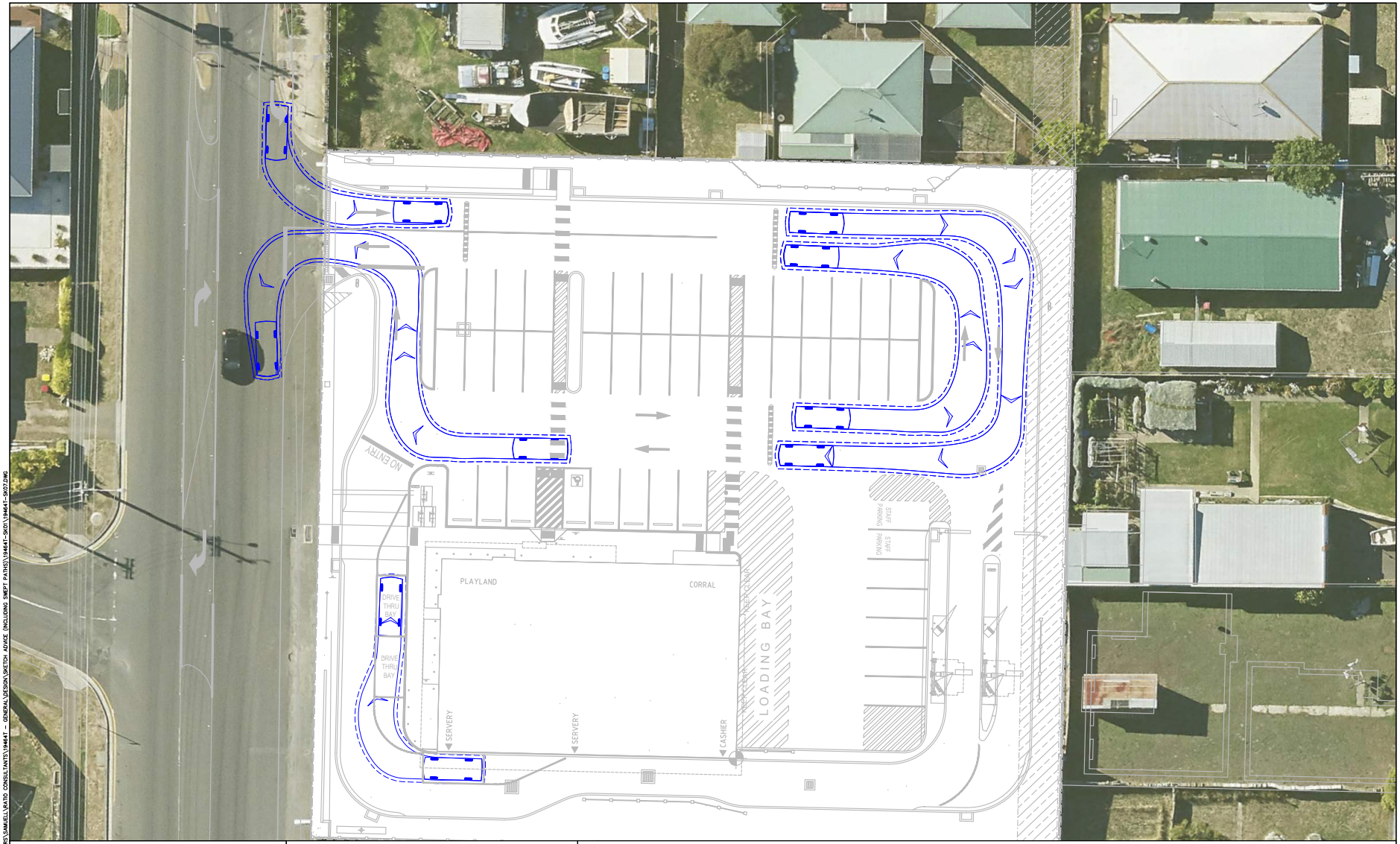

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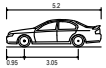
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

B99 Vehicle (AS/NZS2890.1:2004)



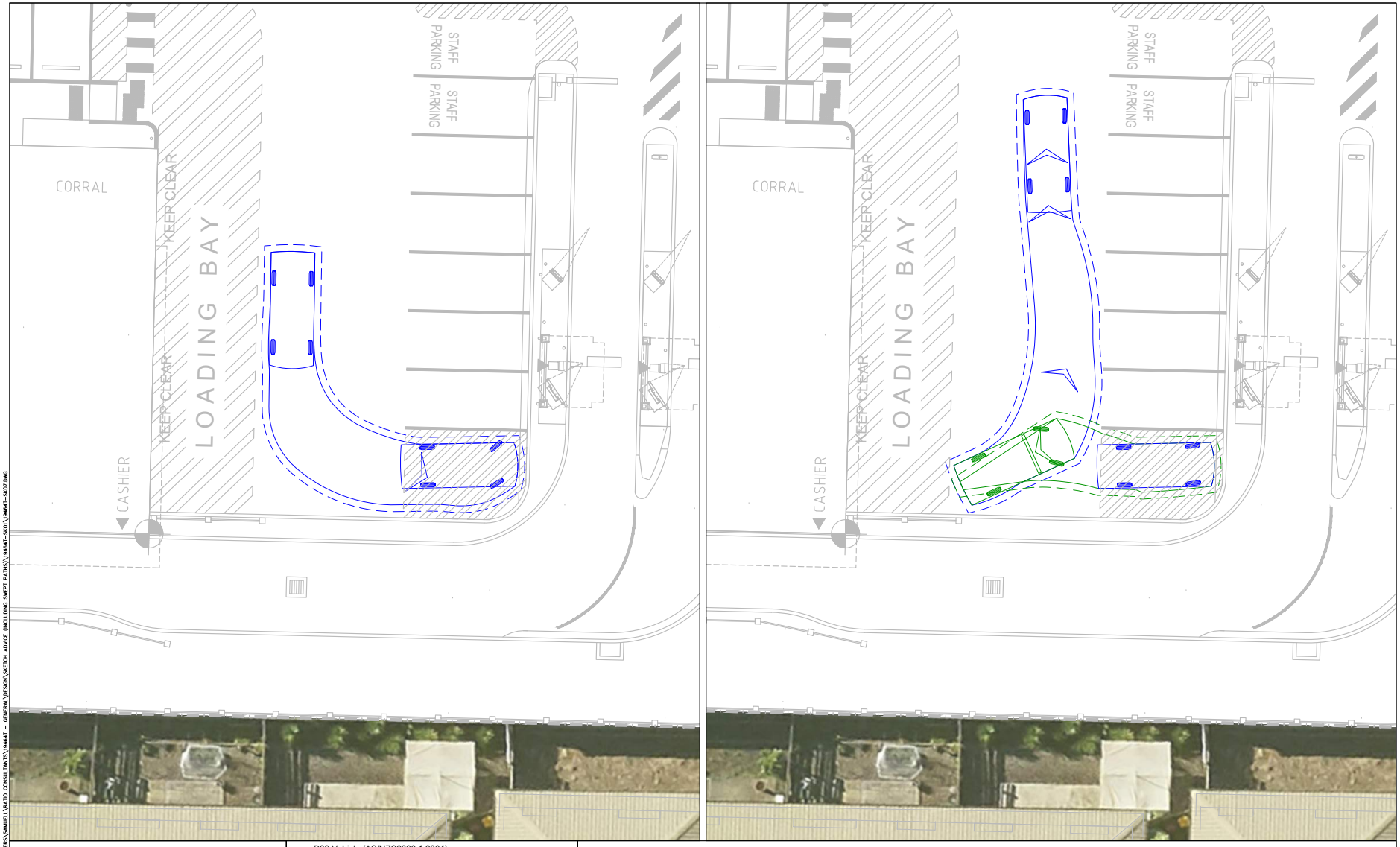
VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	2 of 9	1:300 @ A3	24/05/2024



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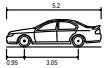
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

B99 Vehicle (AS/NZS2890.1:2004)



VEHICLE ENVELOPE (FORWARD)	
300mm CLEARANCE (FORWARD)	
VEHICLE ENVELOPE (REVERSE)	
300mm CLEARANCE (REVERSE)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
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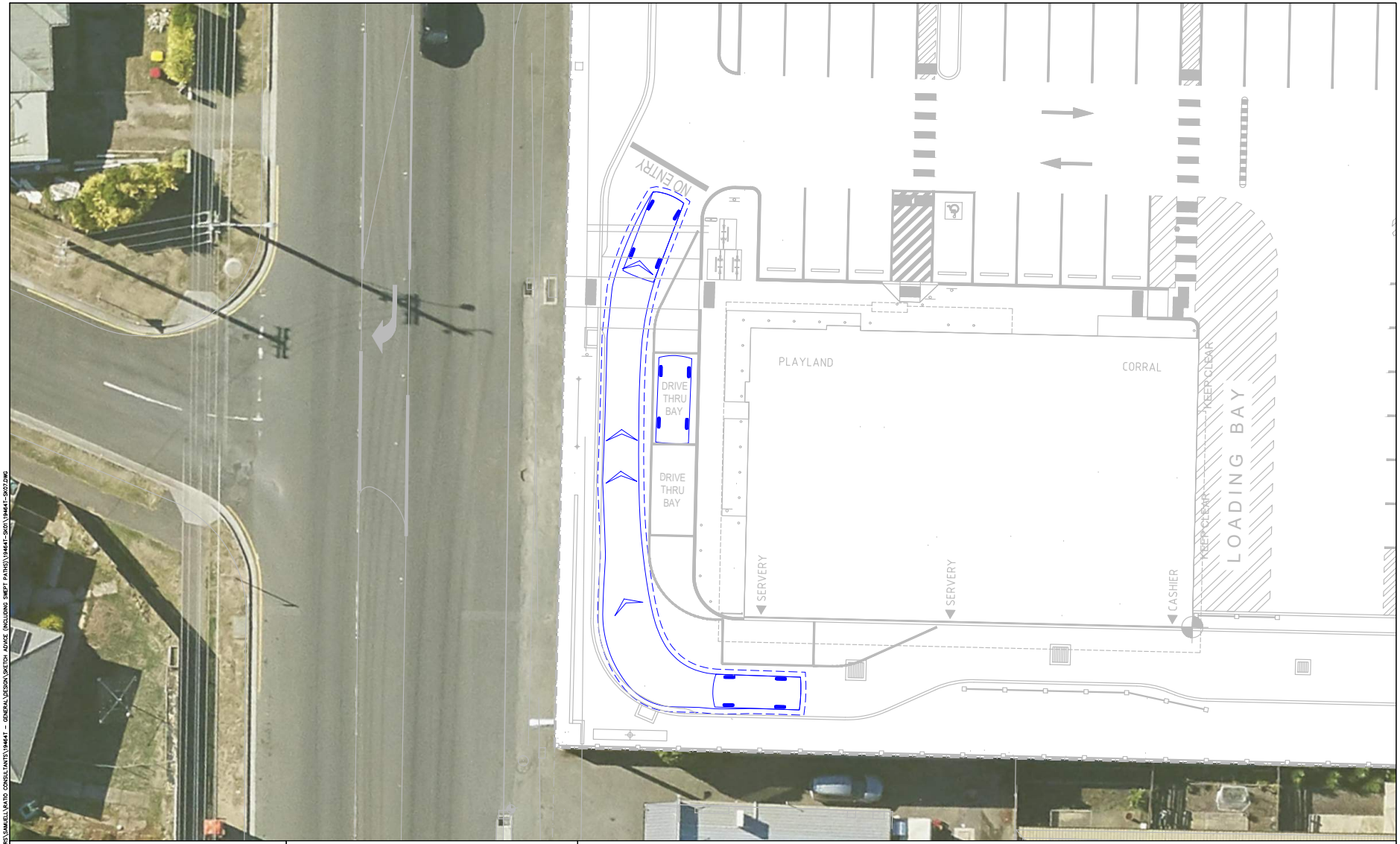

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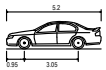
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

B99 Vehicle (AS/NZS2890.1:2004)



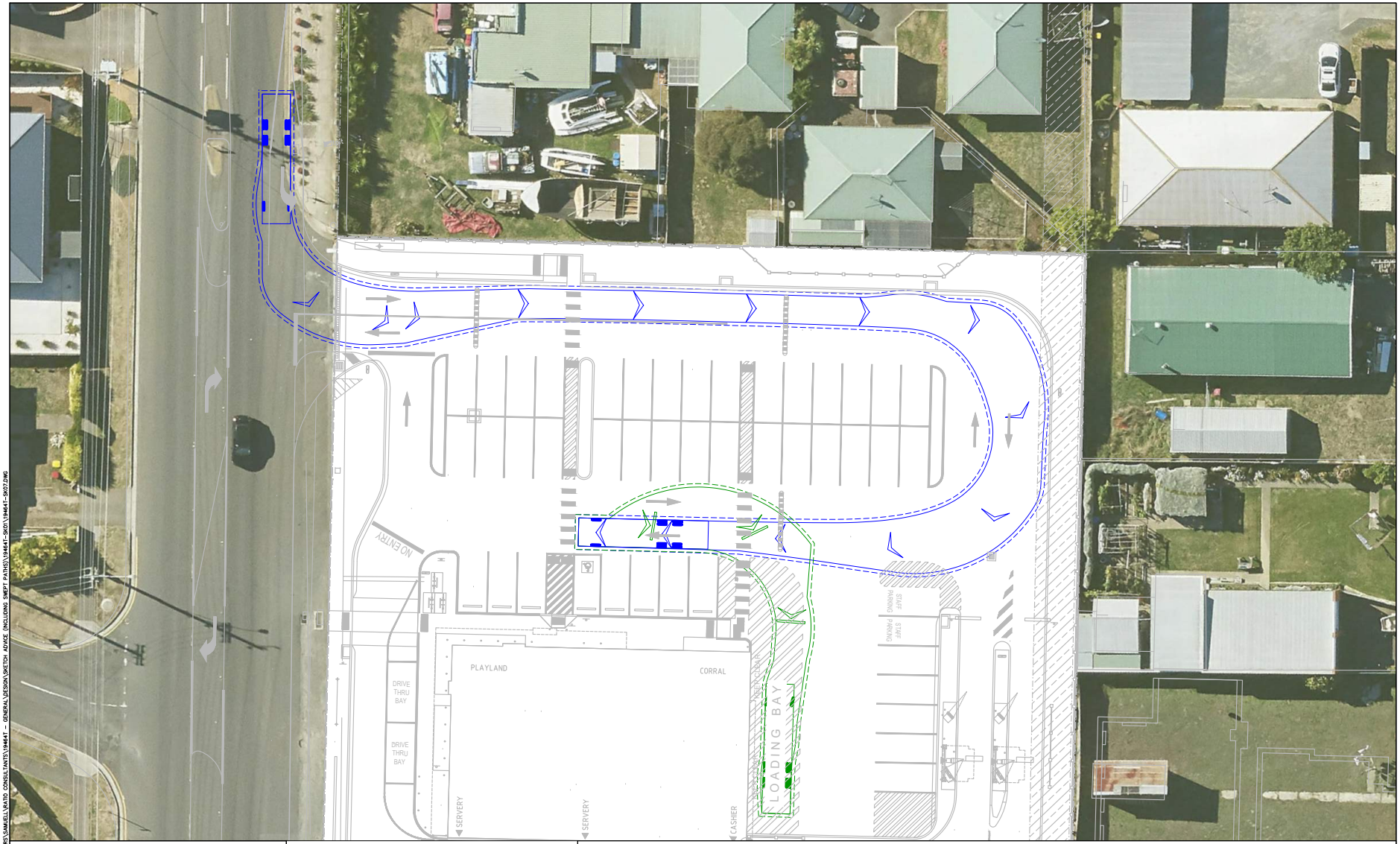
VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	4 of 9	1:300 @ A3	24/05/2024



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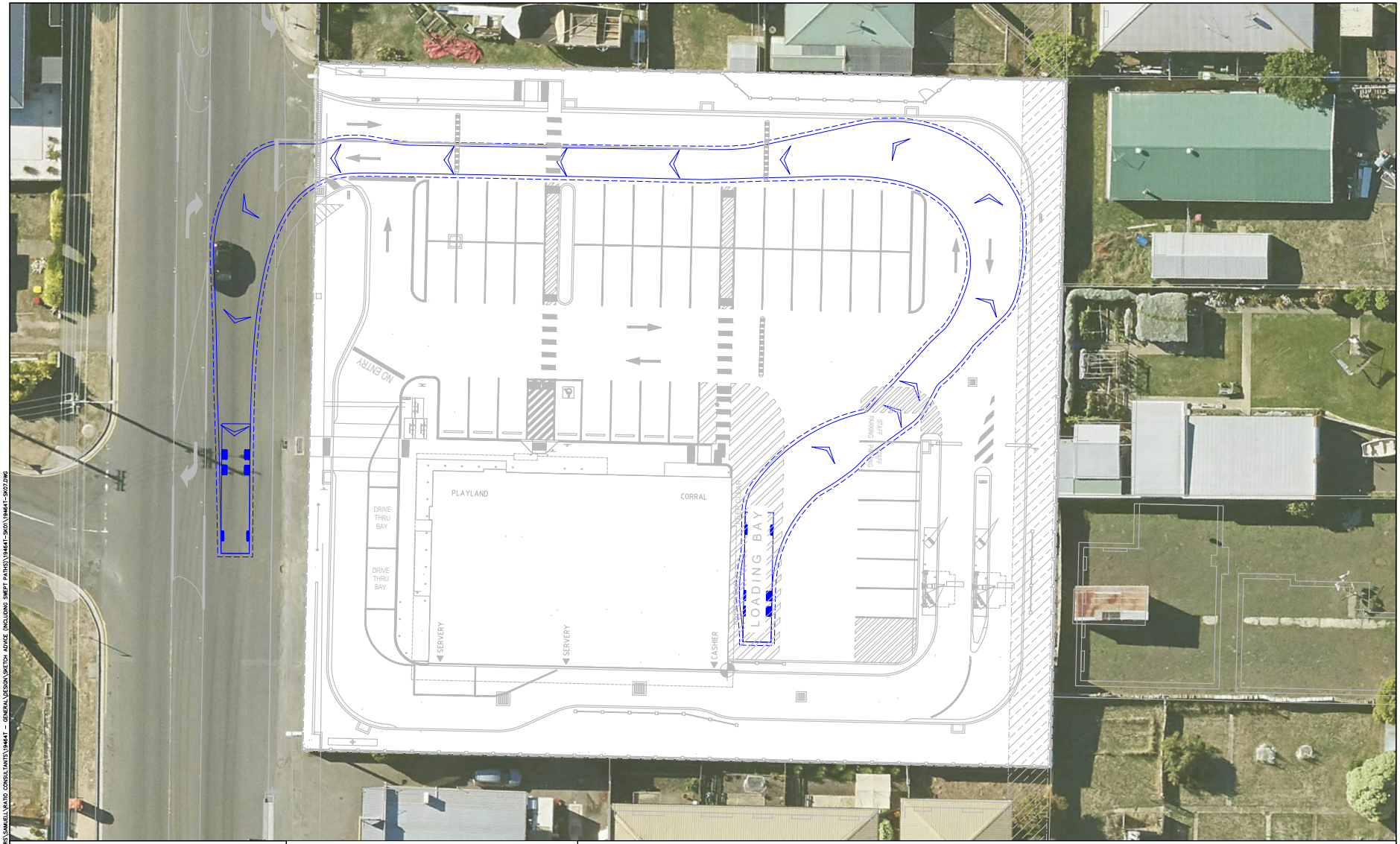
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

Proposed McDonalds Development
345–347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment – 14 Pallet Rigid Truck Ingress

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	5 of 9	1:300 @ A3	24/05/2024



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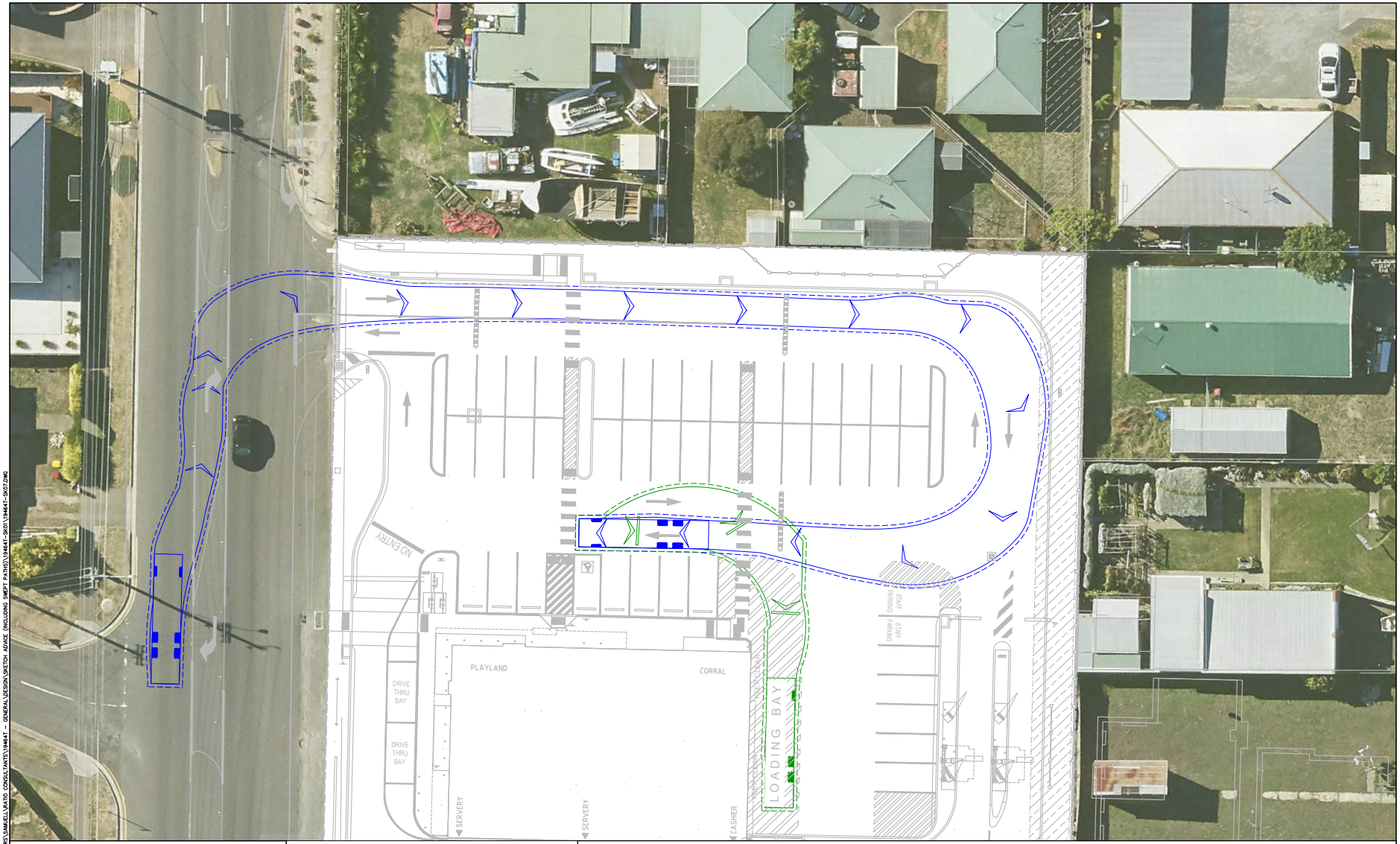
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment - 14 Pallet Rigid Truck Egress

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	6 of 9	1:300 @ A3	24/05/2024



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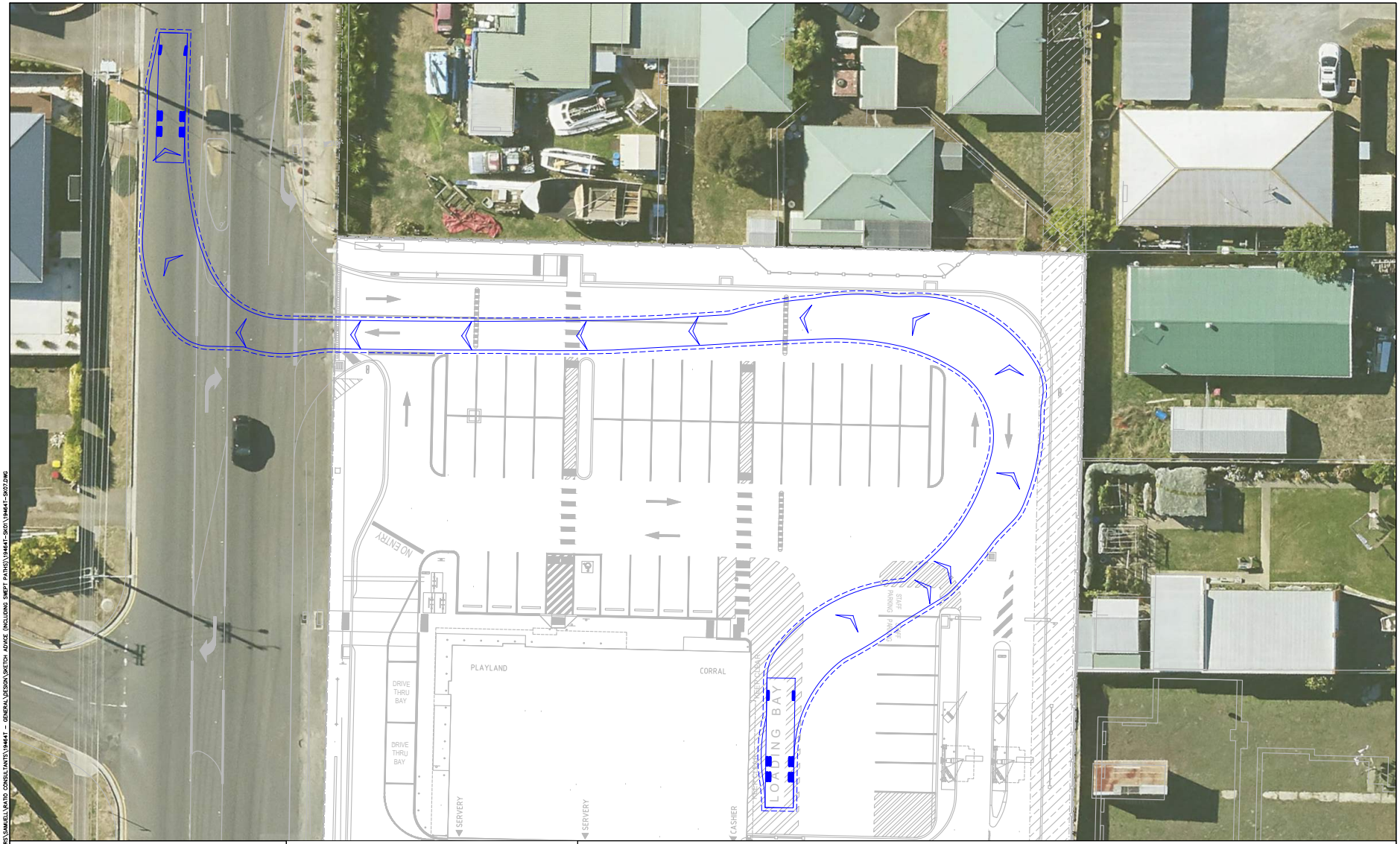
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment - 14 Pallet Rigid Truck Ingress

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	7 of 9	1:300 @ A3	24/05/2024



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ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

Proposed McDonalds Development
345–347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment – 14 Pallet Rigid Truck Ingress

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	8 of 9	1:300 @ A3	24/05/2024

C:\USERS\SAMUELL\RATIO CONSULTANTS\194647 - GENERAL\DESIGN\SKETCH ADVICE (INCLUDING SWEPT PATHS)\19464T-SK01\19464T-SK07.DWG
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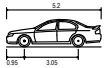
ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

B99 Vehicle (AS/NZS2890.1:2004)



VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

Proposed McDonalds Development
345-347 Westbury Road, Prospect Vale, TAS
Swept Path Assessment

NOTE:
1) Base Plan Received on 29/04/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	SCALE	DATE
19464T-SK07/SL	9 of 9	1:300 @ A3	24/05/2024

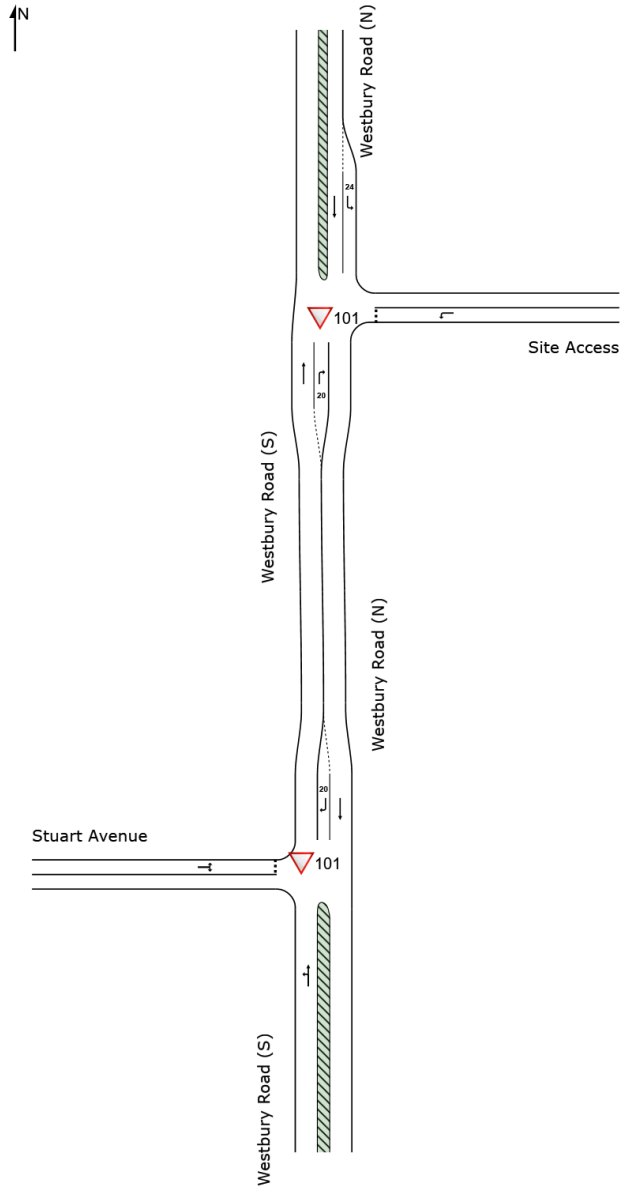
Appendix E - SIDRA Modelling Results – Post Development Conditions

NETWORK LAYOUT

Network: N101 [2024 Post Development - Friday (Network Folder: 2024 Post Development)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access
▽101	NA	Westbury Road / Stuart Avenue

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Wednesday, May 22, 2024 8:56:11 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access (Site Folder: 2024 Post Development - Friday)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2024 Post Development - Friday (Network Folder: 2024 Post Development)]

Westbury Road / Site Access - 2024 - Friday Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	680	5.0	680	5.0	0.331	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	45	0.0	45	0.0	0.071	6.8	LOS A	0.1	0.7	0.58	0.76	0.58	46.2
Approach			725	4.7	725	4.7	0.331	0.4	NA	0.1	0.7	0.04	0.05	0.04	58.7
East: Site Access															
4	L2	All MCs	89	0.0	89	0.0	0.143	9.6	LOS A	0.2	1.4	0.57	0.82	0.57	45.7
Approach			89	0.0	89	0.0	0.143	9.6	LOS A	0.2	1.4	0.57	0.82	0.57	45.7
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	628	5.0	628	5.0	0.329	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			673	4.7	673	4.7	0.329	0.5	NA	0.0	0.0	0.00	0.04	0.00	58.9
All Vehicles			1487	4.4	1487	4.4	0.331	1.0	NA	0.2	1.4	0.05	0.09	0.05	57.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Processed: Wednesday, May 22, 2024 8:55:37 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue (Site Folder: 2024 Post Development - Friday)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2024 Post Development - Friday (Network Folder: 2024 Post Development)]

Westbury Road / Stuart Avenue - 2024 Friday Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	32	0.0	32	0.0	0.339	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.1
2	T1	All MCs	665	5.0	665	5.0	0.339	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.3
Approach			697	4.8	697	4.8	0.339	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.1
North: Westbury Road (N)															
8	T1	All MCs	701	5.0	701	5.0	0.341	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	33	0.0	33	0.0	0.041	6.0	LOS A	0.1	0.4	0.59	0.72	0.59	47.1
Approach			734	4.8	734	4.8	0.341	0.3	NA	0.1	0.4	0.03	0.03	0.03	59.1
West: Stuart Avenue															
10	L2	All MCs	60	0.0	60	0.0	0.276	10.0	LOS A	0.4	2.8	0.79	0.95	0.92	37.9
12	R2	All MCs	26	0.0	26	0.0	0.276	36.4	LOS E	0.4	2.8	0.79	0.95	0.92	44.8
Approach			86	0.0	86	0.0	0.276	18.0	LOS C	0.4	2.8	0.79	0.95	0.92	40.8
All Vehicles			1517	4.5	1517	4.5	0.341	1.3	NA	0.4	2.8	0.06	0.08	0.06	57.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

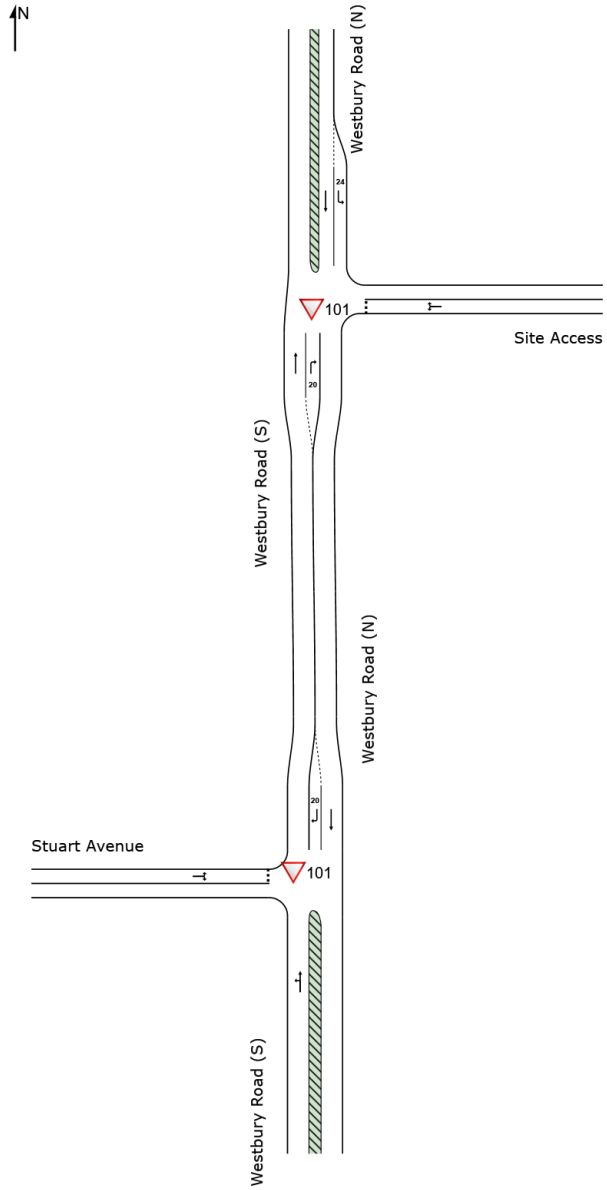
Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Processed: Wednesday, May 22, 2024 8:55:37 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

NETWORK LAYOUT

Network: N101 [2024 Post Development - Saturday (Network Folder: 2024 Post Development)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access
▽101	NA	Westbury Road / Stuart Avenue

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Wednesday, May 22, 2024 8:56:13 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access (Site Folder: 2024 Post Development - Saturday)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2024 Post Development - Saturday (Network Folder: 2024 Post Development)]

Westbury Road / Site Access - 2024 - Saturday Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	509	5.0	509	5.0	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	All MCs	45	0.0	45	0.0	0.058	5.6	LOS A	0.1	0.6	0.52	0.69	0.52	47.6
Approach			555	4.6	555	4.6	0.248	0.5	NA	0.1	0.6	0.04	0.06	0.04	58.6
East: Site Access															
4	L2	All MCs	45	0.0	45	0.0	0.276	9.4	LOS A	0.4	3.0	0.75	0.93	0.87	38.5
6	R2	All MCs	44	0.0	44	0.0	0.276	25.4	LOS D	0.4	3.0	0.75	0.93	0.87	45.2
Approach			89	0.0	89	0.0	0.276	17.3	LOS C	0.4	3.0	0.75	0.93	0.87	42.7
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	501	5.0	501	5.0	0.263	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			545	4.6	545	4.6	0.263	0.5	NA	0.0	0.0	0.00	0.05	0.00	58.7
All Vehicles			1189	4.2	1189	4.2	0.276	1.8	NA	0.4	3.0	0.08	0.12	0.09	56.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Processed: Wednesday, May 22, 2024 8:55:41 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue (Site Folder: 2024 Post Development - Saturday)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2024 Post Development - Saturday (Network Folder: 2024 Post Development)]

Westbury Road / Stuart Avenue - 2024 Saturday Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	18	0.0	18	0.0	0.263	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.2
2	T1	All MCs	522	5.0	522	5.0	0.263	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Approach			540	4.8	540	4.8	0.263	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.3
North: Westbury Road (N)															
8	T1	All MCs	542	5.0	542	5.0	0.264	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	All MCs	20	0.0	20	0.0	0.020	4.8	LOS A	0.0	0.2	0.52	0.62	0.52	48.5
Approach			562	4.8	562	4.8	0.264	0.2	NA	0.0	0.2	0.02	0.02	0.02	59.4
West: Stuart Avenue															
10	L2	All MCs	33	0.0	33	0.0	0.068	7.7	LOS A	0.1	0.7	0.60	0.75	0.60	45.3
12	R2	All MCs	8	0.0	8	0.0	0.068	19.4	LOS C	0.1	0.7	0.60	0.75	0.60	49.6
Approach			41	0.0	41	0.0	0.068	10.1	LOS B	0.1	0.7	0.60	0.75	0.60	46.6
All Vehicles			1143	4.7	1143	4.7	0.264	0.6	NA	0.1	0.7	0.03	0.05	0.03	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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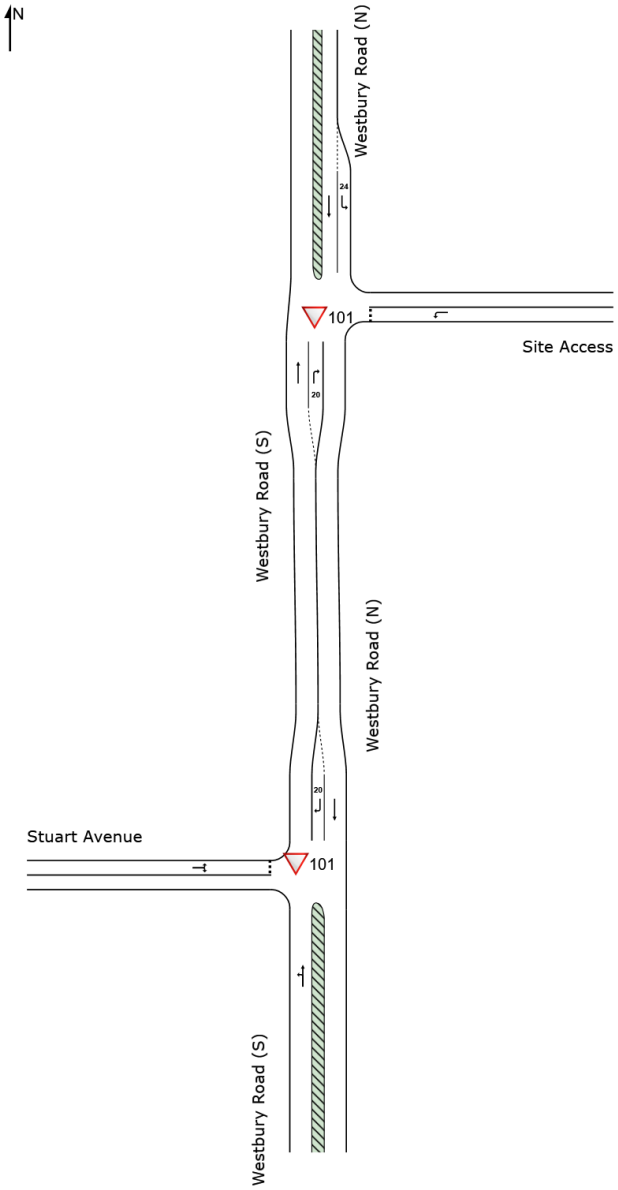
Appendix F - SIDRA Modelling Results – Future Year Conditions (1.0% Growth)

NETWORK LAYOUT

Network: N101 [2034 Post Development - Friday 1% (Network Folder: 2034 Post Development - 1%)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access
▽101	NA	Westbury Road / Stuart Avenue

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Wednesday, May 22, 2024 8:57:16 PM
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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue (Site Folder: 2034 Post Development - Friday - 1%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Friday 1% (Network Folder: 2034 Post Development - 1%)]

Westbury Road / Stuart Avenue - 2034 Friday Peak (1%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	32	0.0	32	0.0	0.369	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.1
2	T1	All MCs	727	5.0	727	5.0	0.369	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.3
Approach			759	4.8	759	4.8	0.369	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.1
North: Westbury Road (N)															
8	T1	All MCs	765	5.0	765	5.0	0.372	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	33	0.0	33	0.0	0.045	6.6	LOS A	0.1	0.5	0.61	0.75	0.61	46.4
Approach			798	4.8	798	4.8	0.372	0.3	NA	0.1	0.5	0.02	0.03	0.02	59.1
West: Stuart Avenue															
10	L2	All MCs	60	0.0	60	0.0	0.351	11.8	LOS B	0.5	3.6	0.85	0.99	1.05	34.5
12	R2	All MCs	26	0.0	26	0.0	0.351	47.8	LOS E	0.5	3.6	0.85	0.99	1.05	42.3
Approach			86	0.0	86	0.0	0.351	22.8	LOS C	0.5	3.6	0.85	0.99	1.05	37.8
All Vehicles			1643	4.5	1643	4.5	0.372	1.5	NA	0.5	3.6	0.06	0.08	0.07	57.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access (Site Folder: 2034 Post Development - Friday - 1%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Friday 1% (Network Folder: 2034 Post Development - 1%)]

Westbury Road / Site Access - 2034 - Friday Peak (1%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	742	5.0	742	5.0	0.361	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	45	0.0	45	0.0	0.079	7.6	LOS A	0.1	0.8	0.62	0.81	0.62	45.4
Approach			787	4.7	787	4.7	0.361	0.4	NA	0.1	0.8	0.04	0.05	0.04	58.7
East: Site Access															
4	L2	All MCs	89	0.0	89	0.0	0.160	10.5	LOS B	0.2	1.5	0.62	0.84	0.62	44.8
Approach			89	0.0	89	0.0	0.160	10.5	LOS B	0.2	1.5	0.62	0.84	0.62	44.8
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	693	5.0	693	5.0	0.363	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			737	4.7	737	4.7	0.363	0.4	NA	0.0	0.0	0.00	0.03	0.00	58.9
All Vehicles			1614	4.4	1614	4.4	0.363	1.0	NA	0.2	1.5	0.05	0.08	0.05	57.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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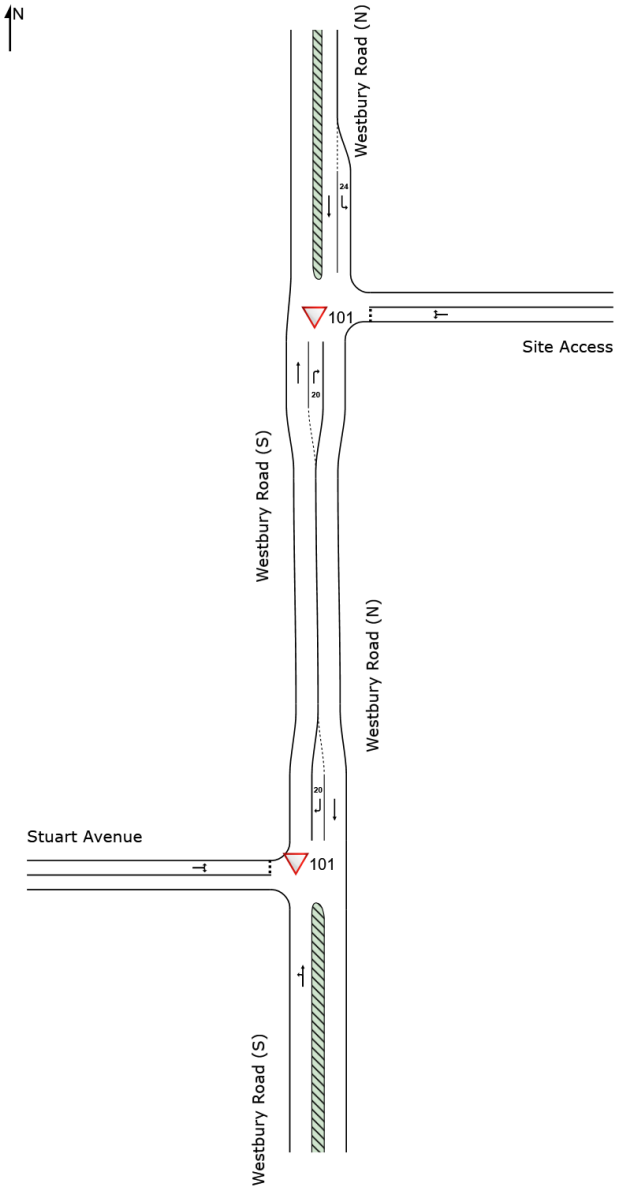
NETWORK LAYOUT

Network: N101 [2034 Post Development - Saturday (1%) (Network Folder: 2034 Post Development - 1%)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access - 1%
▽101	NA	Westbury Road / Stuart Avenue - 1%

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Wednesday, May 22, 2024 8:57:19 PM
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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue - 1% (Site Folder: 2024 Post Development - Saturday - 1%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Saturday (1%) (Network Folder: 2034 Post Development - 1%)]

Westbury Road / Stuart Avenue - 2034 Saturday Peak (1%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	18	0.0	18	0.0	0.288	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.2
2	T1	All MCs	574	5.0	574	5.0	0.288	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Approach			592	4.8	592	4.8	0.288	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.4
North: Westbury Road (N)															
8	T1	All MCs	594	5.0	594	5.0	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	20	0.0	20	0.0	0.021	5.2	LOS A	0.0	0.2	0.54	0.64	0.54	48.1
Approach			614	4.8	614	4.8	0.289	0.2	NA	0.0	0.2	0.02	0.02	0.02	59.4
West: Stuart Avenue															
10	L2	All MCs	33	0.0	33	0.0	0.077	8.0	LOS A	0.1	0.8	0.63	0.79	0.63	44.2
12	R2	All MCs	8	0.0	8	0.0	0.077	22.9	LOS C	0.1	0.8	0.63	0.79	0.63	49.0
Approach			41	0.0	41	0.0	0.077	11.1	LOS B	0.1	0.8	0.63	0.79	0.63	45.7
All Vehicles			1246	4.7	1246	4.7	0.289	0.6	NA	0.1	0.8	0.03	0.04	0.03	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access - 1% (Site Folder: 2024 Post Development - Saturday - 1%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Saturday (1%) (Network Folder: 2034 Post Development - 1%)]

Westbury Road / Site Access - 2034 - Saturday Peak (1%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	561	5.0	561	5.0	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	All MCs	45	0.0	45	0.0	0.063	6.0	LOS A	0.1	0.7	0.55	0.72	0.55	47.1
Approach			606	4.6	606	4.6	0.273	0.5	NA	0.1	0.7	0.04	0.05	0.04	58.7
East: Site Access															
4	L2	All MCs	45	0.0	45	0.0	0.333	10.8	LOS B	0.5	3.6	0.80	0.97	0.99	35.8
6	R2	All MCs	44	0.0	44	0.0	0.333	31.4	LOS D	0.5	3.6	0.80	0.97	0.99	43.3
Approach			89	0.0	89	0.0	0.333	21.0	LOS C	0.5	3.6	0.80	0.97	0.99	40.4
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	554	5.0	554	5.0	0.290	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			598	4.6	598	4.6	0.290	0.5	NA	0.0	0.0	0.00	0.04	0.00	58.8
All Vehicles			1294	4.3	1294	4.3	0.333	1.9	NA	0.5	3.6	0.07	0.11	0.09	56.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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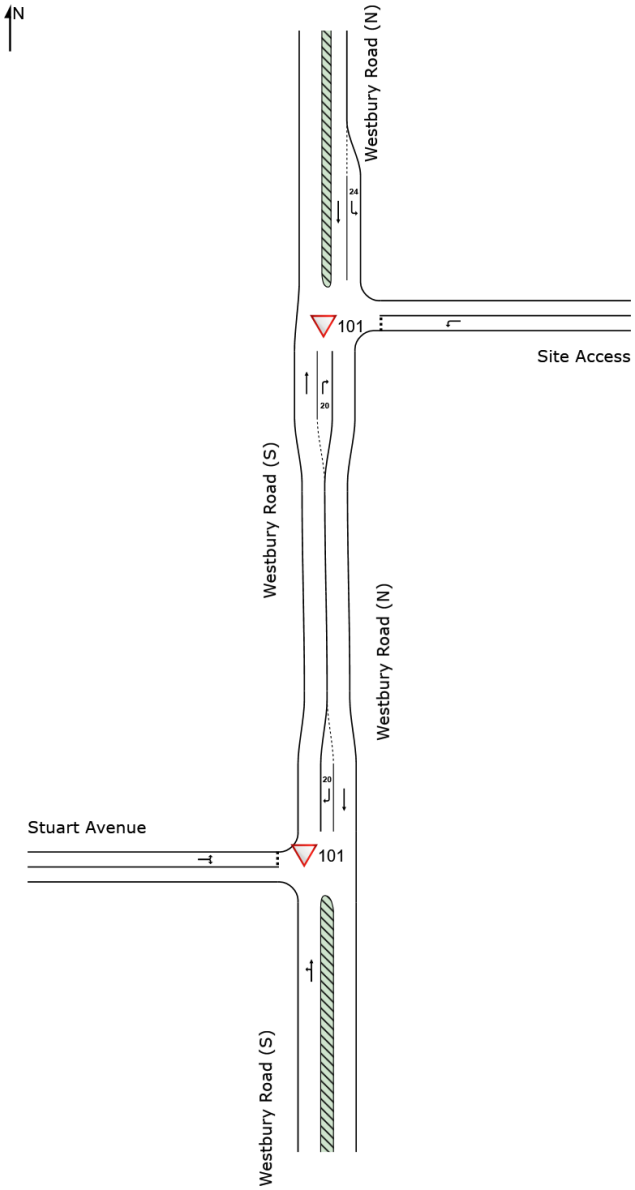
Appendix G - SIDRA Modelling Results – Future Year Conditions (1.9% Growth)

NETWORK LAYOUT

Network: N101 [2034 Post Development - Friday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access - 1.9%
▽101	NA	Westbury Road / Stuart Avenue - 1.9%

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Created: Wednesday, May 22, 2024 8:57:41 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access - 1.9% (Site Folder: 2034 Post Development - Friday - 1.9%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Friday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

Westbury Road / Site Access - 2034 - Friday Peak (1.9%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	803	5.0	803	5.0	0.391	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	45	0.0	45	0.0	0.088	8.4	LOS A	0.1	0.9	0.66	0.84	0.66	44.5
Approach			848	4.7	848	4.7	0.391	0.5	NA	0.1	0.9	0.04	0.04	0.04	58.7
East: Site Access															
4	L2	All MCs	89	0.0	89	0.0	0.179	11.4	LOS B	0.2	1.7	0.67	0.86	0.67	43.9
Approach			89	0.0	89	0.0	0.179	11.4	LOS B	0.2	1.7	0.67	0.86	0.67	43.9
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	755	5.0	755	5.0	0.396	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Approach			799	4.7	799	4.7	0.396	0.4	NA	0.0	0.0	0.00	0.03	0.00	58.9
All Vehicles			1737	4.5	1737	4.5	0.396	1.0	NA	0.2	1.7	0.05	0.08	0.05	57.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue - 1.9% (Site Folder: 2034 Post Development - Friday - 1.9%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N101 [2034 Post Development - Friday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

Westbury Road / Stuart Avenue - 2034 Friday Peak (1.9%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	32	0.0	32	0.0	0.406	5.7	LOS A	0.0	0.0	0.00	0.02	0.00	57.1
2	T1	All MCs	803	5.0	803	5.0	0.406	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.3
Approach			835	4.8	835	4.8	0.406	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.1
North: Westbury Road (N)															
8	T1	All MCs	827	5.0	827	5.0	0.402	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
9	R2	All MCs	33	0.0	33	0.0	0.051	7.5	LOS A	0.1	0.5	0.66	0.81	0.66	45.5
Approach			860	4.8	860	4.8	0.402	0.3	NA	0.1	0.5	0.03	0.03	0.03	59.0
West: Stuart Avenue															
10	L2	All MCs	60	0.0	60	0.0	0.466	15.8	LOS C	0.7	4.8	0.91	1.05	1.22	29.9
12	R2	All MCs	26	0.0	26	0.0	0.466	66.2	LOS F	0.7	4.8	0.91	1.05	1.22	38.6
Approach			86	0.0	86	0.0	0.466	31.1	LOS D	0.7	4.8	0.91	1.05	1.22	33.4
All Vehicles			1781	4.6	1781	4.6	0.466	1.8	NA	0.7	4.8	0.06	0.08	0.07	56.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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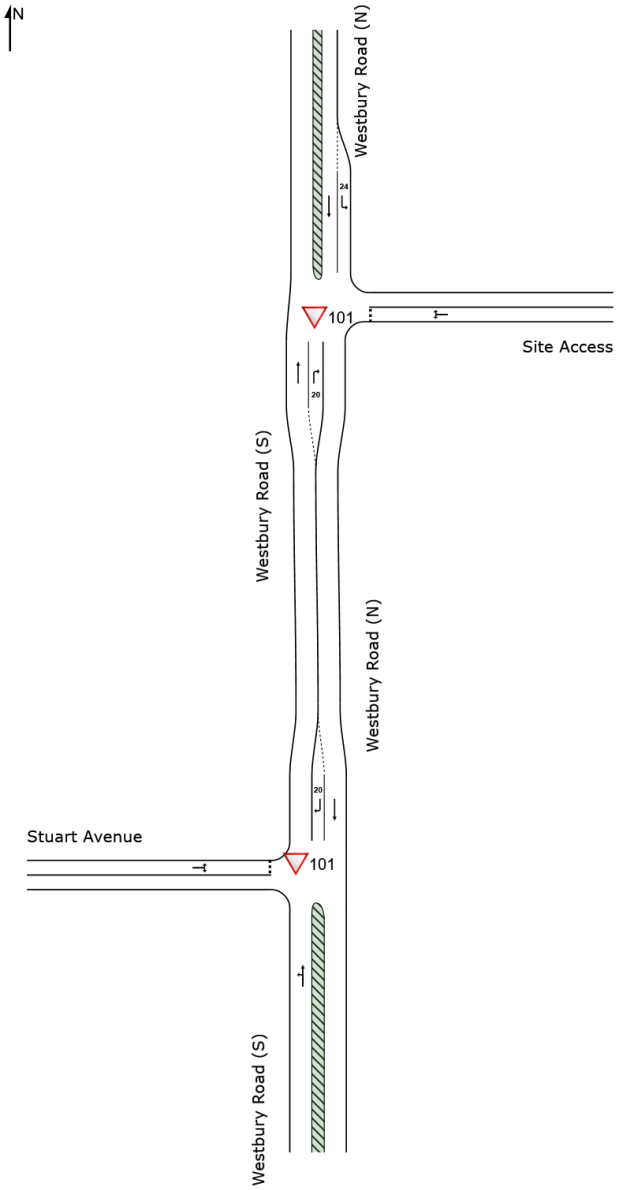
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

NETWORK LAYOUT

Network: N103 [2034 Post Development - Saturday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	Westbury Road / Site Access - 1.9%
▽101	NA	Westbury Road / Stuart Avenue - 1.9%

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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Stuart Avenue - 1.9% (Site Folder: 2034 Post Development - Saturday - 1.9%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N103 [2034 Post Development - Saturday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

Westbury Road / Stuart Avenue - 2034 Saturday Peak (1.9%)
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
1	L2	All MCs	18	0.0	18	0.0	0.320	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.2
2	T1	All MCs	640	5.0	640	5.0	0.320	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Approach			658	4.9	658	4.9	0.320	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.4
North: Westbury Road (N)															
8	T1	All MCs	645	5.0	645	5.0	0.314	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
9	R2	All MCs	20	0.0	20	0.0	0.023	5.6	LOS A	0.0	0.3	0.57	0.68	0.57	47.5
Approach			665	4.8	665	4.8	0.314	0.2	NA	0.0	0.3	0.02	0.02	0.02	59.4
West: Stuart Avenue															
10	L2	All MCs	33	0.0	33	0.0	0.092	8.5	LOS A	0.1	0.9	0.67	0.84	0.67	42.7
12	R2	All MCs	8	0.0	8	0.0	0.092	28.0	LOS D	0.1	0.9	0.67	0.84	0.67	48.1
Approach			41	0.0	41	0.0	0.092	12.5	LOS B	0.1	0.9	0.67	0.84	0.67	44.4
All Vehicles			1364	4.7	1364	4.7	0.320	0.6	NA	0.1	0.9	0.03	0.04	0.03	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Westbury Road / Site Access - 1.9% (Site Folder: 2034 Post Development - Saturday - 1.9%)]

Output produced by SIDRA INTERSECTION Version: 9.1.4.221

Network: N103 [2034 Post Development - Saturday - 1.9% (Network Folder: 2034 Post Development - 1.9%)]

Westbury Road / Site Access - 2034 - Saturday Peak (1.9%)
Site Category: (None)
Give-Way (Two-Way)

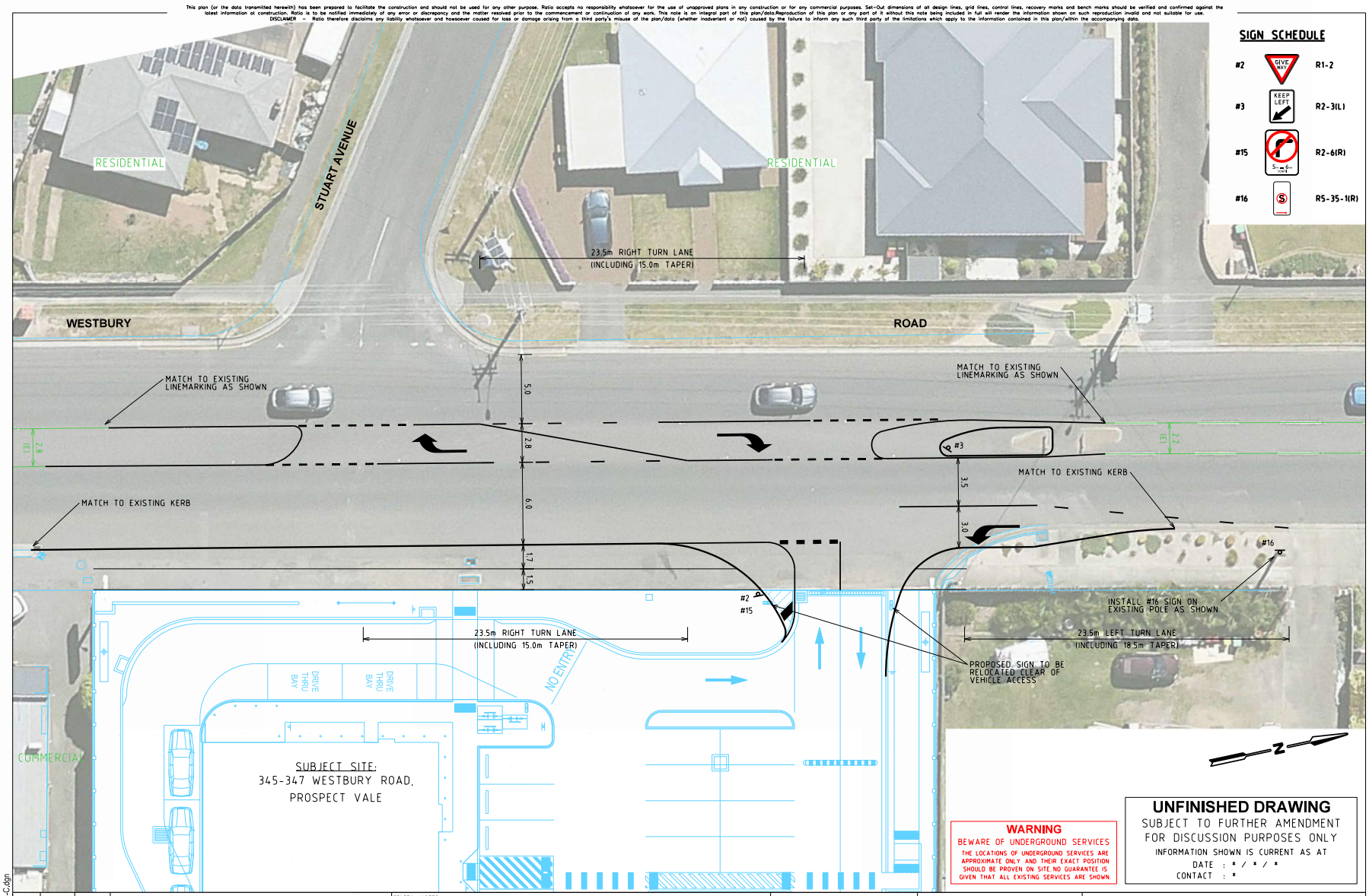
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westbury Road (S)															
2	T1	All MCs	612	5.0	612	5.0	0.298	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	All MCs	45	0.0	45	0.0	0.068	6.6	LOS A	0.1	0.7	0.57	0.75	0.57	46.5
Approach			657	4.7	657	4.7	0.298	0.5	NA	0.1	0.7	0.04	0.05	0.04	58.7
East: Site Access															
4	L2	All MCs	45	0.0	45	0.0	0.405	12.9	LOS B	0.6	4.4	0.85	1.01	1.12	32.7
6	R2	All MCs	44	0.0	44	0.0	0.405	39.3	LOS E	0.6	4.4	0.85	1.01	1.12	40.9
Approach			89	0.0	89	0.0	0.405	25.9	LOS D	0.6	4.4	0.85	1.01	1.12	37.6
North: Westbury Road (N)															
7	L2	All MCs	44	0.0	44	0.0	0.024	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	52.9
8	T1	All MCs	604	5.0	604	5.0	0.317	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			648	4.7	648	4.7	0.317	0.5	NA	0.0	0.0	0.00	0.04	0.00	58.8
All Vehicles			1395	4.4	1395	4.4	0.405	2.1	NA	0.6	4.4	0.07	0.11	0.09	56.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: RATIO CONSULTANTS PTY LTD | Licence: PLUS / 1PC | Processed: Wednesday, May 22, 2024 8:55:57 PM
Project: C:\Users\samuell\Ratio Consultants\19464T - General\Work\Analysis\SIDRA\19464T - SIDRA Analysis - Recreated.sip9

Appendix H – Concept Layout Plan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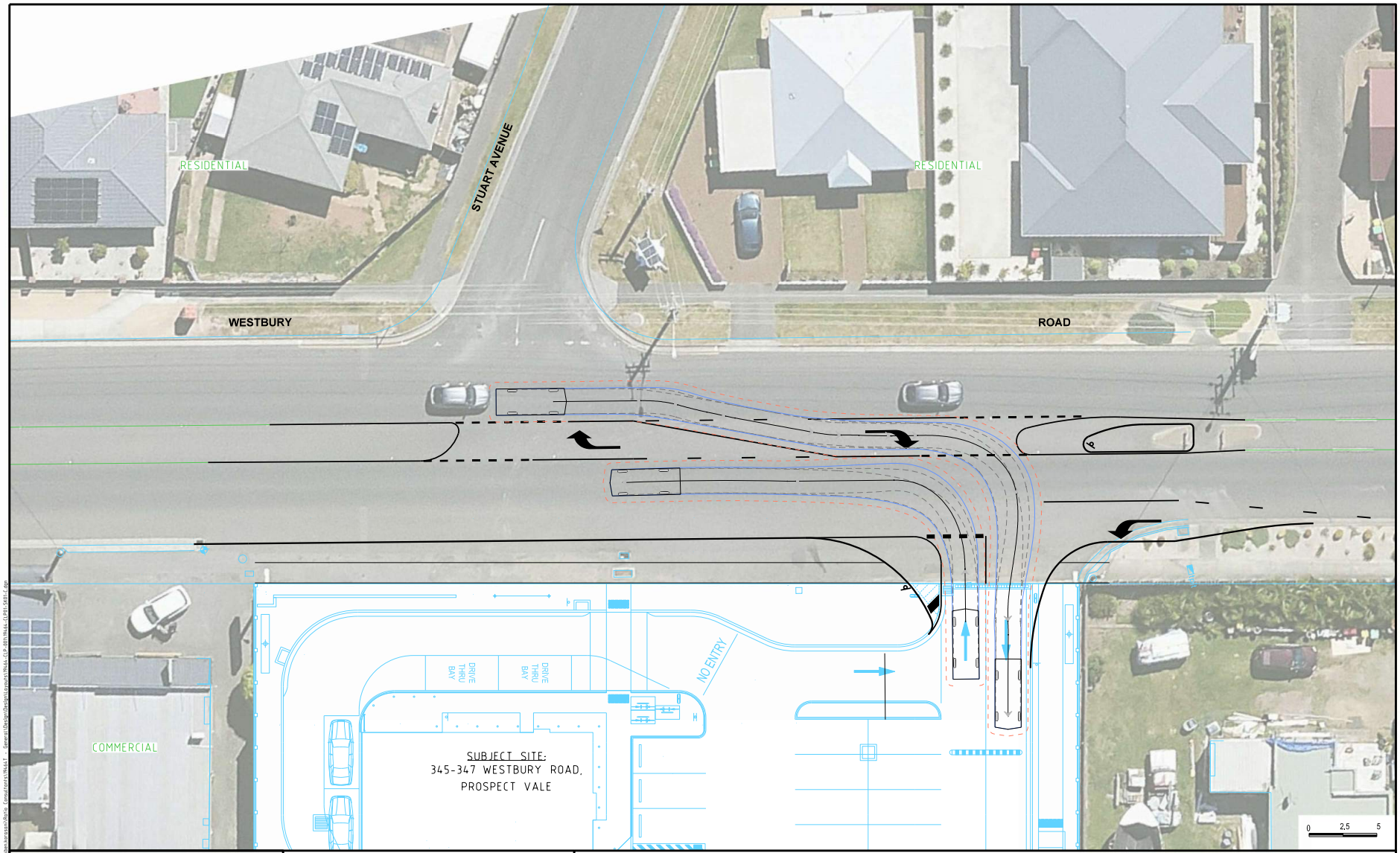
SIGN SCHEDULE
#2 GIVE WAY R1-2
#3 KEEP LEFT R2-3(L)
#15 R2-6(R)
#16 R5-35-1(R)
RESIDENTIAL
STUART AVENUE
RESIDENTIAL
23.5m RIGHT TURN LANE
(INCLUDING 15.0m TAPER)
WESTBURY
ROAD
MATCH TO EXISTING
LINEMARKING AS SHOWN
MATCH TO EXISTING
LINEMARKING AS SHOWN
MATCH TO EXISTING KERB
MATCH TO EXISTING KERB
5.0
2.8
6.0
1.7
1.5
3.5
3.0
2.8
2.2
#2
#15
#3
#16
23.5m RIGHT TURN LANE
(INCLUDING 15.0m TAPER)
NO ENTRY
INSTALL #16 SIGN ON
EXISTING POLE AS SHOWN
23.5m LEFT TURN LANE
(INCLUDING 18.5m TAPER)
PROPOSED SIGN TO BE
RELOCATED CLEAR OF
VEHICLE ACCESS
COMMERCIAL
SUBJECT SITE:
345-347 WESTBURY ROAD,
PROSPECT VALE
WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE.NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.
UNFINISHED DRAWING
SUBJECT TO FURTHER AMENDMENT
FOR DISCUSSION PURPOSES ONLY
INFORMATION SHOWN IS CURRENT AS AT
DATE : * / * / *
CONTACT : *
CAD File: 19464-CLP-001-1-C.dgn
ISSUE | APP'D | DATE | COMMENTS
C | C.G. | 24.05.24 | COUNCIL COMMENTS
B | C.G. | 23.04.24 | COUNCIL COMMENTS
A | C.G. | 13.12.23 | INITIAL ISSUE
GENERAL NOTES
1. AERIAL IMAGERY RECIEVED FROM LANDCHECKER DATED 1/11/2023
2. ARCHITECTURAL BASE PLAN PREPARED BY TIMMINS WHYTE REF No. Xr-site-PV.dwg DATED 16/04/2024
3. ALL DIMENSIONS ARE IN METRES AND MEASURED TO THE INVERT OF KERB AND CHANNEL
4. LOCAL ROAD - WESTBURY ROAD (SPEED ZONE 60KM/H)
- STUART AVENUE (SPEED ZONE 50KM/H)
DESIGNED T. HO 13.12.23
CHECKED S. McKENZIE 13.12.23
AUTHORISED C. GREENLAND 13.12.23
SCALE 1:250 @ A3
0 4 8
ratio:
RATIO CONSULTANTS PTY LTD
ACN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9428 3011
345-347 WESTBURY ROAD, PROSPECT VALE
Meander Valley Council
PROPOSED SITE ACCESS
CONCEPT LAYOUT PLAN
DATE 13.12.2023
SHEET NO. 01 of 06
DRAWING NO. 19464-CLP-001
ISSUE C



ratio:

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CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

5.20
0.95 3.05
PASSENGER–CAR

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.6

VEHICLE ENVELOPE
500mm CLEARANCE
TIRES
CENTRE LINE

345-347 Westbury Road, Prospect Vale
Westbury Road
Swept Path Assessment

NOTE:
1) Base Plan Supplied By Timmins Whyte
2) Swept Path Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
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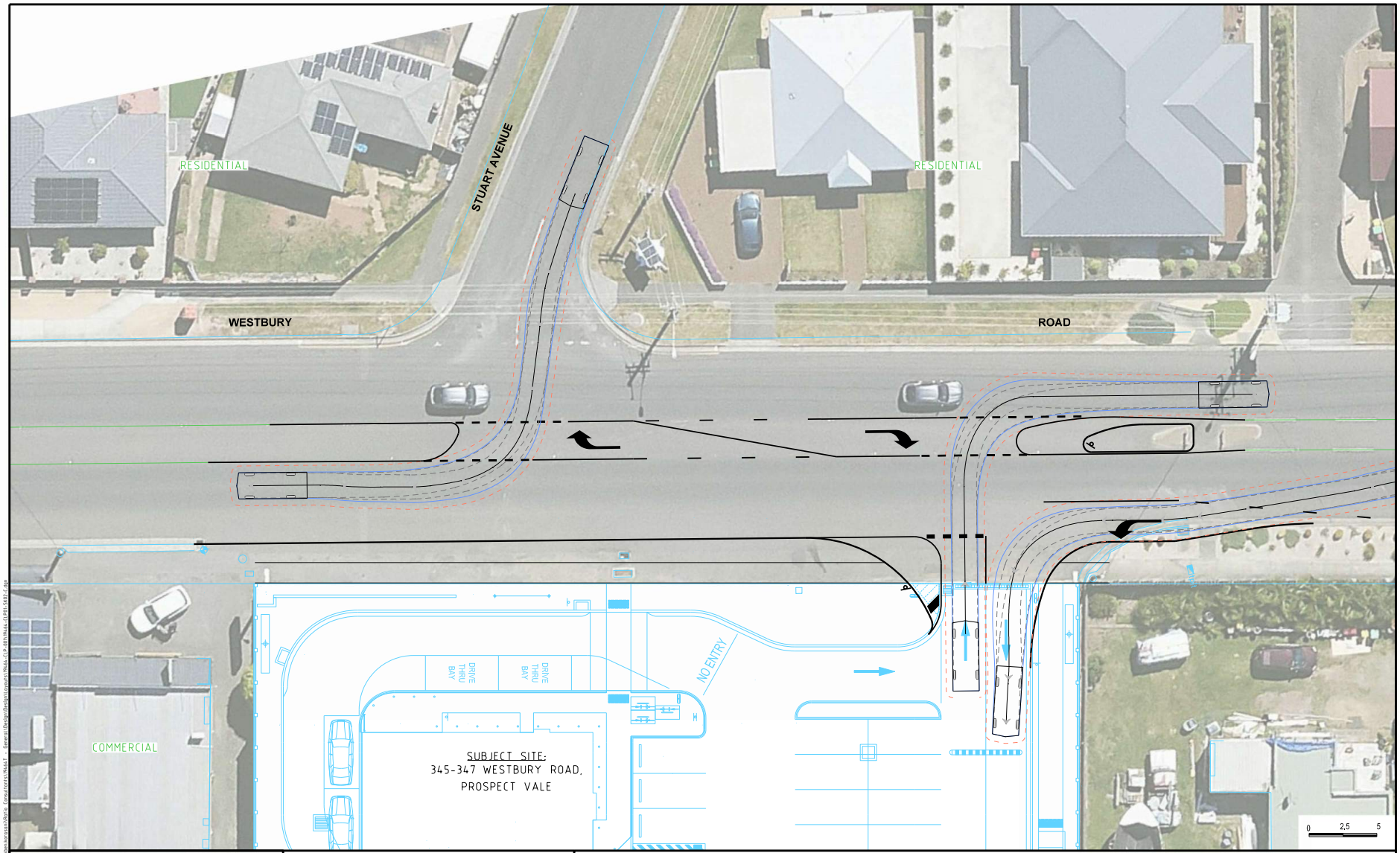

ratio:

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ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
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5.20
0.95 3.05
PASSENGER–CAR

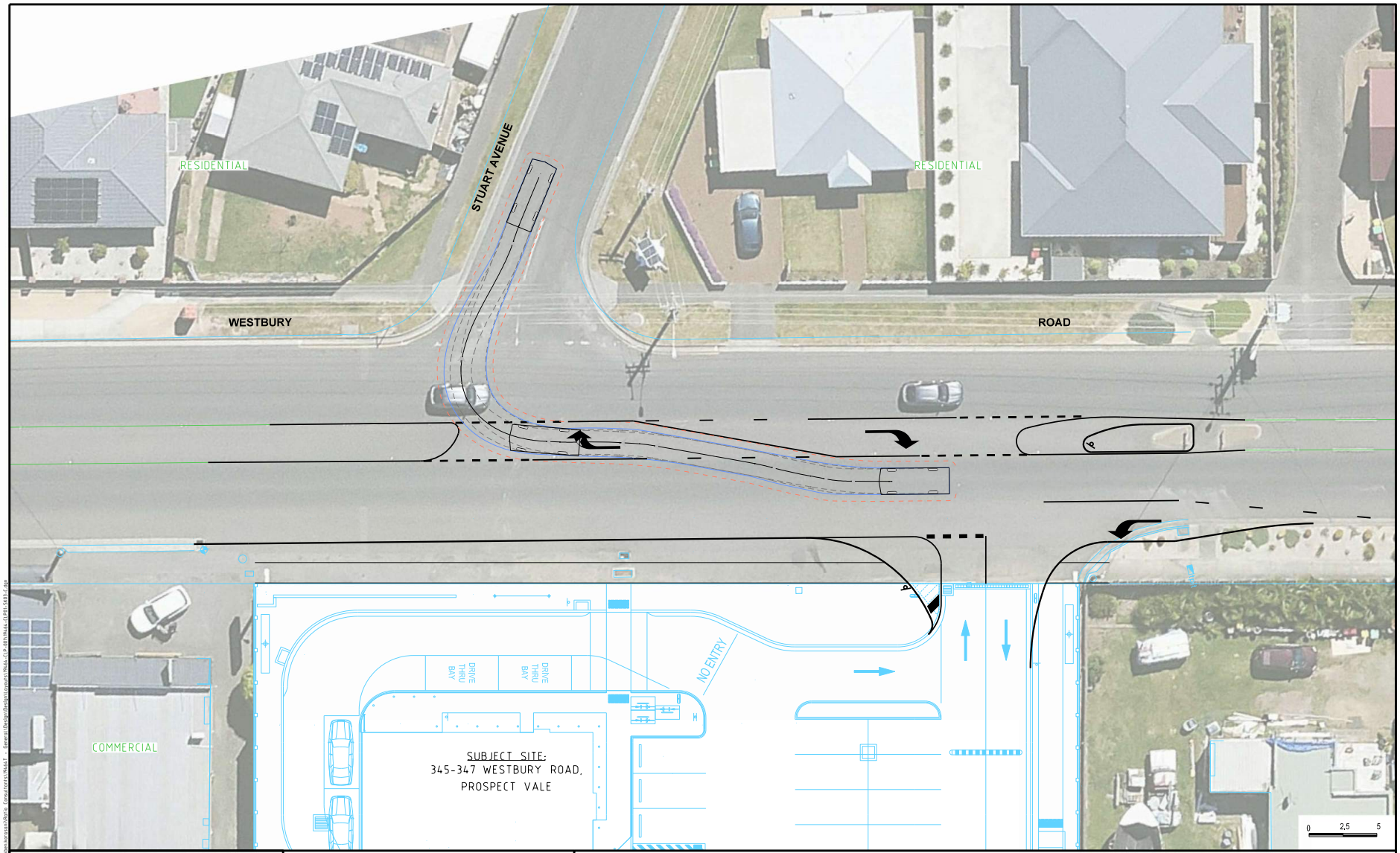
	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.6

VEHICLE ENVELOPE
500mm CLEARANCE
TIRES
CENTRE LINE

345-347 Westbury Road, Prospect Vale
Westbury Road
Swept Path Assessment

NOTE:
1) Base Plan Supplied By Timmins Whyte
2) Swept Path Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
19464-CLP01-SK02-C.dgn	03 of 06	T.H.	1:250 @A3	12.12.2023



ratio:

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8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

5.20
0.95 3.05
PASSENGER–CAR

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.6

VEHICLE ENVELOPE
500mm CLEARANCE
TIRES
CENTRE LINE

345-347 Westbury Road, Prospect Vale
Westbury Road
Swept Path Assessment

NOTE:
1) Base Plan Supplied By Timmins Whyte
2) Swept Path Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
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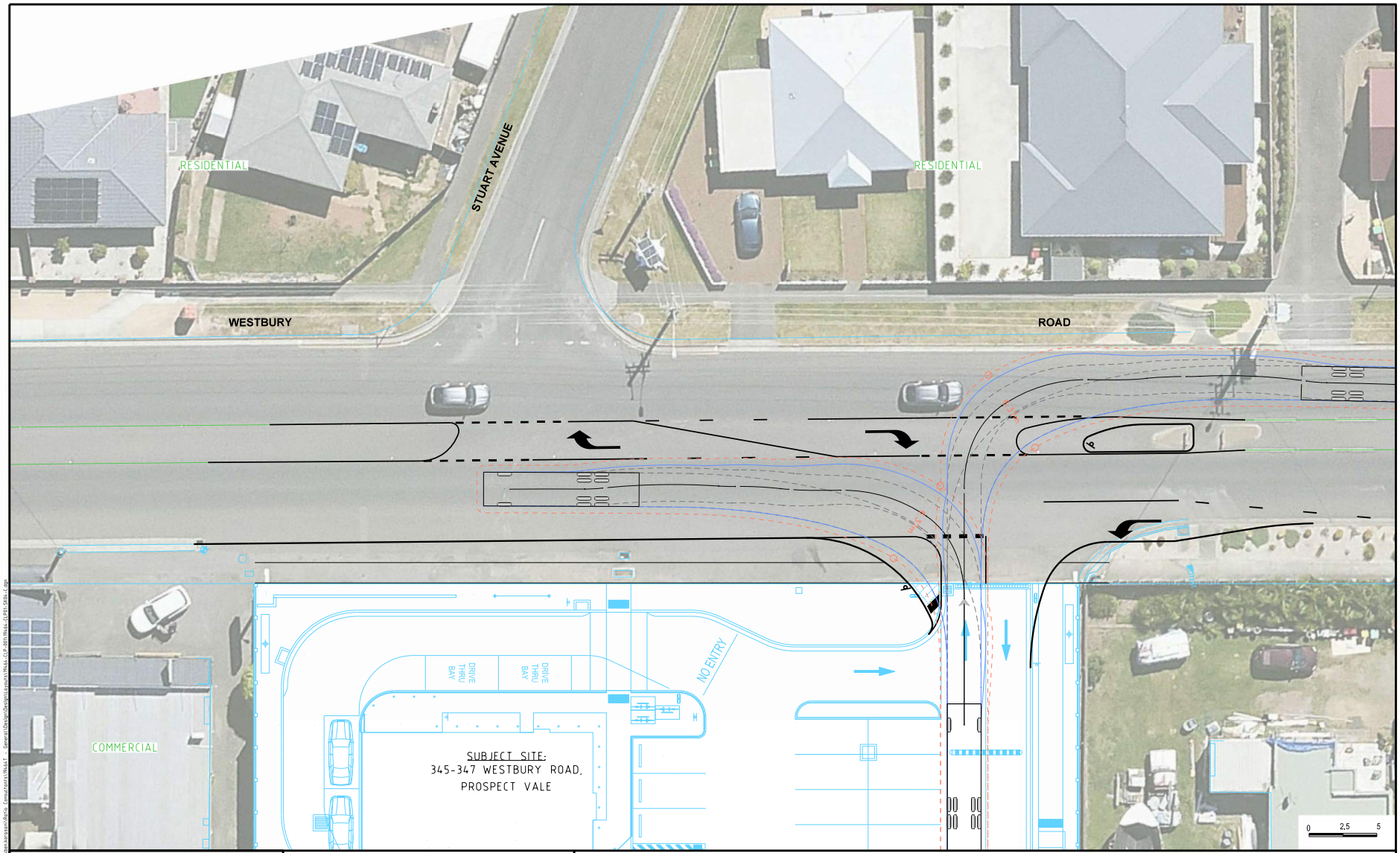

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ABN 005 422 104
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CREMORNE, VICTORIA 3121
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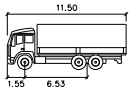
FACSIMILE (03)9429 3011



McDonald's 14-Pallet Rigid

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 5.0
Steering Angle	: 36.6

VEHICLE ENVELOPE
500mm CLEARANCE
TIRES
CENTRE LINE

345-347 Westbury Road, Prospect Vale
Westbury Road
Swept Path Assessment

NOTE:
1) Base Plan Supplied By Timmins Whyte
2) Swept Path Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
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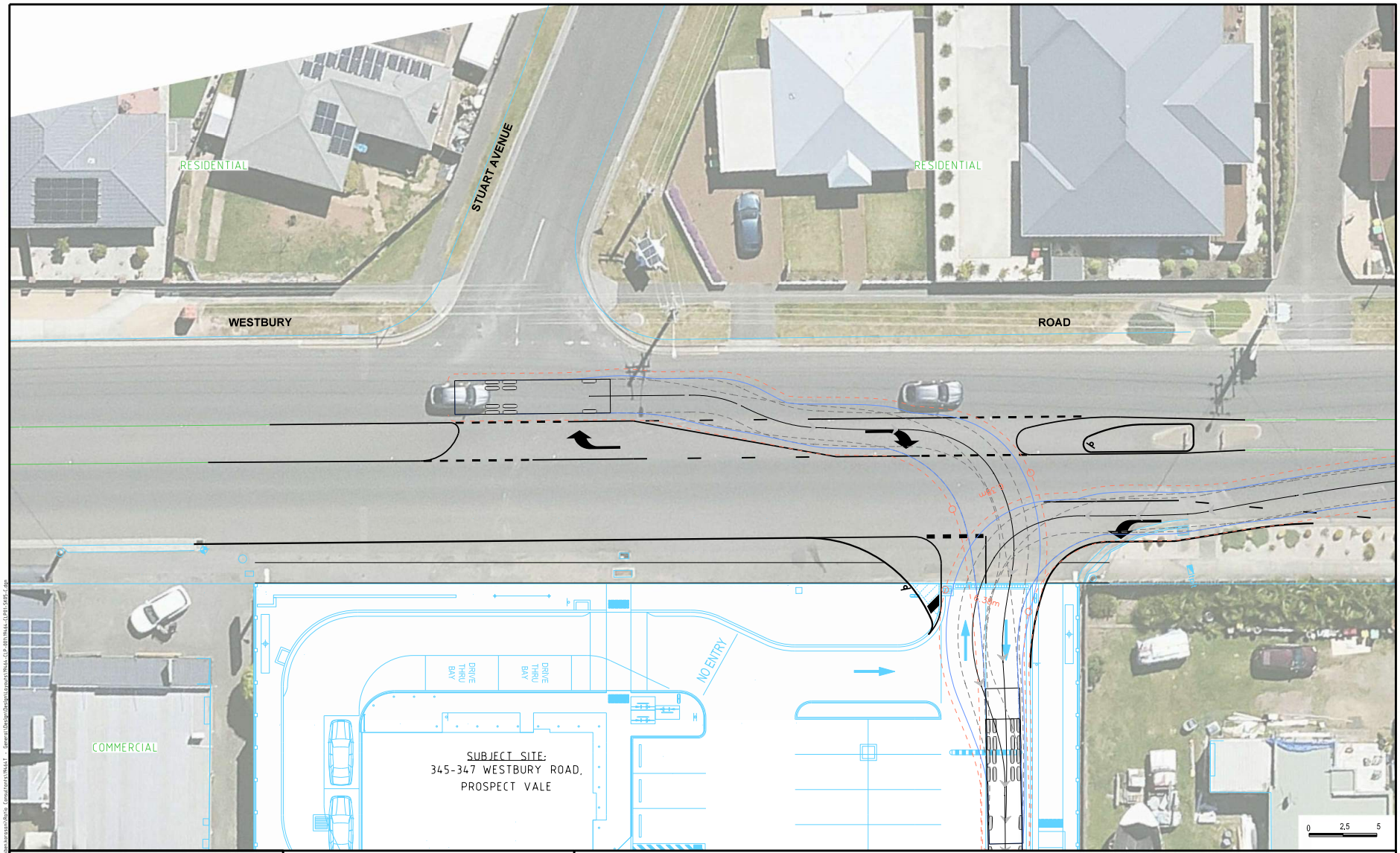

ratio:

RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
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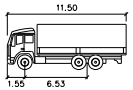

McDonald's 14-Pallet Rigid

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 5.0
Steering Angle	: 36.6

VEHICLE ENVELOPE
500mm CLEARANCE
TIRES
CENTRE LINE

345-347 Westbury Road, Prospect Vale
Westbury Road
Swept Path Assessment

NOTE:
1) Base Plan Supplied By Timmins Whyte
2) Swept Path Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
19464-CLP01-SK05-C.dgn	06 of 06	T.H.	1:250 @A3	12.12.2023

13 Omaru Street
Loganholme QLD 4129
+61 401 811 834 m
scott_forbes@rubidiumlight.com.au e
www.rubidiumlight.com.au w

Proposed McDonalds Development

345-347 Westbury Road, Prospect Vale Tasmania

Obtrusive Light Analysis

rubidium light

Prepared for:
Ratio

Version	Author/Reviewer	Date	Description of changes
V1	Scott Forbes	12/12/23	Draft for Comment
V2	Scott Forbes	13/12/23	Additional Information Included
V3	Scott Forbes	22/2/24	Additional Information Included
V4	Scott Forbes	7/3/24	Additional Information Included
V5	Scott Forbes	20/3/24	Additional Information Included
V6	Scott Forbes	28/5/24	Additional Information Included
V7	Scott Forbes	10/6/24	Response to RFI

Prepared by

Scott Forbes MIES, RLP
Rubidium Light

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About Rubidium Light

Rubidium Light is a specialist lighting design consultancy that works with stakeholders across many areas of development from concept to final construction.

Rubidium Light has been operating since 2011 and brings together an in-depth knowledge of lighting and its application in technically difficult lighting solutions.

Rubidium Light prides itself on its ability to react quickly and in a cost-effective manner to provide outcomes both responsible and cost effective to its clients and the environment.

1. Introduction

Rubidium Light was engaged by Ratio to provide commentary surrounding potential impacts to amenity from the proposed McDonalds development at 345-347 Westbury Road, Prospect Vale, Tasmania.

The proposed site consists of a McDonalds Restaurant, with drive-through and on-site carparking.

Exterior lighting will include pole-mounted area lights for the carpark and driveways, wall-mounted area lights, and illuminated signage.

The site will operate 24 hours per day, 7 days per week.

Illumination will be provided from dusk to dawn and exterior lights and signs will be controlled by timeclock and PE cells.

In considering the potential for changes to amenity, the following sensitive receptors were identified:

- Dwellings surrounding the proposed site
- Threshold increment to roadway along Westbury Road
- Luminance of illuminated signage

The proposed exterior lighting and illuminated signage scheme was evaluated for compliance with the Australian Standard AS/NZS4282:2023 *Control of the obtrusive effects of outdoor lighting.*

An analysis of headlight-beams of vehicles using the proposed site was also conducted to determine whether there is potential for intrusion into the habitable rooms of the dwellings on the Western side of Westbury Road immediately adjacent to the drive-through, and to dwellings towards the rear of the proposed site as vehicles traverse the carpark and drive-through.

2. Lighting Design

The Planning Scheme requires the exterior lighting to meets the requirements of AS/NZS1158.3.1:2005 – *Lighting for roads and public spaces* for outdoor carparks.

These parameters were determined using Table 2.5 and Table 2.9 of AS/NZS1158.3.1:2005, and based on high night time vehicle and/or pedestrian movements, high night-time occupancy rates and high risk of crime.

It is noted that the proposal meets both the previous and current versions (2005 and 2020) of AS/NZS1158.3.1 – *Lighting for roads and public spaces.*

TABLE 2.5

LIGHTING CATEGORIES FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4	5
	Selection criteria[a]			
Type of area	Night time vehicle or pedestrian movements	Night time occupancy rates (NTOR)	Risk of crime[b]	Applicable lighting subcategory[c]
Parking spaces, aisles and circulation roadways	High	>75%	High	P11a
	Medium	≥25%, ≤75%	Medium	P11b
	Low	<25%	Low	P11c
Designated parking spaces specifically intended for people with disabilities	N/A	N/A	N/A	P12

a) The selection criteria of Columns 2 to 4 should be separately evaluated. The highest level of any of the selection criteria that is deemed appropriate for the area type will determine the applicable lighting subcategory.

b) The risk levels 'High', 'Medium' and 'Low' correspond to the classifications of the same names in HB 436.

c) Providing a lighting scheme that meets the requirements of more than one subcategory by the use of switching is permitted.

Figure 1 AS/NZS1158.3.1:2005 Table 2.5

TABLE 2.9

VALUES OF LIGHT TECHNICAL PARAMETERS AND PERMISSIBLE LUMINAIRE TYPES FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4	5	6
Lighting subcategory	Light technical parameters[a]				Permissible luminaire type (see Table 2.5)
	Average horizontal illuminance[a,b] ($\overline{E}_h$) lux	Point horizontal illuminance[a,b] (E_{Ph}) lux	Illuminance (horizontal) uniformity[c] Cat. P (U_{E2})	Point vertical illuminance[a,b] (E_{Pv}) lux	
P11a	14	3	10	3	
P11b	7	1.5	10	1.5	Types 3, 4, 5 or 6
P11c	3.5	0.7	10	—	
P12	—	≥14 and ≥ $\overline{E}_h$[d]	—	—	

a) These values are maintained.

b) Compliance is achieved by being greater than or equal to the applicable table value.

c) Compliance is achieved by being less than or equal to the applicable table value.

d) E_{Ph} shall be determined for each P12 area in the car park and, in each case, it shall be greater than the value stated and greater than the average for the overall car park.

Figure 2 AS/NZS1158.3.1:2005 Table 2.9

Note that all requirements have been met for the carpark, driveways and bike parking areas. Bike parking is considered as part of the carpark area.

Calculation Summary					AUSTRALIAN STANDARD					COMPLIANCE WITH STANDARD		
Label	Avg	Max	Min	Max/Avg	APPLICABLE STANDARD	AVE E_h	E_{ph}	U_{E2}	E_{PV}			
BIKE PARKING	14.23	19	8.9	1.3	AS/NZS1158.3.1:2005 Cat P11a	14	3	10	3		YES	
CARPARK Eh	25.69	72	7	2.8	AS/NZS1158.3.1:2005 Cat P11a	14	3	10	3		YES	
CARPARK Ev1	11.19	26	3	2.3	AS/NZS1158.3.1:2005 Cat P11a	14	3	N/A	3		YES	
CARPARK Ev2	14.69	32	6	2.2	AS/NZS1158.3.1:2005 Cat P11a	14	3	N/A	3		YES	
PCD PARKING BAY	52.75	70	36	N/A	AS/NZS1158.3.1:2005 Cat P12	N/A	≥14 & ≥E_h	N/A	N/A		YES	
DRIVE-THROUGH Eh	23.77	74	3	3.1	AS/NZS1158.3.1:2005 Cat P11a	7	1.5	10	1.5		YES	

The area lights used are standard McDonalds luminaires, manufactured by Cree Lighting and distributed in Australia by Advanced Lighting Technologies Australia.

A combination of 47W, 66W and 99W lights was used on 4m, 6m and 8m poles to achieve compliance with AS/NZS1158.3.1:2005.

The luminous distributions of the luminaires were carefully selected to direct light onto the subject site, with minimal spill outside the boundaries.

These luminaires are mounted with the front glass horizontal and have zero upward light component.

Luminaires located on site boundaries are fitted with backlight shields to cut off light emitted in the direction of dwellings, as shown in diagram below.

House Side Carpark Side

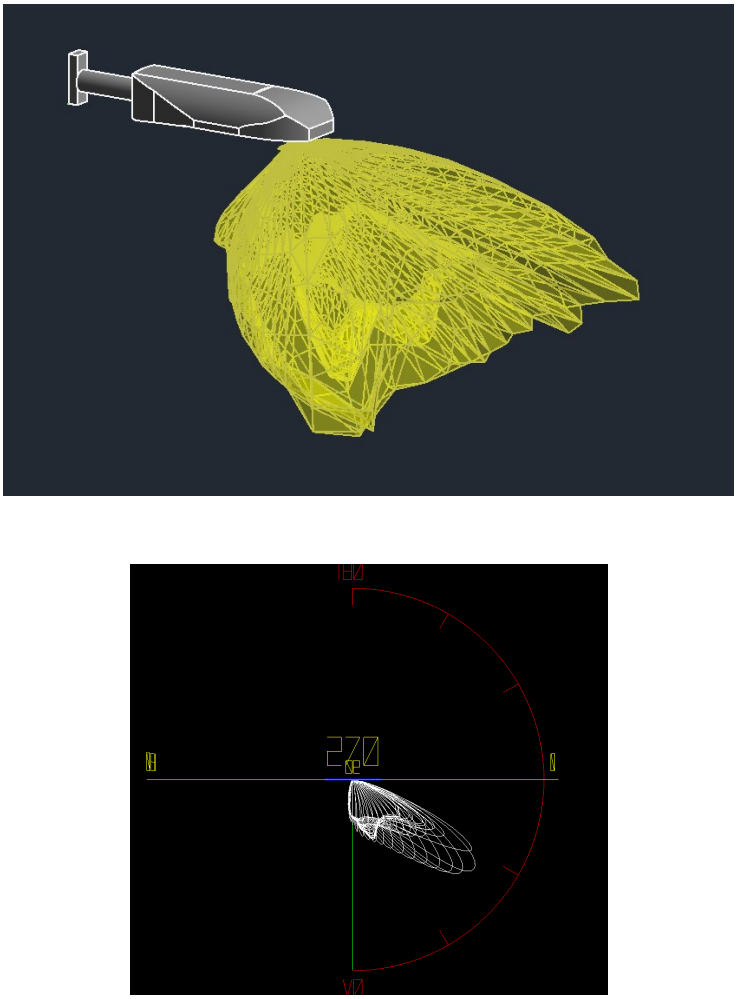
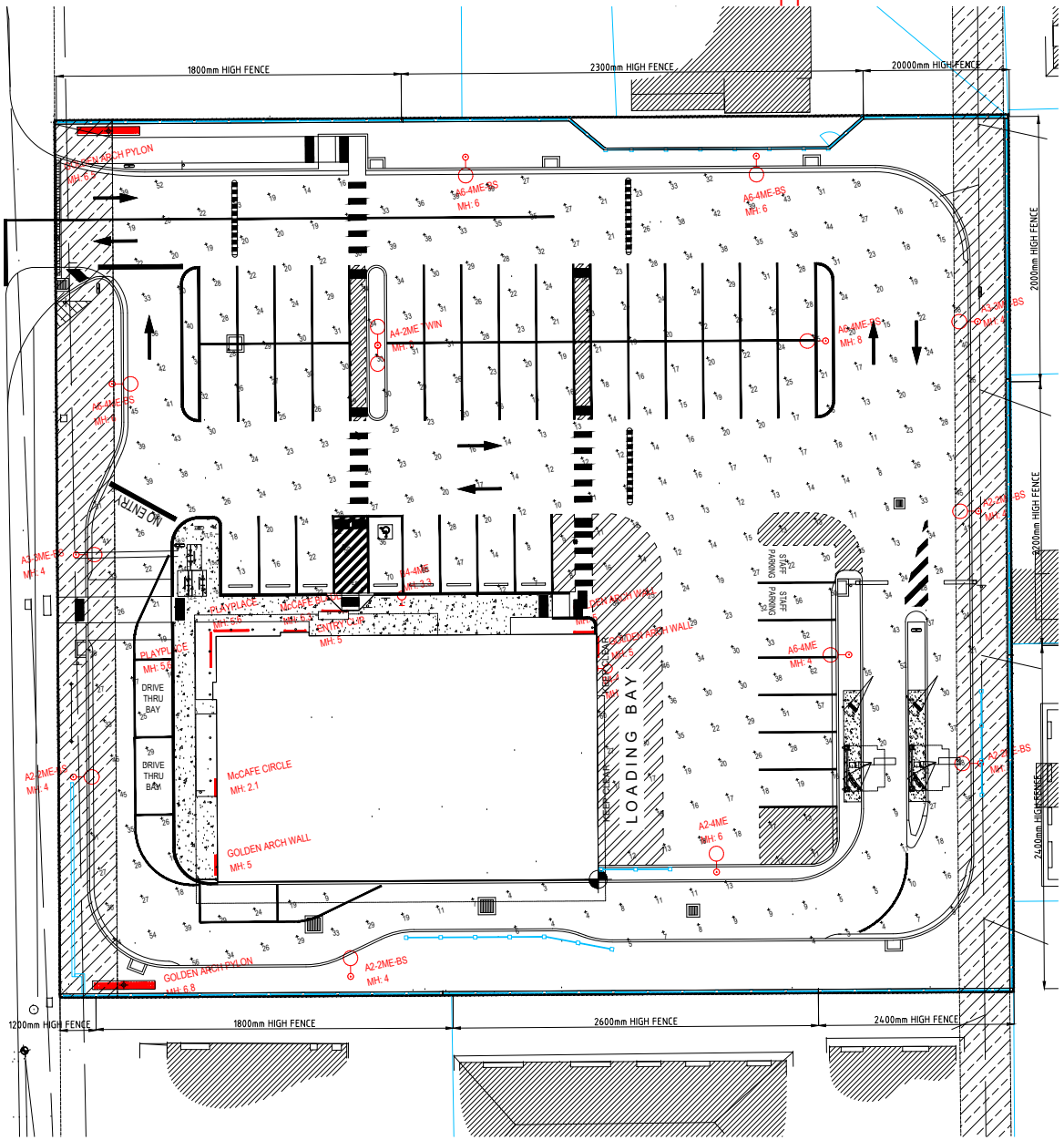


Figure 3 Luminous distribution of area light with house-side backlight shield

Page | 7

Figure 4 Cree Area Light

The acoustic fences to the North, East and South boundaries, and 1500mm high to part of the Westbury Road boundary have been included in the modelling.



Luminaire Schedule

Symbol	Qty	Label	Description	LLF	Luminaire Lumens
	1	A2-4ME	47W LED AREA LIGHT ON 6m POLE - ADLT XSPSM-D-HT-4ME-SL-40K7-UL-SV-N_PL1248S-001B	0.700	5256
	2	A3-3ME-BS	47W LED AREA LIGHT ON 4m POLE - ADLT XSPSM-D-HT-3ME-SL-40K7-Ux-SV-N W_XA-SPR3BLS	0.700	3690
	1	A4-2ME TWIN	TWIN 66W LED AREA LIGHT ON 8m POLE - ADLT XSPSM-D-HT-2ME-SL-40K7-Ux-SV-N	0.700	7775
	1	A6-4ME	95W LED AREA LIGHT ON 4m POLE - ADLT XSPMD-D-HT-4ME-12L-40K7-Ux-SV-N	0.700	11800
	4	A2-2ME-BS	46W LED AREA LIGHT ON 4m POLE - ADLT XSPSM-D-HT-2ME-SL-40K7-UL-SV-N w_XA-SPR3BLS_PL12759-001B	0.700	4193
	2	PLAYPLACE	2400 x 690	0.700	3400
	2	B4-4ME	66W LED AREA LIGHT WALL-MOUNTED - ADLT XSPWE-WM-4ME-8L-40K_66W	0.700	8756
	1	ENTRY CLIP	1811 x 221	0.700	1300
	2	GOLDEN ARCH PYLON		0.700	N.A.
	3	GOLDEN ARCH WALL	1371 x 1200mm	0.700	2400
	1	McCAFE BLADE	1492 x 700	0.700	3850
	1	McCAFE CIRCLE	1200 DIAMETER	0.700	3850
	4	A6-4ME-BS	95W LED AREA LIGHT ON 6m/8m POLE - ADLT XSPMD-D-HT-4ME-12L-40K7-Ux-SV-N W_XA-SP1BLS	0.700	8625

Calculation Summary

Label	Avg	Max	Min	Max/Avg
BIKE PARKING	14.23	19.0	8.9	1.3
CARPARK Eh	20.69	72	7	2.8
CARPARK Ev1	11.19	26	3	2.3
CARPARK Ev2	14.69	32	6	2.2
DRIVE-THROUGH Eh	23.77	74	3	3.1

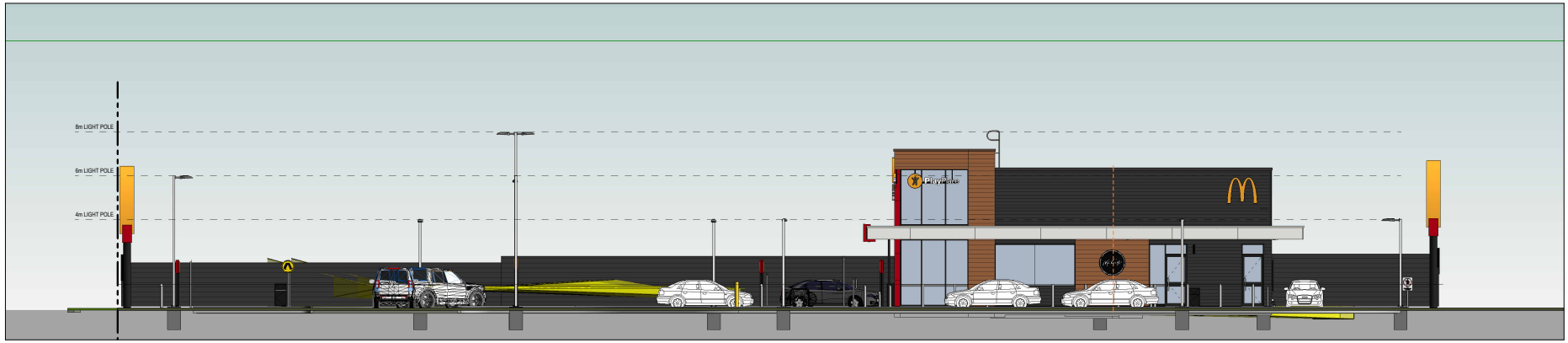
Rev.	Date	Dm.	Description	Chkd.
G	28/5/24	SAF	CHANGES MADE FOR RFI RESPONSE	

Project:
PROPOSED McDONALDS RESTAURANT
345-347 WESTBURY ROAD
PROSPECT VALE Tas.

Title:
ELECTRICAL SERVICES
LIGHTING
GENERAL ARRANGEMENT

Drawn: SAF Chk SAF Date: 28/05/2024
Scale:
Drawing No. MCD01155-E01-2 Rev G Size A3

Rubidium Light
A 13 Omaru Street
Loganholme QLD 4129
E admin@rubidiumlight.com.au


8m LIGHT POLE
6m LIGHT POLE
4m LIGHT POLE

3. Signage

Illuminated signage on the site was evaluated for compliance with Australian Standard AS/NZS4282:2023 *Control of the obtrusive effects of outdoor lighting.*

The applicable part of the Standard is 3.3.3.3.1 *Internally lit and light emitting surfaces,* which indicates the maximum average luminance of surfaces allowable for each environmental zone.

Table 3.4 — Maximum average luminance of surfaces (cd/m²)

Application conditions	Environmental zones				
	A0	A1	A2	A3	A4
See Clause 3.3.3	0.1	50	150	250	350

Figure 5 AS/NZS4282:2023 Table 3.4

In this case, the environmental zone is A4, and the limit is 350 cd/m²

The sign manufacturer will ensure that all signs are set to comply with this limit.

3.3.3.4 Control of upward waste light

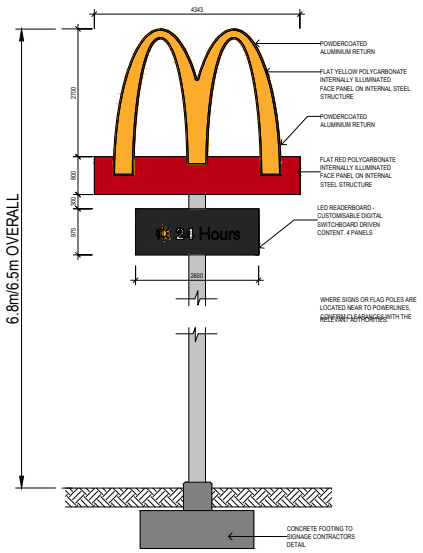
The upward light impact of lighting included under Clause 3.3.3 shall be assessed as individual items as follows:

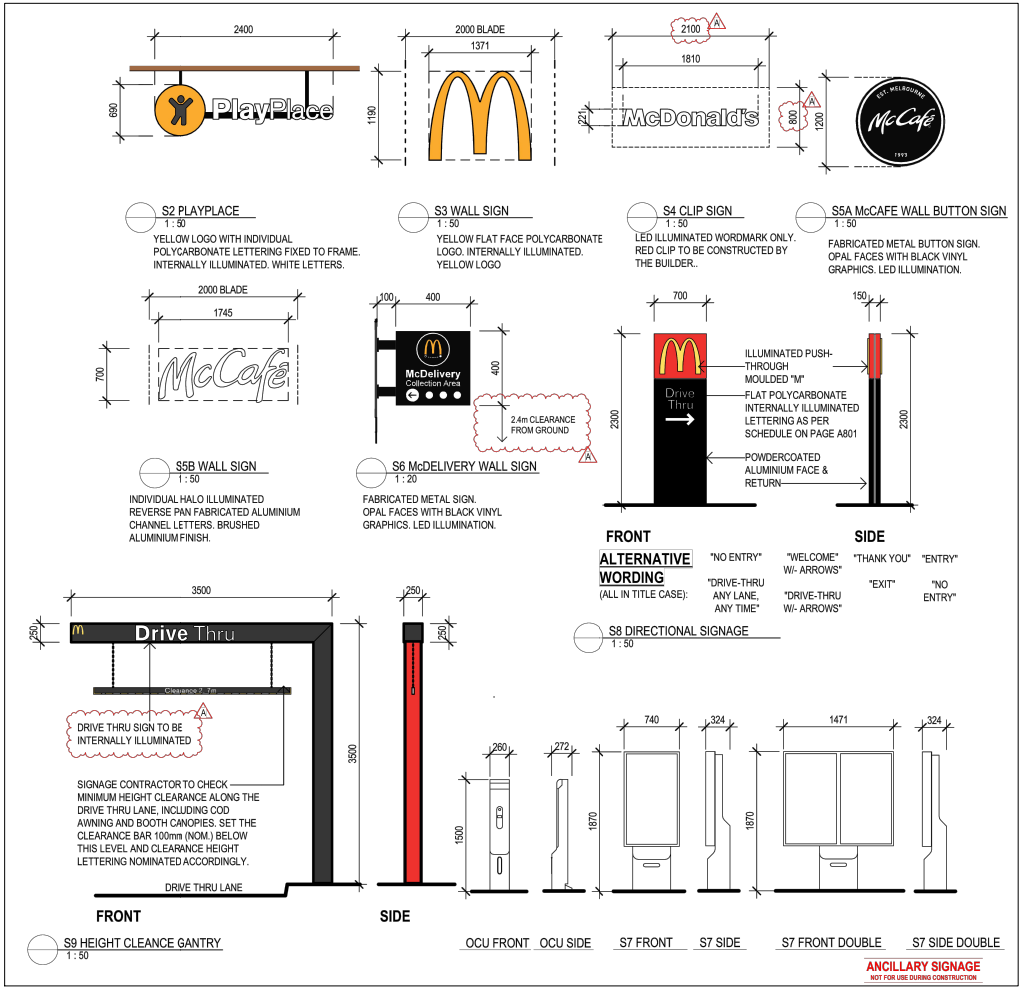
(a) Internally illuminated signs and other internally illuminated objects shall have a ULRL of ≤ 0.50.

All internally illuminated signs have ULRL ≤ 0.50

Illuminated signage will operate from dusk until dawn 7 days per week, 365 days per year.

The pylon sign at the Northwest corner of the proposed site will be extinguished after 10PM daily to ensure compliance with AS/NZS4282:2023 illuminance limits at the residential property fronting Westbury Road to the immediate North of the proposed site. This will be controlled by timeclock.





Obtrusive Light - Compliance Report

AS/NZS 4282:2023, A4 - High District Brightness, Curfew
Filename: MCD01155 - 1 EXTERIOR MAY 2024 SIGNS ONLY
28/05/2024 10:25:29 AM

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 50.0 %

Calculated UWLR: 49.8 %
Test Results: **PASS**

Table 3.4 — Maximum average luminance of surfaces (cd/m²)

Application conditions	Environmental zones				
	A0	A1	A2	A3	A4
See Clause 3.3.3	0.1	50	150	250	350

McDonalds Prospect Vale - Sign Luminance Calculations

	ILLUMINATED AREA	INSTALLED MODULES	LUMENS	COLOUR	SIGN Tx FACTOR	EXITANCE (LUMENS PER SQ.M)	L (diffuse) EXITANCE/PI LIMIT 2500
PYLON SIGN ARCH	6.784	696	34800	YELLOW	0.7	5130	1144
PYLON SIGN RED KEYSTONE	6.954	518	25900	RED	0.5	3724	593
WALL ARCH	0.5	48	3600	YELLOW	0.7	7200	1605
PLAYPLACE	3.111	112	8400	WHITE / YELLOW	0.7	2700	602
ENTRY CLIP	0.3978	130	812.5	RED	0.5	2042	325
McCAFE BLADE	1.0444	77	5775	WHITE / BLACK	0.7	5529	1233
BUTTON	1.1304	68	5100	WHITE / BLACK	0.7	4512	1006

ALL ILLUMINATED SIGNAGE WILL BE LIMITED TO 350cd/m^2 by the sign manufacturer/supplier to comply with Table 3.4 AS/NZS4282:2023 Environmental zone A4

Rev.	Date	Drn.	Description	Chkd.
G	28/5/24	SAF	CHANGES MADE FOR RFI RESPONSE	

Project:
PROPOSED McDONALDS RESTAURANT
345-347 WESTBURY ROAD
PROSPECT VALE Tas.

Title:
ELECTRICAL SERVICES
LIGHTING
SIGN LUMINANCE CALCULATIONS

Drawn: SAF Chk SAF Date: 28/05/2024
Scale:
Drawing No. MCD01155-E01-4 Rev G Size A3

Rubidium Light
A 13 Omaru Street Loganholme QLD 4129
E admin@rubidiumlight.com.au

4. Property Description

The subject Property is best described as:

345-347 Westbury Road, Prospect Vale, Tas.

Figure 6 Aerial photo showing subject site – Nearmap

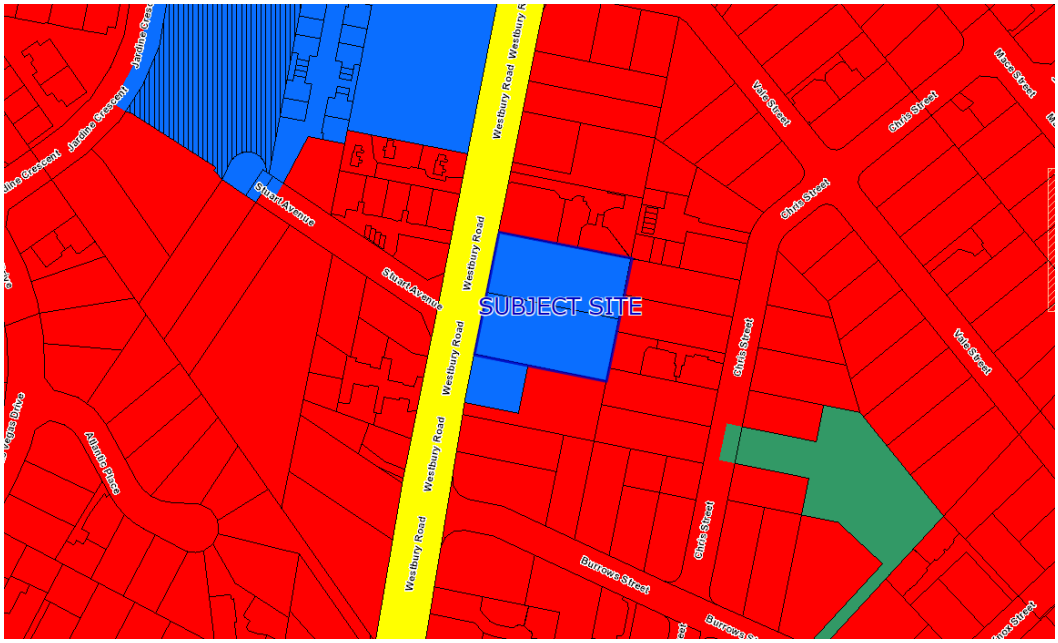


Figure 7 Zoning map – LISTmapTopography of site and adjacent properties

The proposed site is located on gently sloping land rising from approximately 187m elevation in the Northwest corner to approximately 189m in the Southwest corner along the Westbury Road frontage.

The land parcels on which the proposed development are located are zoned as “General Business” and the surrounding land parcels are zoned “General Residential”, with the exception of the parcel to the immediate South of the proposed site, along the Westbury Road frontage, which is zoned “General Business”.

Residential properties along Westbury Road to the West of the proposed site, and South of Stuart Avenue are positioned approximately 1m below the level of Westbury Road. These residences are single-storey in nature, and have views to the proposed site.

Residential properties along Westbury Road to the West of the proposed site, and North of Stuart Avenue are positioned at the surface level of Westbury Road. These residences are single-storey in nature, and have views to the proposed site.

The residential properties to the immediate North of the site are approximately 1.5m below the finished level of the carpark on the proposed site. The dwellings are of single-storey nature, and have views to the proposed site.

Figure 8 Existing site conditions

Figure 9 Contours of topography in surrounding area

Figure 10 Residences on Westbury Road South of Stuart Avenue

Figure 11 Residences on Westbury Road North of Stuart Avenue

Figure 12 Residence on Westbury Road to immediate North of Proposed Site

Figure 13 Residences on Chris Street to immediate East of Proposed Site

5. Applicable Legislation

The proposed lighting scheme falls under the following legislative framework:

- Australian Standard – AS/NZS4282:2023 *Control of the obtrusive effects of outdoor lighting*

5.1 Australian Standard – AS/NZS4282:2023 *Control of the obtrusive effects of outdoor lighting*

The objective of this Standard is to provide a common basis for assessment of the likely effects of developments that involve the provision of outdoor lighting. However, it should be noted that the potentially obtrusive effects of the lighting will normally be only one of a number of environmental and ecological considerations that will need to be addressed. Conformance to this Standard, i.e. to the limits for the various light technical parameters, will therefore not usually be the sole basis for the approval of particular development proposals.

This Standard provides a determination of when spill light becomes obtrusive to others.

The requirements and recommendations are based on surveys of interested parties, i.e. local government, electricity utilities and the lighting industry; on studies of people's reaction to obtrusive light; on the extent of spill light from lighting installations; and on precedents for the regulatory control of obtrusive light.

Several aspects of potential obtrusiveness are considered, e.g. light falling on surrounding properties, the brightness of luminaires in the field of view of nearby residents, glare to users of adjacent transport systems, the effects on astronomical observations (see Clause 2.4.4) and the impact on protected dark environments. For the control of these effects, the limiting values of the light technical parameters specified in Tables 3.2 to 3.5 have been developed taking account of the following:

- The level of lighting existing in the area.
- The times that the proposed lighting is to operate.
- The type of lighting technology available to light the task.
- The use of readily available and easily understood technical data on the lighting installations that can easily be verified at the design and assessment stages.

These criteria have been employed to ensure that this Standard is both credible to the interested parties and pragmatic in application.

Research indicates that the limiting values of illuminance at windows and of the intensity of bright light sources, necessary to satisfy the large majority of people as being at all times unobtrusive, are rather low. Furthermore, these values can easily be exceeded with conventional lighting practice, especially if the area of activity being lit is large and the required light level is relatively high. Thus, the potentially conflicting requirements for dark-hours activity and the maintenance of amenity and environmental integrity have to be resolved.

Therefore, two sets of limiting values are given dependent on the levels of lighting already in the area. One, with higher values, is for application outside the curfew period set by local government and the other, with lower values, is for application during the curfew period. Subject to council approval, we believe that is appropriate to set the curfew from 11pm to 6am daily.

In this case, the site has been evaluated to comply with both non-curfew and curfew limits as it will operate 24 hours per day.

The less restrictive values are predicated on dark time activity taking place whilst giving passive recipients of spill light relief from it being excessively obtrusive. The limiting values are based on the use of conventional lighting technology but with good practice being employed through the selection of appropriate lighting levels, luminaires and aiming practices.

Visual intrusion caused by the daytime appearance of outdoor lighting systems, including associated support structures, is not addressed in this Standard. Whilst the subject is important, the issues involved are of more general application involving aesthetics and environmental design.

Outdoor lighting whilst intended for a specific purpose may have some adverse effect on the environment in which it is installed.

The objectives of the lighting may be incompatible with the containment of light within the intended area of application. For example, some activities require the illumination of an object in a volume or space, not just of a surface at ground level; however, there will be a general diffusion of light within the lit space resulting from reflection from surfaces and atmospheric scattering.

5.1.1 Influence Of Surrounding Developments

The obtrusive effects of the lighting system may be significantly influenced by the following factors:

- The use of the area abutting or in close proximity to the proposed development.
- The topography of the area surrounding the lighting installation. Residential developments at a lower level than that of the lighting installation are more likely to be subjected to a direct view of the luminaires.
- Physical features, such as adjacent buildings, trees and spectator stands, that may be effective in restricting light spill beyond the boundaries of the development.
- The existing ambient lighting characteristics relative to the proposed lighting.
- The location of the proposed development relative to areas of special significance, for example, areas having cultural, environmental, historical or scientific importance such as harbours, airports, waterways, roads or railway systems where spill light from the proposed development may interfere with the visibility of signalling systems

5.1.2 Specific Effects

5.1.2.1 Effects on residents

Effects on residents generally involve a perceived reduction of amenity arising from light technical factors such as the following:

The illumination from spill light being obtrusive, particularly where the light enters habitable rooms. The illuminance on surfaces, particularly vertical surfaces, is an indicator of this effect.

The direct view of bright luminaires from normal viewing directions causing annoyance, distraction or even discomfort. The luminous intensity of a luminaire, in a nominated direction, is an indicator of this effect.

Changes in luminance in the peripheral vision due to effects such as variable content in signage or trees moving across bright lights.

The tolerable levels of each of these light technical parameters will be influenced by the ambient lighting existing in the environment where the light technical parameters are being calculated.

5.1.2.2 Effects on transport system users

Effects on transport system users (e.g. pilots, water craft operators, train drivers, motorists, cyclists, pedestrians) normally involve a reduction in the ability to see caused by disability glare from bright light sources. The contrast of other objects and the surrounds to the user will be lowered, rendering them less visible or even invisible, especially if the environment is intrinsically dark. The magnitude of the effect will depend on the level of lighting to which the user is adapted. The relevant indicator for transport system users is the threshold increment (*TI*).

5.1.2.3 Effects on transport signalling systems

Effects on transport signalling systems will normally involve a reduction in the visibility of the signals either by—

- disability glare,or
- visual clutter; where signals are viewed against a competing background of other lighting. The effect is exacerbated if background lighting is the same colour as the signal lighting or a mix of colours.

5.1.3 Applicable Limits

The indicators of potential obtrusive effects identified in Clause 2.4 shall relate to the light technical parameters specified in Tables 3.2 to 3.5. Although these limiting values are intended to control the obtrusive effects, they will not necessarily ensure that a conforming installation will receive no adverse reaction from those affected by the spill light.

Different limits have been applied based on the ambient light conditions. These ambient conditions are described for each of the environmental zones in Table 3.1.

For the reasons stated in Clauses 2.4.1 and 2.4.4, two sets of limits are specified in Tables 3.2 and 3.3 for the parameters E_v and I respectively based on the times that the lighting system is to operate. A higher level of light may be less obtrusive in the early hours of the evening when there is more activity and the majority of people are awake. For later times (in the curfew period) lower limits have been applied.

The lower limit for application during the curfew period need not apply where it can be demonstrated to the satisfaction of the authority that there will be no adverse effects on residents, i.e. no nearby residential development, either existing or planned. The lower limit is also applied to environmentally sensitive areas.

5.1.4 Basis For Differentiation Of Limits According To Area Type

The limiting values specified for E_v, *I* and *TI* in Tables 3.2, 3.3 and 3.4are differentiated according to the environment type (see Table 3.1). The differentiation takes account of land use zoning which, in part, reflects the function of the lighting, and the level of night-time activity to be expected in the area.

Table 3.1 — Environmental zones

Environmental zones	Ambient light conditions	Descriptions/ Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA: Dark Sky Parks, Reserves or Sanctuaries Major optical observatories Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
A1	Dark	Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) Generally roadways without streetlighting through rural areas
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas Generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A3	Medium district brightness	Suburban areas in towns and cities Generally roadways with streetlighting through suburban, rural or semi-rural areas
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and Port areas Transport Interchanges
TV	High district brightness	Vicinity of major sport and event stadiums during TV broadcasts
NOTE Zones A0 and A1 would normally have a minimum area of 50 ha.(0.5 km^2). There may be smaller environmentally sensitive areas.		

The Environmental Zone that applies to the subject site and its surrounds is A4.

5.1.5 Basis For Differentiation Of Limits For E_v And I According To Times Of Operation

The limiting values for E_v and I necessary to satisfy a large majority of the population at all times are relatively low.

Demonstration of conformance to the limits specified in Tables 3.2 to 3.4 requires a detailed analysis of the situation with the identification of potential problem locations, e.g. windows of dwellings and specific viewing directions of concern.

There is a potential conflict between the lighting requirements necessary to facilitate an activity and the maintenance of amenity and environmental integrity. Two sets of limits for E_v and I are given, based on the times that the lighting is to operate, as follows:

(a) *Limits for non-curfew period* The higher of the two sets of limits shall apply for operation of the lighting outside the curfew period.

The non-curfew limits have as their objective the facilitation of the intended activity whilst giving recipients of spill light relief from it being obtrusive.

(b) *Limits for curfew period*

The lower of the two sets of limits shall apply for operation of the lighting during the curfew period during which maintenance of the amenity and environmental integrity of the area become the dominant considerations.

The limits according to time that apply to this site are curfew.

5.1.6 Basis For Differentiation Of Limits For I According To Precedent

Level 1 (L1) and Level 2 (L2) limits for I shall be in accordance with Table 3.3. L1 limits shall apply for all new installations. L2 limits shall apply to upgraded/modified installations where the reuse of the existing infrastructure does not permit L1 control. Additionally, where L2 limits are applied it shall be demonstrated that control of the obtrusive effects of the new scheme are equal to or better than the previous.

Table 3.3 — Maximum luminous intensities per luminaire

Zone	Luminous intensity (I), cd		
	Non-curfew Level 1 (L1)	Non-curfew Level 2 (L2)	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	165 000	0
NOTE For A0, I shall be as close to zero as practicable without impacting safety considerations.			

The limits according to precedent that apply to this site are Level 1.

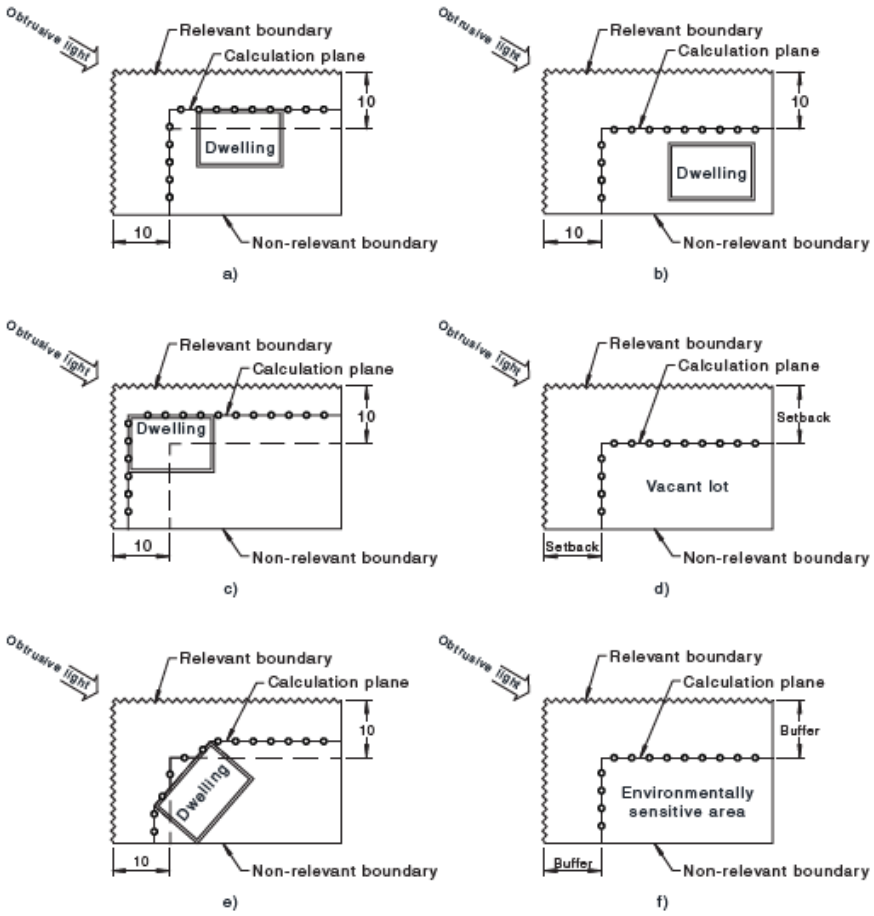


Figure 3.1 — Examples showing application of limits for E_V and I for zones A0 to A4

Figure 14- AS/NZS4282:2023 Location of calculation planes

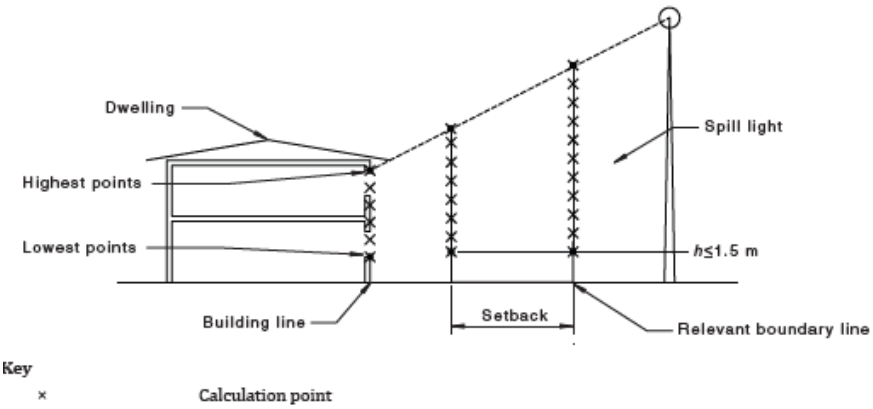


Figure 3.2 — Example of location and height of calculation points for limits for E_V and I for zones A0 to A4 (excluding environmentally sensitive areas)

Figure 15- AS/NZS4282:2023 Heights of calculation planes

Obtrusive Light - Compliance Report

AS/NZS 4282:2023, A4 - High District Brightness, Non-Curfew L1
Filename: MCD01155 - 1 EXTERIOR MAY 2024
28/05/2024 10:53:27 AM

Illuminance

Maximum Allowable Value: 25 Lux

Calculations Tested (25):

Calculation Label	Test Results	Max. Illum.
REL BDY 349 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 370 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 370 WESTBURY ROAD_III_Seg2	PASS	2
REL BDY 370 WESTBURY ROAD_III_Seg3	PASS	1
REL BDY 370 WESTBURY ROAD_III_Seg4	PASS	2
REL BDY 349A WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 343 WESTBURY ROAD_III_Seg1	PASS	11
REL BDY 343 WESTBURY ROAD_III_Seg2	PASS	9
REL BDY 343 WESTBURY ROAD_III_Seg3	PASS	6
REL BDY 368 WESTBURY ROAD_III_Seg1	PASS	4
REL BDY 366 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 12 CHRIS STREET_III_Seg1	PASS	0
REL BDY 12 CHRIS STREET_III_Seg2	PASS	1
REL BDY 10 CHRIS STREET_III_Seg1	PASS	2
REL BDY 8 CHRIS STREET_III_Seg1	PASS	1
REL BDY 6 CHRIS STREET_III_Seg1	PASS	1
REL BDY 2 CHRIS STREET_III_Seg1	PASS	1
REL BDY 2 CHRIS STREET_III_Seg2	PASS	1
REL BDY 378 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 376 WESTBURY ROAD_III_Seg1	PASS	4
REL BDY 376 WESTBURY ROAD_III_Seg2	PASS	1
REL BDY 374 WESTBURY ROAD_III_Seg1	PASS	2
REL BDY 374 WESTBURY ROAD_III_Seg2	PASS	1
REL BDY 374 WESTBURY ROAD_III_Seg3	PASS	2
REL BDY 374 WESTBURY ROAD_III_Seg4	PASS	1

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 25000 Cd

Calculations Tested (25):

Calculation Label	Test Results	
REL BDY 349 WESTBURY ROAD_Cd_Seg1	480	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg1	1584	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg2	1511	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg3	1463	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg4	1448	PASS
REL BDY 349A WESTBURY ROAD_Cd_Seg1	336	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg1	1734	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg2	1663	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg3	1706	PASS
REL BDY 368 WESTBURY ROAD_Cd_Seg1	1701	PASS
REL BDY 366 WESTBURY ROAD_Cd_Seg1	1376	PASS
REL BDY 12 CHRIS STREET_Cd_Seg1	659	PASS
REL BDY 12 CHRIS STREET_Cd_Seg2	942	PASS
REL BDY 10 CHRIS STREET_Cd_Seg1	1079	PASS
REL BDY 8 CHRIS STREET_Cd_Seg1	1080	PASS
REL BDY 6 CHRIS STREET_Cd_Seg1	935	PASS
REL BDY 2 CHRIS STREET_Cd_Seg1	711	PASS
REL BDY 2 CHRIS STREET_Cd_Seg2	831	PASS
REL BDY 378 WESTBURY ROAD_Cd_Seg1	670	PASS
REL BDY 376 WESTBURY ROAD_Cd_Seg1	1471	PASS
REL BDY 376 WESTBURY ROAD_Cd_Seg2	1527	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg1	1671	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg2	1691	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg3	1728	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg4	1734	PASS

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (3):

Calculation Label	Adaptation Luminance	Test Results
TI STUART AVE	5	PASS
TI WESTBURY RD NTH	5	PASS
TI WESTBURY RD STH	5	PASS

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 3.0 %

Calculated UWLR: 0.0 %
(EXCLUDING SIGNS CALCULATED SEPARATELY)
Test Results: PASS

Obtrusive Light - Compliance Report

AS/NZS 4282:2023, A4 - High District Brightness, Curfew
Filename: MCD01155 - 1 EXTERIOR MAY 2024
28/05/2024 10:57:31 AM

Illuminance

Maximum Allowable Value: 5 Lux

Calculations Tested (25):

Calculation Label	Test Results	Max. Illum.
REL BDY 349 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 370 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 370 WESTBURY ROAD_III_Seg2	PASS	1
REL BDY 370 WESTBURY ROAD_III_Seg3	PASS	0
REL BDY 370 WESTBURY ROAD_III_Seg4	PASS	1
REL BDY 349A WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 343 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 343 WESTBURY ROAD_III_Seg2	PASS	0
REL BDY 343 WESTBURY ROAD_III_Seg3	PASS	5
REL BDY 368 WESTBURY ROAD_III_Seg1	PASS	1
REL BDY 366 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 12 CHRIS STREET_III_Seg1	PASS	0
REL BDY 12 CHRIS STREET_III_Seg2	PASS	0
REL BDY 10 CHRIS STREET_III_Seg1	PASS	1
REL BDY 8 CHRIS STREET_III_Seg1	PASS	1
REL BDY 6 CHRIS STREET_III_Seg1	PASS	1
REL BDY 2 CHRIS STREET_III_Seg1	PASS	0
REL BDY 2 CHRIS STREET_III_Seg2	PASS	1
REL BDY 378 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 376 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 376 WESTBURY ROAD_III_Seg2	PASS	0
REL BDY 374 WESTBURY ROAD_III_Seg1	PASS	0
REL BDY 374 WESTBURY ROAD_III_Seg2	PASS	0
REL BDY 374 WESTBURY ROAD_III_Seg3	PASS	0
REL BDY 374 WESTBURY ROAD_III_Seg4	PASS	0

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 2500 Cd

Calculations Tested (25):

Calculation Label	Test Results	
REL BDY 349 WESTBURY ROAD_Cd_Seg1	480	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg1	1584	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg2	1511	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg3	1463	PASS
REL BDY 370 WESTBURY ROAD_Cd_Seg4	1448	PASS
REL BDY 349A WESTBURY ROAD_Cd_Seg1	336	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg1	1734	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg2	1663	PASS
REL BDY 343 WESTBURY ROAD_Cd_Seg3	1706	PASS
REL BDY 368 WESTBURY ROAD_Cd_Seg1	1701	PASS
REL BDY 366 WESTBURY ROAD_Cd_Seg1	1376	PASS
REL BDY 12 CHRIS STREET_Cd_Seg1	659	PASS
REL BDY 12 CHRIS STREET_Cd_Seg2	942	PASS
REL BDY 10 CHRIS STREET_Cd_Seg1	1079	PASS
REL BDY 8 CHRIS STREET_Cd_Seg1	1080	PASS
REL BDY 6 CHRIS STREET_Cd_Seg1	935	PASS
REL BDY 2 CHRIS STREET_Cd_Seg1	711	PASS
REL BDY 2 CHRIS STREET_Cd_Seg2	831	PASS
REL BDY 378 WESTBURY ROAD_Cd_Seg1	670	PASS
REL BDY 376 WESTBURY ROAD_Cd_Seg1	1471	PASS
REL BDY 376 WESTBURY ROAD_Cd_Seg2	1527	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg1	1671	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg2	1691	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg3	1728	PASS
REL BDY 374 WESTBURY ROAD_Cd_Seg4	1734	PASS

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (3):

Calculation Label	Adaptation Luminance	Test Results
TI STUART AVE	5	PASS
TI WESTBURY RD NTH	5	PASS
TI WESTBURY RD STH	5	PASS

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 3.0 %

Calculated UWLR: 0.0 %
(EXCLUDING SIGNS CALCULATED SEPARATELY)
Test Results: PASS

Rev.	Date	Drn.	Description	Chkd.
G	28/5/24	SAF	CHANGES MADE FOR RFI RESPONSE	

Project:
PROPOSED McDONALDS RESTAURANT
345-347 WESTBURY ROAD
PROSPECT VALE Tas.

Title:
ELECTRICAL SERVICES
LIGHTING
OBTRUSIVE LIGHT ANALYSIS

Drawn: SAF Chk SAF Date: 28/05/2024
Scale:
Drawing No. MCD01155-E01-3 Rev G Size A3

Rubidium Light
A 13 Omaru Street
Loganholme QLD 4129
E admin@rubidiumlight.com.au

LUMINOUS INTENSITY CALCULATIONS - AS/NZS4282:2023

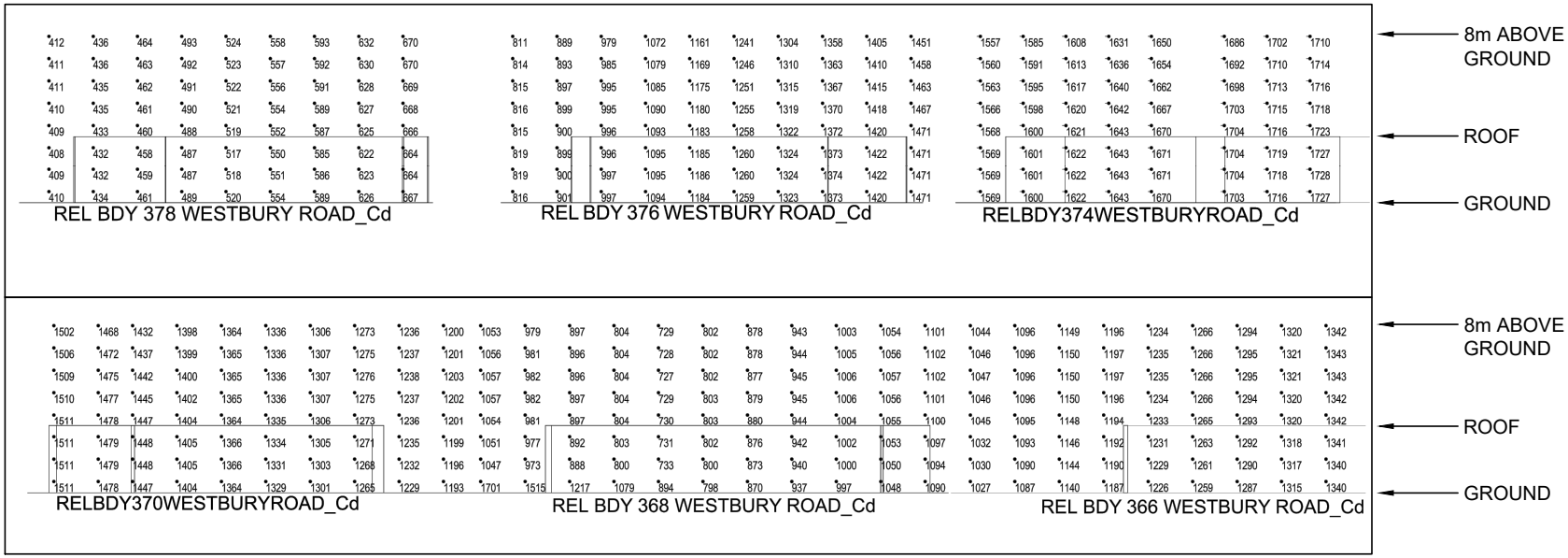
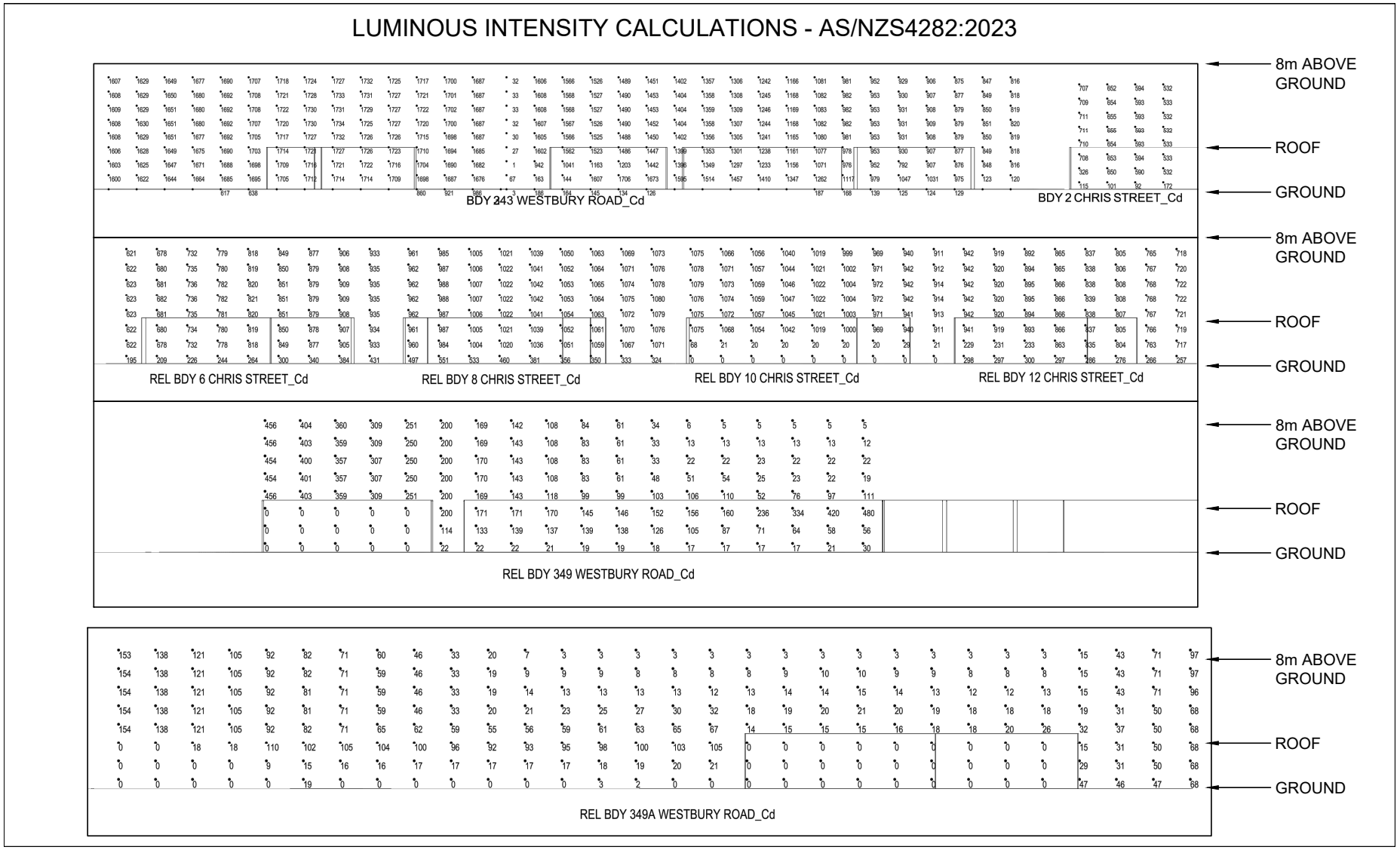


Table 3.3 — Maximum luminous intensities per luminaire

Zone	Luminous intensity (I), cd		
	Non-curfew Level 1 (L1)	Non-curfew Level 2 (L2)	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	165 000	0

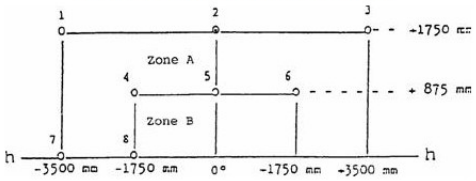
NOTE For A0, I shall be as close to zero as practicable without impacting safety considerations.


LUMINOUS INTENSITY CALCULATIONS - AS/NZS4282:2023
8m ABOVE GROUND
ROOF
GROUND
BDY 243 WESTBURY ROAD_Cd
BDY 2 CHRIS STREET_Cd
8m ABOVE GROUND
ROOF
GROUND
REL BDY 6 CHRIS STREET_Cd
REL BDY 8 CHRIS STREET_Cd
REL BDY 10 CHRIS STREET_Cd
REL BDY 12 CHRIS STREET_Cd
8m ABOVE GROUND
ROOF
GROUND
REL BDY 349 WESTBURY ROAD_Cd
8m ABOVE GROUND
ROOF
GROUND
REL BDY 349A WESTBURY ROAD_Cd

6. Headlight Beams

The headlight beam analysis relies upon information provided in ADR46/00 Vehicle Standard (Australian Design Rule 46/00 – Headlamps) 2006.

C. Measuring points of illumination values



Note:

Figure P1C shows the measuring points for right-hand traffic.

Points 7 and 8 move to their corresponding location at the right-hand side of the picture for left-hand traffic.

Headlight beams are shown in low-beam mode.

The scenarios shown are for vehicles traversing the site, including the drive-through driveway and consider the sensitive receptors.

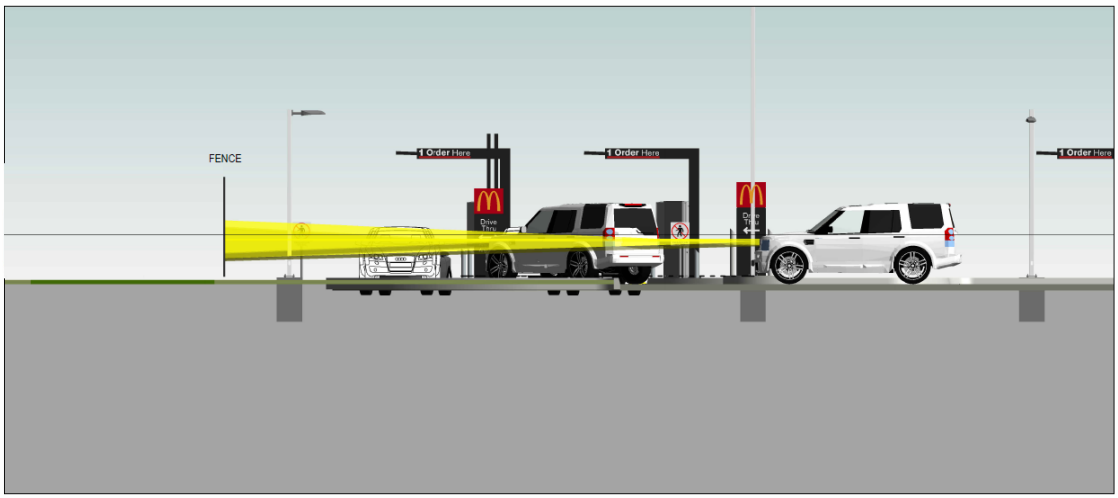


Figure 16- Headlight beam analysis for drive-through traffic – beams are cutoff by fence along Eastern boundary.

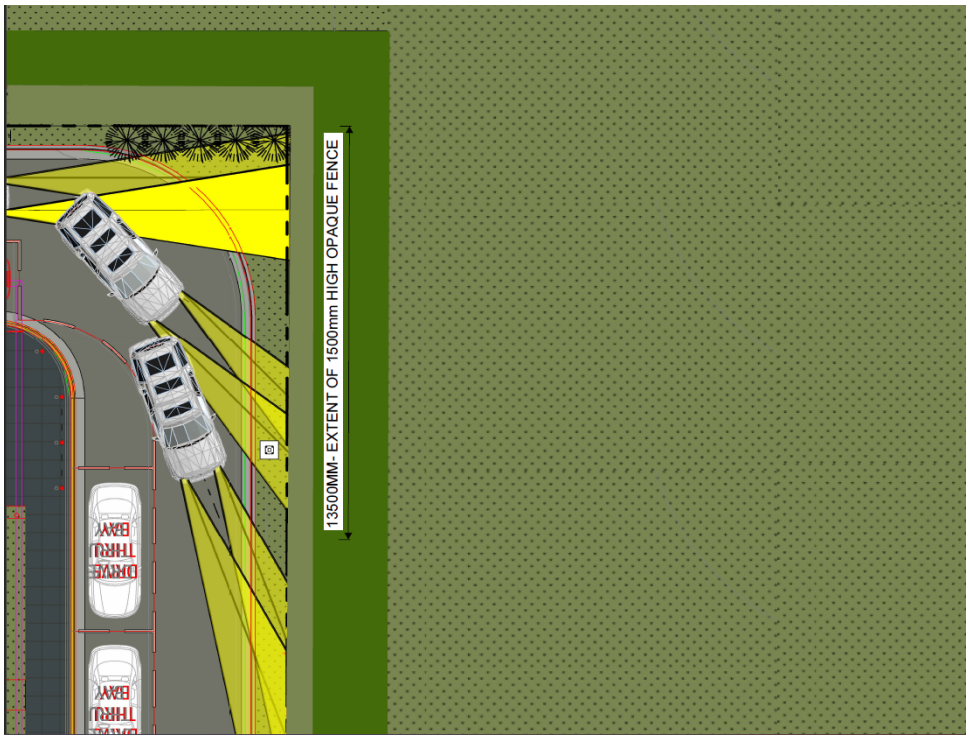


Figure 17 - Headlight beam analysis for drive-through traffic – beams are cutoff by 1500mm high fence along part of Western boundary.

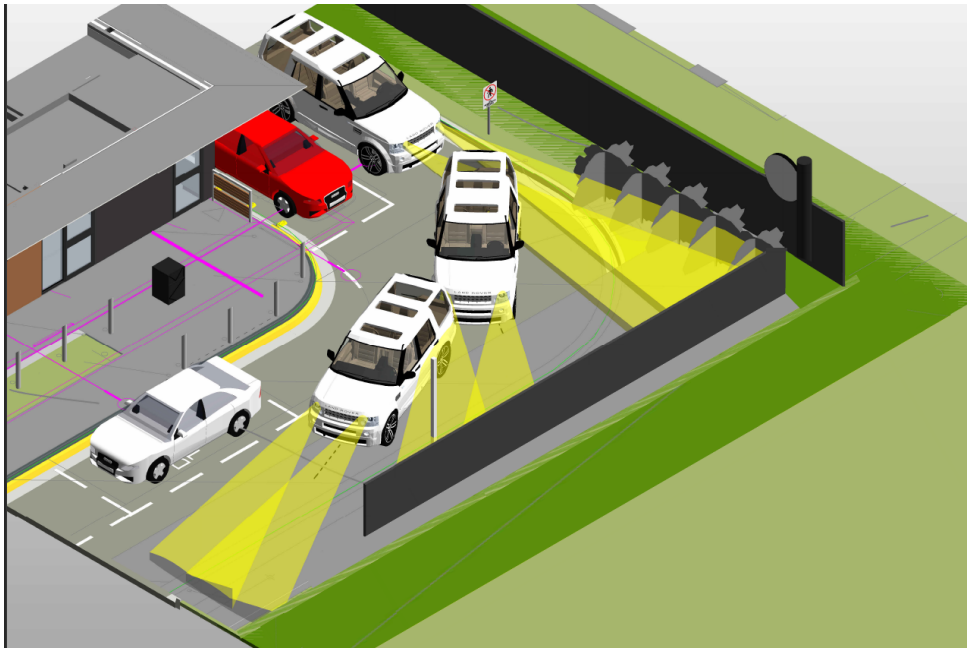


Figure 18 - Headlight beam analysis for drive-through traffic – beams are cutoff by1500mm high fence along part of Western boundary.

7. Summary

7.1 On the matter of compliance with Australian Standard AS/NZS1158.3.1:2005– *Lighting for roads and public spaces;*

7.1.1 It is demonstrated that the proposed lighting scheme complies with AS/NZS1158.3.1:2005 Category P11a and P12 - refer lighting design in Section 2.

7.2 On the matter of compliance with Australian Standard - AS4282:2023 *Control of the obtrusive effects of outdoor lighting*, the following is noted;

7.2.1 Illuminance and Intensity calculations for the Relevant Boundaries at the Dwellings along Westbury Road and to the North, East and South boundaries comply with the requirements of AS/NZS4282:2023 for **pre-curfew** operation in an A4 Environmental zone.

7.2.2 Illuminance and Intensity calculations for the Relevant Boundaries at the Dwellings along Westbury Road and to the North, East and South boundaries comply with the requirements of AS/NZS4282:2023 for **curfew** operation in an A4 Environmental zone when the pylon sign at the Northwest corner of the site is switched off. All other lights remain energised.

7.2.3 Illuminated signage will not exceed 350cd/m^2 in all cases.

7.2.4 Threshold Increment calculations for Westbury Road comply with the requirements of AS/NZS4282:2023 for pre-curfew and curfew operation in an A4 Environmental zone.

7.3 On the matter of the potential for loss of amenity to residents of the surrounding dwellings, caused by vehicle headlights when traversing the site, the headlight beams are contained within the site through the use of opaque fencing along the North, East and South boundaries, and a 1500mm high opaque barrier along part of the Westbury Road frontage.

Curriculum Vitae Scott Forbes

Scott Forbes MIES RLP

Principal Lighting Engineer
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www.rubidumlight.com.au

Key Skills Assessment

- **Lighting Design** – Over 30 years' experience as a lighting engineer. Using the latest in lighting design software and applying knowledge earnt over years of practical experience.
- **Current Standards** – Deep understand of all current lighting relevant standards and their application to project lighting design. This includes – National Construction Code (NCC) and various Australian and International Standards e.g. 2293, 1158, 1428, 4282, 1680, etc.
- **Computer Aided Drafting (CAD)** – A continual user of AutoCAD systems since 1991
- **Value Engineering** – Highly experienced in taking lighting projects and reducing the overall delivery costs without any compromise in end result of quality.
- **Environmental Impact** – Full understanding of AS4282 Obtrusive effect of lighting and also other international standards and their application. Assisting in lighting master plans and lighting management plans for successful lighting impact mitigation for sensitive projects, including mining operations and logistics handling.
- **Lecturing** – presentation of technical information for industry conferences and changes to Codes.
- **Subject Matter Expert** – Actively engaged at high level with Federal Government advisory committees such as ABCB, ASBEC, Australian Standards.
- **Mentoring** – passionate about sharing the knowledge, currently teaching our cadet lighting engineer.

Professional Experience

Director/Principal Lighting Engineer 2017 – current

Rubidium Light

Ninox ST and Rubidium Light merged in 2017 and has grown to employ 3 full time lighting specialist designers. Specialising in lighting consultancy and its skilled application, working on projects from mining to 5-star hotels and delivering exceptional outcomes for our clients.
Scott also specialises in lighting relevant professional witness activities and can talk with great authority on all things lighting including the physiology of sight, human factors and obtrusive lighting compliance.

Director/Principal Lighting Engineer 2004 - 2017

Ninox ST

Ninox ST was created by Scott Forbes to service the lighting consultancy needs developing out of the introduction of the design and construct method of building. This lighting consultancy further developed to provide lighting application engineering services to most of the major big box retailers in Australia along with some more diverse clients from mines and public spaces.

Lighting Engineer 1998 - 2000

Rexel Australia

Working as a lighting engineer for this supplier of lighting focused much of his work on the product available from this supplier. This mainly took the form of road lighting and expanded his knowledge of this subject greatly.

Certifications & Memberships

- Illuminating Engineering Society of Australian and New Zealand (IESANZ) Member (MIES) #280
- Illuminating Engineering Society of Australian and New Zealand (IESANZ) Registered Lighting Practitioner (RLP)
- Course in Lighting Design and Application TAFE QLD 1992
- Illuminating Engineering Society of Australia and New Zealand (IESANZ) Continuing Professional Development Program (CPD) Current
- Technical Director - Illuminating Engineering Society of Australian and New Zealand (IESANZ)
- Electrical Trade Certificate Wagga Wagga College of TAFE 1988
- EDAQ Road Lighting Course 1999

Recent Major Projects

- Newcastle City Council public area lighting upgrades
- All Bunnings Stores Aust. and NZ
- Robina Stadium Commonwealth Games overlay
- All JB Hifi Stores nationwide
- Yaroomba Beach lighting masterplan
- Wellington Prison
- Westfield Coomera
- Lane Cove Interchange
- Ipswich Central Mall
- Ravensworth Mine
- Callide Mine

Lighting Engineer 1991 - 1998

Spectra Lighting

Spectra Lighting was a lighting supplier with luminaires used in applications as diverse as the mining sector all the way through to international museums. The work was highly varied and exposure to their projects allowed for rapid expansion in knowledge and project management skills.

Lighting Engineer 1989 - 1991

GEC Osram Lighting

Scott began his lighting career back in Bisbane as a cadet at GEC Osram working mainly on sportsfields, heavy industry and road lighting designs. It was during this period that Scott completed the IESANZ Certificate in Illumination Engineering.

Apprentice Electrical Mechanic
1986 - 1989

State Rail Authority NSW

After completing senior studies at school, Scott moved to Sydney and commenced an apprenticeship as a railway signal electrician. Finishing his Electrical Trade Certificate, Scott moved to Canberra to study Electrical Engineering in the fourth year of his apprenticeship.

Expert Witness

- Supporting Land Court decisions
- Preparation of submissions for Development Applications
- Reports for Coronial Enquiries

CLARITY
ACOUSTICS

Report R01 Rev5 22203

24 May 2024

345-347 Main Road, Prospect Vale

Planning Application - Acoustic Assessment Report

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ABN 86 301 701 872

CLARITY
ACOUSTICS

PROJECT SUMMARY:

R01 Rev5 22203

345-347 Westbury Road, Prospect Vale

Planning Application Acoustic Report

PREPARED FOR:

McDonald's Australia Ltd

2 Smith Street

Collingwood VIC 3066

ATTENTION: Chris Ling

REFERENCE	REV	STATUS	DATE	AUTHOR	REVIEWER
R01 22203	-	DRAFT	15 MAR 2023	RL	AC
R01 22203	-	ISSUED	20 MAR 2023	RL	AC
R01 22203	Rev1	ISSUED	19 APR 2023	RL	AC
R01 22203	Rev2	ISSUED	11 AUG 2023	RL	AC
R01 22203	Rev3	ISSUED	8 DEC 2023	RL	AC
R01 22203	Rev4	ISSUED	9 FEB 2024	RL	AC
R01 22203	Rev5	ISSUED	24 MAY 2024	RL	AC

CLARITY
ACOUSTICS

AAAC

Clarity Acoustics is a member of the *Association of Australasian Acoustical Consultants* (AAAC), the not-for-profit peak body representing the acoustic consulting industry in Australia and New Zealand.

Contents

1.0 INTRODUCTION

McDonald's Australia Ltd propose to develop a new convenience restaurant with associated drive through facility at 345-347 Westbury Road in Prospect Vale.

Clarity Acoustics Pty Ltd (Clarity Acoustics) has been engaged by McDonald's Australia Ltd to conduct an acoustic assessment for the proposed development to be submitted as part of the planning application.

This report provides details of the proposed site operations, measured background noise environment, relevant noise criteria, recommended noise controls and an assessment of operational noise with the incorporation of the recommended noise controls.

A glossary of acoustic terminology used in this report is provided in APPENDIX A.

2.0 PROJECT DESCRIPTION

2.1 Subject site

The subject site is located 345-347 Westbury Road, Prospect Vale and is bounded by:

- Westbury Road to the west with dwellings beyond
- Dwellings on Westbury Road to the north
- Dwellings on Chris Street to the east
- Commercial properties and dwellings on Westbury Road to the south.

The nearest receivers are dwellings on Westbury Road to the south, west and north of the subject site and on Chris Street to the east of the subject site.

2.2 Proposed operations

The proposed development is to include a convenience restaurant with dual customer order devices (CODs) installed in parallel with a single drive through lane. The CODs will be located to the east of the restaurant building and the cashier and servery windows will be located along the southern facade of the building.

The convenience restaurant will have a dedicated loading bay to the east of the restaurant building. Deliveries to the restaurant will be via delivery vans or delivery trucks up to 14 m in length. Waste collection from the subject site will also occur from the loading bay area.

Mechanical plant associated with subject site will be installed on the roof of the restaurant and will be shielded by the proposed parapet around the roof.

The proposed site layout is provided in APPENDIX B.

The subject site is proposed to operate 24 hours a day, 7 days a week, however, deliveries to the site are to be restricted to 0700 to 2100 hours, Monday to Saturday and 0800 to 2100 hours, Sunday.

2.3 Nearest affected noise sensitive receivers

Table 1 provides details of the nearest affected receivers that have been considered in the following assessment.

Table 1 - Details of the nearest noise sensitive receivers

ID	Address	Description
R1	1/376-378 Westbury Road	Single storey dwelling to the south-west of the subject site
R2	374 Westbury Road	Single storey dwelling to the south-west of the subject site
R3	370 Westbury Road	Single storey dwelling to the west of the subject site
R4	1/2 Stuart Avenue	Single storey dwelling to the north-west of the subject site
R5	1/343 Westbury Road	Single storey dwelling to the north of the subject site
R6	2/343 Westbury Road	Single storey dwelling to the north of the subject site
R7	3/343 Westbury Road	Single storey dwelling to the north of the subject site
R8	4/343 Westbury Road	Single storey dwelling to the north of the subject site
R9	4-6/2 Chris Street	Single storey dwelling to the north-east of the subject site
R10	6 Chris Street	Single storey dwelling to the east of the subject site
R11	8 Chris Street	Single storey dwelling to the east of the subject site
R12	10 Chris Street	Three single storey dwellings to the east of the subject site
R13	12 Chris Street	Single storey dwelling to the south-east of the subject site
R14	1-6/349 Westbury Road	Single storey dwellings to the south of the subject site

An aerial photograph of the subject site and nearest affected receivers is provided in Figure 1.

Figure 1 - Aerial photograph of the subject site and receivers (source: Nearmap)

For brevity, receivers have been grouped together based on the predicted noise exposure and only predicted noise levels for the most affected dwelling of each group have been presented. Receiver locations have been grouped as outlined in Table 2.

Table 2 – Receiver groups based on predicted noise exposure

Receivers	Address
R1 & R2	1/376-378 Westbury Road & 374 Westbury Road
R3 & R4	370 Westbury Road & 1/2 Stuart Avenue
R5-R8	1-4/343 Westbury Road
R9-R11	4-6/2 Chris Street, 6 Chris Street and 8 Chris Street
R12	10 Chris Street
R13	12 Chris Street
R14	1-6/349 Westbury Road

3.0 ADOPTED CRITERIA

The subject site is located within a General Business Zone. Under the Tasmanian Planning Scheme, a food services use is classified as a permitted use within a General Business Zone.

Use standards for a General Business Zone include the following in relation to noise:

Objective	That uses do not cause an unreasonable loss of amenity to residential zones.
Acceptable Solutions	**Performance Criteria**
A1 Hours of operation of a use listed as Discretionary, excluding Emergency Services, must be within the hours of: (a) 7.00am to 9.00pm Monday to Saturday; and (b) 8.00am to 9.00pm Sunday and public holidays.	**P1** Hours of operation of a use listed as Discretionary, excluding Emergency Services, Natural and Cultural Values Management, Passive Recreation, Residential, Utilities or Visitor Accommodation, on a site within 50m of a General Residential Zone or Inner Residential Zone, must not cause an unreasonable loss of amenity to the residential zones having regard to: (a) the timing, duration or extent of vehicle movements; and (b) noise, lighting or other emissions.
A3 Commercial vehicle movements and the unloading and loading of commercial vehicles for a use listed as Discretionary, excluding Emergency Services, must be within the hours of: (a) 7.00am to 9.00pm Monday to Saturday; and (b) 8.00am to 9.00pm Sunday and public holidays.	**P3** Commercial vehicle movements and the unloading and loading of commercial vehicles for a use listed as Discretionary, excluding Residential or Visitor Accommodation, on a site within 50m of a General Residential Zone or Inner Residential Zone, must not cause an unreasonable loss of amenity to adjacent sensitive uses, having regard to: (a) the time and duration of commercial vehicle movements (b) the number and frequency of commercial vehicle movements (c) the size of commercial vehicles involved: (d) manoeuvring required by the commercial vehicles, including the amount of reversing and associated warning noise (e) any noise mitigation measures between the vehicle movement areas and the residential zone: and (f) potential conflicts with other traffic.

The above guidance does not provide objective noise targets required to be achieved for the proposed development at the subject site. In the absence of objective noise targets, and based on discussions with EPA Tasmania, we have adopted the following criteria for noise emissions associated with the proposed development:

- $L_{Aeq,\ 15\ minute}$ ≤ the existing background noise level ($L_{A90,\ 15\ minute}$) + 5 dB
- A sleep disturbance criterion of 60 dB L_{Amax}
- A low frequency noise threshold of C-weighted noise level minus A-weighted ≤ 15 dB.

Each of the above criteria are discussed in more detail in the following sections.

3.1 $L_{Aeq,\ 15\ minute}$ ≤ the existing background noise level ($L_{A90,\ 15\ minute}$) + 5 dB

A "background noise level plus" approach is commonly used for the assessment of noise and the proposed criteria are consistent with the Acceptable Solution provided in other scenarios under the Tasmanian Planning Scheme.

Furthermore, the proposed criteria are consistent with the intrusiveness criteria in NSW EPA's *Noise Policy for Industry* (NPfI) however, under the NPfI, a base limit of 35 dB $L_{Aeq,\ 15\ minute}$ is applicable during the night period which is 2 dB higher than the proposed night time criteria for the subject site. For the day and evening period, the NPfI sets base limits of 35 and 40 dB $L_{Aeq,\ 15\ minute}$, however, these would not be considered relevant for the subject site due to the background noise environment (i.e., a background + 5 dB criteria would apply for day and evening periods rather than base criteria).

In Victoria, EPA publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) is used to determine noise limits applicable to commercial, industrial or trade premises. Considering the background noise environment at the subject site, the noise limits that would apply under the Noise Protocol are as follows:

For urban areas:

- Day period - 50 dB $L_{Aeq,\ 30\ minute}$
- Evening period - 44 dB $L_{Aeq,\ 30\ minute}$
- Night period - 37 dB $L_{Aeq,\ 30\ minute}$

For rural areas:

- Day period - 47 dB $L_{Aeq,\ 30\ minute}$
- Evening period - 42 dB $L_{Aeq,\ 30\ minute}$
- Night period - 37 dB $L_{Aeq,\ 30\ minute}$.

It can be seen from the above that proposed criteria are consistent with, or more stringent than, the acoustic criteria applicable to similar developments in other jurisdictions.

3.2 Sleep Disturbance Criterion

The NSW Environmental Protection Authority (EPA) conducted a review of sleep disturbance studies the results of which are outlined in the NSW EPA's Road Noise Policy. The NSW EPA concluded that:

- *maximum internal noise levels below 50–55 dB L_{Amax} are unlikely to awaken people from sleep*
- *one or two noise events per night, with maximum internal noise levels of 65-70 dB L_{Amax} are not likely to affect health and wellbeing significantly.*

An open window provides an approximate noise reduction of 10-15 dB from outside to inside (refer to World Health Organisation guidelines and RNP). A sleep disturbance criterion of 65 dB L_{Amax} (applicable externally to existing dwellings) has been applied to the subject site which is consistent with the maximum noise criterion contained within the Acceptable Solution A1 for sensitive uses within a substation facility buffer area (C4.5.1) under the Tasmanian Planning Scheme.

The proposed sleep disturbance criterion is also consistent with the decision in *Marching Ants (Tas) Pty Ltd v Launceston City Council and Ors [2021]*.

It is noted that Council's review of the previous iteration of the acoustic report for this application highlighted that the Environment Protection Policy (Noise) 2009 by Department of Environment, Parks, Heritage and the Arts Tasmania includes a reference to 60 dB L_{Amax}. While our experience is that a sleep disturbance criterion of 65 dB L_{Amax} is an appropriate external criterion, we have updated the assessment to reflect the more stringent 60 dB L_{Amax} criterion outlined in the Environment Protection Policy (Noise) 2009.

3.3 Low frequency threshold

EPA Tasmania's *Noise Measurement Procedures Manual* includes corrections for low frequency noise based on the difference between the A-weighted noise level and the C-weighted noise level. If the C-weighted noise level is more than 15 dB higher than the A-weighted noise level, a 5 dB correction is applied.

For the purposes of this assessment, we are proposing that the low frequency threshold of C-weighted noise level minus A-weighted ≤15 dB be achieved rather than applying penalties for scenarios if the threshold is not achieved.

4.0 BACKGROUND NOISE MONITORING

As outlined in Section 3.1, the adopted criteria for the subject site are set accounting for existing background noise levels in the vicinity of the proposed use. Accordingly, noise monitoring was undertaken at the subject site between 1130 hours on Wednesday, 25 January and 1000 hours on Wednesday, 8 February 2023 to quantify the background noise levels.

The background noise monitoring was undertaken using a Class 1 sound level meter (Svantek 977A Sound & Vibration Analyser - serial number 46000) with the microphone set at a height of 1.8 m above ground level. The noise monitor was installed along rear boundary of the subject site.

Figure 2 provides the noise monitoring position.

Figure 2 – Noise monitoring position (source: Nearmap)

The measured background noise levels have been processed in accordance with the EPA Tasmania's *Noise Measurement Procedures Manual*. Table 3 provides the results of the background noise monitoring as well as the typical ambient noise levels during the monitoring period.

Table 3 – Measured background and ambient noise levels, dB

Period	Time Period	Measured background noise levels, $L_{A90,\ 15\ minute}$	Measured typical ambient noise levels, $L_{Aeq,\ 15\ minute}$
Day	(0700 - 1800 hours)	38	44
Evening	(1800 – 2200 hours)	36	42
Night	(2200 – 0700 hours)	28	32

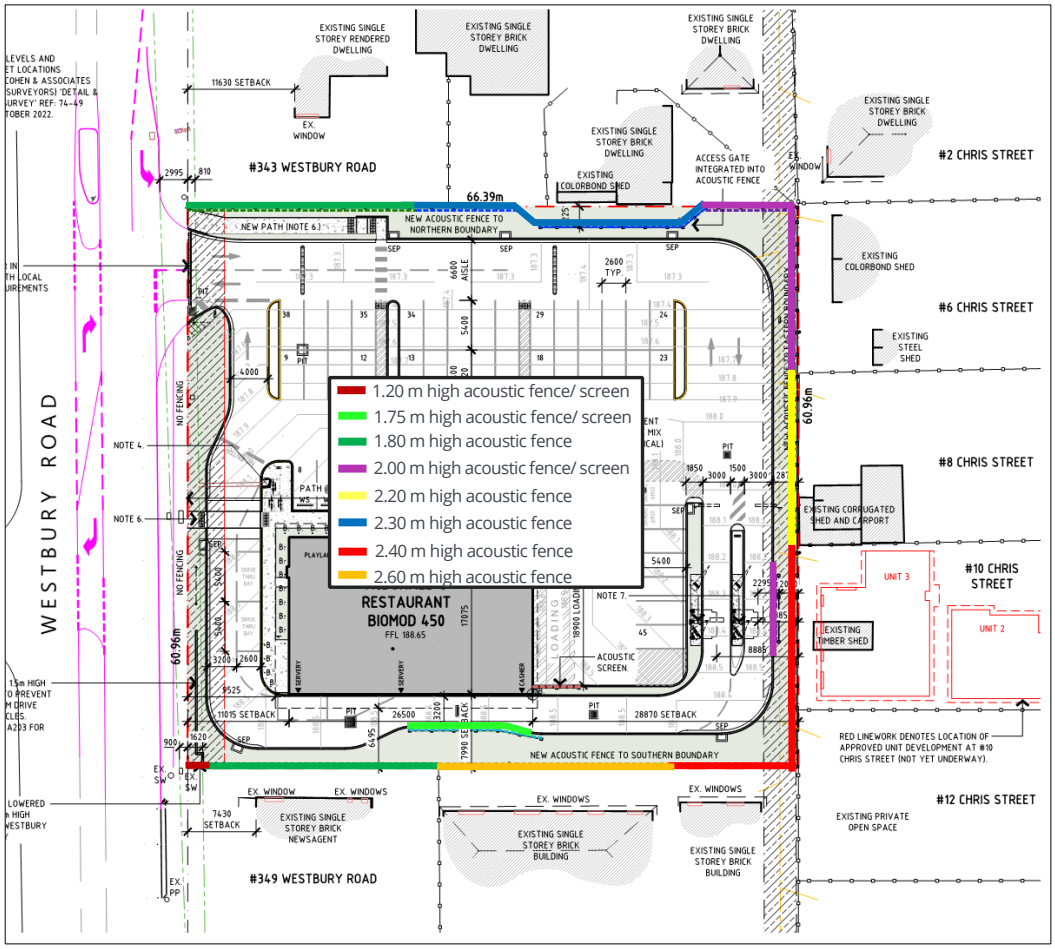
5.0 NOISE CONTROL MEASURES

A 3-D noise model of the site and surrounding area has been created to predict noise levels from the operation of the subject site at neighbouring residential properties. Outcomes of the noise modelling indicate that the following noise controls will be required to enable compliance with the adopted environmental noise criteria.

5.1 Perimeter acoustic fencing

It is recommended that perimeter acoustic fencing be provided along the northern, eastern and western site boundaries. The acoustic fencing is to be between 1.8 and 2.6 m high (above FSL). The location, extent and heights of the proposed acoustic fences are provided in Figure 3.

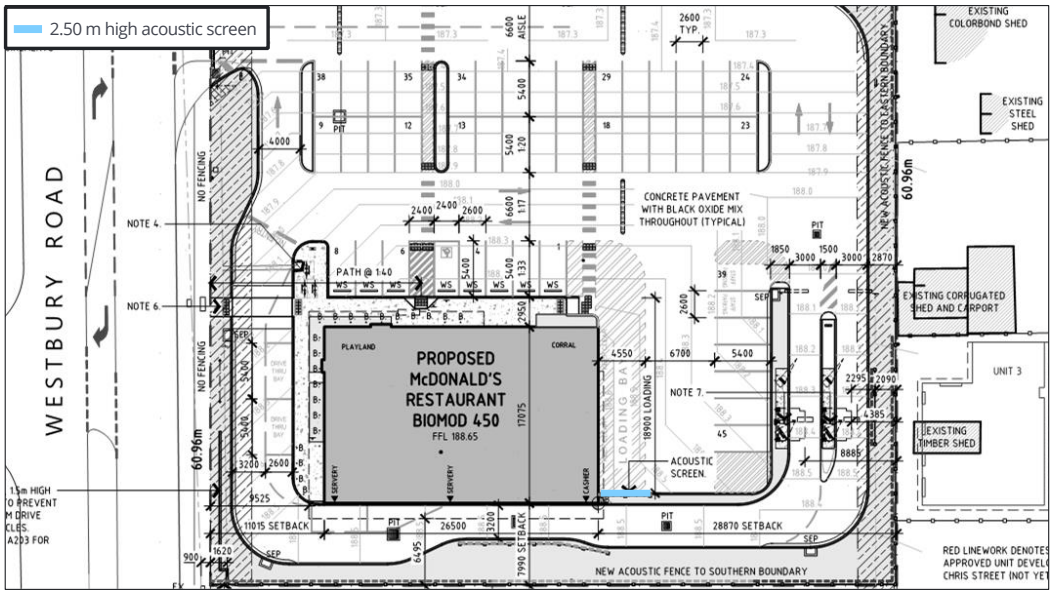
Figure 3 – Extent of acoustic fencing



5.2 Acoustic screening to loading bay

It is recommended that a 2.5 m high acoustic screen (above FSL) be provided to the rear (i.e., south) of the loading bay. The location and extent of the proposed acoustic screen to the loading bay is provided in Figure 4.

Figure 4 – Acoustic screening to loading bay



It is recommended that acoustic absorption be provided to the inner face of the acoustic screen to the loading bay. The absorptive lining should have a minimum Noise Reduction Coefficient (NRC) of 0.7. Materials such as 100 mm thick glasswool insulation with perforated metal facing, 50 mm thick Stratocell Whisper, 50 mm thick Envirospray 300 or any other material with an NRC ≥ 0.7 can be used.

5.3 Acoustic fence/screen construction

To provide adequate noise attenuation the construction material of the proposed acoustic screens must have a minimum surface density of 12 kg/m^2 and be free from holes and gaps. Materials such as 9 mm thick fibre cement sheet, 25 mm thick plywood timber panelling or proprietary acoustic panels such as *ModularWalls AcoustiMax* panels or *Wallmark EVO* panels will achieve the required surface density. A typical acoustic timber fence detail is provided in APPENDIX C.

If a material which meets the above requirement and does not restrict light is required, 12 mm thick Perspex, 16 mm thick Thermoclear or 6 mm thick float glass can be used. Where a perforated finish or batten screen finish is preferred such as metal or timber perforated balustrades or a timber look batten screen, the chosen finish will require a solid backing such as 12 mm thick Perspex or 6 mm thick glass or any other approved material which meets the minimum surface density specification.

5.4 Construction of grates and speed humps

In order to limit impulsive noises from the subject site, where metal grates are required in trafficable areas of the carpark, they should be designed to maintain the continuity of the surface finish (i.e., sit flush and tight with surface) and should be maintained so they do not become loose or uneven.

Speed humps should be fixed rubber type speed humps and should be maintained so they do not become loose or uneven.

5.5 Operational restrictions

Deliveries to the subject site via Heavy Rigid Vehicles (HRVs) should be restricted to the day time period only (i.e., between 0700-1800 hours, Monday to Saturday and 0800 hours-1800 hours, Sundays).

All other deliveries to the subject site (i.e., deliveries via delivery vans, Light Rigid Vehicles (LRVs) and Medium Rigid Vehicles (MRVs)) are to be restricted in accordance with Acceptable Solution A3 of Clause 9.3.1 (i.e., between 0700-2100 hours, Monday to Saturday and 0800-2100 hours, Sundays).

In addition, to enable compliance with the environmental noise criteria, waste collection from the subject site should be scheduled to only occur during the day period (i.e., 0700-1800 hours, Monday to Saturday and 0800-1800 hours, Sundays) and refrigeration condensers associated with delivery vehicles must be switched off during deliveries (i.e., prior to entering the subject site).

No deliveries or waste collection are proposed for Public Holidays.

5.6 Mechanical Plant

All plant associated with the proposed development will need to be designed to be compliant with the environmental noise criteria at the nearest affected receivers in conjunction with all other noise sources associated with the site that are covered under the adopted criteria.

At this stage, the mechanical services plant selections have not been undertaken for the site. Based on the indicative plant layout provided, it is understood that plant associated with the subject site will be housed on the roof of the store building and will be afforded acoustic shielding via the roof parapet. Based on the indicative layout provided, the following plant and maximum sound power level for each plant item has been incorporated in our noise model.

Table 4 – Sound Power Level of mechanical plant, dB L_{Aw}

Description	Maximum permissible sound power level
AC Unit 1	82
AC Unit 2	81
AC Condenser 3	62
Toilet Exhaust Fan	66
Fry Exhaust Fan	73
Filet Exhaust Fan	73
Grill Exhaust Fan	70
Washup Exhaust Fan	57
Make Up Air Fan	64
Relief Air Fan	70
FSB Condenser	68
MAC-90 Refrigeration Unit	84

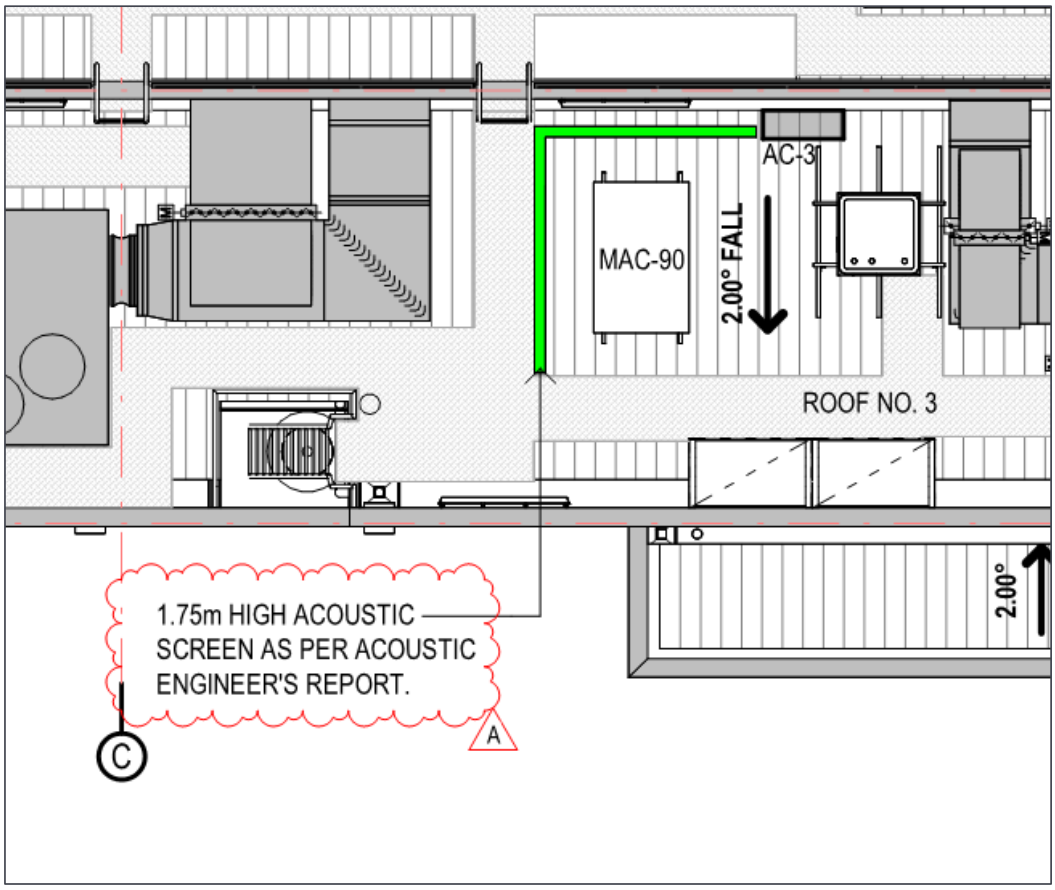
It will also be a requirement that AC Units 1 and 2 operate at low speed at night (2200 hours to 0700 hours). The sound power levels of for AC Units 1 and 2 operating at low speed are to be 77 and 76 dB L_{Aw}, respectively.

In addition, localised acoustic screening will be required to the roof mounted MAC-90 refrigeration unit. The acoustic screen will need to be 1.75 m high and be installed directly to the east and south of the unit. The acoustic screen should be constructed of a material with a minimum surface density of 12 kg/m^2. The minimum surface density requirement can be achieved by 7.5 mm compressed fibre cement sheet or similar.

In addition, it is recommended that acoustic absorption be provided to the inner face of the acoustic screen to the MAC-90 refrigeration unit. The absorptive lining should have a minimum Noise Reduction Coefficient (NRC) of 0.7. Materials such as 100 mm thick glasswool insulation with perforated metal facing, 50 mm thick Stratocell Whisper, 50 mm thick Envirospray 300 or any other material with an NRC ≥ 0.7 can be used.

The location and the extent of the acoustic screening to the MAC-90 refrigeration unit is provided in Figure 5.

Figure 5 – Acoustic screening to MAC-90 refrigeration unit



6.0 NOISE ASSESSMENT

The following sections detail the methodology for noise prediction from the proposed development and compare the predicted noise levels with the adopted criteria for the subject site.

6.1 Assessment methodology

Operational noise levels from the subject site have been calculated using the proprietary noise modelling software SoundPLAN v8.2 which implements International Standard ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2).

The noise modelling considers the following:

- The noise prediction methodology outlined in APPENDIX D
- Source noise level data for noise sources associated with the proposed operation of the subject site as summarised in APPENDIX E
- Assumed maximum sound power levels for mechanical plant associated with the subject site as summarised in Table 4
- Attenuation of noise provided by the distance between the source and receiver, the built form of the subject site and any existing intervening screening structures
- Attenuation of noise provided by the noise mitigation measures and operational controls outlined in Section 5.0
- Reflections from built form, adjacent buildings, screening structures and the ground surface
- Duration of exposure at the receiver locations.

6.2 Assessment criteria

Table 5 provides the assessment criteria for noise emissions from the subject site derived based on the adopted criteria and measured background noise levels.

Table 5 – Assessment criteria, dB

Period	Assessment criteria		
	L_{Aeq}	L_{Amax}	Low frequency noise threshold
Day	43		C-weighted level – A weighted noise level ≤ 15 dB
Evening	41		C-weighted level – A weighted noise level ≤ 15 dB
Night	33	60	C-weighted level – A weighted noise level ≤ 15 dB

6.3 Source noise data

Noise sources associated with the operation of the proposed development include:

- Goods deliveries to the convenience restaurant
- Operation of mechanical services plant
- Operation of CODs associated with the drive through
- Waste collection from the subject site
- Customer vehicle movements at the subject site.

Source noise levels for the proposed development associated with vehicle movements, deliveries and operation of CODs have been taken from measurements conducted at similar facilities.

Noise levels from customer vehicles using the car park and drive through have been modelled in SoundPLAN using methods prescribed in the Bavarian State Office for the Environment's *Parking Area Noise* (BayLfU, 2007). Noise levels from the car park and drive through have been modelled based on 170 vehicle movements per hour during day/evening peak periods and a peak of 85 vehicle movements per hour for the night period.

Source noise levels for mechanical plant have been based on the maximum permissible sound power level data provided in Table 4. These have been incorporated in to our noise model to predict the noise level contribution from each noise source associated with the subject site at the receiver locations.

A detailed schedule of the noise source data used in our noise model is provided in APPENDIX E.

It should be noted that:

- a + 2 dB tonality correction has been applied to account for the reversing beepers of delivery and waste collection vehicles which has been applied to the day and evening noise predictions for all receivers
- a + 2 dB impulsivity correction has been applied to account for car door slams and vehicles moving over speed humps which has been applied to the day, evening and night period noise predictions for all receivers.

It should also be noted that the above corrections have been applied to the noise modelling outlined in the original report.

Refer to APPENDIX F for further details regarding tonality and impulsiveness corrections.

6.4 Predicted noise levels

Predicted noise levels from the operation of noise sources associated with the operation of the subject site are provided in the subsequent sections based on the following operational assumptions for a worst-case 15-minute period:

Table 6 – Operational assumptions for worst case 15-minute period

Period	Deliveries and Waste Collection	COD Usage
Day	1 x waste collection from loading bay 1 x small delivery via Light Rigid Vehicle (LRV)	5 orders per COD
Evening	1 x small delivery via MRV or LRV	5 orders per COD
Night	No deliveries or waste collection proposed	2 orders per COD

Based on previous experience, it is assumed that the average time taken per order is approximately 20 seconds.

The predicted noise levels account for the proposed built form of the subject site and the noise control measures outlined in Section 5.0.

It should be noted that the predicted noise levels presented in Sections 6.4.3, 6.4.4 and 6.4.5 are provided as integer values for each noise source, however, the cumulative values are based on the logarithmic addition of the decimal values. As such, the logarithmic addition of the presented individual noise source data will not always add up to the cumulative value presented.

6.4.1 Day period operation

Predicted noise levels from the proposed day time operation of the subject site are presented in Table 7. The predicted day period noise levels include a + 2 dB tonality correction and a + 2 dB impulsivity correction for all receivers.

Table 7 - Predicted day period operational noise levels, dB $L_{Aeq, 15\ minute}$

Source	Predicted noise level at receiver (Day)						
	R1 & R2	R3 & R4	R5-R8	R9-R11	R12	R13	R14
CODs	10	24	24	25	33	29	30
Mechanical services	31	28	28	29	30	29	34
Goods deliveries	29	29	28	29	27	24	24
Waste collection	39	42	41	42	42	41	42
Vehicles in carpark and drive through	34	34	31	31	32	28	29
Cumulative noise level	**41**	**43**	**42**	**43**	**43**	**42**	**43**
Assessment criteria	**43**	**43**	**43**	**43**	**43**	**43**	**43**
Compliance?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

As detailed in Table 7, compliance with the day period assessment criteria is predicted to be achieved at the nearest dwellings. For the day period, the predicted cumulative noise levels are lower than the existing measured day period ambient noise level of 44 dB L_{Aeq}.

6.4.2 Evening period operation

Predicted noise levels from the proposed evening period operation of the subject site are presented in Table 8. The predicted evening period noise levels include a + 2 dB tonality correction and a + 2 dB impulsivity correction for all receivers.

Table 8 - Predicted evening period operational noise levels, dB $L_{Aeq, 15\ minute}$

Source	Predicted noise level at receiver (Evening)						
	R1 & R2	R3 & R4	R5-R8	R9-R11	R12	R13	R14
CODs	10	24	24	25	33	29	30
Mechanical services	31	28	28	29	30	29	34
Goods deliveries	29	29	28	29	27	24	24
Vehicles in carpark and drive through	34	34	31	31	32	28	29
Cumulative noise level	**37**	**36**	**34**	**35**	**37**	**34**	**37**
Assessment criteria	**41**	**41**	**41**	**41**	**41**	**41**	**41**
Compliance?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

As detailed in Table 8, compliance with the evening period assessment criteria is predicted to be achieved at the nearest dwellings. For the evening period, the predicted cumulative noise levels are significantly lower than measured evening period ambient noise level of 42 dB L_{Aeq}.

6.4.3 Night-time operation

Predicted noise levels from the proposed operation of the site during the night time period are presented in Table 9. The predicted noise levels take into account the noise controls detailed in Section 5.0. The predicted night period noise levels include a + 2 dB impulsivity correction for all receivers.

Table 9 - Predicted night time operational noise levels, dB L_{Aeq}

Source	Predicted noise level at receiver (Night)						
	R1 & R2	R3 & R4	R5-R8	R9-R11	R12	R13	R14
CODs	< 10	20	20	21	30	25	26
Mechanical services	30	27	27	26	27	27	32
Vehicles in carpark and drive through	30	30	29	28	28	25	26
Cumulative noise level	**33**	**33**	**31**	**31**	**33**	**31**	**33**
Assessment criteria	**33**	**33**	**33**	**33**	**33**	**33**	**33**
Compliance?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

As detailed in Table 9 above, compliance with the night time noise limit is predicted to be achieved at the nearest dwellings. For the night period, the predicted cumulative noise levels are comparable to the existing measured night period ambient noise level of 32 dB L_{Aeq}.

6.4.4 A weighted vs. C weighted

As outlined in Section 3.3, it is proposed that noise from the subject site comply with a low frequency threshold based on a maximum difference between the C-weighted and A-weighted noise level of 15 dB.

Table 10 provides the predicted C-weighted operational noise levels for the day, evening and night periods.

Table 10 - Predicted C-weighted noise levels, dB

Receiver	Predicted C-weighted noise levels		
	Day	Evening	Night
R1 & R2	47	46	42
R3 & R4	47	45	41
R5-R8	48	44	38
R9-R11	49	44	40
R12	51	47	42
R13	47	44	39
R14	52	49	45

Table 11 provides the low frequency assessment for the day, evening and night periods based on the difference between the A-weighted and C-weighted overall noise levels from the subject site.

Table 11 - Predicted difference between the A-weighted and C-weighted noise levels, dB

Receiver	Difference between the C-weighted and A-weighted noise levels			Less than 15 dB?
	Day	Evening	Night	
R1 & R2	6	9	9	**Yes**
R3 & R4	4	9	8	**Yes**
R5-R8	5	10	7	**Yes**
R9-R11	6	9	9	**Yes**
R12	8	10	9	**Yes**
R13	5	10	8	**Yes**
R14	9	12	12	**Yes**

It can be seen from Table 11, that the low frequency thresholds are not predicted to be exceeded at any property during the day, evening or night time periods.

6.4.5 Maximum noise levels

Predicted maximum noise levels from the night time operation of the subject site are provided in Table 12.

Table 12 - Predicted maximum noise levels from late night activity, dB L_{Amax}

Receiver	'Normal' car	Worst case car	Patron voices	Vehicle pass by	COD	Compliance with 60 dB L_{Amax}?
R1 & R2	50	60	57	50	47	**Yes**
R3 & R4	49	60	58	49	47	**Yes**
R5-R8	52	60	59	48	45	**Yes**
R9-R11	51	60	57	48	49	**Yes**
R12	52	60	56	52	57	**Yes**
R13	45	55	52	45	52	**Yes**
R14	52	60	57	52	54	**Yes**

It can be seen from Table 12 that the night-time maximum noise levels from CODs, voices in the carpark/drive-through areas and vehicle movements within the subject site will comply with the maximum noise level component of the assessment criteria.

7.0 CONCLUSION

McDonald's Australia Ltd propose to develop a new restaurant with associated drive through facility at 345-347 Westbury Road in Prospect Vale.

The criteria outlined in Section 3.0 has been adopted so that the subject site does not cause an unreasonable loss of amenity to the residential zones having regard to noise.

Clarity Acoustics has carried out an environmental noise assessment of the proposed restaurant and, based on the proposed design of the development, the adopted assessment criteria for the site can be met by implementing the following:

- Providing perimeter acoustic fencing to the northern, eastern and southern site boundaries as per Section 5.1 of this report
- Providing a 2.5 m high acoustic screen to the south of the loading bay. The inner face of the acoustic screen to the loading bay will need to be provided with an absorptive lining with a minimum NRC of 0.7
- Instructing delivery truck drivers to switch off the truck refrigeration condensers whilst on site
- Selecting mechanical plant to not exceed the permissible sound power levels outlined in Table 4 of this report
- Operating AC-1 and AC-2 in low-speed mode during the night time period i.e., between 2200-0700 hours
- Where metal grates are required in trafficable areas of the carpark, they should be designed to maintain the continuity of the surface finish (i.e., sit flush and tight with surface) and should be maintained so they do not become loose or uneven
- Speed humps should be fixed rubber type speed humps and should be maintained so they do not become loose or uneven
- Providing 1.75 m high localised acoustic screening to the roof mounted MAC-90 refrigeration unit. The inner face of the acoustic screen to the MAC-90 refrigeration unit will need to be provided with an absorptive lining with a minimum NRC of 0.7.

We confirm the proposed hours for delivery and waste collection are as follows:

- Deliveries via HRV – 7 am and 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays).
- Deliveries via other vehicles including MRV, LRV and van – 7 am and 9 pm (Monday to Saturday) and 8 am to 9 pm on Sundays.
- Waste Collection – 7 am and 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays)
- No deliveries or waste collection on Public Holidays.

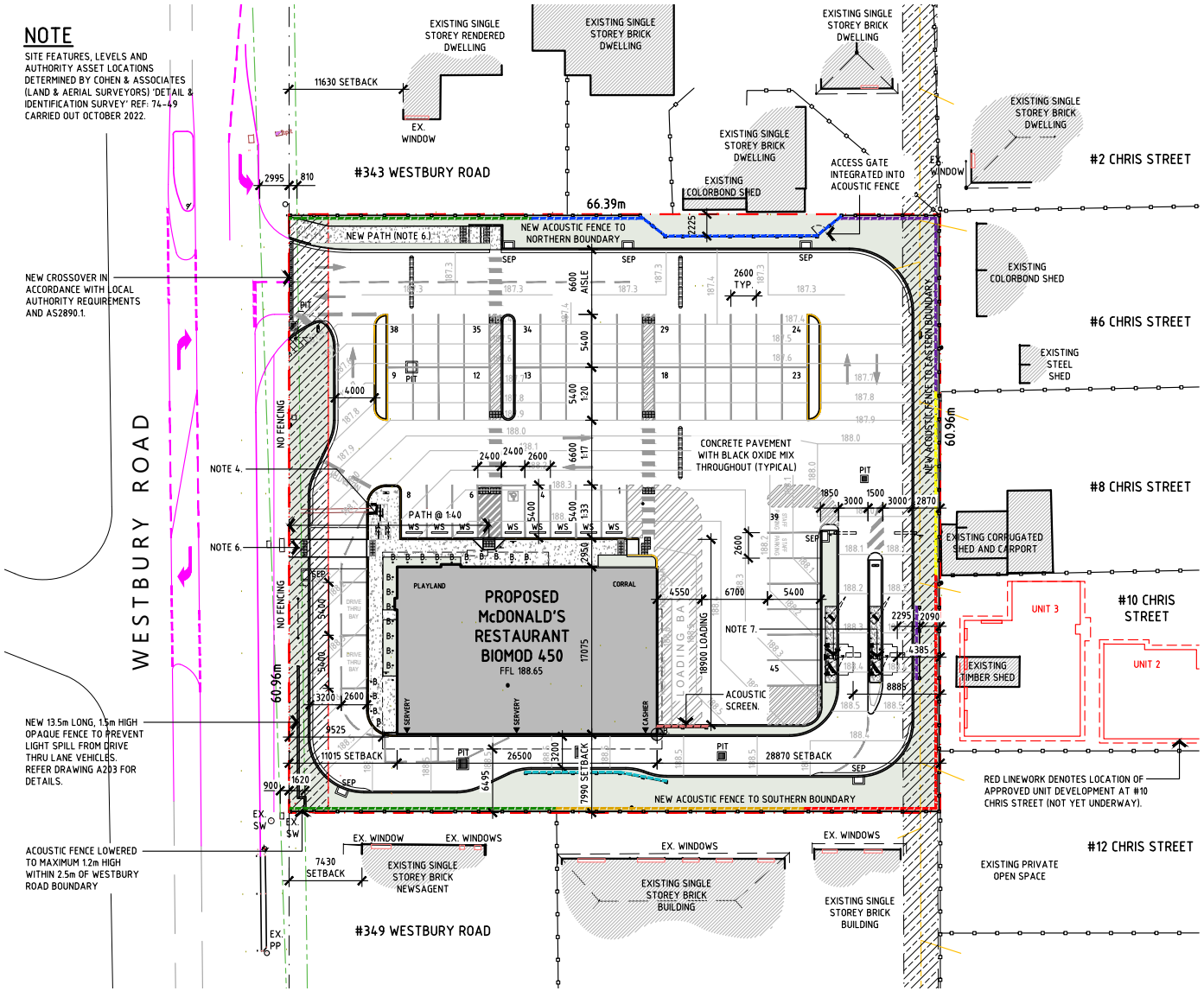
*HRV, MRV and LRV refer to Heavy, Medium and Light Rigid Vehicles, respectively.

Based on the above, we confirm that the subject site is predicted to achieve the adopted noise assessment criteria and, as such, will not cause an unreasonable loss of amenity to the residential zones having regard to noise.

APPENDIX A GLOSSARY OF TERMINOLOGY

dB	Decibel (dB) a relative unit of measurement widely used in acoustics, electronics and communications. The dB is a logarithmic unit used to describe a ratio between the measured sound level and a reference or threshold level of 0 dB.
A-weighting	The A-weighting filter covers the full audio range - 20 Hz to 20 kHz and the shape is similar to the response of the human ear at lower levels. A-weighted measurements correlate well with the perceived loudness at low sound levels, as originally intended.
Hertz	Hertz (Hz) the unit of Frequency or Pitch of a sound. One hertz equals one cycle per second. 1 kHz = 1000 Hz, 2 kHz = 2000 Hz, etc.
$L_{A90\,(t)}$	The sound level exceeded for 90% of the measurement period, A-weighted and averaged over time (t) and commonly referred to as the background sound level.
$L_{Aeq\,(t)}$	A –weighted equivalent continuous sound Level is the sound level equivalent to the total sound energy over a given period of time (t). Commonly referred to as the average sound level.
L_{Amax}	The A-weighted maximum noise level. The highest sound level which occurs during the measurement period or a noise event.
NRC	Noise Reduction Coefficient (NRC) a single number rating system used to compare the sound absorbing characteristics of building materials. A measurement of the acoustic absorption performance of a material, calculated by averaging its sound absorption coefficients at 250, 500, 1000 and 2000 Hz, expressed to the nearest multiple of 0.05.

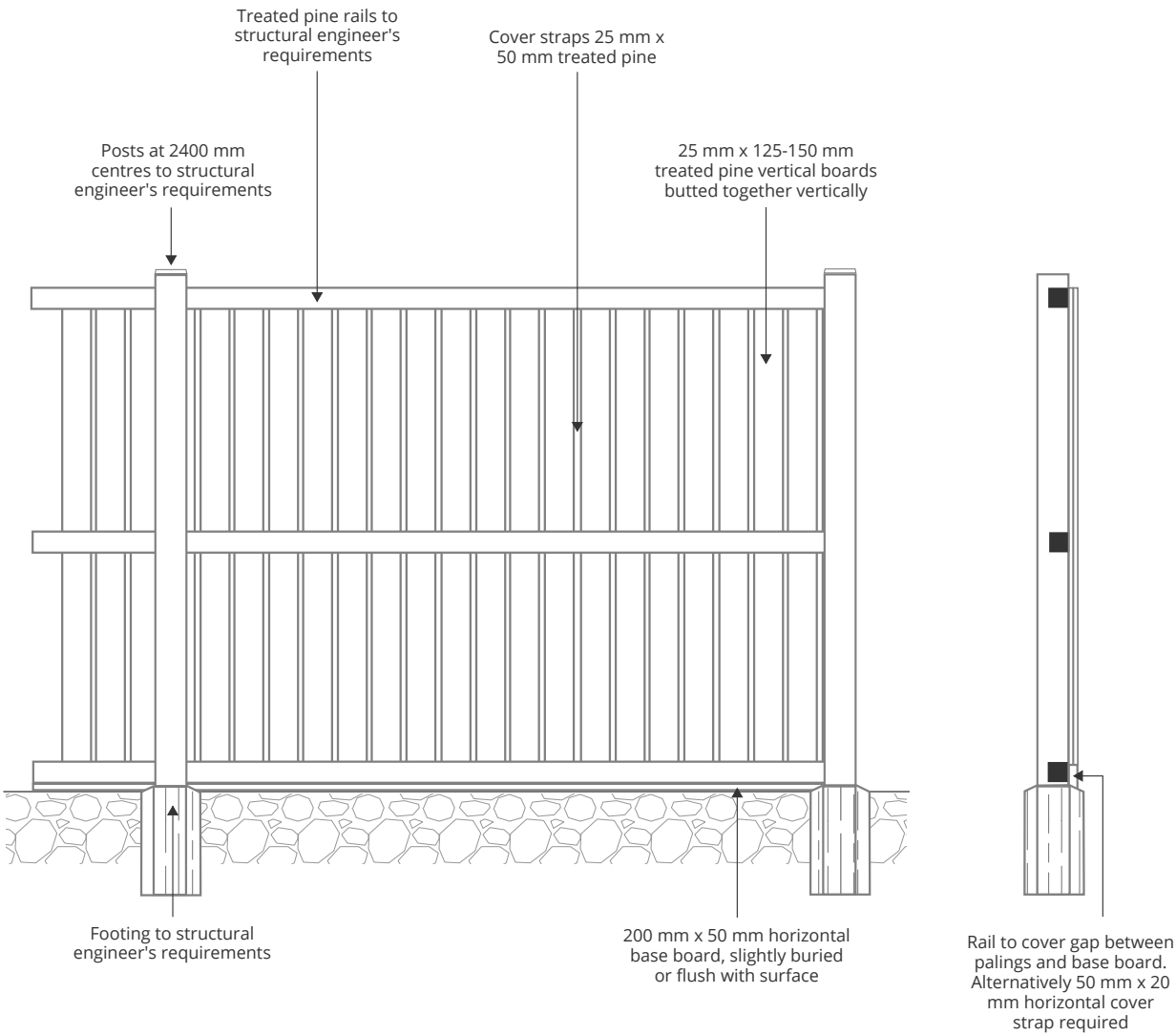
APPENDIX B PROPOSED SITE LAYOUT


NOTE
SITE FEATURES, LEVELS AND AUTHORITY ASSET LOCATIONS DETERMINED BY COHEN & ASSOCIATES (LAND & AERIAL SURVEYORS) 'DETAIL & IDENTIFICATION SURVEY' REF: 74-49 CARRIED OUT OCTOBER 2022.
EXISTING SINGLE STOREY RENDERED DWELLING
EXISTING SINGLE STOREY BRICK DWELLING
EXISTING SINGLE STOREY BRICK DWELLING
EXISTING SINGLE STOREY BRICK DWELLING
11630 SETBACK
EX. WINDOW
#343 WESTBURY ROAD
#2 CHRIS STREET
ACCESS GATE INTEGRATED INTO ACOUSTIC FENCE
EXISTING COLORBOND SHED
66.39m
NEW ACOUSTIC FENCE TO NORTHERN BOUNDARY
NEW PATH (NOTE 6.)
NEW CROSSOVER IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS AND AS2890.1.
#6 CHRIS STREET
EXISTING STEEL SHED
WESTBURY ROAD
NOTE 4.
NOTE 6.
CONCRETE PAVEMENT WITH BLACK OXIDE MIX THROUGHOUT (TYPICAL)
NEW ACOUSTIC FENCE TO EASTERN BOUNDARY
60.96m
#8 CHRIS STREET
PATH @ 1:40
EXISTING CORRUGATED SHED AND CARPORT
PROPOSED McDONALD'S RESTAURANT BIOMOD 450
FFL 188.65
PLAYLAND
CORRAL
#10 CHRIS STREET
UNIT 3
UNIT 2
NOTE 7.
EXISTING TIMBER SHED
ACOUSTIC SCREEN.
NEW 13.5m LONG, 1.5m HIGH OPAQUE FENCE TO PREVENT LIGHT SPILL FROM DRIVE THRU LANE VEHICLES. REFER DRAWING A203 FOR DETAILS.
11015 SETBACK
28870 SETBACK
RED LINEWORK DENOTES LOCATION OF APPROVED UNIT DEVELOPMENT AT #10 CHRIS STREET (NOT YET UNDERWAY).
NEW ACOUSTIC FENCE TO SOUTHERN BOUNDARY
ACOUSTIC FENCE LOWERED TO MAXIMUM 1.2m HIGH WITHIN 2.5m OF WESTBURY ROAD BOUNDARY
EX. WINDOW
EX. WINDOWS
EXISTING SINGLE STOREY BRICK NEWSAGENT
7430 SETBACK
EXISTING SINGLE STOREY BRICK BUILDING
EX. WINDOWS
EX. WINDOWS
#12 CHRIS STREET
EXISTING PRIVATE OPEN SPACE
EXISTING SINGLE STOREY BRICK BUILDING
#349 WESTBURY ROAD
NOTES
1. SITE AREA = APPROX. 4,046m²
BUILDING GFA = 453m²
2. DINING ROOM SEATING CAPACITY = 75 PATRONS.
3. PARKING:
42 X 2600 X 5400 PATRON CAR SPACES.
2 X 2600 X 5400 STAFF CAR SPACES
1 X 2400 X 5400 ACCESSIBLE SPACES WITH
1 X 2400 X 5400 CLEAR ADJACENT SPACE.
2 X 2600 X 5400 WAITING BAYS.
1 X LOADING BAY.
4. BIKE HOOPS IN ACCORDANCE WITH AUSTRALIAN STANDARDS PART 3 BICYCLE PARKING AS2890.3:2015 TO ACCOMMODATE 6 X BICYCLES.
5. HATCHED AREAS DENOTE PEDESTRIAN SIGHT LINES IN ACCORDANCE WITH AS2890.1 CLAUSE 32.4, AND CLAUSE 52.06-9 OF THE PLANNING SCHEME.
6. 1.5m WIDE DDA COMPLIANT BRUSHED CONCRETE PEDESTRIAN STREET ACCESS PATH TO CIVIL ENGINEER'S DETAILS.
7. DRIVE THRU LANE CUSTOMER ORDER DISPLAY AND ASSOCIATED CANOPY, REFER DRAWINGS A082, A807 AND A808 FOR DETAILS.
8. LOT 8 ON PLAN 217681 AND LOT 9 ON PLAN 217358 TO BE CONSOLIDATED PRIOR TO THE OCCUPATION OF THE PROPSOED DEVELOPMENT.
LEGEND
TITLE BOUNDARY
B BOLLARD
EP ELECTRICAL POLE
LP LIGHT POLE
SEP SIDE ENTRY PIT
WS WHEEL STOP
VEHICLE DETECTOR LOOP
EXISTING WATER MAINS
EXISTING SEWER MAINS
PROPOSED EXTERNAL ROAD UPGRADE WORKS TO TRAFFIC ENGINEER'S DETAILS.
FUTURE EASEMENTS FOR EXISTING WATER AND SEWER INFRASTRUCTURE IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS.
3m WIDE FOR SEWER INDICATED
4m WIDE FOR WATER INDICATED
REFERENCES
FOR SITE SIGNAGE PLAN
REFER DWG A801
FOR ACOUSTIC FENCE SHADOW DIAGRAMS
REFER DWG A070
PROPOSED ACOUSTIC FENCE LEGEND
EXTENT OF ACOUSTIC FENCE/SCREEN AT 1.75m HIGH
EXTENT OF ACOUSTIC FENCE AT 1.80m HIGH. LOWER TO 1.2m HIGH WITHIN 2.5m OF WESTBURY ROAD ON SOUTHERN BOUNDARY.
EXTENT OF ACOUSTIC FENCE/SCREEN AT 2.00m HIGH
EXTENT OF ACOUSTIC FENCE AT 2.20m HIGH
EXTENT OF ACOUSTIC FENCE AT 2.30m HIGH
EXTENT OF ACOUSTIC FENCE AT 2.40m HIGH
EXTENT OF ACOUSTIC SCREEN AT 2.50m HIGH
EXTENT OF ACOUSTIC FENCE AT 2.60m HIGH
ALL ACOUSTIC FENCING AND SCREENS MUST HAVE A MINIMUM SURFACE DENSITY OF 12kg/m² AND BE FREE FROM HOLES AND GAPS AS PER ACOUSTIC ASSESSMENT REPORT PREPARED BY CLARITY ACOUSTICS.
BUILDING & WORKS
NOT TO BE USED DURING CONSTRUCTION
Albus & Co
BUILDING DESIGNERS
PROPOSED NEW CONVENIENCE RESTAURANT
McDONALD'S "PROSPECT VALE"
PROPOSED SITE PLAN
24011
A062
D

APPENDIX C ACOUSTIC FENCE DETAIL

TYPICAL ACOUSTIC FENCE SPECIFICATION

CLARITY ACOUSTICS



ELEVATION

SECTION

NOTES:
1. Drawing is not to scale.
2. Specification provided for indicative purposes only. Final specification will be based on individual requirements.
3. Fence, fastenings and footings should be designed by a suitably qualified structural engineer.

APPENDIX D NOISE PREDICTION METHODOLOGY

Predictions of operational noise from the subject site have been undertaken on the basis of:

- The sound emissions of noise sources associated with the development as outlined in APPENDIX E
- A digital noise model of the site and surrounding environment
- International standard(s) used for the calculation of environmental noise propagation.

Details of the prediction methodology are summarised in Table 13 below.

Table 13 - Noise prediction methodology

Detail	Description
Software	Proprietary noise modelling software SoundPLAN v8.2
Method	International Standard ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613-2).
Ground conditions	Ground factor of G = 0.5 i.e., 50 % hard ground
Atmospheric conditions	Temperature 10°C and relative humidity 70% This represents conditions which result in relatively low levels of atmospheric sound absorption.
Receiver heights	1.5 m above finished floor level
Terrain	Subject site finished surface levels taken from civil plans prepared by Parkhill Freeman (dated February 2023). Terrain for area surrounding the subject site obtained from thelist.tas.gov.au.

APPENDIX E NOISE LEVELS OF ON-SITE EQUIPMENT AND ACTIVITIES

Source noise levels for deliveries, vehicle movements, COD units and patron activity have been sourced from measurements at similar sites conducted by Clarity Acoustics. Source noise levels for mechanical plant have been based on manufacturer's data with assumed octave band data if not available from the manufacturer.

The sound power level data used in our assessment is summarised in Table 14.

Table 14 - Sound power level of proposed equipment and activity, dB L_w

Noise source	Octave band centre frequency							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	A
	Equivalent Average Noise Level, L_{eq}							
Light Rigid Vehicle (LRV)	95	92	87	84	84	83	77	89
MRV	103	97	92	89	90	91	85	96
HRV	105	99	94	91	92	93	87	98
Garbage Truck	97	95	95	96	96	94	90	100
Bin Emptying	105	97	94	97	95	94	89	100
CODs	65	61	71	80	80	78	62	84
AC Unit 1	90	89	82	79	76	71	63	82
AC Unit 1 – Low speed	85	84	77	74	71	66	58	77
AC Unit 2	90	89	79	76	75	71	64	81
AC Unit 2 – Low speed	85	84	75	72	70	66	60	76
AC Condenser 3	51	60	57	60	62	59	52	66
Toilet Exhaust Fan	63	64	66	63	61	56	52	65
Fry Exhaust Fan	80	78	74	71	62	64	63	73
Filet Exhaust Fan	80	78	74	71	62	64	63	73
Grill Exhaust Fan	80	79	72	66	62	60	58	70
Washup Exhaust Fan	63	55	60	54	51	48	43	57
Make Up Air Fan	68	68	64	59	56	57	56	64
Relief Air Fan	64	72	68	66	65	64	60	70
MAC-90 Refrigeration unit	85	86	85	83	77	73	64	84

Noise source	Octave band centre frequency							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	A
Maximum Noise Level Events, L_{max}								
'Normal' car[1]	108	96	95	90	90	86	79	94
'Worst-case' car[1,2]	110	108	101	96	99	98	91	104
Vehicle pass by	104	95	88	88	89	85	79	93
Patron maximal shout	83	92	98	97	92	87	87	98
CODs	90	90	83	95	91	95	71	98

[1] Includes door closing and vehicle start up from stationary
[2] A 'worst-case' car includes a V8 or high-powered vehicle driving in an aggressive manner

APPENDIX F TONALITY AND IMPULSIVENESS CORRECTIONS

F1 Tonality discussion

The following is an excerpt from the EPA Tasmania's *Noise Measurement Procedures Manual* in relation to tonality:

> *Where a noise emission has a tonality characteristic, the following adjustment must be made to the measured sound pressure level.*
>
> *With the sound level meter set to A-weighted frequency response, a one-third octave spectrum must be measured. The one-third octave spectrum should be measured over a period of at least 1 minute and less than 30 minutes. Several additional one-third octave spectra should be measured to confirm the temporal stability of the measurement.*
>
> *A tonal band adjustment determined from the following formulae must be arithmetically added to the sound pressure level in each one-third octave band between the centre frequencies of 25 Hz and 16 kHz for which the sound pressure level exceeds the arithmetic average of the two adjacent one-third octave band sound pressure levels by more than 3 dB(A). Tonal band adjustments need not be applied to those bands for which the band level is 25 dB(A) or more below the highest band level.*
>
> *For the range 1,000 to 5,000 Hz the following formula applies:*
>
> *Tonal band adjustment (dB) = 0.35 x (Tonal band SPL minus average of adjacent band levels) + 4.31*
>
> *For the ranges <1,000 Hz and >5,000 Hz the following formula applies:*
>
> *Tonal band adjustment (dB) = 0.26 x (Tonal band SPL minus average of adjacent band levels) + 2.49*
>
> *The overall A-weighted sound pressure level tonally adjusted (L_{Tadj}) must be calculated from the following equation:*
>
> $L_{Tadj} = 10 \text{ Log } \sum 10^{(Li/10)}$
>
> *The adjustment applied to the measured A-weighted sound pressure level is L_{Tadj} minus the measured A-weighted sound pressure level.*

An example tonality calculation for the subject site is provided on the following page.

Project	McDonalds Prospect Vale																												
Project number	22203																												
Receiver	R12																												
Period	Evening																												
Frequency	A	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz
Lp (dB)	33.24	38	37	35	36	35	33	32	31	28	27	26	23	22	20	19	21	27	27	24	18	16	10	10	9	9	8	9	5	5
A weighting		-44.7	-39.4	-34.6	-30.2	-26.2	-22.5	-19.1	-16.1	-13.4	-10.9	-8.6	-6.6	-4.2	-3.2	-1.9	-0.8	0	0.6	1	1.2	1.3	1.2	1	0.5	-0.1	-1.1	-2.5	-4.3	-6.7
Lp (dBA)	33	-7	-2	0	6	9	11	13	15	15	16	17	16	18	17	17	20	27	28	25	19	17	11	11	10	9	7	7	1	-2
Lpmax	28																													
Band exceedence		-4.3	0.8	-1.3	1.2	0.7	-0.4	0.2	1.2	-0.9	0.1	1.2	-1.2	1.2	-0.7	-1.4	-1.9	3.1	1.6	1.6	-2.0	2.1	-3.0	0.7	-0.4	0.7	-0.8	2.7	-1.7	-2.4
Corrected Lp	35.22	-7	-2	0	6	9	11	13	15	15	16	17	16	18	17	17	20	32	28	25	19	17	11	11	10	9	7	7	1	-2
Tonal Correction	2																													

F2 Impulsiveness discussion

The following is an excerpt from the EPA Tasmania's *Noise Measurement Procedures Manual* in relation to impulsiveness:

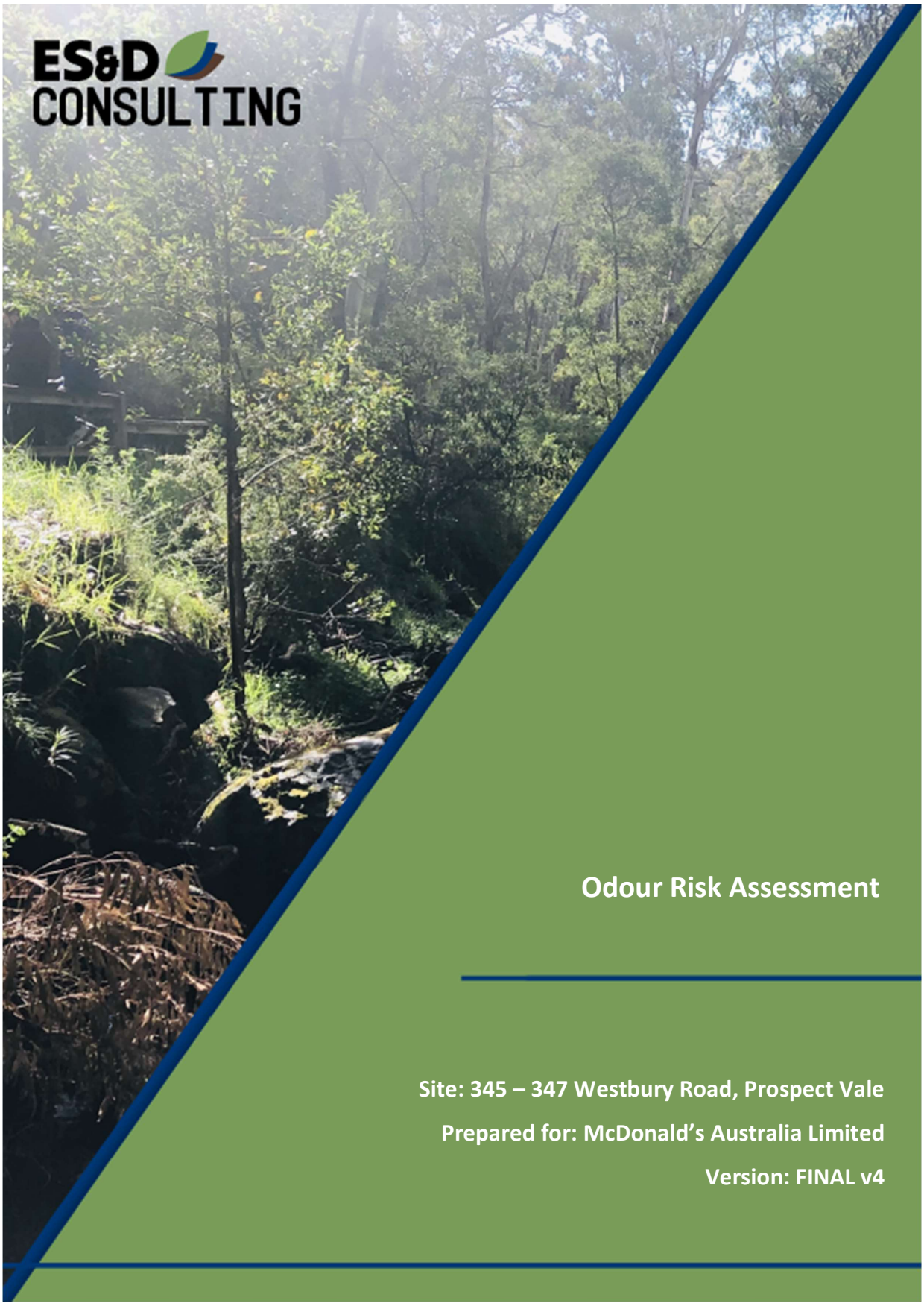
> *A sound is considered to have an impulsiveness characteristic if it includes rapid, short changes in amplitude.*
>
> *An impulsiveness adjustment is determined by taking a measurement when impulsive noise is observed using a sound level meter set initially to fast and then impulse time response. If it is found after taking measurements with these two time responses that the impulse level is greater than 2 dB above the fast response measurement, then the difference is the impulsiveness adjustment.*
>
> *Where an impulse measurement cannot be made, perhaps due to the response time of the sound level meter, then the impulsiveness adjustment must be 2 dB if the impulsive noise is just detectable, and 5 dB if it is readily detectable.*

For the subject site, a 2 dB correction for impulsiveness has been applied based on noise measurements conducted at similar McDonald's facilities. An example of the impulsiveness assessment for a similar McDonald's facility is provided below:

Table 15 – Impulsiveness assessment

Description	Measured McDonald's noise level, $L_{Aeq,\ 15\ minute}$
Measured noise level with impulse time response	37.6 dB
Measured noise level with fast time response	36.2 dB
Difference	**1.4 dB**

It can be seen from Table 15 that the difference between the measured McDonald's noise level using fast time response against impulse time response is less than 2 dB and, as such, an impulsiveness correction is not applicable. Nevertheless, as a conservative approach, for this assessment we have applied a + 2 dB impulsiveness correction.



ES&D CONSULTING

Odour Risk Assessment

Site: 345 – 347 Westbury Road, Prospect Vale

Prepared for: McDonald's Australia Limited

Version: FINAL v4

Document Control

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FINAL v3	Royce Aldred	ES&D	5/2/2024
FINAL v4	Royce Aldred	ES&D	24/5/2024

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1 Background and Scope

ES&D are assisting their client with the planning aspects for the construction of a McDonald's restaurant at the subject site, with a 24/7 drive through. The development will be a potential source of odour relating to the use of cooking oils, odour from stored rubbish, exhaust emissions from idling vehicles and odour from extracted air/mechanical ventilation beyond the building.

As part of their assessment, Meander Valley Council (Council) requires a site-specific environmental assessment from a suitably qualified person addressing the relevant environmental emissions associated with the development. This assessment has been undertaken by ES&D to meet Council's requirements.

NOTE: It is noted that the car parking configuration has been amended since the original version of the odour report. These changes have not affected the findings of the odour report as they are not material changes to the location of odour sources or receptors. A previous version of the layout has been used in this report.

1.1 Scope of assessment

The scope of the assessment will include the following:

- Review of odour complaints history relating to a similar development (McDonalds Invermay and South Launceston),
- A qualitative assessment of odour at a similar McDonalds (Invermay and South Launceston),
- Assessment of meteorological conditions for the locality, including wind rose information, and
- A risk assessment relating to the likelihood of odour related nuisance within the development.

1.2 Planning Scheme Requirements

The site is in the General Business Zone and is adjacent to residentially zoned land to the north, east and south. Proposed hours of operation exceed the Acceptable Solution A1 of Clause 15.3.1, and accordingly compliance with the Performance Standard must be demonstrated. Meander Valley Council has requested an odour report to satisfy this standard, as per item 3 (a) in their request for further information letter sent to the applicant.

The assessment must demonstrate that odour will not cause an unreasonable loss of amenity to the neighbouring residential zones, as per P1 of 15.3.1 of the Planning Scheme. The sources of odour addressed should include vehicles, vehicle movements and idling, odour from extracted air/mechanical ventilation beyond the building, having regard to the overall development.

The relevant section of the *Tasmanian Planning Scheme – State Planning Provisions* is:

- 15.3 Use Standards, 15.3.1 All uses,

  Objective: That uses do not cause an unreasonable loss of amenity to residential zones

  Performance Criteria P1

  Hours of operation of a use, excluding Emergency Services, Natural and Cultural Values Management, Passive Recreation, Residential, Utilities or Visitor Accommodation, on a site within 50m of a General Residential Zone or Inner Residential Zone, must not cause an unreasonable loss of amenity to the residential zones having regard to:

  (a) the timing, duration, or extent of vehicle movements; and

  (b) noise, lighting, or other emissions.

Meander Valley Council's public brochure *Neighbour Disputes and Environmental Nuisances* states that:

> "An Environmental Nuisance may occur when an emission of a pollutant (e.g., noise, odour, smoke) causes an unreasonable interference with a person's enjoyment of their environment. To wilfully and or unlawfully cause an environmental nuisance is an offence under the *Environmental Management and Pollution Control Act 1994* (EMPCA)."

1.3 Odour Sources

Figure 1 below shows the proposed site layout for the development, with potential odour sources shown in yellow.

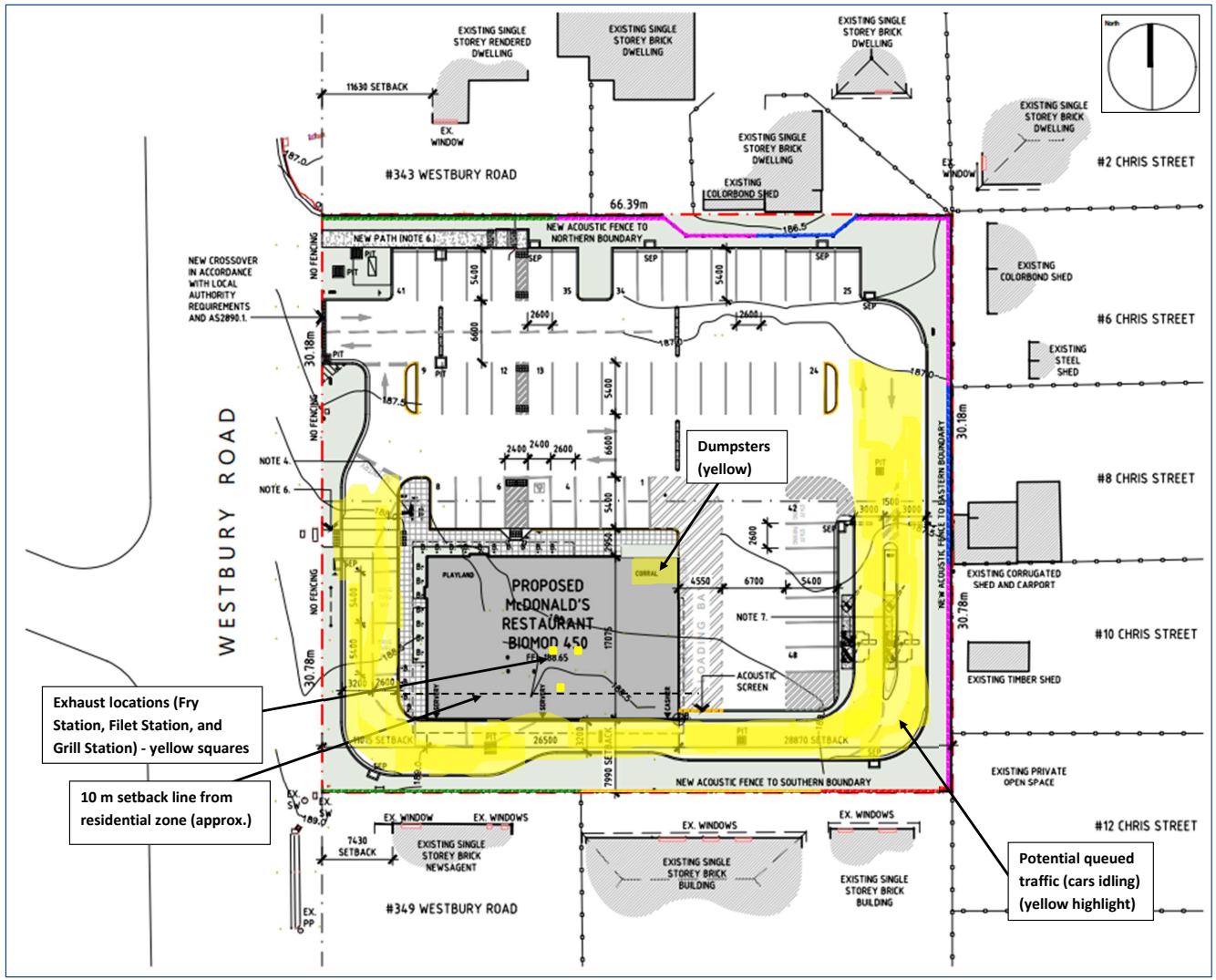


Figure 1: Proposed development – General Site Layout with odour sources shown (Subject to minor changes)

Potential odour sources from the proposed McDonald's are listed as follows:

- Rooftop exhausts. The Fry Station, Filet Station, and Grill Station would be the main exhausts of interest.
- Odour from dumpsters, and
- Odour from vehicle exhausts, where cars are likely to be queued and idling.

1.4 Review of odour complaints history relating to other McDonald's Restaurants

Odour complaints history has been provided by City of Launceston Environmental Health Department for two existing McDonald's Restaurants within their municipality – the South Launceston and Invermay McDonald's. They have confirmed that no noise or odour concerns have been recorded in relation to either location, noting that both restaurants have been operating for a while so the community tolerance around them is high.

The South Launceston McDonald's is surrounded mainly by light industrial and commercial buildings in most directions, except there are five residences approximately 30 to 40 metres to the south of the restaurant and a total of ten residences within 100 metres to the south of the restaurant.

The Invermay McDonald's similarly is surrounded by commercial premises, but has one residence immediately to the east, less than 20 m from the restaurant and six residences to the north within about 60 to 80 metres.

By comparison, the proposed Prospect McDonald's will have one sensitive receptor (resident) within about 15 metres from the kitchen exhaust locations to the south, one resident about 30 metres to the southeast, five residents approximately 50 metres to the north, and five residents approximately 50 metres to the east of the proposed development.

1.5 Assessment of meteorological conditions for the locality, including wind rose information

Wind rose information has been obtained from the Bureau of Meteorology website (http://www.bom.gov.au/clim_data/cdio/tables/pdf/windrose), and is included in Figure 2 and Figure 3.

At 9am, the annual wind rose indicates that:

- Prevailing winds are from the north and northwest about 40% of the time.
- Winds from the southeast occur about 15% of the time.
- Still conditions occur for about 19% of the time.

At 3pm, the annual wind rose indicates that:

- Prevailing winds are from the north and northwest almost 70% of the time.
- Still conditions occur for about 3% of the time.

Warm still conditions are thought to be worst case for dispersion of odour, as any odour plume would simply spread around the source by diffusion in a reasonably even fashion. The other unfavourable scenario would be a gentle breeze towards the nearest sensitive receptor, which would blow the plume towards the receptor before it is diluted by ambient air. In the case of Prospect Vale, that scenario would be a gentle breeze from the north/northwest, which is a regular occurrence.

ES&D believes that the provided windrose information is representative of site-specific wind conditions. A review of the windrose information from the Bureau of Meteorology (BOM) website for all weather stations in the greater Launceston area shows that the prevailing wind is north/northwest at both 9am and 3 pm for all locations (091237 Launceston (Ti-Tree Bend), 091049 Launceston (City), 091123 Launceston (Mount Pleasant), 091311 Launceston Airport, 091104 Launceston Airport Comparison). The BOM data is based on decades of measurements and provides comprehensive data on which to base any conclusions.

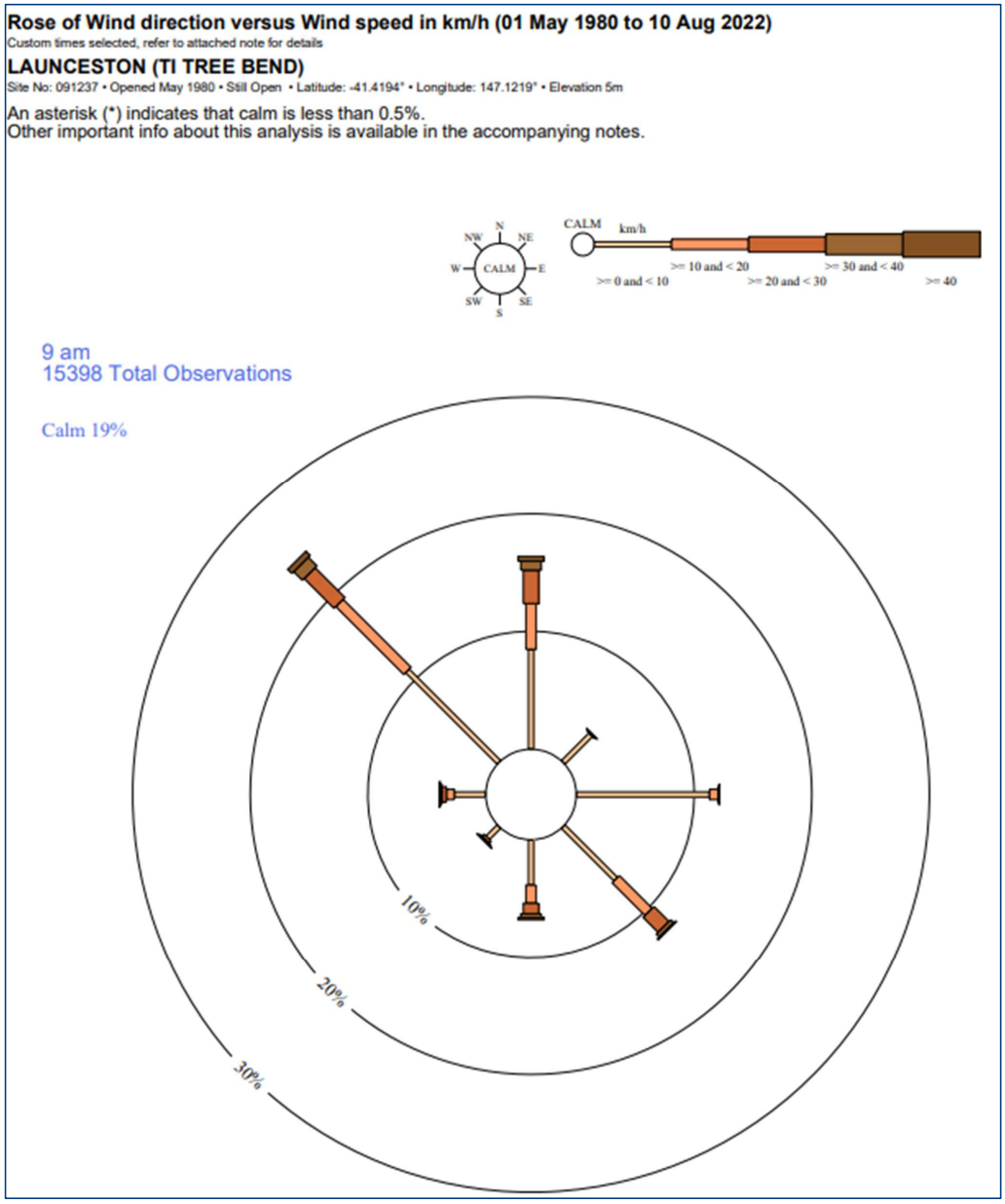


Figure 2: Annual Windrose for Ti Tree Bend weather station (Site No: 091237) – 9am

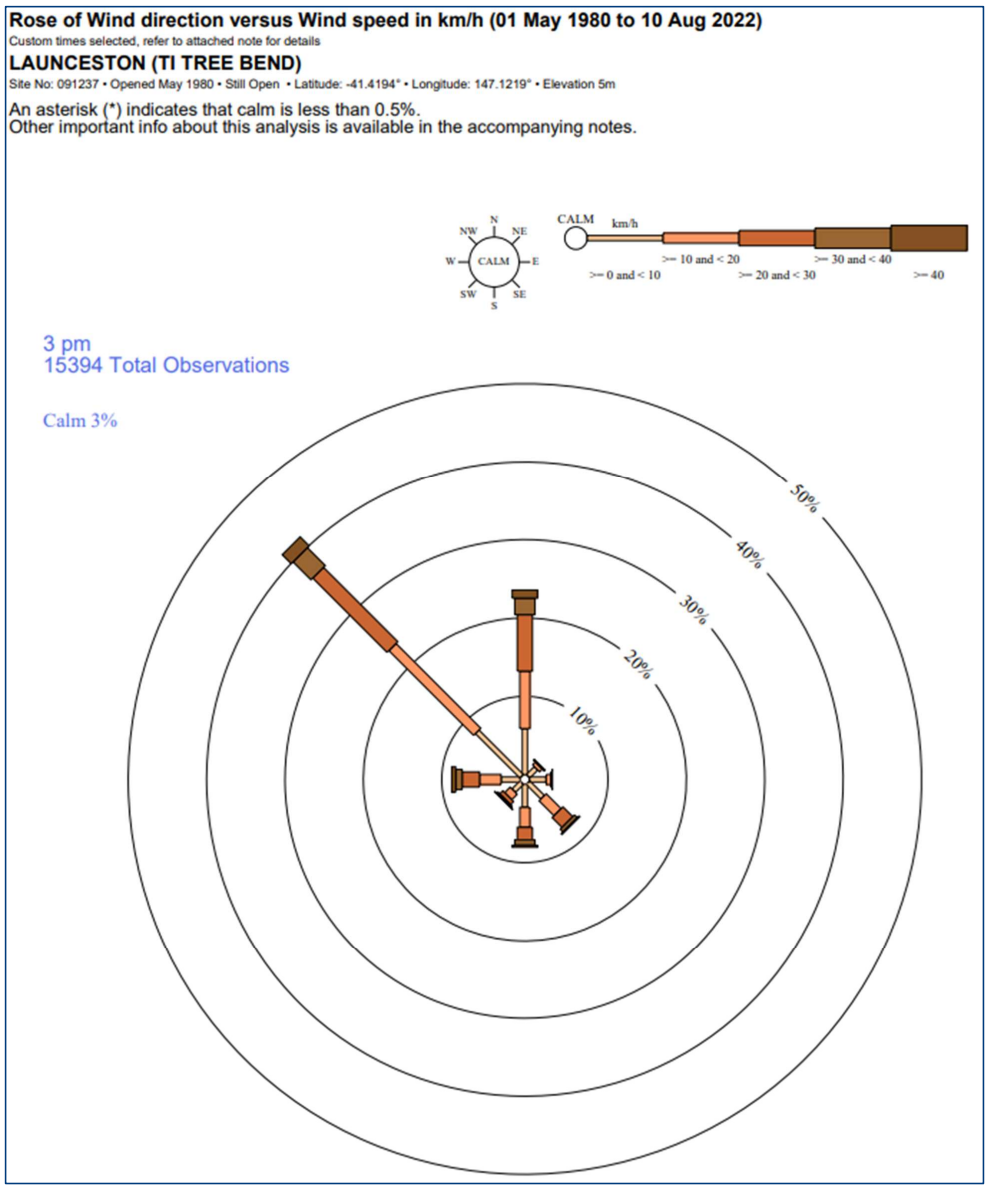


Figure 3: Annual Windrose for Ti Tree Bend weather station (Site No: 091237) – 3pm

1.6 Background Odour Profile for the Site

The development site is in a combined residential/shopping precinct with a Woolworths complex across the road and to the north of the Site. The shopping precinct contains some businesses that create cooking odour including a bakery, Asian takeaway, Charcoal Chicken, Subway restaurant, and a Woolworths Supermarket which includes the cooking of barbeque chickens. In addition, up until December 2022, the Roadster Roadhouse operated at the exact location of the proposed McDonald's building, cooking deep fried foods such as fish and chips, hamburgers, and other takeaway foods. There is also an Asian restaurant immediately to the south of the development site (see Figure 4).

Royce Aldred from ES&D has spent several days at the site whilst completing contamination assessments for the proposal. In terms of the background odour profile for the site, the roadhouse would have been a significant odour source due to the cooking of takeaway foods. The roadhouse was not a 24-hour business however and was open from 6am to 3pm daily. Hence, there was no odour source after 3pm daily.

The smell of chickens being cooked at the Charcoal Chicken was evident consistently at the site during the day. The odour can be described as a distinct, pleasant smell of moderate intensity, with a descriptor of meaty (cooked, good). However, the Charcoal Chicken closes daily at 8pm. The McDonald's restaurant will be open 24 hours a day, seven days a week, meaning that there will be a cooking odour source after 8pm every day that has not previously been there. Given that the odour from Charcoal Chicken was evident at the Site, it is likely that the residents at Chris Street to the east of the development site will have experienced this odour at times too. This is likely to be intermittent, as the odour from the Charcoal Chicken would likely only be evident at the development site and the Chris Street residences during periods of light to strong northerly breezes, and not as likely to be noticed during southerly breezes or during still periods.

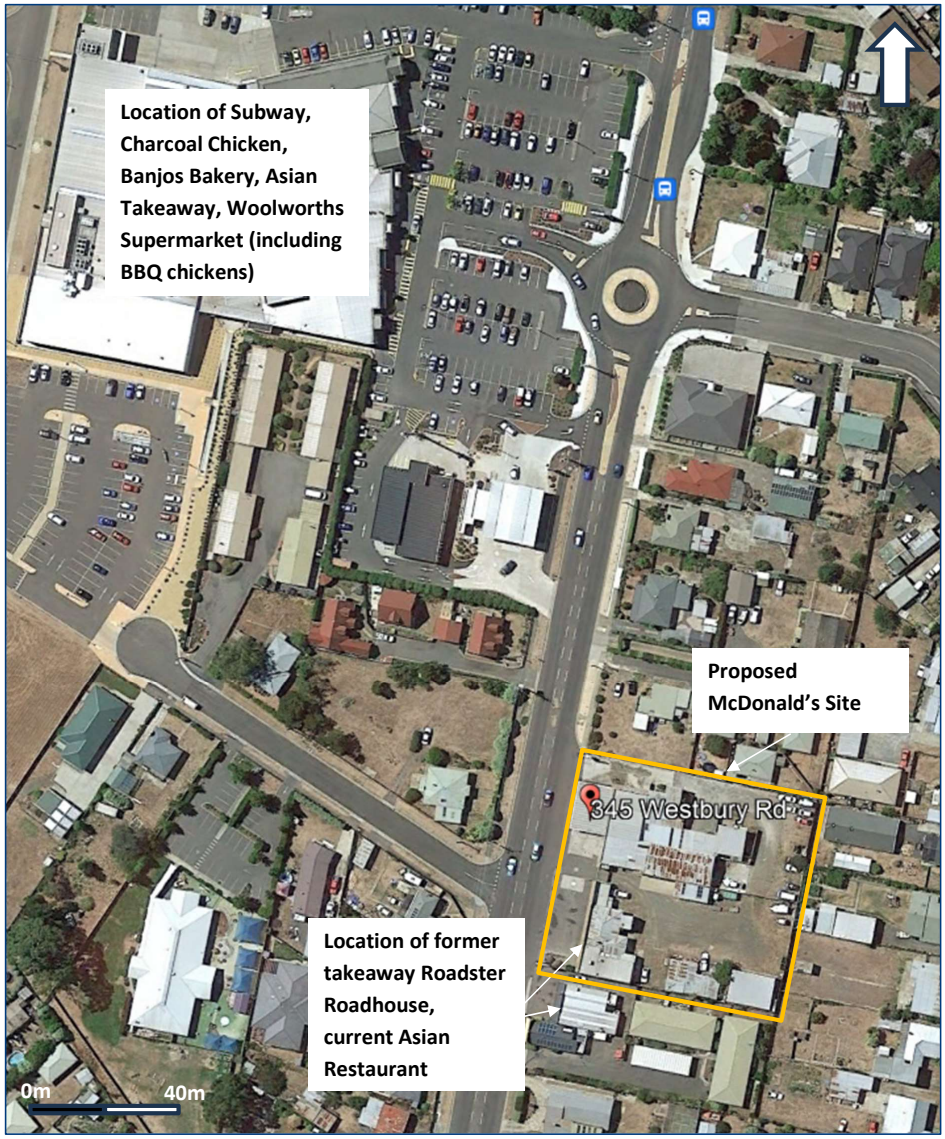


Figure 4: Local potential cooking odour sources

1.7 Site specific odour assessment - Invermay

On Monday 28 August 2023, Royce Aldred (RA) and Evan Langridge (EL) of ES&D conducted a field survey of the McDonald's Restaurant at the corner of Goderich and Forster Streets, Invermay. The survey was based on the *Guide to conducting field odour surveys* published by the NSW EPA in 2021. The survey was completed between 1:50 and 3:30 pm on the Monday.

An initial rapid screening field survey was completed by both team members within 10 metres of the front entrance (see location 'R' in Figure 5). The details were as follows:

- Time 1:50 pm
- Wind speed: up to 1.5 m/s, direction N/A
- Odour detected: Yes, Odour intensity: 2 – 3 (weak to distinct)
- Odour character: 8 (Meaty (cooked, good)), 16 (Garlic, onion), 30 (Oily, fatty)
- Hedonic tone: +2 (pleasant)
- Comments: Intermittent, frier/grill exhaust dominant.

Figure 5: Invermay Odour Field Survey Locations

Subsequently, a series of 10-minute odour assessments were completed by Royce and Evan around the boundary of the site, at locations 1 – 8 as per Figure 5. There was no odour detected at most locations for most of the time. The weather conditions were assumed to be worst case for this time of year, as the conditions were still, and the temperature was around 15°C for the entire assessment period. Field record sheets were completed by both participants. The wind speed was typically described by both participants as ranging from calm (wind scale score zero) to a light breeze (score 2). Royce's (RA) and Evan's (EL) notes are summarised below. NSW EPA Odour Descriptors were used for notation purposes and are included in the following section, for reference.

Table 1: Odour survey – 10 minutes, notes, and details

Location	Start Time	Wind Speed	Notes
1	2:01 pm	Calm to light breeze (0 – 2)	RA: Intensity 0, EL: Intensity mostly 0, with the occasional intermittent reading of intensity 1 – 2 with descriptor 8 (meaty cooked, pleasant)
2	2:15 pm	Calm to light air (0 – 1)	RA: Intensity 0 with one reading of intensity 1 with descriptors 8, 16 and 30 ((Meaty (cooked, good), Garlic, onion, Oily, fatty), EL: Intensity 0
3	2:27	Calm to light breeze (0 – 2)	RA: Intensity 0, EL: Intensity 0
4	2:39	Calm to gentle breeze (0 – 3)	RA: Intensity mostly 0, with the occasional intermittent reading of intensity 2 with descriptor 8, 16 and 30 ((Meaty (cooked, good), Garlic, onion, Oily, fatty), EL: Intensity mostly 0, with the occasional intermittent reading of intensity 2 with descriptor 8, 16 and 30 ((Meaty (cooked, good), Garlic, onion, Oily, fatty), smell of cleaner at 6-minute mark.
5	2:50	Calm to light breeze (0 – 2)	RA: Intensity mostly 0, with the occasional intermittent reading of intensity 1 – 2 with descriptor 8 (meaty cooked, pleasant), EL: Intensity mostly 1 - 3, with descriptor “food”, whiff of coffee (descriptor 6) at 9-minute mark.
6	3:03	Calm to light breeze (0 – 2)	RA: Intensity 0, EL: Intensity mostly 0, with the occasional intermittent reading of intensity 1 with descriptor “food”.
7	3:15	Light air to gentle breeze (1 – 3)	RA: Intensity 0, EL: Intensity 0
8	3:26	Calm to light breeze (0 – 2)	RA: Intensity 0, EL: Intensity 0

It was also noted that the car park was about 50% full most of the time, and both the drive through and restaurant were moderately busy during the survey.

The findings of the survey are summarised here:

- The odour from car exhausts and dumpsters would be described as unpleasant, however was not noticed by either participant during the survey, even at close to the source.
- ES&D expects that vehicle emissions will be unnoticed on the other side of the proposed (high) acoustic fence. ES&D consultants tested this at the Invermay restaurant site and could not detect exhaust odours on the other side of the acoustic fence.
- The dumpsters are well contained in a compound with ventilation, and are well maintained, reducing the risk of the odour from this source, which is not expected to cause nuisance or loss of amenity at the residences.

- It was clear from the survey that the cooking odour from the exhaust fans on the roof is the main noticeable odour source at the site.
- However, for the duration of the survey, the cooking odour did not carry far from the source and was only experienced at locations within about 15 metres of the source (mainly locations 4, 5 and 6).
- Even in location 4 in the drive through area, which is closest to the exhaust source, the odour was mild and only occasionally experienced by one or both participants.
- There was occasionally an odour experienced, however it was mild and contained within the boundary of the premises most if not all, of the time.
- The odour also did not persist at any of the locations for more than a few minutes at a time during the survey period.
- The cooking odour was described as pleasant by both participants.
- The participants went into the neighbouring car park area east of location 5 and could not notice an odour from any of the McDonald's sources.

1.8 Site specific odour assessment – South Launceston

On Monday 3rd October 2023, Royce Aldred (RA) and Evan Langridge (EL) of ES&D conducted a field survey of the McDonald's Restaurant at 99-105 Howick Street, South Launceston. The survey was based on the *Guide to conducting field odour surveys* published by the NSW EPA in 2021. The survey was completed between 2:45 and 4:30 pm on the Monday.

Figure 6: South Launceston Odour Field Survey Locations

A series of 10-minute odour assessments were completed by Royce and Evan around the boundary of the site, at locations 1 – 7 as per Figure 6. There was no odour detected at most locations for most of the time. The weather conditions were fine with varying wind speeds and the ambient temperature was around 18°C for the entire assessment period. Field record sheets were completed by both participants. The wind speed was typically described by both participants as ranging from light breeze (score two) to a fresh breeze (score five). Royce's (RA) and Evan's (EL) notes are summarised below. NSW EPA Odour Descriptors were used for notation purposes and are included in the following section, for reference.

Table 2: Odour survey – 10 minutes, notes, and details

Location	Start Time	Wind Speed	Notes
1	3:00 pm	Gentle to Moderate breeze (3 – 4)	RA: Intensity 0 - 1, EL: Intensity 0 – 1. Occasional intermittent reading of intensity 1 with descriptor 8/30 (meaty/oily).
2	3:15 pm	Gentle to Fresh breeze (3 – 5)	RA: Intensity 0 - 2, EL: Intensity 0 – 3. Intermittent reading of intensity 1 to 3 with descriptor 8/16/30 (meaty/onion/oily). Building was channelling the wind.
3	3:30 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0 - 1, EL: Intensity 0 – 1. Occasional intermittent reading of intensity 1 with descriptor 8/16/30 (meaty/onion/oily).
4	3:45 pm	Gentle to Moderate breeze (3 – 4)	RA: Intensity 0 - 1, EL: Intensity 0 – 1. Only one recording of intensity 1 with descriptor 8/16/30 (meaty/onion/oily).
5	4:00 pm	Light to Fresh breeze (2 – 5)	RA: Intensity 0 , EL: Intensity 0. No odours detected.
6	4:15 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0 - 1, EL: Intensity 0. RA one recording noting vehicle exhaust fumes at intensity 1.
7	4:30 pm	Gentle to Fresh breeze (3 – 5)	RA: Intensity 0 - 1, EL: Intensity 0 – 1. Only a couple recordings at intensity 1 but unsure of odour character.

It is worth noting that the car park was about 25 to 50% full and the drive through was moderately busy during the survey.

The findings of the South Launceston survey are summarised here:

- The odour from car exhausts were not noticeable by either participant (except one occasion), even in the drive through locations close to vehicles.
- The dumpsters would be described as unpleasant; however, they are well contained in a compound with ventilation, and are well maintained, reducing the risk of the odour from this source. Even standing close to this source odours were not recorded.
- There was occasionally cooking related odour experienced, however it was mild at best and did not persist at any of the locations for more than a few minutes.
- The cooking odour was most noticeable in survey locations near the building where air movement was concentrated such as the drive through pickup. Beyond these locations no odour was noticeable.

1.9 Site specific odour assessment – South Launceston (evening)

On Saturday 3rd February 2024, Royce Aldred (RA) of ES&D conducted a field survey of the McDonald's Restaurant at 99-105 Howick Street, South Launceston. The survey was based on the *Guide to conducting field odour surveys* published by the NSW EPA in 2021. The survey was completed between 9:50pm and 11pm on the Saturday. The timing of the survey was selected to line up with a typical busy period, as advised by McDonald's. It was also undertaken after 9:30pm to indicate the likely odour during the extended hours that the proposed McDonald's will operate for.

Figure 7: South Launceston Odour Field Survey Locations – evening survey

A series of 10-minute odour assessments were completed by Royce around the boundary of the site, at locations 1 – 7 as per Figure 6. There was no odour detected at most locations for most of the time. The weather conditions were fine with varying wind speeds and the ambient temperature was around 18- 20°C for the entire assessment period. A field record sheet was completed. The wind speed was typically described as ranging from light breeze (score two) to a fresh breeze (score five). Royce's (RA) notes are summarised below. NSW EPA Odour

Descriptors were used for notation purposes and are included in the following section, for reference.

Table 3: Odour survey – 10 minutes, notes, and details

Location	Start Time	Wind Speed	Notes
1	9:55 pm	Gentle to Moderate breeze (2 – 4)	RA: Intensity 0 – 1. One reading of intensity 1 with descriptor 40 (exhaust smell).
2	10:05 pm	Gentle to Fresh moderate (2 – 4)	RA: Intensity 0 – 1. Two readings of intensity 1 with descriptor 8 (meaty, cooked, good). Building was channelling the wind.
3	10:15 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0. No odour noticed.
4	10:25 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0. No odour noticed.
5	10:35 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0. No odour noticed.
6	10:45 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0. No odour noticed.
7	10:55 pm	Light to Moderate breeze (2 – 4)	RA: Intensity 0. No odour noticed.

It is worth noting that the car park was about 50% full and the drive through was very busy during the survey. The restaurant was moderately busy for dine-in customers.

The findings of the South Launceston survey are summarised here:

- The odour from car exhausts were not noticeable by either participant (except one occasion), even in the drive through locations close to vehicles.
- The dumpsters would be described as unpleasant; however, they are well contained in a compound with ventilation, and are well maintained, reducing the risk of the odour from this source. Even standing close to this source odours were not recorded.
- There was occasionally cooking related odour experienced, however it was mild at best and did not persist at any of the locations for more than a few minutes.

The cooking odour was most noticeable in survey locations near the building where air movement was concentrated such as the drive through pickup. Beyond these locations no odour was noticeable.

1.10 Odour Field Survey Descriptors

Intensity	
Scale	Description
6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Hedonic Tone	
Scale	Description
–4	Extremely unpleasant
–3	
–2	
–1	
0	Neutral
+1	
+2	
+3	
+4	Extremely pleasant

Beaufort Wind Scale			
Scale	Description	How to recognise	~m/s
0	Calm	Smoke rises straight up	0.0–0.2
1	Light air	Smoke drifts	0.3–1.5
2	Light breeze	Wind felt on face; leaves rustle	1.6–3.3
3	Gentle breeze	Flags flap; twigs move all the time	3.4–5.4
4	Moderate breeze	Papers blow; small branches move	5.5–7.9
5	Fresh breeze	Small trees sway	8.0–10.7
6	Strong breeze	Large branches move, wind whistles	10.8–13.8
7	Near gale	Whole trees sway	>13.8

Character Descriptors							
Number	Description	Number	Description	Number	Description	Number	Description
1	Fragrant	11	Bark-like	21	Like blood, raw meat	31	Like gasoline, solvent
2	Perfumy	12	Woody, resinous	22	Rubbish	32	Fishy
3	Sweet	13	Medicinal	23	Compost	33	Putrid, foul, decayed
4	Fruity	14	Burnt, smoky	24	Silage	34	Paint-like
5	Bakery (fresh bread)	15	Soapy	25	Sickening	35	Rancid
6	Coffee-like	16	Garlic, onion	26	Musty, earthy, mouldy	36	Sulphur smelling
7	Spicy	17	Cooked vegetables	27	Sharp, pungent, acid	37	Dead animal
8	Meaty (cooked, good)	18	Chemical	28	Metallic	38	Faecal (like manure)
9	Sea/marine	19	Etherish, anaesthetic	29	Tar-like	39	Sewer odour
10	Herbal, green, cut grass	20	Sour, acrid, vinegar	30	Oily, fatty	40	Other – please describe

1.11 Site-Specific Risk Assessment

Figure 8 below shows the ventilation odour source relative to receptors, with an approximate 20 metre radius shown.

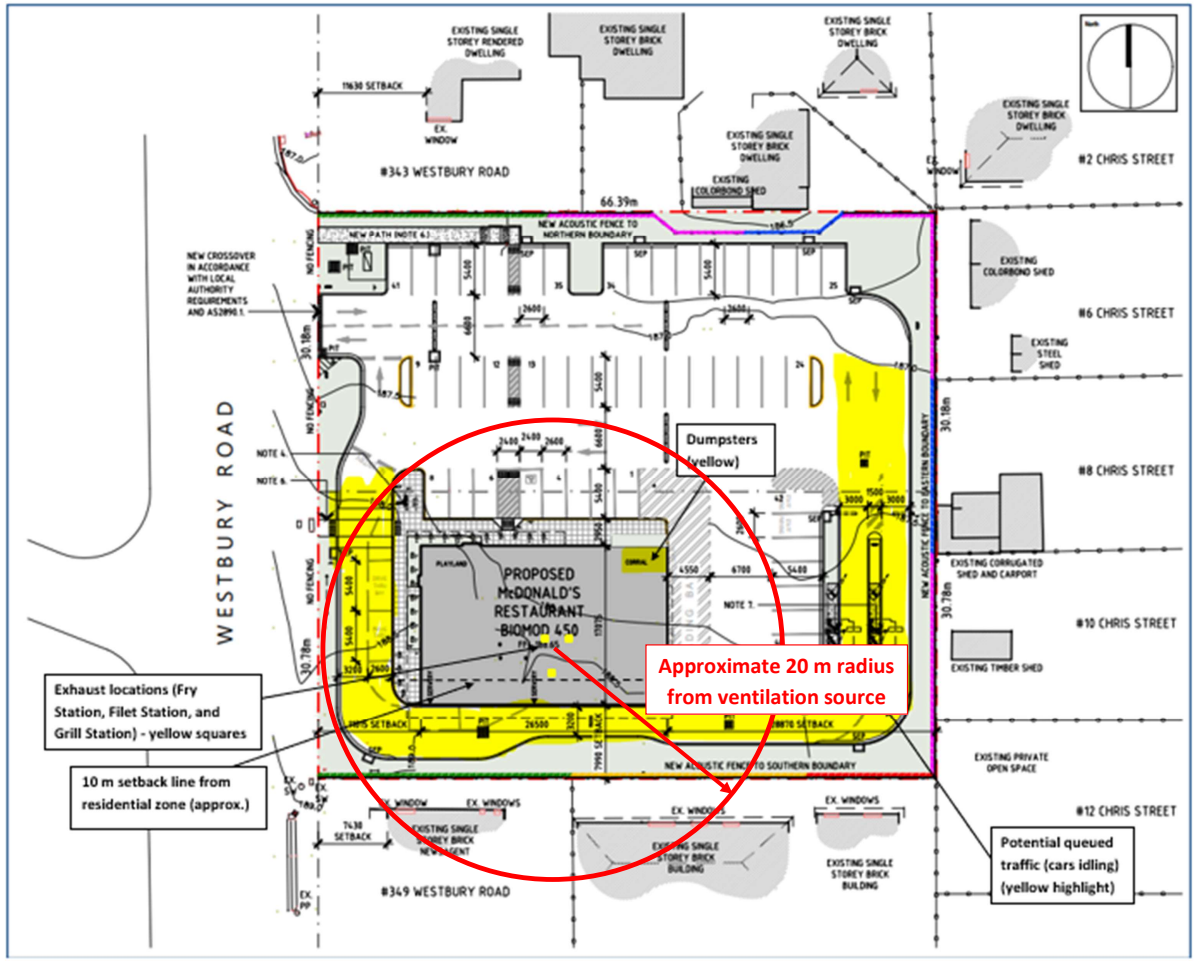


Figure 8: Odour source relative to receptors (subject to minor changes)

For the odour surveys undertaken, during warm still conditions the odour was not noticed more than about 15 - 20 metres from the exhaust outlets. At more than 20 metres from the exhaust outlets, it is likely that there will be no odour most of the time, with intermittent odour for short periods only. This means that the risk to residences more than 40 metres from the exhaust vents is low. In the case of the proposed Prospect Vale development, most residences are more than 40 metres away and to the north and to the east, so the risk is lower still, given that prevailing winds are from the north/north-west, so will blow any odour away from these residences most of the time.

The likelihood of odour nuisance at these residences is low due to wind direction being favourable most of the time. The severity of any odour experienced at these residences is also low due to distance from the source being more than 40 metres.

Risk of loss of amenity caused by nuisance odour for residences to the north and east of the proposed development is therefore very low.

There is one residence (sensitive receptor) about 15 metres south from the roof top exhaust outlets, and another residence about 30 metres southeast of the exhaust outlets. These two residences are in the direction of the prevailing winds.

It should be noted that at the McDonald's in Howick Street, South Launceston, there are residences around 30 metres to the south, in the path of the prevailing wind (see Figure 9). There have been no complaints from these residences, even though the McDonald's has existed at that location since 1996. Lack of complaints is a good indicator that a loss of amenity has not occurred.

The likelihood of the odour from the roof top exhausts carrying to the two residences to the south and southeast of the proposed McDonald's at Prospect Vale is moderate due to wind direction being still or towards the residences most of the time. The severity of any odour experienced at these residences is likely to be low to moderate due to distance from the source being 15 metres and 30 metres for each residence.

Risk of loss of amenity caused by nuisance odour for the two residences to the south and southeast of the development is low to moderate.

Figure 9: South Launceston McDonald's

2 Conclusion

Based on the odour surveys conducted by ES&D at the Invermay and South Launceston McDonald's, including a Saturday evening survey, the main odour source was determined to be the cooking odour from the roof top exhaust locations. The odour from the dumpsters and vehicles on the site, even when idling, was not noticeable during both surveys, even when the participants were close to these sources. The cooking odour was noticeable only intermittently during the surveys, and only within about 15 - 20 metres from the source. This finding indicates that the odour disperses rapidly even during worst case conditions.

Overall, the risk of loss of amenity within the neighbouring residences around the proposed McDonalds is low. This is due to most residences being 40 metres or more from the exhaust fans and not in the direction of the prevailing winds which are northerly/north westerly.

There are two residences 15 metres to the south and 30 metres to the southeast that could experience cooking odour from the McDonalds intermittently. ES&D recommends that the ventilation installed has an exhaust air speed of 2 metres per second or more. This will be sufficient to force the odour well clear of the roof and ensure that any low flow 'void' areas on the roof top are cleared to aid in dispersion of odour. This is a conservative approach. Given prevailing winds are northerly, the location of the fans towards the south of the building will aid with good dispersion, decreasing the chance of odour being evident at the properties immediately to the south.

If the above recommendation is actioned, the risk of loss of amenity caused by nuisance odours will be low, and the development could proceed without creating loss of amenity at nearby residences.

NOTE: It is noted that the car parking configuration has been amended since the original version of the odour report. These changes have not affected the findings of the odour report as they are not material changes to the location of odour sources or receptors. A previous version of the layout has been used in this report.

3 References

Tasmanian Planning Scheme – State Planning Provisions

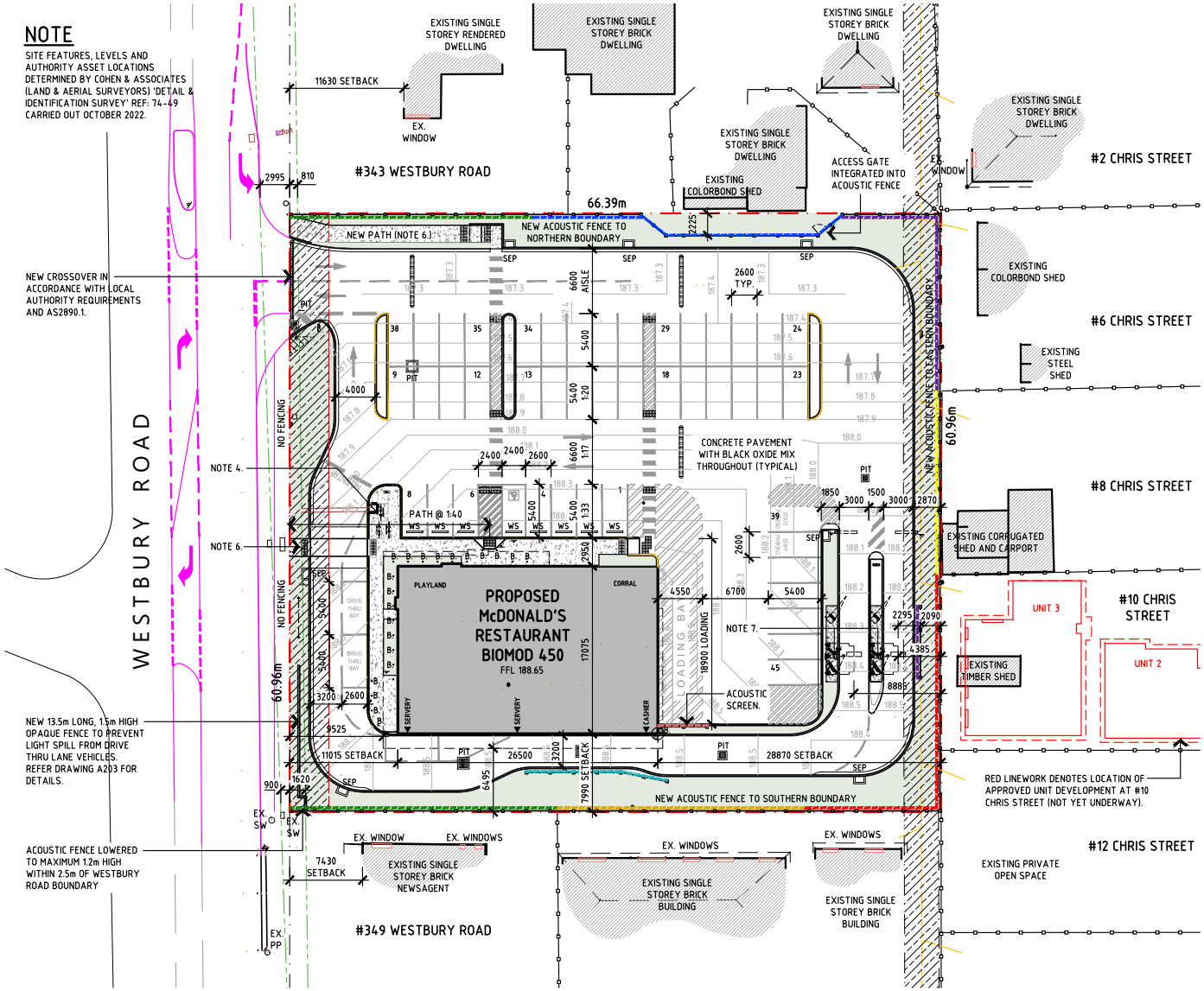
Meander Valley Council's public brochure *Neighbour Disputes and Environmental Nuisances*

Environmental Management and Pollution Control Act 1994 (EMPCA)

http://www.bom.gov.au/clim_data/cdio/tables/pdf/windrose

Guide to conducting field odour surveys, NSW EPA, 2021

4 Appendix 1 – Most recent site layout



NOTES

1. SITE AREA = APPROX. 4,046m²
BUILDING GFA = 453m²
2. DINING ROOM SEATING CAPACITY = 75 PATRONS.
3. PARKING:
42 X 2600 X 5400 PATRON CAR SPACES.
2 X 2600 X 5400 STAFF CAR SPACES
1 X 2400 X 5400 ACCESSIBLE SPACES WITH
1 X 2400 X 5400 CLEAR ADJACENT SPACE.
2 X 2600 X 5400 WAITING BAYS.
1 X LOADING BAY.
4. BIKE HOOPS IN ACCORDANCE WITH AUSTRALIAN STANDARDS PART 3 BICYCLE PARKING AS2890.3:2015 TO ACCOMMODATE 6 X BICYCLES.
5. HATCHED AREAS DENOTE PEDESTRIAN SIGHT LINES IN ACCORDANCE WITH AS2890.1 CLAUSE 32.4, AND CLAUSE 52.06-9 OF THE PLANNING SCHEME.
6. 1.5m WIDE DDA COMPLIANT BRUSHED CONCRETE PEDESTRIAN STREET ACCESS PATH TO CIVIL ENGINEER'S DETAILS.
7. DRIVE THRU LANE CUSTOMER ORDER DISPLAY AND ASSOCIATED CANOPY, REFER DRAWINGS A082, A807 AND A808 FOR DETAILS.
8. LOT 8 ON PLAN 217681 AND LOT 9 ON PLAN 217358 TO BE CONSOLIDATED PRIOR TO THE OCCUPATION OF THE PROPSOED DEVELOPMENT.

LEGEND

- TITLE BOUNDARY
- B BOLLARD
- EP ELECTRICAL POLE
- LP LIGHT POLE
- SEP SIDE ENTRY PIT
- WS WHEEL STOP
- VEHICLE DETECTOR LOOP
- EXISTING WATER MAINS
- EXISTING SEWER MAINS
- PROPOSED EXTERNAL ROAD UPGRADE WORKS TO TRAFFIC ENGINEER'S DETAILS.
- FUTURE EASEMENTS FOR EXISTING WATER AND SEWER INFRASTRUCTURE IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS.
3m WIDE FOR SEWER INDICATED
4m WIDE FOR WATER INDICATED

REFERENCES

FOR SITE SIGNAGE PLAN
REFER DWG | A801

FOR ACOUSTIC FENCE SHADOW DIAGRAMS
REFER DWG | A070

PROPOSED ACOUSTIC FENCE LEGEND

- EXTENT OF ACOUSTIC FENCE/SCREEN AT 1.75m HIGH
- EXTENT OF ACOUSTIC FENCE AT 1.80m HIGH. LOWER TO 1.2m HIGH WITHIN 2.5m OF WESTBURY ROAD ON SOUTHERN BOUNDARY.
- EXTENT OF ACOUSTIC FENCE/SCREEN AT 2.00m HIGH
- EXTENT OF ACOUSTIC FENCE AT 2.20m HIGH
- EXTENT OF ACOUSTIC FENCE AT 2.30m HIGH
- EXTENT OF ACOUSTIC FENCE AT 2.40m HIGH
- EXTENT OF ACOUSTIC SCREEN AT 2.50m HIGH
- EXTENT OF ACOUSTIC FENCE AT 2.60m HIGH

ALL ACOUSTIC FENCING AND SCREENS MUST HAVE A MINIMUM SURFACE DENSITY OF 12kg/m² AND BE FREE FROM HOLES AND GAPS AS PER ACOUSTIC ASSESSMENT REPORT PREPARED BY CLARITY ACOUSTICS.

BUILDING & WORKS
NOT TO BE USED DURING CONSTRUCTION

Revisions				
D	ACOUSTIC FENCE LOCALLY LOWERED	23.05.24	-	DW
C	EXTERNAL ROADWORKS ADDED	29.04.24	DW	DW
C	CAR PARK LAYOUT UPDATED	16.04.24	DW	DW
B	RFI RESPONSE 2	07.12.23	DW	TM
-	PLANNING APPLICATION	20.04.23	ST	DW
Issue	Description	Date	Chk	Int

General Notes
Do not scale this drawing. The drawing shows design intent only. All dimensions to be checked on site prior to construction or production. Construction details to be confirmed by contractor/manufacturer. This is a computer generated drawing. Do not amend by hand. Figure dimensions are to be used. Contact architect for clarification if dimensions are not clear. All dimensions are in millimeters. All discrepancies and omissions on site must be reported to the architect for their comments or approval prior to commencing work.

Drawing Notes

North

Client
McDonald's Australia Limited
ABN: 43 008 496 928
☎ 03 9418 5555
Project Manager

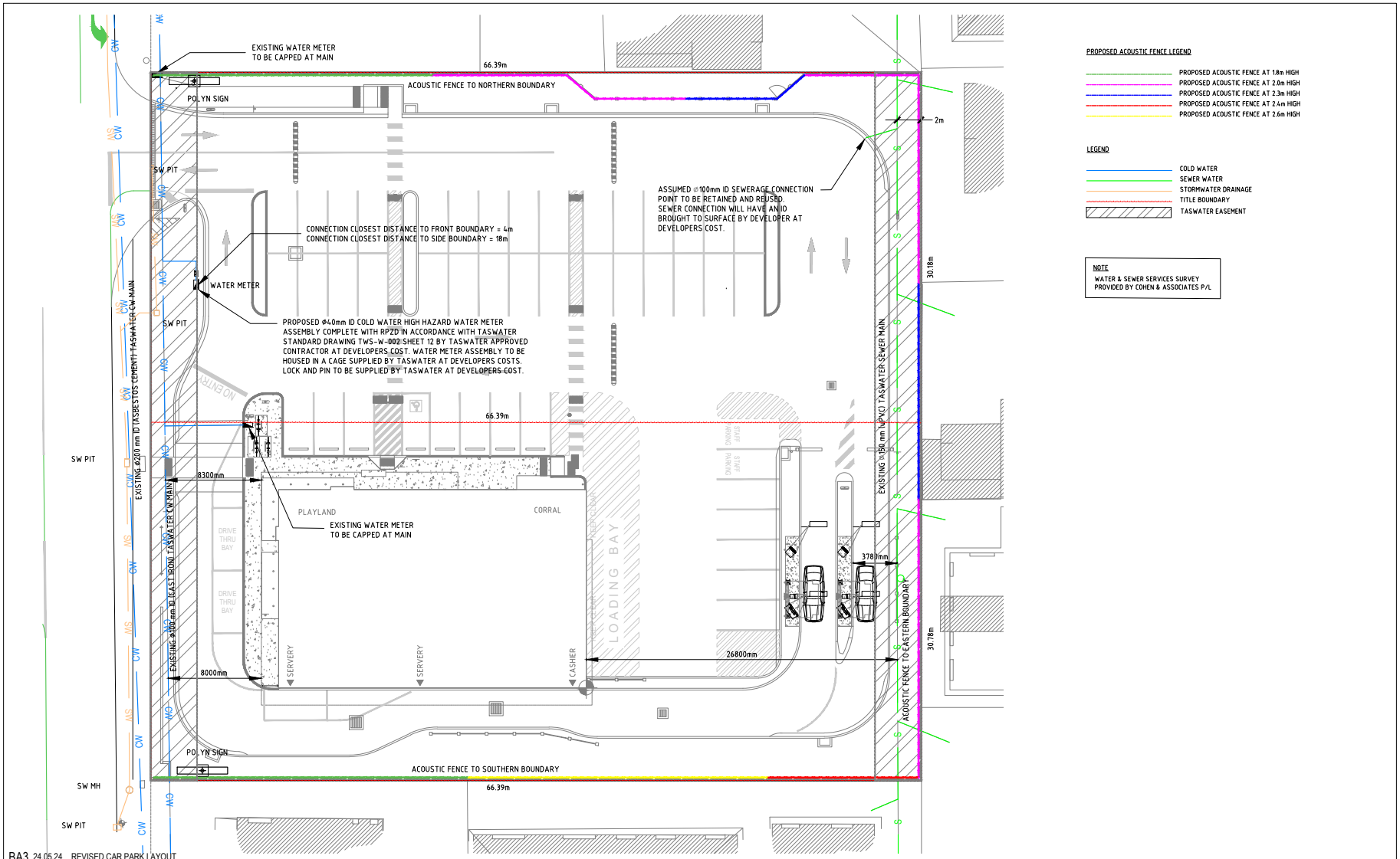
Lead Consultant
Albus & Co
BUILDING DESIGNERS
T: (+61) 0407 399 984
E: hello@albusco.com.au
NORTHCOTE, 3070 VIC AUSTRALIA

Project
PROPOSED NEW CONVENIENCE RESTAURANT
McDONALD'S "PROSPECT VALE"
Location
345-347 WESTBURY ROAD
PROSPECT VALE TAS 7250

Scale	Series
1:400 @ A3	BIOMOD-450

Drawing
PROPOSED SITE PLAN

Project Number	Drawing Number	Issue
24011	A062	D



REV	DATE	REMARK
BA3	24.05.24	REVISED CAR PARK LAYOUT
BA2	01.09.23	BUILDING APPROVAL
BA1	22.06.23	BUILDING APPROVAL

Accepted (Discipline Head)	N. LOWRY	Date
Accepted (Team Leader)	N. STOLP	Date
Approved (Principal)	C. PURDON	Date

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SCALES @ A3	DESIGNED BY	DRAWN BY
1:300	RES	RES
	PLOT DATE	24/05/2024

DO NOT SCALE. Use only figured dimensions. Locations of structure, fittings, services etc on this drawing are indicative only. CONTRACTOR to check Architects & other project drawings for co-ordination between structure, fabric, fixtures, fittings, services etc. CONTRACTOR to site check all dimensions and exact locations of all items. JMG accepts no responsibility for dimensional information scaled or digitally derived from this document.

Engineers & Planners
Johnstone McGee & Gandy Pty. Ltd.
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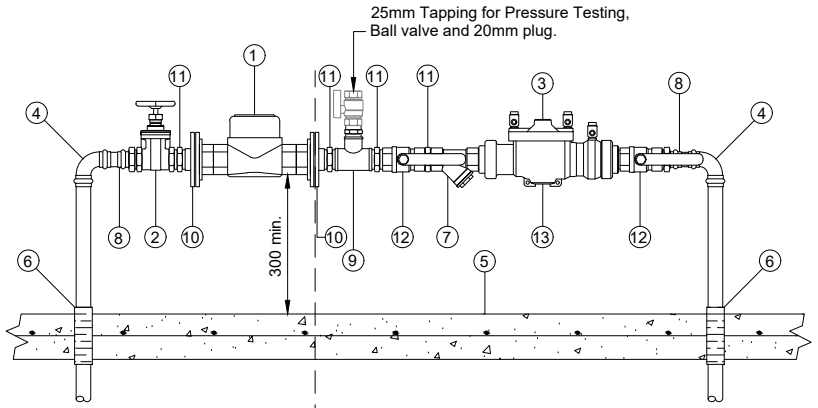
117 Harrington Street, Hobart, Tas (03) 6231 2555
49-51 Elizabeth Street, Launceston, Tas (03) 6334 5548
www.jmg.net.au infohbt@jmg.net.au infoltn@jmg.net.au

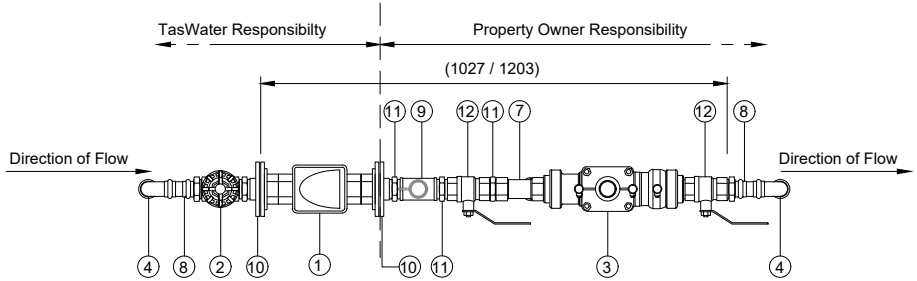
PROJECT
345 - 347 WESTBURY ROAD
PROSPECT VALE

TITLE
SITE SERVICES PLAN

PROJECT NO. 230392BS
DWG NO. H01
REVISION BA3
PLOT DETAILS 230392BS-H.DWG



ELEVATION



PLAN

VALVE & EQUIPMENT SCHEDULE

1. Only use products with watermark certification and approved for use by TasWater and listed within City West Water's approved products catalogue.
2. Installation must comply with manufacturer's written instructions.
3. All valves must be resilient seated, clockwise closing to AS 1628 with 316 stainless steel bolts and washers.
4. Unless approved otherwise the water meter/s, tails and meter boxes are to be supplied by TasWater.

BOUNDARY CONNECTION PARTS LIST		
No.	DESCRIPTION	COMMENTS
①	DN.40 'Sensus' Iperl Water Meter with Dual Check Valve	Supplied by TasWater
②	DN.40 Gate Valve	Supplied by TasWater
③	High hazard DN.40 'ValvCheQ' RPZD RP03 Valve Only	Owned, operated and maintained by Property Owner
④	DN.40 Type 'A' Copper Pipework	
⑤	100mm (minimum) Reinforced Concrete Slab	SL72 placed central
⑥	Pipe Wrapped where Concrete will contact Pipe	(Refer Note 5)
⑦	DN.40 Strainer	Owned, operated and maintained by Property Owner
⑧	B-Press Fittings or Equivalent	
⑨	DN.40 x 25 Fem x Fem BSP Reducing Tee	
⑩	DN.40 BSP to Table E Flange Adaptor	
⑪	DN.40 Nipple	
⑫	DN.40 Ball Valve - Lockable Quarter Turn brass DZR with brass handle, resilient seated	
⑬	Vent only applies to RPZD	

GENERAL NOTES

1. All dimensions in millimeters (mm), unless noted otherwise.
2. Installation and fittings schedule is also suitable for DN.40 meter.
3. Dimensions shown in brackets apply to (DN.32 / DN.40).
4. A 3mm clearance has been added where a gasket is required.
5. All metallic pipe work to be 'Denso' wrapped, or equivalent where it comes in contact with concrete - to protect it from corrosion.
6. Install and locate the meter assembly so that the meter can be easily read.
7. Where a vented back flow prevention device is required such as a Reduced Pressure Zone Device (RPZD) it shall:
   - Comply with AS 3500 and AS 2845; and shall
   - Have free ventilation to the atmosphere for the relief valve at all times.
   - Not to be in an area that may be subject to ponding;
   - Have the relief drain outlet not less than 300mm above the surrounding surface.
8. Install the meter assembly in cage in accordance with TWS-W-0003.
9. The Property Owner is responsible for the ongoing maintenance of the security cage.

REV	DATE	REMARK
BA3	24.05.24	REVISED CAR PARK LAYOUT
BA2	01.09.23	BUILDING APPROVAL
BA1	22.06.23	BUILDING APPROVAL

Accepted (Discipline Head)	N. LOWRY	Date
Accepted (Team Leader)	N. STOLP	Date
Approved (Principal)	C. PURDON	Date

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SCALES @ A3	DESIGNED BY	DRAWN BY
NTS	RES	RES
	PLOT DATE	24/05/2024

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PROJECT: 345 - 347 WESTBURY ROAD PROSPECT VALE

TITLE: WATER METER ASSEMBLY DETAIL

PROJECT NO. 230392BS
DWG NO. H02
REVISION BA3
PLOT DETAILS 230392BS-H.DWG

About McDonald's Australia

December 2022

McDonald's Australia

McDonald's Australia is the country's largest quick service restaurant company, contributing billions to the national economy.

Australia's first McDonald's restaurant opened in Yagoona, Western Sydney in 1971. It didn't take long for our customers to lovingly make us 'Macca's'. Today, we have more than 1,020 restaurants across Australia and employ more than 110,000 people nationwide.

McDonald's Australia operates as a franchise business, with approximately 85% of our restaurants owned and operated by more than 200 local businesspeople.

Our Values

- **Serve** – We put our customers and people first
- **Inclusion** – We open our doors to everyone
- **Integrity** – We do the right thing
- **Community** – We are good neighbours
- **Family** – We get better together

McDonald's Australia's economic impact

110,000+ employees

1,020+ restaurants across Australia

Hired more than **1.3m** people since 1971

$1.5b+ annually on employee wages

Millions donated annually to community causes, events and charities

$2.7b+ per year on operations and capital expenditure

Between 2017-2022

$730 million+

invested to open 100+ new restaurants

$1 billion+

annually on local produce, products and ingredients

Our purpose & impact

At Macca's, our purpose is to feed and foster communities.

We've been a part of Australian communities for more than 50 years, serving great quality, great value food and creating feel-good Macca's moments for our people, customers and communities.

With **more than 1,020 restaurants**, **200 Franchisees** and **110,000 employees nationwide**, we're proud to be one of the largest restaurant companies in Australia,

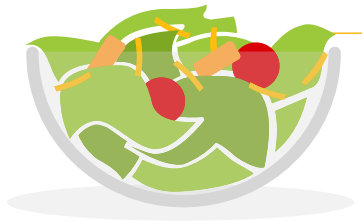
We know we have a responsibility and opportunity to change for the better and drive positive outcomes from the farm to the front counter and beyond, in the areas that matter most to our customers, employees, suppliers, franchisees and communities.

1,020+ Restaurants

200+ Franchisees

110,000+ Employees

Our impact areas

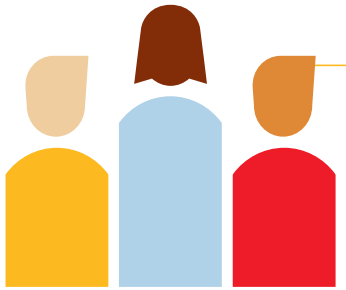


Food Quality and Sourcing

McDonald's has been purchasing fresh produce, ingredients and products from Aussie farmers and suppliers for more than 50 years, working with them to shape a future of high-quality, secure and sustainable food.

Our Planet

We are doing our part to protect the planet for communities today and into the future; from minimising how much packaging we use to driving climate action, investing in renewable energies and partnering to advance sustainable agriculture.



Community Connection

We are committed to playing an active role in local communities through providing jobs, supporting local charities and sporting clubs, and contributing in times of need. At the heart of this commitment is the support we provide to Ronald McDonald House Charities, helping them to support thousands of seriously ill and injured children and their families every year.

Jobs, Inclusion & Empowerment

As one of the largest employers in Australia, we are serving up bright futures for our people by offering a supportive working environment, world-class training programs and the opportunity to develop a long-term career with McDonald's.

Food quality & sourcing

Prioritising local

Where our food comes from and how it is produced, matters to our customers, communities, and the environment.

We've worked with Australian farmers and producers for more than 50 years. We purchase over 90% of our produce, products, and ingredients such as beef, chicken, milk, wheat, eggs, crisp lettuce, fresh tomatoes, and apples from more than 15,000 farmers, right here in Australia.

We have evolved our menu over the years, focusing on quality, nutrition and providing more balanced choices for our customers. This includes reducing the levels of salt, sugar and artificial colours and flavours in menu favourites such as Happy Meals; reducing the amount of sugar in our burger buns to 5%; and, leading the way with the move to 100% cage-free eggs and RSPCA-approved chicken.

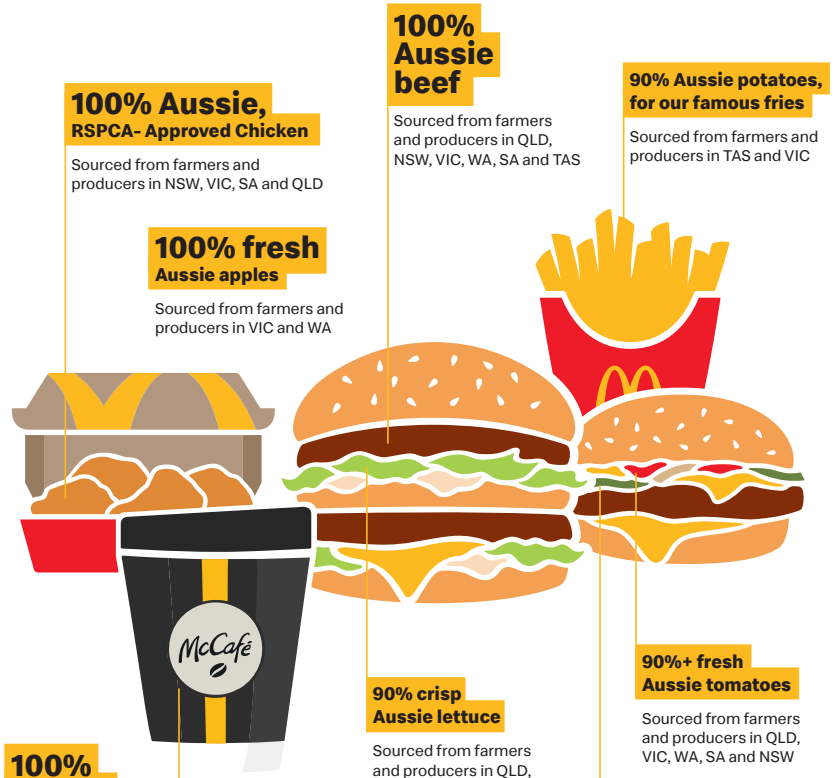
- Every year we source more than **200 million kilos of Aussie produce** from Australian Farmers
- More than **$1 billion spent on Aussie produce**, products and ingredients, every year
- **Over 20 years of sustainable sourcing milestones**, including 100% cage-free eggs, RSPCA-Approved chicken and Rainforest Alliance Certified Coffee.

200m kilos
of Aussie produce every year

$1b spent
on Aussie produce every year

20+ years
of sustainable sourcing milestones

Supporting Aussie farmers for more than 50 years



100% Aussie, RSPCA- Approved Chicken
Sourced from farmers and producers in NSW, VIC, SA and QLD

100% fresh Aussie apples
Sourced from farmers and producers in VIC and WA

100% Aussie beef
Sourced from farmers and producers in QLD, NSW, VIC, WA, SA and TAS

90% Aussie potatoes, for our famous fries
Sourced from farmers and producers in TAS and VIC

90% crisp Aussie lettuce
Sourced from farmers and producers in QLD, NSW, VIC, SA and TAS

90%+ fresh Aussie tomatoes
Sourced from farmers and producers in QLD, VIC, WA, SA and NSW

100% Aussie milk
Sourced from farmers and producers in each state and territory

100% Arabica Beans for McCafé coffee
Roasted in Melbourne, beans sourced from Brazil, Honduras, Kenya and Ethiopia, in partnership with the Rainforest Alliance.

100% Aussie cucumbers, for our famous pickles
Sourced from farmers and producers in NSW

Our first preference is always to source local. However, subject to changes due to availability or seasonality, produce may be imported from other countries such as New Zealand or the United States.

Our planet

We are committed to using our scale, purchasing power and platforms for good.

Together with our customers, employees, franchisees, farmers, producers and suppliers, **we're finding ways to reduce emissions, keep waste out of nature and preserve natural resources.** From minimising how much packaging we use, driving climate action, investing in renewable energy and partnering to advance sustainable agriculture.

Reducing plastic in our customer packaging and Happy Meals

By the end of 2020, McDonald's had moved to phase out single-use plastic straws and cutlery, removing more than 500 million straws and 115 million pieces of cutlery from circulation.

We're working toward sourcing all of our customer packaging from renewable or recycled sources, and are making progress towards our goal of every Happy Meal toy sold in Australia being made from at least 60% renewable or recycled materials.

Addressing litter

McDonald's is a founding partner of Clean Up Australia Day, helping to keep communities tidy and waste out of nature.

Since 1990, more than 130,000 of our employees have volunteered on Clean Up Australia Day, removing more than 7,000 ute-loads of rubbish from communities. McDonald's has also donated over $5 million towards the partnership and clean up kits.

Climate action

In 2021, McDonald's globally pledged to achieve net zero emissions by 2050 and join the United Nations Race to Zero campaign.

Our new restaurants are built to use less power – from energy management systems that control our lights, heating and air conditioning, to energy-efficient kitchen equipment and motion sensitive lighting.

In December 2020 we opened 'Restaurant 1000' in Melbourne. Designed to operate with 100% renewable energy and elements like carbon neutral McDelivery, Restaurant 1000 is our hub for testing industry-leading sustainability innovations.

Sustainable agriculture and supply chains

We approach beef sustainability holistically and consider our impact on the planet, the livelihoods of the people who produce our food, the communities in which they live and the well-being of the animals we rely on.

We actively support the Australian Beef Sustainability Framework through participation in its external consultation committee. To date, we've committed more than $1 million to advance sustainable production of Australian beef.

At McDonald's Australia, it's important to us that we only do business with suppliers committed to helping us achieve our collective planet goals.

Many of our suppliers are making improvements, setting standards and being acknowledged for their quality environmental and employment practices.

Community connection

We are committed to supporting our local communities.

At Macca's, we are proud to play an active role in neighbourhoods all over Australia. One of the ways we do this is by supporting groups and charities that are important to our customers and people.

Together with our franchisees, we commit **millions of dollars each year to support activities, events and groups that help Aussies** lead active lifestyles, develop skills, care for the environment, and support one another through times of crisis.

Our 40-year-long partnership with Ronald McDonald House Charities (RMHC) is at the heart of this commitment. McDonald's provides essential funding to help RMHC, one of Australia's most trusted charities, support thousands of seriously ill and injured children and their families every year.

Ronald McDonald House Charities® Australia

More than
$61 million raised

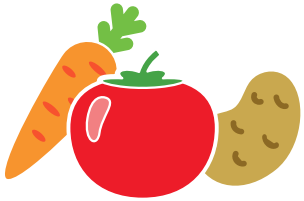
Over the past 30 years, McHappy Day has raised over $61 million for Ronald McDonald House Charities (RMHC).

Supported more than
46,000 families

The funds raised help RMHC support over 46,000 families each year through vital accommodation programs such as Ronald McDonald Houses, Family Rooms, Family Retreats.

Invest
millions yearly

Together with our franchisees, we invest millions every year to local community groups, activities and causes.



More than
615,000kg of fresh produce

We've been a partner of Foodbank for more than 10 years. In the past 5 years, we've donated more than 615,000kg of fresh produce from our distribution centres across Australia.

Jobs, inclusion & empowerment

We put our people first and invest in their future growth and development.

As one of the largest employers in Australia, we are serving up bright futures for our people by offering a supportive working environment, world-class training programs and the opportunity to develop a long-term career with McDonald's.

For many young Australians, McDonald's will be their first job. We are honoured to have this privilege, and are committed to equipping our people with skills, experiences and values for life.

An important part of living our McDonald's values is prioritising **diversity, equity and inclusion** across our business. **We are committed to using our scale to accelerate meaningful change** for our people, franchisees, suppliers, customers and communities.

Our Focus Areas:

- Employer of Youth
- Skills & Education
- Diversity, Equity and Inclusion
- Respectful Workplaces

We employ more than

110,000+

people

Approximately

70%

of our employees

are secondary, TAFE or university students.

From 2018 –2021, McDonald's Australia was recognised as an

Employer of Choice

in The Australian Business Awards.

Registered Training Organisation*

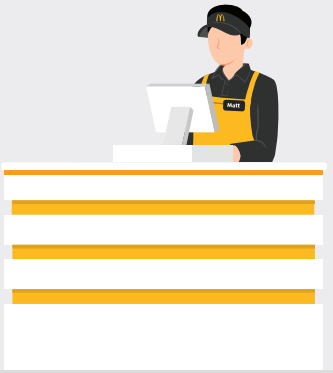
We offer nationally recognised qualifications in the retail and food service sectors.

To date, more than

50,000

employees

have completed a nationally recognised qualification or skill set through McDonald's Australia.



*McDonald's Australia RTO Code 90820.

For more information, visit mcdonalds.com.au/our-impact

29-May-24
Ref: ABE0072.01

Ratio Consultants
8 Gwynne Street
Cremorne, Victoria 3121

Attention: Maria Lasso
maria.lasso@ratio.com.au

Review and Advice
Phase 2 Environmental Site Assessment
347 Westbury Road, Prospect Vale, Tasmania

Introduction

Stakeholders of the above referenced Site engaged Abacus Environmental Pty Ltd (Abacus) to provide this letter of advice as a Certified Environmental Professional – Contaminated Land Specialist (CEnvP)[1].

The Site, a former service station with underground fuel storage, is being redeveloped as a McDonald's restaurant. Given the contamination risk associated with service stations, an Environmental Site Assessment (ESA) was necessary before the planning permit for the new development could be granted.

This letter provides advice on the environmental condition of the Site and the suitability of a change to land use to facilitate the planning approval.

Environmental Study and Reporting

Environmental works have been completed and a report concluding that the development was appropriate has already been accepted by local authorities. The approved report is referenced:

- ES&D Consulting Pty Ltd, *Phase 2 Environmental Site Assessment, 345-347 Westbury Road, Prospect Vale, TAS 7250, Final v3*, 6 February 2024 (ESA V3).

Since approval of Version 3 the report has been updated to Version 4 to incorporate minor changes to the text and to reflect negligeable changes to the proposed development design.

Purpose of Letter

The purpose of this letter therefore is to provide CEnvP sign-off on the above referenced changes as presented in the final report:

- ES&D Consulting Pty Ltd, *Phase 2 Environmental Site Assessment, 345-347 Westbury Road, Prospect Vale, TAS 7250, Final v4*, 29 May 2024 (ESA V4).

[1] Certified Environmental Professional (No. 1081) / Contaminated Land Specialist (No. SC41068).

Outcome

ESA V3 concluded that Site conditions resulting from past uses do not present an unacceptable risk, that the Site was suitable for the proposed use and excavation could proceed.

The changes to the development and to the report implemented since that time and presented as ESA V4 are immaterial to potential risk and therefore do not change conclusions.

The current condition of the Site does not present an unacceptable risk to future Site users under the proposed land use. There are therefore no environmental impediments to redevelopment, and it is my opinion that the proposed planning permit should be approved and that Site excavation can now proceed with standard health and safety procedures in place.

Site Risk Scenario

Service stations present a risk of contamination primarily due to the underground storage of significant volumes of petroleum hydrocarbon fuels and the potential for leaks.

Contamination however does not necessarily equate to unacceptable risk. Unacceptable risk occurs when concentrations are above a certain threshold and users/occupiers have direct contact with contaminated soil or groundwater, or vapours emanating from contaminated soil or groundwater accumulate within occupied buildings.

For the Site, the following lines of evidence shows that there is no unacceptable risk:

- All fuel storage infrastructure, and therefore the primary source of contamination, has been removed.
- Knowledgeable environmental professionals have excavated all identified and accessible contaminated soil for off-site disposal.
- Any petroleum hydrocarbon contamination remaining in soil or groundwater is limited in extent and expected to naturally degrade over time.
- The Site will be paved with no potential for future users to access soil or groundwater.
- Direct soil and groundwater sampling conducted at the Site showed that concentrations are below thresholds that would present an unacceptable risk in a commercial scenario.
- The proposed building is located away from the former fuel infrastructure and therefore the risk of vapours accumulating indoors is low.

Although there may be some contamination remaining at the Site, multiple lines of evidence demonstration that site-specific conditions do not present an unacceptable risk.

Opinion on Changes to Development Design

Since Version 3 of the report there have been minor proposed changes to the design of Site driveways. The following should be considered when reassessing the risk:

- There is no unacceptable risk associated with paved areas.
- Risk profile would only change due to the risk of vapour accumulation within occupied buildings.
- As there is no change to building design or location, there is no change to potential risk.

The proposed design changes are immaterial to environmental risk and there is no change to the conclusion presented in ESA V3. The Site remains suitable for the proposed use and Site excavation can now proceed with standard health and safety procedures in place.

Opinion on Changes to Report Text from V3 to V4

ESA V4 includes an additional discussion on compliance with the Tasmanian Planning Scheme, concluding that Site contamination does not present an unacceptable risk to human health or the environment and no specific further remediation or management controls are required.

This is in part due to evidence showing that any limited subsurface contamination remaining at the Site is below the proposed depth of development excavation.

As with any civil project, if contaminated soil is unexpectedly encountered a competent site supervisor should implement necessary procedures to ensure soil is handled and disposed of correctly. Passing exposure to minor amounts of petroleum hydrocarbon contamination does not present an unacceptable health risk.

ESA V4 presents conclusions consistent with the Tasmanian Planning Scheme and appropriately protective of human health based on the site-specific conditions and confirmed development excavation plans.

Comment on Potential Ongoing Groundwater Contamination

There is evidence of contaminated groundwater (or perched water) in the northwest portion of the Site, a location consistent with the past fuel storage infrastructure. Testing shows there is no risk to the proposed commercial land use and not impediment to the proposed excavation. However, additional work is required to quantify potential risk to off-site receptors. Abacus understands that this data gap is currently being investigated.

Works associated with groundwater (perched water) have no impact on the suitability of the Site for its intended use or the proposed excavation and can be conducted after planning approval.

Conclusion

The originally approved ESA V3 concluded that the Site is suitable for the proposed use and development and that there was no unacceptable environment risk barring final approval of the planning permit.

Upon review, the changes implemented between ESA V3 and ESA V4 are immaterial to environmental risk. Therefore, risk remains acceptable and the Site is suitable for the proposed development.

Data gaps associated with perched water in the northwest of the Site should be addressed but have no influence on the proposed development and should not delay planning permit approval.

The two versions of the ESA report reviewed are provided as **Attachment 1** and **Attachment 2**.

Closing

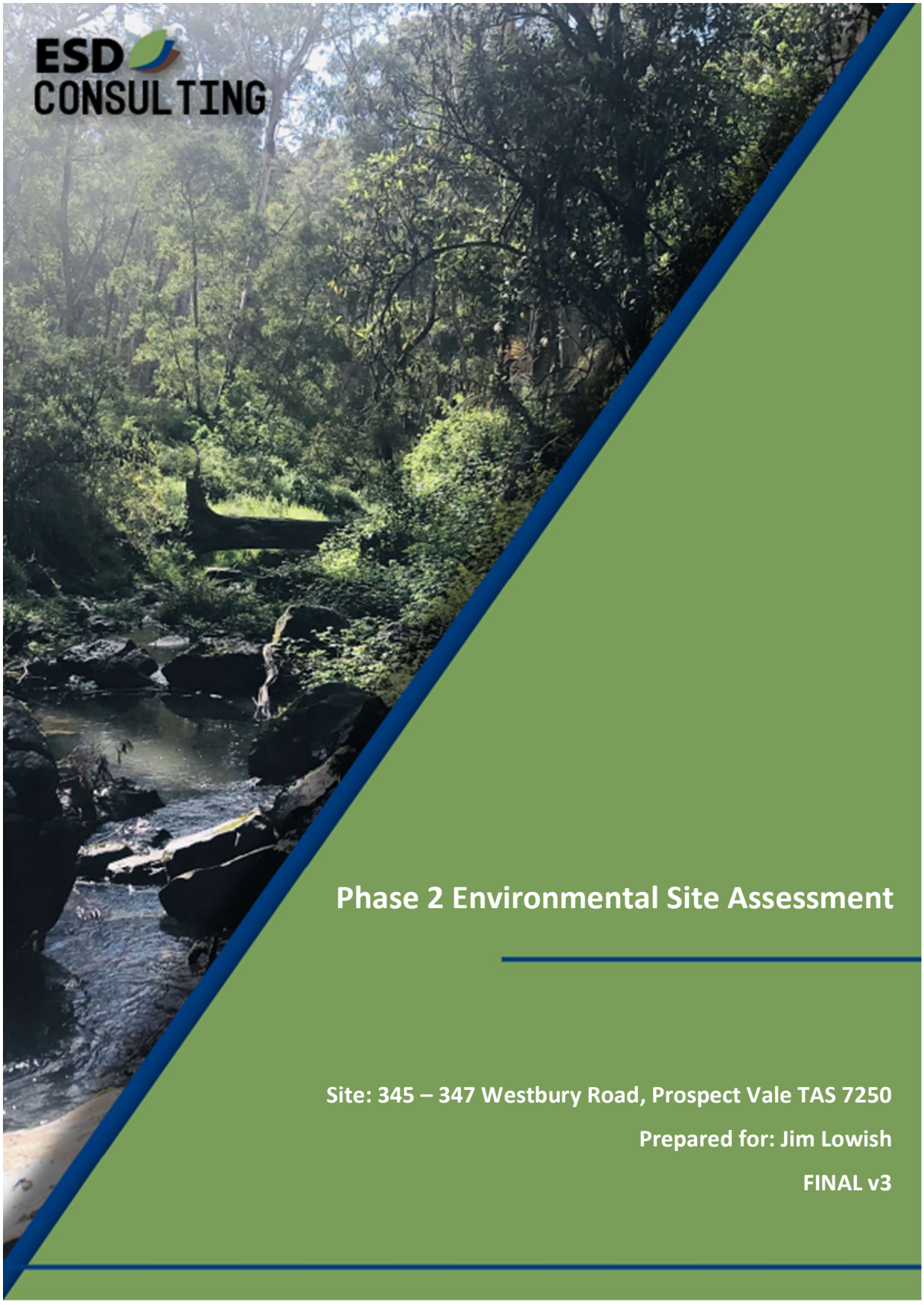
If you have any questions, please don't hesitate to contact me by email or mobile: 0404 227 818.

Kind regards,

Richard H Evans
Principal Geologist / Director
Abacus Environmental
0404 227 818
revans@abacusenviro.com
Certified Environmental Practitioner (Site Contamination)

29-May-24
Ref: ABE0072.01

Attachment 1 – ES&D Consulting Phase 2 ESA Report Version 3



Phase 2 Environmental Site Assessment

Site: 345 – 347 Westbury Road, Prospect Vale TAS 7250

Prepared for: Jim Lowish

FINAL v3

Document Control

Prepared & published by:	ES&D Consulting
Version:	FINAL
File:	7936
Contact name:	Royce Aldred
Contact number:	0429 335 664
Prepared for:	Jim Lowish

Version:	Author:	Company:	Date:
Draft 1	Royce Aldred	ES&D	8/8/2023
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FINAL v2	Rod Cooper	ES&D	9/12/2023
FINAL v3	Royce Aldred	ES&D	6/2/2024

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1 Executive Summary

Environmental Service and Design (ES&D) were commissioned to undertake a Phase 2 Environmental Site Assessment (ESA) at 345 - 347 Westbury Road, Prospect Vale 7250 (Jim's Car Care Centre), (the 'Site').

The subject property is flagged as contaminated land for previous potentially contaminated activity, specifically fuel sales and mechanical workshop. This Phase 2 ESA is based on the Phase 1 ESA also completed by ES&D. Further information is outlined in the Phase 1 ESA.

Figure 1 shows the development proposed for the site. The McDonald's Restaurant is positioned up gradient of where the decommissioned UPSS system was, and just up gradient of groundwater bores 5 and 7 (GB5 and GB7). The conceptual site model (CSM) confirms that there is no contamination at the proposed position of the development and so no pathway from the soil to the restaurant. The UPSS Decommissioning confirmed that the soil associated with the system has acceptable risk to operate as a commercial site.

Concerns relating to a light non-aqueous phase liquid (LNAPL) plume moving between GB1 and GB4 was investigated, and the latest results (December 2023) confirms that if a plume exists it is no longer on the site. The current concentrations and concentration trends at GB1 confirm that the site poses acceptable risk for the proposed development, and the development construction is occurring up gradient of the removed UPSS and outside the buffer proposed by *National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended April 11, 2013 (NEPASCM).*

It is noted from the civil engineer that excavation across the site will be no more than 1.5 m below ground level (m BGL) for all works except for the building foundations that will be to approximately 3 m BGL. The acoustic fence will require excavation no deeper than 2 metres. Excavation to these depths are low risk as the groundwater plume and associated residual soil contamination is below 2 m BGL. The proposed building location, with excavation to a depth of 3 m BGL, is well away from and upgradient from the groundwater plume, so excavation in that location is low risk. A copy of an email from the Civil Engineer is included in the appendices.

2 Scope of works

The scope of works included the following:

1. Installation of groundwater monitoring wells to delineate the hydrocarbon contamination in the groundwater at the site, which was identified in previous assessments.
2. Sampling of soil and groundwater in accordance with the Sampling Analysis Quality Plan as outlined in the Phase 1 ESA.
3. Remediation and validation sampling of areas of the soil at the Site identified in the UPSS Decommissioning Report as having exceedances above relevant soil health and ecological investigation levels.
4. Develop a NEPM based risk assessment and final conceptual site model to determine if the site is suitable for the proposed commercial development.

3 Proposed Development

The development proposed is a McDonald's Restaurant with parking and drive through facility. The building is constructed deliberately up gradient of the fuel facility that the NEPM guidance considers it a suitable buffer. Appendix 7 shows the detailed development with the building, parking spaces, drive and park zones shown. The restaurant layout is a refined design, which has taken into account feedback from hundreds of facilities around Australia to assure environmental impacts are managed.

Figure 1 shows the development layout on the site and the groundwater bores (labelled as GB1, GB2 etc.) relevant to potential impacts. The blue arrow shows localised perched groundwater flow. The detected leak in the fuel system was upgradient of GB1. GB1 is now showing low level contamination (below the commercial standards). This poses acceptable risk to the development. It should be considered that the bitumen carpark is over the former UPSS area. This means that any vapour will vent directly upwards through the bitumen as a preferential pathway, protecting up gradient and down gradient receptors.

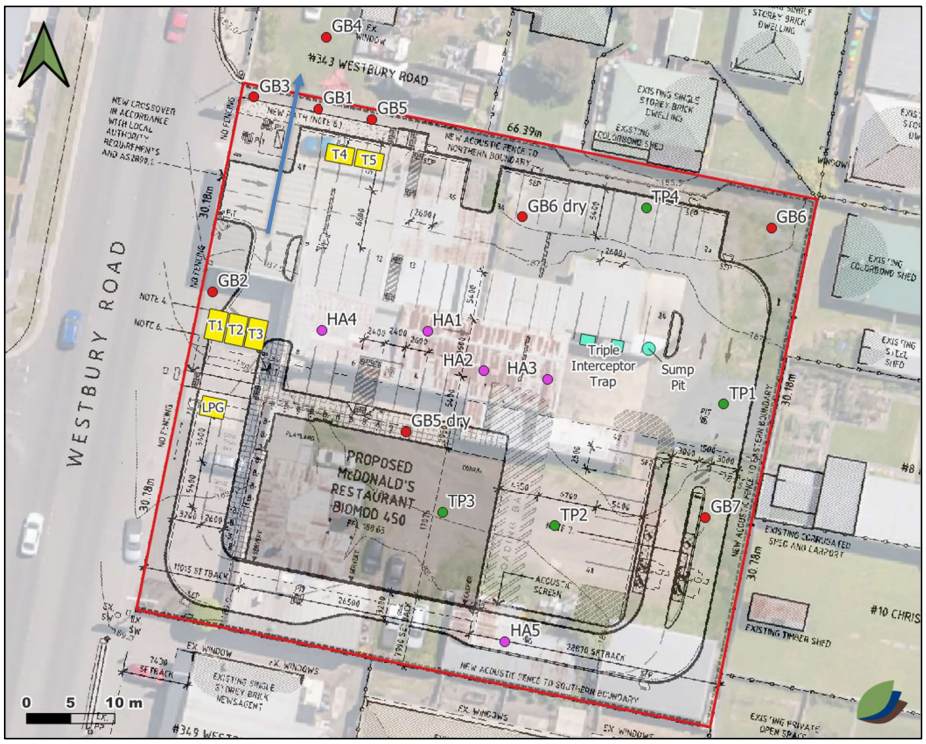


Figure 1 - Development Layout

4 Assessment Criteria

The Environmental Site Assessment is required to ensure potential contamination sources are identified and any risks posed by these sources are managed and mitigated.

The screening levels are provided in the *National Environmental Protection (Assessment of Site Contamination) Measure* 1999, as amended April 11, 2013 (NEPASCM). The site falls under the category of commercial/industrial and the relevant limits have been used. The following screening levels will be applied in the assessment: Health Screening Levels (HSLs), Health Investigation Levels (HILs), Ecological Screening Levels (ESLs), Ecological Investigation Levels (EILs), Groundwater Investigation Levels (GILs) and Management Levels (MLs).

Additional NEPASCM reference material considered in the assessment include CRC CARE *Technical Report No. 10 "Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater Part 2: Application Document"*.

5 Soil Sampling

5.1 General

Soil sampling was undertaken across the site to ascertain contaminant levels and validate remediation where completed.

Sampling was completed by suitably qualified and trained personnel in accordance with ES&D soil sampling procedures which ensure quality control. For all sampling events, samples were collected into a glass jar provided by ALS Laboratory, Springvale, and were placed directly into a chilled Esky after collection. Eskies were sent to ALS via overnight air freight at the end of each day, and analysed by ALS Springvale, a NATA accredited laboratory. Strict chain of custody protocols were followed.

5.2 Previous work

The underground petroleum storage systems (UPSS) were decommissioned in late January/early February 2023. The Site remained fenced off with excavators and trucks available on site for some time after the tank removal. For the sake of efficiency and to save remobilising equipment to the site, ES&D undertook two pieces of work at the site while machinery was available, as follows:

- Remediation of soil hotspots, as identified in the UPSS decommissioning works. Removing these 2 hotspots upon validation confirms that the remaining soil on the site is acceptable for commercial development, and
- Removal and sampling of the oil water separator, wash bay and triple interceptor trap.

Details of the works undertaken are outlined below. This work was completed prior to the Phase 1 ESA, as they were works known to be necessary prior to the site-wide assessment.

5.3 Remediation of soil hotspots

On Wednesday 12 April 2023, ES&D and Dickson Earthmoving (DE) attended the site to excavate further soil to remove hotspots of contamination, as outlined in the previously completed UPSS report recommendations.

Some sections of concrete were removed and stockpiled at the back of the site for future disposal. DE then excavated soil under the supervision of Royce Aldred, Senior Environmental Consultant at ES&D. Two locations were excavated. The excavation referred to as T3 covered the hotspot to the south of the former bowser locations (sample location T1E) and in the fuel line trench (FL1) sample location. The second excavation referred to as T4 covered the hotspot to the north of the former bowser location (sample location FL2C). See Figure 3 below.

The extent of excavation was guided by staining of soils, odour, and use of VOC readings from ES&D's calibrated Photoionization detector meter (PID). Removed soil was stockpiled on Fortecon plastic at the rear of the site – two stockpiles were formed; these were separate but additional to the stockpiles still on site, generated during the UPSS removal works. Stockpile 3 (SP3) was the material from T3 and stockpile 4 (SP4) is the material from T4 respectively.

The extremities of each excavation were sampled accordingly, as outlined in Figure 4 and Figure 5 below.

Contaminants analysed for included polycyclic aromatic hydrocarbons (in samples around the former diesel tanks, diesel fuel lines and associated stockpiles only – T4 and SP4), aliphatic hydrocarbons (NEPM fractions and total petroleum hydrocarbons), BTEXN (benzene, toluene, ethylene, xylene, and naphthalene) and total lead where leaded fuels were previously stored (T3 and SP3). These analytes have a direct relation to petrol (unleaded and leaded) and diesel contamination.

Laboratory reports and chain of custody documents are included in the appendices.

The results show that the remediation was successful as all results were below the relevant NEPASCM levels (see Section 4) as shown in Table 1 to Table 3 below. Removed soil was Level 2 low level contaminated soil in accordance with Information Bulletin 105 and was disposed of with EPA approval at a licenced facility. Blind duplicates of sampling locations T3-2 and T4-1 were within acceptable ranges based on a relative percent difference basis.

Figure 2 - Hotspot locations

Figure 3 – Location of remediation works (T3 and T4)

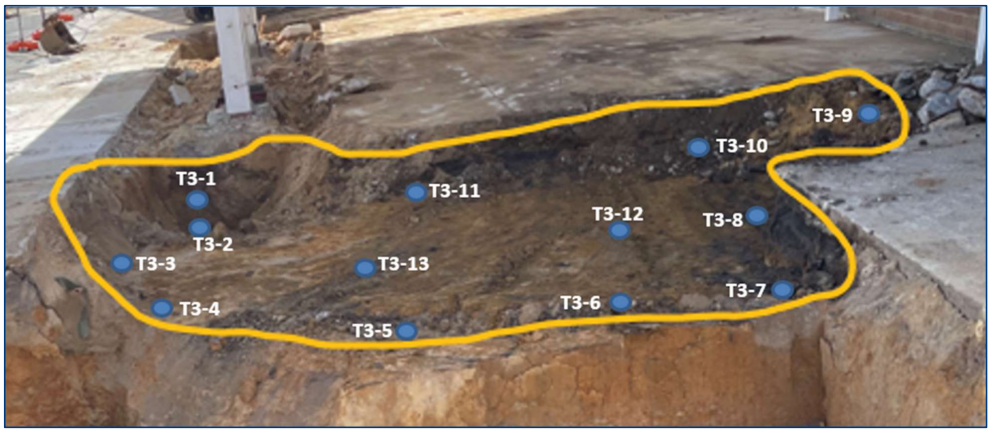


Figure 4 – Location of sample points (T3)

Figure 5 – Location of sample points (T4)

Figure 6 – Soil stockpile SP3

Figure 7 – Soil stockpile SP4

Table 1 – Remediation soil results (T3)

Parameter	Units	LOR	T3-1	T3-2	DUP (T3-2)	T3-3	T3-4	T3-5	T3-6	T3-7	T3-8	T3-9	T3-10	T3-11	T3-12	T3-13	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		5.5	2.7	2.7	2.4	1.9	3.1	1.8	1.0	1.6	1.6	1.6	1.0	2.7	1.8							
Odour	-		No	No	No	No	No	No	No	No	No	No	No	No	Slight	Slight							
Sample depth	m		1.5	1.5	1.5	0.75	0.75	0.75	0.75	0.4	0.4	0.75	0.75	0.75	1.0	1.0		0m - 1m	1m - 2m				
Description	-		Light brown sandy clay slightly moist red mottle	Light brown sandy clay slightly moist red mottle	Light brown sandy clay slightly moist red mottle	Light brown moist sand	Light brown sandy clay slightly moist red mottle	Dry firm light brown clay, red mottle, crumbly	Dry firm light brown clay, red mottle, crumbly	Dark brown, moist clay, crumbly	Dark brown moist clay, crumbly	Dark brown sandy clay, moist, crumbly	Light brown stiff clay, slightly moist	Light brown stiff sandy clay	Light brown stiff sandy clay	Light brown stiff sandy clay							
Lead	mg/kg	5	8	46	13	16	7	6	7	7	14	12	8	10	8	8	1,500						
Total Petroleum Hydrocarbons																							
C6 - C9 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	<100	120	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	<50	120	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																							
C6 - C10 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	<100	180	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	<50	280	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50						170	170
BTEXN																							
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				

Table 2 – Remediation soil results (T4) Remaining on site

Parameter	Units	LOR	T4-1	DUP2 (T4-1)	T4-2	T4-3	T4-4	T4-5	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		0.8	0.8	3.6	40.6	19.8	0.5							
Odour	-		No	No	No	Slight	Slight	No							
Sample depth	m		0.75	0.75	0.75	0.75	1.5	0.75		0m - 1m	1m - 2m				
Description	-		Dark brown sandy clay	Dark brown sandy clay	Dark brown sandy clay	Light brown sandy clay, crumbly	Dark brown clay, dry, crumbly	Dark brown moist sandy clay, crumbly. Evidence of fill - red brick fragments.							
Lead	mg/kg	5	----	----	----	----	----	----	1,500						
Total Petroleum Hydrocarbons															
C6 - C9 Fraction	mg/kg	10	<10	<10	25	76	20	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	120	270	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	120	110	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	120	230	270	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions															
C6 - C10 Fraction	mg/kg	10	<10	<10	37	141	36	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	37	135	35	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	110	**220**	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	160	140	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	160	250	220	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	110	**220**	<50	<50						170	170
BTEXN															
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	4.3	0.8	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	4.3	0.8	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	5.8	0.8	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	3	1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2							

Red shows exceedances

Table 3 – Remediation soil results (stockpiles SP3 and SP4) Removed from site.

Parameter	Units	LOR	SP3-1	SP3-2	SP4-1	SP4-2	IB105 L1	IB105 L2	IB105 L3
VOC field reading	ppm		16.3	16.3	24.3	95.0			
Odour	-		Yes	Yes	Yes	Yes			
Lead	mg/kg	5	23	32	-	-	300	1200	3000
Total Petroleum Hydrocarbons									
C6 - C9 Fraction	mg/kg	10	<10	11	<10	29	65	650	1000
C10 - C14 Fraction	mg/kg	50	<50	120	<50	60			
C15 - C28 Fraction	mg/kg	100	100	1260	110	320			
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100			
C10 - C36 Fraction (sum)	mg/kg	50	100	**1380**	110	380	1,000	5,000	10,000
Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	mg/kg	10	<10	18	<10	51			
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	18	<10	50			
>C10 - C16 Fraction	mg/kg	50	<50	540	60	130			
>C16 - C34 Fraction	mg/kg	100	130	900	140	260			
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100			
>C10 - C40 Fraction (sum)	mg/kg	50	130	1440	200	390			
>C10 - C16 Fraction minus Naphthalene (F	mg/kg	50	<50	540	60	130			
BTEXN									
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	1	5	50
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	1	100	1,000
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	3	100	1,080
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	1.4			
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5			
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	1.4	14	180	1,800
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	1.4			
Naphthalene	mg/kg	1	<1	<1	<1	2			

Red shows exceedances.

5.4 Oil water separator, wash bay and triple interceptor trap

At the rear of the service station building and mechanical workshop, there was a triple interceptor trap, an oily water separator and a wash bay, with an associated sump. Water from the service station apron was directed to sewer via the triple interceptor trap in the past, which captures hydrocarbons for removal and recycling by a licensed contractor. The use of the triple interceptor was discontinued due to the installation of the above ground oil water separator (OWS) around five years ago (see Figure 9). A vehicle wash bay was also installed at the same time, with a small sediment trap under a grated drain included (Figure 10). This area drained directly through the OWS. All the flows then drained into a concrete sump in the southeastern corner of this area, prior to discharge to sewer at the rear of the property. Due to the risk of leakage of petroleum hydrocarbons from this infrastructure, ES&D with Dickson Earthworks undertook the removal of these items from the site on 19 May 2023. Given the OWS is an above ground installation above a bunded area, the risk of leakage from it is low.

Figure 8 – Sampling locations: oil water separator, wash bay and triple interceptor trap

Soil sampling was undertaken by Royce Aldred, Senior Environmental Scientist with ES&D as the infrastructure was removed. Sample locations are shown in Figure 8. Contaminants analysed for included polycyclic aromatic hydrocarbons, aliphatic hydrocarbons (NEPASCM fractions and total petroleum hydrocarbons), BTEXN (benzene, toluene, ethylene, xylene and naphthalene), phenols and total lead.

All results for all parameters were below laboratory detection levels, except for Total Recoverable Hydrocarbons in the C10 - C16 Fraction at sample location Sump-W which was 50 mg/kg, right at the laboratory detection level. There were no exceedances of relevant guidelines at any location for any parameter. A blind duplicate taken at sample location WB-B was within acceptable ranges on a relative percent difference basis.

Figure 9 – Above ground oil water separator inside small bunded area

Figure 10 – Wash Bay area with grated sediment pit

Table 4 – Oil water separator, triple interceptor and wash bay soil sample results

Parameter	Units	LOR	SUMP-B	SUMP-N	DUP (WB-B)	SUMP-W	SUMP-E	SUMP-S	WB-B	TIT-B	SP	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		1.8	4.7	0.0	1.4	0.1	0.0	0.0	13.4	0.0							
Odour	-		No	No	No	No	No	No	No	No	No							
Sample depth	m		0.75	0.75	0.75	0.75	1.5	0.75					0m - 1m	1m - 2m				
Description	-		Orangey brown sandy clay	Orangey brown sandy clay	Fine grained dry sandy clay, crumbly, light brown	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Fine grained dry sandy clay, crumbly, light brown	Orangey brown sandy clay	N/A							
Lead	mg/kg	5	10	6	8	15	10	8	8	9	12	1,500						
Total Petroleum Hydrocarbons																		
C6 - C9 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																		
C6 - C10 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	<50	50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	<50	50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	<50	50	<50	<50	<50	<50	<50						170	170
BTEXN																		
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2							
Phenol	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250,000						

5.5 Site-wide Soil Sampling

Soil sampling was also undertaken across the remainder of the Site, using a combination of a targeted and grid-based sampling approach, in accordance with the sampling and analysis quality plan (SAQP) included in the Phase 1 ESA. The purpose of this sampling was to confirm no contamination of the site has occurred from activities not associated with the UPSS.

According to the LISTMap, the site is approximately 4,000 square metres or slightly larger. This equates to 0.4 hectares, so in accordance with *AS 4482.1 (2005) Guide to the Sampling and Investigation of Potentially Contaminated Soil - Part 1: Non-Volatile and Semi Volatile Compounds*, 11 sampling locations are recommended for a square grid-based sampling pattern. This will detect a hotspot with a diameter of 22.5 metres with 95% confidence.

The 11 locations sampled were a combination of targeted and grid locations - targeted sampling was conducted in areas where the site history indicated activities occurred that are potentially contaminating. These included mechanical workshop locations. Soil sampling locations are shown in Figure 11 below. Some previous assessments have been completed also by Greencap consultants, Hydro Earth and ES&D.

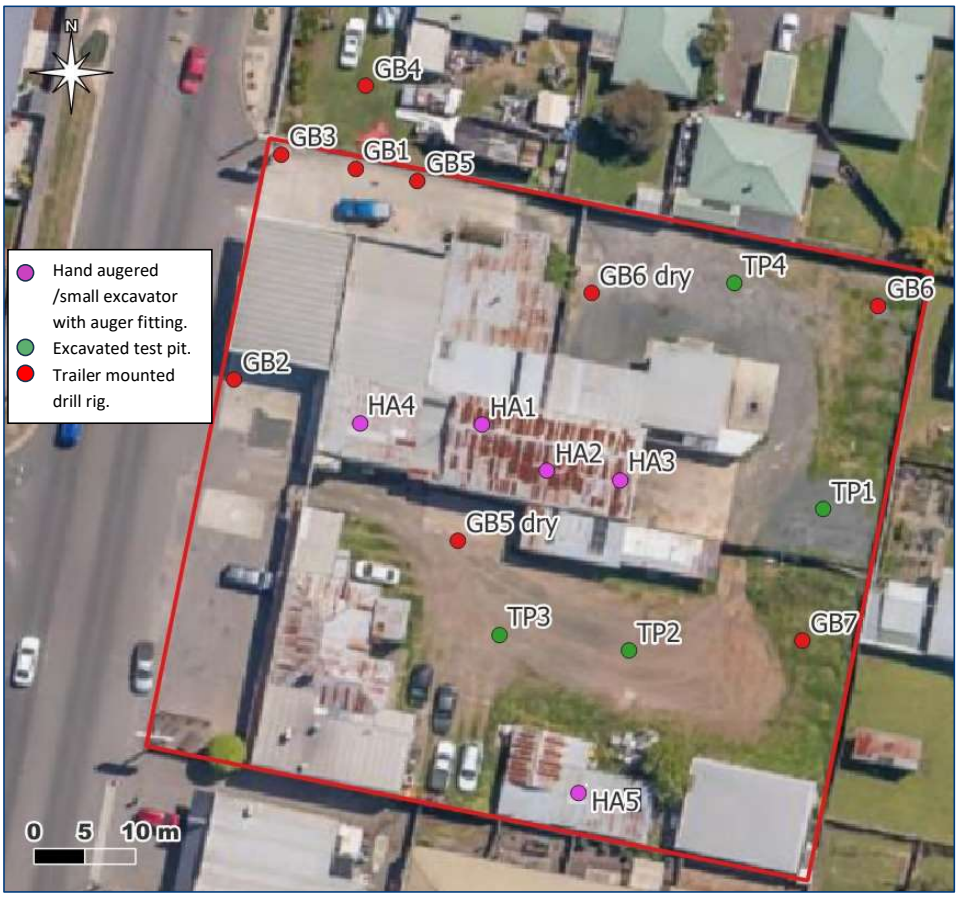


Figure 11 – Soil Sampling Locations – Site-wide

Samples were taken by excavating test pits where access allowed (Test Pits TP1 – TP4), hand auger / excavator with auger fitting (HA1 – HA5) and drill rig (GB5 – GB7). GB1 – GB4 and GB5 dry and GB6 dry are existing. During the sampling process, soil samples were taken at regular intervals increasing in depth. Where possible, soil sample locations targeted change in horizons and/or soil layers that were notably different.

Four test pits were excavated across the site. The test pits were excavated in the open spaces north, south, and east of the central workshop building to an approximate depth of 2.1 to 2.3 m. Soil samples were taken from each major change in soil horizon which was determined during excavation. The approximate depth of each sample location was recorded.

Four hand auger locations were marked out in the central building. Three of the hand augers were in the workshop and the fourth was in the storeroom/historical workshop. The building has concrete slab floors which required cutting to expose the soil underneath. Soil samples were taken from each major change in soil horizon which was determined during excavation. The approximate depth of each was recorded. Locations HA1 to HA3 were inside the workshop which has a roller door for access at the rear. The sampling team was able to gain access with a small excavator through this door, so HA1 to HA3 were mechanically augered using a drill bit connected to the excavator to gain extra depth. We experienced auger refusal on what appeared to be rock at 2.4m in HA1, 2m in HA2 and 1.8m in HA3. Refusal was evident due to the excavator lifting slightly under the pressure and generating smoke at the base of the auger bit, caused by friction with the underlying material. It is not possible to drill deeper inside the workshop unless it is demolished to enable access to the soil with a drill rig. The drill rig operator advised that previously they had experienced refusal with the drill rig outside of the workshop building at a similar depth. There appears to be a shelf of rock or hard material through the centre of the site underlying the workshop building and surrounds, but the extent of this shelf is unconfirmed.

HA4 was at the front of the building where access by excavator was not possible, so this location was hand augered and the depth was restricted to 0.8 m. Similarly, location HA5 was inside the car storage shed on the central southern boundary and was hand augered to a depth of 0.5 metres, through the exposed soil floor.

Locations GB5 to GB7 were sampled using a drill rig with an auger bit, to a depth of 5 metres, 8 metres and 9 metres respectively. All three locations were converted to groundwater monitoring wells. Soil samples were generally taken at 1 m intervals in each location.

5.6 Site-wide Soil Results

Soil results for all sample locations for the site-wide assessment are included below in Table 5 to Table 8. Results were tabulated against the relevant NEPASM levels (see Section 4) and there were no exceedances at any sampling location, except for BH5 (GB5) at 2.0 m. At this sample location, the ecological limit was exceeded, and it is noted that this location is within the hydrocarbon plume footprint at approximately the standing water level. Formal ALS laboratory certificates and chain of custody documents are included in the appendices. Blind duplicates taken at sampling locations TP2-0.4, BH5-1.0 and GB7-7 were within acceptable ranges on a relative percent difference basis.

Table 5 – Soil analytical results HA1 – HA5

Parameter	Units	LOR	HA1-1.2	HA1-2.2	HA1-2.4	HA2-1.4	HA2-2.0	HA3-1.2	HA3-1.8	HA4-0.15	HA4-0.8	HA5-0.2	HA5-0.5	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I -Coarse soil	Management limits C/I -Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
Odour	-		No	No	No	No	No	No	No	No	No	No	No							
Sample depth	m		1.2	2.2	2.4	1.4	2.0	1.2	1.8	0.15	0.8	0.2	0.5		0m - 1m	1m - 2m				
Soil Description	-		Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Topsoil/ gravel	Orangey brown sandy clay	Topsoil/ gravel	Orangey brown sandy clay							
Lead	mg/kg	5	14	18	18	9	13	12	14	43	11	17	10	1,500						
Total Petroleum Hydrocarbons																				
C6 - C9 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																				
C6 - C10 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50						170	170
BTEXN																				
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2							
Phenol	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250,000						
Arsenic	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	3,000						
Cadmium	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	900						
Chromium (HIL is for Chromium VI)	mg/kg	2	110	112	169	140	142	135	110	47	134	137	140	4,000						
Copper	mg/kg	5	6	7	12	5	6	<5	6	13	15	<5	<5	240,000						
Lead	mg/kg	5	14	18	18	9	13	12	14	43	11	17	10	1,500						
Nickel	mg/kg	2	8	6	7	9	10	8	5	4	10	7	9	6,000						
Zinc	mg/kg	5	26	24	44	10	<5	17	21	22	8	19	5	400,000						

Table 6 – Soil analytical results TP1 – TP4

Parameter	Units	LOR	TP1-0.7	TP1-1.3	TP1-2.3	TP2-0.4	DUP2 (TP2-0.4)	TP2-0.9	TP2-2.1	TP3-0.4	TP3-0.8	TP3-2.1	TP4-0.45	TP4-0.8	TP4-2.2	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A							
Odour	-		No	No	No	No	No	No	No	No	No	No	No	No	No							
Sample depth	m		0.7	1.3	2.3	0.4	0.4	0.9	2.1	0.4	0.8	2.1	0.45	0.8	2.2		0m - 1m	1m - 2m				
Soil Description	-		Orangey brown sandy clay	Orangey brown sandy clay	Dry firm light brown clay, red mottle, crumbly	Orangey brown sandy clay	Orangey brown sandy clay	Orangey brown sandy clay	Dry firm light brown clay, red mottle, crumbly	Orangey brown sandy clay	Orangey brown sandy clay	Dry firm light brown clay, red mottle, crumbly	Orangey brown sandy clay	Orangey brown sandy clay	Dry firm light brown clay, red mottle, crumbly							
Lead	mg/kg	5	27	14	9	11	13	9	11	8	8	15	13	5	7	1,500						
Total Petroleum Hydrocarbons																						
C6 - C9 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																						
C6 - C10 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50						170	170
BTEXN																						
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2							
Phenol	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250,000						
Arsenic	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	3,000						
Cadmium	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	900						
Chromium (HIL is for Chromium VI)	mg/kg	2	30	140	133	174	124	152	156	192	153	212	131	62	45	4,000						
Copper	mg/kg	5	8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	240,000						
Lead	mg/kg	5	27	14	9	11	13	9	11	8	8	15	13	5	7	1,500						
Nickel	mg/kg	2	5	6	9	4	4	10	5	8	8	3	4	7	6	6,000						
Zinc	mg/kg	5	95	<5	<5	8	20	<5	<5	<5	<5	<5	<5	<5	<5	400,000						

Table 7 – Soil analytical results GB5 and GB6

Parameter	Units	LOR	BH5-1.0	DUP (BH5-1.0)	BH5-2.0	BH5-3.0	BH5-4.0	GB6-1	GB6-2	GB6-3	GB6-4	GB6-5	GB6-6	GB6-7	GB6-8	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm		0	0	0	0	0	0.0														
Odour	-		Nil	Nil	Nil	Nil	Nil	No	No	No	No	No	No	No	No							
Sample depth	m		1.00	1.00	2.00	3.00	4.0	1.0	2	3	4	5	6	7	8		0m - 1m	1m - 2m				
Soil Description	-		Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining							
Lead	mg/kg	5	-	-	-	-	-	9	7	<5	<5	<5	<5	<5	<5	1,500						
Total Petroleum Hydrocarbons																						
C6 - C9 Fraction	mg/kg	10	<10	<10	14	<10	14	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	310	80	90	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	660	190	230	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	970	270	320	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																						
C6 - C10 Fraction	mg/kg	10	<10	<10	28	<10	25	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	28	<10	25	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	580	140	150	<50	<50	<50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	390	120	190	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	970	260	340	<50	<50	<50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	580	140	150	<50	<50	<50	<50	<50	<50	<50	<50						170	170
BTEXN																						
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2							
Phenol	mg/kg	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250,000						
Arsenic	mg/kg	5	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	3,000						
Cadmium	mg/kg	1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	900						
Chromium (HIL is for Chromium VI)	mg/kg	2	-	-	-	-	-	207	63	26	16	24	23	21	18	4,000						
Copper	mg/kg	5	-	-	-	-	-	<5	<5	<5	<5	9	6	7	<5	240,000						
Lead	mg/kg	5	-	-	-	-	-	9	7	<5	<5	<5	<5	<5	<5	1,500						
Nickel	mg/kg	2	-	-	-	-	-	13	8	<2	<2	<2	<2	<2	<2	6,000						
Zinc	mg/kg	5	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	400,000						

Table 8 – Soil analytical results GB7

Parameter	Units	LOR	GB7-1	GB7-2	GB7-2.5	GB7-3	GB7-4	GB7-5	GB7-6	GB7-7	DUP1 (GB7-7)	GB7-8	GB7-9	HIL-D	HSL-D (sand)	HSL-D (clay)	Management limits C/I - Coarse soil	Management limits C/I - Fine soil	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm																			
Odour	-		No	No	No	No	No	No	No	No	No	No	No							
Sample depth	m		1	2	2.5	3	4	5	6	7	7	8	9		0m - 1m	1m - 2m				
Soil Description	-		Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining							
Lead	mg/kg	5	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1,500						
Total Petroleum Hydrocarbons																				
C6 - C9 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
C15 - C28 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C29 - C36 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100							
C10 - C36 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
Total Recoverable Hydrocarbons - NEPM 2013 Fractions																				
C6 - C10 Fraction	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		260	480	700	800	215	215
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10							
>C10 - C16 Fraction	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		NL	NL	1000	1000	170	170
>C16 - C34 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				3500	5000	1700	2500
>C34 - C40 Fraction	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100				10000	10000	3300	6600
>C10 - C40 Fraction (sum)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50							
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50						170	170
BTEXN																				
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		3	6			75	95
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			135	135
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL			165	185
meta- & para-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
ortho-Xylene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			NL				
Total Xylenes	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		230	NL			180	95
Sum of BTEX	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			NL				
Naphthalene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			NL				
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		NL	NL				
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40						
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6							
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2							
Phenol	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250,000						
Arsenic	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	3,000						
Cadmium	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	900						
Chromium (HIL is for Chromium VI)	mg/kg	2	182	45	5	24	32	26	54	47	52	24	19	4,000						
Copper	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	240,000						
Lead	mg/kg	5	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1,500						
Nickel	mg/kg	2	10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	6,000						
Zinc	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	400,000						

5.7 Groundwater Monitoring Well Installations

Three groundwater monitoring bores were drilled, and wells installed on 27 April 2023 (BH5/GB5) and 4 July 2023 (GB6 and GB7) using a 4-inch solid stem auger drill bit. GB5 is located a few metres east of GB1, and there were similar ground conditions encountered. The drilling team drilled through concrete and FILL material before intercepting natural soils approximately 1.5 metres below ground level (m BGL). GB6 and GB7 were in the rear of the Site, with GB6 approximately 50m east of GB1, and GB7 south from GB6 by approximately 40 metres. Beneath the gravel top layer, boreholes presented a comparable sub surface profile; with ~1 metre of light brown silty CLAY transitioning into a 6 to 7 metre sequence of reddish-brown-mottled-grey silty CLAY with trace sand.

Locations of groundwater bores are presented in Figure 11, and complete borehole logs for the new locations are attached in the appendices. Borehole logs for existing bores are included in previous work.

5.8 Groundwater Sampling

Groundwater samples were collected according to the documented QA/QC procedures and with reference to *AS 5667.11 (1998) Water quality – Sampling Part 11: Guidance on Sampling of Groundwaters*. Low flow sampling techniques were attempted in previous monitoring rounds, but inflow rates were too low to maintain steady groundwater levels, so grab samples were collected using a clean water sampling bailer for each monitoring well. Field parameters were measured using a calibrated Horiba U-50 series multi-parameter probe. This data included temperature, pH, Oxidation Reduction Potential (ORP), Electrical Conductivity (EC), Dissolved Oxygen (DO) and Turbidity (NTU). Field data for each sample is shown in Table 9.

Table 9 – Field measurements groundwater

Location	Date	SWL (m)	Temp (°C)	pH	Conductivity (uS/cm)	DO (mg/L)	Redox (mV)	Turbidity (NTU)	Comments
GB1	14/6/2023	2.60	15.3	6.0	0.39	3.8	0.26	188	Slightly cloudy, no odour, purged dry
GB2	14/6/2023	3.60	14.3	6.6	0.36	5.8	0.24	274	Slight odour, cloudy
GB3	14/6/2023	3.30	15.8	5.8	0.28	14.2	0.18	491	Turbid, strong odour, sheen
GB4	14/6/2023	1.70	14.1	5.6	1.03	14.0	0.66	218	Odour, cloudy, slight sheen
GB5	14/6/2023	2.40	16.0	6.1	0.30	5.6	0.20	385	Slight odour, sheen
GB1	18/7/2023	2.40	12.3	6.1	0.44	2.7	0.29	152	Strong odour
GB2	18/7/2023	3.60	13.5	6.2	0.35	5.7	0.23	100	Slight pressure build-up
GB3	18/7/2023	3.30	13.2	5.9	0.25	5.2	0.16	182	Slight pressure build-up
GB5	18/7/2023	2.55	13.0	6.8	0.94	5.0	0.31	375	Slight odour, sheen
GB6	18/7/2023	4.9	14.1	7.2	0.11	0.44	4.4	56	Clear, no odour
GB7	18/7/2023	7.7	13.4	6.9	0.86	2.2	133	170	Clear, no odour

Due to slow recharge, groundwater wells were purged approximately 24 hours before groundwater samples were taken. Purging of wells was completed by taking three times the volume in the well or until the well was dry in each location. This ensures complete recharge of groundwater and removal of stagnant water in each well to give a more representative sample. To check that each bore had fully recharged, the SWL was recorded before each purge and before each sampling event at each groundwater well. Field parameters were also recorded at each location. Purged groundwater was treated by Hagen Oil through their oily water treatment process prior to discharge to sewer in accordance with their trade waste agreement.

Prior to sampling events, several rounds of purging were completed to attempt to remove some of the hydrocarbon contamination. ES&D initially attempted a mechanical pump and treat method, but the recharge was too slow to allow this to be undertaken efficiently over a longer period. So, ES&D undertook purging on a regular basis with treatment of the extracted water initially through the on-site oil water separator prior to its removal from the site, and then via Hagen Oil.

It would appear that given there is good quality silty clay from 1.5 metres, this likely means that there is not an aquifer but rather surface water collecting at 1.5 metres and flowing over the clay which is acting as a barrier. The very low recharge suggests the water is sitting rather than flowing. This explains what appears to be an LNAPL plume that disappeared quickly as it was removed with bailing.

Three rounds of groundwater monitoring were undertaken. On 15 June 2023, locations GB1, GB2, GB3, GB4, and GB5 were sampled. GB6 and GB7 were installed during the site-wide soil sampling undertaken on 4 July 2023. The second round of groundwater monitoring was complete on 20 July 2023. Locations GB1, GB2, GB3, GB5, GB6 and GB7 were included in the second round. GB4 was not sampled – this is the location on the neighbouring residential property - as the owner of the property would not grant ES&D access. A third round of sampling occurred on the 4th of December 2023, locations GB1, GB2, GB3, GB5, GB6 and GB7. Sampling of GB 4 will occur soon as the owner has granted permission.

Samples were taken on all occasions using a clean water sampling bailer for each monitoring well, with sampled water decanted into ALS supplied bottles with preservative included where required for each parameter. The samples were placed into a chilled esky with freezer bricks and dispatched overnight to the ALS laboratory for analysis with the formal chain of custody documents included.

Results have been tabulated below and compared with the relevant NEPASCM guidelines as appropriate. Original laboratory reports and chain of custody documents are included in the appendices. A blind duplicate taken at GB3 was within acceptable ranges on a relative percent difference basis.

Figure 12 – Groundwater Monitoring Locations

Figure 11 also shows the locations of three TasWater assets – a 200 mm asbestos cement water main to the west (blue line), a 100 mm cast iron water main right on the boundary of the Site, and a 150 mm PVC-U sewer main along the eastern boundary of the Site (red line). The two water mains were located by Proctor Cable Locators and their depth was determined to be between 0.6 to 0.8 metres below ground level. Given the standing water level is greater than 2 metres below ground level, and both water mains are made from materials that resist chemicals, the risk to these mains is low, and they are unlikely to act as preferential pathways for contaminants.

The results show numerous exceedances of the Freshwater Groundwater Investigation Levels, however due to the distance to (freshwater) sensitive receptors being high, these exceedances pose little to no risk. Marine (saline) waters are further away still. These exceedances have therefore not been highlighted in the results tables. There was one exceedance of the commercial/industrial health screening levels for vapour intrusion, being for benzene in clay at between 2 to 4 metres below ground level for sample location GB1 for the 20 July sampling round. The value was 31,200 µg/L for benzene, against the HSL of 30,000 µg/L. For the 15 June sampling round, the benzene result at GB1 was 19,700 µg/L which is below the HSL. The results from the sampling completed on 4th December 2023 showed that the Benzene level at GB1 is now 8,710 µg/L - well below the commercial guideline levels. All other locations showed no exceedances, including the results at location GB4, which is within the residential lot, and was therefore compared with the residential HSLs.

In summary, there may be a hydrocarbon plume in the groundwater off the site to the north. Another round of GB4 sampling will confirm this. Following several rounds of purging dry the monitoring wells GB1, GB2, GB3, GB4 and the recently installed GB5, the light non-aqueous phase liquid is no longer evident at location GB1 where previously there was up to 700 mm found. Locations GB6 and GB7 along the eastern boundary were clean, with parameters near or below laboratory detection levels, indicating that the contamination does not extend off site to the east. These results also mean that the sewer line along the eastern boundary (as shown in Figure 12 – red line) and unconfirmed stormwater drain along the northeastern boundary are not within the contaminant plume, so the risk of them being preferential pathways is currently low. Similarly, the two water mains on the western boundary are located above the groundwater level (0.8 mBGL compared with groundwater at > 2.0 m BGL), so are unlikely to act as preferential pathways.

However, GB4 shows that the plume extends off site to the north into the residential site at 343 Westbury Road. Given the calculated flow is towards the east, but that there is also the potential for groundwater to flow towards the north based on topography, the groundwater well GB4 at 343 Westbury Road should be monitored and the risk reassessed if levels increase.

There are two drilling locations that were developed as groundwater monitoring wells that remain dry (GB5 dry and GB6 dry) and several locations where drilling met with refusal at approximately 2.5 metres, indicating that there is a shelf of rock through the central part of the Site. It was not possible to install further monitoring bores through the central part of the site because of the rock, without demolishing buildings to enable access to these locations with a larger drill rig. Soil sampling results in this central area showed no evidence of contamination down to the rock layer.

Based on parameters C6 – C10 and benzene, there is an almost tenfold decrease in levels from GB1 to GB3, which is approximately 7.5 m to the west. It is unlikely that the plume extends beyond Westbury Road to the west, given the drop in contaminant levels between GB1 and GB3 and the calculated groundwater flow is to the east. From GB1 to GB4 in 343 Westbury Road, there is a similar (tenfold) decrease in contaminant levels, so it is likely that the edge of the plume is currently within that property to the north. The owner is currently not granting access to his property so the installation of further monitoring wells at 343 Westbury Road to confirm this is not currently an option. The south of the Site is hydraulically upgradient to where the tanks were formerly located, so the groundwater is unlikely to be contaminated to the south. And GB6 and GB7 are relatively clean so it is highly likely that the edge of the plume is a small distance east of GB5, which is also displaying low levels of contamination.

Table 10 – Groundwater Monitoring Results – 15 June 2023

Parameter	Units	LOR	GB1	GB2	GB3	DUP	GB4	GB5	GW HSL A (Res.) 2 m - < 4 m CLAY	GW HSL D (C/I) 2 m - < 4 m CLAY	GILs Fresh Waters
Date			**15/06/2023**	**15/06/2023**	**15/06/2023**	**15/06/2023**	**15/06/2023**	**15/06/2023**			
Lead	µg/L	0.001	0.001	0.01	0.002	0.027	0.027	0.001			3.4
Total Petroleum Hydrocarbons											
C6 - C9 Fraction	µg/L	20	36000	39200	17300	15500	11800	2430			
C10 - C14 Fraction	µg/L	50	5760	9460	5130	7920	22600	1380			
C15 - C28 Fraction	µg/L	100	2820	600	260	430	25600	350			
C29 - C36 Fraction	µg/L	50	<50	<50	<50	<50	90	<50			
C10 - C36 Fraction (sum)	µg/L	50	8580	10100	5390	8350	48300	1730			
Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	µg/L	20	42700	41800	21200	19600	14300	2960			
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	10800	11600	8910	8950	5620	930			
>C10 - C16 Fraction	µg/L	100	4420	4680	2260	3500	25100	970			
>C16 - C34 Fraction	µg/L	100	1910	350	150	260	17300	230			
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100			
>C10 - C40 Fraction (sum)	µg/L	100	6330	5030	2410	3760	42400	1200			
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	3980	4310	1930	3140	24800	920			
BTEXN											
Benzene	µg/L	1	19700	9000	2390	2530	2750	563	5000	30000	950
Toluene	µg/L	2	2790	13300	183	166	534	67	NL	NL	
Ethylbenzene	µg/L	2	2050	2440	3580	3000	1480	202	NL	NL	
meta- & para-Xylene	µg/L	2	6280	4040	4820	3700	2750	856	NL	NL	200
ortho-Xylene	µg/L	2	1130	1390	1320	1250	1170	338	NL	NL	350
Total Xylenes	µg/L	2	7410	5430	6140	4950	3920	1190	NL	NL	
Sum of BTEX	µg/L	1	32000	30200	12300	10600	8680	2030			
Naphthalene	µg/L	5	438	373	334	355	294	48	NL	NL	16
Phenol	µg/L	1	127	13.6	5	6.4	6	2.8			320
2-Chlorophenol	µg/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			340
2.4-Dichlorophenol	µg/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			120
2.4.6-Trichlorophenol	µg/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			3
Pentachlorophenol	µg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0			3.6

Table 11 - Groundwater Monitoring Results – 20 July 2023

Parameter	Units	LOR	GB1	DUP (GB1)	GB2	GB3	GB5	GB6	GB7	GW HSL A (res) 2 m - < 4 m CLAY	GW HSL D (C/I) 2 m - < 4 m CLAY	GILs Fresh Waters
			20/07/2023	20/07/2023	20/07/2023	20/07/2023	20/07/2023	20/07/2023	20/07/2023			
Lead	µg/L	0.001	0.013	0.014	0.002	0.029	<0.001	0.003	0.001			3.4
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	51400	46900	40100	9280	8660	<20	<20			
C10 - C14 Fraction	µg/L	50	8140	7390	11400	8710	4050	<50	<50			
C15 - C28 Fraction	µg/L	100	680	520	720	950	610	130	<100			
C29 - C36 Fraction	µg/L	50	<50	<50	100	<50	<50	80	<50			
C10 - C36 Fraction (sum)	µg/L	50	8820	7910	12200	9660	4660	210	<50			
Total Recoverable Hydrocarbons - NEPM 2013 Fractions												
C6 - C10 Fraction	µg/L	20	53800	49200	43900	12200	9720	<20	<20			
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	6680	5660	12100	5710	3230	<20	<20			
>C10 - C16 Fraction	µg/L	100	4060	3630	5320	4550	2200	<100	<100			
>C16 - C34 Fraction	µg/L	100	440	340	480	570	370	180	<100			
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100	<100			
>C10 - C40 Fraction (sum)	µg/L	100	4500	3970	5800	5120	2570	180	<100			
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	3680	3260	4900	4390	1960	<100	<100			
BTEXN												
Benzene	µg/L	1	**31200**	28800	7950	1160	2540	<1	<1	5000	30000	950
Toluene	µg/L	2	4490	4170	15100	146	182	<2	<2	NL	NL	
Ethylbenzene	µg/L	2	2800	2610	2250	1120	1480	<2	<2	NL	NL	
meta- & para-Xylene	µg/L	2	7400	6810	4780	2880	2020	<2	<2	NL	NL	200
ortho-Xylene	µg/L	2	1230	1150	1730	1180	270	<2	<2	NL	NL	350
Total Xylenes	µg/L	2	8630	7960	6510	4060	2290	<2	<2	NL	NL	
Sum of BTEX	µg/L	1	47100	43500	31800	6490	6490	<1	<1			
Naphthalene	µg/L	5	376	374	425	162	245	<5	<5	NL	NL	16

Red indicates an exceedance

Figure 13 - Groundwater Monitoring Results 4/12/2023

			GB1	GB2	GB3	GB5	GB6	GB7	GW HSL A (Res) 2m-<4m CLAY	GW HSL D(C/I) 2m-<4m CLAY	GILs Fresh Water
			4/12/2023	4/12/2023	4/12/2023	4/12/2023	4/12/2023	4/12/2023			
Lead	mg/L	0.001	0.008	0.004	0.03	0.003	0.003	<0.001			3.4
Total Petroleum Hydrocarbons											
C6 - C9 Fraction	µg/L	20	15700	44800	5750	3740	<20	<20			
C10 - C14 Fraction	µg/L	50	5310	7240	4550	3150	<50	<50			
C15 - C28 Fraction	µg/L	100	4090	820	530	2180	<100	<100			
C29 - C36 Fraction	µg/L	50	<50	<50	<50	60	<50	<50			
C10 - C36 Fraction (sum)	µg/L	50	9400	8060	5080	5390	<50	<50			
Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	µg/L	20	16000	46700	7420	4490	<20	<20			
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	3030	13200	3310	1410	<20	<20			
>C10 - C16 Fraction	µg/L	100	5180	3470	2430	2820	<100	<100			
>C16 - C34 Fraction	µg/L	100	2420	500	300	1350	<100	<100			
>C34 - C40 Fraction	µg/L	100	<100	<100	<100	<100	<100	<100			
>C10 - C40 Fraction (sum)	µg/L	100	7600	3970	2730	4170	<100	<100			
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	5060	2940	2200	2710	<100	<100			
BTEXN											
Benzene	µg/L	1	8710	5520	900	336	<1	<1	5000	30,000	950
Toluene	µg/L	2	868	12200	87	257	<2	<2	NL	NL	
Ethylbenzene	µg/L	2	849	2480	1050	667	<2	<2	NL	NL	
meta- & para-Xylene	µg/L	2	2260	8970	1510	1170	<2	<2	NL	NL	200
ortho-Xylene	µg/L	2	279	4310	560	653	<2	<2	NL	NL	350
Total Xylenes	µg/L	2	2540	13300	2070	1820	<2	<2	NL	NL	
Sum of BTEX	µg/L	1	13000	33500	4110	3080	<1	<1			
Naphthalene	µg/L	5	122	528	225	107	8	<5	NL	NL	16

6 Summary of Results

6.1 QA/QC report

ALS produces a QC report with each certificate of analysis. They provide a laboratory duplicate (DUP), method blank (MB), laboratory control spike (LCS) and matrix spike (MS) report. The results of these reports are shown below in Table 12.

Table 12 – ALS QA/QC

ALS Report	*Date*	*MB*	*DUP*	*LC*	*MS*	*SR*	*AHT*	*FQCS*
EM2306486	19/4/23	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers
EM2307466	2/5/23	No outliers	No outliers	No outliers	One outlier – see below (1)	No outliers	No outliers	No outliers
EM2309205	29/5/23	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers	One outlier (2)
EM2310922	21/6/23	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers
EM2312226	12/7/23	No outliers	One outlier (3)	No outliers	3 outliers (4)	No outliers	No outliers	No outliers
EM2313201	26/7/23	No outliers	No outliers	No outliers	No outliers	No outliers	No outliers	Outliers (5)

Key: MB =Method Blank, DUP = Duplicate, LC = Laboratory Control, MS = Matrix Spike, SR = Surrogate Recovery, AHT = Analysis Holding Time, FQCS = Frequency of Quality Control Samples

1. Matrix Spike (MS) Recoveries, EM2307466--002 BH5-2.0 ---- Recovery greater than upper data quality objective, EP080/071: Total Petroleum Hydrocarbons C10 - C14 Fraction 126 % (acceptable range 71.2-125%)

2. Quality Control Samples, PAH/Phenols QC samples:1, regular: 13 Actual: 7.69% Expected: 10%.

3. Duplicate TP4-0.45, Chromium RPD 39.7%, exceeds range of 0 – 20%

4. Matrix Spike (MS) Recoveries, EM2312226--002 HA1-2.2, Recovery less than lower data quality objective; EG005(ED093)T: Arsenic 63.5 % (78.0-124%); EM2312198--002 Anonymous, MS recovery not determined, background level greater than or equal to 4x spike level; Not Determined Arsenic, EM2312198--002 Anonymous, Recovery less than lower data quality objective, EG035T: Total Recoverable Mercury 28.4 % versus range 76.0-116%.

5. Quality Control Samples, Laboratory Duplicates (DUP), PAH/Phenols QC samples: 0 Regular: 12 Actual: 0% Expected: 10%; TRH - Semivolatile Fraction QC: 0 Regular: 14 Actual: 0% Expected: 10%.

Field duplicates were taken at a rate of more than one duplicate per 20 samples.

RPD Formula

The following formula is used to calculate a relative percent difference (RPD.)

$$RPD\ (\%) = [X2-X1]/[[X2+X1]/2]*100$$

A field duplicate of sample T4-1 was taken but as there was less than results for all parameters in one or both samples, an RPD % could not be calculated. Field Duplicate 2 (FD2) was a duplicate of T1 W sample. Due to low homogeneity in the pit soil, this duplicate failed the RPD % test – see below.

Field duplicates for T3-2, WB-B, BH5-1.0, were also taken, and all results were less than detection in all samples.

Parameter	Units	LOR	TP2-0.4	DUP2 (TP2-0.4)	RPD (%)
Lead	mg/kg	5	11	13	17%
Chromium	mg/kg	2	174	124	-34%
Lead	mg/kg	5	11	13	17%
Nickel	mg/kg	2	4	4	0%
Zinc	mg/kg	5	8	20	86%

Parameter	Units	LOR	GB7-7	DUP1 (GB7-7)	RPD (%)
Chromium	mg/kg	2	47	52	10%

Parameter	Units	LOR	GB3	DUP	RPD (%)
Date			**15/06/2023**	**15/06/2023**	
Lead	µg/L	0.001	0.002	0.027	172%
Total Petroleum Hydrocarbons					
C6 - C9 Fraction	µg/L	20	17300	15500	-11%
C10 - C14 Fraction	µg/L	50	5130	7920	43%
C15 - C28 Fraction	µg/L	100	260	430	49%
C29 - C36 Fraction	µg/L	50	<50	<50	
C10 - C36 Fraction (sum)	µg/L	50	5390	8350	43%
Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	µg/L	20	21200	19600	-8%
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	8910	8950	0%
>C10 - C16 Fraction	µg/L	100	2260	3500	43%
>C16 - C34 Fraction	µg/L	100	150	260	54%
>C34 - C40 Fraction	µg/L	100	<100	<100	
>C10 - C40 Fraction (sum)	µg/L	100	2410	3760	44%
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	1930	3140	48%
BTEXN					
Benzene	µg/L	1	2390	2530	6%
Toluene	µg/L	2	183	166	-10%
Ethylbenzene	µg/L	2	3580	3000	-18%
meta- & para-Xylene	µg/L	2	4820	3700	-26%
ortho-Xylene	µg/L	2	1320	1250	-5%
Total Xylenes	µg/L	2	6140	4950	-21%
Sum of BTEX	µg/L	1	12300	10600	-15%
Naphthalene	µg/L	5	334	355	6%
Phenol	µg/L	1	5	6.4	25%

Parameter	Units	LOR	GB1	DUP (GB1)	RPD (%)
			20/07/2023	20/07/2023	
Lead	µg/L	0.001	0.013	0.014	7%
Total Petroleum Hydrocarbons					
C6 - C9 Fraction	µg/L	20	51400	46900	-9%
C10 - C14 Fraction	µg/L	50	8140	7390	-10%
C15 - C28 Fraction	µg/L	100	680	520	-27%
C29 - C36 Fraction	µg/L	50	<50	<50	
C10 - C36 Fraction (sum)	µg/L	50	8820	7910	-11%
Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	µg/L	20	53800	49200	-9%
C6 - C10 Fraction minus BTEX (F1)	µg/L	20	6680	5660	-17%
>C10 - C16 Fraction	µg/L	100	4060	3630	-11%
>C16 - C34 Fraction	µg/L	100	440	340	-26%
>C10 - C40 Fraction (sum)	µg/L	100	4500	3970	-13%
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	100	3680	3260	-12%
BTEXN					
Benzene	µg/L	1	31200	28800	-8%
Toluene	µg/L	2	4490	4170	-7%
Ethylbenzene	µg/L	2	2800	2610	-7%
meta- & para-Xylene	µg/L	2	7400	6810	-8%
ortho-Xylene	µg/L	2	1230	1150	-7%
Total Xylenes	µg/L	2	8630	7960	-8%
Sum of BTEX	µg/L	1	47100	43500	-8%
Naphthalene	µg/L	5	376	374	-1%

6.2 Exceedances - Soil

A summary of exceedances of relevant soil investigation levels remaining at the site follows.

Table 13 – Exceedances, Management Limits, Soil

Parameter	Units	T1 W	B3 (T3B)	Management limits C/I -Coarse soil	Management limits C/I -Fine soil
VOC field reading	ppm	3000	1660		
Odour	-	Yes	Yes		
Sample depth	m	3.4m	5m		
Description	-	Blue-grey clay	Grey, brown clay		
Location	-	Tank 1 pit	Tank 3 pit		
C6 - C10 Fraction	mg/kg	**2290**	**2150**	700	800
>C10 - C16 Fraction	mg/kg	**860**	50	1000	1000

Exceedances of management limits are present at the base of pit 1 which formerly contained the three petrol tanks in the southern cluster at the site. Further excavation at each location was not practical for the following reasons:

- Location T1W is near TasWater services in Westbury Road. Further excavation at that location could potentially undermine those services, and that risk is considered higher than the risk posed by the exceedances, which are in clay at a depth of over 3 metres below ground level. The risk to services is low as they are less than 1 metre below ground level and are not beneath the standing water level.

- Location T3B is near the building. Further excavation at that location could not be undertaken due to the risk of building subsidence.

In addition, the excavated pit was left open after tank removal and sampling for as long as possible while ES&D awaited results to enable decision making. Given the excavation was not benched, which was not possible due to room, it was important to backfill the pit before the wet season to avoid the risk of pit collapse.

The risk posed by these exceedances is the transfer of petroleum hydrocarbons to the groundwater and subsequently posing a vapour risk at ground level. Monitoring of groundwater at the site will help in understanding the ongoing risk posed by these exceedances and determine if mitigation of the risk is required. ES&D currently considers that the risk associated with these exceedances is low, due to the depth and nearby groundwater results (at GB2) indicating a low risk associated with vapour.

Table 14 – Exceedances, Ecological screening levels, Soil

Parameter	Units	T3E	T5E	TP9 1.0m	T4-3	BH5-2.0	ESLs C/I - Coarse soil	ESLs C/I - Fine soil
VOC field reading	ppm	780	2	14.8	40.6	0		
Odour	-	Yes	No	No	Slight	Nil		
Sample depth	m	5m	3.5m	1.0	0.75	2.00		
Description	-	Grey /brown clay	Grey clay and sand	Grey/ orange mottled clay, high plasticity	Light brown sandy clay, crumbly	Silty clay, red brown with grey mottle, medium plasticity, no odour or staining		
Location	-	Tank 3 pit	Tank 5 pit		----			
C6 - C10 Fraction	mg/kg	**277**	66	**302**	141	28	215	215
>C10 - C16 Fraction	mg/kg	120	**490**	**170**	**220**	**580**	170	170
>C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	120	**490**	160	**220**	**580**	170	170

There are also some exceedances of ecological screening levels in the soil as outlined in Table 14. These exceedances are low risk, as the distance to sensitive receptors is more than 900 metres, being minor tributaries of both Dalrymple Creek and Kings Meadow Rivulet.

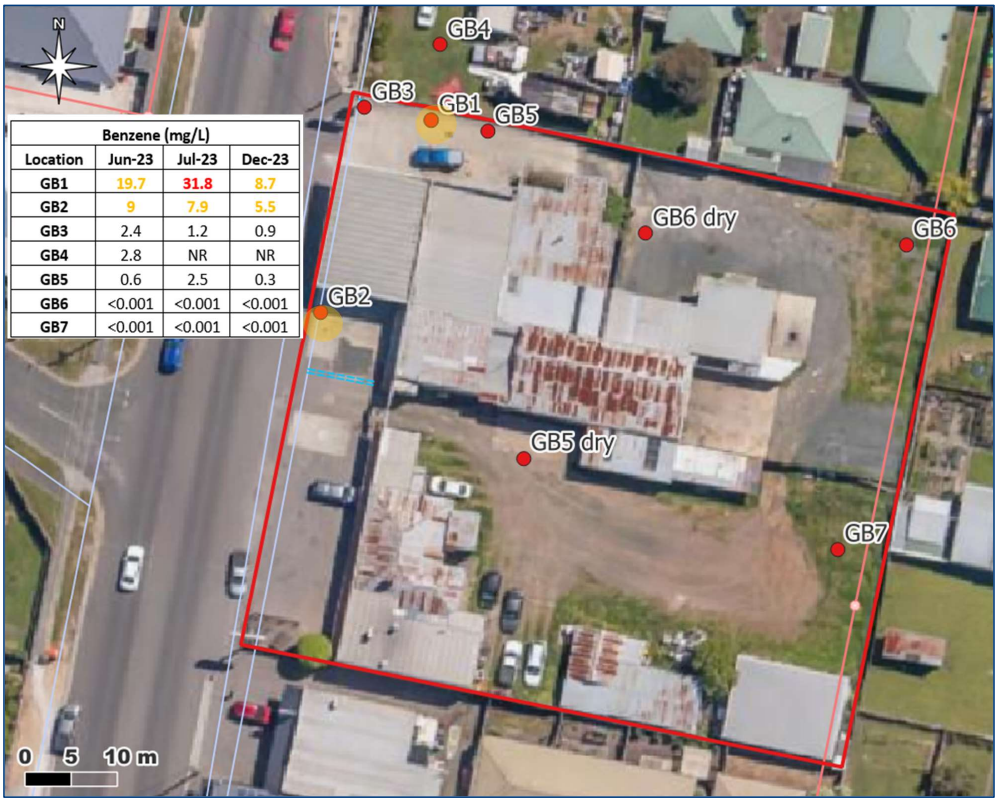
All the exceedances in the soil are in and around where the underground petroleum storage systems were previously located. There are no exceedances of relevant NEPASCM levels in the soil relating to other activities at the Site.

6.3 Exceedances – Groundwater

A summary of exceedances of relevant groundwater investigation levels remaining at the site follows.

Parameter	Units	LOR	GB1	GB2	GW HSL A (res) 2 m - < 4 m CLAY	GW HSL D (C/I) 2 m - < 4 m CLAY	GILs Fresh Waters
			4/12/2023				
Benzene	µg/L	1	8710	5520	5000	30000	950

There were no exceedances of the commercial Industrial Levels (HSL'D) and so the site is suitable for the proposed development. There were 2 exceedance of the groundwater health screening level for Residential Sites at location GB1 & GB2 for benzene for the sampling round undertaken on 4th of December 2023. For the previous sampling round there were exceedances. There were also exceedances of the groundwater investigation levels for fresh waters, and as mentioned above these are not considered a risk due to the distance to sensitive receptor being more than 900 metres. A risk remains to the residential property to the north of the site at 1/343 Westbury Road, that the hydrocarbon contamination could be moving towards the residence and pose a future vapour risk. The groundwater should be monitored to assess this potential risk - currently considered low confirmed by previous vapour testing through the concrete slab of the residence. See Figure 14 for comparison with HSL-A and HSL-D levels.



Benzene (mg/L)			
Location	Jun-23	Jul-23	Dec-23
GB1	19.7	31.8	8.7
GB2	9	7.9	5.5
GB3	2.4	1.2	0.9
GB4	2.8	NR	NR
GB5	0.6	2.5	0.3
GB6	<0.001	<0.001	<0.001
GB7	<0.001	<0.001	<0.001

Figure 14 – Groundwater results versus HSL-A and HSL-D

Key:

	GW above HSL A (residential) – 5 mg/L
	GW above HSL D (commercial) – 30 mg/L

7 Conclusions

Conclusions are as follows:

- As the soil and groundwater onsite are below the HSL'D' levels for commercial / Industrial sites, the site is suitable for its proposed use. No further onsite remediation is required. The required management measures are to check vapour during excavation and all soil removed from the site must be tested and disposed of appropriately.
- There remain some exceedances of management limits in soils at the former tank location where tanks 1 to 3 were located. The exceedances are in the base of the pit and the risk of remediation by removal of soil is outweighed by the risk to nearby services and existing buildings subsidence, so remediation is not recommended. The on-going risk of these exceedances can be managed by monitoring the groundwater at the site monthly for six months, to ensure levels of hydrocarbons in the groundwater at the Site are decreasing.
- Exceedances of ecological screening levels in soils pose low risk to sensitive receptors due to distance, and further management is not required. The NEPASCM does not recommend management for ecological receptors on Commercial properties.
- There two exceedances of benzene (Residential) health screening levels at groundwater monitoring location GB1 & GB2 during the December 2023 sampling round. The groundwater should be monitored to ensure the levels are decreasing by natural attenuation. Future monitoring should include at location GB4 which is in the residential property to the north to continue to monitor the risk to the residence.
- The natural attenuation monitoring should be documented in a Remediation Action Plan and certified by a suitably qualified person that implementation of the plan will be sufficient to ensure that the Site is suitable for the proposed ongoing use and the risk to human health and the environment is low.

8 Recommendations

ES&D recommends that the Site is suitable for intended commercial use and does not pose an unacceptable risk to public health or the environment in accordance with the *Contaminated Land Code* C14.5 and C14.6.

It is noted from the civil engineer that excavation across the site will be no more than 1.5 metres below ground level (m BGL) for all works except for the building foundations that will be to approximately 3 m BGL. The acoustic fence will require excavation no deeper than 2 m BGL. Excavation to these depths are low risk as the groundwater plume and associated residual soil contamination is below 2 m BGL. The proposed building location, with excavation to a depth of 3 m BGL, is well away from and upgradient from the groundwater plume, so excavation in that location

is low risk. A copy of an email from the Civil Engineer is included in the appendices. **Excavation** on the site can proceed with the management measure specified below.

The development can proceed with the following management measures:

- Encountering petroleum-based hydrocarbon contamination during excavation at the site is unlikely, but during excavation, if odour or discolouration is detected, re-assess with a PID meter. If vapour is detected, management will need to be upgraded to manage risk to subsurface workers during the excavation. Standard excavation type PPE is required.
- Continued monitoring of onsite bores is required as part of a remediation action plan (RAP) which is to be developed and certified by a suitably qualified person. This will be sufficient to manage the risk to offsite receptors. Implementation of the RAP will ensure that the offsite impacts are managed.

The site is suitable for commercial development, provided the above management measures are implemented. An updated site conceptual model has been included below.

The assessment has been completed in accordance with the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* as amended.

Yours sincerely,

_____

Rod Cooper BSc., CEnvP Site Contamination

Principal Consultant ES&D

Contamination Source	COPC	Pathway	Receptor
On site activities, former fuel storage **Primary Source**	• Petroleum hydrocarbons • BTEXN	Vapour inhalation of COPC in surface soils **Low risk – use of PPE and PID meter during excavation as required**	• Subsurface workers • Future Site users • Nearby residents
	• Heavy metals (lead) and others • Petroleum hydrocarbons • PAH • BTEXN	Dermal contact/ingestion of COPC in surface soils **Low risk – use of PPE and PID meter during excavation as required**	• Subsurface workers • Future Site users • Nearby residents
	• Heavy metals (lead) and others • Petroleum hydrocarbons • PAH • BTEXN	Migration into soil and groundwater and subsequent ingestion/dermal contact or inhalation of COPC **Low risk – monthly monitoring of groundwater for six months, then review.**	• Subsurface workers • Future Site users • Tributary of Dalrymple Creek, Kings Meadows Rivulet, urban waterways • Transient wildlife
Hydrocarbon plume in groundwater, UPSS at nearby service station **Secondary Source**	• Petroleum hydrocarbons • BTEXN	Vapour inhalation from hydrocarbon plume **Low risk – monthly monitoring of groundwater for six months, then review**	• Subsurface workers • Future Site users • Nearby residents

9 References

Tasmanian Planning Scheme - Potentially Contaminated Land Code

Land Information System Tasmania (TheLIST), www.thelist.tas.gov.au

Department of Primary Industries, Parks, Water and Environment (DPIPWE) Groundwater Information Access Portal: http://wrt.tas.gov.au/groundwater-info/,

McCLENAGHAN, M.P. and VICARY, M.J. 2010. Digital Geological Atlas 1:25 000 Scale Series.

National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended April 11, 2013 (NEPASCM)

CRC CARE *Technical Report No. 10 "Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater Part 2: Application Document"*

AS 4482.1 (2005) Guide to the Sampling and Investigation of Potentially Contaminated Soil - Part 1: Non-Volatile and Semi Volatile Compounds

AS 5667.11 (1998) Water quality – Sampling Part 11: Guidance on Sampling of Groundwaters

10 Appendices

10.1 Groundwater flow direction modelling

10.1.1 Groundwater Monitoring Bore Installation & Monitoring Report, Hydro Earth Consulting, February 2022

Building on the previous work undertaken at the site, which identified the likely contaminant source to be leaking filler lines in two of the underground petroleum storage systems (UPSS), Hydro Earth recommended locations for two additional groundwater monitoring bores and subsequently installed the bores in November 2021. Their resulting report details:

- Drilling and bore construction details.
- Further groundwater monitoring results.
- Revised groundwater flow direction assessment.
- Revised assessment of the potential contaminant source.
- Recommendations for further work.

The groundwater monitoring network monitored by Hydro Earth now included the two existing bores, installed earlier by Greencap (GW01/GB1 and GW02/GB2) plus two additional monitoring locations. GB3 was installed to the west of GB1 through the same concrete pad. GB4 was installed downslope off site in a property to the north. These locations are shown in Figure 15 below.

Figure 15 – Groundwater monitoring wells GB1 – GB4

Hydro Earth was able to calculate the groundwater flow direction by surveying and triangulating now that there are four monitoring bores at the site/neighbouring site. Their calculations indicated that groundwater could be flowing towards the east/southeast. Figure 16 and Figure 17 below shows the Hydro Earth calculations with calculated groundwater flow path and detailed contours/topography, which aligns with the calculated flow path.

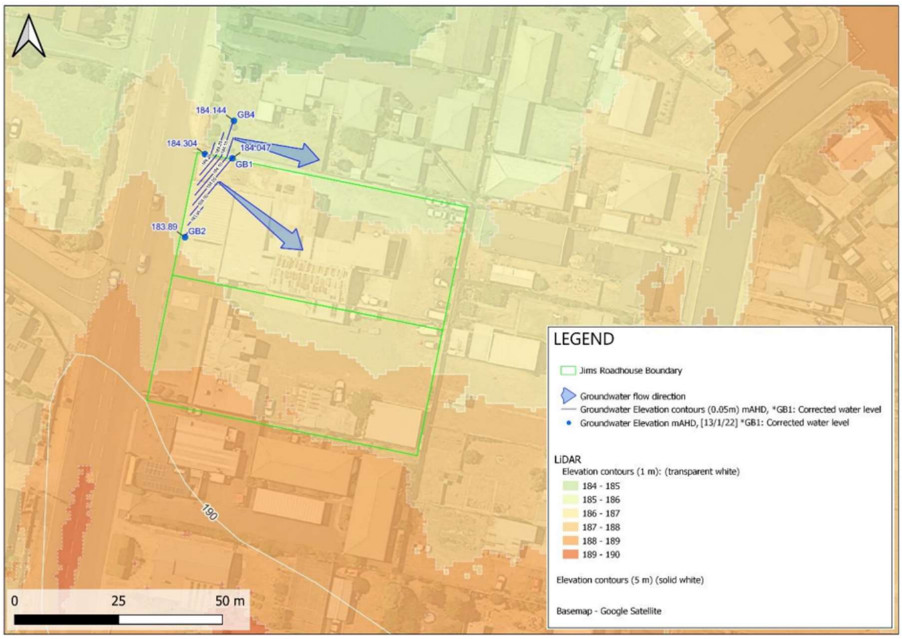


Figure 16 – Calculated Groundwater Flow direction

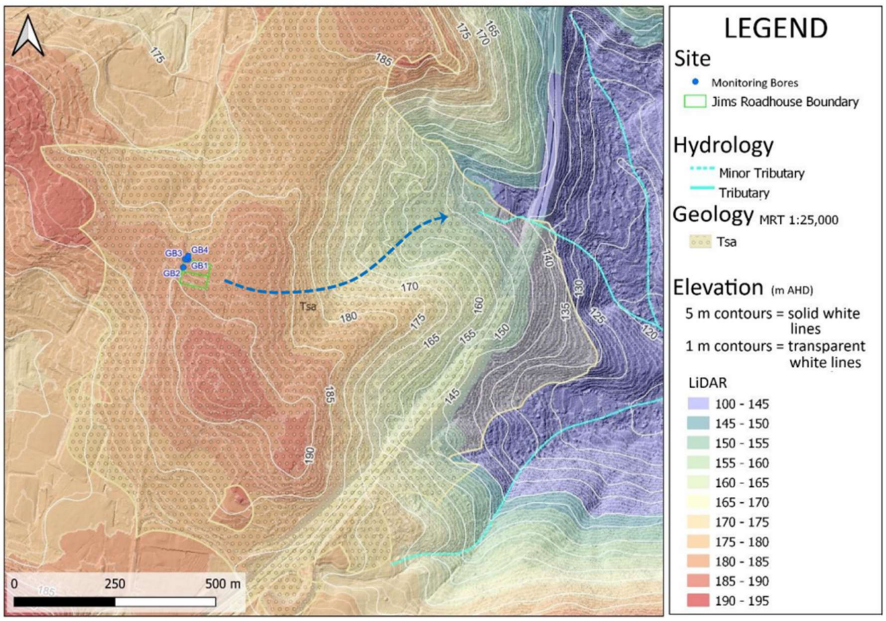


Figure 17 – Conceptualised groundwater flow (dashed blue line) within the (Tsa) sediments

10.2 Analytical results

CERTIFICATE OF ANALYSIS

Work Order	: **EM2306486**	Page	: 1 of 11
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: Jims Roadhouse - Prospect	Date Samples Received	: 13-Apr-2023 12:45
Order number	: 7936	Date Analysis Commenced	: 14-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 17:10
Sampler	: ROYCE ALDRED		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 24		
No. of samples analysed	: 24		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

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Work Order : EM2306486
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : Jims Roadhouse - Prospect

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP3-1	TP3-2	TP3-3	TP3-4	TP3-5
			Sampling date / time	12-Apr-2023 13:29	12-Apr-2023 13:33	12-Apr-2023 13:27	12-Apr-2023 13:41	12-Apr-2023 13:45
Compound	CAS Number	LOR	Unit	EM2306486-001	EM2306486-002	EM2306486-003	EM2306486-004	EM2306486-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**25.6**	**22.1**	**16.5**	**26.3**	**24.2**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**8**	**46**	**16**	**7**	**6**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	**120**	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**120**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**180**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**100**	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	**280**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**90.1**	**94.0**	**78.1**	**92.7**	**94.2**
Toluene-D8	2037-26-5	0.2	%	**87.9**	**87.8**	**72.1**	**84.2**	**89.0**
4-Bromofluorobenzene	460-00-4	0.2	%	**89.5**	**94.3**	**79.7**	**86.4**	**95.6**

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Work Order : EM2306486
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : Jims Roadhouse - Prospect

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP3-6	TP3-7	TP3-8	TP3-9	TP3-10
			Sampling date / time	12-Apr-2023 13:48	12-Apr-2023 13:52	12-Apr-2023 13:55	12-Apr-2023 14:00	12-Apr-2023 14:04
Compound	CAS Number	LOR	Unit	EM2306486-006	EM2306486-007	EM2306486-008	EM2306486-009	EM2306486-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**25.4**	**19.1**	**18.4**	**10.6**	**20.5**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**7**	**7**	**14**	**12**	**8**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**88.2**	**85.8**	**85.1**	**102**	**90.3**
Toluene-D8	2037-26-5	0.2	%	**81.2**	**71.1**	**74.0**	**89.5**	**87.5**
4-Bromofluorobenzene	460-00-4	0.2	%	**83.2**	**81.9**	**79.4**	**97.2**	**83.1**

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Work Order : EM2306486
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : Jims Roadhouse - Prospect

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP3-11	TP3-12	TP3-13	TP4-1	TP4-2
			Sampling date / time	12-Apr-2023 14:08	12-Apr-2023 14:13	12-Apr-2023 14:13	12-Apr-2023 14:20	12-Apr-2023 14:27
Compound	CAS Number	LOR	Unit	EM2306486-011	EM2306486-012	EM2306486-013	EM2306486-014	EM2306486-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.3**	**25.5**	**28.0**	**20.6**	**19.4**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**10**	**8**	**8**	**----**	**----**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	**----**	**----**	**----**	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**----**	**----**	**----**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**----**	**----**	**----**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	**25**
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	**120**
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	**110**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	**230**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	**37**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	**37**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP3-11	TP3-12	TP3-13	TP4-1	TP4-2
				Sampling date / time	12-Apr-2023 14:08	12-Apr-2023 14:13	12-Apr-2023 14:13	12-Apr-2023 14:20	12-Apr-2023 14:27
Compound	CAS Number	LOR	Unit		EM2306486-011	EM2306486-012	EM2306486-013	EM2306486-014	EM2306486-015
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	**110**
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	**140**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	**250**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	**110**
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	----	----	**86.5**	**92.9**
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	----	**100**	**105**
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	----	**80.4**	**95.8**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	----	**84.2**	**86.9**
Anthracene-d10	1719-06-8	0.5	%		----	----	----	**92.4**	**92.6**
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	----	**90.2**	**91.4**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**96.5**	**77.2**	**75.1**	**94.4**	**80.4**
Toluene-D8	2037-26-5	0.2	%		**91.5**	**68.6**	**68.3**	**83.9**	**72.8**
4-Bromofluorobenzene	460-00-4	0.2	%		**86.9**	**75.7**	**79.1**	**82.1**	**79.4**

Page : 7 of 11
Work Order : EM2306486
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : Jims Roadhouse - Prospect

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP4-3	TP4-4	TP4-5	DUP	SP3-1
			Sampling date / time	12-Apr-2023 14:33	12-Apr-2023 14:42	12-Apr-2023 14:53	12-Apr-2023 00:00	12-Apr-2023 15:09
Compound	CAS Number	LOR	Unit	EM2306486-016	EM2306486-017	EM2306486-018	EM2306486-019	EM2306486-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**11.7**	**24.9**	**26.8**	**23.0**	**16.7**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**----**	**----**	**----**	**13**	**23**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**1.8**	<0.5	<0.5	**----**	**----**
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**1.8**	<0.5	<0.5	**----**	**----**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**----**	**----**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	**76**	**20**	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	**270**	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	**100**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**270**	<50	<50	<50	**100**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	**141**	**36**	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	**135**	**35**	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP4-3	TP4-4	TP4-5	DUP	SP3-1
				Sampling date / time	12-Apr-2023 14:33	12-Apr-2023 14:42	12-Apr-2023 14:53	12-Apr-2023 00:00	12-Apr-2023 15:09
Compound	CAS Number	LOR	Unit		EM2306486-016	EM2306486-017	EM2306486-018	EM2306486-019	EM2306486-020
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C10 - C16 Fraction	----	50	mg/kg		**220**	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	**130**
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**220**	<50	<50	<50	**130**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		**220**	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		**1.5**	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		**4.3**	**0.8**	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		**5.8**	**0.8**	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		**4.3**	**0.8**	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		**3**	**1**	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**80.3**	**94.3**	**83.1**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**99.0**	**96.2**	**94.4**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**85.9**	**87.7**	**81.7**	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**84.8**	**85.8**	**84.6**	----	----
Anthracene-d10	1719-06-8	0.5	%		**89.9**	**91.4**	**93.0**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**78.4**	**89.4**	**89.6**	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**88.6**	**93.1**	**72.8**	**98.0**	**93.5**
Toluene-D8	2037-26-5	0.2	%		**86.7**	**87.9**	**63.6**	**96.2**	**85.3**
4-Bromofluorobenzene	460-00-4	0.2	%		**82.8**	**89.2**	**66.6**	**93.0**	**89.2**

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Work Order : EM2306486
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : Jims Roadhouse - Prospect

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SP3-2	SP4-1	SP4-2	DUP2	----
			Sampling date / time	12-Apr-2023 15:11	12-Apr-2023 15:12	12-Apr-2023 15:14	12-Apr-2023 00:00	----
Compound	CAS Number	LOR	Unit	EM2306486-021	EM2306486-022	EM2306486-023	EM2306486-024	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**21.9**	**17.6**	**21.5**	**20.2**	**----**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**32**	**----**	**----**	**----**	**----**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Acenaphthylene	208-96-8	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Acenaphthene	83-32-9	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Fluorene	86-73-7	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Phenanthrene	85-01-8	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Anthracene	120-12-7	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Fluoranthene	206-44-0	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Pyrene	129-00-0	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Benz(a)anthracene	56-55-3	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Chrysene	218-01-9	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	**----**	<0.5	<0.5	<0.5	**----**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**----**	**0.6**	**0.6**	**0.6**	**----**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**----**	**1.2**	**1.2**	**1.2**	**----**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	**11**	<10	**29**	<10	**----**
C10 - C14 Fraction	----	50	mg/kg	**120**	<50	**60**	<50	**----**
C15 - C28 Fraction	----	100	mg/kg	**1260**	**110**	**320**	**120**	**----**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	**----**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**1380**	**110**	**380**	**120**	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	**18**	<10	**51**	<10	**----**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	**18**	<10	**50**	<10	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SP3-2	SP4-1	SP4-2	DUP2	----
			Sampling date / time	12-Apr-2023 15:11	12-Apr-2023 15:12	12-Apr-2023 15:14	12-Apr-2023 00:00	----
Compound	CAS Number	LOR	Unit	EM2306486-021	EM2306486-022	EM2306486-023	EM2306486-024	--------
				Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C10 - C16 Fraction	----	50	mg/kg	**540**	**60**	**130**	<50	----
>C16 - C34 Fraction	----	100	mg/kg	**900**	**140**	**260**	**160**	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**1440**	**200**	**390**	**160**	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	**540**	**60**	**130**	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	**1.4**	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	**1.4**	<0.2	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	**1.4**	<0.5	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	**2**	<1	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	**99.2**	**78.1**	**87.2**	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	**104**	**92.4**	**95.6**	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	**91.7**	**83.9**	**90.4**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	**89.5**	**82.3**	**86.0**	----
Anthracene-d10	1719-06-8	0.5	%	----	**94.4**	**89.3**	**92.4**	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	**94.1**	**88.4**	**94.6**	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**99.6**	**88.8**	**86.3**	**93.8**	----
Toluene-D8	2037-26-5	0.2	%	**94.1**	**81.7**	**82.5**	**90.7**	----
4-Bromofluorobenzene	460-00-4	0.2	%	**91.4**	**83.9**	**81.3**	**89.2**	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

CERTIFICATE OF ANALYSIS

Work Order	: **EM2307466**	Page	: 1 of 5
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 7936	Date Samples Received	: 28-Apr-2023 11:15
Order number	: 7936	Date Analysis Commenced	: 29-Apr-2023
C-O-C number	: ----	Issue Date	: 02-May-2023 15:31
Sampler	: ROYCE ALDRED		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP071: EM2307466_002 Higher than expected matrix spike recovery due to sample matrix. Confirmed by re-extraction and re-analysis.

Page : 3 of 5
Work Order : EM2307466
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH5-1.0	BH5-2.0	BH5-3.0	BH5-4.0	DUP
			Sampling date / time	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00
Compound	CAS Number	LOR	Unit	EM2307466-001	EM2307466-002	EM2307466-003	EM2307466-004	EM2307466-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**28.8**	**22.2**	**13.8**	**29.6**	**23.6**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	**14**	<10	**14**	<10
C10 - C14 Fraction	----	50	mg/kg	<50	**310**	**80**	**90**	<50
C15 - C28 Fraction	----	100	mg/kg	<100	**660**	**190**	**230**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	**970**	**270**	**320**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	**28**	<10	**25**	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	**28**	<10	**25**	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	**580**	**140**	**150**	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	**390**	**120**	**190**	<100

Page : 4 of 5
Work Order : EM2307466
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH5-1.0	BH5-2.0	BH5-3.0	BH5-4.0	DUP
				Sampling date / time	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307466-001	EM2307466-002	EM2307466-003	EM2307466-004	EM2307466-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	**970**	**260**	**340**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	**580**	**140**	**150**	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**97.4**	**96.1**	**97.2**	**93.6**	**96.7**
2-Chlorophenol-D4	93951-73-6	0.5	%		**95.9**	**94.6**	**95.8**	**95.3**	**97.2**
2.4.6-Tribromophenol	118-79-6	0.5	%		**79.7**	**83.3**	**84.1**	**78.6**	**79.2**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**104**	**91.8**	**103**	**102**	**102**
Anthracene-d10	1719-06-8	0.5	%		**105**	**107**	**106**	**105**	**104**
4-Terphenyl-d14	1718-51-0	0.5	%		**108**	**110**	**115**	**122**	**107**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**94.3**	**89.6**	**71.0**	**92.4**	**93.5**
Toluene-D8	2037-26-5	0.2	%		**82.4**	**77.5**	**74.9**	**84.0**	**84.5**
4-Bromofluorobenzene	460-00-4	0.2	%		**91.4**	**86.8**	**81.7**	**93.4**	**89.7**

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

CERTIFICATE OF ANALYSIS

Work Order	: **EM2309205**	Page	: 1 of 9
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 7936	Date Samples Received	: 23-May-2023 11:25
Order number	: 7936	Date Analysis Commenced	: 25-May-2023
C-O-C number	: ----	Issue Date	: 29-May-2023 17:07
Sampler	: ROYCE ALDRED		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Sanjay Parekh	LCMS Coordinator	Melbourne Inorganics, Springvale, VIC
Sanjay Parekh	LCMS Coordinator	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP071: EM2309205-004 sample TRH results were confirmed by re-analysis.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

Page : 3 of 9
Work Order : EM2309205
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SUMP-B	SUMP-N	DUP	SUMP-W	SUMP-E
			Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00
Compound	CAS Number	LOR	Unit	EM2309205-001	EM2309205-002	EM2309205-003	EM2309205-004	EM2309205-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**18.7**	**16.8**	**18.9**	**19.8**	**21.1**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**10**	**6**	**8**	**15**	**10**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Page : 4 of 9
Work Order : EM2309205
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SUMP-B	SUMP-N	DUP	SUMP-W	SUMP-E
				Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00
Compound	CAS Number	LOR	Unit		EM2309205-001	EM2309205-002	EM2309205-003	EM2309205-004	EM2309205-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	**50**	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**50**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	**50**	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**101**	**100.0**	**86.8**	**96.4**	**84.8**
2-Chlorophenol-D4	93951-73-6	0.5	%		**92.3**	**96.0**	**100**	**91.0**	**106**
2.4.6-Tribromophenol	118-79-6	0.5	%		**75.4**	**79.3**	**65.4**	**79.0**	**75.5**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**98.7**	**97.8**	**90.8**	**99.6**	**102**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SUMP-B	SUMP-N	DUP	SUMP-W	SUMP-E
				Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00
Compound	CAS Number	LOR	Unit		EM2309205-001	EM2309205-002	EM2309205-003	EM2309205-004	EM2309205-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	0.5	%		**111**	**114**	**110**	**109**	**119**
4-Terphenyl-d14	1718-51-0	0.5	%		**106**	**108**	**98.3**	**101**	**108**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**87.6**	**87.3**	**86.8**	**91.5**	**88.8**
Toluene-D8	2037-26-5	0.2	%		**77.4**	**75.8**	**77.8**	**81.5**	**80.4**
4-Bromofluorobenzene	460-00-4	0.2	%		**85.8**	**83.4**	**86.5**	**89.2**	**87.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SUMP-S	WB-B	TIT-B	SP	----
			Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	----
Compound	CAS Number	LOR	Unit	EM2309205-006	EM2309205-007	EM2309205-008	EM2309205-009	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**20.3**	**20.8**	**24.6**	**14.5**	**----**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**8**	**8**	**9**	**12**	**----**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----

Page : 7 of 9
Work Order : EM2309205
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SUMP-S	WB-B	TIT-B	SP	----
				Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	----
Compound	CAS Number	LOR	Unit		EM2309205-006	EM2309205-007	EM2309205-008	EM2309205-009	--------
					Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**99.4**	**98.4**	**103**	**96.6**	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**94.5**	**90.6**	**105**	**103**	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**68.8**	**71.5**	**81.4**	**88.6**	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**98.5**	**92.4**	**99.2**	**102**	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SUMP-S	WB-B	TIT-B	SP	----
				Sampling date / time	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	19-May-2023 00:00	----
Compound	CAS Number	LOR	Unit		EM2309205-006	EM2309205-007	EM2309205-008	EM2309205-009	--------
					Result	Result	Result	Result	----
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	0.5	%		**112**	**104**	**115**	**120**	**----**
4-Terphenyl-d14	1718-51-0	0.5	%		**106**	**97.0**	**107**	**107**	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**94.7**	**84.1**	**88.6**	**101**	**----**
Toluene-D8	2037-26-5	0.2	%		**86.1**	**75.4**	**78.7**	**88.7**	**----**
4-Bromofluorobenzene	460-00-4	0.2	%		**92.5**	**85.6**	**84.9**	**92.2**	**----**

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

CERTIFICATE OF ANALYSIS

Work Order	: **EM2310922**	Page	: 1 of 9
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 7936	Date Samples Received	: 16-Jun-2023 11:30
Order number	: 7936	Date Analysis Commenced	: 17-Jun-2023
C-O-C number	: ----	Issue Date	: 21-Jun-2023 16:58
Sampler	: EL		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

Page : 3 of 9
Work Order : EM2310922
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GB1	GB2	GB3	GB4	GB5
			Sampling date / time	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00
Compound	CAS Number	LOR	Unit	EM2310922-001	EM2310922-002	EM2310922-003	EM2310922-004	EM2310922-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Lead	7439-92-1	0.001	mg/L	**0.010**	**0.002**	**0.027**	**0.001**	<0.001
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	**127**	**13.6**	**5.0**	**6.0**	**2.8**
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	**104**	**110**	**6.5**	**5.3**	**1.6**
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	**64.2**	**55.4**	**3.9**	**2.9**	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1.0	µg/L	**16.1**	**14.6**	**7.0**	**7.5**	**1.1**
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	**199**	**272**	**171**	**308**	**20.5**
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	**1.8**	<1.0
Fluorene	86-73-7	1.0	µg/L	**1.9**	<1.0	<1.0	**5.4**	<1.0
Phenanthrene	85-01-8	1.0	µg/L	**1.4**	<1.0	<1.0	**5.1**	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	**3.0**	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	**202**	**272**	**171**	**323**	**20.5**
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								

Page : 4 of 9
Work Order : EM2310922
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GB1	GB2	GB3	GB4	GB5
				Sampling date / time	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00
Compound	CAS Number	LOR	Unit		EM2310922-001	EM2310922-002	EM2310922-003	EM2310922-004	EM2310922-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	20	µg/L		36000	39200	17300	11800	2430
C10 - C14 Fraction	----	50	µg/L		5760	9460	5130	22600	1380
C15 - C28 Fraction	----	100	µg/L		2820	600	260	25600	350
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	90	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		8580	10100	5390	48300	1730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		42700	41800	21200	14300	2960
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		10800	11600	8910	5620	930
>C10 - C16 Fraction	----	100	µg/L		4420	4680	2260	25100	970
>C16 - C34 Fraction	----	100	µg/L		1910	350	150	17300	230
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		6330	5030	2410	42400	1200
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		3980	4310	1930	24800	920
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		19700	9000	2390	2750	563
Toluene	108-88-3	2	µg/L		2790	13300	183	534	67
Ethylbenzene	100-41-4	2	µg/L		2050	2440	3580	1480	202
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		6280	4040	4820	2750	856
ortho-Xylene	95-47-6	2	µg/L		1130	1390	1320	1170	338
^ Total Xylenes	----	2	µg/L		7410	5430	6140	3920	1190
^ Sum of BTEX	----	1	µg/L		32000	30200	12300	8680	2030
Naphthalene	91-20-3	5	µg/L		438	373	334	294	48
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		24.0	26.9	21.3	17.6	26.2
2-Chlorophenol-D4	93951-73-6	1.0	%		87.6	103	69.9	84.9	89.2
2.4.6-Tribromophenol	118-79-6	1.0	%		93.9	115	72.8	79.7	82.9
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		64.9	88.5	55.4	70.4	63.5
Anthracene-d10	1719-06-8	1.0	%		67.0	81.0	51.2	67.2	60.2
4-Terphenyl-d14	1718-51-0	1.0	%		76.6	92.9	58.8	88.3	70.3
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		114	96.5	101	125	99.4

Page	:	5 of 9
Work Order	:	EM2310922
Client	:	ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project	:	7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GB1	GB2	GB3	GB4	GB5
				Sampling date / time	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00	15-Jun-2023 00:00
Compound	CAS Number	LOR	Unit		EM2310922-001	EM2310922-002	EM2310922-003	EM2310922-004	EM2310922-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**87.3**	**76.7**	**83.9**	**104**	**80.6**
4-Bromofluorobenzene	460-00-4	2	%		**112**	**103**	**107**	**107**	**97.6**

Page	:	6 of 9
Work Order	:	EM2310922
Client	:	ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project	:	7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP	----	----	----	----
			Sampling date / time	15-Jun-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2310922-006	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Lead	7439-92-1	0.001	mg/L	**0.027**	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	**6.4**	----	----	----	----
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	**7.0**	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	**5.1**	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L	**9.7**	----	----	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	**267**	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	**267**	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								

Page : 7 of 9
Work Order : EM2310922
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	DUP	----	----	----	----
			Sampling date / time	15-Jun-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2310922-006	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	20	µg/L	**15500**	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	**7920**	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	**430**	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	**8350**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	**19600**	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	**8950**	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	**3500**	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	**260**	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	**3760**	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	**3140**	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	**2530**	----	----	----	----
Toluene	108-88-3	2	µg/L	**166**	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	**3000**	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	**3700**	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	**1250**	----	----	----	----
^ Total Xylenes	----	2	µg/L	**4950**	----	----	----	----
^ Sum of BTEX	----	1	µg/L	**10600**	----	----	----	----
Naphthalene	91-20-3	5	µg/L	**355**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**28.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**104**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**110**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**83.7**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**76.8**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**89.7**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**99.2**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	DUP	----	----	----	----
				Sampling date / time	15-Jun-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2310922-006	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**80.7**	**----**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**103**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	51
2-Chlorophenol-D4	93951-73-6	30	114
2.4.6-Tribromophenol	118-79-6	26	133
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

CERTIFICATE OF ANALYSIS

Work Order	: **EM2312226**	Page	: 1 of 30
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 7936	Date Samples Received	: 06-Jul-2023 11:30
Order number	: 7936	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: ----	Issue Date	: 12-Jul-2023 16:27
Sampler	: Evan Langridge		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 43		
No. of samples analysed	: 43		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Lu	VOC Section Supervisor	Melbourne Organics, Springvale, VIC
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Sample 11 'GB6-2' was received broken. Sample integrity has been compromised. Volatiles analysis on this sample has been compromised.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005-T : EM2312226 #30 Poor duplicate precision for total Chromium due to sample matrix. Confirmed by re-digestion and re-analysis.
- EG035T: EM2312198#2 Poor matrix spike recovery for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG005T: EM2312226 #2, Poor matrix spike recovery for Arsenic due to sample matrix. Confirmed by re-extraction and re-analysis.

Page : 3 of 30
Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	HA1-1.2	HA1-2.2	HA1-2.4	HA2-1.4	HA2-2.0
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-001	EM2312226-002	EM2312226-003	EM2312226-004	EM2312226-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**16.8**	**21.2**	**19.7**	**18.3**	**20.7**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**110**	**112**	**169**	**140**	**142**
Copper	7440-50-8	5	mg/kg	**6**	**7**	**12**	**5**	**6**
Lead	7439-92-1	5	mg/kg	**14**	**18**	**18**	**9**	**13**
Nickel	7440-02-0	2	mg/kg	**8**	**6**	**7**	**9**	**10**
Zinc	7440-66-6	5	mg/kg	**26**	**24**	**44**	**10**	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Page : 4 of 30
Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	HA1-1.2	HA1-2.2	HA1-2.4	HA2-1.4	HA2-2.0
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-001	EM2312226-002	EM2312226-003	EM2312226-004	EM2312226-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	HA1-1.2	HA1-2.2	HA1-2.4	HA2-1.4	HA2-2.0
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-001	EM2312226-002	EM2312226-003	EM2312226-004	EM2312226-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		113	113	108	109	108
2-Chlorophenol-D4	93951-73-6	0.5	%		110	111	107	108	108
2.4.6-Tribromophenol	118-79-6	0.5	%		102	102	69.2	98.2	98.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		95.5	98.2	95.5	97.6	87.1
Anthracene-d10	1719-06-8	0.5	%		102	105	108	102	102
4-Terphenyl-d14	1718-51-0	0.5	%		108	106	97.5	102	104
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		100	86.2	84.0	83.4	97.3
Toluene-D8	2037-26-5	0.2	%		86.0	81.3	75.8	79.5	82.4
4-Bromofluorobenzene	460-00-4	0.2	%		90.0	84.1	79.0	81.7	85.5

Page : 6 of 30
Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	HA3-1.2	HA3-1.8	HA4-0.15	HA4-0.8	GB6-1
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-006	EM2312226-007	EM2312226-008	EM2312226-009	EM2312226-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**20.7**	**12.5**	**9.9**	**22.8**	**21.2**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**135**	**110**	**47**	**134**	**207**
Copper	7440-50-8	5	mg/kg	<5	**6**	**13**	**15**	<5
Lead	7439-92-1	5	mg/kg	**12**	**14**	**43**	**11**	**9**
Nickel	7440-02-0	2	mg/kg	**8**	**5**	**4**	**10**	**13**
Zinc	7440-66-6	5	mg/kg	**17**	**21**	**22**	**8**	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	**0.2**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	HA3-1.2	HA3-1.8	HA4-0.15	HA4-0.8	GB6-1
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-006	EM2312226-007	EM2312226-008	EM2312226-009	EM2312226-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	HA3-1.2	HA3-1.8	HA4-0.15	HA4-0.8	GB6-1
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-006	EM2312226-007	EM2312226-008	EM2312226-009	EM2312226-010
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		109	99.3	97.0	96.5	97.4
2-Chlorophenol-D4	93951-73-6	0.5	%		107	103	102	101	99.7
2.4.6-Tribromophenol	118-79-6	0.5	%		99.2	59.8	60.1	60.2	63.2
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		86.1	83.5	95.8	82.6	84.0
Anthracene-d10	1719-06-8	0.5	%		107	110	109	106	108
4-Terphenyl-d14	1718-51-0	0.5	%		101	105	110	108	102
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		88.7	81.8	86.9	94.0	86.2
Toluene-D8	2037-26-5	0.2	%		73.4	76.9	81.4	88.2	84.0
4-Bromofluorobenzene	460-00-4	0.2	%		74.0	77.8	88.1	91.3	86.9

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GB6-2	GB6-3	GB6-4	GB6-5	GB6-6
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-011	EM2312226-012	EM2312226-013	EM2312226-014	EM2312226-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.5**	**16.0**	**13.3**	**17.1**	**18.9**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**63**	**26**	**16**	**24**	**23**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	**9**	**6**
Lead	7439-92-1	5	mg/kg	**7**	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	**8**	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.4**	**0.1**	<0.1	<0.1	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

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Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB6-2	GB6-3	GB6-4	GB6-5	GB6-6
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-011	EM2312226-012	EM2312226-013	EM2312226-014	EM2312226-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB6-2	GB6-3	GB6-4	GB6-5	GB6-6
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-011	EM2312226-012	EM2312226-013	EM2312226-014	EM2312226-015
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		102	102	94.8	106	106
2-Chlorophenol-D4	93951-73-6	0.5	%		104	102	96.2	106	107
2.4.6-Tribromophenol	118-79-6	0.5	%		68.7	77.1	90.2	63.5	84.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.7	84.2	84.4	91.4	83.0
Anthracene-d10	1719-06-8	0.5	%		114	111	98.7	109	110
4-Terphenyl-d14	1718-51-0	0.5	%		107	100	92.8	99.6	101
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		79.1	92.1	92.2	92.4	74.6
Toluene-D8	2037-26-5	0.2	%		71.3	82.6	79.7	79.3	69.6
4-Bromofluorobenzene	460-00-4	0.2	%		74.5	85.5	82.3	83.0	72.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GB6-7	GB6-8	GB7-1	GB7-2	GB7-2.5
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-016	EM2312226-017	EM2312226-018	EM2312226-019	EM2312226-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**18.4**	**19.5**	**22.1**	**13.5**	**7.1**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**21**	**18**	**182**	**45**	**5**
Copper	7440-50-8	5	mg/kg	**7**	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	**7**	<5	<5
Nickel	7440-02-0	2	mg/kg	<2	<2	**10**	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	**0.3**	**0.5**	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB6-7	GB6-8	GB7-1	GB7-2	GB7-2.5
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-016	EM2312226-017	EM2312226-018	EM2312226-019	EM2312226-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB6-7	GB6-8	GB7-1	GB7-2	GB7-2.5
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-016	EM2312226-017	EM2312226-018	EM2312226-019	EM2312226-020
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		101	104	106	107	105
2-Chlorophenol-D4	93951-73-6	0.5	%		99.5	104	106	107	107
2.4.6-Tribromophenol	118-79-6	0.5	%		66.8	91.4	70.5	92.6	90.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		77.3	83.4	84.3	87.3	99.8
Anthracene-d10	1719-06-8	0.5	%		112	102	111	104	115
4-Terphenyl-d14	1718-51-0	0.5	%		98.3	109	97.8	99.5	109
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		81.1	84.2	81.0	84.4	83.4
Toluene-D8	2037-26-5	0.2	%		75.7	75.1	75.3	76.4	77.3
4-Bromofluorobenzene	460-00-4	0.2	%		76.9	77.7	79.9	78.0	80.7

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Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GB7-3	GB74	GB7.5	GB7-6	GB7-7
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-021	EM2312226-022	EM2312226-023	EM2312226-024	EM2312226-025
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**13.1**	**13.1**	**11.3**	**12.5**	**10.6**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**24**	**32**	**26**	**54**	**47**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB7-3	GB74	GB7.5	GB7-6	GB7-7
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-021	EM2312226-022	EM2312226-023	EM2312226-024	EM2312226-025
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB7-3	GB74	GB7.5	GB7-6	GB7-7
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-021	EM2312226-022	EM2312226-023	EM2312226-024	EM2312226-025
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		75.8	72.1	62.1	59.6	64.7
2-Chlorophenol-D4	93951-73-6	0.5	%		114	112	92.6	95.5	101
2.4.6-Tribromophenol	118-79-6	0.5	%		87.0	84.9	70.2	73.1	70.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		100	104	100	96.2	93.0
Anthracene-d10	1719-06-8	0.5	%		112	110	112	111	112
4-Terphenyl-d14	1718-51-0	0.5	%		113	102	112	113	105
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		83.8	88.1	81.9	83.8	86.3
Toluene-D8	2037-26-5	0.2	%		78.3	83.0	60.0	76.2	73.7
4-Bromofluorobenzene	460-00-4	0.2	%		80.3	84.8	73.6	78.6	80.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GB7_8	GB7.9	HA5-0.2	HA5-0.5	TP4-0.45
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-026	EM2312226-027	EM2312226-028	EM2312226-029	EM2312226-030
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**11.6**	**11.7**	**13.4**	**25.8**	**7.8**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**24**	**19**	**137**	**140**	**131**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	**17**	**10**	**13**
Nickel	7440-02-0	2	mg/kg	<2	<2	**7**	**9**	**4**
Zinc	7440-66-6	5	mg/kg	<5	<5	**19**	**5**	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB7_8	GB7.9	HA5-0.2	HA5-0.5	TP4-0.45
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-026	EM2312226-027	EM2312226-028	EM2312226-029	EM2312226-030
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GB7_8	GB7.9	HA5-0.2	HA5-0.5	TP4-0.45
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-026	EM2312226-027	EM2312226-028	EM2312226-029	EM2312226-030
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		66.4	60.6	56.1	56.5	57.8
2-Chlorophenol-D4	93951-73-6	0.5	%		112	98.0	95.0	92.1	94.6
2.4.6-Tribromophenol	118-79-6	0.5	%		65.7	66.0	74.2	69.5	71.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		104	96.6	97.4	99.3	96.8
Anthracene-d10	1719-06-8	0.5	%		114	111	112	109	109
4-Terphenyl-d14	1718-51-0	0.5	%		103	112	103	101	112
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		82.4	89.9	90.1	81.7	89.6
Toluene-D8	2037-26-5	0.2	%		71.1	77.5	73.9	75.7	78.4
4-Bromofluorobenzene	460-00-4	0.2	%		76.9	82.5	84.2	75.0	84.8

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP4-0.8	TP4-2.2	TP3-0.4	TP3-0.8	TP3-2.1
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-031	EM2312226-032	EM2312226-033	EM2312226-034	EM2312226-035
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**14.6**	**20.5**	**24.0**	**25.0**	**19.8**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**62**	**45**	**192**	**153**	**212**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	**5**	**7**	**8**	**8**	**15**
Nickel	7440-02-0	2	mg/kg	**7**	**6**	**8**	**8**	**3**
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.1**	<0.1	<0.1	**0.1**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP4-0.8	TP4-2.2	TP3-0.4	TP3-0.8	TP3-2.1
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-031	EM2312226-032	EM2312226-033	EM2312226-034	EM2312226-035
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP4-0.8	TP4-2.2	TP3-0.4	TP3-0.8	TP3-2.1
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-031	EM2312226-032	EM2312226-033	EM2312226-034	EM2312226-035
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		62.2	62.0	65.5	55.8	60.7
2-Chlorophenol-D4	93951-73-6	0.5	%		104	97.1	97.1	92.3	95.8
2.4.6-Tribromophenol	118-79-6	0.5	%		76.8	69.2	70.3	67.8	72.1
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		99.3	94.4	99.3	100	98.8
Anthracene-d10	1719-06-8	0.5	%		112	106	111	107	107
4-Terphenyl-d14	1718-51-0	0.5	%		110	104	111	97.1	100
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		86.4	82.3	86.6	80.1	75.7
Toluene-D8	2037-26-5	0.2	%		72.9	73.4	70.7	59.8	60.6
4-Bromofluorobenzene	460-00-4	0.2	%		76.9	78.6	77.9	75.3	68.5

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Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP2-0.4	TP2-0.9	TP2-2.1	TP1-0.7	TP1-1.3
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2312226-036	EM2312226-037	EM2312226-038	EM2312226-039	EM2312226-040
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**7.5**	**20.7**	**23.3**	**13.5**	**12.6**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**174**	**152**	**156**	**30**	**140**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	**8**	<5
Lead	7439-92-1	5	mg/kg	**11**	**9**	**11**	**27**	**14**
Nickel	7440-02-0	2	mg/kg	**4**	**10**	**5**	**5**	**6**
Zinc	7440-66-6	5	mg/kg	**8**	<5	<5	**95**	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.3**	<0.1	<0.1	<0.1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP2-0.4	TP2-0.9	TP2-2.1	TP1-0.7	TP1-1.3
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-036	EM2312226-037	EM2312226-038	EM2312226-039	EM2312226-040
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP2-0.4	TP2-0.9	TP2-2.1	TP1-0.7	TP1-1.3
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2312226-036	EM2312226-037	EM2312226-038	EM2312226-039	EM2312226-040
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		54.3	56.3	61.5	72.8	58.7
2-Chlorophenol-D4	93951-73-6	0.5	%		89.0	92.9	102	96.1	94.4
2.4.6-Tribromophenol	118-79-6	0.5	%		71.3	71.8	74.1	77.4	74.7
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		97.6	101	108	96.1	96.4
Anthracene-d10	1719-06-8	0.5	%		104	109	113	111	109
4-Terphenyl-d14	1718-51-0	0.5	%		107	102	103	107	109
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		82.3	82.5	85.2	84.5	83.1
Toluene-D8	2037-26-5	0.2	%		73.6	69.7	73.9	71.5	71.1
4-Bromofluorobenzene	460-00-4	0.2	%		76.8	77.4	78.3	73.6	75.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1-2.3	DUP1	DUP2	----	----
			Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	EM2312226-041	EM2312226-042	EM2312226-043	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**22.6**	**11.0**	**7.8**	**----**	**----**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**----**	**----**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	**----**	**----**
Chromium	7440-47-3	2	mg/kg	**133**	**52**	**124**	**----**	**----**
Copper	7440-50-8	5	mg/kg	<5	<5	<5	**----**	**----**
Lead	7439-92-1	5	mg/kg	**9**	<5	**13**	**----**	**----**
Nickel	7440-02-0	2	mg/kg	**9**	<2	**4**	**----**	**----**
Zinc	7440-66-6	5	mg/kg	<5	<5	**20**	**----**	**----**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.8**	<0.1	<0.1	**----**	**----**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	**----**	**----**
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	**----**	**----**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	**----**	**----**

Page : 28 of 30
Work Order : EM2312226
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP1-2.3	DUP1	DUP2	----	----
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2312226-041	EM2312226-042	EM2312226-043	--------	--------
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----

Page	:	29 of 30
Work Order	:	EM2312226
Client	:	ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project	:	7936

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP1-2.3	DUP1	DUP2	----	----
				Sampling date / time	04-Jul-2023 00:00	04-Jul-2023 00:00	04-Jul-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2312226-041	EM2312226-042	EM2312226-043	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		102	104	105	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		115	117	118	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		117	106	118	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		88.5	93.4	92.4	----	----
Anthracene-d10	1719-06-8	0.5	%		93.8	97.5	98.8	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		105	101	93.6	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		84.2	88.4	84.6	----	----
Toluene-D8	2037-26-5	0.2	%		77.3	74.8	67.5	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		77.5	81.8	82.0	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

CERTIFICATE OF ANALYSIS

Work Order	: **EM2313201**	Page	: 1 of 9
Client	: **ENVIRONMENTAL SERVICE AND DESIGN PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: ROYCE ALDRED	Contact	: Hannah White
Address	: 80 MINNA ROAD PO BOX 651 HEYBRIDGE TASMANIA, AUSTRALIA 7316	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 7936	Date Samples Received	: 21-Jul-2023 11:25
Order number	: ----	Date Analysis Commenced	: 22-Jul-2023
C-O-C number	: ----	Issue Date	: 26-Jul-2023 15:14
Sampler	: Evan Landridge		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Arenie Vijayaratnam	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

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Work Order : EM2313201
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GB1	GB2	GB3	GB5	GB6
			Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2313201-001	EM2313201-002	EM2313201-003	EM2313201-004	EM2313201-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Lead	7439-92-1	0.001	mg/L	**0.013**	**0.002**	**0.029**	<0.001	**0.003**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	**59.8**	**18.9**	**6.6**	**1.3**	<1.0
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	**143**	**114**	**5.5**	**6.9**	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	**121**	**57.4**	**5.8**	**2.5**	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1.0	µg/L	**26.3**	**16.8**	**31.3**	**6.1**	<1.0
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	**266**	**310**	**128**	**173**	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	**1.7**	<1.0	<1.0	**1.3**	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	**268**	**310**	**128**	**174**	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								

Page : 4 of 9
Work Order : EM2313201
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GB1	GB2	GB3	GB5	GB6
			Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2313201-001	EM2313201-002	EM2313201-003	EM2313201-004	EM2313201-005
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	20	µg/L	51400	40100	9280	8660	<20
C10 - C14 Fraction	----	50	µg/L	8140	11400	8710	4050	<50
C15 - C28 Fraction	----	100	µg/L	680	720	950	610	130
C29 - C36 Fraction	----	50	µg/L	<50	100	<50	<50	80
^ C10 - C36 Fraction (sum)	----	50	µg/L	8820	12200	9660	4660	210
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	53800	43900	12200	9720	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	6680	12100	5710	3230	<20
>C10 - C16 Fraction	----	100	µg/L	4060	5320	4550	2200	<100
>C16 - C34 Fraction	----	100	µg/L	440	480	570	370	180
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	4500	5800	5120	2570	180
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	3680	4900	4390	1960	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	31200	7950	1160	2540	<1
Toluene	108-88-3	2	µg/L	4490	15100	146	182	<2
Ethylbenzene	100-41-4	2	µg/L	2800	2250	1120	1480	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	7400	4780	2880	2020	<2
ortho-Xylene	95-47-6	2	µg/L	1230	1730	1180	270	<2
^ Total Xylenes	----	2	µg/L	8630	6510	4060	2290	<2
^ Sum of BTEX	----	1	µg/L	47100	31800	6490	6490	<1
Naphthalene	91-20-3	5	µg/L	376	425	162	245	<5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	20.1	17.8	24.6	25.4	26.8
2-Chlorophenol-D4	93951-73-6	1.0	%	62.4	65.0	65.4	73.7	66.1
2.4.6-Tribromophenol	118-79-6	1.0	%	101	114	110	110	83.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	85.3	97.2	92.9	91.2	74.1
Anthracene-d10	1719-06-8	1.0	%	74.3	80.3	80.1	82.6	66.8
4-Terphenyl-d14	1718-51-0	1.0	%	88.7	96.2	97.1	100	80.5
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	115	108	116	113	113

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GB1	GB2	GB3	GB5	GB6
				Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2313201-001	EM2313201-002	EM2313201-003	EM2313201-004	EM2313201-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**114**	**118**	**119**	**117**	**111**
4-Bromofluorobenzene	460-00-4	2	%		**114**	**110**	**115**	**118**	**113**

Page : 6 of 9
Work Order : EM2313201
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GB7	DUP	----	----	----
			Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2313201-006	EM2313201-007	--------	--------	--------
				Result	Result	----	----	----
EG020T: Total Metals by ICP-MS								
Lead	7439-92-1	0.001	mg/L	**0.001**	**0.014**	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	**57.0**	----	----	----
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	**140**	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	**119**	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	----	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	**25.3**	----	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	----	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	----	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	----	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	----	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	**266**	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	**1.8**	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	<0.5	**268**	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								

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Work Order : EM2313201
Client : ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project : 7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GB7	DUP	----	----	----
				Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2313201-006	EM2313201-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	20	µg/L		<20	46900	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	7390	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	520	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	7910	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	49200	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	5660	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	3630	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	340	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	3970	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	3260	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	28800	----	----	----
Toluene	108-88-3	2	µg/L		<2	4170	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	2610	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	6810	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	1150	----	----	----
^ Total Xylenes	----	2	µg/L		<2	7960	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	43500	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	374	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		32.8	22.6	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		90.1	68.8	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		105	110	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		92.6	94.8	----	----	----
Anthracene-d10	1719-06-8	1.0	%		83.7	80.7	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		100	96.6	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		113	113	----	----	----

Page	:	8 of 9
Work Order	:	EM2313201
Client	:	ENVIRONMENTAL SERVICE AND DESIGN PTY LTD
Project	:	7936

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GB7	DUP	----	----	----
				Sampling date / time	20-Jul-2023 00:00	20-Jul-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2313201-006	EM2313201-007	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		**115**	**109**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**117**	**110**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	51
2-Chlorophenol-D4	93951-73-6	30	114
2.4.6-Tribromophenol	118-79-6	26	133
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129

10.3 Chain of Custody Documents

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

[ ] ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8 | [ ] MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal | [ ] NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph | [ ] SYDNEY 277-289 Woodpark Road Smithfield NSW

[ ] BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 0 | [X] MELBOURNE 2-4 Westall Road Springvale VIC 317 Ph: 03 8549 9600 E: samples.mel | [ ] NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02442 | [ ] TOWNSVILLE 14-15 Desma Court Bohle QLD 4818

[ ] GLADSTONE 46 Callemondah Drive Clinton QLD 458 | [ ] MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 63 72 6735 E: mudgee.mail@als | [ ] PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: s | [ ] WOLLONGONG 99 Kenny Street Wollongong NSW

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : [X] Standard TAT (List due date): 7 days is fine		FOR LABORATORY USE ONLY (Circle)
OFFICE: 74 Minna Rd, Heybridge 7316	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) [] Non Standard or urgent TAT : 2 workday turn around		Custody Seal Intact? Yes No N/A
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 7936	PROJECT: 7936	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Royce Aldred	SAMPLER MOBILE: 0429 335664	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES)	EDD FORMAT (or default):	*Royce Aldred*	
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME: 21/2/2023	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au		RELINQUISHED BY:	RECEIVED BY:
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		DATE/TIME:	DATE/TIME: 13/4 12-45

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIV (refer to codes below)	TOTAL CONTAINERS	TRH / BTEXN	TPH	Total Lead	PAH					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	TP3-1	12/04/2023	S	Jar	1	x	x	x						
2	TP3-2	12/04/2023	S	Jar	1	x	x	x						
3	TP3-3	12/04/2023	S	Jar	1	x	x	x						
4	TP3-4	12/04/2023	S	Jar	1	x	x	x						
5	TP3-5	12/04/2023	S	Jar	1	x	x	x						
6	TP3-6	12/04/2023	S	Jar	1	x	x	x						
7	TP3-7	12/04/2023	S	Jar	1	x	x	x						
8	TP3-8	12/04/2023	S	Jar	1	x	x	x						
9	TP3-9	12/04/2023	S	Jar	1	x	x	x						
10	TP3-10	12/04/2023	S	Jar	1	x	x	x						
11	TP3-11	12/04/2023	S	Jar	1	x	x	x						
12	TP3-12	12/04/2023	S	Jar	1	x	x	x						
13	TP3-13	12/04/2023	S	Jar	1	x	x	x						
14	TP4-1	12/04/2023	S	Jar	1	x	x		X					
15	TP4-2	12/04/2023	S	Jar	1	x	x		X					
16	TP4-3	12/04/2023	S	Jar	1	x	x		X					
17	TP4-4	12/04/2023	S	Jar	1	x	x		X					
18	TP4-5	12/04/2023	S	Jar	1	x	x		X					
19	DUP	12/04/2023	S	Jar	1	x	x	x						
20	SP3-1	12/04/2023	S	Jar	1	x	x	x						
21	SP3-2	12/04/2023	S	Jar	1	x	x	x						
22	SP4-1	12/04/2023	S	Jar	1	x	x		X					
23	SP4-2	12/04/2023	S	Jar	1	x	x		X					
24	DUP2	12/04/2023	S	Jar	1	x	x		X					
				TOTAL	24									

Environmental Division
Melbourne
Work Order Reference
EM2306486

Telephone : + 61-3-8549 9600

FREIGHT

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

[ ] ADELAIDE 21 Burma Road Pooraka SA 5095Ph: 08 - [ ] MACKAY 78 Harbour Road Mackay QLD 4740Ph: 07 4944 0177 E: mackay@alsglobal [ ] NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304F [ ] SYDNEY 277-289 Woodpark Road Smithfield NSW

[ ] BRISBANE 32 Shand Street Stafford QLD 4053Ph: 0 [X] MELBOURNE 2-4 Westall Road Springvale VIC 3171Ph: 03 8549 9600 E: samples.m [ ] NOWRA 4/13 Geary Place North Nowra NSW 2541Ph: 0244 [ ] TOWNSVILLE 14-15 Desma Court Bohle QLD 4818

[ ] GLADSTONE 46 Callemondah Drive Clinton QLD 46 [ ] MUDGEE 27 Sydney Road Mudgee NSW 2850Ph: 02 6372 6735 E: mudgee.mail@al [ ] PERTH 10 Hod Way Malaga WA 6090Ph: 08 9209 7655 E: [ ] WOLLONGONG 99 Kenny Street Wollongong NSW

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS :	[X] Standard TAT (List due date): 7 days is fine	FOR LABORATORY USE ONLY (Circle)
OFFICE: 74 Minna Rd, Heybridge 7316	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	[] Non Standard or urgent TAT : 2 workday turn around	Custody Seal Intact? Yes No N/A
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 7936	PROJECT: 7936	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Royce Aldred	SAMPLER MOBILE: 0429 335664	RELINQUISHED BY:	RECEIVED BY: Kg	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES)	EDD FORMAT (or default):	Royce Aldred	28/4/23		
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au		21/2/2023	11:15		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIV (refer to codes below)	TOTAL CONTAINERS	TRH / BTEXN	TPH	Total Lead	PAH					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH5-1.0	27/04/2023	S	Jar	1	x	x		x					
2	BH5-2.0	27/04/2023	S	Jar	1	x	x		x					
3	BH5-3.0	27/04/2023	S	Jar	1	x	x		x					
4	BH5-4.0	27/04/2023	S	Jar	1	x	x		x					
5	DUP	27/04/2023	S	Jar	1	x	x		x					
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
			S	Jar										
				TOTAL	5									

Environmental Division
Melbourne
Work Order Reference
EM2307466

Telephone : +61-3-8549 9600

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

FREIGHT

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine	FOR LABORATORY USE ONLY (Circle)
OFFICE: 74 Minna Rd, Heybridge 7316		[] Non Standard or urgent TAT : 2 workday turn around	Custody Seal Intact? Yes No N/A
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 7936	PROJECT: 7936	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Royce Aldred	SAMPLER MOBILE: 0429 335664	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES)	EDD FORMAT (or default):	*Royce Aldred*	
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed) admin@esandd.com.au		21/2/2023	

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME: 23/5, 11:05

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIV (refer to codes below)	TOTAL CONTAINERS	TRH / BTEXN	TPH	Total Lead	PAH	Phenols				
1	SUMP-B	19/05/2023	S	Jar	1	x	x	x	x	x				
2	SUMP-N	19/05/2023	S	Jar	1	x	x	x	x	x				
3	DUP	19/05/2023	S	Jar	1	x	x	x	x	x				
4	SUMP-W	19/05/2023	S	Jar	1	x	x	x	x	x				
5	SUMP-E	19/05/2023	S	Jar	1	x	x	x	x	x				
6	SUMP-S	19/05/2023	S	Jar	1	x	x	x	x	x				
7	WB-B	19/05/2023	S	Jar	1	x	x	x	x	x				
8	TIT-B	19/05/2023	S	Jar	1	x	x	x	x	x				
9	SP	19/05/2023	S	Jar	1	x	x	x	x	x				
				TOTAL	9									

Environmental Division
Melbourne
Work Order Reference
EM2309205

Telephone : +61-3-8549 9600

FREIGHT

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick >

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine	FOR LABORATORY USE ONLY (Circle)
OFFICE: 74 Minna Rd, Heybridge 7316		[] Non Standard or urgent TAT : 2 workday turn around	Custody Seal Intact? Yes No N/A
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 7936	PROJECT: 7936	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Evan Langridge	SAMPLER MOBILE: 0448 946 030	RELINQUISHED BY:	RECEIVED BY: FD
COC emailed to ALS? (YES)	EDD FORMAT (or default):	*Royce Aldred*	DATE/TIME: 16/6 11:30
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME: 15/6/2023	RELINQUISHED BY: / DATE/TIME: / RECEIVED BY: / DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	BTEXN	TPH/TRH	Total Lead	PAH	Phenols				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	GB1	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
2	GB2	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
3	GB3	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
4	GB4	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
5	GB5	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
6	DUP	15/06/2023	W	ALS supplied bottles	4	x	x	x	x	x				
				TOTAL	24									

Environmental Division
Melbourne
Work Order Reference
EM2310922

Telephone : +61-3-8549 9600

FREIGHT

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick >

[ ] ADELAIDE 21 Burma Road Pooraka SA 5095Ph: 08 8... [ ] MACKAY 78 Harbour Road Mackay QLD 4740Ph: 07 4944 0177 E: mackay@... [ ] NEWCASTLE 5/396 Maitland Rd Islington/Mayfield West NSW Ph: 02 4... [ ] PERTH 10 Hod Way Malaga WA 6090Ph: 08 9209 7655 E: s... [ ] WOLLONGONG 99 Kenny Street Wollongong NSW

[ ] BRISBANE 32 Shand Street Stafford QLD 4053Ph: 0... [ ] MELBOURNE 2-4 Westall Road Springvale VIC 3171Ph: 03 8549 9600 E: ... [ ] NEWPA 4/13 Geary Place North Nowra NSW 2541Ph: 02 44... [ ] TOWNSVILLE 14-15 Desma Court Bohle QLD 4818

[ ] GLADSTONE 46 Callemondah Drive Clinton QLD 48... [ ] MUDGEE 77 Sydney Road Mudgee NSW 2850Ph: 02 4372 4735 E: mudgee@... [ ] PERTH 10 Hod Way Malaga WA 6090Ph: 08 9209 7655 E: s... [ ] WOLLONGONG 99 Kenny Street Wollongong NSW

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine [] Non Standard or urgent TAT : 2 workday turn around	FOR LABORATORY USE ONLY (Circle) Custody Seal Intact? Yes No N/A Free ice / frozen ice bricks present upon receipt? Yes No N/A Random Sample Temperature on Receipt: °C Other comment:
OFFICE: 74 Minna Rd, Heybridge 7316	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
PROJECT: Jims Roadhouse - Prospect	PROJECT: 7936		
ORDER NUMBER: 7936			
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999		
SAMPLER: Evan Langridge	SAMPLER MOBILE: 0448 946 030	RELINQUISHED BY: *Royce Aldred*	RECEIVED BY:
COC emailed to ALS? (YES)	EDD FORMAT (or default):	DATE/TIME: 15/6/2023	DATE/TIME:
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		RELINQUISHED BY:	RECEIVED BY: Marcus (Mrs)
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au		DATE/TIME:	DATE/TIME: 6/7, 11-30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-27								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	HA1-1.2	4/07/2023	S	ALS Supplied Jars		x								S27 (TRH (C6-C40) / BTEXN / PAH / Phenols / 8 metals)
2	HA1-2.2	4/07/2023	S	ALS Supplied Jars		x								
3	HA1-2.4	4/07/2023	S	ALS Supplied Jars		x								
4	HA2-1.4	4/07/2023	S	ALS Supplied Jars		x								
5	HA2-2.0	4/07/2023	S	ALS Supplied Jars		x								
6	HA3-1.2	4/07/2023	S	ALS Supplied Jars		x								
7	HA3-1.8	4/07/2023	S	ALS Supplied Jars		x								
8	HA4-0.15	4/07/2023	S	ALS Supplied Jars		x								
9	HA4-0.8	4/07/2023	S	ALS Supplied Jars		x								
10	GB6-1	4/07/2023	S	ALS Supplied Jars		x								
11	GB6-2	4/07/2023	S	ALS Supplied Jars		x								
12	GB6-3	4/07/2023	S	ALS Supplied Jars		x								
13	GB6-4	4/07/2023	S	ALS Supplied Jars		x								
14	GB6-5	4/07/2023	S	ALS Supplied Jars		x								
15	GB6-6	4/07/2023	S	ALS Supplied Jars		x								
				TOTAL	0									

Environmental Division
Melbourne
Work Order Reference
EM2312226

Telephone : +61-3-8549 9600

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

[ ] ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: (0[illegible] [ ] MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal [ ] NEWCASTLE 5/585 Maitland Pl Mayfield West NSW 2304 Ph: [illegible] [ ] ORANGE 277-279 Woodward Road Orange NSW

[ ] BRISBANE 32 Shand Street Stafford QLD 4053 Ph: (0[illegible] [X] MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: [illegible] [ ] NOWRA 4/19 Centre Place North Nowra NSW 2541 Ph: 02 442[illegible] [ ] TOWNSVILLE 14-15 Desma Court Bohle QLD 4818

[ ] GLADSTONE 44 Callemondah Drive Clinton QLD 4[illegible] [ ] MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 4372 4170 E: mudgee mail@als [ ] PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: s [ ] WOLLONGONG 99 Kenny Street Wollongong NSW

CLIENT: Enviromental Service & Design		TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine [] Non Standard or urgent TAT : 2 workday turn around							FOR LABORATORY USE ONLY (Circle)			
OFFICE: 74 Minna Rd, Heybridge 7316		ALS QUOTE NO.:								Custody Seal Intact?	Yes	No	N/A
PROJECT: Jims Roadhouse - Prospect		PROJECT: 7936								Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
ORDER NUMBER: 7936										Random Sample Temperature on Receipt:		°C	
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999									Other comment:			
SAMPLER: Evan Langridge	SAMPLER MOBILE: 0448 946 030	RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:					
COC emailed to ALS? (YES)	EDD FORMAT (or default):	*Royce Aldred*											
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME:		DATE/TIME:		DATE/TIME:		DATE/TIME:					
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au		15/6/2023											

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-27								
16	GB6-7	4/07/2023	S	ALS Supplied Jars		x								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
17	GB6-8	4/07/2023	S	ALS Supplied Jars		x								S27 (TRH (C6-C40) /
18	GB7-1	4/07/2023	S	ALS Supplied Jars		x								BTEXN / PAH / Phenols / 8 metals)
19	GB7-2	4/07/2023	S	ALS Supplied Jars		x								
20	GB7-2.5	4/07/2023	S	ALS Supplied Jars		x								
21	GB7-3	4/07/2023	S	ALS Supplied Jars		x								
22	GB7-4	4/07/2023	S	ALS Supplied Jars		x								
23	GB7-5	4/07/2023	S	ALS Supplied Jars		x								
24	GB7-6	4/07/2023	S	ALS Supplied Jars		x								
25	GB7-7	4/07/2023	S	ALS Supplied Jars		x								
26	GB7-8	4/07/2023	S	ALS Supplied Jars		x								
27	GB7-9	4/07/2023	S	ALS Supplied Jars		x								
28	HA5-0.2	4/07/2023	S	ALS Supplied Jars		x								
29	HA5-0.5	4/07/2023	S	ALS Supplied Jars		x								
				TOTAL										

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine [] Non Standard or urgent TAT : 2 workday turn around	FOR LABORATORY USE ONLY (Circle) Custody Seal Intact? Yes No N/A Free ice / frozen ice bricks present upon receipt? Yes No N/A Random Sample Temperature on Receipt: °C Other comment:
OFFICE: 74 Minna Rd, Heybridge 7316			
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
ORDER NUMBER: 7936	PROJECT: 7936		
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999		
SAMPLER: Evan Langridge	SAMPLER MOBILE: 0448 946 030		
COC emailed to ALS? (YES)	EDD FORMAT (or default):		
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au			
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au			
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Royce Aldred			
DATE/TIME: 15/5/2023	DATE/TIME:	DATE/TIME:	DATE/TIME:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-27								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
30	TP4-0.45	4/07/2023	S	ALS Supplied Jars		x								S27 (TRH (C6-C40) /
31	TP4-0.8	4/07/2023	S	ALS Supplied Jars		x								BTEXN / PAH / Phenols / 8 metals)
32	TP4-2.2	4/07/2023	S	ALS Supplied Jars		x								
33	TP3-0.4	4/07/2023	S	ALS Supplied Jars		x								
34	TP3-0.8	4/07/2023	S	ALS Supplied Jars		x								
35	TP3-2.1	4/07/2023	S	ALS Supplied Jars		x								
36	TP2-0.4	4/07/2023	S	ALS Supplied Jars		x								
37	TP2-0.9	4/07/2023	S	ALS Supplied Jars		x								
38	TP2-2.1	4/07/2023	S	ALS Supplied Jars		x								
39	TP1-0.7	4/07/2023	S	ALS Supplied Jars		x								
40	TP1-1.3	4/07/2023	S	ALS Supplied Jars		x								
41	TP1-2.3	4/07/2023	S	ALS Supplied Jars		x								
42	DUP1	4/07/2023	S	ALS Supplied Jars		x								
43	DUP2	4/07/2023	S	ALS Supplied Jars		x								
				TOTAL										

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick >

FREIGHT

CLIENT: Enviromental Service & Design	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	[X] Standard TAT (List due date): 7 days is fine	FOR LABORATORY USE ONLY (Circle)
OFFICE: 74 Minna Rd, Heybridge 7316		[] Non Standard or urgent TAT : 2 workday turn around	Custody Seal Intact? Yes No N/A
PROJECT: Jims Roadhouse - Prospect	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 7936	PROJECT: 7936	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Royce Aldred	CONTACT PH: (03) 6431 2999	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Evan Langridge	SAMPLER MOBILE: 0448 946 030	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES)	EDD FORMAT (or default):	*Royce Aldred*	
Email Reports to: admin@esandd.com.au, raldred@esandd.com.au		DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): admin@esandd.com.au		20/07/2023	

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME: 21/7 1125

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	BTEXN	TPH/TRH	Total Lead	PAH	Phenols				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	GB1	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
2	GB2	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
3	GB3	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
4	GB5	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
5	GB6	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
6	GB7	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
7	DUP	20/07/2023	W	ALS supplied bottles	4	x	x	x	x	x				
				TOTAL	28									

Environmental Division
Melbourne
Work Order Reference
EM2313201

Telephone : +61-3-8549 9600

10.4 Field sheets

Environmental Service Design

Purging and Sampling Record

Bore ID: CB1

Job Information	Sampling Information	Bore Information
Client:	Sample Method:	SWL: 2.6 m mBGSL Logic Check:
Project:	WQ Meter Type:	Date: Time:
	Flow Cell: Y / N Pump Depth: m	Ref.datum: Stick Up: m
Proj. No.:	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 4.45 m mBGSL Bore Diam.: mm
Sampler:	NAPL Check:	Screen From: to mBGSL Well Cap Secure?

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (mS/cm)	DO (mg/L)	Ox-Red Pt. (± mV)	SWL (mBGSL)	(NTU)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		sl-cloudy Nil +B
	3.5	14.65	5.47	0.303	1.54 mg 11.8 x	0.203		152	
						TDS			
14/6									
14:15	~	15.31	6.03	0.394	3.75	0.258		188	2.75 SWL
							2.55		1.9 m water
							2.45		
13/7	14:15	12.34	6.11	0.443	2.71	0.286	2.4	+ floc	strong odour

RUP

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes
Casing Int. Dia (mm) 50 100 150
Vol (L/m of casing) 2.0 7.9 17.7
*Double for gravel pack

Purging and Sampling Record

Bore ID: GB2

Job Information
Client: .....
Project: .....
.....
Proj. No.: .....
Sampler: .....

Sampling Information
Sample Method: .....
WQ Meter Type: .....
Flow Cell: Y / N Pump Depth: .....m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: .....

Bore Information
SWL: 3.9m mBGSL Logic Check: .....
Date: ..... Time: .....
Ref.datum: ..... Stick Up: ..... m
Bore Depth: 5.6m mBGSL Bore Diam.: ..... mm
Screen From: .....to..... mBGSL Well Cap Secure? .....

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	DO (.....)	Ox-Red Pt. (± mV)	SWL (mBGSL)	(NTU) (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
	3.5L	13.94	5.28	0.[illegible]	2.1mg/L	0.186		79.7	slight odour, cloudy
	7.0L	13.95	5.56	0.296	3.28	0.192		366	"
	10.5	14.08	5.52	0.309	3.44	0.201		248	"
14/6									
15:05	—	14.27	6.56	0.359	5.76	0.235		274	3.6m SWL popped seal
	[illegible]								
							3.7		3.7m SWL
							3.0		
18/7	16.35						3.5		+ heater, slight pressure release
		13.5	6.16	0.350	5.74	0.226	3.6m	99.5	

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes
Casing Int. Dia (mm) 50 100 150
Vol (L/m of casing) 2.0 7.9 17.7
*Double for gravel pack

1.7m water
3.4L purge

7936

Purging and Sampling Record

Bore ID: GB 3

Job Information
Client: .....
Project: .....
.....
Proj. No.: .....
Sampler: .....

Sampling Information
Sample Method: .....
WQ Meter Type: .....
Flow Cell: Y / N Pump Depth: .....m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: .....

Bore Information
SWL: 3.5m mBGSL Logic Check: .....
Date: ..... Time: .....
Ref.datum: ..... Stick Up: ..... m
Bore Depth: 6.6m mBGSL Bore Diam.: ..... mm
Screen From: .....to..... mBGSL Well Cap Secure?.....

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (..mS/cm)	DO (mg/L)	Ox-Red Pt. (± mV)	SWL (mBGSL)	NTV (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
	@5L	14.77	4.57	0.229	7.48	0.148		478	strong odor, cloudy, sheen
	@7L	5.9	4.67	0.233	3.19	~~0.156~~		455	
	@10L	14.76	4.49	0.229	7.82	0.152		~~760~~ 450	
						1.49			
(14/6) 11:20	-	15.83	5.82	0.280	11.20	0.184		491	4.2m SWL
14:37							3.3m		2L dry popped!
16:05							3.5m		popped!!
19:17							3.3m		popped!!
	13.15	5.00		0.253	5.22	0.164	4.15	182	

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes
Casing Int. Dia (mm) 50 100 150
Vol (L/m of casing) 2.0 7.9 17.7
*Double for gravel pack

3 m ✡ popped! twice! thrice!

7936

Purging and Sampling Record

Bore ID: GB4

Job Information
Client: .....
Project: .....
.....
Proj. No.: .....
Sampler: .....

Sampling Information
Sample Method: .....
WQ Meter Type: .....
Flow Cell: Y / N Pump Depth: .....m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: .....

Bore Information
SWL: 2.55 mBGSL Logic Check: .....
Date: ..... Time: .....
Ref.datum: ..... Stick Up: ..... m
Bore Depth: 4.6 mBGSL Bore Diam.: ..... mm
Screen From: .....to..... mBGSL Well Cap Secure? .....

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	DO (.....)	Ox-Red Pt. (± mV)	SWL (mBGSL)	(NTU)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
	4	13.99	4.4	0.698	1.94	0.448		563	odour, cloudy, slight sheen
	BATTERY FLAT								
14/6	7.5	13.61	4.15	0.913	1.32	0.585		1000 11.00	
15:20	~	14.15	5.65	1.03	13.49	0.657	-	218	1.65 SWL, odour + sheen

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Parameters / Preservatives	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes
Casing Int. Dia (mm) 50 100 150
Vol (L/m of casing) 2.0 7.9 17.7
*Double for gravel pack

2.05
4.1L

7936

Purging and Sampling Record

3.4m Bore ID: GB5

Job Information	Sampling Information	Bore Information
Client:	Sample Method:	SWL: 2.55m ✓ mBGSL Logic Check:
Project:	WQ Meter Type:	Date: Time:
	Flow Cell: Y / N Pump Depth:.....m	Ref.datum: Stick Up: m
Proj. No.:	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 5.0m ✓ mBGSL Bore Diam.: mm
Sampler:	NAPL Check:	Screen From:.....to..... mBGSL Well Cap Secure?

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	DO (.....)	Ox-Red Pt. (± mV)	SWL (mBGSL)	NTU (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
	~~5~~ 11	16.06	5.51	0.~~2~~85	4.31	0.183	4.5	471	
1556 1.55	✓	15.98	6.07	0.301	5.62	0.198		385	3.4m SWL, post simple
~~17~~									
11 17 15:35	11						2.4m		
18 17	11						2.55		
							2.3m	+ floater	
~~20~~		1305	6.78	-94	5.00	0.317	3.75		(NTU 9.2)

Field QA Checks:	Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Air bubbles in vials? Y / N Any violent reactions? Y / N	Preservatives													
Decontamination? Y / N														
Was sampling equipment pre-cleaned? Y / N														
COC updated? Y / N Field Filtered? Y / N														

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Sheen, slight odour (petrol),

Purge Volumes			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7
*Double for gravel pack			

2024 x3 x4 x1 x5 new .535 x2

Purging and Sampling Record

Bore ID: GB6

Job Information	Sampling Information	Bore Information
Client: Jim's Roadhouse	Sample Method:.....	SWL: ..... m bRef Logic Check: .....
Project: Groundwater Monitoring	WQ Meter Type:...Horiba (H)	Date: ..... Time: .....
.....	Flow Cell: Y / N Pump Depth: .....m	Ref.datum: Top of casing Stick Up: m
Proj. No.: 7936	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 8.0m 7.85 m b toc Bore Diam.: 50 mm
Sampler:	NAPL Check:.....	Screen From..?..to..?. m b toc Well Cap Secure?.....

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	~~ORP*~~ (± mV)	Elec.Cond (mS/cm)	DO mg/L	DO %Sat	Turbdity NTU	SWL (m btoc)	Comment: Colour / Turbidity	Sediment	Odour	Sheen	Other
Stable When:		*+/- 0.2 C*	*+/- 0.05 pH*	*+/- 10 mV*	*+/- 3%*	*+/- 10%*			*stable*					
7/7 14:00	6.6								4.8 m	base @ 8.0m				
11/7 14:55	~~6.6~~								4.8 m	" "				
	18.0													
18/7 11:45	-								5.0m	" "				
	/	14.08	7.20	112	0.447	4.3	41.2	56.0	4.9m					

Field QA Checks:	* ORP = oxidation reduction potential using an Ag/AgCl electrode with a 3.33 mol/L KCl internal solution.
Air bubbles in vials? Y / N Any violent reactions? Y / N Decontamination? Y / N Was sampling equipment pre-cleaned? Y / N COC updated? Y / N Field Filtered? Y / N	ORP_{SHE} = ORP + 206 - 0.7(t-25) mV (t-0~60 °C)

Comment:

Br = brown; Lt = light; dk = dark. No vis = none visible. VL = very low.

Purging and Sampling Record

Bore ID: GB7

Job Information	Sampling Information	Bore Information
Client: Jim's Roadhouse	Sample Method:.....	SWL: ..... m bRef Logic Check: .....
Project: Groundwater Monitoring	WQ Meter Type:...Horiba (H)	Date: ..... Time: .....
.....	Flow Cell: Y / N Pump Depth: .....m	Ref.datum: Top of casing Stick Up: m
Proj. No.: 7936	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 9.0m 7.85 m b toc Bore Diam.: 50 mm
Sampler:	NAPL Check:.....	Screen From..?..to..?. m b toc Well Cap Secure?.....

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	ORP* (± mV)	Elec.Cond (mS/cm)	DO mg/L	DO %Sat	Turbdity NTU	SWL (m btoc)	Comment: Colour / Turbidity	Sediment	Odour	Sheen	Other
Stable When:		*+/- 0.2 C*	*+/- 0.05 pH*	*+/- 10 mV*	*+/- 3%*	*+/- 10%*			*stable*					
2:12									7.65	8m total	drag			
~~15:55~~	~~15:55~~	15:25							~~7.8m~~	7.6 SWL				
15:55	15:55	~~13.41~~							8.2m	→ Plastic	wet	→ minus 5cm	7.7m	
~~13.41~~		13.41	6.88	133	0864	2.24	21.1	170	7.7m					

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

* ORP = oxidation reduction potential using an Ag/AgCl electrode with a 3.33 mol/L KCl internal solution.
ORP_{SHE} = ORP + 206 - 0.7(t-25) mV (t-0~60 °C)

Comment:

Br = brown; Lt = light; dk = dark. No vis = none visible. VL = very low.