

APPENDIX F

Helicopter Landing Study

Please note this report is provided as information only



REHBEIN AIRPORT CONSULTING

DATE 14 MARCH, 2013

CONTACT MICHAEL WARD

**Kempsey District Hospital - Stage 1 Aeronautical Assessment
For Health Infrastructure**

TABLE OF CONTENTS

| | | |
|-----|---|---|
| 1.0 | INTRODUCTION | 1 |
| 2.0 | EXISTING HLS | 2 |
| 3.0 | PROPOSED STAGE 1 BUILDING AND MEDICAL GASES | 3 |
| 4.0 | APPLICABLE STANDARDS | 4 |
| 4.1 | PHYSICAL CHARACTERISTICS | 4 |
| 4.2 | OBSTACLE RESTRICTIONS | 5 |
| 4.3 | FLIGHT PATHS | 6 |
| 5.0 | HAZARD ASSESSMENT | 7 |
| 6.0 | CONCLUSIONS AND RECOMMENDATIONS | 8 |

APPENDIX A

SUPPLIED DATA

APPENDIX B

ASNSW CORRESPONDENCE

APPENDIX C

FIGURES

APPENDIX D

HLS UPGRADE WORKS INDICATIVE COSTS

Document Control Page

| Revision | Date | Description | Author | Signature | Verifier | Signature | Approver | Signature |
|----------|----------|-------------|--------|-----------|----------|-----------|----------|-----------|
| 0 | 31/10/12 | DRAFT | MMW | | MCW | | BJH | |
| 1 | 05/11/12 | DRAFT | MMW | | MCW | | BJH | |
| 2 | 09/11/12 | DRAFT | MMW | | MCW | | BJH | |
| 3 | 15/01/13 | FINAL | MMW | | MCW | | BJH | |
| 4 | 14/03/13 | FINAL | MMW | | MCW | | BJH | |

1.0 INTRODUCTION

REHBEIN Airport Consulting was commissioned by Enstruct Group Pty Ltd (Enstruct) to assess the impact a proposed new building associated with Stage 1 of the Kempsey District Hospital (KDH) Redevelopment will have on the existing Helicopter Landing Site (HLS).

Additionally, the relocation of the demountable Drug and Alcohol Rehabilitation Buildings to the east of the existing Community Health Building and a generator, substation, and compounds for the storage of LPG and medical gases adjacent to a realigned and expanded access road with parking proposed to the south of the existing HLS have been considered as part of this assessment.

This assessment is based on the following information provided directly to REHBEIN Airport Consulting by Project Architects BVN Architecture and included at **Appendix A**.

- Drawing 5027-BVN-AR-DWG-1A1-X06, Issue 6, Site Plan – Proposed; and
- Drawing 04564DET09.VCD, Revision D dated 28/02/2013 - Detailed Site Survey, Sheets 1 to 8.

A site visit was conducted by Michael Ward of REHBEIN Airport Consulting on 18 October 2012 with Ryan Thompson (the KDH Assistant Engineer), and Tim Boulton and Jan Blaha of Enstruct. Additionally, as primary users of the KDH HLS, the Ambulance Service of New South Wales (ASNSW) was consulted and copies of correspondence are included at **Appendix B**.

2.0 EXISTING HLS

Kempsey District Hospital is located approximately 2km north west of Kempsey CBD, NSW on River Street.

The existing HLS is located on the eastern side of the hospital campus. The existing HLS consists of a sealed surface approximately 9m x 9m, which is shown in Figure 1 included at Appendix C.

There is a small shed approximately 20m to the south west for the storage of 2-3 fuel barrels and a pump as shown in Figure 2 included at Appendix C.

There are a number of large obstacles in the area around the existing HLS. Directly to the north of the HLS is the Community Health Building, a section of which is multi-storey and shown in Figure 3 included at Appendix C. To the west is a large tree, miscellaneous small buildings/sheds, a large water tower, and the old workshops and laundry building which are shown in Figure 4 included at Appendix C. South of the HLS is relatively clear to the hospital boundary where there are some large trees as shown in Figure 5 included at Appendix C. To the east are a few tall trees, residences (at a lower elevation than the HLS) and several tall power poles along Tozer Street as shown in Figure 6 included at Appendix C. The elevation of the HLS is approximately RL 24.29m. The ground slopes down towards the south east.

Discussions with the KDH Assistant Engineer suggest pilots approach and depart from the south east and north west.

KDH advised that helicopter movement number records are unavailable. We understand that there are approximately 2 movements a month and all helicopter movements are retrievals.

The Medical Retrieval Unit (MRU) of State Wide Services is responsible for tasking of all NSW Helicopter Emergency Medical Service (HEMS) operations. HEMS users are contracted to Ambulance Service of New South Wales (ASNSW) under the direction of the MRU. The helicopter types may include the August AW139, the Eurocopter EC145, Bell 412EP and Bell 412SP, and the Kawasaki BK-117B-2. Most frequent use is likely to involve the Hunter Region Lifesaver HEMS Bell 412EP. However, the design helicopter for the HLS physical dimensions is the AW139. This type of helicopter reflects the new generation helicopters used in HEMS with the maximum weight and contact load and minimum contact area. The AW139 overall length and rotor diameter are similar to the Bell 412 which has typically been the largest HEMS helicopter in operation.

3.0 PROPOSED STAGE 1 BUILDING AND MEDICAL GASES

The proposed new Stage 1 Building (S1B) will be to the west of the existing HLS and replace the large tree, miscellaneous small buildings/sheds, large water tower, and old workshops and laundry building shown in Figure 3 and Figure 4 included at Appendix C. The location of the S1B relative to the existing HLS is shown in Figure 7 included at Appendix C.

The S1B will be relatively rectangular with its length running from north to south. The S1B will consist of four (4) levels above ground (indicatively shown in Figure 8) and reach a maximum height of 46.18m AHD.

Figure 8 – 3D layout of proposed S1B



A generator, substation, additional car parking, and compounds for the storage of LPG and medical gases are proposed to be constructed to the south of the existing HLS adjacent to a relocated and expanded access road as shown in Figure 7 included at Appendix C.

4.0 APPLICABLE STANDARDS

The State Government of New South Wales Department of Health has developed NSW Health Policy Directive PD2005_128 (25 January 2005) incorporating Circular 98/61 *Guidelines for Medical Helipads*. At present it is a requirement of NSW Health for hospital HLS in NSW to comply with criteria within this document. However, this document is set to be superseded by a more comprehensive set of guidelines being developed by NSW Health for the planning, design, operation and management of Department of Health HLS which is currently in draft form. The new guidelines are outlined in the Draft Policy Directive NSW Health Department Guidelines for Hospital Helicopter Landing Sites in NSW, version 6a (draft NSW guidelines)

The physical characteristics of the existing HLS appear to comply with the existing NSW Health Policy Directive PD2005_128. However, as meeting the criteria in the draft NSW guidelines will be a requirement of NSW Health when they are finalized, the draft NSW guidelines criteria for physical dimensions and obstacle restriction have been used as the primary guidance material for assessment purposes.

4.1 PHYSICAL CHARACTERISTICS

Elements of a surface level hospital HLS and minimum required dimensions based on the draft NSW Guidelines are described in the following sections.

4.1.1 GEA/TLOF

The Ground Effect Area (GEA) or Touchdown and Lift-off Area (TLOF) is a load bearing generally sealed surface capable of supporting the dynamic loads of the helicopters intended to use the HLS and providing ground effect. Additionally, the GEA/TLOF should provide a firm smooth working surface for hospital personnel and the wheeled equipment used for moving patients on gurneys. The draft NSW guidelines state the minimum dimension of the GEA/TLOF is 14m diameter or square.

4.1.2 LLA

The Landing and Lift-off Area (LLA) is a load bearing generally sealed surface normally centred within the GEA/TLOF on which helicopters land and lift-off. The draft NSW guidelines state the minimum dimensions of the LLA are determined as 6.35m diameter or 6.35m x 6.35m square. The NSW Health Policy Directive PD2005_128 standard for an LLA is a hard stand surface with minimum dimension of 9m diameter or square, which is what is currently in place.

4.1.3 FATO

The Final Approach and Take-off Area (FATO) is a load bearing generally sealed surface that contains the GEA/TLOF and is the area on which arriving helicopters terminate their approach and from where departing helicopters take-off. The draft NSW guidelines state the minimum dimension of the FATO is 25m diameter or square.

4.1.4 SAFETY AREA

The Safety Area is an area required around the FATO which is to be free of all obstacles and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO. The draft NSW guidelines state the minimum dimension of the Safety Area is 4m around the FATO or 33m diameter or square.

4.2 OBSTACLE RESTRICTIONS

In addition to the provision of physical facilities for the helipad, flight path envelopes that are clear of obstacles need to be provided. These are referred to as Obstacle Limitation Surfaces (OLS) and are based around the proposed flight path centre line.

The OLS consist of several sections each with differing requirements in terms of horizontal and vertical geometry.

4.2.1 APPROACH AND DEPARTURE SURFACES

The approach and departure surfaces provide sufficient airspace clear of hazards for the safe approach and departure of helicopters from a HLS.

For a non-instrument FATO such as that at KDH an Approach and Departure Surface starts at the edge of the FATO and slopes upwards for a distance of 1,219m to a height of 152m above the elevation of the HLS. The surface also diverges away from the flight path centreline to a width of 152m. The maximum slope identified in the draft NSW guidelines for the approach and departure surface is 7.5° (8:1). However, although it is not mandatory and it is understood that it may be difficult to achieve, a HLS operator should aim to provide an approach and departure surface slope of 2.5° (22:1) to protect helicopters with the lowest performance.

4.2.2 TRANSITIONAL SURFACES

In addition to the approach and departure surfaces the draft NSW guidelines allow for transitional surfaces. Transitional surfaces start from the edge of the FATO parallel to the flight path centre line and from the outer edges of the approach and departure surfaces and extend outwards at a slope of 2:1 for a distance of 62.5m from the edge of the FATO.

However, the transitional surfaces can be overlooked if lateral extensions of the approach and departure surface on each side are provided for a distance of 610m. For assessment purposes lateral extensions have been applied.

4.2.3 OBJECT IDENTIFICATION SURFACES

The draft NSW guidelines also allow for an Object Identification Surface (OIS) within which the marking and lighting of obstacles is recommended. The OIS starts at the Safety Area perimeter and extends outwards horizontally in all directions for 30m except under the approach and departure surface. Under the approach and departure surface the OIS starts from the edge of the FATO and extends horizontally out for a distance of 250m. From this point the OIS extends

outwards for an additional distance of 1,000m while sloping upwards at 8:1. The width of the OIS increases from 30m to 60m either side of the approach and departure surface at the upper end.

4.3 FLIGHT PATHS

The draft NSW guidelines recommend that a surface level HLS has at least two flight paths separated by not less than 150 degrees and that flight paths should be oriented such that the usability factor is 95% for the helicopters the HLS is intended to serve.

5.0 HAZARD ASSESSMENT

The proposed S1B will infringe the obstacle limitation surfaces for western flight paths. However, with consideration of the existing obstacles to the west of the HLS including the water tower, development of the S1B is considered to improve the existing obstacle situation to the west as it is a more conspicuous and uniform structure.

The proposed S1B will be located within the OIS and obstacle lighting is required on the corners to outline the shape of the building and on the highest point in accordance with the draft NSW guidelines. Obstacle lighting is also required on the existing Community Health building which is also within the OIS. The existing hospital buildings on the western part of the campus are shielded from the S1B and are outside the OIS and do not require obstacle lighting.

With regard to obstacle avoidance, preliminary assessment suggests helicopters could approach and depart from the north east and south east between 040° - 160° as illustrated in Figure 7 included at Appendix C. This represents a 120° sector available for flight paths.

Allowance has been made in the S1B construction works to relocate the high voltage pole closest to the HLS shown in Figure 6 included at Appendix C.

The southern end of the relocated demountable Drug and Alcohol Rehabilitation Buildings to the east of the existing Community Health Building will infringe the OLS for the 120° sector by approximately 2.0m and will require obstacle lighting in accordance with the draft NSW guidelines.

Analysis of historical wind data has been conducted to assess the sector's usability. The wind data was obtained from the Bureau of Meteorology records for Kempsey (Wide Street) for the period 01 January 1990 to 30 April 2011. A 10 knot crosswind and 0 knot tailwind limit was selected for assessment purposes based on the helicopter types that use the HLS and is considered conservative. The usability for the 040° - 160° sector was calculated to be approximately 61.8%. This is less than the minimum usability of 95% recommended by the draft NSW guidelines and ASNSW has advised this may result in occasions when the HLS is not usable.

The proposed generator compound, substation compound, LPG compound, medical gas compound, and car parking adjacent to the relocated and expanded access road are within the 040° - 160° sector as shown in Figure 7 included at Appendix C. These facilities do not penetrate the OLS but are within the OIS. However, marking and lighting of these facilities is considered not to be required. It should be noted that cars parked in the proposed car parks may be struck by debris as a result of rotor downwash during a helicopter operation.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The number of obstacles in the vicinity of the existing HLS combined with out of date HLS facilities makes the existing HLS sufficiently hazardous to recommend immediate consideration of HLS upgrade works even without the Stage 1 redevelopment.

However, the findings of this assessment and consultation with ASNSW conclude the existing HLS does not need to be relocated as a result of the new Stage 1 building and other nearby development provided the physical characteristics of the existing HLS are upgraded as follows to comply with the draft NSW guidelines.

- Increase the load bearing sealed area to 33m diameter for compliance with the draft NSW guidelines;
- Upgrade the HLS paint markings for compliance with the draft NSW guidelines;
- Install Night Vision Goggle (NVG) compatible GEA/TLOF and FATO edge lighting for compliance with the draft NSW guidelines;
- Install Night Vision Goggle (NVG) compatible preferred flight path lighting for compliance with the draft NSW guidelines;
- Install manually activated flood lighting that suitably illuminates the HLS and walkway; and
- Install a new illuminated wind indicator.

Preliminary indicative costs for the upgrade works are provided at Appendix D.

The assessment has drawn the following additional conclusions and recommendations:

- The proposed S1B will require obstacle lighting as described in the draft NSW guidelines on the corners to outline the shape of the building and on the highest point which meet illumination characteristic criteria outlined in the Civil Aviation Safety Authority Manual of Standards Part 139 – Aerodromes (CASA MOS Part 139);
- Obstacle lighting is required on the ridgeline of the existing Community Health Building in accordance with the CASA MOS Part 139;
- The existing trees to the east of the Community Health Building on the site of the proposed relocated Drug and Alcohol Rehabilitation Buildings and shown in the background of Figure 1 included at Appendix C are recommended for removal or lopping. It is understood that allowance for removal of these trees has been made in the planning of these redevelopment works;
- The existing tree to the east of the HLS, adjacent to Tozer Street and shown in Figure 6 included at Appendix C is recommended for removal or lopping. It is understood that allowance for removal of this tree has been made in the planning of these redevelopment works;

- The high voltage pole to the east of the HLS shown in Figure 6 included at Appendix C is a significant hazard and is recommended to be relocated. It is understood that allowance for removal of this tree has been made in the planning of these redevelopment works; and
- Wire markers are recommended on the electricity wires on the east side of Tozer Street shown in Figure 6 included at Appendix C to make them conspicuous to pilots.

APPENDIX A

SUPPLIED DATA

IMPORTANT NOTICE REGARDING SERVICE DETAILS

1. VISUAL EVIDENCE IS SHOWN TO SURVEY ACCURACY.
2. INVERTS AND DIAMETERS ARE SHOWN WHERE REASONABLE ACCESS WAS OBTAINED.
3. DIRECTION OF SERVICES SHOWN HAVE BEEN DERIVED FROM VISUAL EVIDENCE OR SERVICE AUTHORITY DRAWINGS & WITH THE ASSISTANCE OF A SPECIALIST LOCATOR.
4. SERVICE DETAILS MUST BE CONFIRMED WITH THE RELEVANT SERVICE AUTHORITIES. THE PRESENCE OF SERVICES IS SHOWN BY AN INDICATIVE LINE WHICH DOES NOT IN ANY WAY REPRESENT THE NUMBER OR NATURE OF PIPES, CONDUITS ETC THAT MAY BE PART OF THE SERVICE.
5. NO EXCAVATION, POT-HOLING OR PROBING PICKUP HAS BEEN UNDERTAKEN.

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"THIS DETAIL SURVEY IS NOT A 'SURVEY' AS DEFINED BY THE SURVEYING & SPATIAL INFORMATION ACT, 2002. IN CONJUNCTION WITH THIS DETAIL SURVEY, THE BOUNDARIES HAVE BEEN MEASURED & MARKED PURSUANT TO SURVEY & SPATIAL INFORMATION REGULATION 2006. DIMENSIONS ARE SUBJECT TO REGISTRATION OF (IPP) DP 1181981 THERE ARE NO EASMENTS ON TITLE.

IMPORTANT NOTE: THE SURVEY NOW INCLUDES LAND ON THE WESTERN SIDE OF RIVER STREET BEING LOT 1 DP 1181981. THIS LAND IS NOT INCLUDED IN DP 1181981. THE BOUNDARY AT THE MACLEAY RIVER IS A NATURAL BOUNDARY BEING THE MEAN HIGH WATER MARK. AN APPROXIMATE PLOT HAS BEEN PROVIDED ONLY.

ORIGIN OF LEVELS & COORDINATES
PM 25996
RL 26.519 AHD
462860.275 E
6502609.285 N
S.C.I.M.S.
MGA ORIENTATION

- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E OVER HEAD ELECTRICITY
- S SEWER LINE
- SW STORM WATER
- W WATER MAIN
- T TELSTRA LINE
- G GAS LINE
- C COMMUNICATIONS CABLE

SEWER MANHOLE SCHEDULE

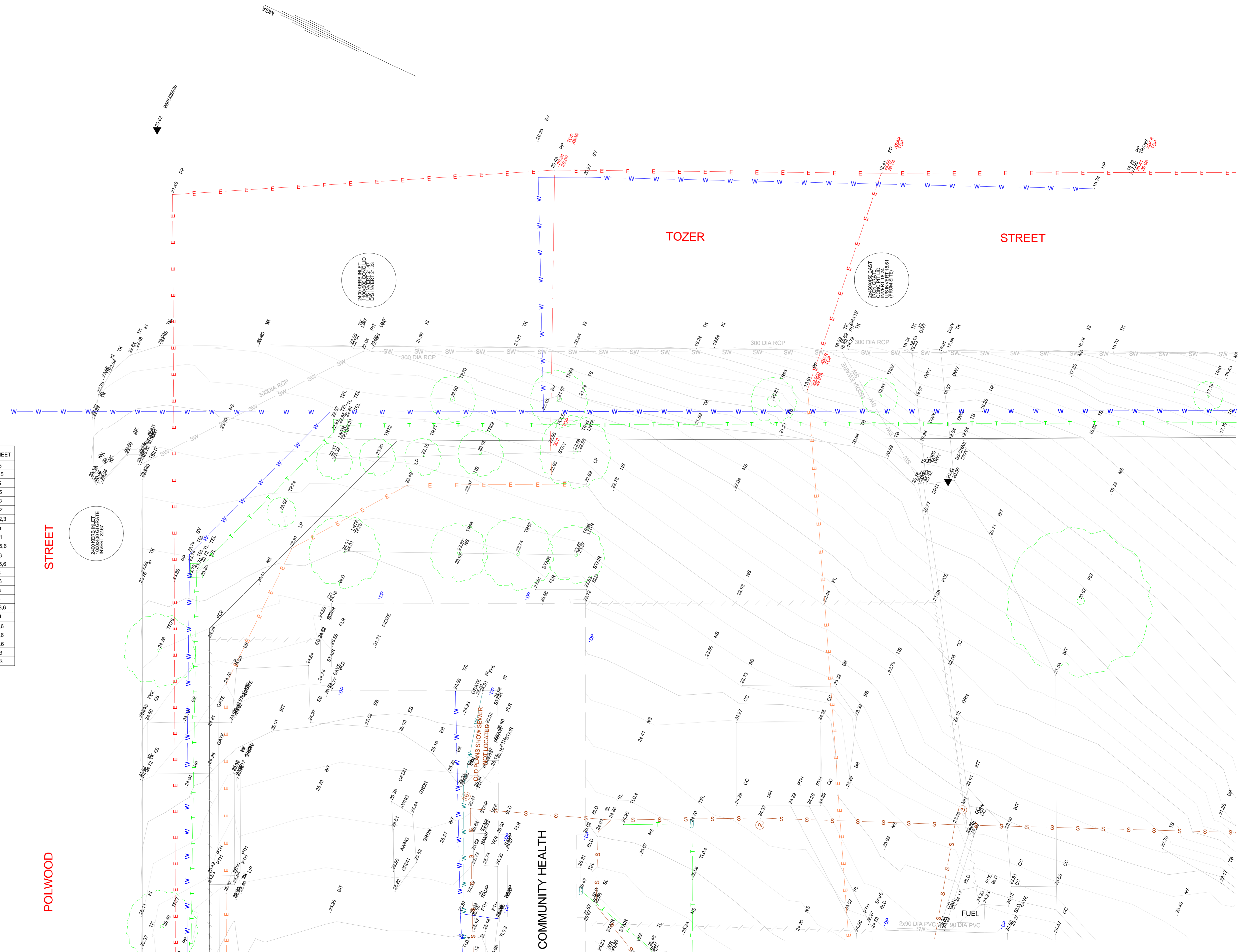
| No. | LINE | RL - AHD LID | INVERT/S | DETAIL | IMAGE | SHEET |
|-------|---------|--------------|-------------------------------|--------------------|-------|-------|
| 1 | - | 26.90 | 25.46 | 150 DIA PVC | x2 | 5 |
| 2 | - | 24.37 | 23.54 | 150 DIA | x2 | 4.5 |
| 3 | - | 23.55 | DROP 23.01 - 22.50 - 22.47 | 150 DIA | x2 | 5 |
| 4 | - | 26.99 | 26.215 - 26.205 - 26.20 | 150 DIA | x2 | 5 |
| 5 | - | 27.61 | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | 23.41 - 22.63 | 150 DIA | x2 | 2.3 |
| 8 | - | 28.49 | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | - | 150 DIA | x3 | 1 |
| 10 | - | 20.28 | 19.6 | 150 DIA | x2 | 5.6 |
| BK12A | - | 12.01 | 11.2 | 450 CAST | x1 | 6 |
| BK12 | - | 12.66 | 11.15 - 11.62 - 11.32 - 11.64 | 150 DIA IN 450 OUT | x1 | 5.6 |
| 13 | - | 20.86 | 20.125 | 150 DIA | x2 | 6 |
| 14 | - | 22.28 | 20.38 | 150 DIA | x1 | 6 |
| 15 | - | 22.62 | 20.98 | 150 DIA | x1 | 6 |
| 16 | - | 25.47 | 24.44 | 150 DIA | x1 | 4 |
| 17 | - | 22.71 | 21.07* | - | x2 | 3.6 |
| 18 | - | 22.79 | 21.81* | - | x2 | 3 |
| 19 | - | 24.04 | - | 150 DIA | x4 | 5.6 |
| MD1 | MD(KSC) | 13.83 | 12.895 - 12.865 | 150 DIA PVC IN | x2 | 3.6 |
| MD2 | MD(KSC) | 16.155 | 15.2 - 15.18 | 150 DIA PVC OUT | x2 | 3.6 |
| MD3 | MD(KSC) | 19.515 | 16.885 - 16.895 | 150 DIA | x2 | 3 |
| MD4 | MD(KSC) | 21.59 | 20.08 - 17.375 | 150 DIA | x4 | 3 |

* CONCRETE FLOOR PIPES ARE EARTHENWARE EXCEPT AS SHOWN

- CODES:
- TK = Top of Kerb
 - KI = Kerb Invert
 - LP = Lip of Kerb
 - PTH = Pathway
 - CC = Concrete
 - DWY = Driveway
 - EB = Edge of Bitumen
 - BIT = Bitumen
 - PP = Power Pole
 - LP = Light Pole
 - ELP = Electricity Pit
 - SLB = Electricity Sub Station
 - TEL = Telstra Pit
 - CCM = Communication Cable
 - PHBOX = Public Phone Box
 - FCE = Fence
 - NS = Natural Surface
 - TB = Top of Bank
 - BB = Bottom of Bank
 - TV = Top of Wall
 - BT = Bottom of Wall
 - GRN = Drain
 - SEPT = Septic Tank
 - MH = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PIT = Stormwater Pit
 - GRATE = Stormwater Grate
 - IN = Invert
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - QXY = Medical Oxygen
 - LID = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - ROG = Ridge Height
 - VER = Verandah
 - LNTR = Line of Trees
 - TR001 = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area

PL = Power Line *
RL = Fire Hydrant Line *
GL = Gas Line *
WL = Water Line *
SL = Sewer Line *
TL = Telstra Line *

* Indicates location of services identified at ground level



M.W.R. ROGERS & ASSOCIATES
URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT
MARK ROGERS
3472 Eshow Street, P.O. Box 5075, West Kempsey 2440
Phone (08) 652 4488 Fax (08) 652 4274
Email: mark.mrogers@rogers.com.au

| | |
|-------------------------|----------------|
| PTY LTD | L.G.A. KEMPSEY |
| SCALE: 1:200 (A1) | DATUM: AHD |
| DATE: 13/11/2012 | APPROVED: |
| JOB No.: 04564DET09.VCD | SHEET 1 OF 8 |

| | |
|---------------------------|------------|
| PLAN PURPOSE & AMENDMENTS | |
| No. | DATE |
| A | 27/11/2012 |
| B | 05/12/2012 |
| C | 20/12/2012 |
| D | 28/02/2013 |

PLAN OF LOTS 1-8 SEC 20A DP 759080 & LOT 20 DP 112084
RIVER, TOZER & POLWOOD STS
KEMPSEY
For: ENSTRUCT GROUP Pty Ltd

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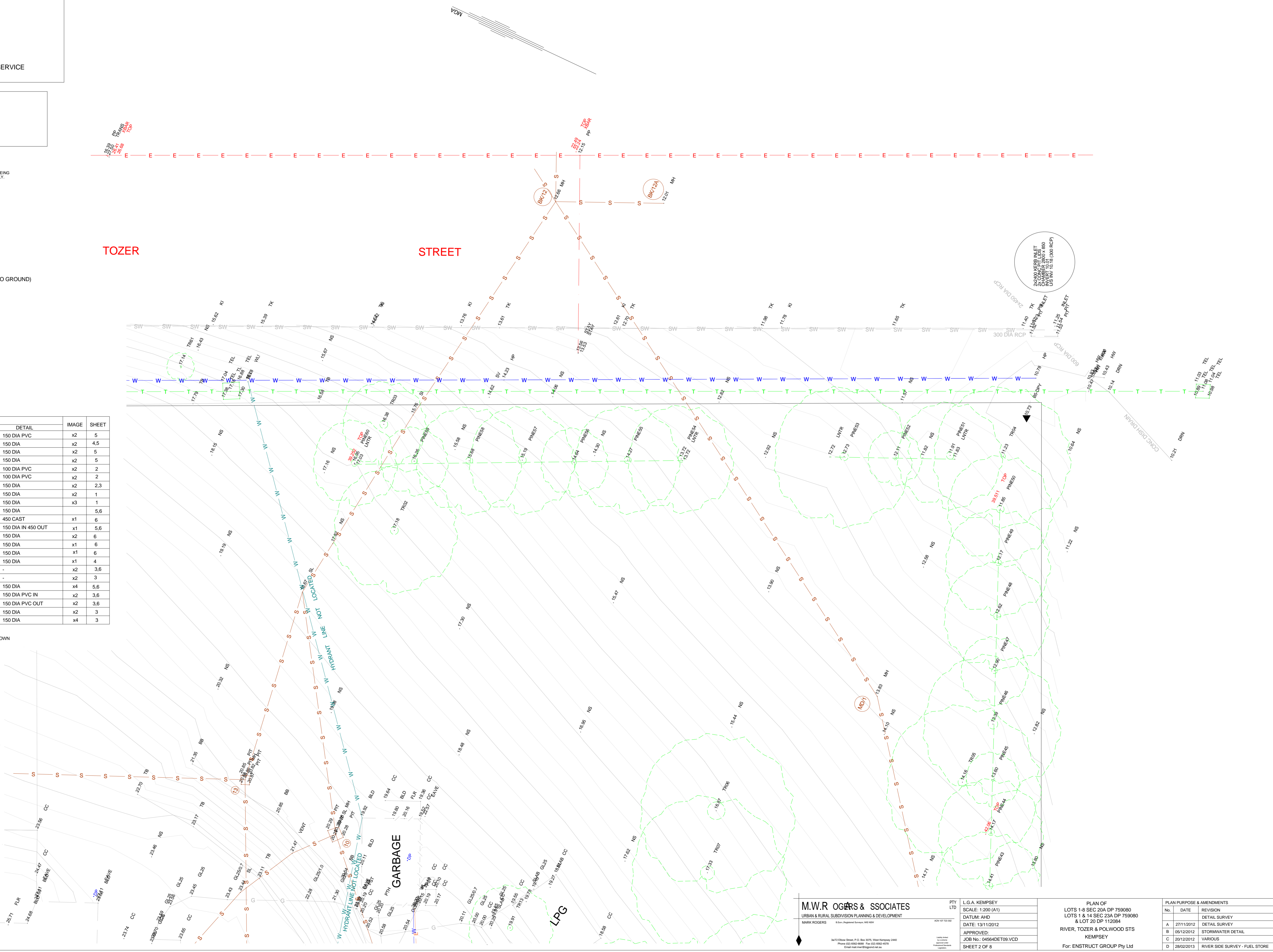
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 - ELP = Electricity Pit
 - SUB = Electricity Sub Station
 - TEL = Telstra Pit
 - CCM = Communication Cable
 - PHBOX = Public Phone Box
 - FCE = Fence
 - NS = Natural Surface
 - TB = Top of Bank
 - BB = Bottom of Bank
 - TW = Top of Wall
 - BB = Bottom of Wall
 - DRN = Drain
 - SEPT = Septic Tank
 - MH = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PIT = Stormwater Pit
 - GRATE = Stormwater Grate
 - INV = Invert
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - GOY = Medical Oxygen
 - LID = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - ROD = Ridge Height
 - VER = Verandah
 - LINTR = Line of Trees
 - TR00 = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area

* Indicates location of services identified at ground level



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URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT
MARK ROGERS 8 Sun Regentway, Suite 102, 1616
3472 Ebbw Street, P.O. Box 5075, West Kempsey 2448
Phone (08) 652-6488 Fax (08) 652-6278
Email mark.mrogers@rogers.net.au

| | |
|-------------------------|------------------|
| PTY LTD | L.G.A. KEMPSEY |
| SCALE: 1:200 (A1) | DATE: 13/11/2012 |
| DATE: 13/11/2012 | APPROVED: |
| JOB No.: 04564DET09.VCD | SHEET 2 OF 8 |

| | | |
|--|------------|--------------------------------|
| PLAN OF LOTS 1-8 SEC 20A DP 759080 & LOT 20 DP 112084 RIVER, TOZER & POLWOLD STS KEMPSEY For: ENSTRUCT GROUP Pty Ltd | | PLAN PURPOSE & AMENDMENTS |
| No. | DATE | REVISION |
| A | 27/11/2012 | DETAIL SURVEY |
| B | 05/12/2012 | STORMWATER DETAIL |
| C | 20/12/2012 | VARIOUS |
| D | 28/02/2013 | RIVER SIDE SURVEY - FUEL STORE |

IMPORTANT NOTICE REGARDING SERVICE DETAILS

1. VISUAL EVIDENCE IS SHOWN TO SURVEY ACCURACY.
2. INVERTS AND DIAMETERS ARE SHOWN WHERE REASONABLE ACCESS WAS OBTAINED.
3. DIRECTION OF SERVICES SHOWN HAVE BEEN DERIVED FROM VISUAL EVIDENCE OR SERVICE AUTHORITY DRAWINGS & WITH THE ASSISTANCE OF A SPECIALIST LOCATOR.
4. SERVICE DETAILS MUST BE CONFIRMED WITH THE RELEVANT SERVICE AUTHORITIES. THE PRESENCE OF SERVICES IS SHOWN BY AN INDICATIVE LINE WHICH DOES NOT IN ANY WAY REPRESENT THE NUMBER OR NATURE OF PIPES, CONDUITS ETC THAT MAY BE PART OF THE SERVICE.
5. NO EXCAVATION, POTHOLING OR PROBING PICKUP HAS BEEN UNDERTAKEN.

DIAL 1100 FOR DIAL BEFORE YOU DIG SERVICE
www.dialbeforeyoudig.com.au

"THIS DETAIL SURVEY IS NOT A 'SURVEY' AS DEFINED BY THE SURVEYING & SPATIAL INFORMATION ACT, 2002. IN CONJUNCTION WITH THIS DETAIL SURVEY, THE BOUNDARIES HAVE BEEN MEASURED & MARKED PURSUANT TO SURVEY & SPATIAL INFORMATION REGULATION 2006. DIMENSIONS ARE SUBJECT TO REGISTRATION OF (PPN) DP 1181981 THERE ARE NO EASMENTS ON TITLE.

IMPORTANT NOTE: THE SURVEY NOW INCLUDES LAND ON THE WESTERN SIDE OF RIVER STREET BEING LOT 15500. THIS LAND IS NOT INCLUDED IN DP 1181981. THE BOUNDARY AT THE MACLEAY RIVER IS A NATURAL BOUNDARY BEING THE MEAN HIGH WATER MARK. AN APPROXIMATE PLOT HAS BEEN PROVIDED ONLY.

ORIGIN OF LEVELS & COORDINATES
PM 25996
RL 26519 AHD
482860.275 E
6562009.285 N
S.C.I.M.S.
MGA ORIENTATION

- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E OVER HEAD ELECTRICITY
- S SEWER LINE
- SW STORM WATER
- W WATER MAIN
- T TELSTRA LINE
- G GAS LINE
- C COMMUNICATIONS CABLE

SEWER MANHOLE SCHEDULE

| No. | LINE | RL - AHD | LID | INVERTS | DETAIL | IMAGE | SHEET |
|-------|---------|----------|-----|-------------------------------|--------------------|-------|-------|
| 1 | - | 26.90 | | 25.46 | 150 DIA PVC | x2 | 5 |
| 2 | - | 24.37 | | 23.54 | 150 DIA | x2 | 4.5 |
| 3 | - | 23.55 | | DROP 23.01 - 22.50 - 22.47 | 150 DIA | x2 | 5 |
| 4 | - | 26.99 | | 26.215 - 26.205 - 26.20 | 150 DIA | x2 | 5 |
| 5 | - | 27.61 | | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | | 23.41 - 22.63 | 150 DIA | x2 | 2.3 |
| 8 | - | 28.49 | | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | | - | 150 DIA | x3 | 1 |
| 10 | - | 20.28 | | 19.6 | 150 DIA | x1 | 5.6 |
| BK12A | - | 12.01 | | 11.2 | 450 CAST | x1 | 6 |
| BK12 | - | 12.66 | | 11.15 - 11.62 - 11.32 - 11.64 | 150 DIA IN 450 OUT | x1 | 6 |
| 13 | - | 20.86 | | 20.125 | 150 DIA | x2 | 6 |
| 14 | - | 22.28 | | 20.38 | 150 DIA | x1 | 6 |
| 15 | - | 22.62 | | 20.98 | 150 DIA | x1 | 6 |
| 16 | - | 25.47 | | 24.44 | 150 DIA | x1 | 4 |
| 17 | - | 22.71 | | 21.07* | - | x2 | 3.6 |
| 18 | - | 22.79 | | 21.81* | - | x2 | 3 |
| 19 | - | 24.04 | | - | 150 DIA | x4 | 5.6 |
| MD1 | MD(KSC) | 13.83 | | 12.895 - 12.865 | 150 DIA PVC IN | x2 | 3.6 |
| MD2 | MD(KSC) | 16.155 | | 15.2 - 15.18 | 150 DIA PVC OUT | x2 | 3.6 |
| MD3 | MD(KSC) | 19.515 | | 16.885 - 16.895 | 150 DIA | x2 | 3 |
| MD4 | MD(KSC) | 21.59 | | 20.06 - 17.375 | 150 DIA | x4 | 3 |

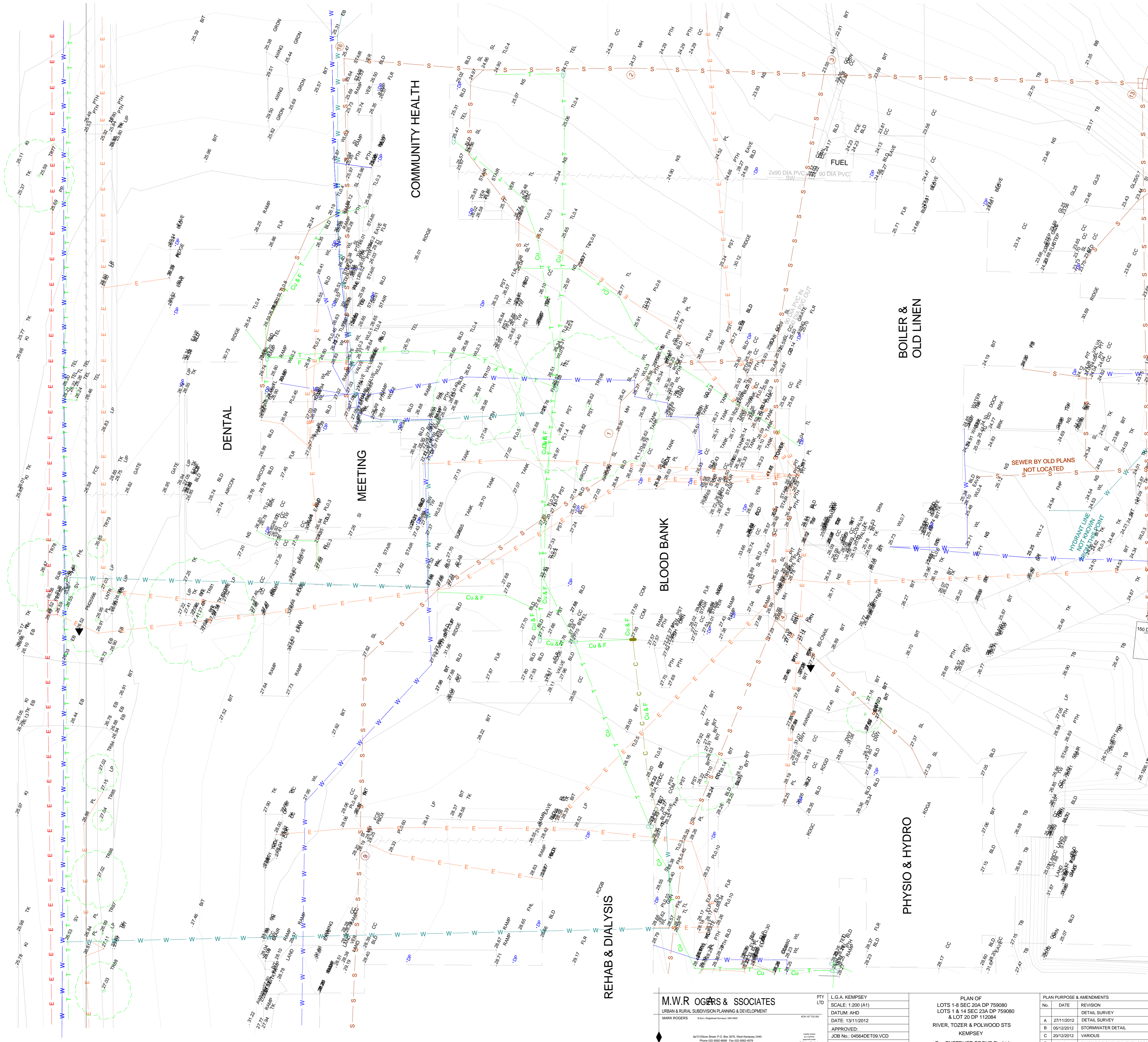
* CONCRETE FLOOR
PIPES ARE EARTHENWARE EXCEPT AS SHOWN

- CODES:
- TK = Top of kerb
 - KI = Kerb Invert
 - LI = Lip of Kerb
 - PTH = Pathway
 - CC = Concrete
 - DWY = Driveway
 - EB = Edge of Bitumen
 - BIT = Bitumen
 - PP = Power Pole
 - LP = Light Pole
 - ELP = Electricity Pit
 - SLB = Electricity Sub Station
 - TEL = Telstra Pit
 - CCM = Communication Cable
 - PHBOX = Public Phone Box
 - FCE = Fence
 - NS = Natural Surface
 - TB = Top of Bank
 - BB = Bottom of Bank
 - TW = Top of Wall
 - BIW = Bottom of Wall
 - DRN = Drain
 - SEPT = Septic Tank
 - MI = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PIT = Stormwater Pit
 - GRATE = Stormwater Grate
 - RIV = River
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SH = Stop Valve
 - OXY = Medical Oxygen
 - LID = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - ROD = Ridge Height
 - VER = Verandah
 - LINTR = Line of Trees
 - TR001 = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area
 - PL = Power Line
 - FHL = Fire Hydrant Line
 - GL = Gas Line
 - WL = Water Line
 - SL = Sewer Line
 - TL = Telstra Line

* Indicates location of services identified at ground level

STREET

POLWOOD



M.W.R OGGERS & ASSOCIATES
URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT

PTY LTD
L.G.A. KEMPSEY
SCALE: 1:200 (A1)
DATE: 13/11/2012
APPROVED:
JOB No.: 04564DET09.VCD
SHEET 3 OF 8

| PLAN PURPOSE & AMENDMENTS | |
|---------------------------|---|
| No. | REVISION |
| A | 27/11/2012 DETAIL SURVEY |
| B | 05/12/2012 STORMWATER DETAIL |
| C | 20/12/2012 VARIOUS |
| D | 28/02/2013 RIVER SIDE SURVEY - FUEL STORE |

PLAN OF
LOTS 1 & 8 SEC 20A DP 75980
& LOT 20 DP 112084
RIVER, TOZER & POLWOOD STS
KEMPSEY
For: ENSTRUCT GROUP Pty Ltd

3472 Elbow Street, P.O. Box 1075, West Kempsey 2440
Phone: 081 652 0888 Fax: 081 652 4974
Email: mark@mwroggers.com.au

IMPORTANT NOTICE REGARDING SERVICE DETAILS

1. VISUAL EVIDENCE IS SHOWN TO SURVEY ACCURACY.
2. INVERTS AND DIAMETERS ARE SHOWN WHERE REASONABLE ACCESS WAS OBTAINED.
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5. NO EXCAVATION, POT-HOLING OR PROBING PICKUP HAS BEEN UNDERTAKEN.

DIAL 1100 FOR DIAL BEFORE YOU DIG SERVICE
www.dialbeforeyoudig.com.au

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IMPORTANT NOTE: THE SURVEY NOW INCLUDES LAND ON THE WESTERN SIDE OF RIVER STREET BEING LOT 1 DP 115000. THIS LAND IS NOT INCLUDED IN DP 1181981. THE BOUNDARY AT THE MACLEAY RIVER IS A NATURAL BOUNDARY BEING THE MEAN HIGH WATER MARK. AN APPROXIMATE PLOT HAS BEEN PROVIDED ONLY.

ORIGIN OF LEVELS & COORDINATES
PM 25996
RL 26 519 AHD
462860.275 E
650269.265 N
S.C.I.M.S.
MGA ORIENTATION

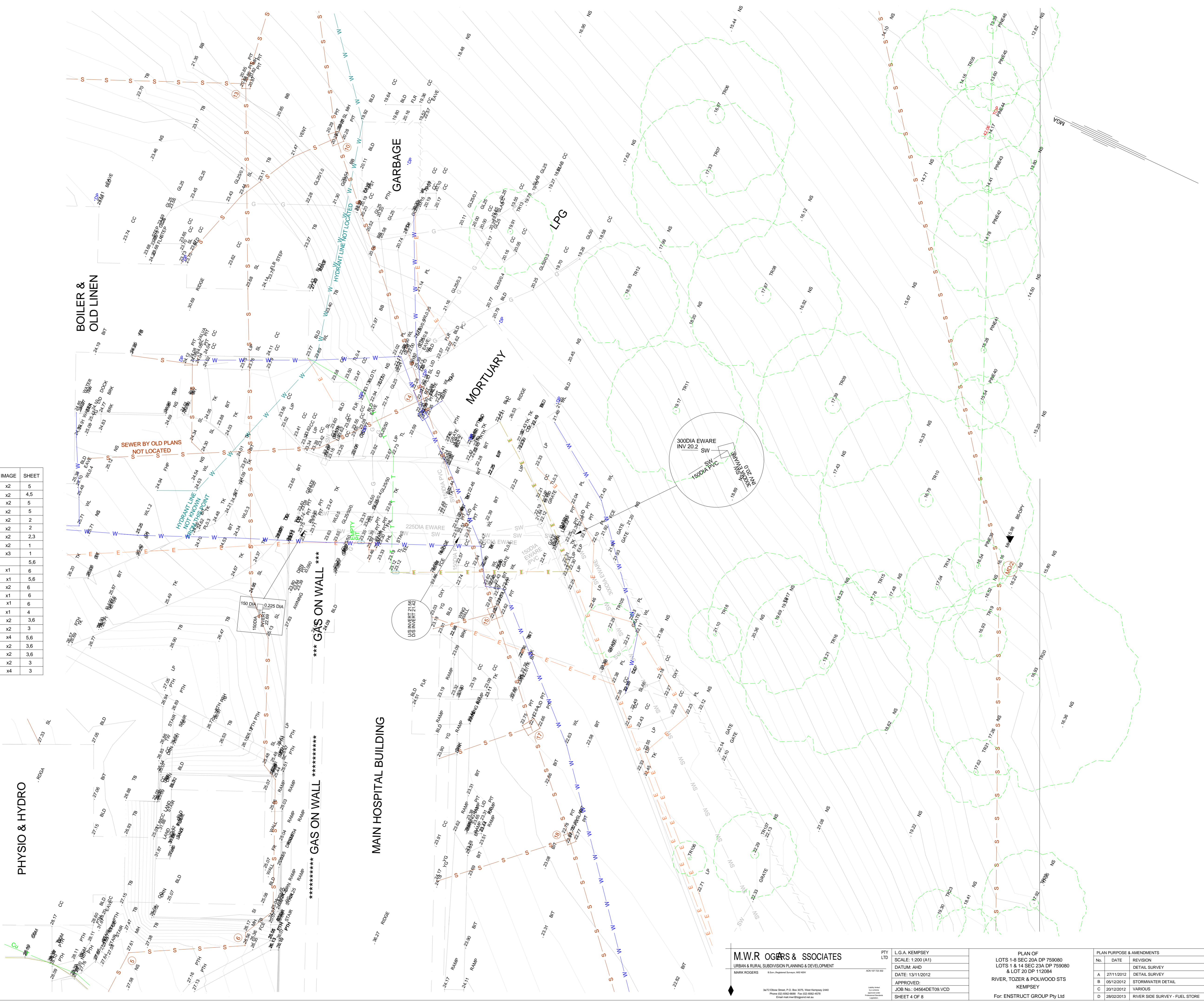
- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E OVER HEAD ELECTRICITY
- S SEWER LINE
- SW STORM WATER
- W WATER MAIN
- T TELSTRA LINE
- G GAS LINE
- C COMMUNICATIONS CABLE

SEWER MANHOLE SCHEDULE

| No. | LINE | RL - AHD | LID | INVERT/S | DETAIL | IMAGE | SHEET |
|-------|---------|----------|-----|-------------------------------|--------------------|-------|-------|
| 1 | - | 26.90 | | 25.46 | 150 DIA PVC | x2 | 5 |
| 2 | - | 24.37 | | 23.54 | 150 DIA | x2 | 4.5 |
| 3 | - | 23.55 | | DROP 23.01 - 22.50 - 22.47 | 150 DIA | x2 | 5 |
| 4 | - | 26.99 | | 26.215 - 26.205 - 26.20 | 150 DIA | x2 | 5 |
| 5 | - | 27.61 | | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | | 23.41 - 22.63 | 150 DIA | x2 | 2.3 |
| 8 | - | 28.49 | | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | | - | 150 DIA | x3 | 1 |
| 10 | - | 20.28 | | 19.6 | 150 DIA | x2 | 5.6 |
| BK12A | - | 12.01 | | 11.2 | 450 CAST | x1 | 6 |
| BK12 | - | 12.66 | | 11.15 - 11.62 - 11.32 - 11.64 | 150 DIA IN 450 OUT | x1 | 5.6 |
| 13 | - | 20.86 | | 20.125 | 150 DIA | x2 | 6 |
| 14 | - | 22.28 | | 20.38 | 150 DIA | x1 | 6 |
| 15 | - | 22.62 | | 20.98 | 150 DIA | x1 | 6 |
| 16 | - | 25.47 | | 24.44 | 150 DIA | x1 | 4 |
| 17 | - | 22.71 | | 21.07* | - | x2 | 3.6 |
| 18 | - | 22.79 | | 21.81* | - | x2 | 3 |
| 19 | - | 24.04 | | - | 150 DIA | x4 | 5.6 |
| MD1 | MD(KSC) | 13.83 | | 12.895 - 12.865 | 150 DIA PVC IN | x2 | 3.6 |
| MD2 | MD(KSC) | 16.155 | | 15.2 - 15.18 | 150 DIA PVC OUT | x2 | 3.6 |
| MD3 | MD(KSC) | 19.515 | | 16.885 - 16.895 | 150 DIA | x2 | 3 |
| MD4 | MD(KSC) | 21.59 | | 20.08 - 17.375 | 150 DIA | x4 | 3 |

* CONCRETE FLOOR
PIPES ARE EARTHENWARE EXCEPT AS SHOWN

- CODES:**
- TK = Top of kerb
 - KI = Kerb Invert
 - LP = Lip of Kerb
 - PTH = Pathway
 - CC = Concrete
 - DWY = Driveway
 - EB = Edge of Bitumen
 - BIT = Bitumen
 - PP = Power Pole
 - LP = Light Pole
 - ELP = Electricity Pit
 - SUB = Electricity Sub Station
 - TEL = Telstra Pit
 - CCM = Communication Cable
 - PHBOX = Public Phone Box
 - FACE = Fence
 - NS = Natural Surface
 - TB = Top of Bank
 - RB = Bottom of Bank
 - TV = Top of Wall
 - BL = Bottom of Wall
 - DRN = Drain
 - SEPT = Septic Tank
 - MH = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PIT = Stormwater Pit
 - GRATE = Stormwater Grate
 - INV = Invert
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - GXY = Medical Oxygen
 - LID = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - ROD = Ridge Height
 - VER = Verandah
 - LNTR = Line of Trees
 - TAG = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area
- PL = Power Line *
GL = Gas Line *
WL = Water Line *
SL = Sewer Line *
TL = Telstra Line *
- * Indicates location of services identified at ground level



M.W.R OGGERS & ASSOCIATES
URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT

| |
|-------------------------|
| PTY LTD |
| L.G.A. KEMPSEY |
| SCALE: 1:200 (A1) |
| DATUM: AHD |
| DATE: 13/11/2012 |
| APPROVED: |
| JOB No.: 04564DET09.VCD |
| SHEET 4 OF 8 |

PLAN OF
LOTS 1-8 SEC 20A DP 759800
LOTS 1 & 14 SEC 23A DP 759800
& LOT 20 DP 112084
RIVER, TOZER & POLWOOD STS
KEMPSEY
For: ENSTRUCT GROUP Pty Ltd

| PLAN PURPOSE & AMENDMENTS | |
|---------------------------|------------|
| No. | DATE |
| 1 | 27/11/2012 |
| 2 | 05/12/2012 |
| 3 | 20/12/2012 |
| 4 | 28/02/2013 |

3472 Ebbw Street, P.O. Box 5075, West Kempsey 2440
Phone: (02) 652 4888 Fax: (02) 652 4274
Email: m.rogers@moggers.com.au

IMPORTANT NOTICE REGARDING SERVICE DETAILS

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2. INVERTS AND DIAMETERS ARE SHOWN WHERE REASONABLE ACCESS WAS OBTAINED.
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ORIGIN OF LEVELS & COORDINATES
PM 25996
PL 26519 AHD
462860.275 E
6502609.265 N
S.C.I.M.S.
MGA ORIENTATION

- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E OVER HEAD ELECTRICITY
- S SEWER LINE
- SW STORM WATER
- W WATER MAIN
- T TELSTRA LINE
- G GAS LINE
- C COMMUNICATIONS CABLE

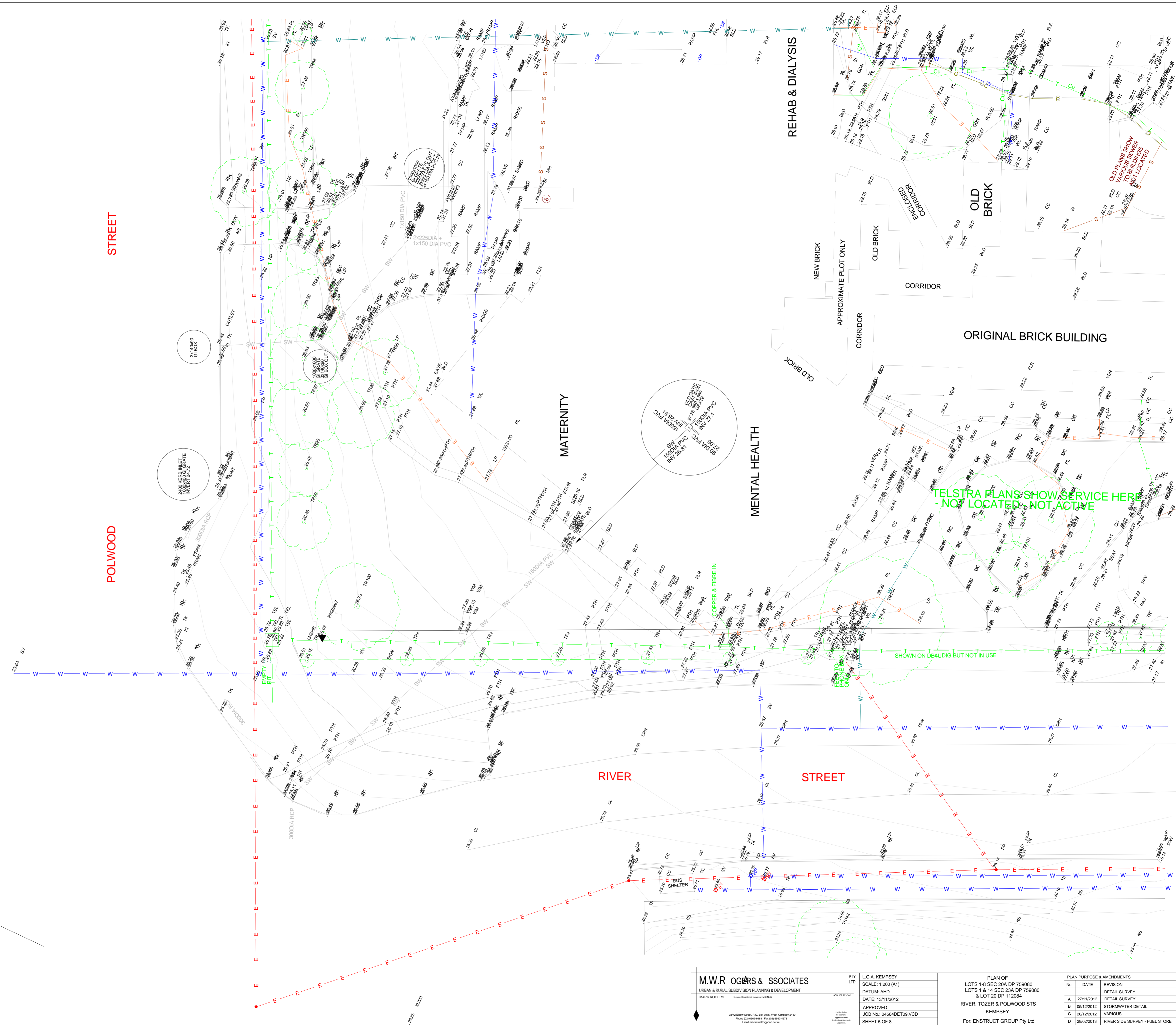
SEWER MANHOLE SCHEDULE

| No. | LINE | RL - AHD LID | INVERT/S | DETAIL | IMAGE | SHEET |
|-------|---------|--------------|-------------------------------|--------------------|-------|-------|
| 1 | - | 26.90 | 25.46 | 150 DIA PVC | x2 | 4, 5 |
| 2 | - | 24.37 | 23.54 | 150 DIA | x2 | 5 |
| 3 | - | 23.55 | DROP 23.01 - 22.50 - 22.47 | 150 DIA | x2 | 5 |
| 4 | - | 26.99 | 26.215 - 26.205 - 26.20 | 150 DIA | x2 | 5 |
| 5 | - | 27.61 | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | 23.41 - 22.63 | 150 DIA | x2 | 2,3 |
| 8 | - | 28.49 | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | - | 150 DIA | x3 | 1 |
| 10 | - | 20.28 | 19.6 | 150 DIA | x2 | 5,6 |
| BK12A | - | 12.01 | 11.2 | 450 CAST | x1 | 6 |
| BK12 | - | 12.66 | 11.15 - 11.62 - 11.32 - 11.64 | 150 DIA IN 450 OUT | x1 | 5,6 |
| 13 | - | 20.86 | 20.125 | 150 DIA | x2 | 6 |
| 14 | - | 22.28 | 20.38 | 150 DIA | x1 | 6 |
| 15 | - | 22.62 | 20.98 | 150 DIA | x1 | 6 |
| 16 | - | 25.47 | 24.44 | 150 DIA | x1 | 4 |
| 17 | - | 22.71 | 21.07* | - | x2 | 3,6 |
| 18 | - | 22.79 | 21.81* | - | x2 | 3 |
| 19 | - | 24.04 | - | 150 DIA | x4 | 5,6 |
| MD1 | MD(KSC) | 13.83 | 12.895 - 12.865 | 150 DIA PVC IN | x2 | 3,6 |
| MD2 | MD(KSC) | 16.155 | 15.2 - 15.18 | 150 DIA PVC OUT | x2 | 3,6 |
| MD3 | MD(KSC) | 19.515 | 16.885 - 16.895 | 150 DIA | x2 | 3 |
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 - SEPT = Septic Tank
 - MH = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PIT = Stormwater Pit
 - GRATE = Stormwater Grate
 - IN = Invert
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - GXY = Medical Oxygen
 - LID = Building Corner
 - BLD = Brick Wall
 - BRK = Brick Wall
 - FL = Floor Level
 - ROG = Ridge Height
 - VER = Verandah
 - LNTR = Line of Trees
 - T5001 = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area
 - PL = Power Line
 - PLH = Fire Hydrant Line
 - GL = Gas Line
 - WL = Water Line
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 - TL = Telstra Line

* Indicates location of services identified at ground level



M.W.R. ROGERS & ASSOCIATES
URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT

| |
|-------------------------|
| PTY LTD |
| L.G.A. KEMPSEY |
| SCALE: 1:200 (A1) |
| DATUM: AHD |
| DATE: 13/11/2012 |
| APPROVED: |
| JOB No.: 04564DET09.VCD |
| SHEET 5 OF 8 |

| | |
|--------------------------------|------------|
| PLAN PURPOSE & AMENDMENTS | |
| No. | DATE |
| REVISION | |
| A | 27/11/2012 |
| DETAIL SURVEY | |
| B | 05/12/2012 |
| STORMWATER DETAIL | |
| C | 20/12/2012 |
| VARIOUS | |
| D | 28/02/2013 |
| RIVER SIDE SURVEY - FUEL STORE | |

PLAN OF
LOTS 1-8 SEC 20A DP 759080
& LOT 20 DP 112084
RIVER, TOZER & POLWOOD STS
KEMPSEY
For: ENSTRUCT GROUP Pty Ltd

3472 Essex Street, P.O. Box 5075, West Kempsey 2440
Phone: (08) 652 4688 Fax: (08) 652 4578
Email: mrd@mrogard.com.au

IMPORTANT NOTICE REGARDING SERVICE DETAILS

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ORIGIN OF LEVELS & COORDINATES
PM 25996
RL 26.519 AHD
462860.275 E
6502609.285 N
S.C.I.M.S.
MGA ORIENTATION

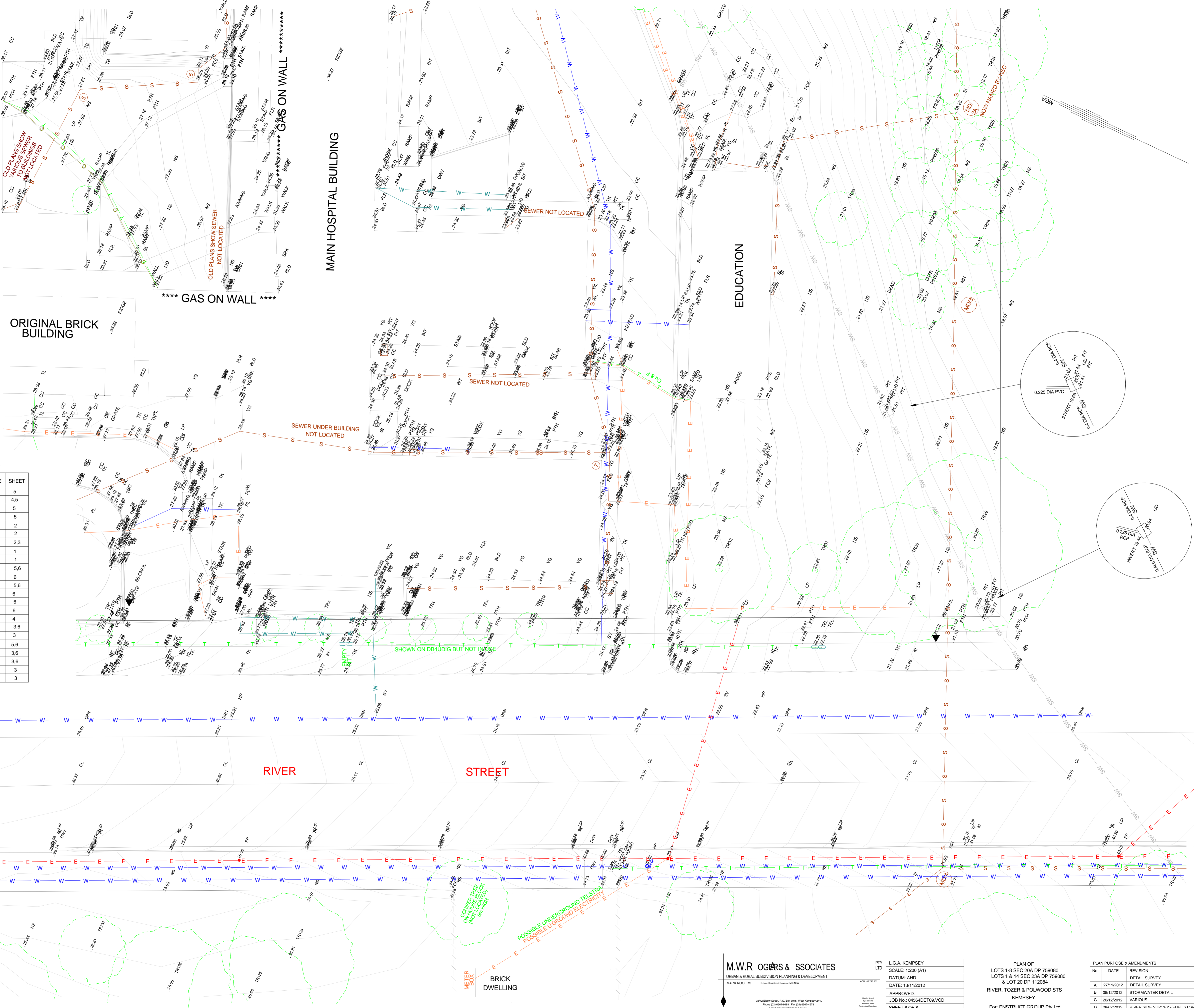
- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E OVER HEAD ELECTRICITY
- S SEWER LINE
- SW STORM WATER
- W WATER MAIN
- T TELSTRA LINE
- G GAS LINE
- C COMMUNICATIONS CABLE

SEWER MANHOLE SCHEDULE

| No. | LINE | RL- AHD LID | INVERT/S | DETAIL | IMAGE | SHEET |
|-----|---------|-------------|----------------------------|-----------------|-------|-------|
| 1 | - | 26.90 | 25.46 | 150 DIA PVC | x2 | 5 |
| 2 | - | 24.37 | 23.54 | 150 DIA | x2 | 4.5 |
| 3 | - | 23.55 | DROP 23.01 - 22.50 - 22.47 | 150 DIA | x2 | 5 |
| 4 | - | 26.99 | 26.215 - 26.205 - 26.20 | 150 DIA | x2 | 5 |
| 5 | - | 27.61 | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | 23.41 - 22.63 | 150 DIA | x2 | 2.3 |
| 8 | - | 28.49 | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | - | 150 DIA | x3 | 1 |
| 10 | - | 20.28 | 19.6 | 150 DIA | x2 | 5.6 |
| 6 | BK12A | 12.01 | 11.2 | 450 CAST | x1 | 6 |
| 13 | - | 20.86 | 20.125 | 150 DIA | x2 | 6 |
| 14 | - | 22.28 | 20.38 | 150 DIA | x1 | 6 |
| 15 | - | 22.62 | 20.98 | 150 DIA | x1 | 6 |
| 16 | - | 25.47 | 24.44 | 150 DIA | x1 | 4 |
| 17 | - | 22.71 | 21.07* | - | x2 | 3.6 |
| 18 | - | 22.79 | 21.81* | - | x2 | 3 |
| 19 | - | 24.04 | - | 150 DIA | x4 | 5.6 |
| MD1 | MD(KSC) | 13.83 | 12.895 - 12.895 | 150 DIA PVC IN | x2 | 3.6 |
| MD2 | MD(KSC) | 16.155 | 15.2 - 15.18 | 150 DIA PVC OUT | x2 | 3.6 |
| MD3 | MD(KSC) | 19.515 | 16.885 - 16.895 | 150 DIA | x2 | 3 |
| MD4 | MD(KSC) | 21.59 | 20.08 - 17.375 | 150 DIA | x4 | 3 |

* CONCRETE FLOOR
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- TK = Top of kerb
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 - CC = Concrete
 - DWY = Driveway
 - EB = Edge of Bitumen
 - BT = Bitumen
 - PP = Power Pole
 - LP = Light Pole
 - ELP = Electricity Pit
 - SUB = Electricity Sub Station
 - TEL = Telstra Pit
 - CCM = Communication Cable
 - PHBOX = Public Phone Box
 - FCE = Fence
 - NS = Natural Surface
 - TB = Top of Bank
 - RB = Bottom of Bank
 - TW = Top of Wall
 - BB = Bottom of Wall
 - DRN = Drain
 - SEPT = Septic Tank
 - SI = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - PP = Stormwater Pit
 - GRATE = Stormwater Grate
 - RV = Invert
 - HW = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - GXY = Medical Oxygen
 - LID = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - ROD = Ridge Height
 - VER = Verandah
 - LNTR = Line of Trees
 - TR001 = Tree (Tagged)
 - GDN = Garden
 - PAV = Paved Area
 - PL = Power Line
 - PL = Fire Hydrant Line
 - GL = Gas Line
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 - TL = Telstra Line
- * Indicates location of services identified at ground level



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URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT
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| | |
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| DATE: 13/11/2012 | APPROVED: |
| JOB No.: 04564DET09.VCD | |
| SHEET 6 OF 8 | |

| | | |
|--|------------|--------------------------------|
| PLAN OF LOTS 1-8 SEC 20A DP 759080 & LOT 20 DP 112084 RIVER, TOZER & POLWOOD STS KEMPSEY For: ENSTRUCT GROUP Pty Ltd | | |
| PLAN PURPOSE & AMENDMENTS | | |
| No. | DATE | REVISION |
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| D | 28/02/2013 | RIVER SIDE SURVEY - FUEL STORE |

3472 Elbow Street, P.O. Box 5075, West Kempsey 2440
Phone (08) 652 6488 Fax (08) 652 4278
Email: m.rogers@mroggers.com.au

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ORIGIN OF LEVELS & COORDINATES
PM 25996
RL 26.519 AHD
482860.275 E
656299.285 N
S.C.I.M.S.
MGA ORIENTATION

- TELSTRA PIT
- COMMUNICATIONS PIT
- DP DOWN PIPE (TYPICAL 70, 80 OR 90 x100, 100DIA, INTO GROUND)
- E — OVER HEAD ELECTRICITY
- S — SEWER LINE
- SW — STORM WATER
- W — WATER MAIN
- T — TELSTRA LINE
- G — GAS LINE
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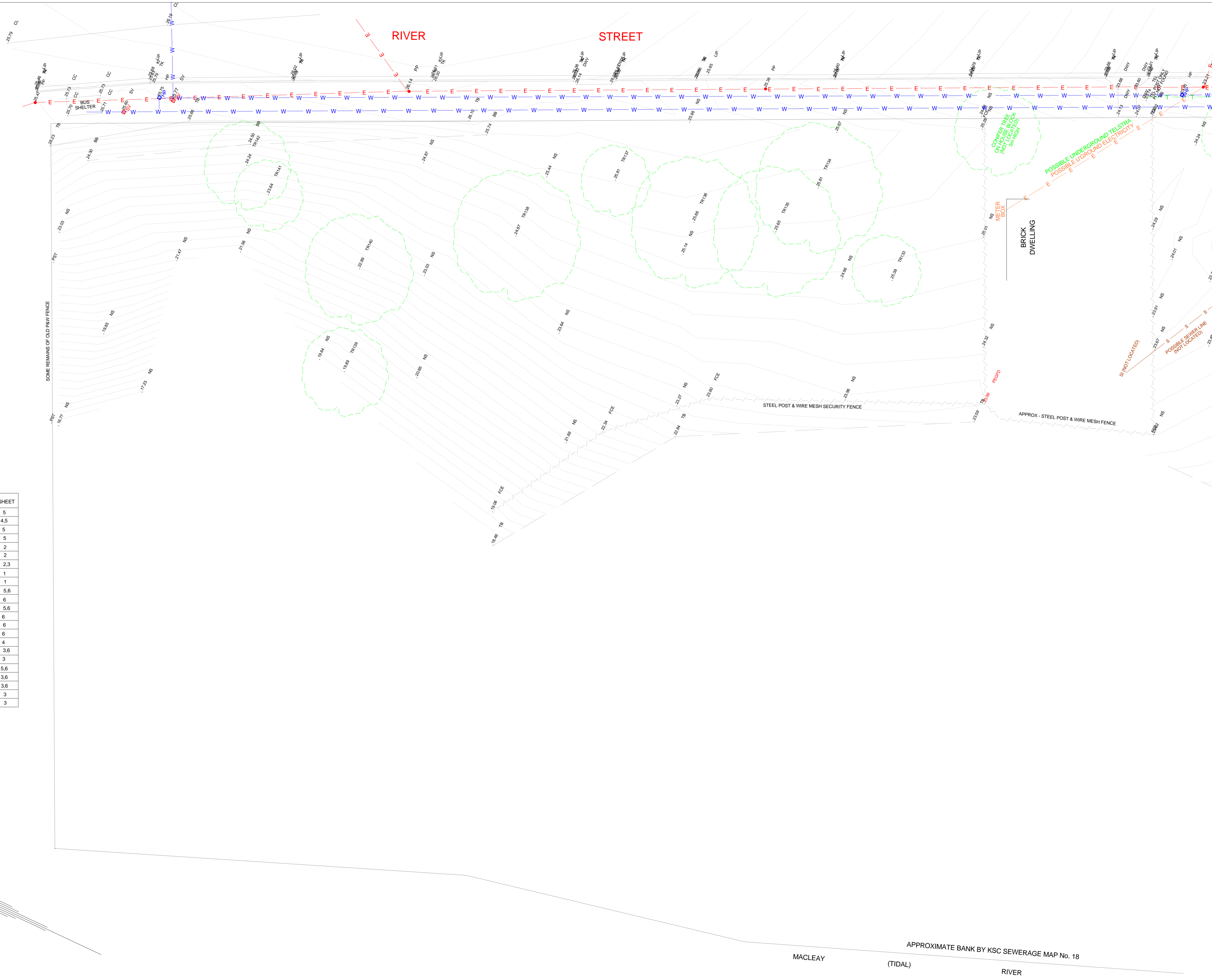
SEWER MANHOLE SCHEDULE

| No. | LINE | RL - AHD LID | INVERT/S | DETAIL | IMAGE | SHEET |
|--------|---------|--------------|-------------------------------|--------------------|-------|-------|
| 1 | - | 26.90 | 25.46 | 150 DIA PVC | x2 | 5 |
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| 5 | - | 27.61 | 27.06 - 26.585 | 100 DIA PVC | x2 | 2 |
| 6 | - | 26.56 | 25.96 - 25.915 | 100 DIA PVC | x2 | 2 |
| 7 | - | 23.81 | 23.41 - 22.63 | 150 DIA | x2 | 2.3 |
| 8 | - | 28.49 | 27.8 - 27.705 | 150 DIA | x2 | 1 |
| 9 | - | 28.19 | - | 150 DIA | x3 | 1 |
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| BK/12A | - | 12.01 | 11.2 | 450 CAST | x1 | 6 |
| BK/12 | - | 12.66 | 11.15 - 11.62 - 11.32 - 11.64 | 150 DIA IN 450 OUT | x1 | 5.6 |
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 - BTF = Bitumen
 - NS = Natural Surface
 - TB = Top of Bank
 - BB = Bottom of Bank
 - TV = Top of Wall
 - BBW = Bottom of Wall
 - DRN = Drain
 - SEPT = Septic Tank
 - MH = Sewer Manhole
 - SI = Sewer Inspection
 - YG = Yard Gully
 - RTI = Stormwater Pt
 - GRATE = Stormwater Grate
 - INV = Invert
 - HP = Water Hydrant
 - FHP = Fire Hydrant
 - SV = Stop Valve
 - OXY = Medical Oxygen
 - LID =
 - BLD = Building Corner
 - BRK = Brick Wall
 - FL = Floor Level
 - RHG = Ridge Height
 - VER = Verandah
 - LNR = Line of Trees
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* Indicates location of services identified at ground level



| M.W.R OGERS & ASSOCIATES URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT MARK ROGERS 3472 Elbow Street, P.O. Box 3078, West Kempsey 2440 Phone: (01) 65614688 Fax: (01) 65614679 Email: mark.m@ogersandassociates.com.au | PTY LTD ACN 107 739 302 | L.G.A. KEMPSEY SCALE: 1:200 (A1) DATUM: AHD DATE: 13/11/2012 | PLAN OF LOTS 1 & 8 SEC 20A DP 759080 & LOT 20 DP 112084 RIVER, TOZER & POLWOOD STS KEMPSEY For: ENSTRUCT GROUP Pty Ltd | PLAN PURPOSE & AMENDMENTS <table border="1"> <thead> <tr> <th>No.</th> <th>DATE</th> <th>REVISION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>27/11/2012</td> <td>DETAIL SURVEY</td> </tr> <tr> <td>B</td> <td>05/12/2012</td> <td>STORMWATER DETAIL</td> </tr> <tr> <td>C</td> <td>20/12/2012</td> <td>VARIOUS</td> </tr> <tr> <td>D</td> <td>28/02/2013</td> <td>RIVER SIDE SURVEY - FUEL STORE</td> </tr> </tbody> </table> | No. | DATE | REVISION | A | 27/11/2012 | DETAIL SURVEY | B | 05/12/2012 | STORMWATER DETAIL | C | 20/12/2012 | VARIOUS | D | 28/02/2013 | RIVER SIDE SURVEY - FUEL STORE |
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| APPROVED: JOB No.: 04564DET09.VCD SHEET 7 OF 8 | | | | | | | | | | | | | | | | | | | |
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462860.275 E
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- TELSTRA PIT
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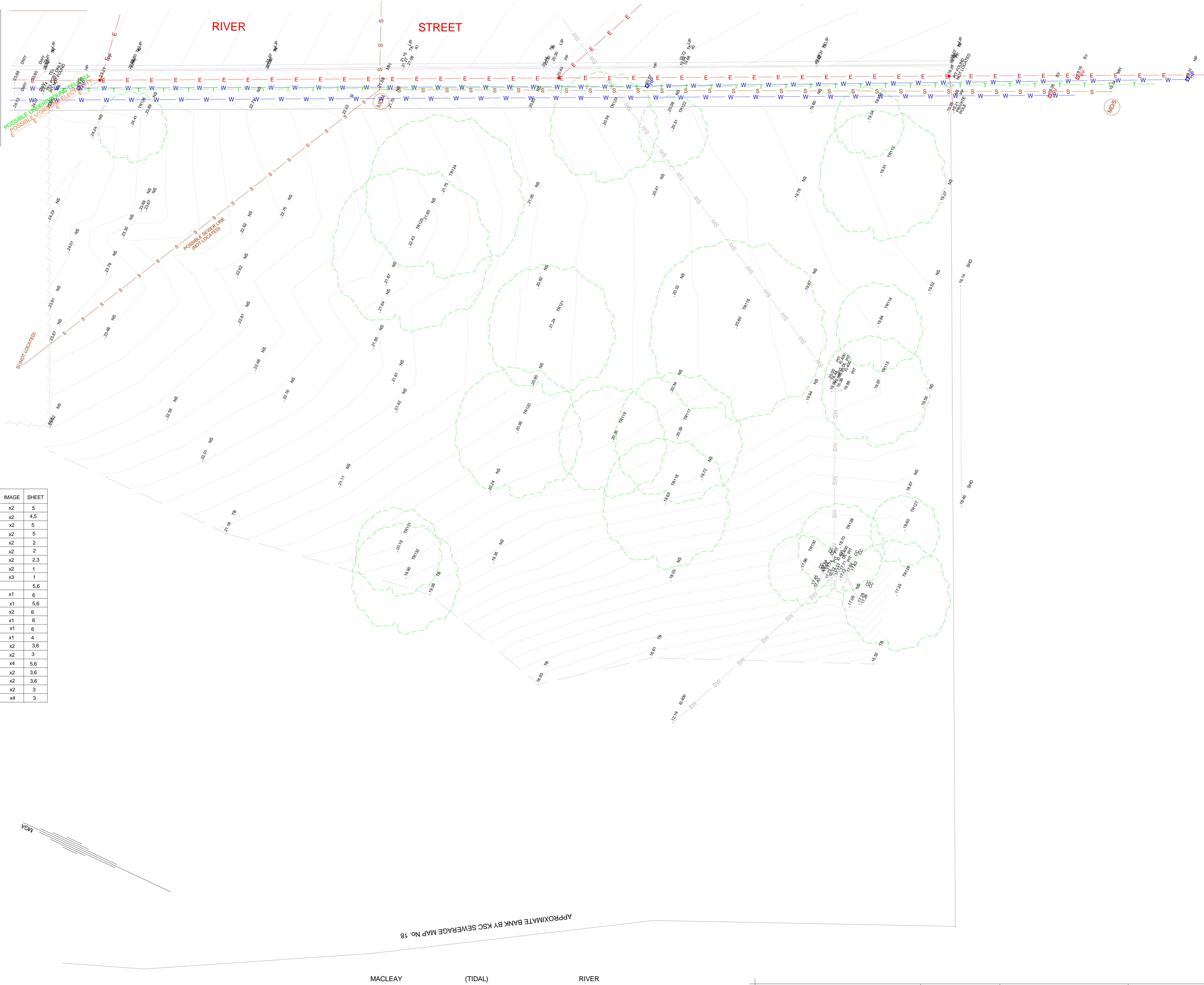
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 - T500 = Tree (Tagged)
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APPROXIMATE BANK BY KSC SEWERAGE MAP No. 18

MACLEAY (TIDAL) RIVER

M.W.R OGBERS & ASSOCIATES
URBAN & RURAL SUBDIVISION PLANNING & DEVELOPMENT

MARK ROGERS
3472 Ebor Street, P.O. Box 5075, West Kempsey 2445
Phone (08) 652-4888 Fax (08) 652-4278
Email mark.mrogers@ogbers.com.au

| |
|-------------------------|
| PTY LTD |
| L.G.A. KEMPSEY |
| SCALE: 1:200 (A1) |
| DATE: 13/11/2012 |
| DATE: AHD |
| DATE: 13/11/2012 |
| APPROVED: |
| JOB No.: 04564DET09.VCD |
| SHEET 8 OF 8 |

PLAN OF
LOTS 1-8 SEC 20A DP 759080
& LOT 20 DP 112084
RIVER, TOZER & POLWOOD STS
KEMPSEY
For: ENSTRUCT GROUP Pty Ltd

| PLAN PURPOSE & AMENDMENTS | |
|---------------------------|------------|
| No. | DATE |
| A | 27/11/2012 |
| B | 05/12/2012 |
| C | 20/12/2012 |
| D | 28/02/2013 |

APPENDIX B

ASNSW CORRESPONDENCE

Mike Ward

From: Graeme C Wright <g.wright@avipro.com.au>
Sent: Tuesday, 19 February 2013 7:59 PM
To: Mike Ward
Cc: Garry Sinclair
Subject: Stage 1 Aeronautical Assessment Kempsey District Hospital
Attachments: NSW DOH HLS Policy Guidelines Rev06a.pdf; 5027-BVN-AR-DWG-SSK-101-01 (1).pdf

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Mike,

As advised, Enstruct have asked that I review the Kempsey report and are to call me back in a day or so.

I went through the report this afternoon.

There is some incorrect information in relation to Section 4 Applicable Standards, however it makes no material difference to the report.

Sub-section 4.1.3 FATO states that the FATO outside the TLOF does not have to be load bearing. For all new and redeveloped HLSs, the FATO area is to be load bearing.

Sub-section 7.1, second dot point is in conflict with Sub-section 4.1.3. This should read, "*Increase the load bearing area to 25 m. diameter for compliance with the draft NSW Ministry of Health Hospital HLS Policy Guidelines Rev06a.*" It is not necessary for the 4 m. Safety Area to be load bearing, however it it can be achieved, it is acceptable.

As discussed today, the impingement of the Dosing Clinic into the VFR Approach/Departure path to the NE of the HLS, as per the attached drawing, will require the fitment of one or more obstacle lights on the top.

Regards,

Graeme C Wright
President
AviPro
Aviation Management & Safety Advisers
HAI Platinum Program of Safety, RABQSA and BARS Accredited Aviation Safety Auditors
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Mike Ward

From: Graeme C Wright <g.wright@avipro.com.au>
Sent: Friday, 2 November 2012 10:46 AM
To: Mike Ward
Cc: Garry Sinclair
Subject: Kempsey District Hospital HLS Assessment - Draft Report
Attachments: S12052AR001Rev0.pdf

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Categories: SAVED

Mike,

I refer to your request.

The current HLS is far less than ideal and fails to meet many of the current safety requirements. Due to its restricted approach/departure paths down to 120 degrees, there will be times when either arrival or departure would not be possible/acceptable. The current HLS does not meet the Category A confined area criteria for the AW 139, the Bell 412EP or the EC 145. The 412SP and BK 117 B-2 are not certified. We need to take account of the proposed Part 133 requirements and CASA appears to now be moving HEMS from Part 138 to Part 133.

If the HLS is upgraded to the current standards, it would be capable of meeting the Category A requirements for size. The FATO would need to be concrete and load bearing. The additional 4 m. Safety Area around the FATO may be grassed but should also be capable of bearing the load when dry. This is to take account of the unlikely event of a Bell 412EP Category A Type B departure. On most occasions however the EP would be unable to meet the Cat A Type B requirements as it would exceed the maximum weight and/or the obstacle heights in Segment 1 would negate.

In relation to the NW/SE Approach/Departure Path, the positioning of the medical gas compound is also less than satisfactory. Is it possible to align it closer to Tozer Street?

Although we specify a minimum of 7.5 degrees or 8:1 for the obstacle free VFR Approach/Departure Path, we aim for 2.5 degrees or 22:1. This is to take account of the worst performer OEI, the Bell 412. More often 2.5 degrees can not be achieved, in common with an inability to achieve the desired OIS. There has been no comment on the obstacle free approach/departure path angles on either VFR Approach/Departure Path?

Cross winds components up to ~ 30 kts. can be accommodated however are not desirable. This varies with aircraft type.

Section 2.0 Existing HLS

I suggest that the last paragraph is reworded in line with the following:

"The Medical Retrieval Unit (MRU) of State Wide Services is responsible for the tasking of all NSW HEMS operations. HEMS users are contracted to ASNSW and under the direction of the MRU. The helicopter types may include the Agusta AW 139, the Eurocopter EC 145, Bell 412EP and SP models, and the BK 117B-2. Most frequent use is likely to involve the Hunter Region LifeSaver HEMS Bell 412EP."

Section 6.0 Conclusions and Recommendations

With the possible exception of the medical gas positioning, the other recommendations are agreed. There may also be additional recommendations required?

Section 7.0 HLS Upgrade Works

The Safety Area 4 m. beyond the FATO, may be grassed but should be level with the FATO and compacted to accept the static load when dry. This will require an area 33 m. in diameter with less than 3 degrees slope. Is there enough space in the current location?

There may also be a need to trim trees and/or relocate wires on the VFR Approach/Departure Paths.

Summary

In summary, the current HLS location as discussed does not meet currently acceptable standards. The proposed upgrade would improve the situation but not fully resolve the approach/departure and obstacle issues. There would remain an inability to undertake Performance Class 1 approach/departures relevant to aircraft specific Category A requirements. The 120 degree separation between flight paths would result in occasions when the HLS was operationally unusable.

Due to the hospital location, local topography and obstacles, the only option which would allow full compliance with safety standards and unlimited access, is an elevated HLS on a roof top, multi-story car park etc.

Regards,

Graeme C Wright
President
AviPro
Aviation Management & Safety Advisers
HAI Platinum Program of Safety, RABQSA and BARS Accredited Aviation Safety Auditors
Aviation Advisers to NSW MoH/ASNSW & ACT Ambulance

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F: 61 (0)2 6654 7531
M: 61 (0)408 245 113

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From: [Graeme C Wright](#)
Sent: Friday, 02 November, 2012 09:09
To: [Graeme C Wright](#)
Subject: Kempsey District Hospital HLS Assessment - Draft Report

From: [Mike Ward](#)
Sent: Wednesday, 31 October, 2012 17:01
To: [Graeme C Wright](#)
Subject: Kempsey District Hospital HLS Assessment - Draft Report

Hi Graeme,

Please find attached a copy of our draft report in relation to the Kempsey District Hospital HLS for your review, comment and input prior to submission to the client.

I have highlighted some areas in red where I would appreciate your acceptance/rejection/input as a representative of ASNSW and Westpac.

Please do not hesitate to contact me to discuss further.

Regards,

Mike Ward

Senior Aviation Consultant

REHBEIN Airport Consulting

Level 3, CBD House, 120 Wickham Street

Fortitude Valley (PO Box 112) QLD 4006

P (07) 3250 9000 F (07) 3250 9001

Email: Mike.W@lar.net.au

Internet: www.lar.net.au

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APPENDIX C

FIGURES

Figure 1 – Existing HLS (looking north east)



Figure 2 – Existing fuel storage shed (looking south west from HLS)



Figure 3 – Existing two-storey section of the Community Health building, single storey section to the right (looking north west from HLS)



Figure 4 – Proposed site of S1B (looking west from HLS)

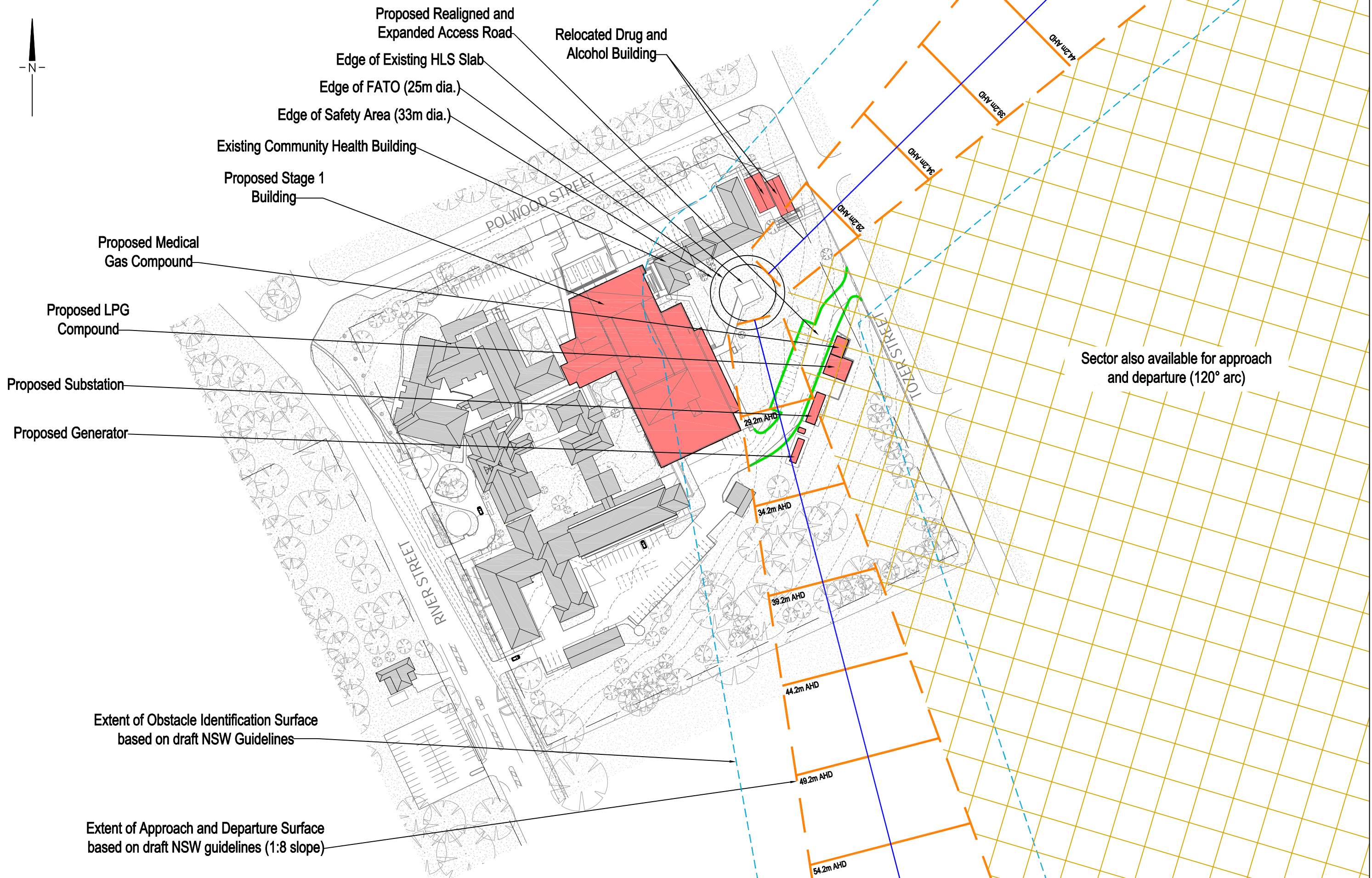
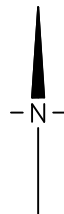


Figure 5 – Looking south east from HLS towards proposed medical gas compound



Figure 6 – Looking east towards residences from HLS (note electricity poles)





Sector also available for approach and departure (120° arc)

Project:
KEMPSEY DISTRICT HOSPITAL

Client:
HEALTH INFRASTRUCTURE

Title:
PROPOSED REDEVELOPMENT AND EXISTING HLS WITH PRELIMINARY FLIGHT PATHS AND OBSTACLE LIMITATION SURFACES

REHBEIN Airport Consulting

CBD House, level 3 Wickham Street
Fortitude Valley QLD 4006
PO Box 112, Fortitude Valley QLD 4006
L&R (REG) Pty Ltd
A.C.N. 126 939 788
A.B.N. 77 126 939 788

TELEPHONE (07) 3250 9000
FACSIMILE (07) 3250 9001
EMAIL mail@r.net.au

Drawn: MMW Checked: MCW Approved: BJH

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|------------|------------|----------------------------|---------------------|----|
| Figure No: | | FIGURE 7 | Scale: NOT TO SCALE | A3 |
| 2 | 11/03/2013 | | | |
| 1 | 15/01/2013 | | | |
| 0 | 31/10/2012 | | | |
| Rev. | Date | File Ref: S12052FIG007Rev2 | | |

APPENDIX D

HLS UPGRADE WORKS INDICATIVE COSTS

Table 1 – Indicative Costs for Minimum Required HLS Upgrade Works

| Item Description | Qty | Unit Rate | Cost |
|---|-------------------|-------------------------|------------------|
| Concrete (with sub base) | 780m ³ | \$120.00/m ³ | \$93,600 |
| Earthworks (cut to fill) | 350m ³ | \$20.00/m ³ | \$7,000 |
| Import fill | 350m ³ | \$30.00/m ³ | \$10,500 |
| Relocate existing sewer | 40m | \$150.00/m | \$6,000 |
| 2x new man holes | 2 | \$4,000/each | \$8,000 |
| Civil live works | | | \$2,000 |
| Line marking | | | \$3,000 |
| Lighting | | | \$60,000 |
| Design Allowance | | 20% | \$38,020 |
| Sub Total | | | \$228,120 |
| Preliminaries (site establishment, overhead etc.) | | 20% | \$45,624 |
| Contingency | | 10% | \$27,374 |
| Total | | | \$301,118 |

Notes: Design and management costs are excluded from the above costs.

Costs are to an accuracy of no greater than +/- 30%

