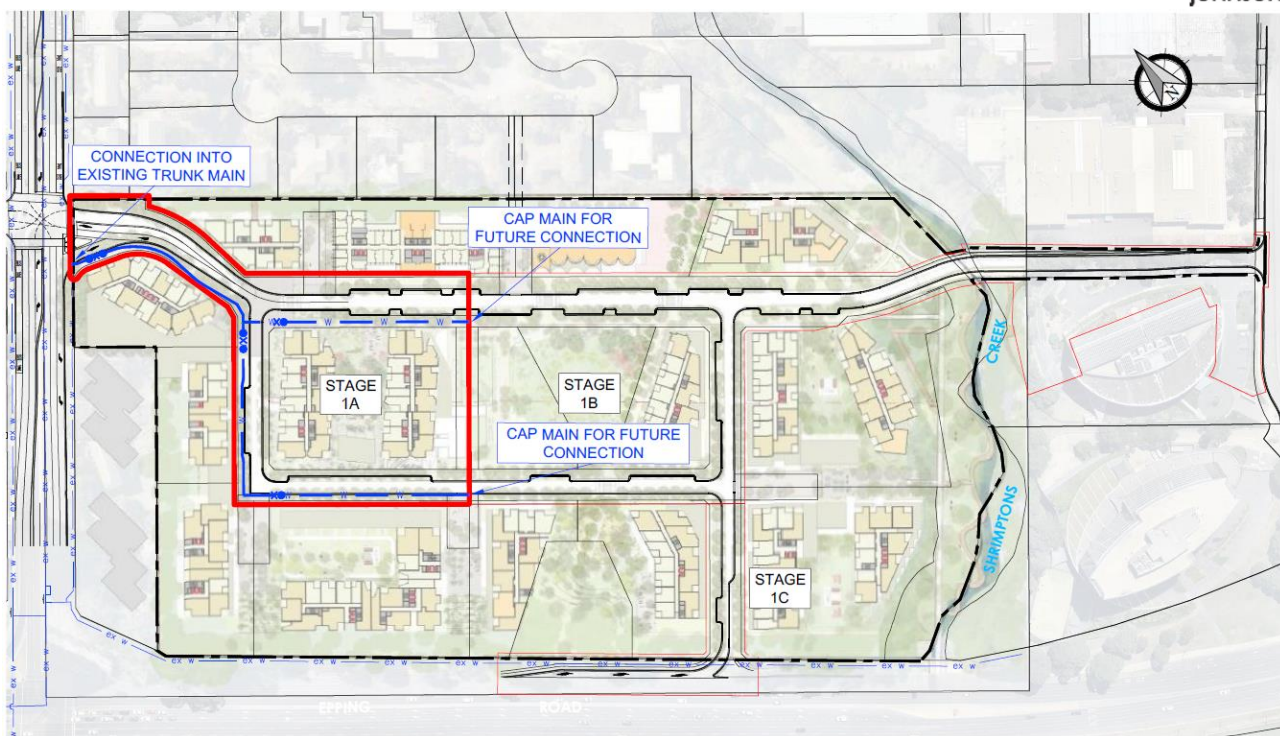


Figure 4.4.1 – Indicative Stage 1A Water Layout

4.4.2 Stage 1B Works

The Stage 1B works will involve connecting into the terminated Stage 1A works and the continuation of the reticulation network through the site.

The reticulation mains will be extended in accordance with the concept design and capped for future connection in the vicinity of the Stage 1B/1C boundary. Similar to Stage 1A, the exact location of the termination will be determined at the CC stage of the development.

As with Stage 1A, service connections will be provided for all buildings fronting the new mains. Details of these connections will be provided at the CC stage of the development.

An indicative layout of the Stage 1B works is shown in **Figure 4.4.2** below.

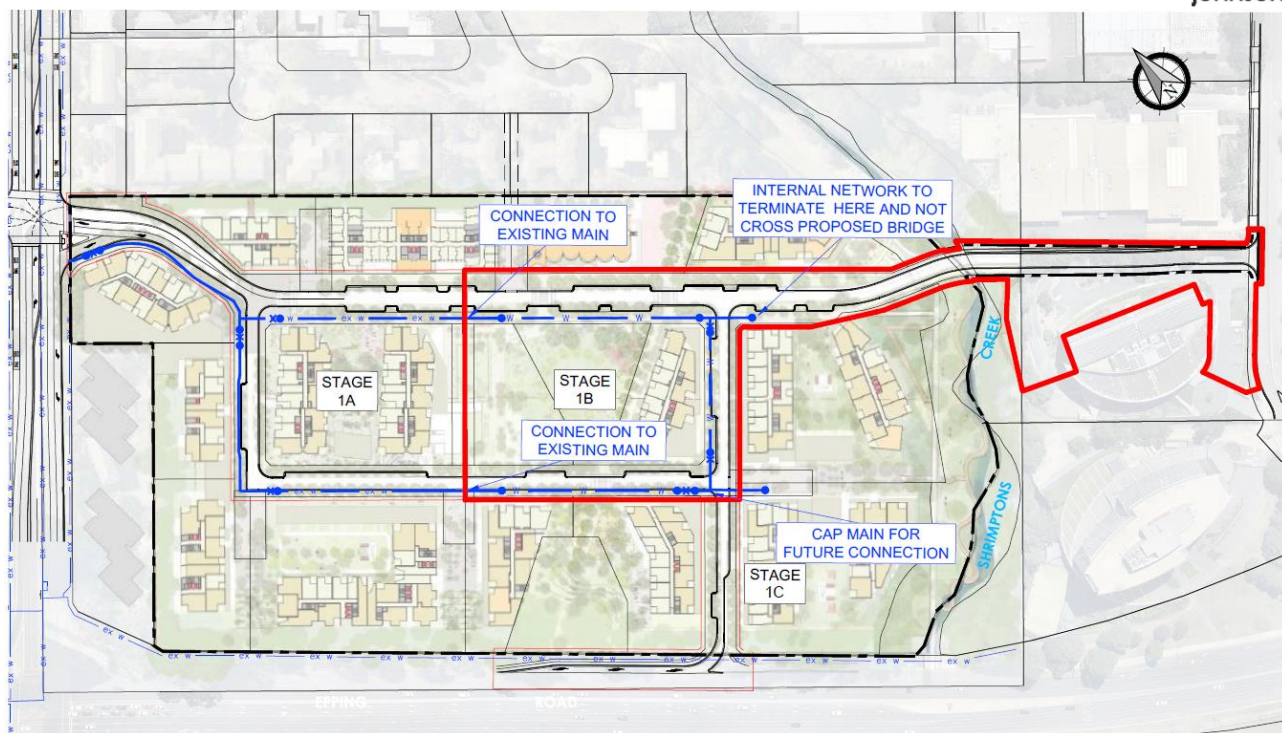


Figure 4.4.2 – Indicative Stage 1B Water Layout

4.4.3 Stage 1C Works

The Stage 1C works will involve connecting into the terminated Stage 1B works and a connection into the existing DN250 main in Epping Road.

As with Stages 1A and 1B, service connections will be provided for all buildings fronting the new mains. Details of these connections will be provided at the CC stage of the development.

An indicative layout of Stage 1C works is shown in **Figure 4.4.3** on the following page.

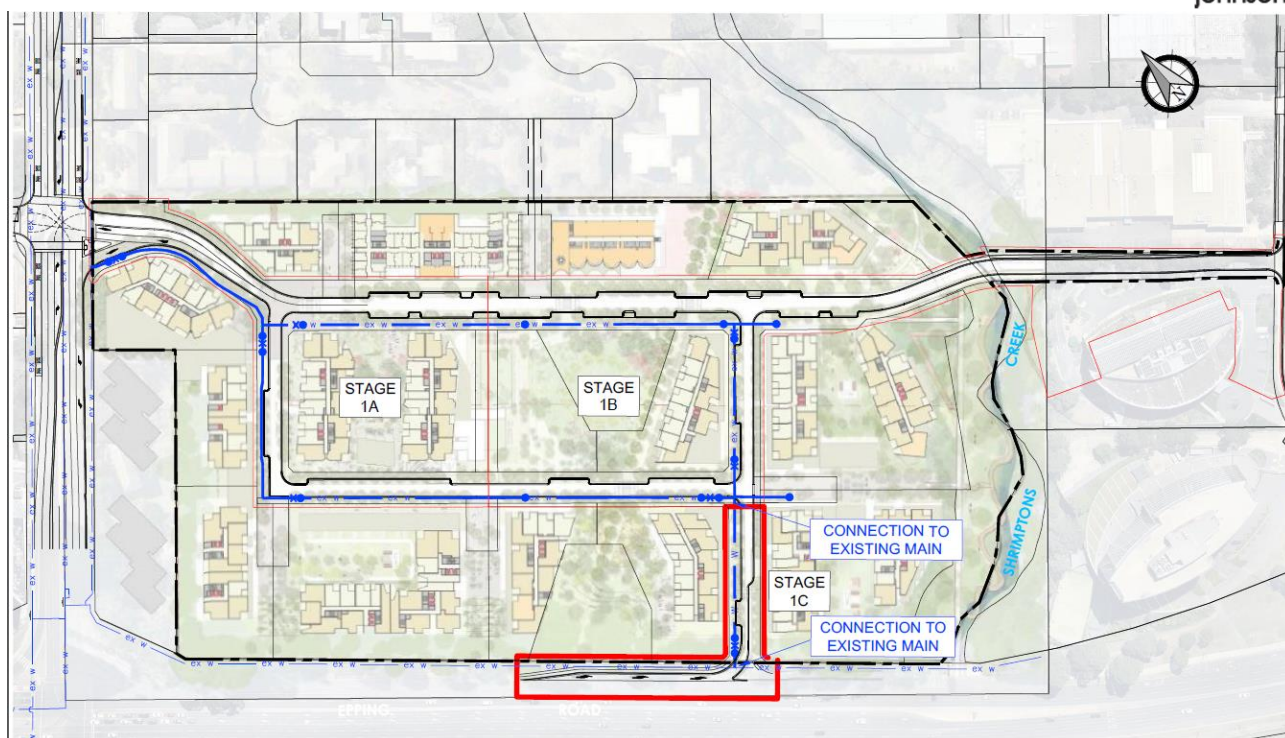


Figure 4.4.3 – Indicative Stage 1C Water Layout

4.5 POTABLE WATER SUPPLY CONCLUSION

Based upon advice received from SWC, there is capacity within the existing trunk potable water network to service Stage 1 of the development.

The Stage 1 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 and extended within the site via the proposed public road network.

A further connection into the existing trunk Main within Epping Road will ensure security of supply for the development.

Accordingly, the provision of potable water is not considered to present a constraint to the delivery of Stage 1.

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 delivery 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 proposed.

5.4 INTERNAL WORKS

It is noted that whilst SWC has no requirement to provide recycled water infrastructure within the proposed development, the developer is proposing to install rainwater tanks within each building for the purposes of rainwater harvesting. It is proposed to use captured rainwater for irrigation purposes. Further details of this can be found in the Stage 1 "Stormwater and Drainage Assessment" prepared by ADW Johnson.

5.5 RECYCLED WATER INFRASTRUCTURE CONCLUSION

There is no requirement from SWC for the provision of recycled water reticulation to the proposed development, however, the developer is proposing to install rainwater tanks within each building for the purposes of rainwater harvesting. It is proposed to use captured rainwater for irrigation and car washing purposes.

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**.

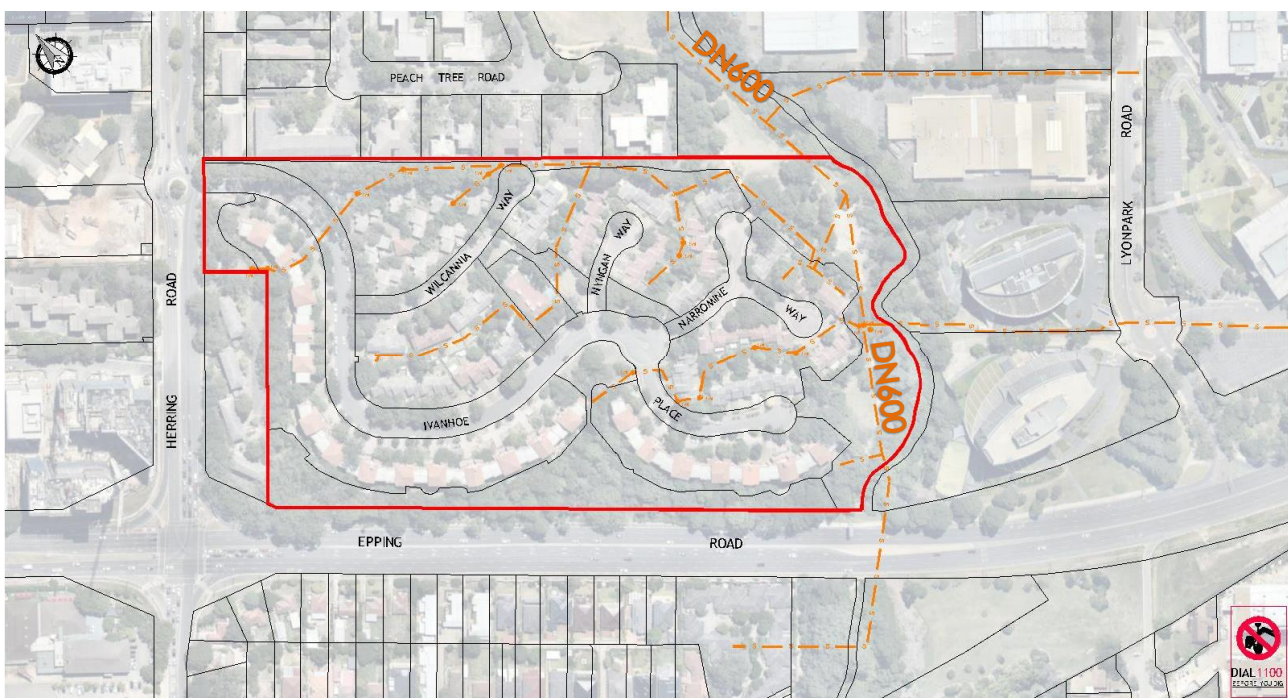


Figure 6.1 – Existing Trunk Sewerage Infrastructure

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.

Subsequent to the feasibility application response, a meeting was held with SWC on the 5th March 2018 to further discuss the stage 1 development application. At this meeting the proposed sewer layout was tabled and discussed, with SWC not raising any issues with the concept design.

6.3 LEAD IN WORKS – TO BE UNDERTAKEN AS PART OF STAGE 1A

In accordance with the SWC's advice in their response to the feasibility application, there are no lead-in works required to service Stage 1 of the proposed development.

The only works required are to connect Stage 1 into the existing DN600 trunk main.

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 6.4**.

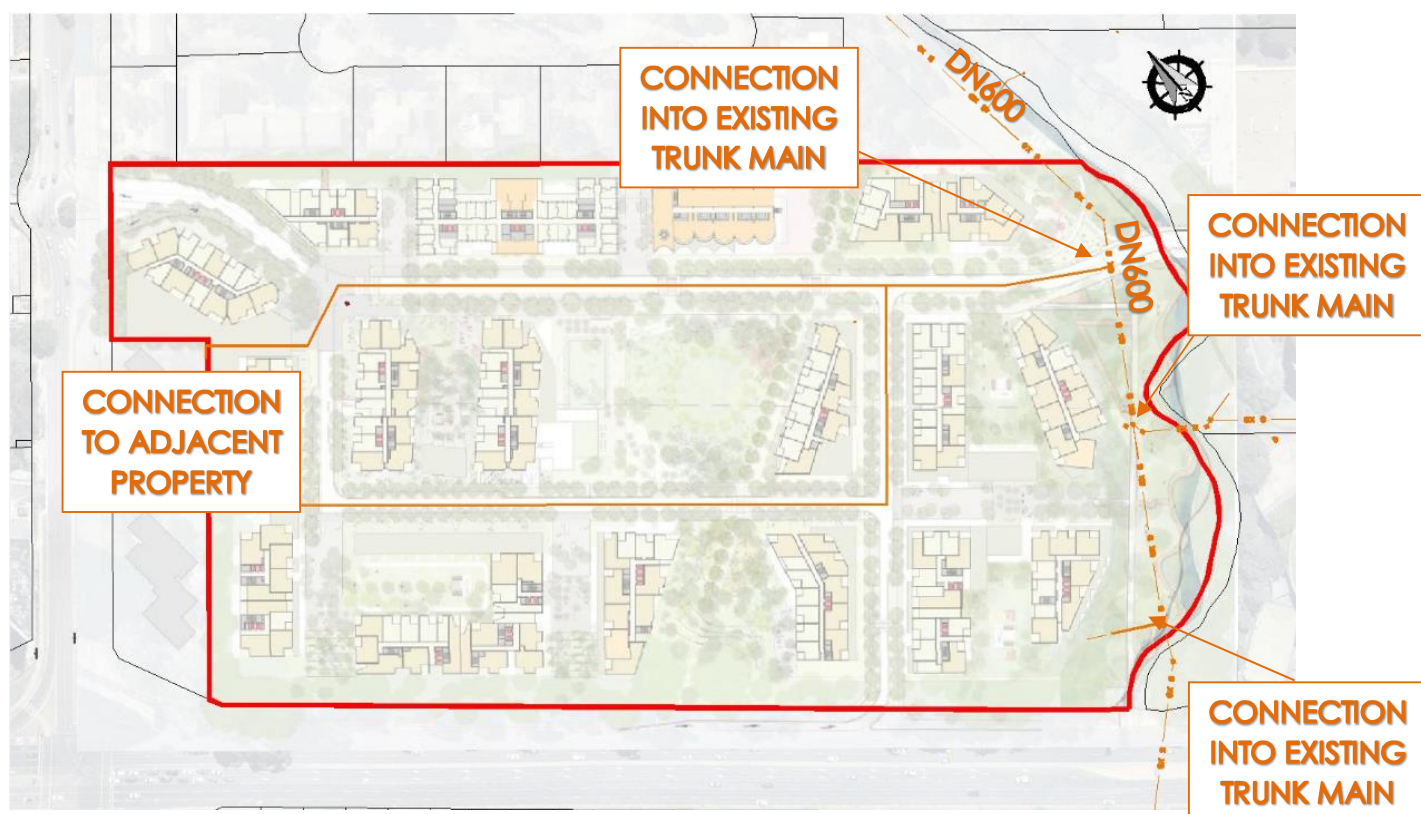


Figure 6.4 – Concept Proposed Sewerage Design

6.4.1 Stage 1A Works

The Stage 1A works will involve the construction of the new sewer mains and service connections to each lot within the Stage 1A development footprint.

As Stage 1A is at the top of the sewer catchment, further works outside of the Stage 1A boundary will be required to connect Stage 1A into the existing system. The following options are proposed:

- Construct the sewerage reticulation network for the entire estate at the future design levels and connect directly into the DN 600 main adjacent to the creek;
 - This option is considered unlikely due to the deep excavations that will be required;
- Construct temporary mains from the Stage 1A boundary and connect into the existing DN 600 main adjacent to the creek;
 - This option is considered unlikely due to the extensive distance required to trench to the main located adjacent to Shrimptons Creek;
- Connect into the existing internal system at an appropriate location;
 - This option is considered to be the most likely due to the minimal amount of works required;
 - This option would be dependent on the location, depths and size of the existing sewer in the vicinity of the Stage 1A boundary.

All of the above options will be considered in detail at the CC stage, with the most appropriate option to be adopted.

An indicative layout of stage 1A work options is shown in **Figure 6.4.1** below.

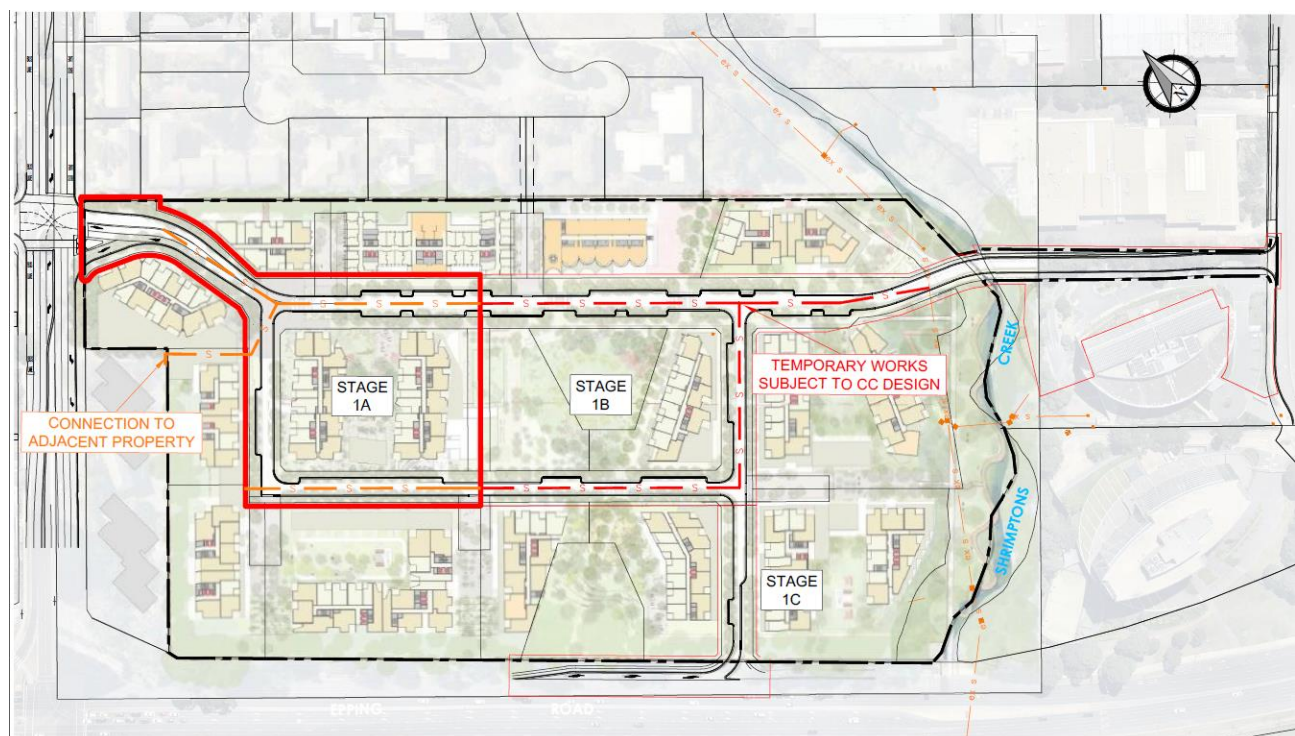


Figure 6.4.1 – Indicative Stage 1A Sewer Layout

6.4.2 Stage 1B Works

The works required within Stage 1B will be dependent on the works undertaken within Stage 1A. Should Option 1 be undertaken within Stage 1A then no further sewer main works would be required within Stage 1B. It is likely that service connections to each lot would be required to be provided.

Should Options 2 or 3 be undertaken within Stage 1A then the temporary mains would need to be removed and the proposed mains be constructed in accordance with the design. This would include service connections to each lot and the connection into the existing DN 600 main adjacent to Shrimptons Creek.

An indicative layout of Stage 1B work options is shown in **Figure 6.4.2** on the following page.

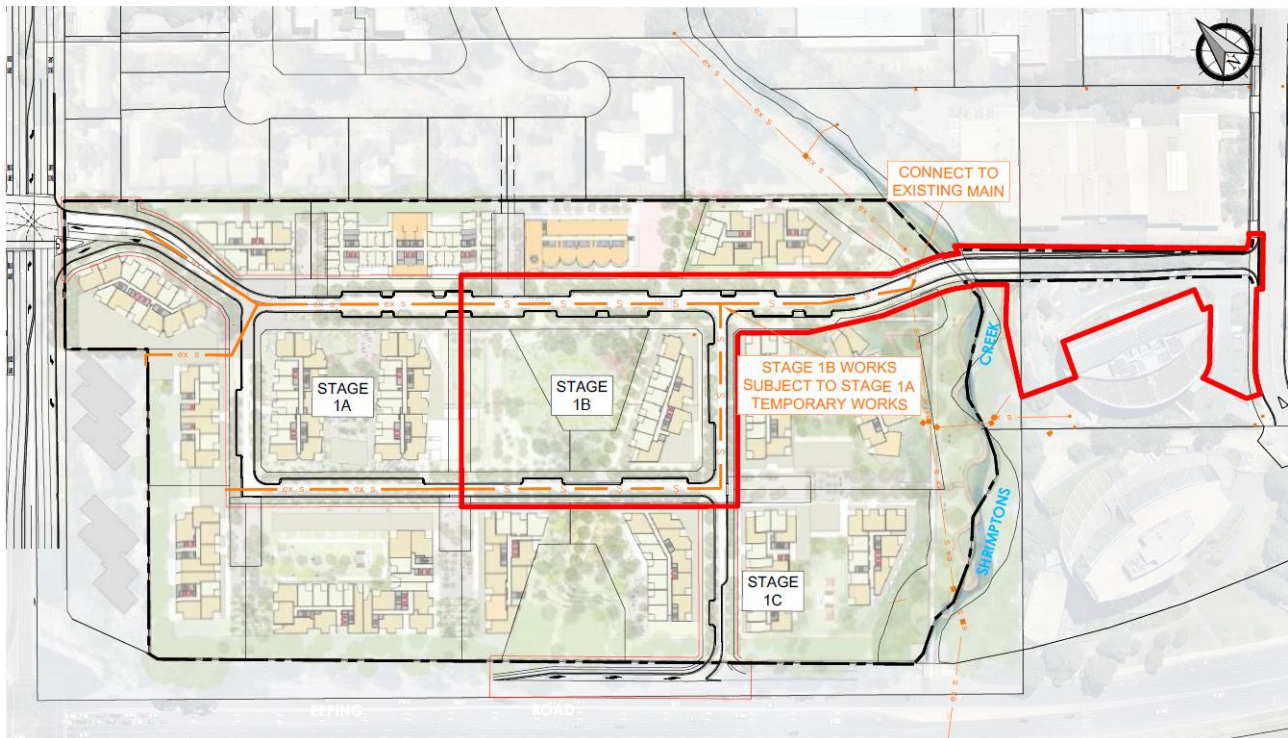


Figure 6.4.2 – Indicative Stage 1B Sewer Layout

6.4.3 Stage 1C Works

There are no sewer works required within Stage 1C of the development.

It is noted that buildings C4 and D4 are to be serviced from lines that connect directly into the DN 600 main adjacent to Shrimptons Creek. These works will be covered in the development application/s for these individual buildings.

6.5 SEWERAGE INFRASTRUCTURE CONCLUSION

Based upon advice received from SWC, there is capacity within the existing trunk sewerage network to service Stage 1 of the proposed development.

The internal sewerage network to be delivered as part of Stage 1 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 infrastructure is not considered to present a constraint to Stage 1.

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**.

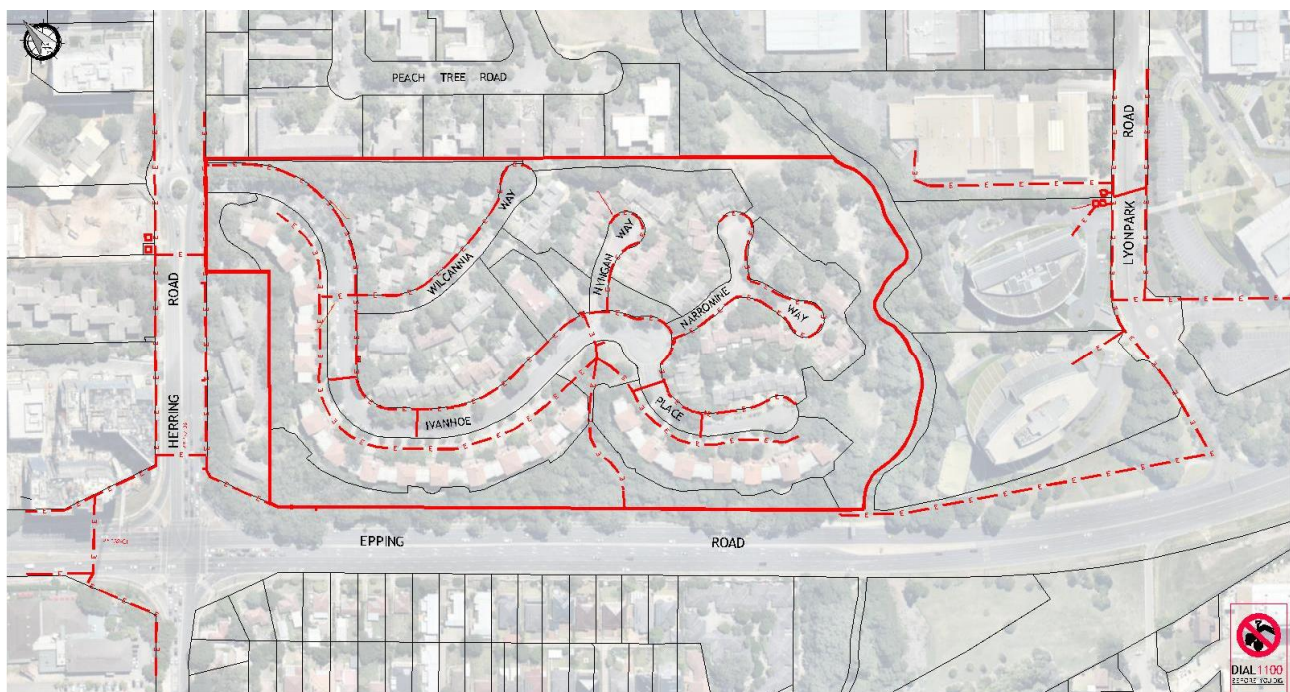


Figure 7.1 – Existing Electricity Infrastructure

7.2 FEASIBILITY APPLICATION

A feasibility application was lodged with Ausgrid on 6th June 2017, 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. Whilst Stage 1 will likely only require one (1) HV feeder, given the complexities of installing two (2) new feeders at a later date, it is proposed to install all three (3) feeders as part of Stage 1 works and connect them into the development as required.

7.3 LEAD IN WORKS – TO BE UNDERTAKEN AS PART OF STAGE 1A

Further to the feasibility application and in response to a proposed design scope submission, a design information package (DIP) was received from Ausgrid on 23rd January 2018. This DIP outlines the proposed route for the three (3) additional HV feeders along with specific details in regards to the cabling and conduits. A copy of the DIP is contained within **Appendix E**.

The proposed new feeder network consists of 4x150mm conduits which are to be installed from the Epping Zone substation to the site (approximately 3.3km). Three (3) new 500mm² AL3 cables are proposed to be installed for the entire run, along with a minimum of 1x150mm spare conduit for each HV feeder cable. One (1) spare 63mm conduit is also to be installed in association with all 11kV cable trenches.

Subsequent to receiving the design information package, further investigations were undertaken on the proposed feeder route. Through this work, it was found that a shorter and more efficient route could be used to bring the feeders to the site.

Figure 7.3, on the following page, shows the proposed alignment for the three HV feeders into the site. A draft design of the HV Lead in works is provided in **Appendix E**.

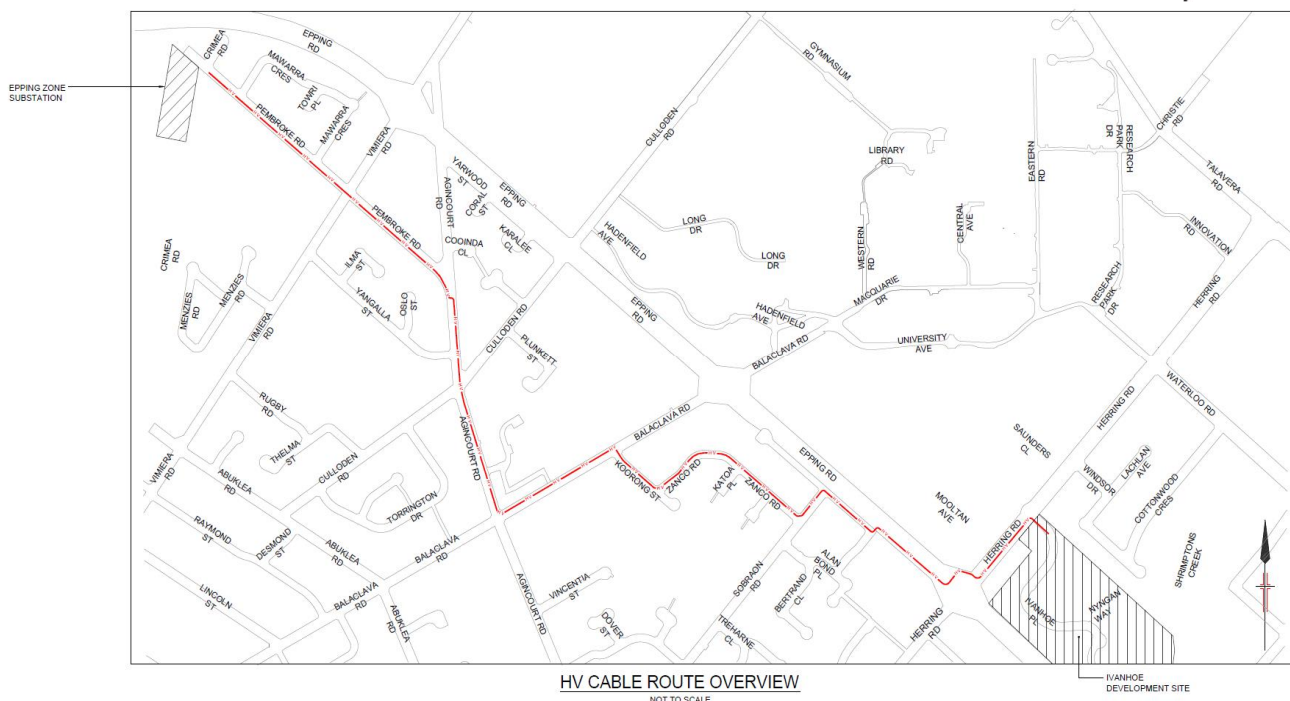


Figure 7.3 – Proposed HV Network

7.4 INTERNAL WORKS

As part of Stage 1, the existing internal infrastructure is to be demolished and replaced with a new high voltage network, including substations to be installed within the proposed lots. These substations will then feed a low voltage supply to the proposed dwellings and street light network. Shelmardines (electrical engineers) have prepared a high-level concept overall masterplan electrical design, which is shown on the following page in **Figure 7.4** and includes the proposed location of the sub stations to service the buildings to be constructed within Stage 1.

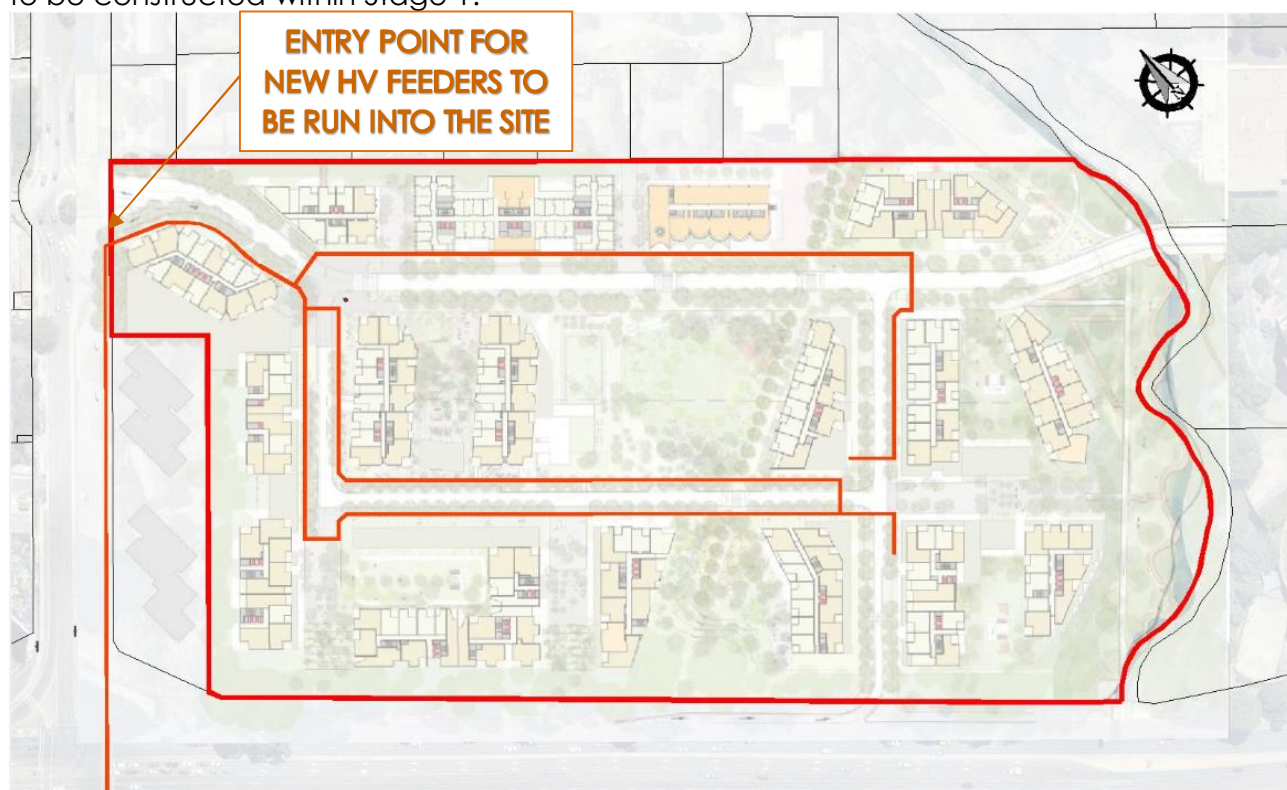


Figure 7.4 – Concept Proposed Electrical Design

7.4.1 Stage 1A Works

The Stage 1A works will involve extending the new HV feeders into the site and the provision of the following substations:

- One (1) Surface Chamber with 2 x 1500 kVA transformers:
 - This chamber would feed buildings A1 and C1.1 which are included within Stage 1, along with buildings A2 and B1.1 (which will be constructed as a part of future stages);
- One (1) Standard surface chamber (mini chamber) with 1 x 1000 kVA transformer:
 - This would feed building C1.2 which is included within Stage 1.

Along with the HV network and proposed substations, the relevant low voltage feeds to each building and the street lights will also be supplied in Stage 1A.

It is noted that the above is indicative only and the final design may change as the project progresses.

An indicative layout of Stage 1A works is shown in **Figure 7.4.1** on the following page.

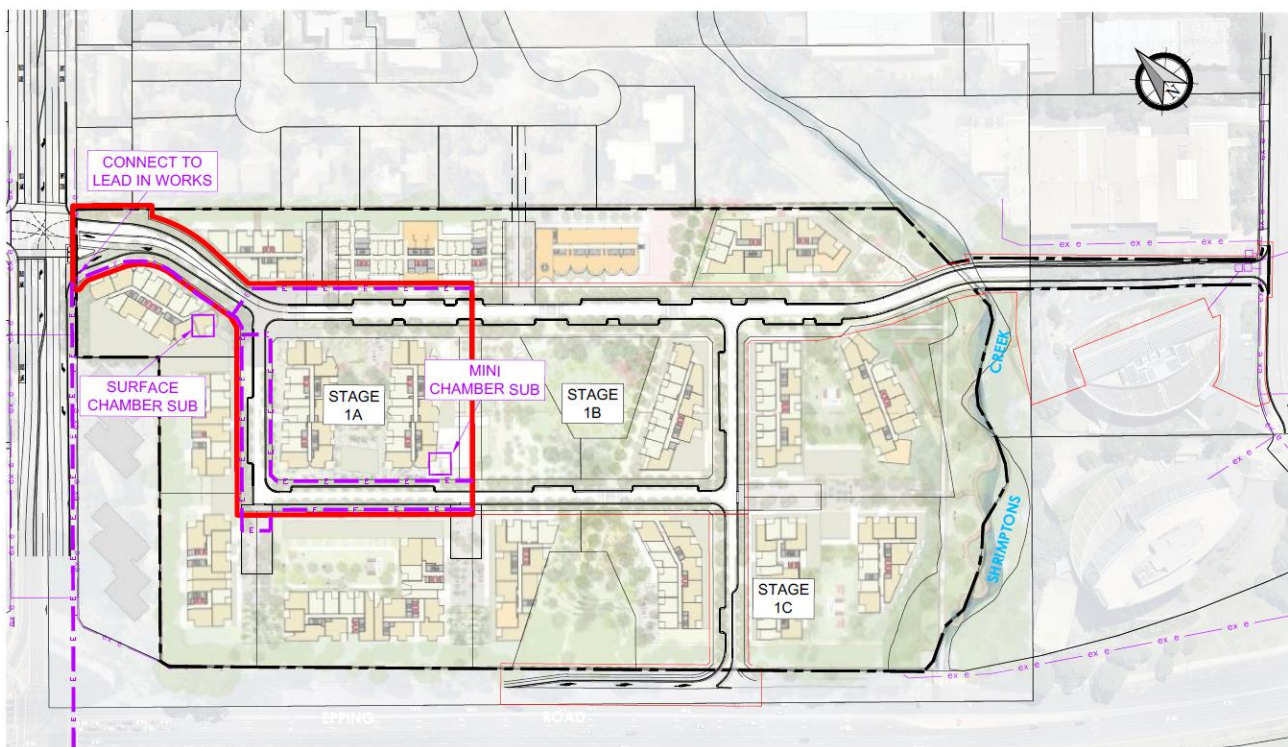


Figure 7.4.1 – Indicative Stage 1A Electrical Layout

7.4.2 Stage 1B Works

Similar to the Stage 1A works, the Stage 1B works will involve the extension of the HV network through the site, the provision of substations as required and the provision of the relevant low voltage feeds.

As the current DIP covers the Stage 1A works only, the exact details of the substations required within the Stage 1B works is unknown at this point in time. Further details around the proposed Stage 1B works will be provided as the development progresses.

Similar to Stage 1A, the relevant low voltage feeds to each building and the street lights will also be supplied in Stage 1B.

As part of the proposed road extension to Lyonpark Road, two (2) existing electrical kiosks will need to be relocated as part of Stage 1B works. An alternate location within the existing site has been chosen and liaison is underway with Ausgrid in regards to confirming that this location is acceptable and ascertaining the associated design requirements. Further details of the works proposed will be provided as part of the CC phase.

An indicative layout of Stage 1B works is shown in **Figure 7.4.2** on the following page.

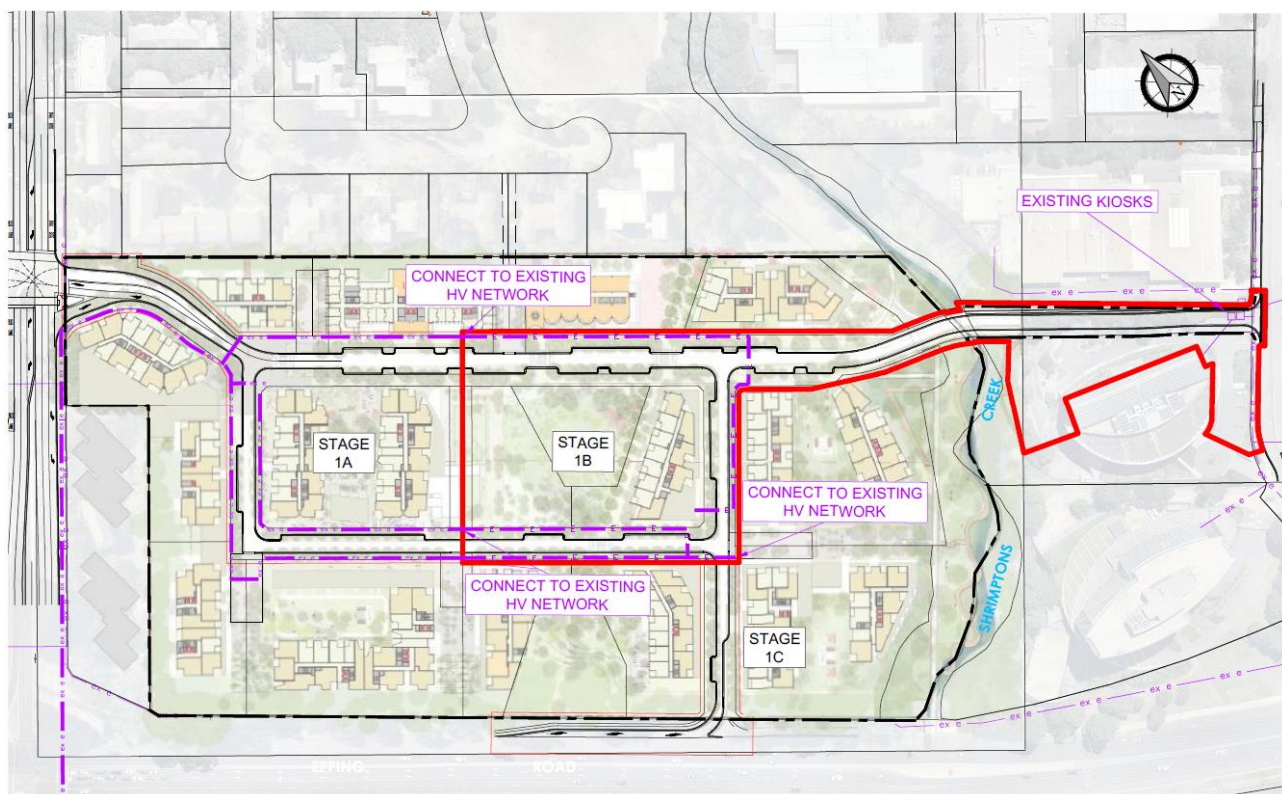


Figure 7.4.2 – Indicative Stage 1B Electrical Layout

7.4.3 Stage 1C Works

Similar to the Stage 1A and 1B works, the Stage 1C works will involve the extension of the HV network through the site, the provision of substations as required and the provision of the relevant low voltage feeds.

As the current DIP covers the Stage 1A works only, the exact details of the substations required within the Stage 1C works is unknown at this point in time. Further details around the proposed Stage 1C works will be provided as the development progresses.

Similar to Stages 1A and 1B, the relevant low voltage feeds to each building and the street lights will also be supplied in Stage 1C.

An indicative layout of stage 1C works is shown in **Figure 7.4.3** on the following page.

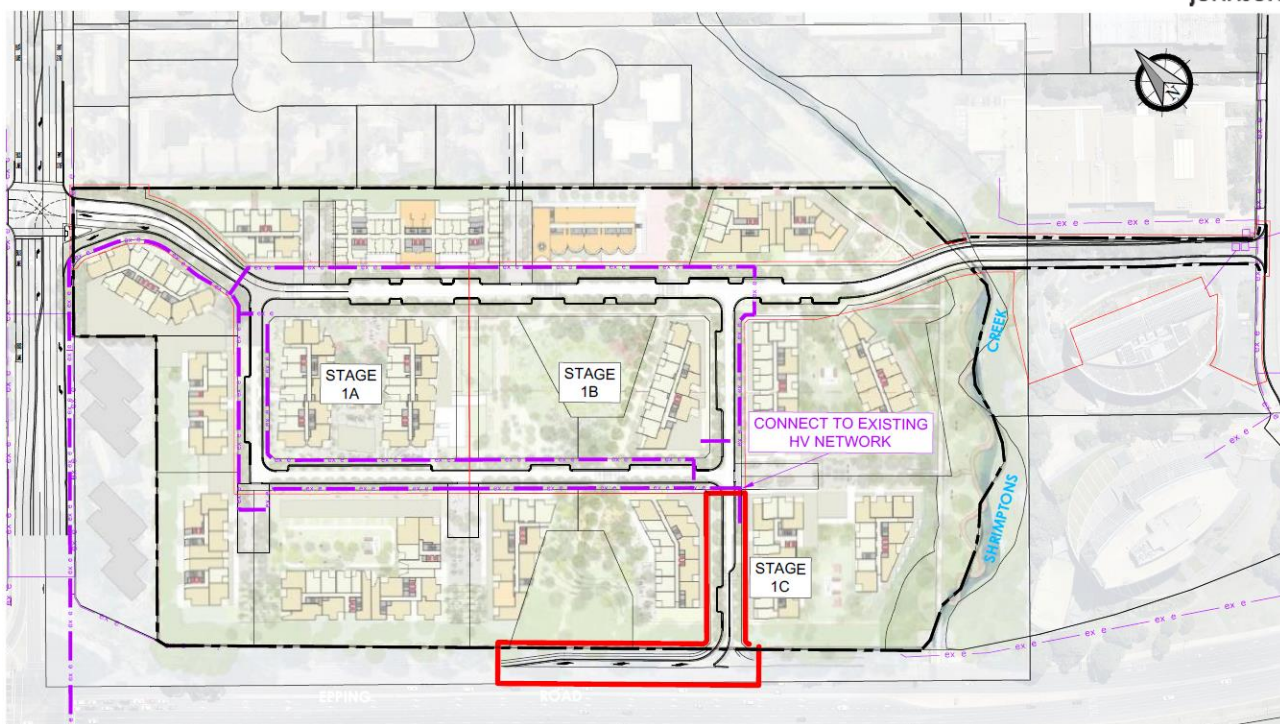


Figure 7.4.3 – Indicative Stage 1C Electrical Layout

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 Stage 1 of the proposed development. Ausgrid have advised that three (3) new feeders will be required to service the overall development and have provided a preferred route for this infrastructure. Subsequent investigations have found a shorter more efficient route for the feeders.

The existing electricity network can be upgraded to facilitate Stage 1 of 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 delivery program.

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 8.1** below, whilst a larger version is contained within **Appendix C**.

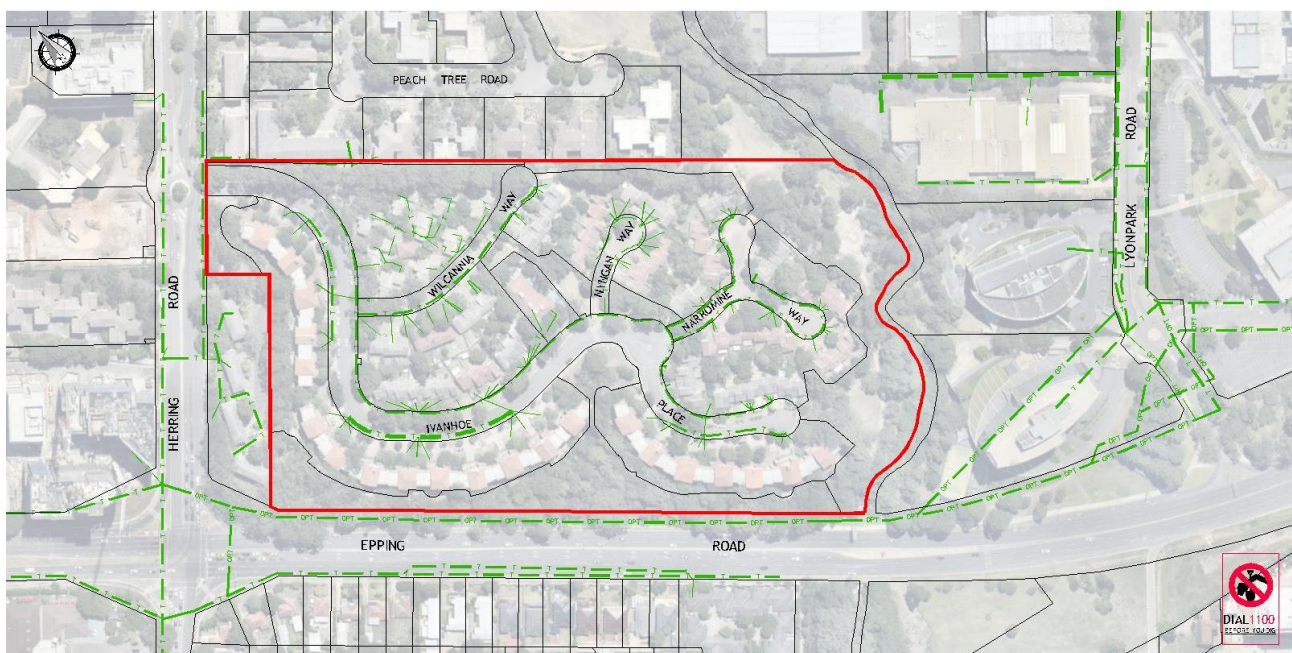


Figure 8.1 – Existing Communications Infrastructure

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.

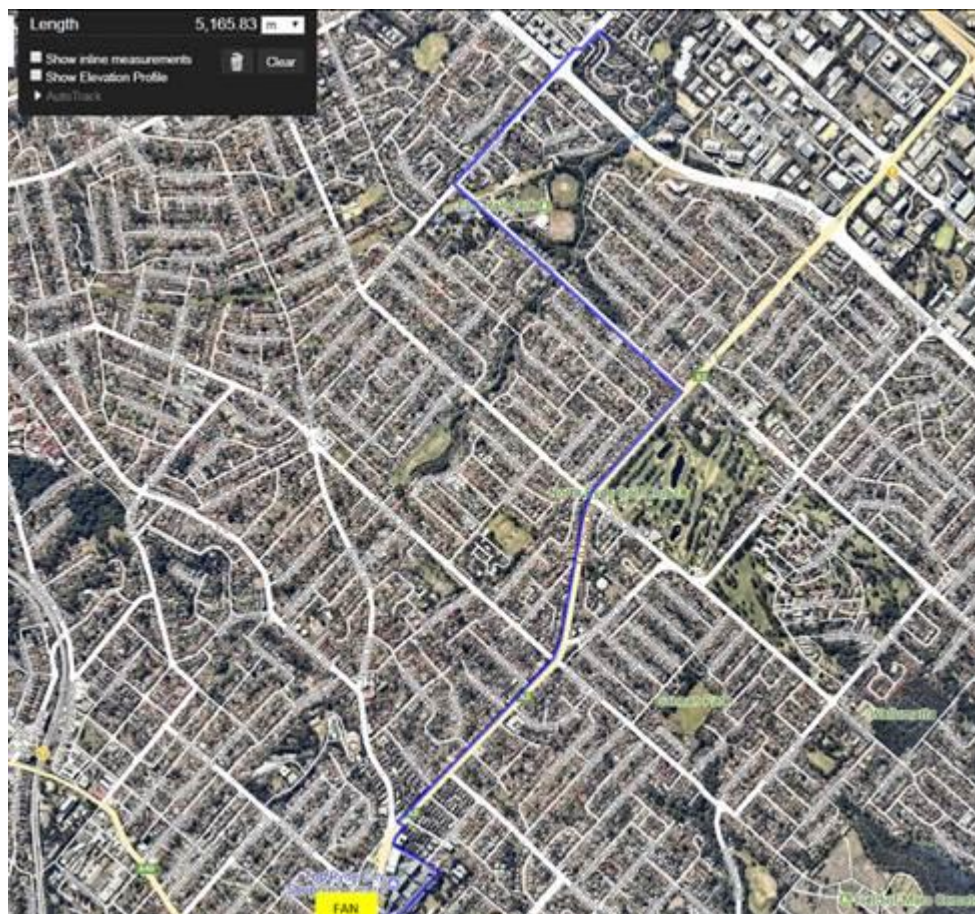


Figure 8.2.2.1 – Preliminary NBN Co Backhaul Lead-In Route
(image provided by NBN Co)

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

The existing internal telecommunication mains within the extent of works for Stage 1 will be removed in conjunction with construction works, or beforehand as part of the demolition process. Further details will be provided as part of CC documentation.

Internal telecommunications infrastructure will be generally located within the public road verges or basement carparks/buildings, with necessary easements created. Further details around the exact location of the telecommunications infrastructure will be provided as a part of the CC documentation.

8.3.1 Stage 1A Works

Stage 1A works will involve the construction of the new internal communications network and the provision of conduits to each lot for future connections. The network will be constructed to the stage 1A boundary and terminated for future connection.

An indicative layout of the Stage 1A works is shown in **Figure 8.3.1** below.

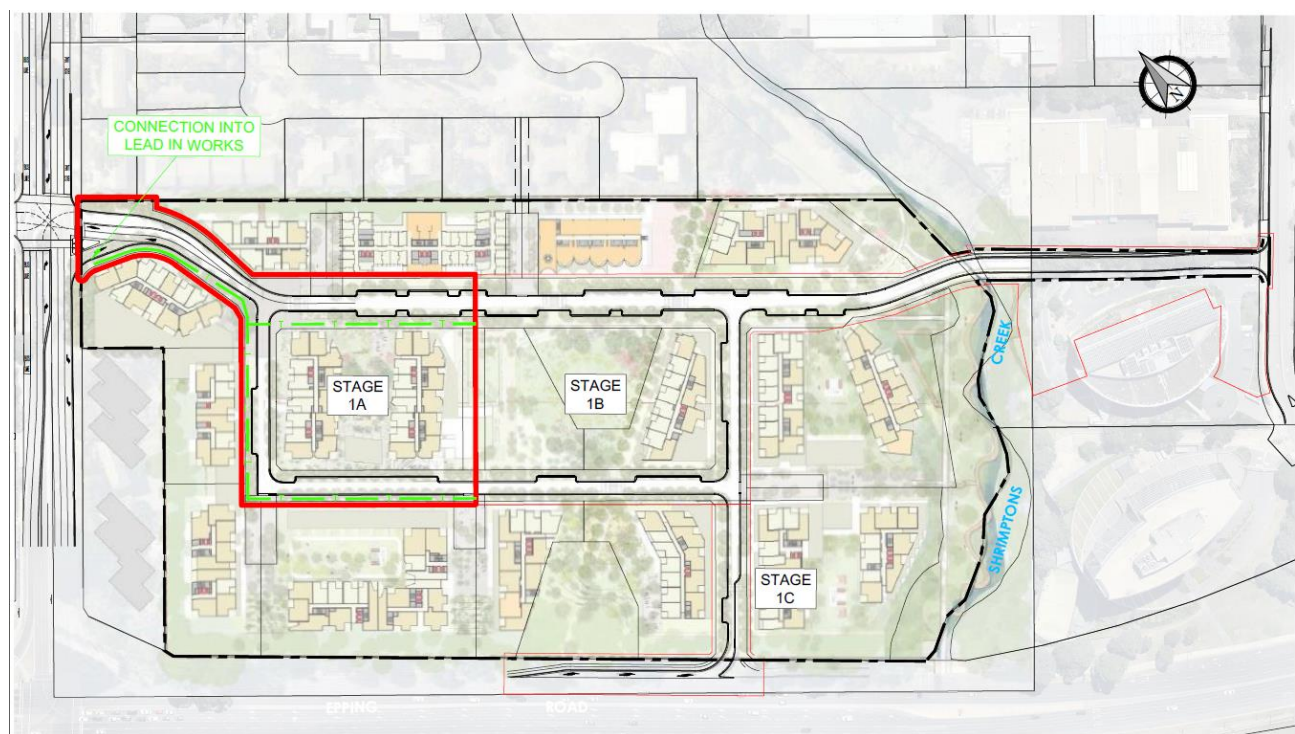


Figure 8.3.1 – Stage 1A Telecommunication Works

8.3.2 Stage 1B Works

Stage 1B works will involve the connection into the existing stage 1A works and the continuation of the internal network. Conduits will be provided to each lot for future connection. The network will be constructed to the Stage 1B boundary and terminated for future connection.

An indicative layout of the Stage 1B works is shown in **Figure 8.3.2** below.

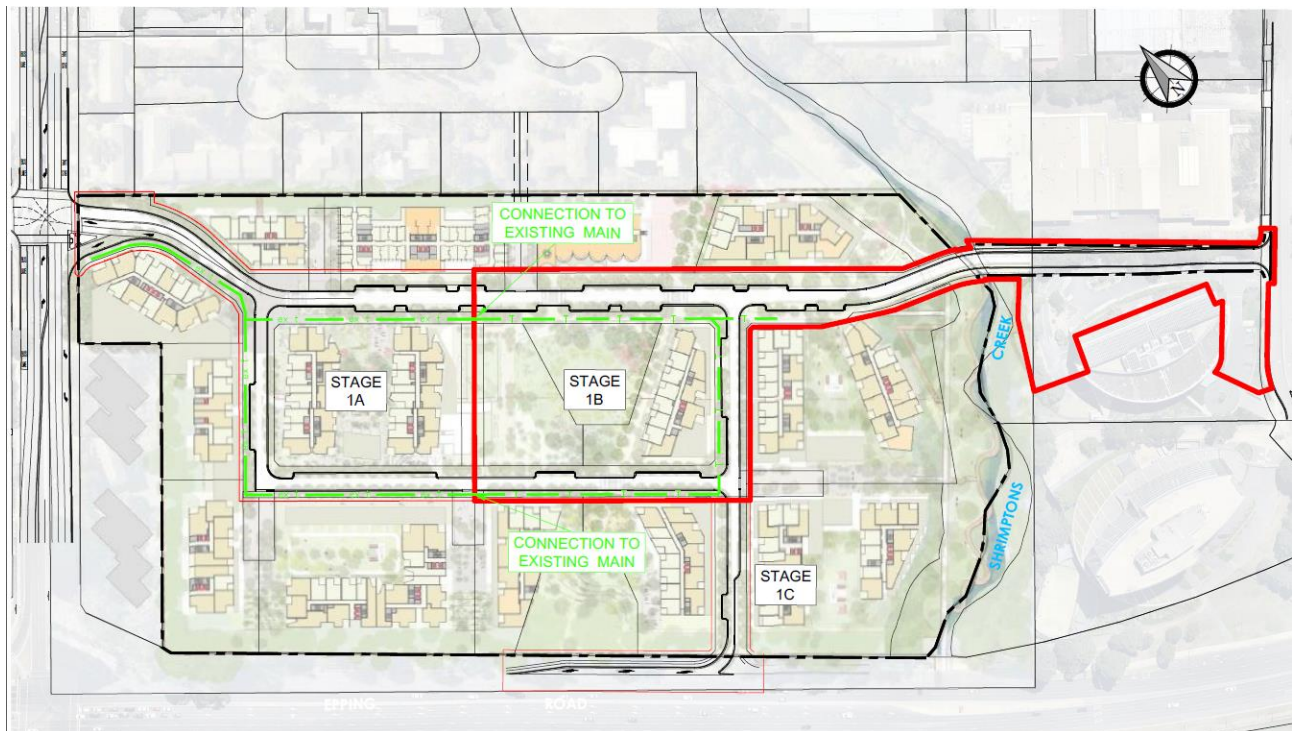


Figure 8.3.2 – Stage 1B Telecommunication Works

8.3.3 Stage 1C Works

There are no required telecommunication works required in stage 1C.

8.4 TELECOMMUNICATIONS INFRASTRUCTURE CONCLUSION

Based upon the advice received from both Opticomm and NBN Co, the provision of telecommunication services to Stage 1 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**.

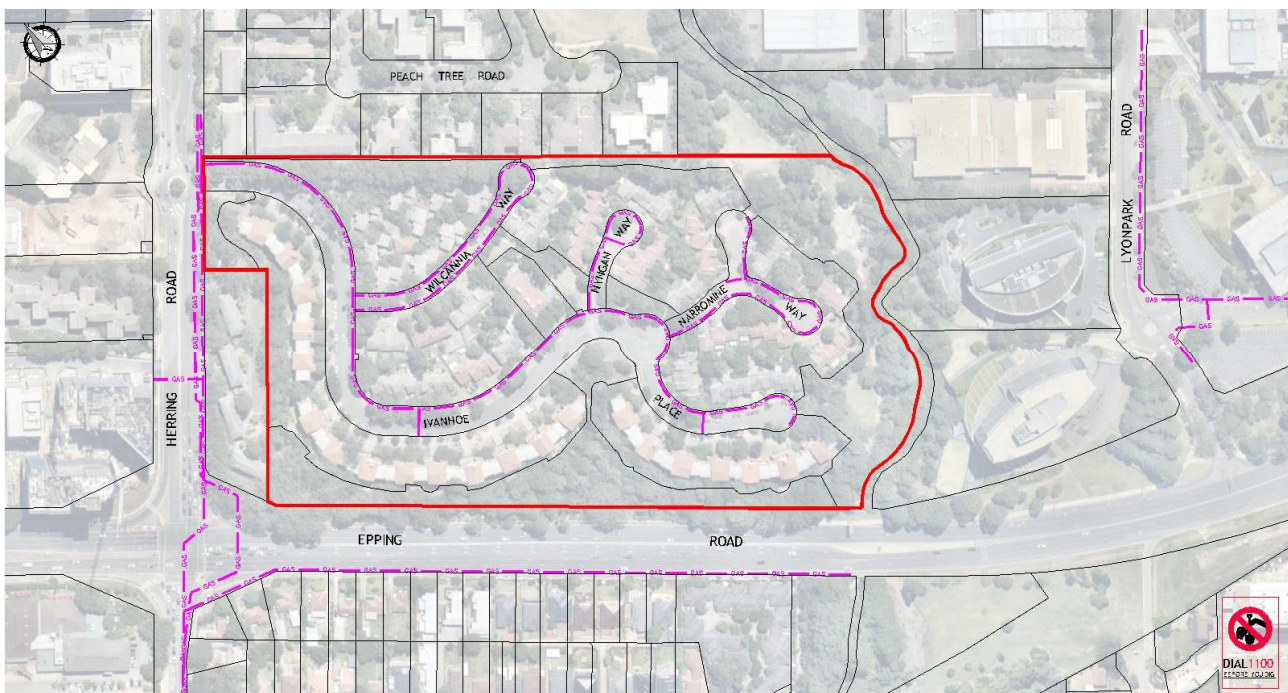


Figure 9.1 – Existing Gas Infrastructure

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 from 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.

9.3 LEAD IN WORKS – TO BE UNDERTAKEN AS PART OF STAGE 1A

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.

9.4 INTERNAL WORKS

The existing internal gas mains within the extent of works for Stage 1 will be removed in conjunction with construction works, or beforehand as part of the demolition process. Further details will be provided as part of CC documentation.

It is expected that gas infrastructure will only be required for commercial purposes within the retail centre of the development, along with the school and residential aged care facility. A connection would be made into the existing 210kPa main located in Herring Road, with the new main being constructed along Main Street, within the appropriate service allocation. This work would all be undertaken within Stage 1A. The gas main is not proposed to be extended within Stages 1B and 1C.

An indicative layout for the gas works can be seen in **Figure 9.4.1** below.

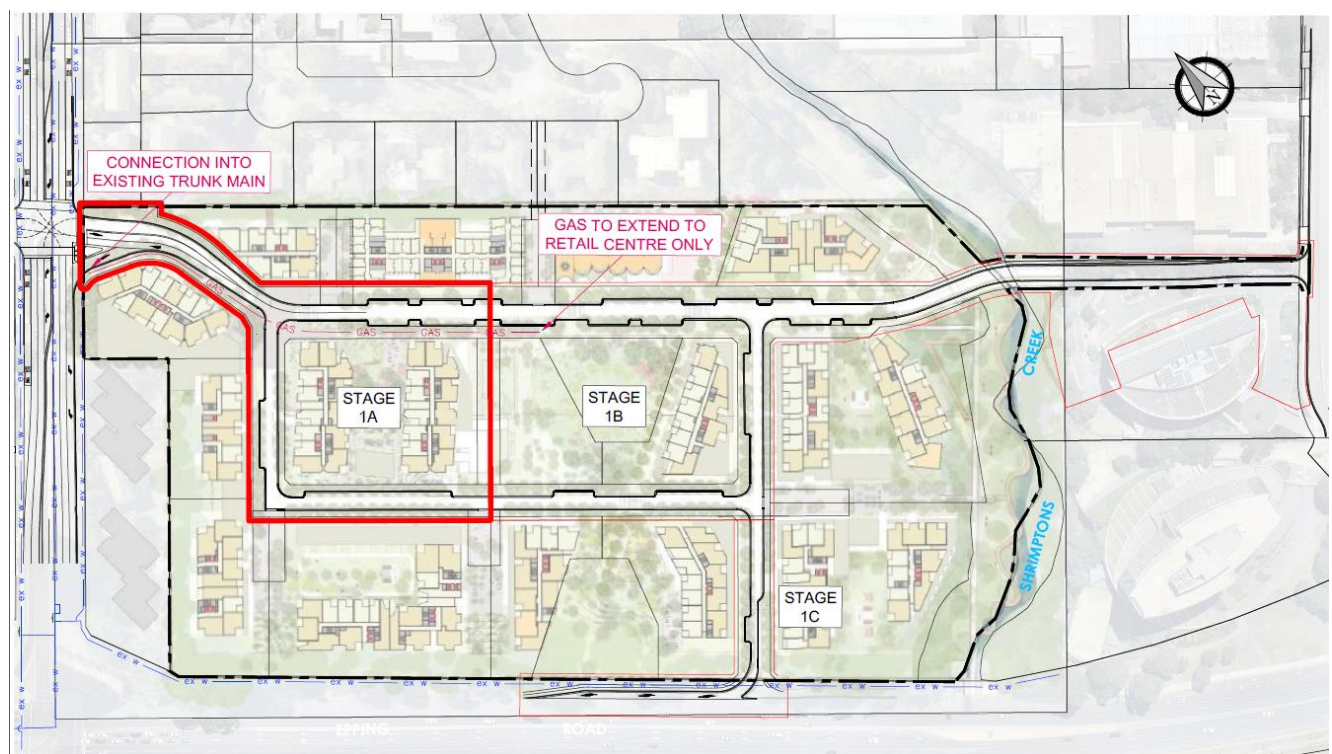


Figure 9.4.1 – Internal Gas Works

9.5 GAS INFRASTRUCTURE CONCLUSION

Based upon the advice received from Jemena, the provision of gas reticulation to Stage 1 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 consist of a single 210 kPa main servicing the retail centre, school and residential aged care facility.

10.0 Conclusion

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, which includes Stage 1.

All authorities have advised that they can service the proposed overall development, albeit in some cases, with upgrades to the existing network required.

In order to provide further details in regards to the internal servicing of Stage 1, a number of subconsultants were engaged to prepare concept designs of the infrastructure required to be installed. A summary of the works to be undertaken for each service within Stage 1 appears in **Table 10.1** below.

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

UTILITY SERVICE	LEAD-IN WORKS	ARE THE LEAD-IN WORKS DEVELOPER FUNDED?	INTERNAL WORKS
Potable Water Supply	STAGE 1A: Connection into existing trunk main within Herring Road only.	Yes	STAGE 1A: Connection to existing trunk main in Herring Road and provision of internal network. STAGE 1B: Extension of internal network. STAGE 1C: Extension of internal network and connection to existing trunk main in Epping Road.
Recycled Water Supply	N/A	N/A	N/A
Sewerage Infrastructure	STAGE 1A: Connection into existing trunk main running on development side of Shrimptons Creek only.	Yes	STAGE 1A: Lead in works and provision of internal network and temporary works to connection point. STAGE 1B: Subject to Stage 1A temporary works. STAGE 1C: No works required.
Electricity Infrastructure	STAGE 1A: Three (3) new high voltage feeders required to service the site.	Yes	STAGE 1A: Lead in works, Internal HV and LV network along with two (2) substations. STAGE 1B: Extension of internal HV and LV network. Multiple new substations. STAGE 1C: Extension of internal HV and LV network. New substation.
Tele-communications Infrastructure	STAGE 1A: New trunk main required to service the site.	Partly	STAGE 1A: Lead in works and provision of Internal network. STAGE 1B: Extension of internal network. STAGE 1C: Extension of internal network.
Gas Infrastructure	STAGE 1A: Connection into existing trunk main within Herring Road only.	Not likely – TBC confirmed by Jemena once development consent obtained.	STAGE 1A: Connection to existing trunk main and extension of new main to the retail centre. Gas will only be available for the retail centre, school and residential aged care facility. STAGE 1B: No works required. STAGE 1C: No works required.

NOTE: All service requirements subject to confirmation with relevant service authorities during the CC phase and therefore, the information contained within Table A may change accordingly.

Following the delivery of the lead-in works (as identified in **Table 10.1** above), the internal utility services networks for Stage 1 are expected to be able to be delivered in accordance with proposed project delivery timeframes. 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

STAGE 1

August 2018

Rory Martin
Sustainability Manager, Residential

1 INTRODUCTION

This report supports a Development Application for Stage 1 of the Ivanhoe Estate redevelopment, 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 DPE 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 and Mission Australia Housing, were selected as the successful proponent to develop the site in July 2017.

In September 2017, DPE issued the Secretary's Environmental Assessment Requirements for a comprehensive Masterplan application that will establish the framework for the staged redevelopment of the site. This Development Application for Stage 1 of the Ivanhoe Estate redevelopment represents the first stage of detailed works pursuant to the Ivanhoe Estate Masterplan.

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 that 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.

Ivanhoe Estate comprised of 17 individual lots owned and managed by the NSW 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.



The Site
 To facilitate road extension to Lyonpark Road

Figure 1- Ivanhoe Estate site

Overview of the Proposed Development

The proposed Stage 1 Development Application seeks consent for the first stage of detailed works within the Ivanhoe Estate, pursuant to the Ivanhoe Estate Masterplan under Section 4.22 of the EP&A Act. The Masterplan establishes the planning and development framework against which this Stage 1 Development Application will be assessed.

The Stage 1 Development Application seeks approval for:

- site preparation works, including tree removal, demolition of roads, services, and earthworks across the Ivanhoe Estate;
- the provision and augmentation of utilities and services infrastructure across the Ivanhoe Estate;
- the construction of all internal roads including public domain within the road reserves, and the bridge crossing and road connection to Lyonpark Road;
- the consolidation of existing lots and subdivision of the Ivanhoe Estate to reflect the revised road layout, open space, and provide superblocks corresponding to the Masterplan;
- the construction and use of Buildings A1 and C1 comprising residential uses (including social housing), a childcare centre, and retail / community spaces.

An image of the Masterplan, identifying Buildings A1 and C1 and illustrating the road network, is provided at **Figure 2** below.

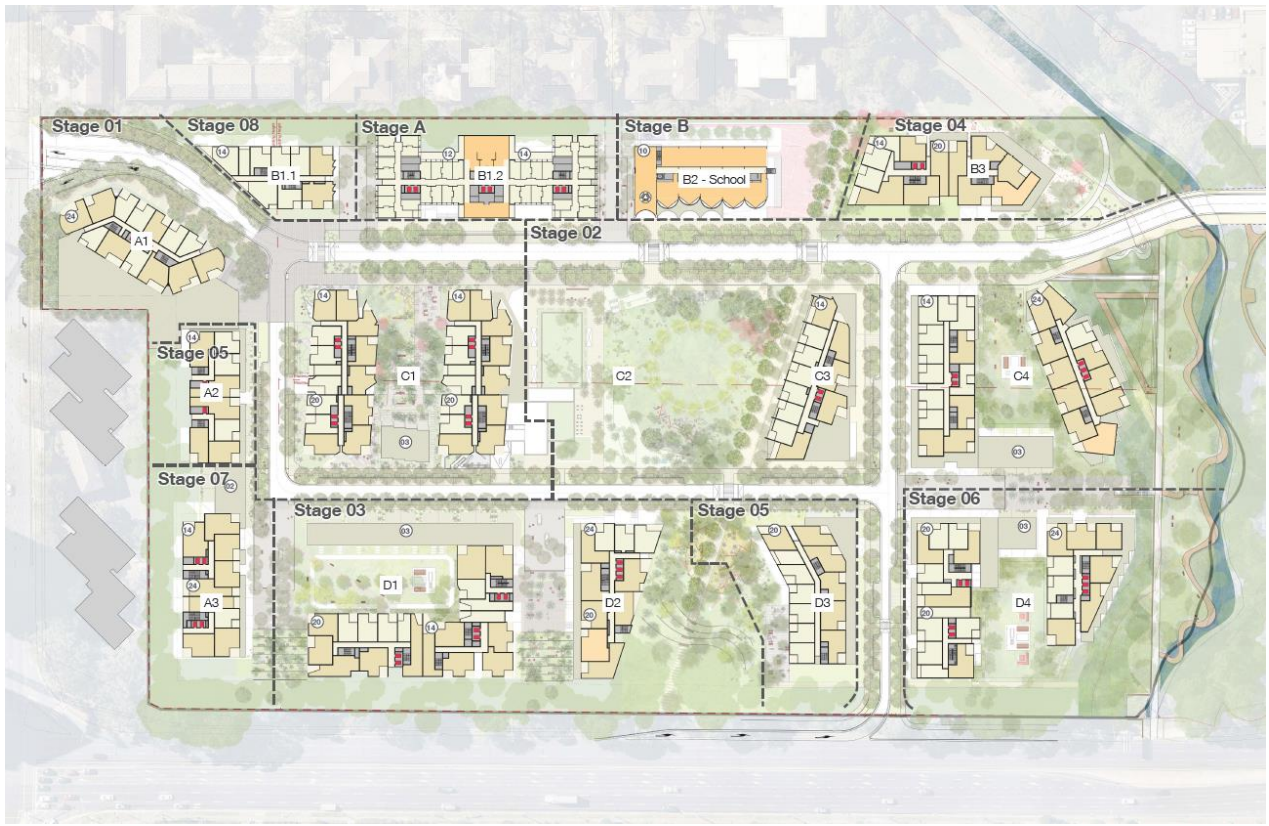


Figure 2- Ivanhoe Estate Masterplan

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 'Real Utilities'

NSW Secretary's Environmental Assessment Requirements (SEARS)

As part of the development at Ivanhoe Estate we are adhering to the 'SEARS' principles of ecologically sustainable development, 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 PHILOSOPHY AND APPROACH

Philosophy

At Frasers Property Australia, we believe that Sustainability isn't just about the environment. It's about creating communities and places that help real people live, play, shop and work in better ways. It's 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. It's about minimising our environmental impact in everything we do, and maximising the social and economic benefits for all.

This philosophy is underpinned by "A Different Way" (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 everyone's 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 Australia's 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 **Fraser's 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 – 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 GBCA's Green Star Steering Committee and Property Council of Australia's 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 worlds' most 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 market's 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 – Design & As Built assesses the sustainability outcomes from the design and construction of new buildings or major refurbishments, across nine holistic impact categories. An indicative strategy to deliver a 5 Star Design & As Built rating for the Stage 1 Buildings is included in Appendix C, and will be further developed as the project progresses.

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 project's design, construction and ongoing operation. These practices will include exploring amongst others:

- A comprehensive Occupants User Manual
- Building Operations – 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 "GoGet" car 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 may be 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

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 – 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 Aspire's 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
Community Health and Happiness	End of trip facilities for non-residential buildings
	To fully quantify and track tangible health and well-being metrics through programs and partnerships including Live Life Get Active and Mission Australia's Strengthening Communities amongst others.
	Public domain that encourages social interaction, has activated street frontages, is adaptable and comfortable, and is pedestrian-oriented
Living Costs	We also commit to a minimum 200 volunteer hours on various community activities specifically for Ivanhoe Estate.
	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
Local Economy	The CCAP Precinct report indicates in excess of a 40% reduction in living costs.
	Integrate commercial opportunities within precinct, including spaces suitable for small business or home business operations and / or work from- home 1. Community Hub – fitted out with offices and session rooms for the delivery of MA's tenant support programs and also drop-in offices for the delivery of community services 2. Social Enterprise Space – 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 – or “Embedded” – 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 – or “parent” – 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 – the more energy consumed, the more revenue they receive – with little attention to energy efficiency. Increasingly they are participating in the Private Network market, but with little benefit to end-users.

Fraser's Property Community Energy Network

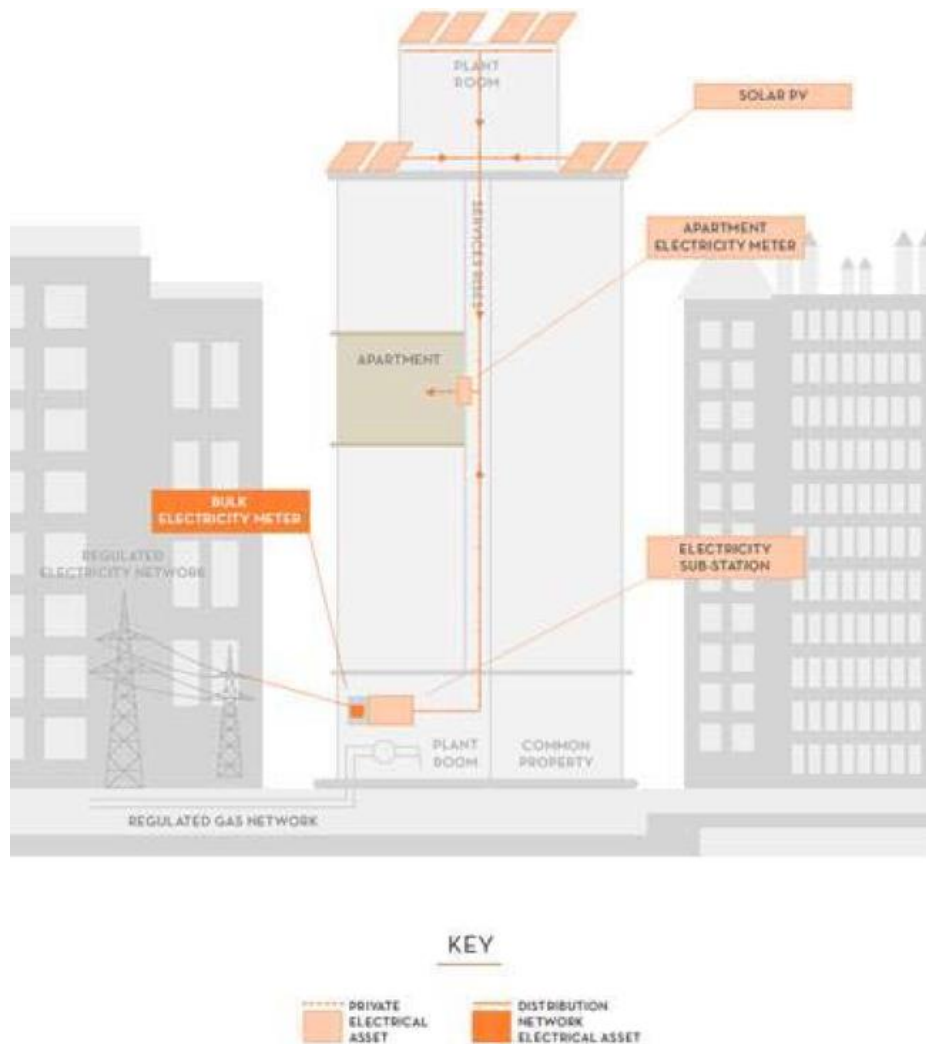
In recently establishing an embedded network division, Real Utilities, Fraser's Property has the ambition to be the leading provider of energy on new developments in Australia. In addition to a commitment to establishing Private Networks on all its new retail, residential and mixed-use developments,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

This capability will allow Fraser's 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.** Fraser's 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 Government's National Carbon Offset Standard (NCOS)

- **Greater demand management by end-users.** Fraser's 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 Aspire's 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	<p>Real Utilities will establish the precinct with one or more private wire networks by installing gate meters</p> <p>These private networks allow for:</p> <ol style="list-style-type: none"> 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	<p>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:</p> <ol style="list-style-type: none"> 1. Time of use energy tariffs 2. Their energy consumption data so they may make better energy use decisions
On-site renewable energy	<p>Ensure that on-site renewable energy generation from Solar PV is maximised wherever possible</p> <p>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</p>
100% Carbon Neutral power	<p>Without charge to any of the precinct's residents, Real Utilities will supply 100% certified carbon neutral power. The energy will be certified under the Australian Government's National Carbon Offset Standard</p> <p>Based on current projected energy loads Frasers Community Utilities will procure offset certificates for the precinct's approximately 12,000 tonnes of CO2 emissions each year</p> <p>To ensure the durability of this feature, Frasers will acquire at least the first 5years' worth of certificates at or prior to completion of each building</p>
Affordability	<p>Real Utilities will provide all residents with electricity cost savings, at tariffs which better those of the 3 major electricity retailers in the area.</p> <p>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.</p> <p>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</p>
Centralised hot water	<p>Frasers Property will provide residents with centralised hot water</p> <p>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</p> <p>Hot water tariffs will set at below standard tariffs</p>
Electric/ induction cooktops	<p>Frasers Property will provide electric / induction cooktops for residents</p> <p>Electric cooktops are preferred by Frasers Property's social housing bid partner</p>
Energy efficient cooling and heating	<p>Frasers Property will procure energy efficient split air-conditioning systems for the non-Social housing dwellings</p> <p>The base solution for Social housing residents is ceiling fans and provisions for future split system air conditioners</p> <p>Heating will be provided to social housing residents via a radiant heating system, which will be provided at a nominal to zero cost</p>

APPENDICES

A. EXPERT SUSTAINABILITY CERTIFIER SUPPORT LETTER



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

By email
Rory.Martin@frasersproperty.com.au

11 December 2017

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

Dear Rory

Ivanhoe Estate | Sustainability 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.

BUILDING A1 – INDICATIVE SCORECARD				
CATEGORY / CREDIT	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
MANAGEMENT			14	
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	1
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	13

INDOOR ENVIRONMENT QUALITY			16	
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	
	10.3	Acoustic Separation	1	0
Lighting Comfort	11.0	Minimum Lighting Comfort	-	Complies
	11.1	General Illuminance and Glare Reduction	1	1

Visual Comfort	11.2	Surface Illuminance	1	0
	11.3	Localised Lighting Control	1	1
	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			16	10

ENERGY			22	
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	5
	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	1	
	16B	Performance Pathway - Reference Building	-	
Total			17	5

TRANSPORT			10	
Sustainable Transport	17A.1	Performance Pathway	10	8
	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	8

Water			12	
Potable Water	18A.1	Potable Water - Performance Pathway	12	4
	18B.1	Sanitary Fixture Efficiency	1	
	18B.2	Rainwater Reuse	1	
	18B.3	Heat Rejection	2	
	18B.4	Landscape Irrigation	1	
	18B.5	Fire System Test Water	1	
Total			12	4

MATERIALS			14	
Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment	6	3
	19A.2	Additional Life Cycle Impact Reporting	4	3
	19B.1	Concrete	3	
	19B.2	Steel	1	
	19B.3	Building Reuse	4	
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			14	11

LAND USE AND ECOLOGY			5	
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			5	3

EMISSIONS			5	
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			10	
Innovative Technology or Process	30A	Innovative Technology or Process	10	
Market Transformation	30B	Market Transformation		
Improving on Green Star Benchmarks	30C	Improving on Green Star Benchmarks		2
Innovation Challenge	30D	Innovation Challenge		5
Global Sustainability	30E	Global Sustainability		
Total			10	7
		TOTALS	AVAILABLE	TARGETED
		CORE POINTS	100	58.0
		CATEGORY PERCENTAGE SCORE		59.2
		INNOVATION POINTS	10	7
		TOTAL SCORE TARGETED		66.2

BUILDING C1 – INDICATIVE SCORECARD

CATEGORY / CREDIT	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
MANAGEMENT			14	
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	1
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	13

INDOOR ENVIRONMENT QUALITY			16	
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			16	12
ENERGY			22	
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	5
	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	1	
	16B	Performance Pathway - Reference Building	-	
Total			17	5
TRANSPORT			10	
Sustainable Transport	17A.1	Performance Pathway	10	8
	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			12	
Potable Water	18A.1	Potable Water - Performance Pathway	12	6
	18B.1	Sanitary Fixture Efficiency	1	
	18B.2	Rainwater Reuse	1	
	18B.3	Heat Rejection	2	
	18B.4	Landscape Irrigation	1	
	18B.5	Fire System Test Water	1	
Total			12	6

MATERIALS			14	
Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment	6	3
	19A.2	Additional Life Cycle Impact Reporting	4	3
	19B.1	Concrete	3	
	19B.2	Steel	1	
	19B.3	Building Reuse	4	
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			14	11

LAND USE AND ECOLOGY			5	
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			5	3

EMISSIONS			5	
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	
Market Transformation	30B	Market Transformation		
Improving on Green Star Benchmarks	30C	Improving on Green Star Benchmarks		
Innovation Challenge	30D	Innovation Challenge		6

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 STAGE 1 DEVELOPMENT PLAN