O'NEILL GROUP

CONSULTING ENGINEERS

**O'Neill Group Pty Ltd**
2 Oxford Street
South Yarra 3141 Australia
Tel +61 3 9828 4600
engdiv@oneillgroup.com.au
www.oneillgroup.com.au
ABN 60 056 476 987



*Principal Consulting*

*Structural*

*Civil*

*Mechanical*

*Electrical*

*Hydraulics*

*Fire Protection*

*Lift*

# STORMWATER DRAINAGE STRATEGY REPORT

**PROPERTY:** **PRECINCT 16 WEST**
**41-59 STEPHENSON STREET &**
**5-9A SUTTON STREET**
**SOUTH KINGSVILLE, VIC 3015**

**CLIENT:** **METRO PROPERTY DEVELOPMENT**
**LEVEL 4, 484 ST KILDA ROAD**
**MELBOURNE VIC 3004**
**PO BOX 7131, ST KILDA ROAD**
**MELBOURNE VIC 8004**

**O'NEILL GROUP PTY LTD**
**2 OXFORD STREET**
**SOUTH YARRA VIC 3141**

**PROJECT NO:** **7991**

**DATE:** **30 June 2020**

**VERSION:** **1**

**CONTENTS**



**O'NEILL GROUP PTY LTD**
**CONSULTING ENGINEERS AND MANGERS**
The O'Neill Group Pty Ltd
ABN 60 056 476 987
2 Oxford Street
South Yarra Victoria 3141

Telephone: +61 3 9828 4600
Facsimile: +61 3 9824 4611

www.oneillgroup.com.au



| REVISION | DATE | ISSUE FOR | APPROVED FOR ISSUE |
|---|---|---|---|
| 1 | 30th June 2020 | Review | MD |
| | | | |
| | | | |
| | | | |
| | | | |

## 1.00 INTRODUCTION

This report investigates the stormwater drainage strategy for the future development of the site located at 41-59 Stephensons Street and 5-9A Sutton Street South Kingsville.

The site is known as Precinct 16 West is currently zoned industrial and is owned by Metro Property Development, Land Real and Able Industries.

The site is bounded by residential properties to the south facing Blackshaws Road, VicTrack Reserve to the north, Stephenson Street to the west, Sutton Street to the east and a mixture of existing and proposed residential properties surrounding the site. The former Caltex site to the east is known as Precinct 16 East and currently in planning stage for residential development.


*Figure 1: Locality Plan*

## 2.00 EXISTING ROADS AND STORMWATER DRAINAGE

The Hobsons Bay City Council is the responsible authority for the provision of roads and stormwater drainage infrastructure in this area. The council asset plan indicates that there are existing stormwater drains within Moresby Street, Stephenson Street and Blackshaws Road. There are no existing stormwater drains within Sutton Road.

Council has advised that the stormwater drainage within Sutton Street is to be upgraded from Moresby Street to Blackshaws Road and on Blackshaws Road from Stephenson Street to Elizabeth Street. However, based on our review of the existing conditions, the development of this site should have little or no impact on the existing drainage within Blackshaws Road as the site is located downhill of Blackshaws Road and does not connect to the council drainage system within Blackshaws Road.

The existing road pavements within Sutton Street are partly asphalt to the south and gravel to the north. Council has advised that the Sutton Street road is to be re-constructed including new asphalt pavements, drainage, kerbs, nature strips, crossovers and undergrounding of the existing overhead power supply cables.

Council has advised that the Legal Point of Discharge stormwater connection for the overall site is to the existing Melbourne Water main drain located in Moresby Street.

As part of the development of the former Caltex site to the east a new council stormwater outfall drain and easement is required to be installed along the north boundary of the site adjacent to the VicTrack Reserve connecting to the Melbourne Water main drain in Moresby Street. It is proposed to connect this site to the new outfall drain which will also connect the Sutton Street drainage system subject to council requirements and approval.

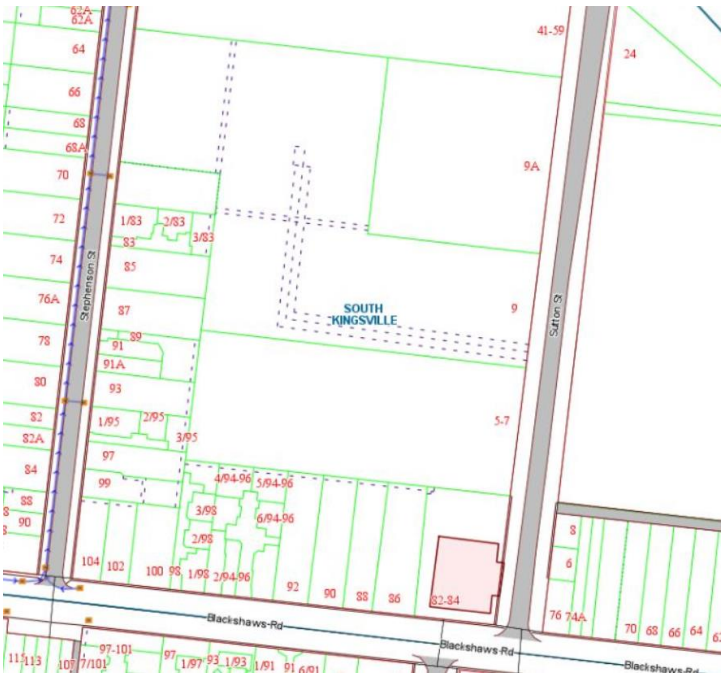



*Figure 2: Hobsons Bay City Council Stormwater Asset Plan*

The Melbourne Water asset plan indicates that the council drainage systems in this area connect to an existing Melbourne Water main drain located within Moresby Street which runs north under the VicTrack Reserve – refer Figure 3 below. Hobsons Bay City Council flood plans are shown in Figure 4.

The asset plan also indicates that part of the site is subject to flood inundation. The advice from Melbourne Water indicates an estimated flood level of RL13.86m AHD for 1 in 100 year storm (AEP 1%). This flood level will require floor levels to be set at RL14.16m (300mm above flood level). This minimum floor level is only about 500-600mm maximum above the existing natural ground levels at the northern portion of the site. Whilst Melbourne Water will need to be consulted during preparation or assessment of the planning permit application, we do not expect this will significantly impact on the development proposed.

*Figure 3: Melbourne Water Stormwater Asset Plan (2017)*

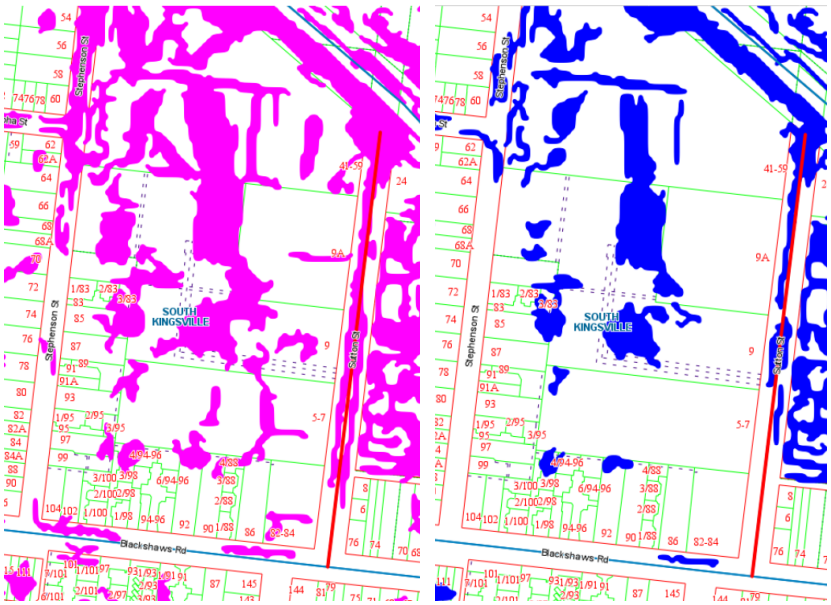



Figure 4: Hobsons Bay city Council Flood Plans 1-100 and 1-10 year ARI

## 3.00 STORMWATER DRAINAGE STRATEGY

The stormwater drainage design for the Precinct 16 West site will be in accordance with the requirements of the building regulations, Australian Standard AS3500.3, Melbourne Water, Hobsons Bay City Council and Growth Area Authority 'Engineering Design and Construction Manual for Subdivisions in Growth Areas – December 2019' incorporating Water Sensitive Urban Design (WSUD) principles to minimise the impact on the environment, waterways and council stormwater drainage system.

The stormwater drainage system will be designed in accordance with Council Planning Scheme Clause 53.16 Stormwater Management in Urban Development incorporating the key principles outlined in the 'Urban Stormwater – Best Environmental Management Guidelines (Victorian Stormwater Committee 1999)'. The principles of WSUD seek to minimise surface runoff and discharge and to mitigate the adverse effects on the natural water balance. The objectives of WSUD are to promote retention, water quality and effective management of the stormwater drainage system.

The WSUD measures to be adopted for this development for compliance with Clause 53.18 will be based on the Melbourne Water's 'Model for Urban Stormwater Improvement Conceptualization' (MUSIC) computer software design program and will include the following.

1. Rainwater harvesting of roof catchment areas and storage tank/s for the re-use of rainwater for landscape irrigation and toilet flushing where space permits.

2. Installation of SPEL Pty Ltd or similar gross pollutant trap and/or water quality treatment systems for the treatment of stormwater drainage discharges from the site prior to connection into the existing Melbourne Water stormwater drainage system as per Council and Melbourne Water guidelines and MUSIC treatment requirements.

3. On-site stormwater detention systems designed to limit the flows from the site. Overland flow provisions will be incorporated for larger storms to travel overland within the internal roads and landscape areas or Council road reserves discharging to the existing railway reserve to the north of the site in accordance with Melbourne Water Guidelines.

The proposed stormwater outfall rate (Permissible Site Discharge) from the site connecting to the existing council's drainage system will not exceed the minimum of the 20% AEP predevelopment peak discharge for the site or the capacity of the existing council stormwater drainage system. The on-site stormwater detention systems with be designed with a minimum capacity to cater for 10% AEP storms. The stormwater drainage system will have provision for runoff from the upstream catchments and include any downstream works necessary to manage flows from this development.

It is proposed to incorporate detention systems consisting of oversized pipes within council and private access road. Oversized pipes are an accepted method of providing water detention that also requires minimal on-going maintenance and servicing. The requirements for water retention will be satisfied by the installation of oversized pipes within the proposed lots or road reserves. The sizing of the drainage pipes within individual properties will be sized to accommodate the upstream catchments and include any catchment areas that proposed to feed into the site. Refer Appendix for Concept Design Plans.

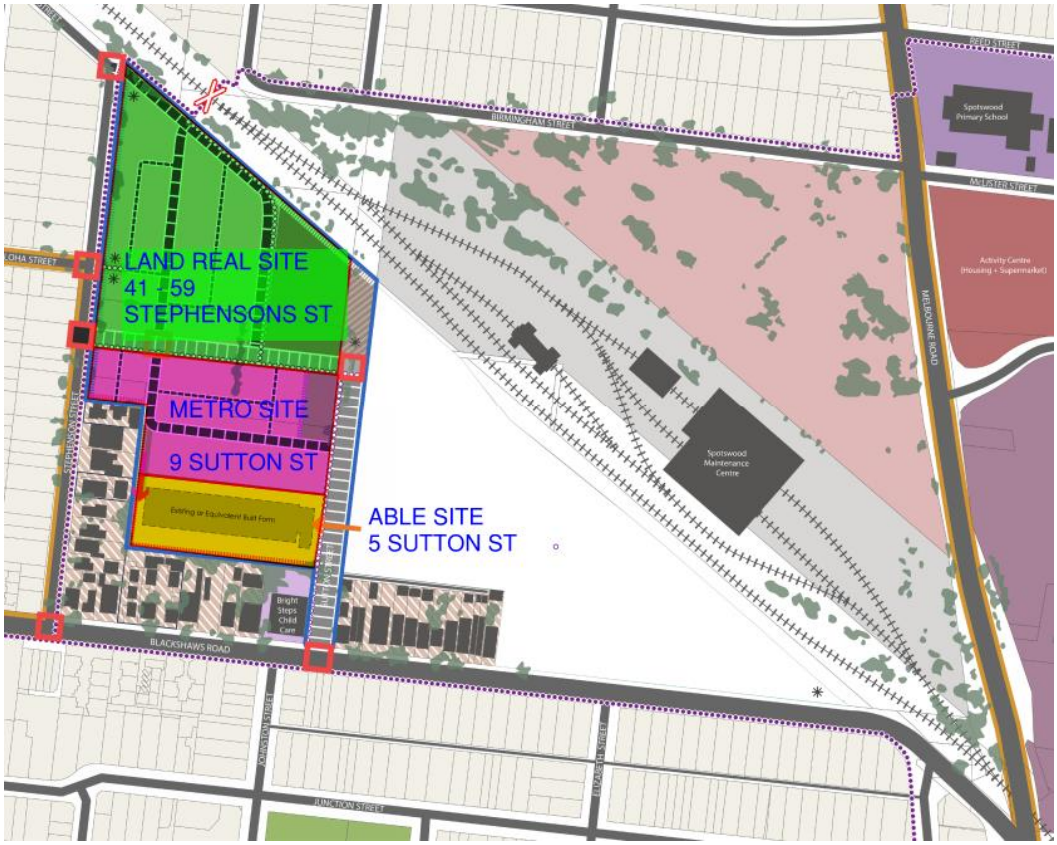



*Figure 5: Site Ownership Boundaries*

**Able Industries Site (5 Sutton Street)**

At this stage the development of the Able Industries site at 5 Sutton Street is proposed to consist of a residential development. The design concept for 5 Sutton Street is yet to be finalized however the draft planning controls propose residential development with a maximum of three storeys.

We expect that the stormwater detention and water quality treatment for this project will be contained within the Able Industries site allotment. The detention system will be located within Common Property and not form part of the Council drainage system. We have excluded this site from the stormwater drainage detention calculations.

**Metro Property Development Site (9 Sutton Street)**

The Metro Property Development site proposal will consist of medium density townhouses with a masterplan and road layout similar to the proposal below. The internal Streets 1, 2 and 3 are proposed to be council road reserves whereas the internal laneways are proposed to be Common Property managed and maintained by the Owner's Corporation. The lots with access via the laneways will have separate combined detention systems located within the Common Property private laneways owned and managed by the Owner's Corporation. It is envisage that the detention system will consist of below ground oversized stormwater drainage pipes. Refer appendix for Concept Design Plans.


*Figure 6: Metro Property Develpoment Proposal*

For the townhouses with direct access from the Council roads, the detention system will consist of oversized pipes located within the road reserve owned and managed by Council. Alternatively subject to approval by Council, these lots may include 2000-3000 litre tanks (where space permits) that could contribute to the detention network and assist to reduce the required capacity of the public network. Note – this has not been considered in the attached drainage calculations. Refer Appendix 1.

**Land Real Site (41 – 59 Stephensons Street)**

The Land Real site proposal will consistent of medium density townhouses and a Superlot with potential for an apartment building with a maximum of six storeys and road layout similar to the proposal below. The internal streets and laneways are proposed to be council road reserves owned and maintained by council. The stormwater detention system for the superlot will be installed below the car park areas and include a rainwater tank below ground for reuse of rainwater within the building.


*Figure 7: Land Real Proposal*

For the townhouses, the detention system will consist of oversized pipes located within the road reserve owned and managed by council. Alternatively subject to approval by Council, these lots may include 2000-3000 litre tanks (where space permits) that could contribute to the detention network and assist to reduce the required capacity of the public network. Note – this has not been considered in the attached drainage calculations. Refer Appendix 1.

For the six level apartment building the stormwater detention and water quality treatment will be contained within this lot. The detention system will be located within Common Property and not form part of the council drainage system. It is proposed to install the detention/retention systems below the common car parking areas.

Refer Appendix for preliminary on-site detention computations and suggested proposed stormwater detention system locations, stormwater drainage concept plan and adjoining property proposed stormwater drainage system.

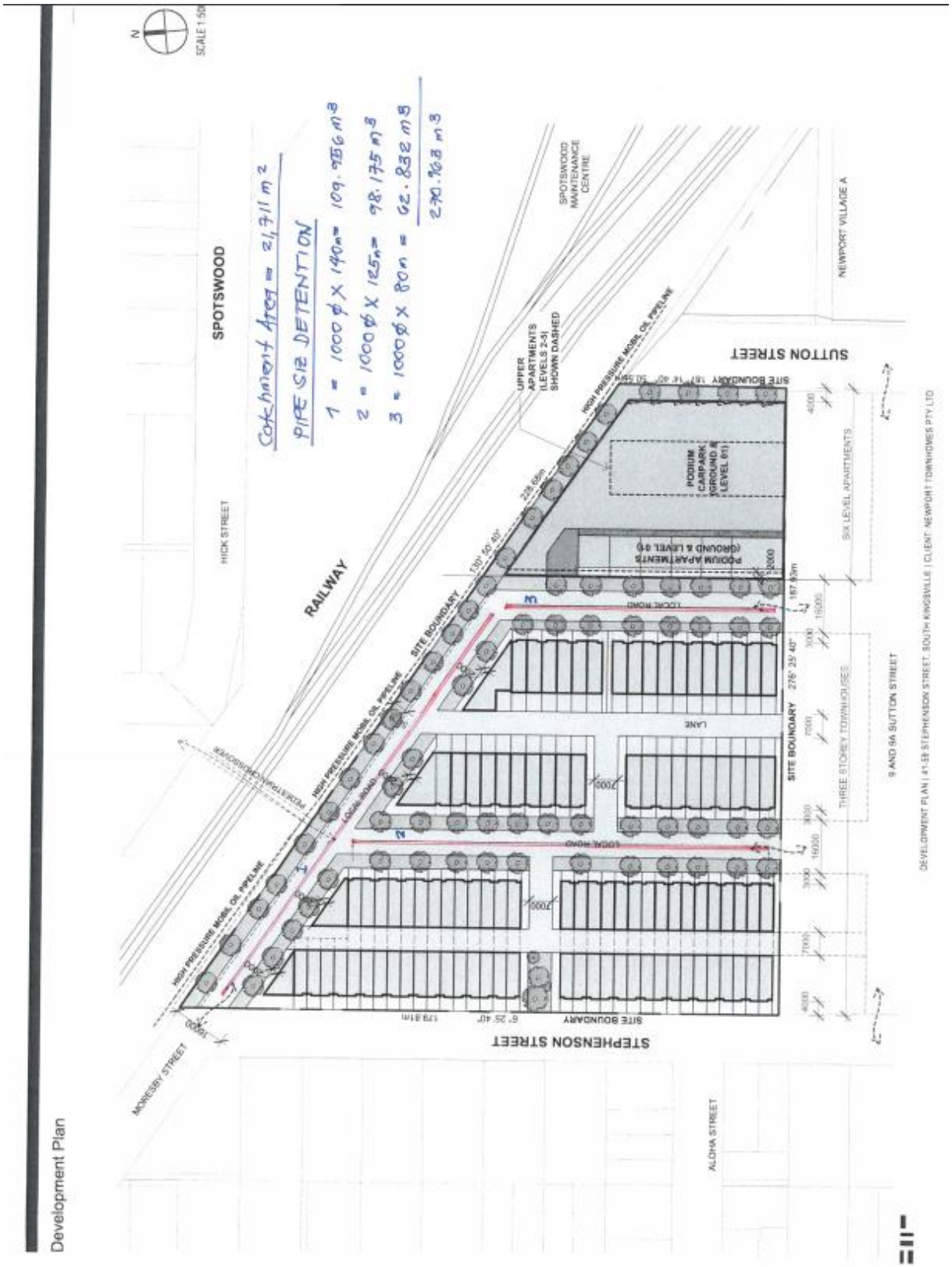
## 4.00 CONCLUSION

Stormwater drainage design and management measures will be adopted for this development which will significantly minimise the impact on the environment, waterways and existing stormwater drain systems. The stormwater drainage system will be designed to comply with the building regulations and codes, and to Melbourne Water, Hobsons Bay City Council, Growth Area Authority 'Engineering Design and Construction Manual for Subdivisions in Growth Areas – December 2019' and the relevant building surveyor's requirements and approval.

## 5.00 APPENDIX

### APPENDIX 1 - ON-SITE STORMWATER DETENTION COMPS AND LOCATIONS

```
*** SUMMARY OSD DESIGN REPORT ***
==========================

Printed from *OSD4W* version 1.08.4   S/N # W5-04201
Licensed to : The O'Neill Group
Prepared by : Sri Singamsetti
=====================================================================

1. CLIENT DETAILS
   Name           : Land Real Pty Ltd
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference  : 7991
   Job Name       : JobName.....
   Job Detail 1   : JobAddress1.....
   Job Detail 2   : JobAddress2.....
   Job Detail 3   : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
   Total Site area :   21711

4. EXISTING SITE DETAILS
   Aes1 : 21711      Ces1 : 0.35
   Aes2 : 0          Ces2 : 0.30
   Aes3 : 0          Ces3 : 0.15
   Aes4 : 0          Ces4 : 0.12
   Weighted C - site  Cew : 0.35

5. PROPOSED SITE DETAILS
   Aps1 : 21711      Cps1 : 0.90
   Aps2 : 0          Cps2 : 0.30
   Aps3 : 0          Cps3 : 0.15
   Aps4 : 0          Cps4 : 0.12
   Weighted C - site  Cpw : 0.90
   Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)
   Time of concentration      : 10.00
   Travel time from discharge point
        to catchment outlet   : 5.00

7. OSD DESIGN
   Flow Control Device        : Control Pit
   Storage type               : Tank
   Rainfall zone              : MELBOURNE
   ARI for OUTFLOW  (years)   : 5
   ARI for STORAGE  (years)   : 10
   Qptot            (L/s)     : 137.55
   Qu               (L/s)     : 0.00
   Qp               (L/s)     : 0.00
   Calculated PSD   (L/s)     : 170.40
   Nominated PSD    (L/s)     : -----
   Adopted PSD      (L/s)     : 170.40

8. STORAGE DETAILS
   Volume           (cub.m.)  : 256.60
   Time to fill storage (mins) : 24.8
   Time to empty storage (mins) : 77.8
   Critical storm duration (mins) : 33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration : 10.0 min.   Intensity : 65.2 mm/hr
   MAX. STORAGE ..... Duration : 33.3 min.   Intensity : 41.0 mm/hr

=====================================================================
=====================================================================
Generated at : 11/7/2019 1:14:26 PM
```


Development Plan
SCALE 1:500
SPOTSWOOD
HICK STREET
RAILWAY
SPOTSWOOD MAINTENANCE CENTRE
NEWPORT VILLAGE A
SUTTON STREET
UPPER APARTMENTS (LEVELS 2-5) SHOWN DASHED
HIGH PRESSURE MOBIL OIL PIPELINE
SITE BOUNDARY
PODIUM CARPARK (GROUND & LEVEL 01)
PODIUM APARTMENTS (GROUND & LEVEL 01)
SIX LEVEL APARTMENTS
LANE
LOCAL ROAD
THREE STOREY TOWNHOUSES
9 AND 9A SUTTON STREET
DEVELOPMENT PLAN | 41-59 STEPHENSON STREET, SOUTH KINGSVILLE | CLIENT: NEWPORT TOWNHOMES PTY LTD
STEPHENSON STREET
MORESBY STREET
ALOHA STREET
Catchment Area = 21,711 m2
PIPE SIZ DETENTION
1 = 1000ϕ X 140m = 109.956 m3
2 = 1000ϕ X 125m = 98.175 m3
3 = 1000ϕ X 80m = 62.832 m3
270.963 m3

1

```
*** SUMMARY OSD DESIGN REPORT ***
==========================

Printed from *OSD4W* version 1.08.4   S/N # W5-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera
================================================================

1. CLIENT DETAILS
   Name           : Metro Property Development
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference  : OSD4W-2008-001
   Job Name       : JobName.....
   Job Detail  1  : JobAddress1.....
   Job Detail  2  : JobAddress2.....
   Job Detail  3  : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
   Total Site area :    993

4. EXISTING SITE DETAILS
   Aes1 : 993        Ces1  : 0.35
   Aes2 : 0          Ces2  : 0.30
   Aes3 : 0          Ces3  : 0.15
   Aes4 : 0          Ces4  : 0.12
   Weighted C - site  Cew  : 0.35

5. PROPOSED SITE DETAILS
   Aps1 : 993        Cps1  : 0.90
   Aps2 : 0          Cps2  : 0.30
   Aps3 : 0          Cps3  : 0.15
   Aps4 : 0          Cps4  : 0.12
   Weighted C - site  Cpw  : 0.90
   Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)
   Time of concentration      : 10.00
   Travel time from discharge point
        to catchment outlet   : 5.00

7. OSD DESIGN
   Flow Control Device        : Control Pit
   Storage type               : Tank
   Rainfall zone              : MELBOURNE
   ARI for OUTFLOW     (years) :  5
   ARI for STORAGE     (years) :  10
   Qptot               (L/s)   :  6.29
   Qu                  (L/s)   :  0.00
   Qp                  (L/s)   :  0.00
   Calculated PSD      (L/s)   :  7.80
   Nominated PSD       (L/s)   :  -----
   Adopted PSD         (L/s)   :  7.80

8. STORAGE DETAILS
   Volume              (cub.m.) : 11.73
   Time to fill storage  (mins) : 24.8
   Time to empty storage (mins) : 77.8
   Critical storm duration (mins) : 33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration : 10.0 min.   Intensity : 65.2 mm/hr
   MAX. STORAGE ..... Duration : 33.3 min.   Intensity : 41.0 mm/hr

================================================================
================================================================
Generated at : 11/7/2019 1:55:11 PM
```

*** SUMMARY OSD DESIGN REPORT ***

Printed from *OSD4W* version 1.08.4 S/N # WS-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera

2

1. CLIENT DETAILS
   Name : Metro Property Development
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference : OSD4W-2008-001
   Job Name : JobName.....
   Job Detail 1 : JobAddress1.....
   Job Detail 2 : JobAddress2.....
   Job Detail 3 : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
   Total Site area : 1456

4. EXISTING SITE DETAILS
   Aes1 : 1456 Ces1 : 0.35
   Aes2 : 0 Ces2 : 0.30
   Aes3 : 0 Ces3 : 0.15
   Aes4 : 0 Ces4 : 0.12
   Weighted C - site Cew : 0.35

5. PROPOSED SITE DETAILS
   Aps1 : 1456 Cps1 : 0.90
   Aps2 : 0 Cps2 : 0.30
   Aps3 : 0 Cps3 : 0.15
   Aps4 : 0 Cps4 : 0.12
   Weighted C - site Cpw : 0.90
   Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)
   Time of concentration : 10.00
   Travel time from discharge point
   to catchment outlet : 5.00

7. OSD DESIGN
   Flow Control Device : Control Pit
   Storage type : Tank
   Rainfall zone : MELBOURNE
   ARI for OUTFLOW (years) : 5
   ARI for STORAGE (years) : 10
   Qptot (L/s) : 9.22
   Qu (L/s) : 0.00
   Qp (L/s) : 0.00
   Calculated PSD (L/s) : 11.42
   Nominated PSD (L/s) : -----
   Adopted PSD (L/s) : 11.42

8. STORAGE DETAILS
   Volume (cub.m.) : 17.21
   Time to fill storage (mins) : 24.8
   Time to empty storage (mins) : 77.9
   Critical storm duration (mins) : 33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration : 10.0 min. Intensity : 65.2 mm/hr
   MAX. STORAGE ..... Duration : 33.3 min. Intensity : 41.0 mm/hr

Generated at : 11/7/2019 2:01:11 PM

```
***  SUMMARY OSD DESIGN REPORT  ***
     ==========================

Printed from  *OSD4W*  version 1.08.4    S/N #  W5-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera
=============================================================================

1. CLIENT DETAILS
   Name           : Metro Property Development
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference  : OSD4W-2008-001
   Job Name       : JobName.....
   Job Detail  1  : JobAddress1.....
   Job Detail  2  : JobAddress2.....
   Job Detail  3  : JobAddress3.....

3. AREAS (sq.m.)  &  RUN-OFF COEFFICIENTS
   Total Site area  :    1368

4. EXISTING SITE DETAILS
   Aes1  : 1368        Ces1   : 0.35
   Aes2  : 0           Ces2   : 0.30
   Aes3  : 0           Ces3   : 0.15
   Aes4  : 0           Ces4   : 0.12
   Weighted C - site   Cew    : 0.35

5. PROPOSED SITE DETAILS
   Aps1  : 1368        Cps1   : 0.90
   Aps2  : 0           Cps2   : 0.30
   Aps3  : 0           Cps3   : 0.15
   Aps4  : 0           Cps4   : 0.12
   Weighted C - site   Cpw    : 0.90
   Uncontrolled portion(s)  UPfrac  : 0.00

6. CATCHMENT TIMES (minutes)
   Time of concentration          : 10.00
   Travel time from discharge point
           to catchment outlet    : 5.00

7. OSD DESIGN
   Flow Control Device            : Control Pit
   Storage type                   : Tank
   Rainfall zone                  : MELBOURNE
   ARI for OUTFLOW       (years)  :  5
   ARI for STORAGE       (years)  :  10
   Qptot            (L/s)         :  8.67
   Qu               (L/s)         :  0.00
   Qp               (L/s)         :  0.00
   Calculated PSD        (L/s)    :  10.73
   Nominated PSD         (L/s)    :  -----
   Adopted PSD           (L/s)    :  10.73

8. STORAGE DETAILS
   Volume              (cub.m.)   :  16.17
   Time to fill storage   (mins)   :  24.8
   Time to empty storage  (mins)   :  77.9
   Critical storm duration (mins)  :  33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration :  10.0 min.    Intensity :  65.2 mm/hr
   MAX. STORAGE ..... Duration :  33.3 min.    Intensity :  41.0 mm/hr

=============================================================================
=============================================================================
Generated at :  11/7/2019 2:01:40 PM
```

5

*** SUMMARY OSD DESIGN REPORT ***

Printed from *OSD4W* version 1.08.4 S/N # W5-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera

1. CLIENT DETAILS
   Name : Metro Property Development
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference : OSD4W-2008-001
   Job Name : JobName.....
   Job Detail 1 : JobAddress1.....
   Job Detail 2 : JobAddress2.....
   Job Detail 3 : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
   Total Site area : 3627

4. EXISTING SITE DETAILS

| | | | |
|---|---|---|---|
| Aes1 | 3627 | Ces1 | 0.35 |
| Aes2 | 0 | Ces2 | 0.30 |
| Aes3 | 0 | Ces3 | 0.15 |
| Aes4 | 0 | Ces4 | 0.12 |
| Weighted C - site | | Cew | 0.35 |

5. PROPOSED SITE DETAILS

| | | | |
|---|---|---|---|
| Aps1 | 3627 | Cps1 | 0.90 |
| Aps2 | 0 | Cps2 | 0.30 |
| Aps3 | 0 | Cps3 | 0.15 |
| Aps4 | 0 | Cps4 | 0.12 |
| Weighted C - site | | Cpw | 0.90 |
| Uncontrolled portion(s) | | UPfrac | 0.00 |

6. CATCHMENT TIMES (minutes)
   Time of concentration : 10.00
   Travel time from discharge point
   to catchment outlet : 5.00

7. OSD DESIGN

| | | |
|---|---|---|
| Flow Control Device | | Control Pit |
| Storage type | | Tank |
| Rainfall zone | | MELBOURNE |
| ARI for OUTFLOW | (years) | 5 |
| ARI for STORAGE | (years) | 10 |
| Qptot | (L/s) | 22.98 |
| Qu | (L/s) | 0.00 |
| Qp | (L/s) | 0.00 |
| Calculated PSD | (L/s) | 28.47 |
| Nominated PSD | (L/s) | ----- |
| Adopted PSD | (L/s) | 28.47 |

8. STORAGE DETAILS

| | | |
|---|---|---|
| Volume | (cub.m.) | 42.87 |
| Time to fill storage | (mins) | 24.8 |
| Time to empty storage | (mins) | 77.8 |
| Critical storm duration | (mins) | 33.3 |

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration : 10.0 min. Intensity : 65.2 mm/hr
   MAX. STORAGE ..... Duration : 33.3 min. Intensity : 41.0 mm/hr

Generated at : 11/7/2019 2:02:23 PM

*** SUMMARY OSD DESIGN REPORT ***
==========

Printed from *OSD4W* version 1.08.4 S/N # W5-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera
==========

1. CLIENT DETAILS
Name : Metro Property Development
Address line 1 : ClientDet1.....
Address line 2 : ClientDet2.....
Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
Job Reference : OSD4W-2008-001
Job Name : JobName.....
Job Detail 1 : JobAddress1.....
Job Detail 2 : JobAddress2.....
Job Detail 3 : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
Total Site area : 2049

4. EXISTING SITE DETAILS
Aes1 : 2049 Ces1 : 0.35
Aes2 : 0 Ces2 : 0.30
Aes3 : 0 Ces3 : 0.15
Aes4 : 0 Ces4 : 0.12
Weighted C - site Cew : 0.35

5. PROPOSED SITE DETAILS
Aps1 : 2049 Cps1 : 0.90
Aps2 : 0 Cps2 : 0.30
Aps3 : 0 Cps3 : 0.15
Aps4 : 0 Cps4 : 0.12
Weighted C - site Cpw : 0.90
Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)
Time of concentration : 10.00
Travel time from discharge point
to catchment outlet : 5.00

7. OSD DESIGN
Flow Control Device : Control Pit
Storage type : Tank
Rainfall zone : MELBOURNE
ARI for OUTFLOW (years) : 5
ARI for STORAGE (years) : 10
Qptot (L/s) : 12.98
Qu (L/s) : 0.00
Qp (L/s) : 0.00
Calculated PSD (L/s) : 16.08
Nominated PSD (L/s) : -----
Adopted PSD (L/s) : 16.08

8. STORAGE DETAILS
Volume (cub.m.) : 24.22
Time to fill storage (mins) : 24.8
Time to empty storage (mins) : 77.8
Critical storm duration (mins) : 33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
PSD ..... Duration : 10.0 min. Intensity : 65.2 mm/hr
MAX. STORAGE ..... Duration : 33.3 min. Intensity : 41.0 mm/hr

==========
==========
Generated at : 11/7/2019 2:02:50 PM

*** SUMMARY OSD DESIGN REPORT ***

Printed from *OSD4W* version 1.08.4 S/N # W5-04201
Licensed to : The O'Neill Group
Prepared by : Allan Pedrera

1. CLIENT DETAILS
   Name : Metro Property Development
   Address line 1 : ClientDet1.....
   Address line 2 : ClientDet2.....
   Address line 3 : ClientDet3.....

2. JOB NAME AND REFERENCE
   Job Reference : OSD4W-2008-001
   Job Name : JobName.....
   Job Detail 1 : JobAddress1.....
   Job Detail 2 : JobAddress2.....
   Job Detail 3 : JobAddress3.....

3. AREAS (sq.m.) & RUN-OFF COEFFICIENTS
   Total Site area : 3198

4. EXISTING SITE DETAILS
   Aes1 : 3198 Ces1 : 0.35
   Aes2 : 0 Ces2 : 0.30
   Aes3 : 0 Ces3 : 0.15
   Aes4 : 0 Ces4 : 0.12
   Weighted C - site Cew : 0.35

5. PROPOSED SITE DETAILS
   Aps1 : 3198 Cps1 : 0.90
   Aps2 : 0 Cps2 : 0.30
   Aps3 : 0 Cps3 : 0.15
   Aps4 : 0 Cps4 : 0.12
   Weighted C - site Cpw : 0.90
   Uncontrolled portion(s) UPfrac : 0.00

6. CATCHMENT TIMES (minutes)
   Time of concentration : 10.00
   Travel time from discharge point
   to catchment outlet : 5.00

7. OSD DESIGN
   Flow Control Device : Control Pit
   Storage type : Tank
   Rainfall zone : MELBOURNE
   ARI for OUTFLOW (years) : 5
   ARI for STORAGE (years) : 10
   Qptot (L/s) : 20.26
   Qu (L/s) : 0.00
   Qp (L/s) : 0.00
   Calculated PSD (L/s) : 25.10
   Nominated PSD (L/s) : -----
   Adopted PSD (L/s) : 25.10

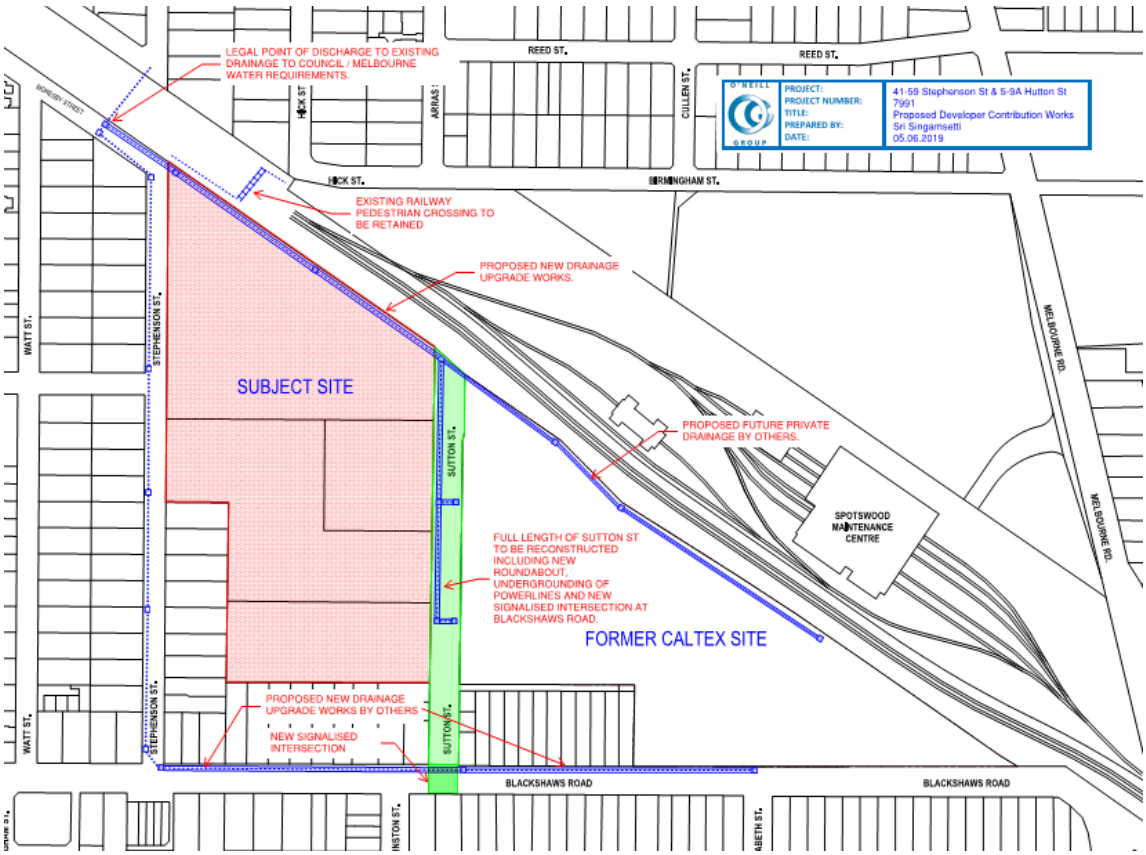
8. STORAGE DETAILS
   Volume (cub.m.) : 37.80
   Time to fill storage (mins) : 24.8
   Time to empty storage (mins) : 77.8
   Critical storm duration (mins) : 33.3

9. STORM DURATIONS & RAINFALL INTENSITIES
   PSD ..... Duration : 10.0 min. Intensity : 65.2 mm/hr
   MAX. STORAGE ..... Duration : 33.3 min. Intensity : 41.0 mm/hr

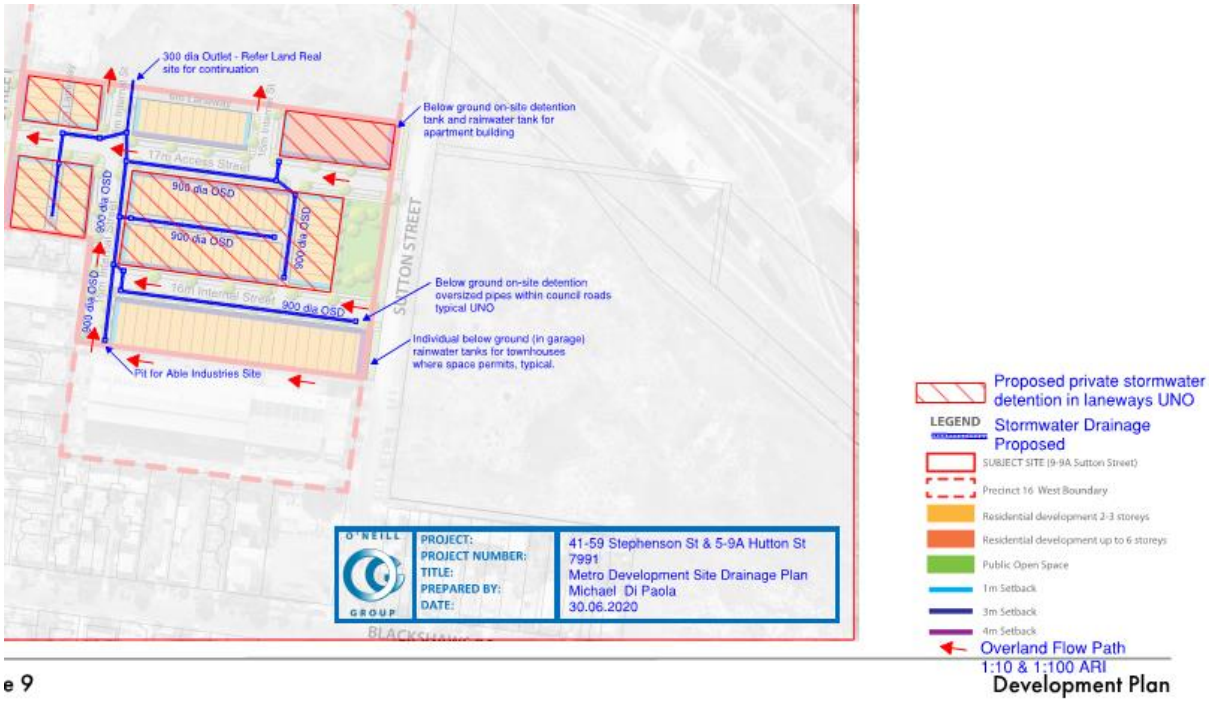
Generated at : 11/7/2019 2:03:21 PM


Design Response
Catchment Area
1 = 993 m2
2 = 1,456 m2
3 = 1,368 m2
4 = 1,368 m2
5 = 3,627 m2
6 = 2,049 m2
7 = 5,198 m2
Private detention system located in laneways
(Common Property). Proposed oversized pipes.
Public detention system managed by Council.
Proposed oversized pipes in road reserve as per Land Real site.
15156/TP02
Townhouse Development
Design Response
Clarke Hopkins Clarke

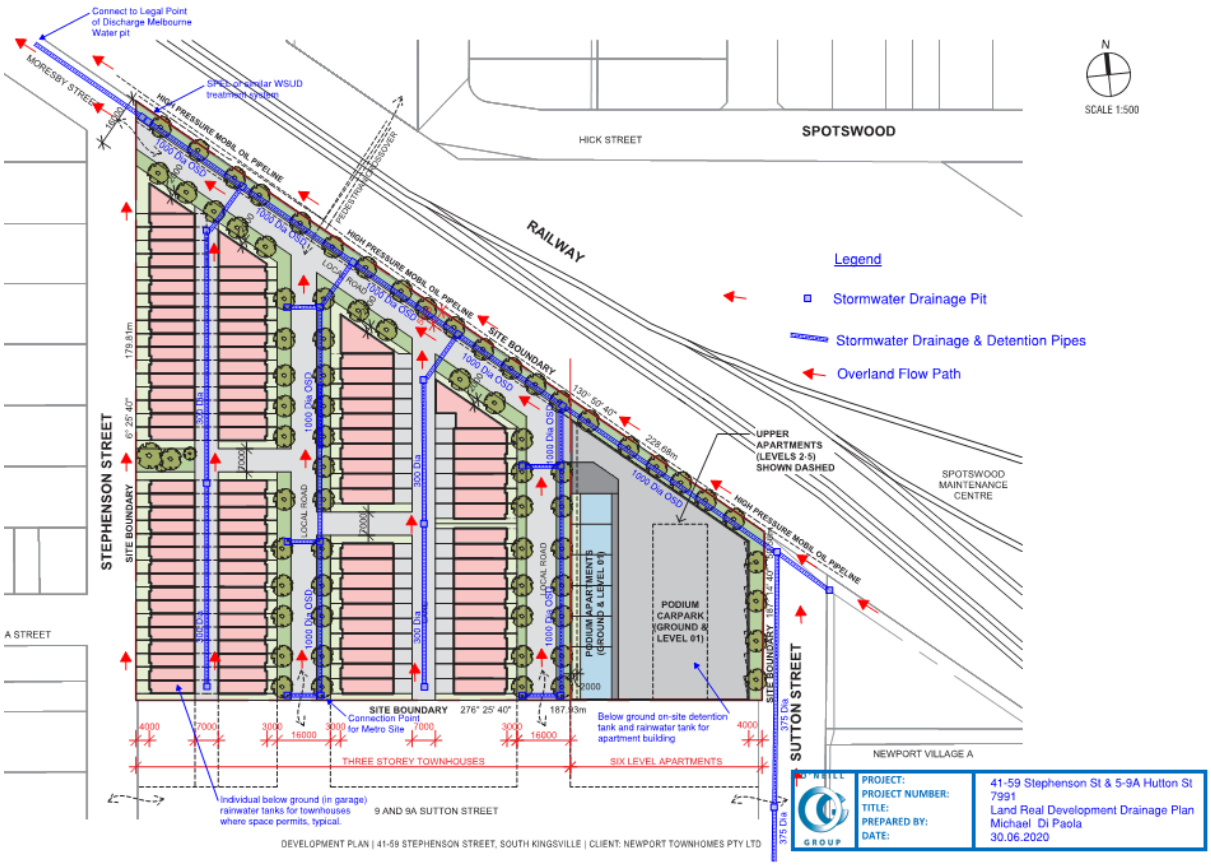
## APPENDIX 2 - OVERALL STORMWATER DRAINAGE CONCEPT PLAN




## APPENDIX 3 - METRO DEVELOPMENT STORMWATER DRAINAGE CONCEPT PLAN



## APPENDIX 4 - LAND REAL DEVELOPMENT STORMWATER DRAINAGE CONCEPT PLAN




## APPENDIX 5 - STORMWATER PROPOSAL FOR ADJOINING SITE (PRECINCT 16 EAST)