Bonnyrigg Partnerships

Bonnyrigg Living Communities Project

Master Plan

Infrastructure Report

May 2008

REVISION	STATUS	AUTHOR	CHECKED	APPROVED FOR ISSUE:	ISSUE DATE:
4	For Approval	J. Gilligan	C. Avis	C. Avis	23.05.08

COMMERCIAL IN CONFIDENCE

The information, project approach and concepts, including intellectual property, contained in this proposal is confidential and proprietary to Hughes Trueman. It may only be used by the person to whom it is provided for the purpose of assessing the technical and financial capability of the firm to undertake the stated project. This intellectual property must not be imparted to any third party or utilised for a subsequent project without prior written approval of Hughes Trueman. Hughes Trueman reserves all legal rights and remedies in relation to any infringement of its rights in respect of its intellectual property and confidential information.

TABLE OF AMENDMENTS

Amendment No.	Section Affected	Description of Amendment
1	**6.1 Earthworks**	**6.1 Earthworks** Additional section under Proposed Services
2	**6.2 Roads and Traffic**	**6.2.1 Access Place Commentary** Additional information added
3	**6.3 Stormwater**	**6.3 Stormwater** Additional table describing OSD basin construction timing
4	**6.5 Recycled Water**	**6.5 Recycled Water** Additional information added under Recycled Water section

**Amendments shown in red*

1 EXECUTIVE SUMMARY

This report by Hughes Trueman is a summary of the infrastructure works required for the Bonnyrigg Living Communities Project (BLCP) which has been undertaken for and on behalf of Bonnyrigg Partnerships.

This review of infrastructure requirements identifies the opportunities, constraints, risks and other issues associated with the proposed master plan development layout and staging plans. The staging plans make provision for approximately 100 existing dwellings and their services, which will require maintenance of access and uninterrupted service provision at all times during the progress of the development.

The primary development constraints and issues that are relevant to BLCP, including:

- Retention of existing dwellings to be occupied continuously throughout the renewal process will impact on safety, access and servicing arrangements;
- Protection or augmentation of existing trunk services to the estate, new infrastructure and temporary connections to service occupied dwellings;
- Removal and replacement of the majority of existing roads and services due to realignment of roads/lot layout and regrading of levels in accordance Bonnyrigg Partnerships and Council agreed road design standards and to create safe and desirable stormwater flow paths and detention facilities;
- Isolated areas of uncontrolled or potentially contaminated or unsuitable fill on the site may adversely affect civil/infrastructure works and impact on housing development; and
- Earthworks management during development staging requires coordination of cut, fill, stockpile and borrow operations for the entire development to avoid unnecessary additional costs.

2 INTRODUCTION

As part of the process of implementing the BLCP, a master plan has been prepared (refer to Appendix A). To implement the renewal process the estate will undergo a number of changes including the:

- alteration of the current Radburn layout;
- development of the public and private open space areas; and
- upgrade of utilities and community facilities.

Under the proposed development, residential dwellings will be demolished and the land redeveloped. The development will be staged over eighteen stages and has been structured to respond to the changing property market conditions and design controls throughout this period. Upon completion, 30% of the final yield will be retained as public housing.

3 EXISTING SITE DESCRIPTION

3.1 LOCATION

The BLCP site area is approximately 80 hectares in size and is located 30 km west of the Sydney CBD. It is adjacent to the suburbs of Edensor Park, St Johns Park, Bonnyrigg Heights and Mt Pritchard and lies within the Fairfield municipally. The master plan area is defined by Edensor Road to the north, Elizabeth Drive and Cabramatta Road to the south, Humphries Road to the east and Bonnyrigg Avenue to the west.

The subject site is best categorised by 3 primary catchment divisions; western, central (which also incorporate areas outside the site boundary of the BLCP) and eastern catchments, which occupy a combined area of 90 ha. The two smaller catchments (western and eastern) occupy approximately 4 and 19 hectares respectively while the larger, central catchment contributes to the remaining area.

The Central catchment of the master plan area is defined by the two natural ridgelines that run through the development site. Typically the catchment area grades towards a central reserve which runs south to north through the middle of the existing site. Grades within the catchment vary between 1% and 5%. The central reserve carries both minor and major events via low flow pipes and overload flow paths.

The Eastern catchment falls to the east with grades varying at 2 - 6%, until it reaches Humphries Road (which runs parallel to the ridgeline). Both minor flow pipes and overland flow paths within roadways then direct flow towards Green Valley Creek which runs north east of the development.

The Western catchment grades towards Bonnyrigg Avenue from the western ridgeline (which runs in a north-south orientation) at grades of 3 – 5%. Runoff is collected via the low flow pipe system, and also makes use of the spaces and road corridors that direct flow out of the catchment.

The topography of the existing site typically consists of New South Wales Department of Housing (DOH) dwellings, some medium density housing and open space areas, which are scattered throughout the site. The upgrade of the area into a new community is consequently classified as a “brown field” development.

The existing site also has a number of features that adjoin or are found within the development area. These including a mix of low and high density residential housing, a shopping centre, schools, temples, an electrical substation, a petrol station, a Croatian soccer club, a number of privately owned properties and a large private estate found in the centre of the BLCP site.

In terms of the geology of the site, the area sits on Bringelly Shale comprising of carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff. Sub surface strata encountered during intrusive investigations comprised of a variety of clay samples suggesting, given the nature of the materials and the site location, that the sub surface strata is likely to be residual soil that developed over Bringelly Shale. Geotechnical investigations conducted by Parsons Brinckerhoff indicate there was no evidence of contamination within the site and no free groundwater was encountered (JBS Environmental 2007).

4 PROPOSED SITE DESCRIPTION

A coordinated master planning approach between the Department of Housing (DOH), Bonnyrigg Partnerships and Fairfield City Council (FCC) aims to renew the existing DoH Bonnyrigg estate by replacing much of the public housing stock. Along with this replacement strategy, the renewal of the urban framework of Bonnyrigg also presented a number of opportunities to the region. These included a review of the infrastructure that services the area, an enhancement of the open space and community facilities serving the community and provision of a sustainable housing mix for the area.

4.1 INTERNAL WORKS

The BLCP works relate to all environmental, social, amenity and engineering aspects of modifying an existing residential area to a revitalised residential environment.

The proposed master plan proposes to demolish 842 dwellings.

As with all developments whether they are greenfield or brownfield the development process contains a number of fundamental tasks and programs. This project with its mix of redevelopment and dwelling retention does however have some requirements in addition to the standard tasks required during a typical development. These site-specific requirements include temporary connections and lead-in/lead-out works, remediation of stormwater overland flow paths and existing flooding impacts.

The internal works for the redevelopment of Bonnyrigg include the initial site establishment. This role in the project includes the establishment of amenities, fencing, temporary traffic control, survey facilities and site security for entire staging. The environmental controls relating to the soil and water management facilities and the management of environmental issues are required to be established at an early period of the staged development.

With the demolition of dwellings there would also be demolition and removal of the existing infrastructure, being road pavements where required, pedestrian bridges, pipe systems, underground services and utilities and vegetation that cannot be retained during the redevelopment process.

The earthworks for the development will generally be undertaken on an individual stage by stage approach however the stockpiling for and borrowing from stages has been reviewed on a whole redevelopment approach. Accordingly, the regrading works to modify and enhance overland flow paths and to adjust the development platforms will require the reuse, stockpiling, and borrowing of material from the entire development site. It is also anticipated that the works on the site might reveal areas of unsuitable or contaminated material that will need to be disposed of off site. Balance cut to fill from further modelling during the detailed design process will need to be undertaken in an attempt to reduce the large volume of excess cut presented by the current site grading proposals. Re-grading of the proposed lots can be undertaken as part of this process to “lose” a large amount of spoil across the development. This method is considerably more cost effective than removal of the surplus from site.

Based on the current master plan, approximately 35% of the road, drainage and services can be retained due to the master planning subdivision layout and road hierarchies.

Some of dual use facilities (open space and stormwater management) will also require extensive works due to the need for relocation and embellishment.

4.2 STAGING

It is proposed to develop the site over 18 stages. The stages have been developed through consideration of marketing, political, physical and economic constraints. The present staging reflects the requirement for construction of lower staging prior to upper catchment staging in the southern portion of the development. A number of the constraints relating to the present sequencing of the stages and potential are listed below:

- minimisation of the disruption to the existing services and thus the residents, within the precincts with cottages being retained;
- service provisions and the reduction in lead-ins, temporary connections or dependencies upon undeveloped stages for service provisions or access;
- the management of the earthworks, particularly the balancing of the material between stages that require substantial filling but do not have a source has been assessed during the cost planning. The sequence of events during the staging and the potential impacts of deleterious material being located during construction highlight some of the possible concerns; and
- marketing of the redeveloped housing estates and the future residential lots.

5 EXISTING SERVICES

The BLCP process must cater for the existing services and residents in the estate. As part of this underlying commitment, the retention of services to all residents is crucial to the development process. The utilisation of temporary services and lead-ins to provide live connections and uninterrupted service to the retained private dwellings or to facilitate the proposed staging, must be maintained as part of the works program.

5.1 WATER

A 450mm diameter trunk main runs through the development from Edensor Road to Elizabeth Drive. This main is located within the central reserve and will not be re-located as part of the renewal works. The water main is located within a 5m wide easement and is of regional importance as it supplies water to the surrounding suburbs.

100mm diameter mains and larger are present across the site and will be retained where possible, however some re-locations will be unavoidable. It is intended to retain all of the mains present in the roads bordering the site; these however may require adjustment, particularly where affected by proposed roads.

The list below indicates the location of mains 150mm diameter or larger within the development area or on the side of the external roads fronting the development.

Street Name	Water Main Size (mm)
Edensor Road	50 (x2), 150
Bonnyrigg Avenue	150
Elizabeth Drive	375
Cabramatta Road	375, 200
Humphries Road	200 (northern end only)
Bishop Crescent	200
Bunker Parade	150, 200
Reeves Crescent	150, 225
Palisade Crescent	150
Tarlington Parade	250 (southern end only)
Bradfield Crescent	450
Monash Place	450

Table 5.1 – Location of Water Mains

5.2 RECYCLED WATER

At present there is no recycled water supply within the Bonnyrigg estate.

5.3 SEWER

The main sewer carrier within the development is located within the Central reserve and is 300mm in diameter. The majority of the existing sewer reticulation mains throughout the site are 150mm diameter.

5.4 ELECTRICAL

The existing low voltage electrical supply servicing the Bonnyrigg estate is an underground reticulation network. However, a high voltage overhead cable traverses the site from the Integral Energy zone substation in Monash Place, north to Edensor Road on the northern boundary of the development.

5.5 TELECOMMUNICATIONS

The existing Bonnyrigg estate telecommunications network consists of a below ground reticulated service. There is currently no exchange, major through route or broadband provisions on site.

5.6 GAS

Existing gas mains are located in isolated areas of the Bonnyrigg estate. The majority of the existing gas mains within the estate are retained. The retained services are located in;

- Bonnyrigg Avenue;
- Cabramatta Road;
- Edensor Road;
- Elizabeth Drive;
- Hebblewhite Place;
- Monash Place; and
- Tarlington Parade.

6 PROPOSED SERVICES

As part of the proposal, it is intended to provide the following Infrastructure as part of the development.

6.1 EARTHWORKS

Due to the amount of existing roads and vegetation retained, minimal earthworks are proposed to achieve a desirable topography. Isolated locations of earthworks are proposed, viz:

- Stage 1 Detention Basin – In order to achieve the required detention volume, maintain acceptable ponding depths and protect existing infrastructure, up to 1.2m of cut and fill are required. These amounts are however associated with the cut/fill of the existing mound to the north of the playing fields.
- Stage 18 Roads – In order to ensure overland flows are kept within parks, the sag point in the Access Street located in Stage 18 was relocated approximately 20m. The maximum cut at this location is 0.4m.

While cut and/or fill levels over 600mm would be prohibited, it should be noted that the level differential between the adjacent lots is less than the 600mm in all cases. Further, the maximum earthworks heights are related to the park mound, not 'natural' ground.

6.2 ROAD WORKS

To achieve the proposed road layout, existing roads will be retained and new roads will require full construction (refer to Appendix A, M05 - Road Hierarchy Plan). The road upgrading works will include provisions for the replacement or improvement of pavements, kerbs and gutter, traffic control devices and intersection upgrades (both internal and external).

The breakdown of new and upgraded infrastructure consists of;

- Upgraded and re-sealed roads totalling 4,500m in length and 74,000m² of re-sealed pavement;
- 8,200m in length and 105,000m² of newly constructed pavement will be constructed as new roads; and
- Additionally, 27,400m² of new or replaced street footpath, including shared cycle/pedestrian links will be provided.

6.2.1 Access Place Commentary

The lowest order public road proposed as part of this project is the 8m wide road reserve Access Place. The Access Place's function is that of a shareway, providing access to off-street parking for residents and thoroughfare for pedestrians.

Roadways are signposted as '10 km/h Shared Roadway' (sign code R4-4) which denotes a mix of vehicles and pedestrians using the roadway. The speed of the vehicles driving on the roadway is anticipated to not exceed the sign-posted speed limit

due to the combination of the local area traffic management devices and short travel distances to the nearby intersections.

The notification of the 'Shared Zone' to both vehicles and pedestrians upon entrance to the roadway will provide clear notification that a higher than normal rate of interaction is anticipated between pedestrians and vehicles (as is its intention) and therefore prompt a higher than normal awareness of potential hazards. It is anticipated that only local residents shall be the users of the roadways, again reinforcing the assumed actual speed travelled by vehicles (as there are no other vehicles using the shared roadway as a through road). Although situated away from resident front doors and having sufficient visitor parking on collector roads and local streets, further discouragement of on-street parking on Access Places will be achieved with the provision of 'no stopping' signage throughout.

The vehicles exiting out of their garages/carports are shown reversing as it demonstrates the more difficult and likely scenario in terms of identifying potential/oncoming hazards for drivers and pedestrians. Drivers reversing onto the roadway are assumed not to exceed 5km/h.

Determining driver sight lines entering onto a roadway from a side street or access point is calculated using AS 2890.1:2004 Part 1: Off-Street car parking code (Figure 3.2). The data given in Figure 3.2 regarding frontage road speed was extrapolated backwards (As shown in Figure 1 below) to obtain a sight distance (Y) for Domestic Property Access sight requirement (DPA) for a vehicle design speed of 10km/h. Based on a 1.5-second reaction time and braking distance at 10km/hr, a minimum distance of 3m is required. For the purpose of this analysis, a conservative 5m has been adopted.

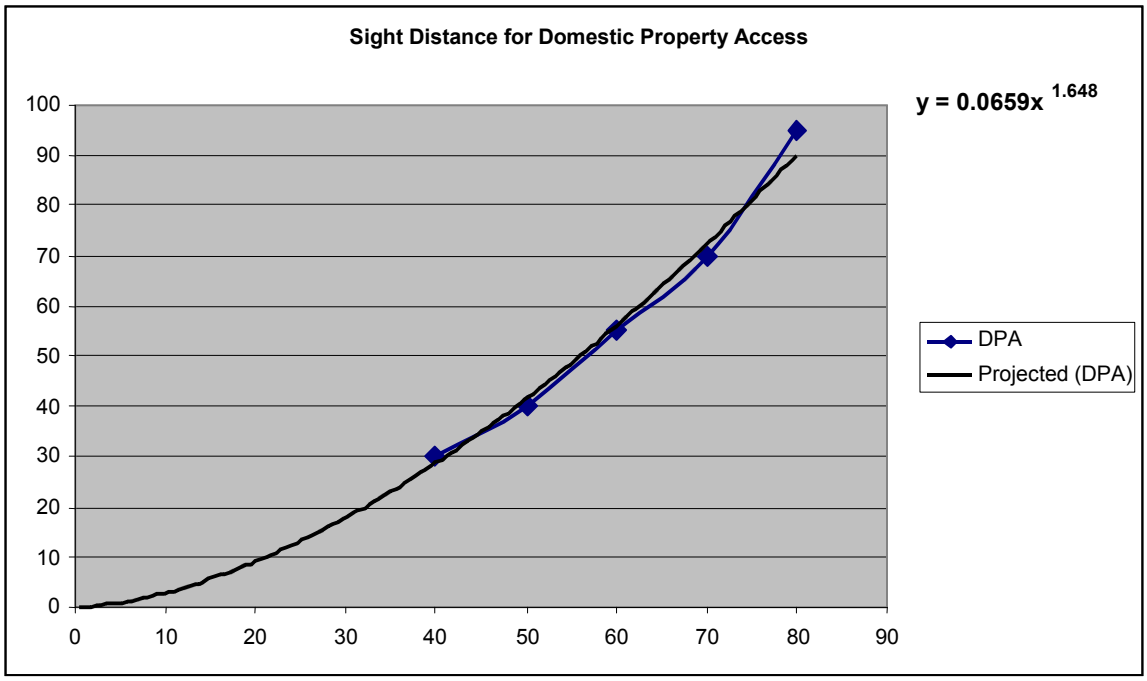


Figure 1 – Sight Distance for Domestic Property Access

Vehicle speed (km/h)	Domestic Property Access (m)
40	30
50	40
60	55
70	70
80	95
10	**2.93**

Table 6.1 – Sight Distance for Domestic Property Access

Road infrastructure summary:

- Proposed – 8,200m
- Retained – 4,500m

6.3 STORMWATER

While some of the existing stormwater drainage infrastructure is to be retained, the water cycle management system will include an upgrade of the major and minor systems as follows;

- The construction of a single, stormwater detention facility for each of the three separate catchments - namely central, eastern and western. These basins will provide approximately 9,300m^3 of combined stormwater detention storage;

Basin Catchment	Volume Required	Stage Constructed
Eastern	1000m^3	3
Central	7860m^3	1
Western	390m^3	16

Table 6.2 – OSD Basin Summary

- The eastern catchment OSD works are to be off-site. The location and extent of which will be negotiated and agreed upon with Council with the Stage 3 Development Application. Refer Appendix C for indicative basin works costings;
- In addition to this stormwater detention, it is also proposed to create a series of water quality control facilities, for treatment of runoff prior to discharge from the site. These facilities shall include wetlands, rain gardens, bio-retention swales and sinks. The area of these facilities is approximately 5,300m^2. Refer to Water Cycle Report for maintenance schedule;
- The construction of new stormwater systems will total approximately 3,700m of pipework and associated pits; and
- Sub-soil drainage provided within the new roads and proposed tree wells will total approximately 12,700m of pipe.

Stormwater pipe infrastructure summary:

- Proposed – 3,700m

- Retained – 6,700m
- Demolished – 2,500m

Refer also to the Water Cycle Report that has been prepared and submitted for this concept plan approval.

6.4 POTABLE WATER

The existing potable water supply within the development area will be extended and upgraded where necessary. The majority of existing pipe will be retained with all new pipe work connecting into the existing system, thus providing approximately 7,100m of new potable water mains, with approximately 3,700m to be removed.

Through discussions with Sydney Water it has been ascertained that any net increase in water consumption will have an adverse impact on supply to neighbouring areas. Sydney Water has indicated that that a pumping station and reservoir are not required to service the development (See Appendix B - SWC Feasibility Letter). The precise nature and location of the amplification will need to be determined during the detailed design stage, however it is noted that the use of recycled water may allow this scenario to be avoided.

Potable water infrastructure summary:

- Proposed – 7,100m
- Retained – 6,900m
- Demolished – 3,700m

6.5 RECYCLED WATER

As previously mentioned it is intended to supply recycled water to the development. A recycled water main will be laid throughout the entire development, greatly reducing the potable water demand and assisting in satisfying the BASIX requirements for portable water demand reductions. The recycled main will be laid alongside the potable water main where possible in new roads and on opposing sides of the road for existing roads to minimise existing service disruption. The estimated length of recycled water main is 12,200m.

Discussions have taken place with Sydney Water and a number of alternative service providers who have indicated a desire to provide a recycled water supply to the development. Provision of supply could be made at the corner of Cabramatta Road and Humphries Road. This would then be connected to the purpose built recycled water reticulation within the development. A decision as to the recycled water supplier will be made after commercial negotiations have occurred.

It is possible that the recycled water supply may not be available for Stage 1 of the project. In our opinion, it is not economically viable, nor in accordance with the principles of ESD to provide temporary water storage tanks until the supply is available.

It is therefore proposed that all recycled water infrastructure is constructed with each stage (i.e. the Stage 1 recycled water will be constructed in Stage 1, Stage 2 in Stage 2, etc.). This infrastructure will be connected to the potable water supply temporarily, until the recycled supply is live.

Recycled water infrastructure summary:

- Proposed – 12,200m

- Retained – 0m
- Demolished – 0m

6.6 SEWER

The existing sewer within the development area will be retained if possible or extended where necessary. In addition to the sewer reticulation works, a number of sewer main upgrades, both on and off site, will be constructed due to the increase in density of the Bonnyrigg renewal. The new sewer reticulation and carrier mains will be connected to the existing Sydney Water system, entailing approximately 8,000m of new sewer main and associated manholes.

Sydney Water has carried out detailed analysis of the system. The result of this analysis is that no augmentation or upgrade of downstream infrastructure is required.

Sewer infrastructure summary:

- Proposed – 8,000m
- Retained – 6,000m
- Demolished – 6,900m

6.7 TELECOMMUNICATIONS

While some of the existing telecommunications infrastructure can be retained as part of the renewal process, a significant portion of the site will require new services. These new works shall be undertaken as part of the infrastructure renewal and will be contained within a shared trench arrangement with electrical, broadband and gas reticulation. The additional telecommunications conduit and cabling will total approximately 5,100m.

Existing telecom ducts and cabling will be retained where possible, but will need to be removed where they do not follow proposed road alignments. Telstra have been contacted and the Access Planning division has indicated that Telstra have no future upgrades planned for the area and that no servicing issues are apparent.

In addition to the standard telecommunications cabling it is proposed to reticulate a broadband network throughout the estate for information technology purposes. It is estimated that the new cabling will total approximately 12,700m.

Future long term and additional provision of Telstra and Optus services for the area will need to be reviewed with the service providers.

Telecommunication infrastructure summary:

- Proposed – 5,100m
- Retained – 11,000m
- Demolished – 7,500m

Broadband infrastructure summary:

- Proposed – 12,700m
- Retained – 0m
- Demolished – 0m

6.8 GAS

Presently, only the central private properties and public housing to the north west of the site (situated between the playing fields and the shopping centre) have the provision of gas reticulation. The gas service will be installed as part of the shared trenching of services for recycled water and broadband through the remainder of the estate.

Gas supply to the future dwellings will be supplied from the retained mains and extended services as part of the works. The existing mains are of various sizes with the supply feed main being located in Edensor Road.

The gas supplier, Alinta has been consulted throughout the design process. Alinta have indicated that they would supply gas to the entire development area in a shared trench arrangement at no extra cost to Bonnyrigg Partnerships. Alinta have also advised us that the existing network has the capacity to serve the development. It is anticipated that approximately 12,200m of new gas piping will need to be installed to supply the entire development proposal.

Gas infrastructure summary:

- Proposed – 12,200m
- Retained – 3,100m
- Demolished – 2,400m

6.9 ELECTRICAL

Similar to the telecommunications services, as much of the existing electrical services as possible will be retained during the renewal process. Any new electrical reticulation will be provided in a shared trenching arrangement within proposed roads and will connect to the existing electrical supply system. The new reticulation will consist of both low and 11 kV high voltage and associated pad-mount substations and switching gear. Due to the Integral Energy's normal augmentation program and the reduction in electrical usage on a per dwelling basis there are no additional off-estate major works required solely servicing the renewal area.

New electrical reticulations will approximate 5,900m of conduit and cabling;

- The number of new light poles will be approximately 290; and
- Pad mount substations provided will be approximately 21.

The electricity supply across the whole of Bonnyrigg will need to be increased. Additional substations will be required to service the proposal. High voltage and Low voltage cabling will need to be installed across all future stages.

Integral Energy have indicated that plans are in place to augment their zone substation in Monash Place. Integral also intend to construct a new zone substation at Abbotsbury, these upgrade measures and the connection between these sites with high voltage transmission lines will ensure that the entire renewal development can be serviced adequately throughout the staged process. Until this infrastructure is constructed the current electrical supply can support 1,400 dwellings. Integral Energy have indicated that the upgrades would occur within the next 3 years. As the expected development program will not create more than 1,400 dwellings until 2013, it is expected that Integral Energy's current program is suitable. However, further discussion with Integral Energy should take place leading up to, and during the detailed design stage of the project.

Total cable service infrastructure to be:

- Proposed – 5,900m
- Retained – 9,000m
- Demolished – 7,200m

High Voltage cable burial infrastructure summary:

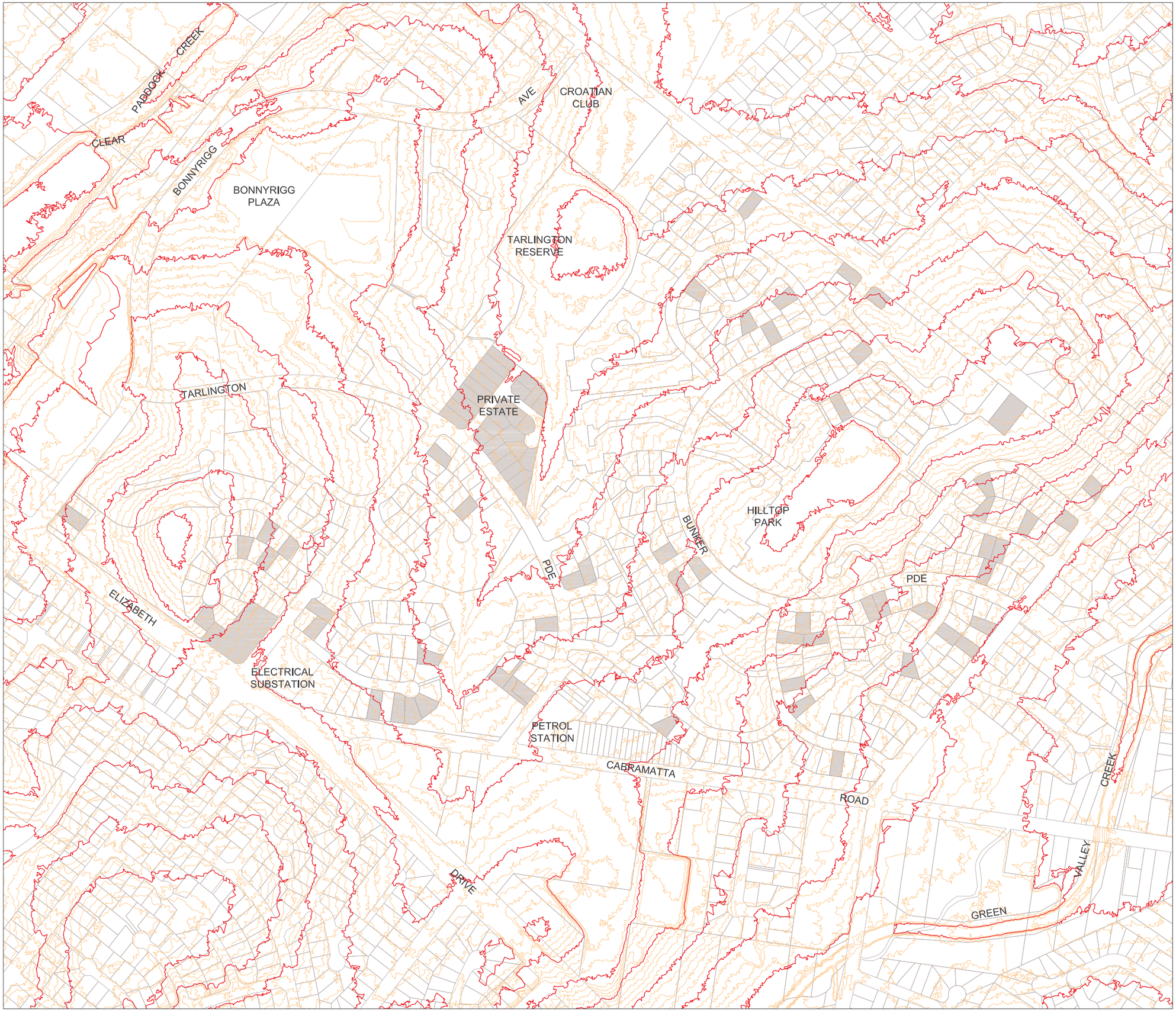
- Proposed – 900m
- Retained – 0m

Total pad-mount substation infrastructure to be:

- Proposed - 21
- Retained – 7
- Demolished - 6

APPENDIX A

INFRASTRUCTURE PLANS



bonnyrigg
PARTNERSHIPS

LEGEND

PRIVATE LOTS

SCALE 1:5000 METRES

100 50 0 100
75 25

Bonnyrigg Living Communities Project

DATE
Aug 07

SCALE
1:5000 @ A3

DRAWING TITLE + DESCRIPTION
Existing Topographical Features

DRAWING NO.
M01

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- CONSTRUCTION STAGING BOUNDARY
- PRIVATE LOTS
- PARK

CREEK
PADDOCK
CLEAR
BONNYRIGG
AVE
CROATIAN CLUB
EDENSOR ROAD
BONNYRIGG PLAZA
BONNYRIGG PRIMARY SCHOOL
PRIVATE ESTATE
ELIZABETH
ELECTRICAL SUBSTATION
PETROL STATION
CABRAMATTA ROAD
HUMPHRIES ROAD
CREEK
VALLEY
GREEN
DRIVE

SCALE 1:5000 METRES
100 50 0 100
75 25

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Proposed Regrading Contour Plan

DATE
Aug 07

SCALE
1:5000 @ A3

DRAWING NO.
M02

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

CONSTRUCTION STAGING BOUNDARY

- > 1.0m FILL**
- 0.25 - 1.0m FILL**
- 0.25 CUT - 0.25m FILL**
- 0.25 - 1.0m CUT**
- > 1.0m CUT**

** INDICATIVE EXTENT OF EARTHWORKS REQUIRED FOR LOT RE- GRADING

SCALE 1:5000 METRES
100 50 0 100
75 25

Bonnyrigg Living Communities Project

DATE
Aug 07

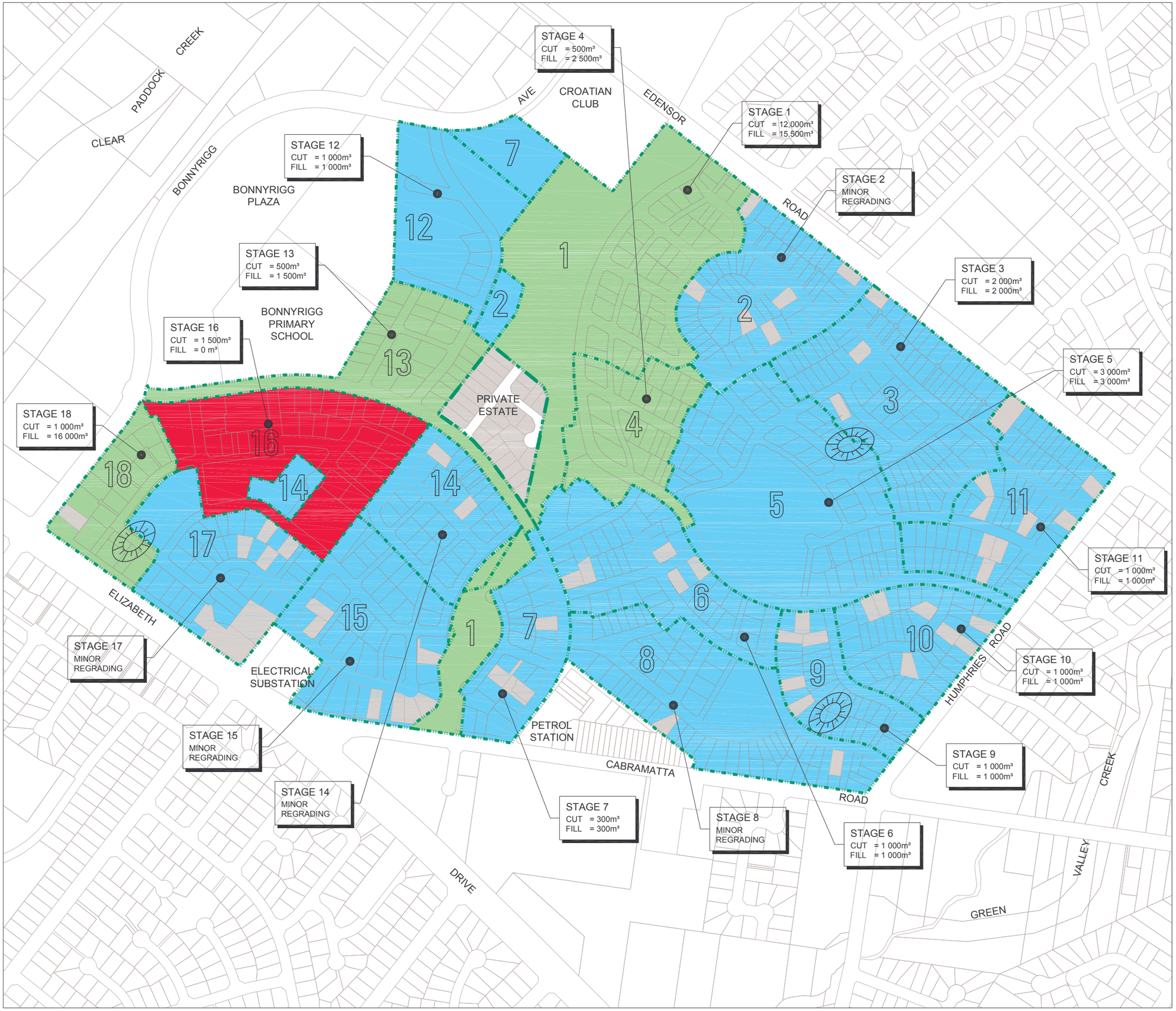
SCALE
1:5000
@ A3

DRAWING TITLE + DESCRIPTION
Earthworks Cut To Fill Plan

DRAWING NO.
M03

REVISION
A

Infrastructure Engineering



bonnyrigg PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- PRIVATE LOTS
- STAGES WITH AN EXCESS FILL BALANCE
- STAGES WITH AN EXCESS CUT BALANCE
- STAGES WITH CUT TO FILL BALANCE
- POSSIBLE STOCKPILE LOCATION

NOTES

1. EARTHWORKS MANAGEMENT BASED UPON PRELIMINARY ROAD GRADES AND ASSOCIATED LOT ADJUSTMENTS.
2. REVISED GRADING PLANS AND ADDITIONAL EARTHWORKS BALANCING PROGRAM TO BE PREPARED AS PART OF DETAIL DESIGN FOR EACH CONSTRUCTION PACKAGE.

SCALE 1:5000 METRES

100 50 0 100
75 25

Bonnyrigg Living Communities Project

DATE
Aug 07

SCALE
1:5000 @ A3

DRAWING TITLE + DESCRIPTION
Earthworks Management Plan

DRAWING NO.
M04

REVISION
A

Infrastructure Engineering

CREEK
PADDOCK
CLEAR
BONNYRIGG
AVE
CROATIAN CLUB
EDENSOR ROAD
BONNYRIGG PLAZA
BONNYRIGG PRIMARY SCHOOL
PRIVATE ESTATE
ELECTRICAL SUBSTATION
ELIZABETH
PETROL STATION
CABRAMATTA ROAD
HUMPHRIES ROAD
CREEK
VALLEY
GREEN
DRIVE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

bonnyrigg
PARTNERSHIPS

COLLECTOR	TYPE	1	2	3
	WIDTH (m)	18	18	15.5
	STATUS	EXISTING	PROPOSED	PROPOSED
	TYPE	4		
	WIDTH (m)	15		
	STATUS	PROPOSED		
ACCESS STREET	TYPE	5	6	7
	WIDTH (m)	20	18	15
	STATUS	EXISTING	EXISTING	EXISTING
	TYPE	8	9	10
	WIDTH (m)	15	15	12
	STATUS	PROPOSED	PROPOSED	PROPOSED
	TYPE	11		
	WIDTH (m)	10.5		
	STATUS	PROPOSED		
ACCESS PLACE	TYPE	12		
	WIDTH (m)	15		
	STATUS	EXISTING		
ACCESS PLACE	TYPE	13		
	WIDTH (m)	8		
	STATUS	PROPOSED		

SCALE 1:5000 METRES
100 50 0 100
75 25

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Road Heirarchy Plan

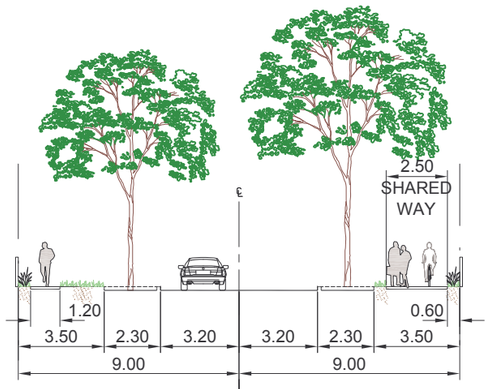
DATE
Aug 07

SCALE
1:5000 @ A3

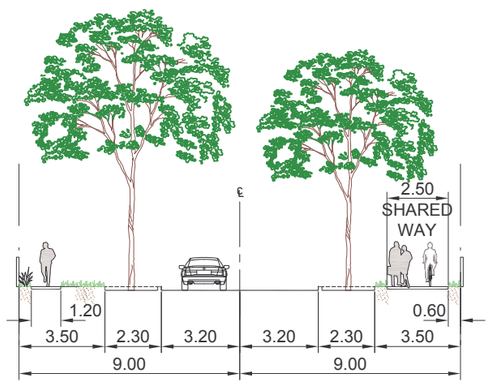
DRAWING NO.
M05

REVISION
A

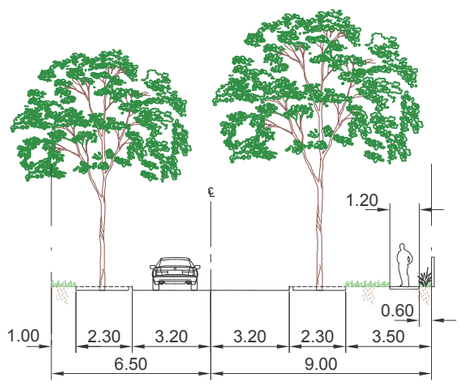
Infrastructure Engineering



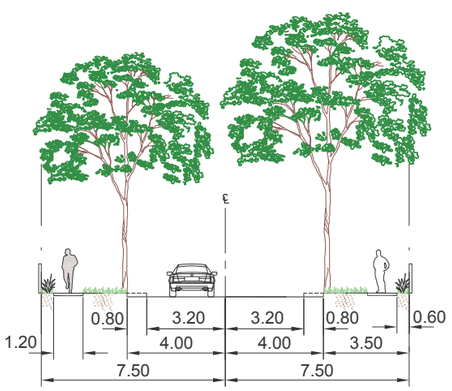
ROAD TYPE 1
EXISTING 18m COLLECTOR



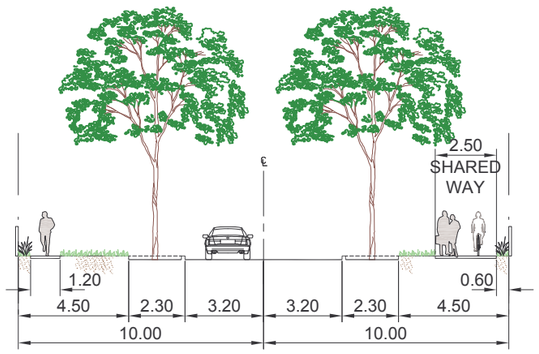
ROAD TYPE 2
PROPOSED 18m COLLECTOR



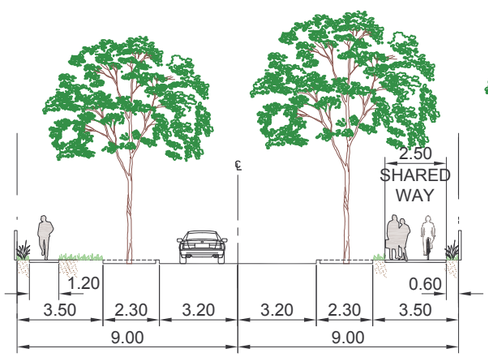
ROAD TYPE 3
PROPOSED 15.5m COLLECTOR
AT PARK



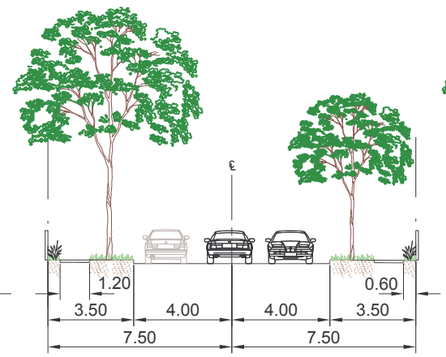
ROAD TYPE 4
PROPOSED 15m COLLECTOR



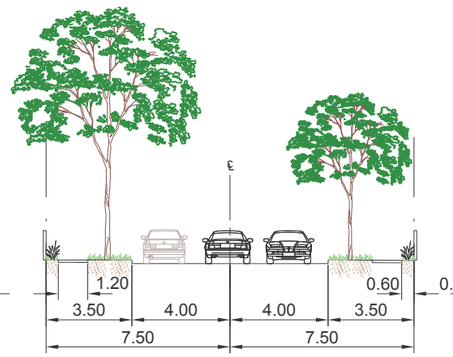
ROAD TYPE 5
EXISTING 20m ACCESS STREET



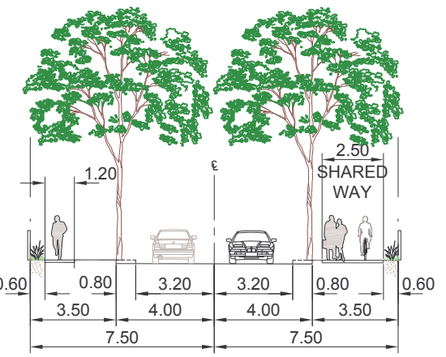
ROAD TYPE 6
EXISTING 18m ACCESS STREET



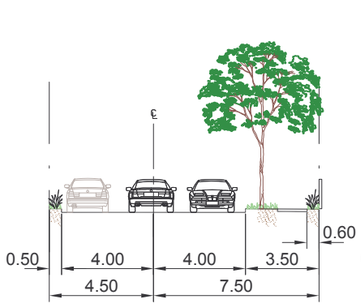
ROAD TYPE 7
EXISTING 15m ACCESS STREET



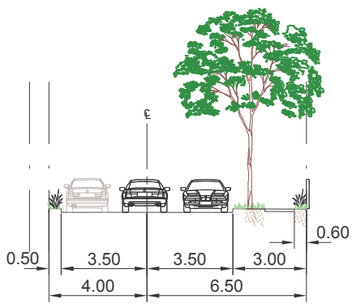
ROAD TYPE 8
PROPOSED 15m ACCESS STREET



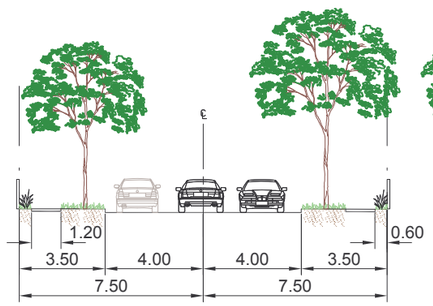
ROAD TYPE 9
PROPOSED 15m ACCESS STREET



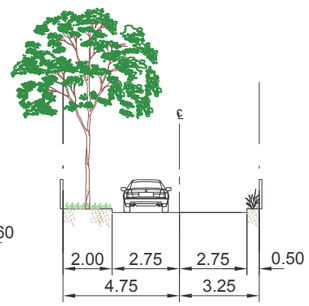
ROAD TYPE 10
PROPOSED 12m ACCESS
STREET AT PARK



ROAD TYPE 11
PROPOSED 10.5m ACCESS
STREET AT PARK



ROAD TYPE 12
EXISTING 15m ACCESS PLACE



ROAD TYPE 13
PROPOSED 8m ACCESS PLACE

bonnyrigg
PARTNERSHIPS

NOTES

1. ALL TREES WILL BE INSTALLED WITH ROOT CONTROL BARRIERS.
2. 3200 TRAVEL LANES AND 2300 PARKING ON COLLECTOR TO ALLOW BUS ROUTE PROVISION FOR SHARED WAY.

SCALE 1:250
METRES
4 2 0 5
5 3 1

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Road Cross Sections

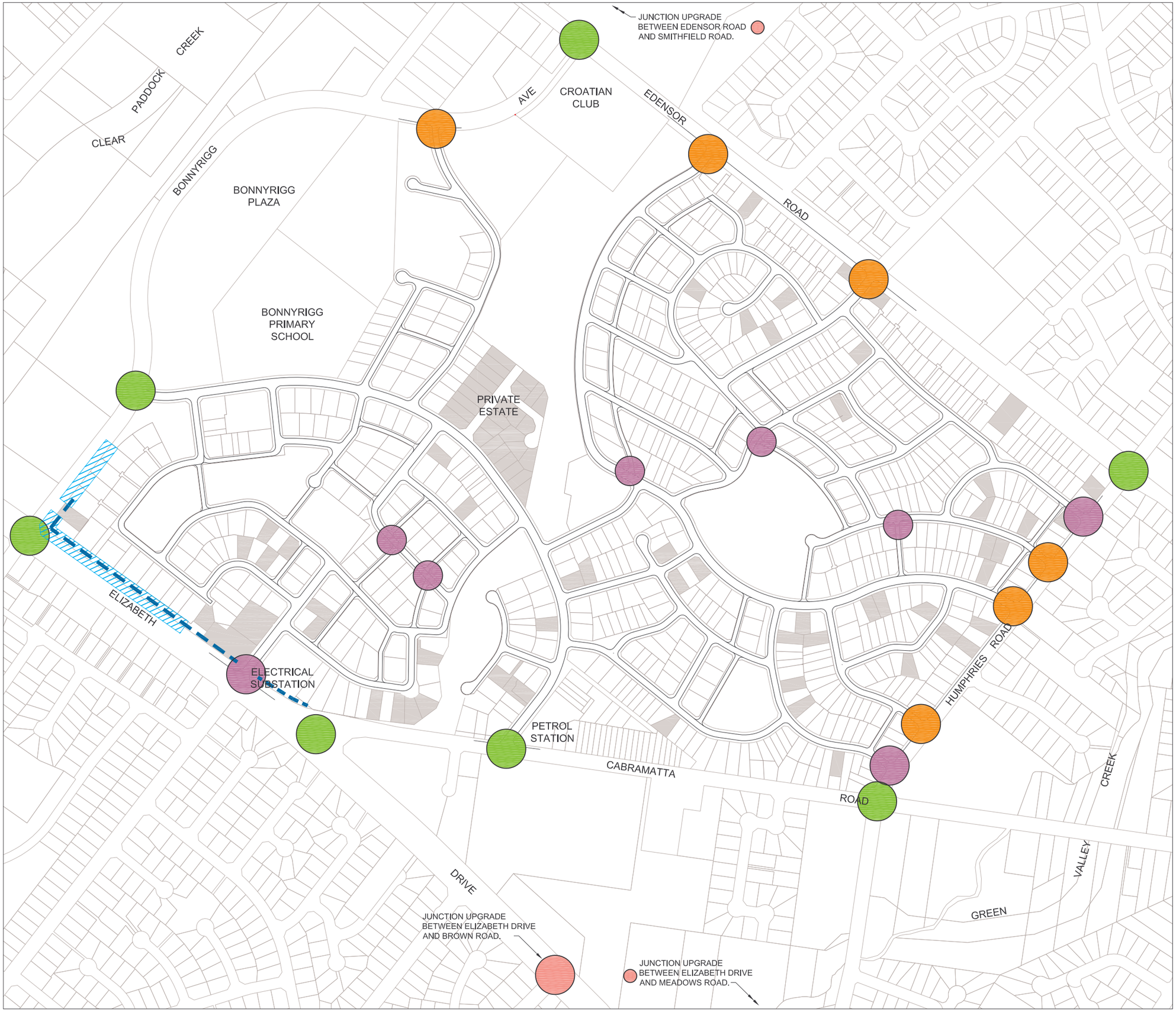
DATE
Aug 07

SCALE
1:250
@ A3

DRAWING NO.
M06

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- SIGNALISED INTERSECTION UPGRADE REQUIRED.
- PROPOSED SIGN CONTROL - ALL TURNS (GIVE WAY)
- PROPOSED SIGN CONTROL - LEFT IN / LEFT OUT
- EXISTING INTERSECTION TREATMENT TO REMAIN
- DENIED ACCESS TO LOT FRONTAGE
- SOUND WALLS

NOTE: INTERNAL INTERSECTION CONTROL (ie. STOP/GIVE WAY NOT SHOWN FOR CLARITY

SCALE 1:5000 METRES
100 50 0 100
75 25

Bonnyrigg Living Communities Project

DATE
Aug 07

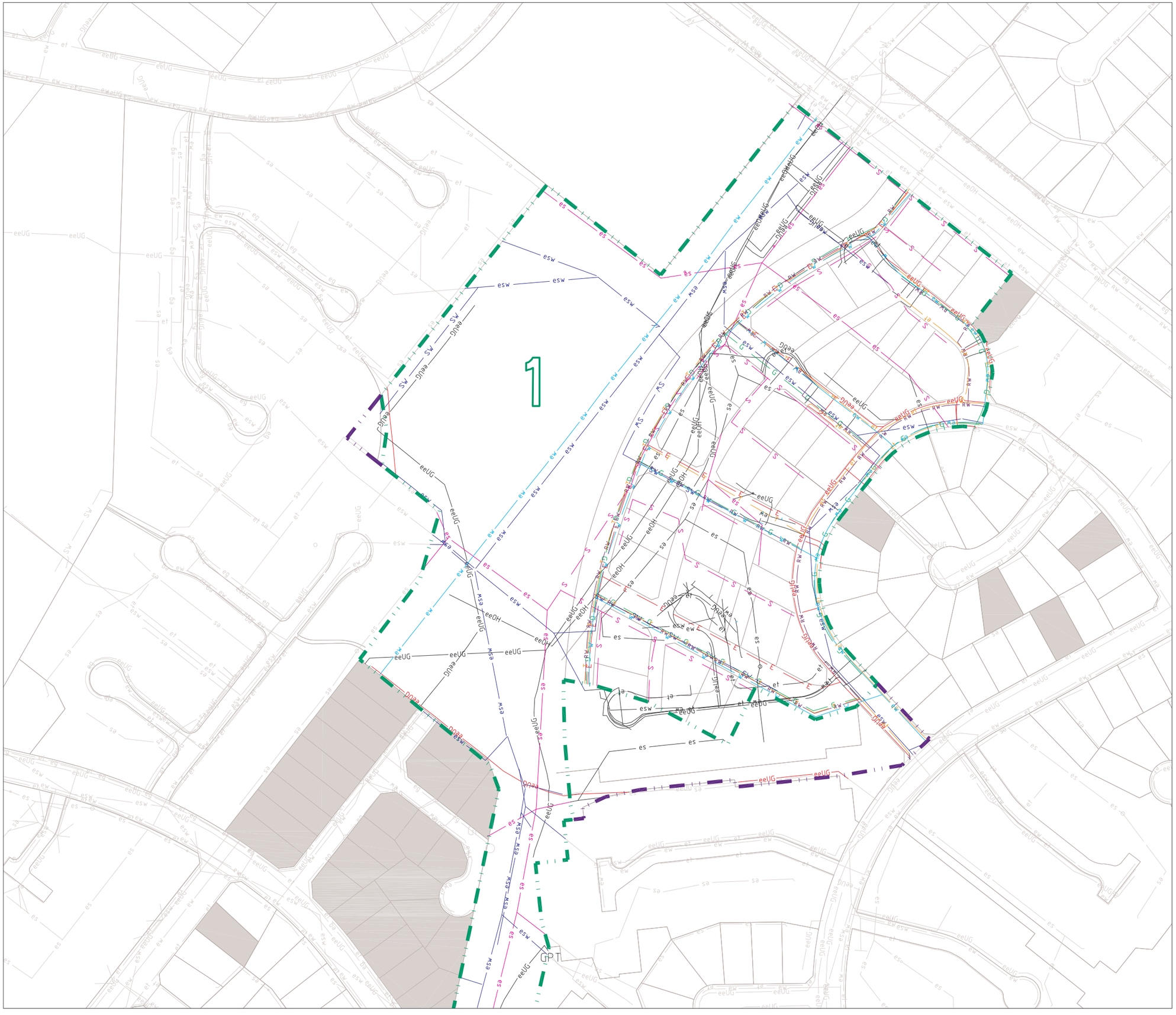
SCALE
1:5000 @ A3

DRAWING TITLE + DESCRIPTION
Traffic / Transportation Infrastructure Plan

DRAWING NO.
M07

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- CONSTRUCTION STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — PROPOSED RECYCLED WATER

SCALE 1:2000 METRES

40 20 0 40
30 10

Bonnyrigg Living Communities Project

DATE
Aug 07

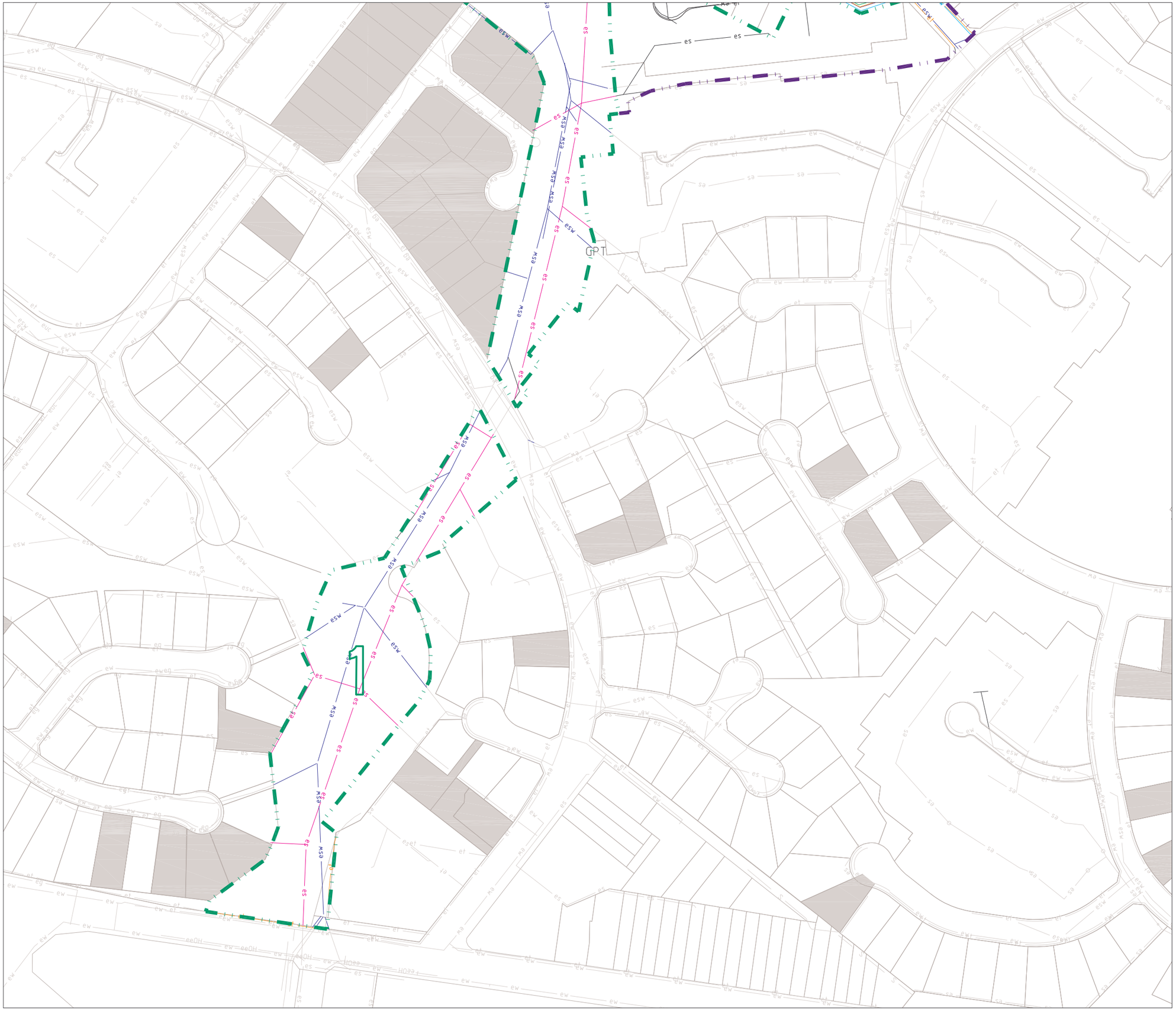
SCALE
1:2000 @ A3

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 1
Sheet 1 of 2

DRAWING NO.
M08

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- CONSTRUCTION STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:2000
METRES

40 20 0 40
30 10

Bonnyrigg Living Communities Project

DATE
Aug 07

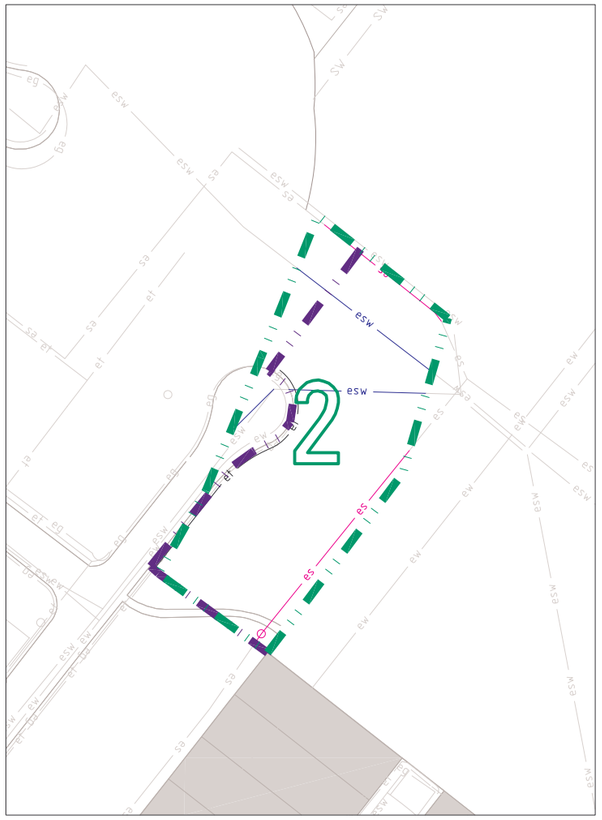
SCALE
1:2000
@ A3

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 1
Sheet 2 of 2

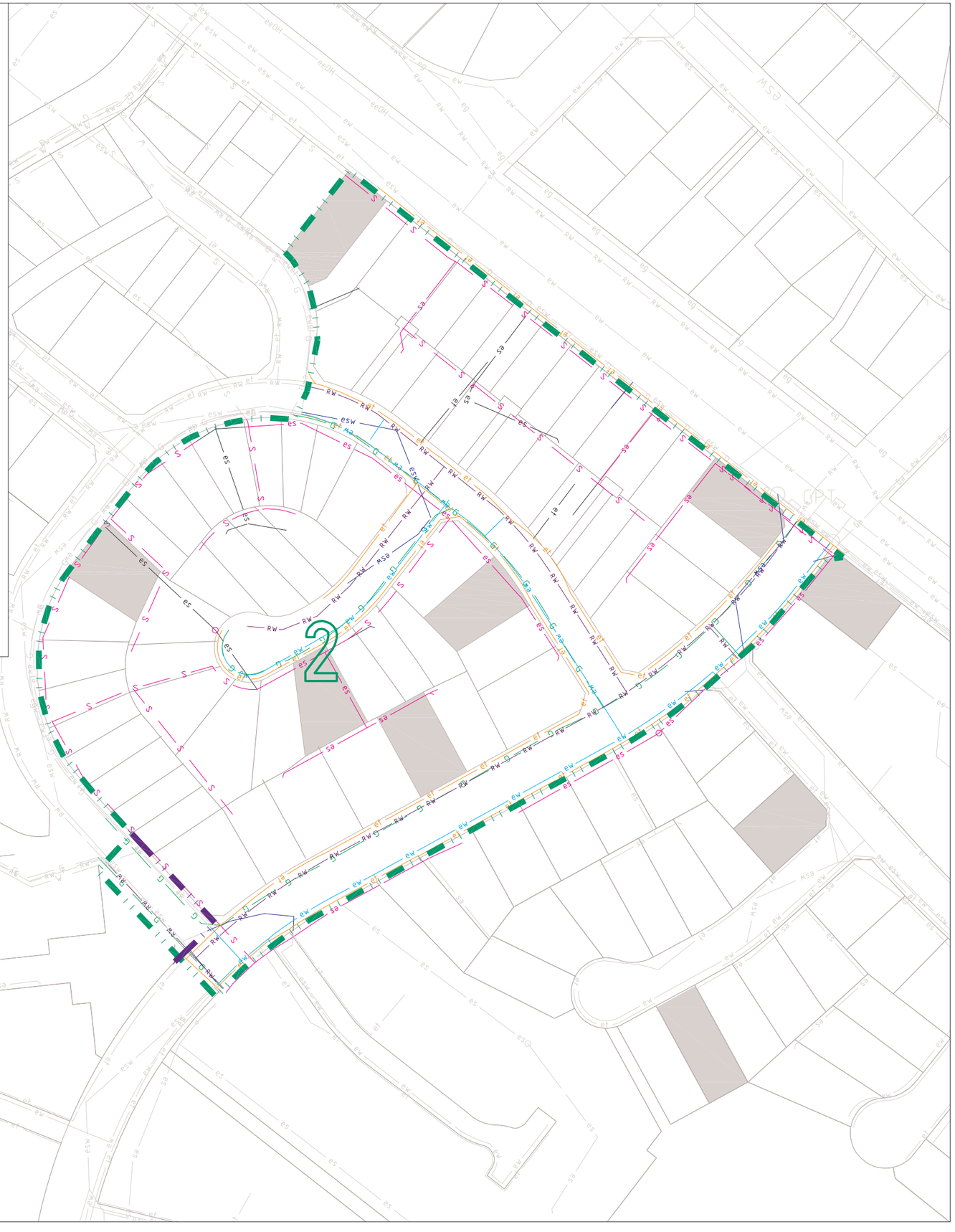
DRAWING NO.
M09

REVISION
A

Infrastructure Engineering



INSET STAGE 2 WEST



bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES
30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 2

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M10

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 3

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M11

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500 METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 4

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M12

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500 METRES
30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 5

DATE
Aug 07

SCALE
1:2000 @ A3

DRAWING NO.
M13

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:2000
METRES
40 20 0 40
30 10

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 6

DATE
Aug 07

SCALE
1:2000
@ A3

DRAWING NO.
M14

REVISION
A

Infrastructure Engineering

INSET STAGE 7 NORTH

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- EXISTING STORMWATER
- EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500 METRES

30 15 0 30

22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION

Masterplan
Staging Plan - Stage 7

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M15

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES
30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 8

DRAWING NO.
M16

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES
30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 9

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M17

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 10

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M18

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 11

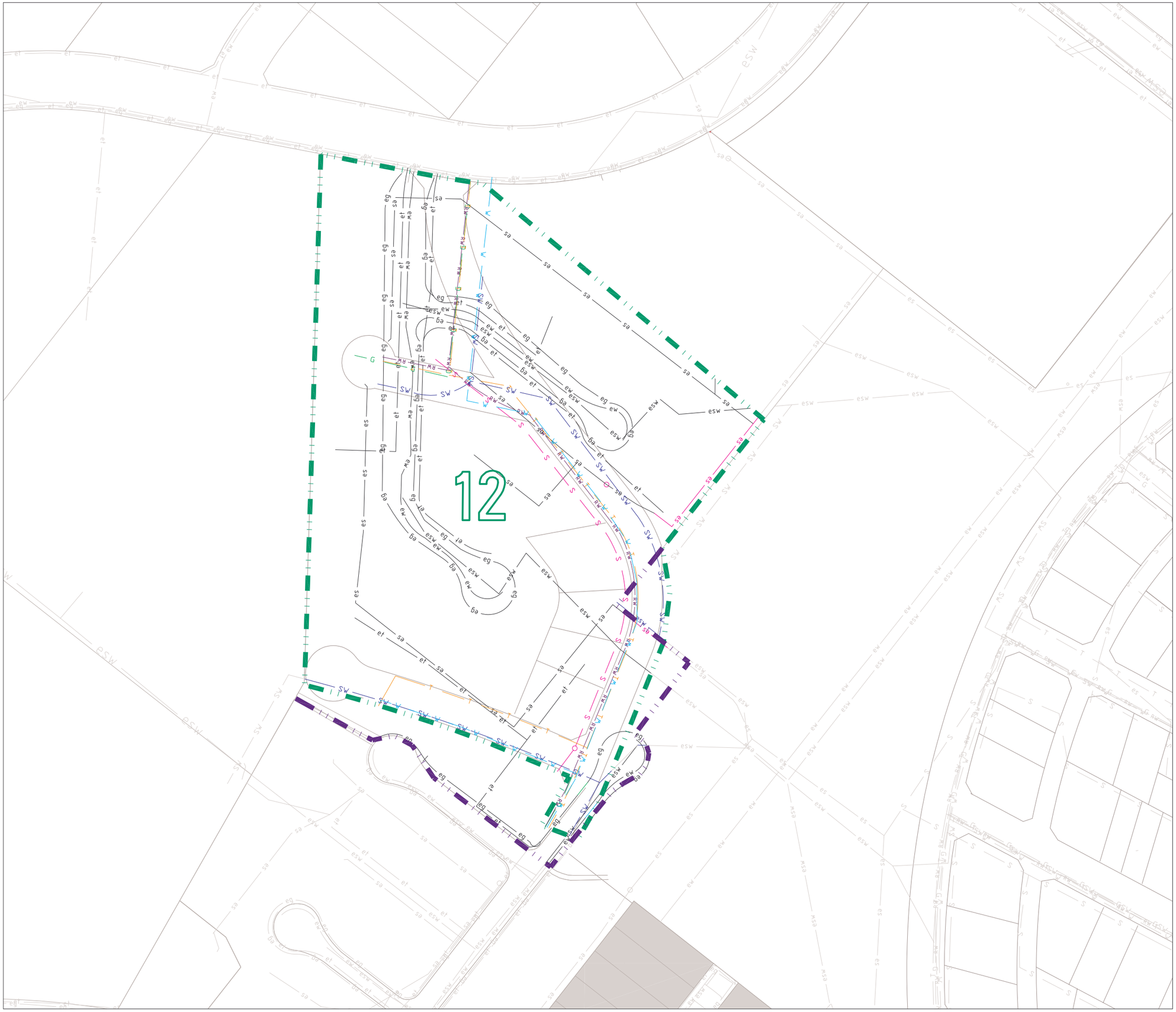
DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M19

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 12

DRAWING NO.
M20

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER
- euc — EXISTING UECOMM

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 13

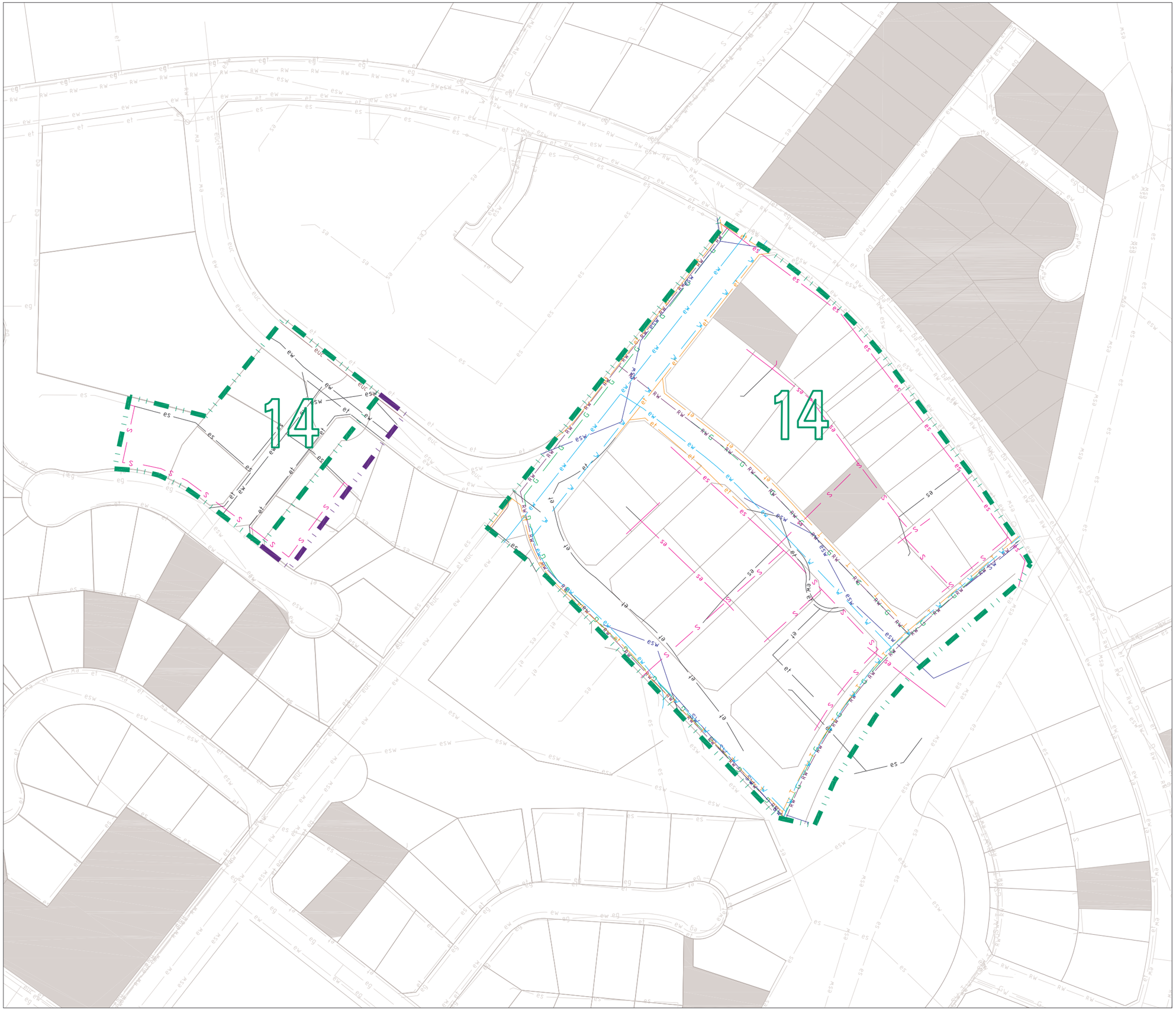
DATE
Aug 07

SCALE
1:2000
@ A3

DRAWING NO.
M21

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER
- euc — EXISTING UECOMM

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DATE
Aug 07

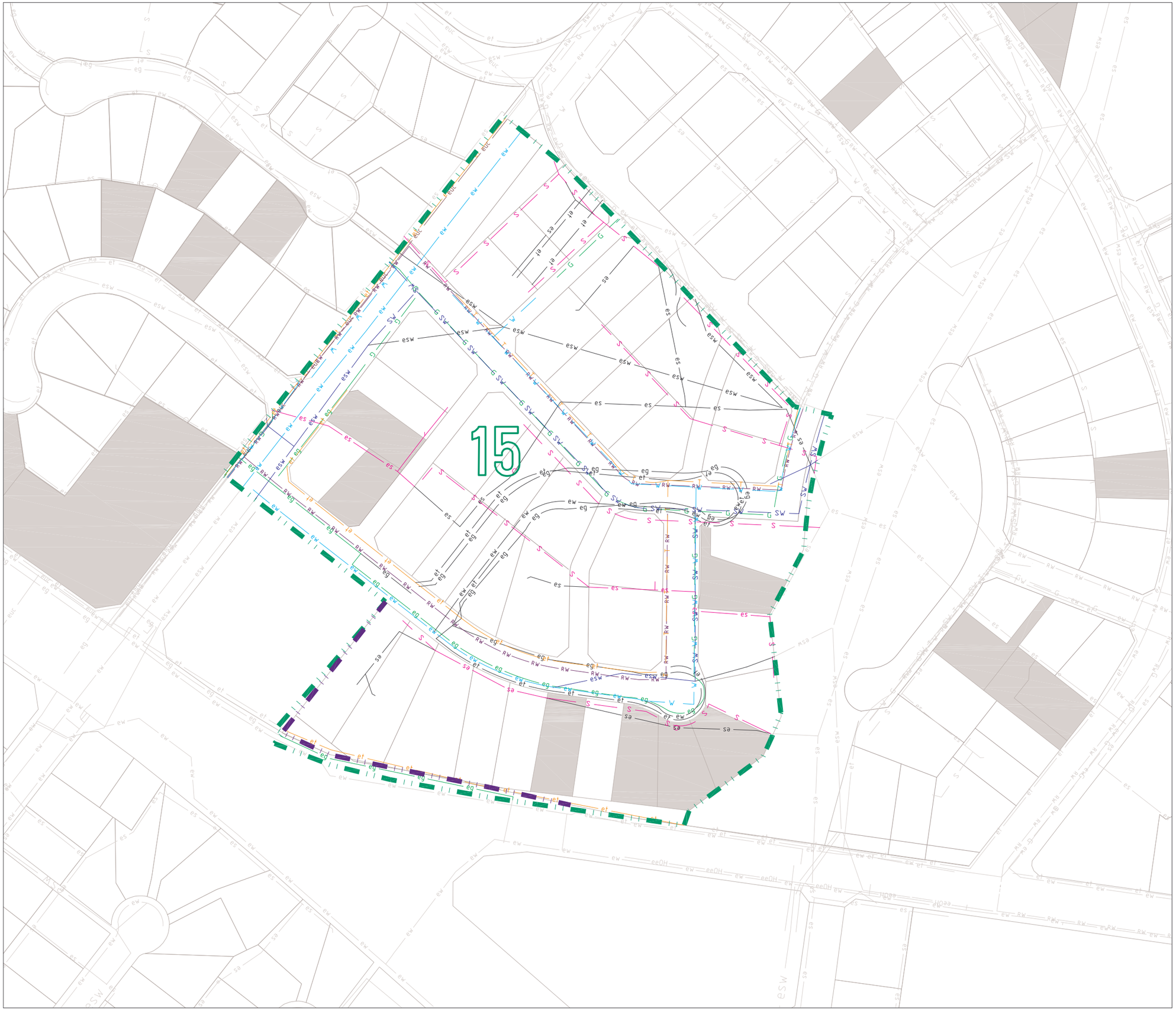
SCALE
1:1500
@ A3

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 14

DRAWING NO.
M22

REVISION
A

Infrastructure Engineering



bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER
- euc — EXISTING UECOMM

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan Staging Plan - Stage 15

DATE
Aug 07

SCALE
1:1500 @ A3

DRAWING NO.
M23

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER
- euc — EXISTING UECOMM

SCALE 1:1500
METRES
30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 16

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M24

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 17

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M25

REVISION
A

Infrastructure Engineering

bonnyrigg
PARTNERSHIPS

LEGEND

- STAGING BOUNDARY
- DEMOLITION STAGING BOUNDARY
- PRIVATE LOTS
- esw — EXISTING STORMWATER
- esw — EXISTING STORMWATER TO BE DEMOLISHED
- SW — PROPOSED STORMWATER
- es — EXISTING SEWER
- es — EXISTING SEWER TO BE DEMOLISHED
- S — PROPOSED SEWER
- ew — EXISTING WATER
- ew — EXISTING WATER TO BE DEMOLISHED
- W — PROPOSED WATER
- eg — EXISTING GAS
- eg — EXISTING GAS TO BE DEMOLISHED
- G — PROPOSED GAS
- et — EXISTING TELECOMS
- et — EXISTING TELECOMS TO BE DEMOLISHED
- T — PROPOSED TELECOMS
- eeUG — EXISTING UNDERGROUND ELECTRICITY
- eeUG — EXISTING UNDERGROUND ELECTRICITY TO BE DEMOLISHED
- E — PROPOSED UNDERGROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY
- eeOH — EXISTING ABOVE GROUND ELECTRICITY TO BE DEMOLISHED
- RW — RW — PROPOSED RECYCLED WATER

SCALE 1:1500
METRES

30 15 0 30
22.5 7.5

Bonnyrigg Living Communities Project

DRAWING TITLE + DESCRIPTION
Masterplan
Staging Plan - Stage 18

DATE
Aug 07

SCALE
1:1500
@ A3

DRAWING NO.
M26

REVISION
A

Infrastructure Engineering

APPENDIX B

SWC FEASIBILITY LETTER

e-Developer

VIEW REQUIREMENTS

CASE INFORMATION	
Case Number	**109743**
WSC's Reference	**Bonnyrigg**
Application Type	**Feasibility**
Development Type	**Multi Unit**
Development Location	**Edensor Road, Bonnyrigg**
WSC Personnel Name	**Christopher Randall**
WSC Company Name	**Hughes Trueman Pty Ltd (Prov S2)**
Developer's Name	**Bonnyrigg Partnerships**
Stage Name	**Masterplan**
Stage Number	**1**
Define DSR Responsible	**Ann Powell**

VIEW REQUIREMENTS	
View Notice/Letter	View

Modifications to the Draft Notice of Requirements:

NEGOTIATE REQUIREMENTS	
Do you agree with the requirements specified in this notice?	(•) Yes ( ) No

This advice is provided as a guide only, is current at the date of issue and may be subject to change.

Sydney WATER

Case Number: 109743

10 January 2008

Bonnyrigg Partnerships
c/- Hughes Trueman P/L (Parramatta)

FEASIBILITY LETTER

Developer:	**Bonnyrigg Partnerships**
Your reference:	**Bonnyrigg**
Development:	**Edensor and Bonnyrigg Roads and Elizabeth Drive Bonnyrigg**
Development Description:	**Urban Re-development of an Existing Brownfield Department of Housing Area (Overall Site)**
Your application date:	**06 November 2007**

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (Coordinator).

Sydney Water will then send you either a:
- Notice of Requirements (Notice) and Works Agreement (Agreement); or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

1. Developer Charges

(a) Adjustment of charges due to the Consumer Price Index (CPI);

(b) Adjustment of charges because of a scheduled review by the Independent Pricing and Review Tribunal (IPART). After that review and registration of the new charges, Sydney Water has to apply those charges; or

(c) If there is rezoning of any land within the development proposal then new charges will apply.

2. Reticulation Recovery Charges

These charges recover part of the cost of works that have been paid for by Sydney Water or other developers and that benefit your development. This charge has been made before your points of connection have been determined. If your completed designs show that your development will be connected to other main/s, the charge may be changed and/or you may need to construct other works.

3. Changing the Proposed Development

If you change your proposed development, e.g. the development description or the plan/site layout, after today, the requirements in this Letter could change when you submit your new application.

Also, if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

You have made an application for specific information. Sydney Water's possible requirements are:

What You Must Do To Get A Section 73 Certificate

To get a Section 73 Certificate you must do the following things. You can also find out about this process by visiting www.sydneywater.com.au ➢ Building Developing and Plumbing ➢ Developing Your Land.

1. Obtain Development Consent from the consent authority for your development proposal.

As this is to be a staged Subdivision **(18 Stages)** you must make separate applications for Section 73 Certificates for each of the development consents issued.

2. Engage a Water Servicing Coordinator (Coordinator).

You must engage your current or another authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development. Before you engage another Coordinator you must write and tell Sydney Water.

For a list of authorised Coordinators, either visit www.sydneywater.com.au ➢ Building Developing and Plumbing ➢ Developing Your Land or call **13 20 92.**

The Coordinator will be your point of contact with Sydney Water. They can answer most questions that you might have about the process and developer charges and can give you a quote or information about costs for services/works (including Sydney Water costs).

3. Water and Sewer Works

3.1 Water

A number of water main extensions must be constructed to provide for all future 18 proposed stages of this development.

Each lot in each stage of your development must have a frontage to a water main that is the right size and can be used for connection.

Sydney Water has no objection to the proposed disuse of water mains as identified on submitted plans in your application.

These works of water reticulation are to be carried out in accordance with the Water Supply Code of Australia (Sydney Water Edition). The developer must submit a detailed design for the construction of the new water mains & provide details of how the new water mains will be constructed while maintaining supply to Sydney Water's customers via the existing water mains.

The existing water system has sufficient capacity to serve the proposed **18 Stages** of this development.

3.2 Sewer

A number of sewer main extensions must be constructed in order to provide for 18 proposed stages of this development.

Each lot in each stage of your development must have a sewer main that is the right size and can be used for connection. That sewer must also have a connection point within each lot's boundaries.

Sydney Water has no objection to the proposed disuse of sewer mains as identified on submitted plans in your application provided that the following requirements are met:

a) The existing sewer connections are maintained and connected to the new sewer mains as per Sewer Supply Code of Australia (Sydney Water Edition).

b) Disused sewer mains must be broken out (not sand-filled) and removed from the site.

These sewer reticulation works must also be carried out in accordance with the Sewer Supply Code of Australia (Sydney Water Edition).

The existing sewer system has sufficient capacity to serve the proposed **18 Stages** of this development.

4. DSP Charges.

Due to the varying development types and densities associated with the various stages in this development DSP Charges cannot be accurately calculated for each stage until a application for each of the stage of this development has been lodged.

The Water DSP area is Liverpool and the Sewer DSP area is SPS 384.

5. Recycled Water

Sydney Water will not comment fully on the proposed use of private recycled water systems in conjunction with this development until full details are submitted for further investigation and it's impact on Sydney Water's existing systems. The comments below have been issued on a general basis:

- Any works associated with the recycled water system for this development should be in accordance with the Water Supply Code of Australia (Sydney Water Edition) and relevant Plumbing Codes.
- The pressure in Sydney Water's potable water system should be greater than the pressure in the proposed private recycled water system to help prevent contamination of the potable water supply should there be a cross connection.
- If Sydney Water ends up owning the potable water and a third party owns the proposed private recycled water system then Sydney Water may require additional checks to our potable water to confirm cross connections between potable water and recycled water do not occur within each property. Please note within the Rouse Hill Development Area where Sydney Water owns both the recycled and potable water systems we carry out additional checks.

Finally as this development proposal is located a substantial distance away from any existing recycled water scheme (i.e. Hoxton Park seems nearest) it is not clear where the developer proposes to source their recycled water from.

APPENDIX C

EASTERN CATCHMENT OSD CONCEPT AND COSTING

HughesTrueman

HUGHES TRUEMAN PTY LTD
AS TRUSTEE FOR HTL REINHOLD TRUST

ABN 53 831 529 091
QUALITY CERTIFIED AS 9001

www.hughestrueman.com.au

LEVEL 3, 90 PHILLIP STREET,
PO BOX 163
PARRAMATTA NSW 2124
AUSTRALIA

T 02 9891 5044
F 02 9891 5386

parramatta@hughestrueman.com.au

9th May 2008

Nilmini De Silva
Natural Systems Manager
86 Avoca Rd, Wakeley 2176
PO Box 21 Fairfield NSW 1860
Facsimile: (02) 9609 3257

Attention: Nilmini De Silva

Dear Ms De Silva,

RE: BONNYRIGG EASTERN CATCHMENT OSD

The 'eastern catchment' of the development site drains to Green Valley Creek. Due to the topography within the eastern catchment there limited opportunities for a single on-site detention basin within the site boundaries. We also understand from discussions with Council that the Green Valley Creek system is not adversely affected by flooding.

For these reasons, it was discussed and agreed upon with Council that Bonnyrigg Partnerships would provide funding for the Green Valley Creek catchment via the Voluntary Planning Agreement (VPA). The target of this funding would be negotiated and agreed upon with Council and Bonnyrigg Partnerships at the time of the Stage 3 DA submission. It was agreed that the funding could be used for either water quantity (flood retardation) works or water quality improvement schemes, depending on the needs of the system at the time of the Stage 3 DA. It was also agreed that, to determine the amount of funding to be provided, we would perform a basic concept design and costing of an upgrade of the existing detention basin in Chisholm Park.

It has been calculated via RAFTS modelling that the eastern Bonnyrigg catchment would require approximately 1000m^3 detention storage to site discharges to those in the pre-developed scenario (refer Water Cycle Report for modelling and details). In order to account for the fact that the Chisolm Park basin is 'on line' we have assumed for the purposes of this costing that an increase of 2000m^3 storage may be required for flows contributed by the eastern catchment. Based on visual site inspection and analysis of satellite imagery, we estimate that the basin has a perimeter length of approximately 540m with a surface area of 18,000m^2. In order to gain 2,000m^3 storage capacity the existing perimeter would therefore need to be increased by 0.11m (say 0.15m). The following associated works be required to complete the basin works;

- Demolish existing culvert/outlet;
- Cut topsoil and stockpile;
- Provide additional fill to raise perimeter bund;
- Construct outlet headwalls, culvert and scour protection; and
- Respread topsoil and lay turf.

The following table shows the breakdown of costs associated with the upgrade of the detention basin located at Chisholm Park.

INFRASTRUCTURE COST BREAKDOWN

DESCRIPTION	Unit	$/Unit	Quantity	Total
1.0 GENERAL				
Site establishment, amenities, etc.	item	$8,000	1.0	$8,000
Survey set-out and as built documentation	item	$3,000	1.0	$3,000
Site security	item	$5,000	1.0	$5,000
SUBTOTAL				**$16,000**
2.0 CIVIL DEMOLITION				
Removal of existing culvert	m^2	$40	475	$19,000
SUBTOTAL				**$19,000**
3.0 EROSION AND SEDIMENT CONTROL				
Sediment trapping and redirecting overland flows	item	$5,000	1	$5,000
Entry gates and signs	each	$700	1	$700
Truck wash facilities	item	$3,000	1	$3,000
Dust control (assume 1 water tank @ 10 days use)	day	$400	10	$4,000
SUBTOTAL				**$12,700**
4.0 EARTHWORKS				
Cut topsoil to stockpile on site 0.1m deep	m^2	$1.00	540	$540
Import place and compact Fill Material (additional 0.15m high bunding 1m wide x 540m long)	m^3	$40	81	$3,240
Respread topsoil on site from stockpile	m^2	$1.00	540	$540
Turfs, laid, rolled and watered for 2 weeks: 400mm wide roll	m^2	$10	540	$5,400
SUBTOTAL				**$9,720**
Construction of inlet/outlet headwalls	each	$7,500	2	$15,000
Construction of culvert (3 cells wide x 15m long)	m	$2,000	45	$90,000
Installation of scour protection to outlet	m^2	$90	105	$9,450
SUBTOTAL				**$114,450**
TOTAL				**$171,870**

It is therefore proposed that the VPA include an allowance for water quantity, or quality works for the Green Valley Creek catchment in the amount of $171,870.

Yours faithfully

HUGHES TRUEMAN

CHRIS AVIS
Associate Director

Our Ref: 06P310


HEADWALL AND CULVERT TO BE UPGRADED
120 m
150 m
BUND TO BE LIFTED 200mm