cranbourne east
precinct structure plan

SERVICES INFRASTRUCTURE CONDITIONS

CEUGP/SR2B

September 2007

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1 INTRODUCTION

The Minister for Planning has recognised a shortfall in supply of zoned residential land in the Casey-Cardinia area. Strategic Planning for the remainder of the Cranbourne East area has since been identified as a key project in resolving this issue. The purpose of this Specialist Report is to investigate the Preliminary Infrastructure Servicing Requirements for the Cranbourne East B Study Area as part of the Strategic Planning Process.

1.1 Scope of Review and Assessment

SKM has been engaged to undertake a Preliminary Servicing Investigation to identify existing infrastructure services in the near vicinity of the Cranbourne East B Study Area and report on anticipated works to service the development.

The servicing investigation will review key services including water supply, sewer reticulation, electricity, gas and telecommunications supply. Consultation with relevant Authorities will be undertaken for input into the investigation regarding standards, capacity of existing services, proposed upgrades to existing services and the requirement of new facilities where applicable.

1.2 Limitations and Assumptions

A site visit has been undertaken; however, this project has been scoped and undertaken as a desktop study to provide preliminary advice on the anticipated servicing works for the Cranbourne East B Study Area. There are limitations on the level of detail that is able to be given due to the nature of this review. Desktop studies such as this are reliant on the information that is made available from service authorities, with an assumption that it provides an accurate representation of existing site conditions. Further assessment and confirmation of details provided will be required during progression of the planning and detailed design stage.

1.3 Sources of Information

This report has been prepared based on the following sources of information:

- Dial Before You Dig data;
- South East Water AssetWebMap online query service
- South East Water: Water Supply Strategy - Dual Pipe Potable, plan 5 (Sept 06)
- South East Water: Water Supply Strategy - Dual Pipe Recycled Water, plan 6 (Sept 06)
- South East Water: Sewerage Strategy – Cranbourne SCAP Sewerage Proposal, plan 3 (Nov 06)
- SP-AusNet: Power point asset picture, cranbourneeast.ppt (received 27 July 07)
- Envestra Ltd.: PDF asset plan, cranbourne_east_development_plan_areas.pdf (received 2 Aug 07)

In addition, the following service authority representatives have been consulted during the preparation of this report:

- Envestra Ltd. (Gas) - Julieanne Free, Mains Extension Co-Ordinator
- South East Water (Sewer / Water) – Andrew Chapman, Manager Network Planning
- SP-AusNet (Electrical) – Stephen Lees, Senior Electrical Engineer
- Telstra (Telecommunications) – Tom Patching

2 SITE DESCRIPTION AND INSPECTION

2.1 Site Description

The Cranbourne East B study area (refer Appendix A) is situated in the City of Casey approximately 50 km south-east of Melbourne and 3km east of Cranbourne.

The subject site is predominantly farmland however there is some residential land use.

- Collisons Estate provides existing low density housing within the subject site;
- Extension of the Blue Hills Rise Retirement Village is proposed within the subject site; a permit has been issued; and
- Cascades on Clyde Estate is located adjacent to the western site boundary, directly north of Collisons Estate. Development has commenced however the region is excluded from the study area.

Limnos Poultry farm is the only commercial site, located adjacent to the western site boundary, in the north western corner of the study region.

The Cranbourne East B Study Area is generally located either side of the currently disused railway reserve, north and south of Berwick-Cranbourne Road.

The parcel of land to the north of the railway reserve is generally bordered by:

- Clyde Road / Clyde Five Ways along the eastern boundary;
- Thompsons Road along the northern boundary; and
- Mayfield Road (part of Collison Estate) along the western boundary.

Several internal roads also traverse the northern development area and provide access to existing residences. Berwick-Cranbourne Road is a significant major cross road through the site which links Narre Warren-Cranbourne Road (to the west) with Clyde Road (to the east).

Collisons Estate is located adjacent to the western site boundary, directly north of Berwick-Cranbourne Road. It consists of north-south running Mayfield Road and Collisons Road, and east-west running Heather Grove and Garden Street.

The proposed Blue Hills Rise Retirement Village extension is located directly south of Berwick-Cranbourne Road, adjacent to the railway reserve boundary.

It is also significant to note that the urban growth boundary falls inside the northernmost section of the development site (refer **Error! Reference source not found.**). This section is currently earmarked as a potential Regional Park site however if development of this region was to occur, significant infrastructure servicing impacts would result.

The parcel of land to the south of the railway reserve is generally bordered by:

- Berwick-Cranbourne Road along the northern boundary; and
- South Gippsland Highway along the western and southern boundaries.

The eastern boundary runs alongside the border of Casey Fields regional sporting facility and directly south to the South Gippsland Highway.

Several internal roads also traverse the southern development area and provide access to existing residences. Ballarto Road is a significant local unsealed cross road through the site which links South Gippsland Highway with Clyde Five Ways Road. Adrian Street and Nelson Street extend north from Ballarto Road and terminate at dead ends.

The southern land parcel for development excludes the existing residential area south-east of the Berwick-Cranbourne Road and Narre Warren-Cranbourne Road.

2.2 Site Visit

A site visit to the Cranbourne East B Study Area was undertaken on August 13th 2007. This trip was to become familiar with the site in relation to issues that may not be easily identifiable on plans. This also served as an opportunity to collect digital photographs (refer Appendix D).

The following was observed on site:

- The site is predominantly undulating farmland with some existing low density residential housing provided.
- Roads:
  - Bordering roads in the region are typically in good condition; sealed and two lanes with painted centrelines and edgelines and unsealed shoulders.
  - Internal access roads to existing residences, eg. Mayfield Road, Ballarto Road etc are predominantly gravel roads in average to good condition. Driveways are typically gravel.
  - Construction of Linsell Boulevard (2 lane sealed) from Clyde Road is currently underway; this will eventually provide access to the approved Cascades on Clyde Estate and link to the partially completed Linsell Boulevard which intersects Narre Warren-Cranbourne Road to the west.
- Electricity:
  - Clyde North Zone Substation (CLN) was observed adjacent to Clyde Road.
  - Transmission towers and power poles were observed traversing the northern section of the development area in an east-west direction from the CLN substation.
  - Overhead power poles were observed in the majority of roads within and surrounding the development area.
- Sewer:
  - A manhole was observed within Casey Fields that was not identifiable on any plans provided by SE Water or Dial Before You Dig. Unknown service.
  - No manholes were observed within the subject site boundaries.
- Water:
  - Rainwater tanks were observed throughout Collisons Estate and at other existing residences within the site area.
  - A water hydrant marker was observed on the southern side of Berwick-Cranbourne Road
  - A Melbourne Water above ground unidentified asset was observed on the northern side of Thompsons Road.

- Gas:
  - Supply main warning sign was observed on northern side of Linsell Boulevard. No other signs observed but plans provided indicate gas mains exist along several surrounding roads.
- Telecommunications:
  - Pits were observed on the northern side of Berwick-Cranbourne Road.
  - Warning markers to cables were observed on the western side of Thompsons Road and southern side of Berwick-Cranbourne Road.

3 SERVICES INVESTIGATION

3.1 Electricity Supply

This section documents the existing services and proposed connection details to the electrical reticulation system that will supply the Cranbourne East B development study area. There is a need for the site to be connected to the system at the early stage of development, and the connection should provide a service that is reliable, flexible, simple in operation and economic.

It should be noted that no electronic files were provided. SP-AusNet (utility provider) provided a basic A3 service plan of the site and its surrounds and services plans were also received from Dial Before You Dig. Plans from Dial before You Dig were of average to poor quality and difficult to read.

Appendix B includes the A3 plan provided and reviewed in this report. The following sections should be read in conjunction with this appendix and drawing VW04115-SK01 (Appendix C) for clarity.

3.1.1 Existing Services

SP-AusNet is the public utility provider for the Cranbourne area. Plans and information provided by SP-AusNet indicate the following major electrical infrastructure in the Cranbourne East region:

- 500kV transmission lines traverse the northern portion of the subject site approximately 600m south of Thompsons Road (refer Figure 1). The tower lines run between Clyde North Zone Substation (CLN) and Cranbourne Terminal Station (CBTS). An easement prevents construction in close vicinity to these assets.

  Whilst the transmission towers are located within the study area, they are outside the urban growth boundary and thus no significant impact from development of the subject site is anticipated. The 500kV transmission lines pass through the proposed Regional Park Site.

- An existing 66 / 22kV Clyde North Zone Substation (CLN) is located on the eastern side of Clyde Road, adjacent to the transmission towers (refer Figure 2).

  This substation is outside the Cranbourne East B site boundary but will be the primary source of electricity into the development area. It currently supplies three 22kV feeders into the Cranbourne East area and further 22kV feeder additions from this substation are expected as growth occurs in the region.

- A 66kV pole line runs alongside the transmission towers between the CLN and CBTS sites. This line provides power to CLN from the 220 / 66kV CBTS in Thompsons Road (near Evans Road) in Cranbourne.
- Overhead 22kV power lines (and several pole mounted substations) are located along:
  - Clyde Road (eastern side and western side to the north and south of Hardys Road respectively);
  - Thompsons Road, Berwick-Cranbourne Road, Garden Street and Heather Road (northern side);
  - Mayfield Road and Collisons Road (eastern side);
  - Narre Warren-Cranbourne Road (western side);
  - Ballarto Road (southern side); and
  - From the CLN zone substation to just south of the 66kV pole line.

- Underground 22kV cables (and some kiosk type substations) are located:
  - from CLN to the approved Cascades on Clyde Estate; and
  - from Berwick-Cranbourne Road into the Casey Fields Regional Facility.

  Capacities and current load allocations of these kiosk substations have not been provided by SP-AusNet and are unknown.

  The newly developed areas directly to the west of the Cranbourne East B study area are generally supplied by underground cables.

For a plan layout of existing major electrical assets surrounding the development, refer to the SP-AusNet service plan in Appendix B.

Figure 1 – 500kV Transmission Lines and 66kV CLN supply line through site

Figure 2 – Clyde North Zone Substation (CLN), Clyde Road

3.1.2 Capacity to Service the Proposed Development

In consultation with SP-AusNet, it has been advised that there is adequate capacity in the existing 66/22kV Clyde North Zone Substation (CLN) to support the residential development of the Cranbourne East B Study area. The CLN zone substation has been designed for expansion and has the ability to meet the long term needs of the area.

It is expected that as the load grows in the Cranbourne region, additional 22kV feeders will be installed at the CLN zone substation to support the increased demand. In approximately 10 years time, as the Cranbourne region continues to grow, a new 66/22kV zone substation will be installed at the Cranbourne Terminal Station (CBTS) to pick up the Cranbourne CBD and surrounding loads. This will subsequently offload the CLN zone substation (which currently supplies the Cranbourne CBD) and allow greater capacity for the Cranbourne East area.

It is noted that if commercial or industrial loads are included in the development of the Cranbourne East B study area, further consideration for the provision of power to the site will need to be undertaken.

In addition, potential difficulties have been flagged in supplying power to the southern end of the southern region of the development area; due to the long cabling distances required to reach this region from the CLN supply point. The southern-most triangular section of land located directly east of Casey Fields Regional Facility and south of the railway reserve is likely to present servicing problems due to access issues and problems associated with single feed services and supply reliability.

3.1.3 Proposed Works to Service the Development

For provision of power to the Cranbourne East B study area, underground service lines will be provided from the CLN zone substation in Clyde Road. These cables will run within the road reserve at specified offsets from the property boundaries. Numerous kiosk substations will be required around the site for the distribution of power and transfer of supply voltages to suitable residential levels. Placement of kiosk substations will be dependent on the site and allotment layout as well as the development staging. High voltage 22kV cables will provide power to each kiosk substation and low voltage reticulation cables will extend from the kiosk substations to supply individual residences.

Electrical cabling works and the installation of new kiosk substations will be staged to match the construction staging of the Cranbourne East B Study area. SP-AusNet have indicated that conservative planning for the long term requirements of the site is recommended in order to avoid unnecessary and costly reworks such as relaying cables.

Solar powered initiatives such as consumer installation of solar panels is a worthy consideration and possible option for the Cranbourne East B area. The use of solar panels as a supply supplement could significantly reduce the required electrical infrastructure throughout the proposed development region however approval of this option by SP-AusNet is not assured.

3.2 Telecommunications

This section documents the existing services and proposed connection details to the telecommunications system that will supply the Cranbourne East B development study area.

The following sections should be read in conjunction with drawing VW04115-SK05 (Appendix C) for clarity.

3.2.1 Existing Services

Telstra are the responsible Authority for provision of communication services to the development

Currently, plans provided by Dial Before You Dig show existing major and minor distribution cables surrounding the site. The following locations within and surrounding the development are identified to contain telecommunication services:

- Narre Warren-Cranbourne Road (Cameron Street) – Main distribution cables run along segments of the western side of the road reserve. Local distribution cables are located on the eastern side of the road reserve.
- Berwick-Cranbourne Road – Main and local distribution cables are located on the northern and southern side of the road reserve.
- South Gippsland Highway – Main distribution cables are located on the northern and southern side of the road reserve. Local cables run along the southern side of the road reserve.
- Clyde Five Ways Road – Main and local distribution cables are located on the western and eastern side of the road reserve between South Gippsland Highway and Berwick-Cranbourne Road;
- Clyde Road – Main distribution cables are located on Hardys Road near its intersection with Clyde Road. Local distribution cables run along the eastern side of the road reserve between Berwick-Cranbourne Road and Hardys Road to the north.
- Thompsons Road – Local distribution cables only run along the southern side of Thompsons Road.
- Ballarto Road – Main and local distribution cables are located on the northern side of the road reserve. Local cables are also located on the southern side of the road reserve.
- Adrian Street – Local distribution cables only run along the eastern side of the road reserve.
- Nelson Road – Local cables only run along the eastern side of the road reserve.
- Collisons Estate – Local distribution cables only are located on the eastern side of the road reserve of Mayfield Road and Collison Road. Garden Street and Heather Grove have local distribution cables that cross from the northern side of the road reserve (west of Collisons Road) to the southern side of the road reserve (east of Collisons Road).

Dial Before You Dig plans appear to indicate fibre optic services exist along all roads containing main distribution cables. Confirmation by Telstra is required,

For a sketch layout of existing major telecommunication services surrounding the development, refer to drawing VW04115 – SK05 (Appendix C).

3.2.2 Capacity to Service the Proposed Development

Telstra has been contacted and advised of the proposed Cranbourne East development. It is the Authority's responsibility to ensure provisions for supply to the development are undertaken. They are additionally responsible for the installation of any new telecommunication infrastructure to meet demand.

To formally register the need for telecommunications services to the site and ensure capacity planners are aware of this requirement, an Intent to Develop (ITD) application should be submitted online to the Telstra Smart Community web site (www.telstrasmartcommunity.com). This form should be submitted upon finalisation of the development layout and upon receipt of a planning permit. Conceptual site layout plans should also be submitted with the ITD application.

During the detailed design phase, submission of an Application for Reticulation form (AFR) will be required for each stage of construction. This information is passed onto Telstra Network Engineering for design and construction briefing. In addition, electrical trenching plans will need to be provided to ABB (authority in Country Victoria) to instigate the design and installation of Telstra network.

3.2.3 Proposed Works to Service the Development

Connection points for supply and extension into the site will be assessed and determined by Telstra according to the application process described above. Several telecommunications services are located in close proximity to the development site and supply is not anticipated to be a problem. Assuming the existing Telstra network allows for expansion, the major telecommunications service along Berwick-Cranbourne Road may provide a likely connection point into the northern and southern segments of the Cranbourne East B study area.

In general, cables and servicing pits will be located within the road reserve throughout the development at specified offsets from the property boundaries. A property connection will be provided to each allotment and cabling will typically follow the same route as the electrical reticulation cables.

Consultation with Telstra should also be undertaken during the early planning stages regarding specific telecommunication requirements for the site; this may include the need / want for fibre optic access, and other specialist telecommunication services. Additional costs may be associated with the provision of these services to the site. Telstra have advised that as of January 2007, 100 percent broadband access is available to all new estates. If fibre to the premises is desired, contributions will be required.

3.3 Sewer Reticulation

This section documents the existing services and proposed connection details to the sewer system that will supply the Cranbourne East B development study area.

It should be noted that electronic files of South East Water sewer assets in the near vicinity were provided. These files detail the sewer services as shown in the South East Water AssetWebMap online service. The alignment of these assets has been included in the infrastructure servicing drawing for this report, VW04115-SK03 (refer Appendix C). The Network Strategy plan for the development of Cranbourne was also provided by South East Water (refer Appendix B) and plans were received from Dial Before You Dig.

The following sections should be read in conjunction with sewer strategy plans in Appendix B and drawing, VW04115-SK03 (Appendix C) for clarity.

3.3.1 Existing Services

South East Water is the responsible authority for management of the sewerage system in the Cranbourne region. The Eastern Treatment Plant is located in Thompsons Road, west of the development and services the Cranbourne community. Sewer services in Cranbourne consist of a combination of gravity reticulation and branch sewers, rising mains and pump stations. Services generally flow in a south to north direction. Private septic tanks are also utilised in some residential areas.

Existing sewerage services have been identified in close proximity the development study area. Based on plans and information provided by South East Water, the following major sewer infrastructure has been identified in the Cranbourne East region:

- 150mm Rising Main is located along South Gippsland Highway adjacent to the southern site boundary; the associated pump station, Junction CL, (refer Appendix B, SE Water Sewerage Strategy plan) pumps flows from the southern end of the rising main.
- 225mm gravity sewer main flows north from the South Gippsland Highway and travels along Narre Warren-Cranbourne Road. This service increases in diameter along its length, before joining several different branch sewers and heading north-west to connect into the 1200mm Cranbourne Main Sewer.

- Another gravity sewer (150mm) is also located in Narre Warren-Cranbourne Road (Cameron Street) and flows west down Sladen Road.
- 150mm rising main runs along the railway reserve, north-west of the development area and its associated pump station, Berwick-Cranbourne Road (refer Appendix B), pumps flows from the southern end towards the Narre Warren-Cranbourne Road gravity sewer.

  The Berwick-Cranbourne Road pump station is to be decommissioned in the future as development of Cranbourne East occurs. Replacement services in this area have been planned as shown in the South East Water Sewerage Strategy.
- The existing Blue Hills Rise Estate north of Berwick-Cranbourne Road and west of Mayfield Road is gravity sewered and connects into the 500mm diameter Cranbourne East Branch Sewer which eventually outfalls to the1200mm Cranbourne Main Sewer, west of the development.
- Collisons Estate and existing residences within the development site are not currently serviced by reticulated sewer and utilise private septic tanks. Ultimately, when the land is subdivided the assumption is that Collisons Estate will require connection to the sewerage network. Currently, the low density housing in this area does not warrant payment for reticulated sewer services. It is understood however that South East Water have not planned for any servicing change to Collison Estate.

Melbourne Water also have major sewer infrastructure located within the Cranbourne East region including:

- Major sewer service that travels from the northern side of the South Gippsland Highway, along Narre Warren-Cranbourne Road (eastern side), east along a segment of Thompsons Road before heading north outside the Cranbourne region.

  An easement surrounds this asset and Melbourne Water must be contacted if works are to be undertaken in the near vicinity.

For a sketch layout of existing major sewer lines surrounding the development, refer to drawing VW04115 – SK03 (Appendix C).

It is noted that whilst there are available sewer services relatively close to the development site, site constraints relating to contour levels are likely to prevent their use. New sewerage infrastructure will need to be provided to adequately service the Cranbourne East B study area (refer Section 3.3.3).

3.3.2 Capacity to Service the Proposed Development

Discussions held with South East Water indicate that there is adequate planning is in place to enable connection of the Cranbourne East B study area to the sewerage system. Whilst additional infrastructure will be required to service the development region, South East Water do not envisage any major concerns arising from installation works.

Potential servicing issues could arise in supply to the development, if the northern region (currently proposed for a Regional Park site), becomes developed land space.

It is also noted that the triangular parcel of land located directly east of Casey Fields Regional Facility and south of the railway reserve has not been considered for servicing in the current South East Water asset plan. South East Water have advised that whilst this area has not been allowed for in any existing strategy, provision of a sewerage service to the area is possible.

3.3.3 Proposed Works to Service the Development

To service the Cranbourne East B region, additional infrastructure will be required. The subject site for this investigation generally slopes to the north with some exceptions noted in the southern regions of the two land parcels where the land slopes to the south.

Network Strategy plans for the sewer services in the Cranbourne East area were provided by South East Water and indicate the major infrastructure planned for the region (refer Appendix B). The direction of sub-catchment flows is also shown.

Based on the Cranbourne SCAP Sewerage Proposal, Plan 3 (Nov 06) the following installations will be required to support the Cranbourne East B study area:

Cranbourne East B - Southern land parcel (west of Casey Fields)

- 300mm Ballarto Road Branch Sewer along the eastern site boundary shall collect gravity flows in the southern section of the site.
- Ballarto Road Pump Station located towards the south-eastern corner of the site. This shall pump flows collected from within the southern section of the site to the internal high point in the northern section.
- 225mm Rising Main from the Ballarto Road Pump Station will transport flows to the internal high point.
- Ballarto Road North Pump Station and a 100mm rising main in the north-western quadrant of the site will support the Ballarto Road Pump Station and connect into the proposed 225mm Rising Main.
- 225mm and 375mm Gravity Mains will collect and transport flows in the northern region of the site and flows pumped from the rising mains. The 375mm Gravity Main will head east along Berwick-Cranbourne Road to a new 450mm Gravity Sewer through the existing Blue Hills Retirement Village. This 450mm Gravity Main will connect into the existing 500mm Cranbourne East Branch Sewer just north of the railway reserve and eventually transport flows to the Eastern Treatment Plant.

Cranbourne East B - Northern land parcel (east of Casey Fields)

- Clyde Road Pump Station located at the south-eastern site corner shall pump gravity flows from the southern catchment of the development, where the land slopes to the south.
- 100mm Rising Main from the Clyde Road Pump Station will transport gravity flows from the southern sub-catchment to the 225mm gravity sewer located further north.
- 225mm Gravity Sewer main will collect flows in the catchment regions south of Berwick-Cranbourne Road and connect into the Clyde Creek Branch Sewer north of Berwick-Cranbourne Road.
- 300/450mm Clyde Creek Branch Sewer will run through the central region of the development from Berwick-Cranbourne Road to the site boundary adjacent to Cascades on Clyde Estate. This Branch Sewer will collect the majority of flows from the northern sub-catchments and transport flows collected from the south.
- Hardys Road Pump Station, located adjacent to the intersection of Clyde Road and Hardys Road, shall pump collected flows from the northern sub-catchments that slope towards the eastern site boundary and cannot be serviced by the Clyde Creek Branch Sewer.
- 150mm Rising Main will transport flows west from Hardys Pump Station to the Wild Scotchman Way Pump Station,

- Wild Scotchman Way Pump Station, located at the junction of the Clyde Creek Branch Sewer outlet and the rising main from Hardys Pump Station, shall pump flows collected to the Clyde Creek North Branch Sewer.
- 300mm Rising Main from Wild Scotchman Way Pump Station shall transport flows to the Clyde Creek North Branch Sewer.
- 450mm Clyde Creek North Branch Sewer will collect flows from catchments outside the Cranbourne East B northern land parcel. The branch sewer will however transport flows from the study area through a series of rising mains and branch sewers to the 1200mm Cranbourne Main Sewer and onto the Eastern Treatment Plant. The Clyde Creek North Branch Sewer will replace the existing Cranbourne East Pump Station currently situated in this location.

The asset plan for the northern land parcel does consider the future connection of Collisons Estate to the sewerage network. However the preliminary sewerage asset plan considers future Collisons Estate connection at the current zoning level. If Collisons Estate is re-zoned to a higher density population, the capacity of Wild Scotchman Way Pump Station would need to be assessed, and this may require larger sewer pumping capacity, and larger retention tanks.

In addition to the major works detailed above, gravity reticulation sewers and individual property connections for each allotment will be required within the Cranbourne East B study area. These sewers will typically be located at specified offsets from the property boundaries within the road reserve.

Based on the proposed sewer network and exiting topography of the site, it is recommended that the Cranbourne East B development be staged from the north in order to reduce upfront infrastructure requirements. This will enable gradual implementation of the proposed new sewerage services. Sequencing of infrastructure may be influenced however by construction of the Blue Hills Rise Retirement Village and Clyde Creek Branch sewer.

3.4 Water Supply

This section documents the existing services and proposed connection details to the water supply system that will supply the Cranbourne East B development study area.

The following sections should be read in conjunction with the water supply Network Strategy Plans provided by South East Water (refer Appendix B) and drawing, VW04115-SK04 (Appendix C) for clarity.

3.4.1 Existing Services

Similarly to the sewer network, South East Water are also responsible for water supply in the Cranbourne region.

Potable Water

The main potable water supply in the Cranbourne East region is currently provided from the 14.3 ML Cranbourne Supply Tank located west of the South Gippsland Highway and Cameron Street intersection, just south of the racecourse. This supply is sourced from the 1050mm Cranbourne No.2 Pipeline and the 1350mm Cardinia-Pearcedale Duplication Main that pass through Cranbourne East.

Plans and information provided by SE Water indicate the following potable water infrastructure within the local Cranbourne East region. Information was also obtained using the AssetWebMap online query service:

- 450 / 375mm supply main from the Cranbourne Supply Tank runs along the southern side of the South Gippsland Highway, opposite the south-western site boundary.

- 225mm main connects into the 450mm South Gippsland main and crosses beneath the roadway to extend along the southern side of Ballarto Road; 100mm mains extend from this service into Adrian and Nelson Streets (western and eastern sides respectively).
- 150mm supply main is located along a section of the South Gippsland Highway (northern side) bordering the site boundary.
- A supply main of varying diameter (375mm, 300mm, 225mm etc) runs along the western side of Narre Warren-Cranbourne Road. This main crosses to the eastern side of the road north of the railway reserve and south of Linsell Boulevard; several other supply mains connect into this service to supply developed areas to the east and west.
- 225mm main is located along the southern side of Berwick-Cranbourne Road. This main connects to the Narre Warren-Cranbourne Road supply main and terminates just west of the intersection of the railway reserve with Berwick-Cranbourne Road.
- A 300mm supply main is located on the northern side of Linsell Boulevard, west of the development site boundary. This main connects into the Narre Warren-Cranbourne supply main and terminates near the junction with Broad Oak Drive.
- A 100mm diameter water main runs adjacent to the site along the eastern side of Clyde Road, north of Hardys Road; this main reduces to an 80mm diameter main south of Hardys Road and terminates just beyond the Clyde Road / Berwick-Cranbourne Road intersection.
- 100mm Clyde Road main extends west into Thompsons Road (northern side), opposite the site boundary. This service terminates on Thompsons Road approximately 900m west of the intersection of the two roads.
- Another water main is located along the northern side of Thompsons Road (75mm diameter), following the same general alignment as the 100mm water main.
- At the termination point of the 100mm and 75mm Thompsons Road mains, another water service line that extends east from Narre Warren-Cranbourne Road terminates. This water supply main is 750mm in diameter near the Narre Warren-Cranbourne Road intersection but it reduces along its length to a 450mm, 300mm and ultimately a 150mm diameter pipe at its termination point.
- Several 25mm and 40mm diameter services are located within the subject site.

  These services are mostly located within the northern region of the development area, north-east of Collisons Estate. Collisons Estate is not currently supplied with reticulated water, however extension of the network to supply Collisons Estate and north to Cascades on Clyde Estate is proposed.
- The SE Water AssetWebMap database shows a water main extending into the southern region of the development from Berwick-Cranbourne Road. Asset information lists the diameter of this service as 0mm. It is currently unknown whether this service is in existence or represents an abandoned pipe. Confirmation of the existence of this main will be required as design progresses.

Melbourne Water also have major potable water infrastructure located within the Cranbourne East region including:

- 1350mm Cardinia-Pearcedale duplication main and 1050mm Cranbourne Pipeline No.2 which share an easement (track reserve) that crosses through the northern region of the development. These mains supply the Cranbourne Tank south of the Racecourse.

  The easement passes diagonally through the Cranbourne East region along a south-west, north-east alignment. Directly west of the development area, the easement passes from

Berwick-Cranbourne Road / Narre Warren-Cranbourne Road intersection to Clyde Road and continues in both directions along this same alignment.

South of Berwick-Cranbourne Road, this easement splits to follow both the diagonal alignment of the 1050mm Cranbourne No.2 Pipeline to the 14.3ML Cranbourne tank and also the Cardinia-Pearcedale pipe alignment which heads south on the eastern side of Narre Warren-Cranbourne Road and along South Gippsland Highway before crossing beneath the roadway and continuing south along Craig Road.

- Abandoned Cranbourne No.1 Pipeline runs parallel to the existing Cranbourne No.2 Pipeline
- The proposed route for the pipeline for the proposed desalination plant at Wonthaggi is currently being finalised. One option is to locate the pipeline in the disused railway corridor that passes through the site. The connection to existing infrastructure would be at the Cardinia – Pearcedale main. There is not envisaged large control gear or additional land required at this juncture, so the affect on the Cranbourne East development is minimal, apart from disruption during pipeline construction.
- An unidentified above ground asset is located on the northern side of Thompsons Road (refer Figure 3). This asset is not located within the subject site and is not anticipated to create any issues with development of the site.

Figure 3 – Unidentified Melbourne Water Above Ground Asset

Recycled Water

Recycled water supply in the Cranbourne East region is currently provided from the Cranbourne Recycled Water Tank and Pump Station located to the west of the Cranbourne Tank for potable water. This supply is sourced from the Eastern Irrigation System (EIS) which is a privately owned recycled water system that distributes water from the Eastern Treatment Plant. Under an agreement with the asset owner, South East Water currently purchase recycled water from the system for urban use.

Plans and information provided by SE Water indicate the following recycled water infrastructure within the local Cranbourne East region. Information was also obtained using the AssetWebMap online query service:

- 450/300mm EIS main is located along the eastern side of Narre Warren-Cranbourne Road and Cameron Street
- 450mm EIS main is located along a segment of the South Gippsland Highway (northern side), adjacent to the site boundary.
- 450mm EIS main extends along the length of Ballarto Road (northern side)
- 450mm EIS main passes beneath roadway of South Gippsland Highway, west to Cranbourne Recycled Water Tank and Pump Station. The recycled mains continue into the Cranbourne West development

3.4.2 Capacity to Service the Proposed Development

Discussions held with South East Water indicate that adequate planning is in place to enable reticulated water supply (potable and recycled) to become available for the Cranbourne East B study area. Whilst additional infrastructure will be required to service the development region, South East Water do not envisage any major concerns arising from installation works.

Potential servicing issues could arise in supply for the development, if the northern region (currently proposed for a Regional Park site), becomes developed land space.

It is also noted that the triangular parcel of land located directly east of Casey Fields Regional Facility and south of the railway reserve has not been considered for servicing in the current South East Water asset plan. South East Water have advised that whilst this area has not been allowed for in any existing supply strategy and is not mandated for recycled water, provision of a water supply to the area is possible.

3.4.3 Proposed Works to Service the Development

To service the Cranbourne East B region, additional infrastructure will be required. A dual pipe system will be installed, providing potable water for domestic use and recycled water for irrigation and fire-fighting. It is likely that the use of recycled water for these purposes will be mandatory.

Network Strategy plans for the potable and recycled water dual pipe networks in the Cranbourne East area were provided by South East Water. Plans indicate the major infrastructure planned for the region (refer Appendix B).

Potable Water

Based on the Water Supply Strategy, Dual Pipe Potable, Plan 5 (Sept 06) the following installations will be required to enable supply of the Cranbourne East B study area:

- 600mm diameter water supply main from Cranbourne Tank to South Gippsland Highway.

  This service will continue north along Narre Warren-Cranbourne Road (western side) to Berwick-Cranbourne Road and provide a replacement service for the existing 450mm supply main.
- 450mm water main connection into the Narre Warren-Cranbourne service and extension along Berwick-Cranbourne Road to just west of the Clyde Road intersection.

  This main will reduce in diameter along its length, varying from 450mm to 225mm at its termination near Clyde Road. It will provide a replacement service for the existing 225mm water main that currently terminates at the railway reserve.
- 225mm water main extension into Heather Grove of Collisons Estate from the development area west of Mayfield Road.

- 225mm water main extension along Collisons Road from Berwick-Cranbourne Road and into Cascades on Clyde Estate via Garden Street.

  This service will connect to the Heather Grove 225mm main extension and create a service loop. It will also eventually link to the proposed 225mm water main extension of the existing 300mm Linsell Boulevard main, to create another service loop.
- 225mm water main connection from Berwick-Cranbourne Road service into the northern and southern regions of the Cranbourne East B study area located east of the railway reserve.

  This main is likely to extend into the development within the road reserve from which the distribution of potable water via smaller reticulation mains will be provided.
- 225mm water main connection from Berwick-Cranbourne Road service into the Cranbourne East B study area located west of the railway reserve.

  This main is likely to extend into the development within the road reserve from which the distribution of potable water via smaller reticulation mains will be provided.

Recycled Water

Based on the Water Supply Strategy, Dual Pipe Recycled Water, Plan 6 (Sept 06) the following installations will be required to enable reticulated supply of the Cranbourne East B study area:

- Installation of Cranbourne Recycled Water Tank and Pumping Station, west of the existing Cranbourne Tank (potable).
- 600mm diameter supply main from Cranbourne Recycled Water Tank to South Gippsland Highway.

  This service will connect into the existing 450/300mm EIS main on South Gippsland Highway that extends north along Narre Warren-Cranbourne Road (eastern side)
- 225mm recycled water main extension into Heather Grove (Collisons Estate) from the development area west of Mayfield Road.

  This 225mm main will extend north along Collisons Road and continue into Cascades on Clyde Estate via Garden Street. It will eventually link back to the development area west of Mayfield Road and create a service loop.
- Recycled water main connection into the Narre Warren-Cranbourne EIS service and extension along Berwick-Cranbourne Road to just west of the Clyde Road intersection.

  This main will vary in diameter along its length, from 225mm at the connection point in Narre-Warren-Cranbourne Road to 375mm along the midsection and 300mm at its termination just west of Clyde Road.
- 300mm diameter recycled main extension south along Collisons Road from 225mm main to Berwick-Cranbourne Road service.
- 225mm recycled water main connection from Berwick-Cranbourne Road service into the northern region of the Cranbourne East B study area located east of the railway reserve.

  This main is likely to extend into the development within the road reserve from which the distribution of recycled water via smaller reticulation mains will be provided.
- 375mm recycled water main connection from the existing Narre Warren-Cranbourne Road (Cameron Street) EIS service and extension east through the development region located west of

the railway reserve. This main will also extend north to connect into the Berwick-Cranbourne Road service and create a service loop.

This main is likely to extend into the development within the road reserve from which the distribution of recycled water via smaller reticulation mains will be provided.

In addition to the major works detailed above, dual pipe water reticulation mains and individual property connections for each allotment will be required within the Cranbourne East B study area. These mains will typically be located at specified offsets from the property boundaries within the road reserve.

South East Water have indicated their preference to stage development for water from the south. This enables progressive upgrade of their systems. It is noted this staging is in direct conflict to the optimal staging for installation of sewer services. It is envisaged the upgrade cost for sewerage service provision will be of a larger magnitude than water service provision, therefore overall staging from the north is preferable.

To reduce the demand and reliance on potable water, consideration of roof runoff re-use and grey water re-use for residential properties is recommended. Whilst reticulated recycled water is currently utilised in the Cranbourne Region, it could be beneficial to reduce the need for installation of significant infrastructure.

3.5 Gas Supply

This section documents the existing services and proposed connection details to the gas reticulation system that will supply the Cranbourne East B development study area.

The following sections should be read in conjunction with the asset plan provided by Envestra Ltd. (refer Appendix B) and drawing VW04115-SK02 (Appendix C) for clarity.

3.5.1 Existing Services

Envestra Ltd. is the closest public utility provider for the Cranbourne area. Plans and information provided by Envestra Ltd. indicate the following major gas infrastructure in the Cranbourne East region:

- A 150mm diameter gas supply main is located along the northern side of Berwick-Cranbourne Road. This main reduces to a 63mm diameter main outside the entrance to the existing Blue Hills Estate and terminates just west of the intersection of the railway reserve with Berwick-Cranbourne Road. A 63mm gas main taps off at this location and extends into the Casey Fields Regional Facility.
- A 150mm diameter gas main is located along the eastern and western side of Narre Warren-Cranbourne Road (it crosses beneath the roadway several times). This service has many other mains connect into it and distribute supply throughout developed regions to the east and west.

  There is currently a program underway to duplicate part of this 150mm main to support load growth in Cranbourne.
- A 50mm diameter main extends east down Thompsons Road, beneath the roadway from Narre Warren-Cranbourne Road. This service terminates approximately 750m east of Narre Warren-Cranbourne Road, opposite the Wagstaff Abattoirs.
- A 180mm diameter supply main is located along the northern side of Linsell Boulevard from Narre Warren-Cranbourne Road. This main terminates at the end of the constructed section of the road near the junction with Broad Oak Drive.
- A 100mm supply main runs along the western side of South Gippsland Highway starting south of its intersection with Narre Warren-Cranbourne Road (Cameron Street) and terminating approximately 350m due south of the intersection with Devon Road. A couple 50mm diameter mains tap off this

supply main and cross beneath the South Gippsland Highway; approximately 750m and 200m due north and south respectively of the Devon Road intersection.

- A gas main of unknown diameter is located along the northern side of Ballarto Road; this main extends beneath the roadway from Narre Warren-Cranbourne Road, heading east. Another unknown diameter main connects into the Ballarto Road main and extends north along Adrian Street (dead end road).

It is noted that apart from the Ballarto Road and Adrian Street gas main, no existing gas services appear to be located within the development boundaries. However, Envestra Ltd have advised that the provision of gas service to the Cascades on Clyde Estate development will be via extension to the Linsell Boulevard main. The gas main servicing the proposed Blue Hills Retirement Estate (Blue Hills Rise) is planned to be constructed along Collison Rd in Collison Estate.

It is noted that GasNet Australia were also contacted during the Dial Before You Dig application. It was advised that no GasNet assets are located in the vicinity of the Cranbourne East region.

3.5.2 Capacity to Service the Proposed Development

In consultation with Envestra Ltd., it has been advised that there is unlikely to be sufficient capacity in the existing gas network to support the residential development of the Cranbourne East B Study area.

Existing asset capacities were not provided by the service provider, however, it was advised that the capability of the existing network to support any additional loads can be determined once provided with the number and location of subdivision lots.

Based on anticipated residential development of the majority of the subject site (no commercial or industrial loads), duplication and extension of the existing gas network to distribute supply throughout the development region is expected. Upon finalisation of the complete concept plan and establishment of the gas supply requirements for the site, further analysis will have to be performed with reference to the reinforcement of the existing network.

It is noted that potential servicing issues are anticipated for the triangular parcel of land located directly east of Casey Fields Regional Facility and south of the railway reserve. Access issues and problems associated with single feed services and supply reliability are likely.

3.5.3 Proposed Works to Service the Development

Connection points for extension and distribution within the subject site will be assessed and determined by Envestra Ltd..

In correspondence with the authority, it has been advised that further duplication of the 150mm main in Narre Warren-Cranbourne Road will be necessary to support growth within the Cranbourne East B study area. In the longer term, a new 200mm or 180mm diameter gas main will be required along Clyde Road.

To service the development area, extension of the existing 180mm diameter supply main in Linsell Boulevard will be required eastwards to Clyde Road. Secondary or intermediate mains will need to be laid in a north-south alignment from the extended 180mm main in Linsell Boulevard to supply the region south of Linsell Boulevard. The alignment of the intermediate supply mains will be dependent on the subdivision layout but Envestra Ltd. have advised their preference for intermediate mains to be located within collector roads.

As planning for the development and subdivision layout is finalised, an application for connection to the existing network should be submitted to Envestra Ltd. to ensure that services are available when required. Following confirmation of the project proceeding and the provision of a detailed scope, Envestra Ltd. will evaluate the feasibility of supply based on the location, demand and the existing reticulation network in the

area. The final analysis can only be performed after the detailed scope has been established and the plans of the development are submitted to council for certification and endorsement.

If there are multiple stages of development, each stage will need to be applied for separately.

In general, gas service lines will run within the road reserve at specified offsets from the property boundary and supply each allotment. Installation will typically occur during the land development phase.

4 SUMMARY AND CONCLUSION

A preliminary servicing investigation to identify existing infrastructure services in the near vicinity of the Cranbourne East B study area and report on anticipated works to service the development has reviewed key services including electricity, telecommunications, sewer reticulation, water supply and gas supply.

In consultation with relevant Authorities regarding standards, capacity of existing services and proposed upgrades to existing services or the requirement of new facilities the following has been identified:

- Electricity
  - Adequate capacity for supply to the development is possible via existing 66/22kV Clyde North Zone Substation (CLN) which has been design for expansion;
  - High voltage and Low voltage Electrical cabling works and installation of kiosk substations will be required throughout the development;
  - Solar powered initiatives could potentially reduce the required electrical infrastructure throughout the proposed development region
- Telecommunications
  - Telstra are responsible for ensuring provisions for supply to the development. They are additionally responsible for the installation of any new telecommunication infrastructure.
  - Application for Reticulation must be made to Telstra to ensure services are available when required.
  - Cables and servicing pits will be required throughout the development, with property connections provided to each allotment. Cabling will typically follow the same route as the electrical reticulation cables.
  - Existing main telecommunications service along Berwick-Cranbourne Road may provide a likely connection point into the development.
  - Specific telecommunication requirements for the site should be considered including fibre optic access, and other specialist telecommunication services. Additional costs may be associated with the provision of these services to the site.
- Sewer Reticulation
  - Significant additional infrastructure will be required to service the development.
  - South East Water are aware of the requirement for new infrastructure and have a planned strategy for extension of the network. New infrastructure will consist of a combination of gravity reticulation and branch sewers, rising mains and pump stations.
  - Optimal staging of development for sewerage services is from the north
- Water Supply
  - Significant additional infrastructure will be required to service the development
  - South East Water are aware of the requirement for new infrastructure and have a planned strategy for extension of the network.
  - Dual pipe system will be installed, providing potable water for domestic use and recycled water for irrigation and fire-fighting. It is likely that the use of recycled water for these purposes will be mandatory.

- South East Water have indicated their preference to stage development for water from the south to allow progressive upgrade of their systems. This is in conflict with installation of sewer services. It is envisaged the upgrade cost for sewerage service provision will be of a larger magnitude than water service provision. Therefore, overall, staging from the north is preferable.
- To reduce the demand and reliance on potable water, consideration of roof runoff re-use and grey water re-use for residential properties is recommended. Reticulated recycled water is currently utilised in the Cranbourne Region, however it could be beneficial to reduce the need for installation of significant infrastructure.

- Gas Supply
  - Based on residential development of the subject site (no commercial or industrial loads), duplication and extension of the existing gas network to distribute supply throughout the development is expected.
  - An application for connection will need to be submitted to Envestra Ltd. when the subdivision layout is finalised to ensure that services are available when required.
  - Extension of the existing 180mm diameter supply main in Linsell Boulevard will be required eastwards to Clyde Road.
  - Secondary or intermediate mains will need to be laid in a north-south alignment from the extended 180mm main in Linsell Boulevard to supply the region south of Linsell Boulevard.
  - Further duplication of the 150mm main in Narre Warren-Cranbourne Road will be necessary to support growth within the Cranbourne East B study area.
  - A new 200mm or 180mm diameter gas main will be required along Clyde Road in the longer term.
- Other
  - Potential servicing issues are anticipated for the triangular parcel of land located directly east of Casey Fields Regional Facility and south of the railway reserve. Access issues and problems associated with single feed services and supply reliability are likely.

APPENDIX A – CRANBOURNE EAST B STUDY AREA

APPENDIX B - SERVICE AUTHORITY PLANS

APPENDIX C – CONCEPTUAL SERVICING PLANS

APPENDIX D – SITE VISIT PHOTOGRAPHS

Clyde North Zone Substation (CLN)

550kV Transmission towers and 66kV poleline through development area

Clyde Road looking south west across northern region of development area

View to the East along Thompsons Road

View from Thompsons Road (northern boundary) looking South West

View from Thompsons Road (northern boundary) looking South East

Unknown Melbourne Water asset on northern side of Thompsons Road

View West along Thompsons Road

View South along Narre Warren-Cranbourne Road

Incomplete construction of Linsell Boulevard looking West to Narre Warren-Cranbourne Road

Current Termination of Linsell Boulevard looking East

Gas Supply Main along northen side of Linsell Boulevard

View East across development from Linsell Boulevard

View South along Mayfield Road (Collison Estate)

View North-East from Mayfield Road (Collison Estate)

View West from Garden Street (Collison Estate)

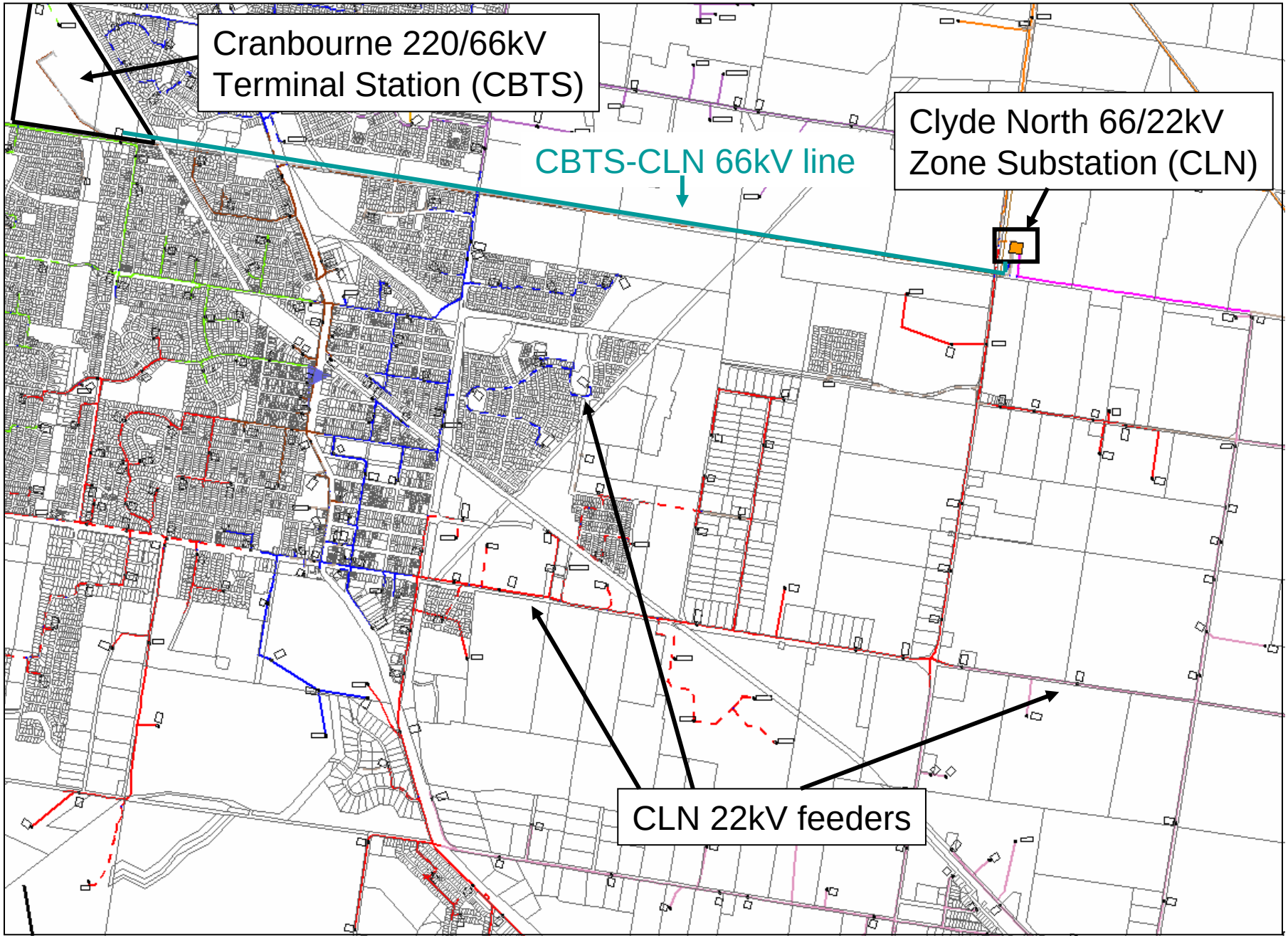
View North across development from corner of Berwick-Cranbourne Road and Clyde Road

View North-West across development from corner of Berwick-Cranbourne Road and Clyde Road

View West along Berwick-Cranbourne Road from Clyde Road corner

View North along Clyde Road eastern boundary from corner of Berwick-Cranbourne Road

Existing residence adjacent to Clyde Road western boundary


Cranbourne 220/66kV
Terminal Station (CBTS)
CBTS-CLN 66kV line
Clyde North 66/22kV
Zone Substation (CLN)
CLN 22kV feeders

THOMPSONS

RD

RD

RD

NARRE WARREN - CRANBOURNE

BERWICK - CRANBOURNE

RD

BERWICK - CRANBOURNE (CLYDE ROAD)

SOUTH GIPPSLAND

BALLARTO

RD

HWY

Envestra Ltd. - Gas Services Asset Plan

LEGEND

- EXISTING RETICULATION SEWER
- EXISTING 225mm SEWER
- RISING MAIN
- SIPHON
- MELBOURNE WATER TRUNK SEWER
- PRIVATELY OWNED RISING MAIN AND SEWER
- BRANCH SEWER DIRECTION AND SIZE
- RETICULATION SEWER DIRECTION AND SIZE
- NATHAN RD PUMPING STATION — EXISTING PUMP STATION
- DEVELOPED AREAS
- SEWERAGE TREATMENT PLANT BOUNDARY
- SCAP BOUNDARY
- URBAN GROWTH BOUNDARY
- SOUTH EAST WATER LIMITED BOUNDARY
- EU1 — SUB-CATCHMENT ID
- SUB-CATCHMENT AREA
- UNSCHEDULED DEVELOPMENT
- PROPOSED SEWER MAIN
- PROPOSED RISING MAIN
- PROPOSED UPGRADE
- PROPOSED RELIEF SEWER
- REL1 — PROPOSED RELIEF SEWER ID
- PROPOSED SEWER DIRECTION AND SIZE
- ROYAL RD PUMP STATION — PROPOSED PUMP STATION
- PROPOSED DIRECTION OF RETICULATION SEWERS
- ROYAL RD PUMP STATION — EXISTING PUMPING STATION TO DECOMMISSION
- A — REFERENCE POINT

EUMEMMERRING CREEK SCAP

HALLAM VALLEY SCAP

HAMPTON SCAP

WEST CATCHMENT

CENTRAL CATCHMENT

EAST CATCHMENT

SOUTH CATCHMENT

CRANBOURNE L.T.P INFLUENT PUMPING STATION

NEW HOLLAND DR PUMPING STATION

BERWICK-CRANBOURNE RD PUMPING STATION

PEARCEDALE ROAD PUMPING STATION

BOTANIC RIDGE - BROWNS ROAD PUMPING STATION

JUNCTION CL PUMPING STATION

BALLARTO ROAD WEST PUMPING STATION

BALLARTO ROAD NORTH PUMPING STATION

BALLARTO ROAD PUMPING STATION

SMITHS LANE PUMPING STATION

CRAIG ROAD PUMPING STATION

CRANBOURNE SOUTH PUMPING STATION

CLYDE ROAD PUMPING STATION

CLYDE ROAD NORTH PUMPING STATION

CLYDE CREEK NORTH BRANCH SEWER

CRANBOURNE EAST PUMPING STATION

WILD SCOTCHMAN WAY PUMPING STATION

HARDYS ROAD PUMPING STATION

COMPILED	Tony Savanah	
CHECKED	Matthew Snell / Paul Clemson	
AUTHORISED	Andrew Chapman	
DATE	30 November 2006	

COMPILED	Tony Savanah	
DATE	30 November 2006	
SCALE	NOT TO SCALE	

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SOUTH EAST WATER

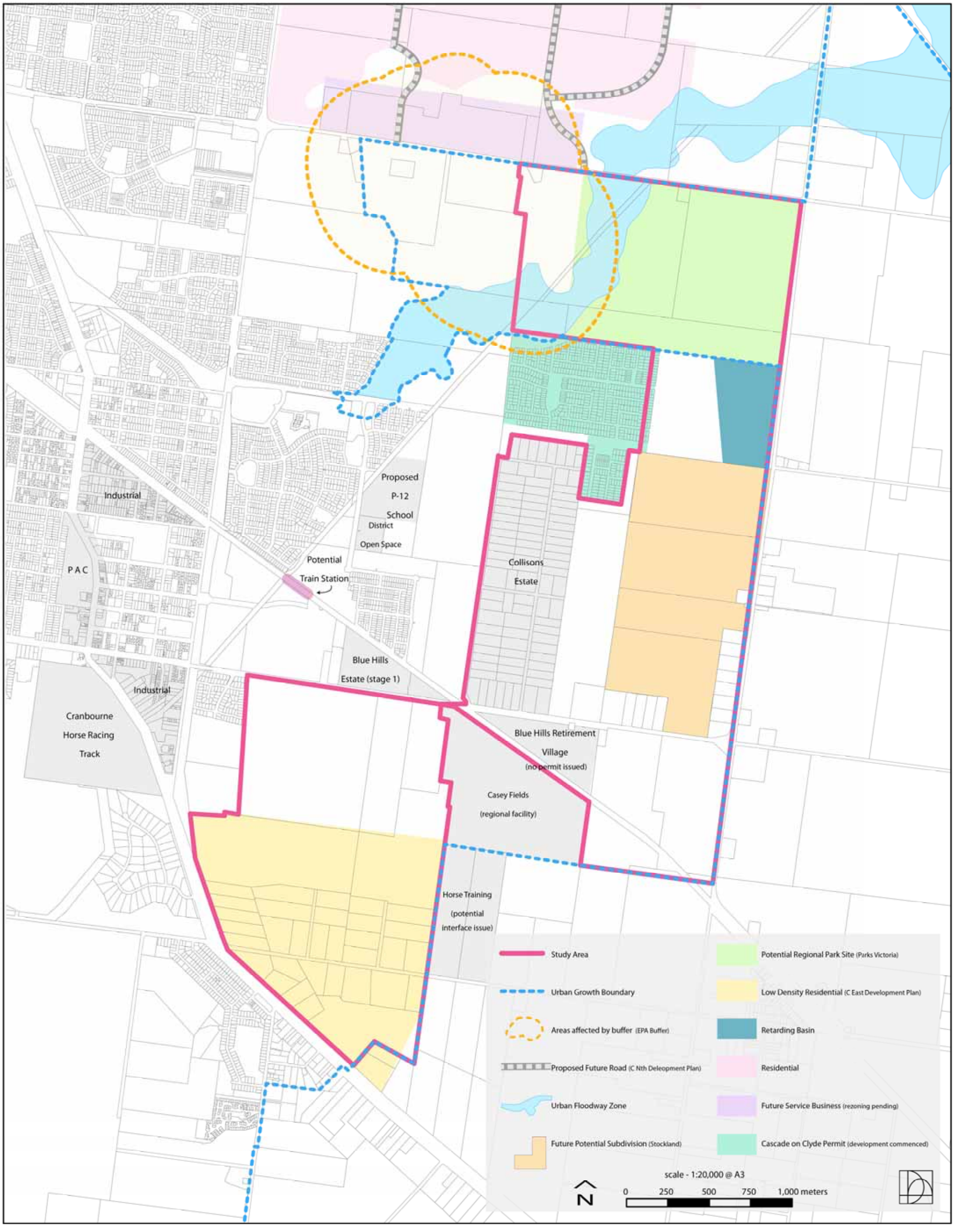
SEWERAGE STRATEGY

CRANBOURNE SCAP SEWERAGE PROPOSAL

ASSET PLANNING - SEWERAGE ASSET PLANNING

PLAN 3

Cranbourne East Briefing Workshop
Summary Map



Cranbourne North
Balancing Tank and Booster Pumping Station

Cranbourne West
Tank & Pump Station

Cranbourne West
High Level Booster

Cranbourne Recycled Water
Tank & Pumping Station

Cranbourne South
High Level Booster

EIS 450/300 Pipeline

Legend

- Residential Timing (UDP 2006)
- 1-2years
- 3-5years
- 6-10years
- 11-15years
- Existing Recycled Mains
- Existing EIS Pipeline
- Distribution Main Timing
- 1-2years (2006-07)
- 3-5years (2008-10)
- 6-10years (2011-15)
- 11+ years (2016+)

COMPILED	Joseph Lin
DATE	September 2006
SCALE	1:
FILE NAME:	I:\

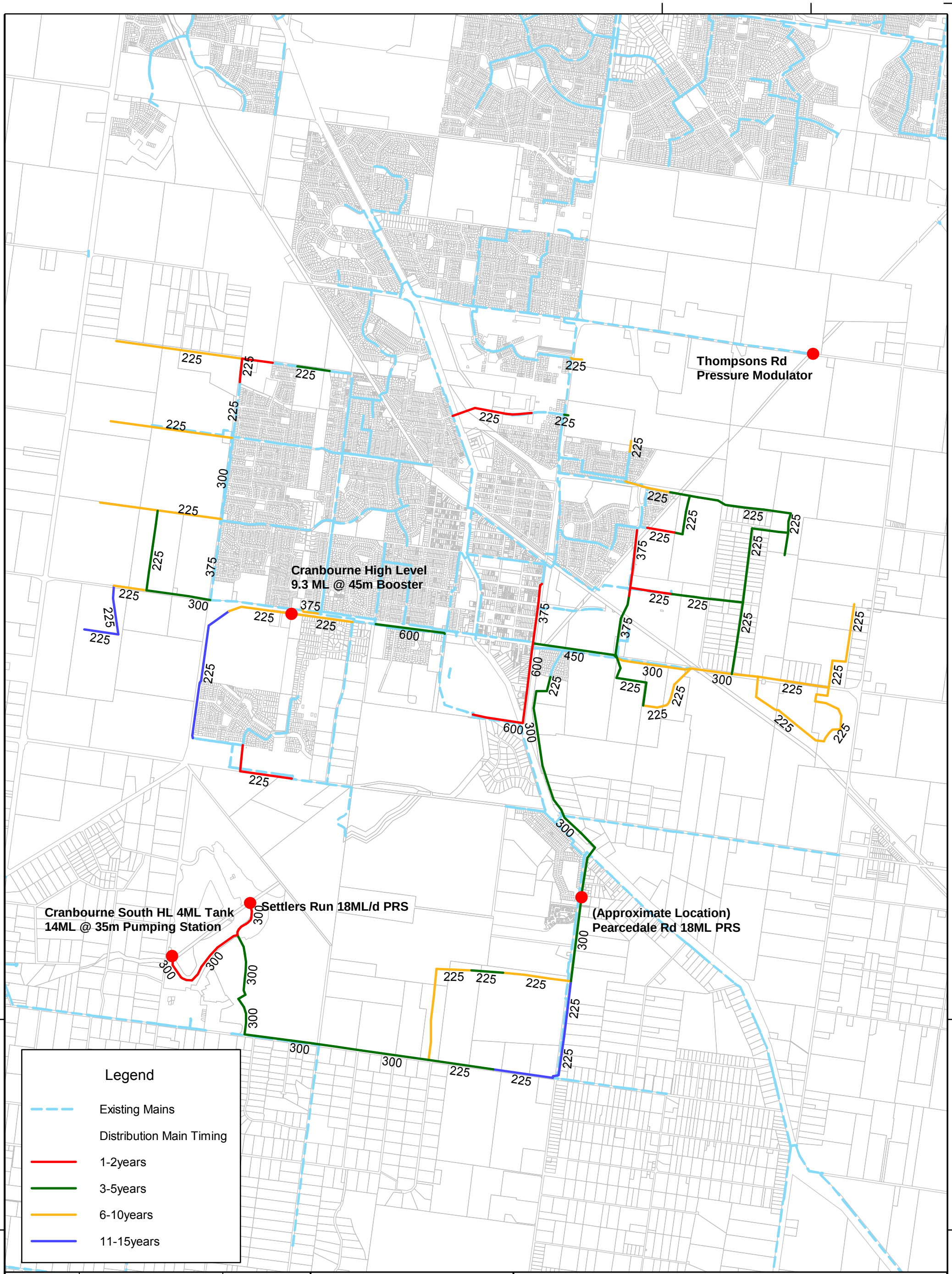
SOUTH EAST WATER

WATER SUPPLY STRATEGY

Dual Pipe Recycled Water
Cranbourne Preferred Option

NETWORK PLANNING

PLAN 6



COMPILED	Joseph Lin		WATER SUPPLY STRATEGY
DATE	September 2006	SOUTH EAST WATER	**Dual Pipe Potable**
SCALE	1:		**Preferred Option**
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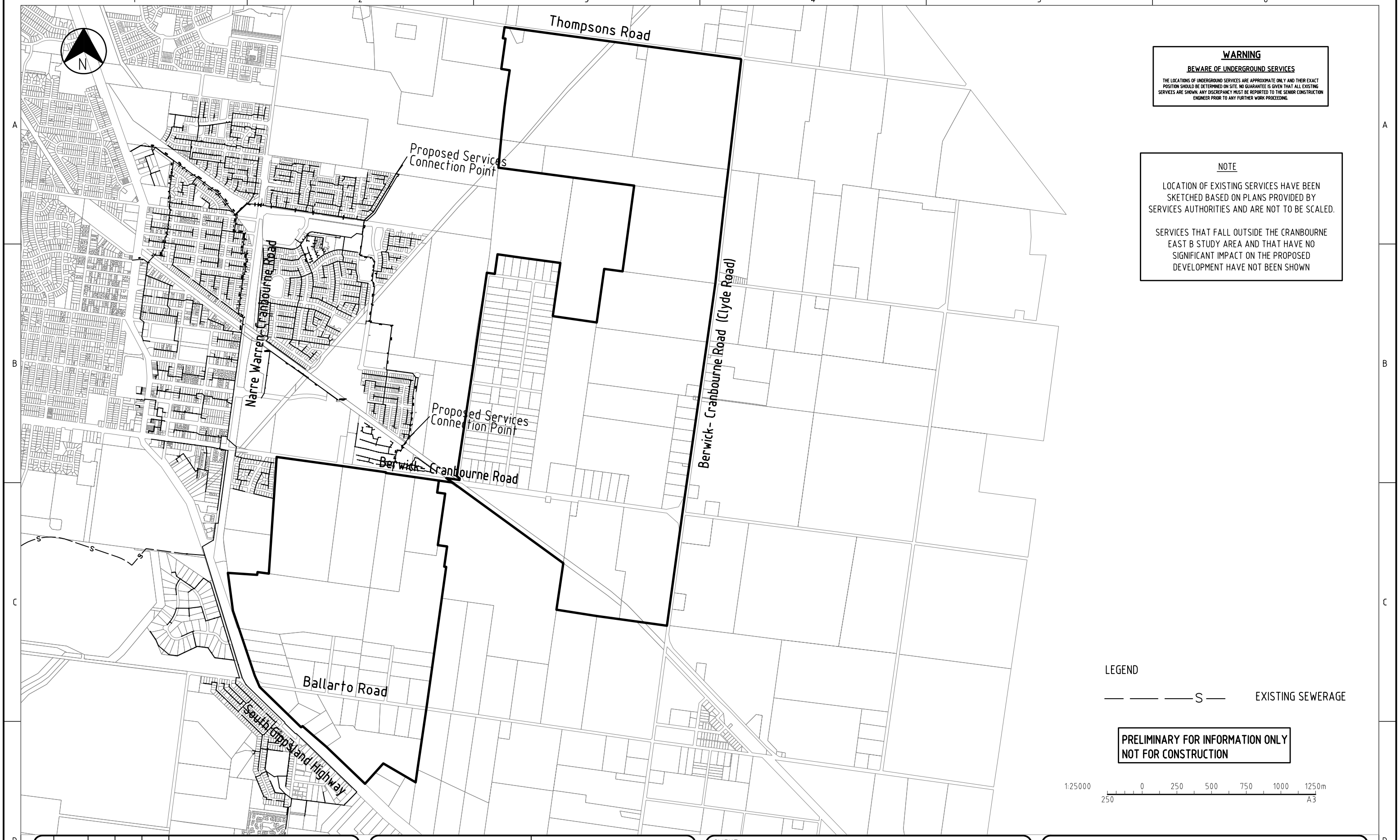

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BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE DETERMINED ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. ANY DISCREPANCY MUST BE REPORTED TO THE SENIOR CONSTRUCTION ENGINEER PRIOR TO ANY FURTHER WORK PROCEEDING.

NOTE

LOCATION OF EXISTING SERVICES HAVE BEEN SKETCHED BASED ON PLANS PROVIDED BY SERVICES AUTHORITIES AND ARE NOT TO BE SCALED.

SERVICES THAT FALL OUTSIDE THE CRANBOURNE EAST B STUDY AREA AND THAT HAVE NO SIGNIFICANT IMPACT ON THE PROPOSED DEVELOPMENT HAVE NOT BEEN SHOWN

LEGEND

—— —— ——S—— EXISTING SEWERAGE

PRELIMINARY FOR INFORMATION ONLY NOT FOR CONSTRUCTION

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SKM

A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
590 Orrong Road
Armadale
VIC 3143 Australia
Telephone 03 9248 3100
Facsimile 03 9500 1180

CLIENT: DAVID LOCK ASSOCIATES

PROJECT: CRANBOURNE EAST B STUDY AREA

DRAWN	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
GD			
DESIGNED	DESIGN REVIEW		
FR			

TITLE: CONCEPTUAL SERVICES CONNECTION PLAN-SEWERAGE

PROPOSED CRANBOURNE EAST B STUDY AREA

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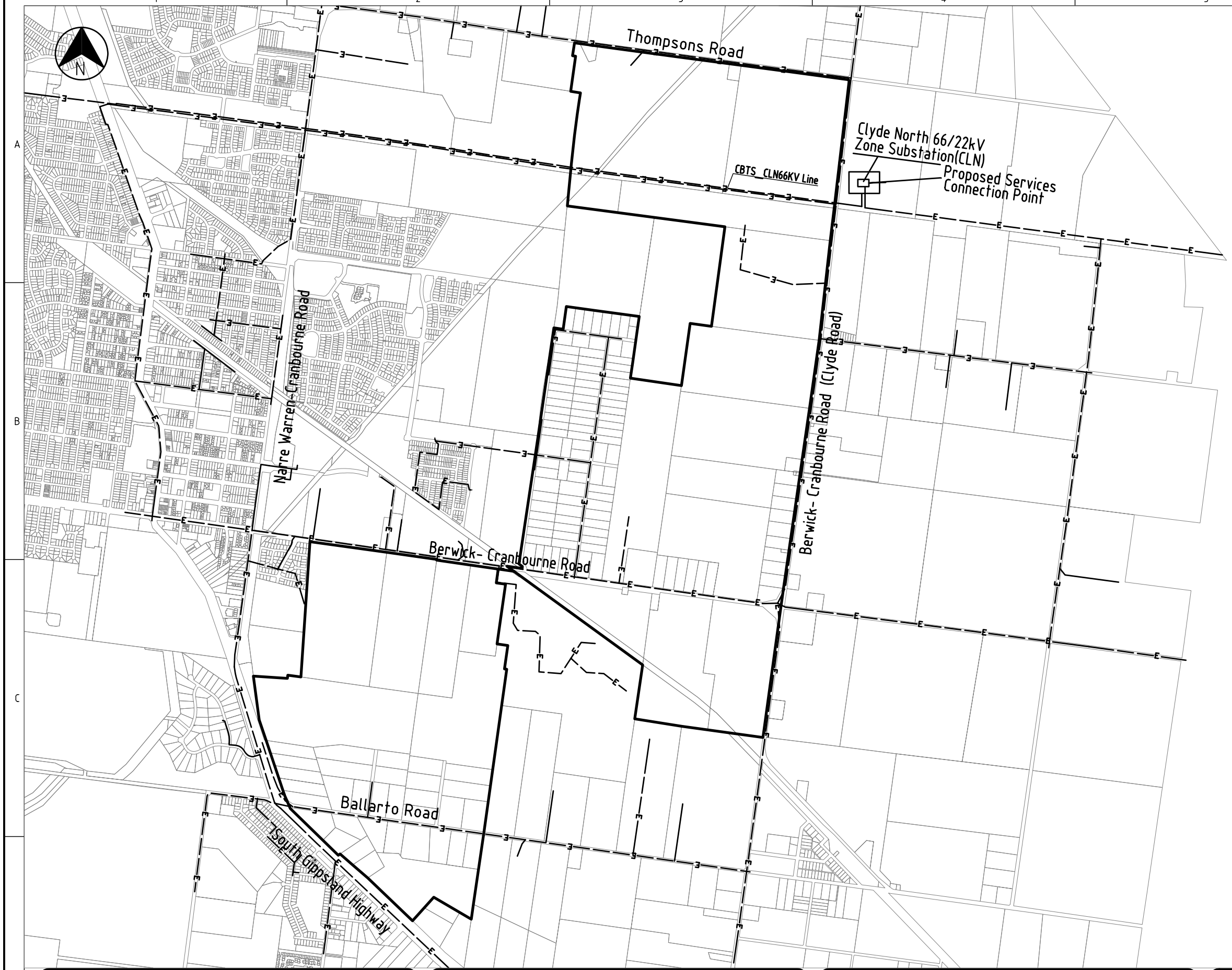

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LEGEND

E — EXISTING ELECTRICITY

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Sinclair Knight Merz Pty. Ltd
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Armadale
VIC 3143 Australia
Telephone 03 9248 3100
Facsimile 03 9500 1180

CLIENT: DAVID LOCK ASSOCIATES

PROJECT: CRANBOURNE EAST B STUDY AREA

DRAWN	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
GD			
DESIGNED	DESIGN REVIEW		
FR			

TITLE: CONCEPTUAL SERVICES CONNECTION PLAN-ELECTRICITY

PROPOSED CRANBOURNE EAST B STUDY AREA

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WARNING

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SERVICES THAT FALL OUTSIDE THE CRANBOURNE EAST B STUDY AREA AND THAT HAVE NO SIGNIFICANT IMPACT ON THE PROPOSED DEVELOPMENT HAVE NOT BEEN SHOWN

LEGEND

W — EXISTING WATER

PRELIMINARY FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

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A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
590 Orrong Road
Armadale
VIC 3143 Australia
Telephone 03 9248 3100
Facsimile 03 9500 1180

CLIENT: DAVID LOCK ASSOCIATES

PROJECT: CRANBOURNE EAST B STUDY AREA

DRAWN	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
GD			
DESIGNED	DESIGN REVIEW		
FR			

TITLE: CONCEPTUAL SERVICES CONNECTION PLAN-WATER

PROPOSED CRANBOURNE EAST B STUDY AREA

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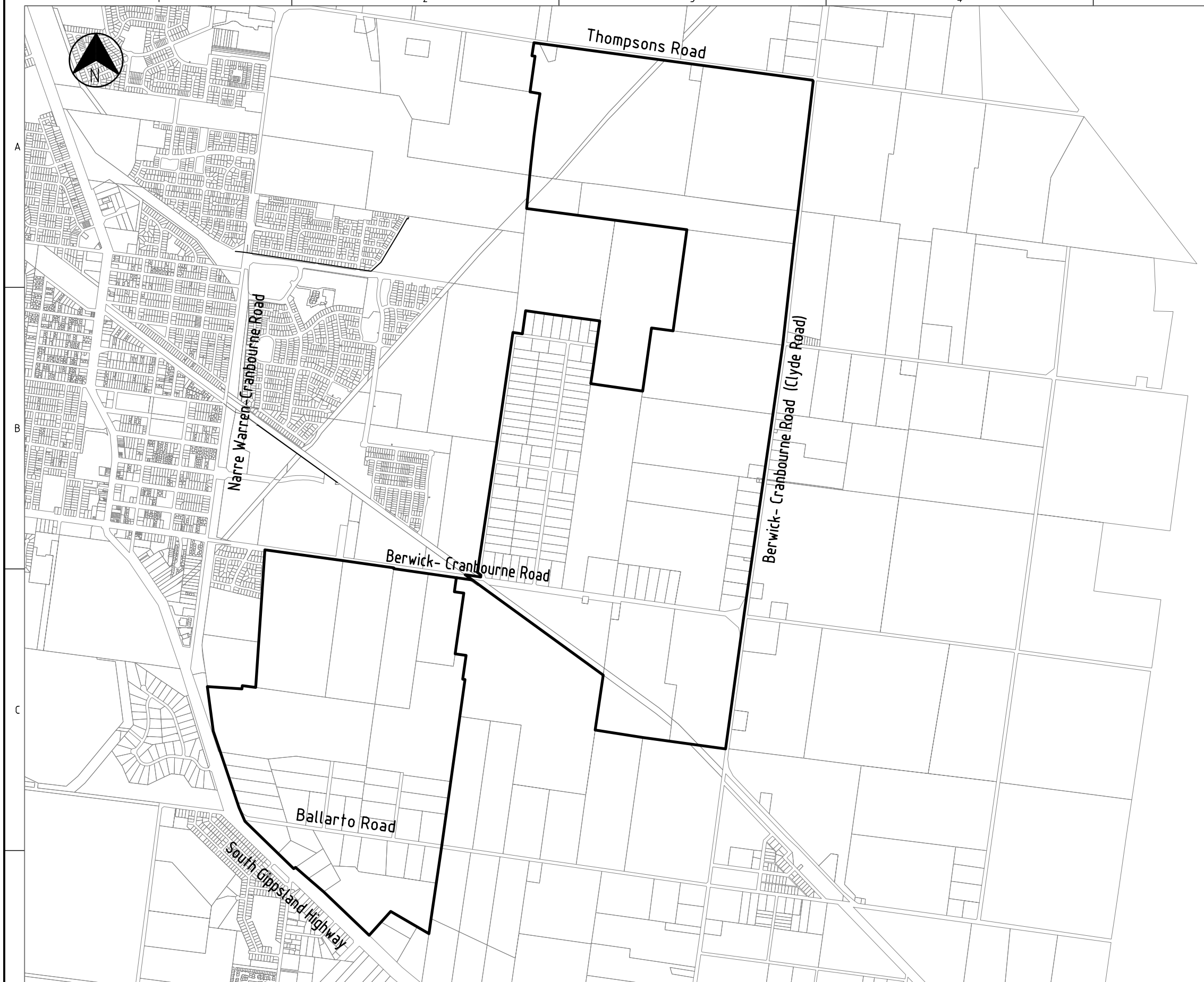

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VIC 3143 Australia
Telephone 03 9248 3100
Facsimile 03 9500 1180

CLIENT: DAVID LOCK ASOCIATES

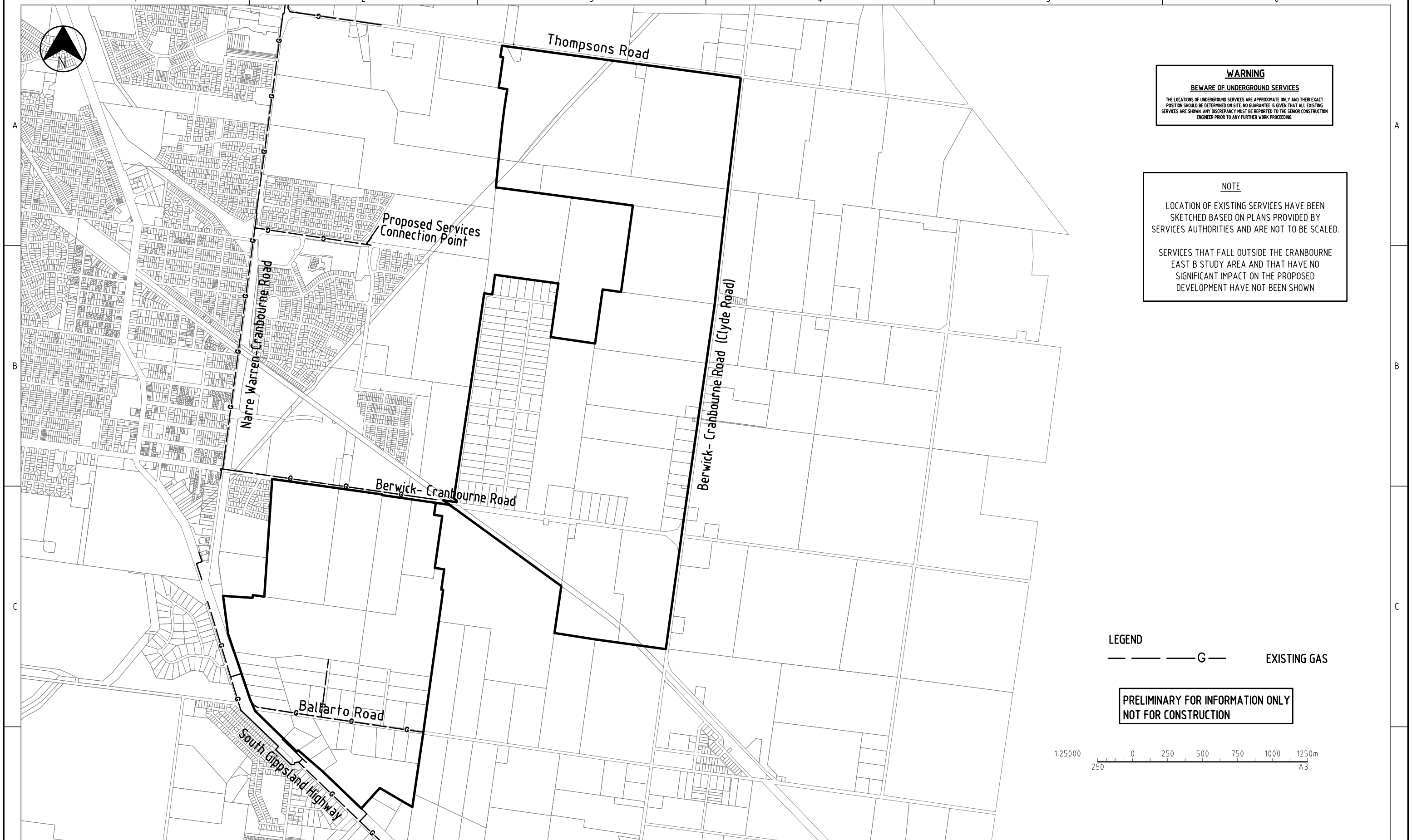
PROJECT: CRANBOURNE EAST B STUDY AREA

DRAWN	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
GD			
DESIGNED	DESIGN REVIEW		
FR			

TITLE: CONCEPTUAL SERVICES CONNECTION PLAN-COMUNICATIONS

PROPOSED CRANBOURNE EAST B STUDY AREA

SCALE	PROJECT No	DRAWING No	AMDT
1:25000	VW04115	SK05	A



WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE DETERMINED ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. ANY DISCREPANCY MUST BE REPORTED TO THE SENIOR CONSTRUCTION ENGINEER PRIOR TO ANY FURTHER WORK PROCEEDING.

NOTE

LOCATION OF EXISTING SERVICES HAVE BEEN SKETCHED BASED ON PLANS PROVIDED BY SERVICES AUTHORITIES AND ARE NOT TO BE SCALED.

SERVICES THAT FALL OUTSIDE THE CRANBOURNE EAST B STUDY AREA AND THAT HAVE NO SIGNIFICANT IMPACT ON THE PROPOSED DEVELOPMENT HAVE NOT BEEN SHOWN

LEGEND

G EXISTING GAS

PRELIMINARY FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

1:25000 0 250 500 750 1000 1250m
250 A3

No	DATE	DESIGN REVIEW	REV'D P.MGR	APP'D P.DIR	AMENDMENT
-					
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A	17/9/07				PRELIMINARY ISSUE

SKM
A.C.N 001 024 095
Sinclair Knight Merz Pty. Ltd
590 Orrong Road
Armadale
VIC 3143 Australia
Telephone 03 9248 3100
Facsimile 03 9500 1180

CLIENT DAVID LOCK ASSOCIATES

PROJECT CRANBOURNE EAST B STUDY AREA

DRAWN	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
GD			
DESIGNED	DESIGN REVIEW		
FR			

TITLE CONCEPTUAL SERVICES CONNECTION PLAN-GAS
PROPOSED CRANBOURNE EAST B STUDY AREA

SCALE	PROJECT No	DRAWING No	AMDT
1:25000	VW04115	SK02	A