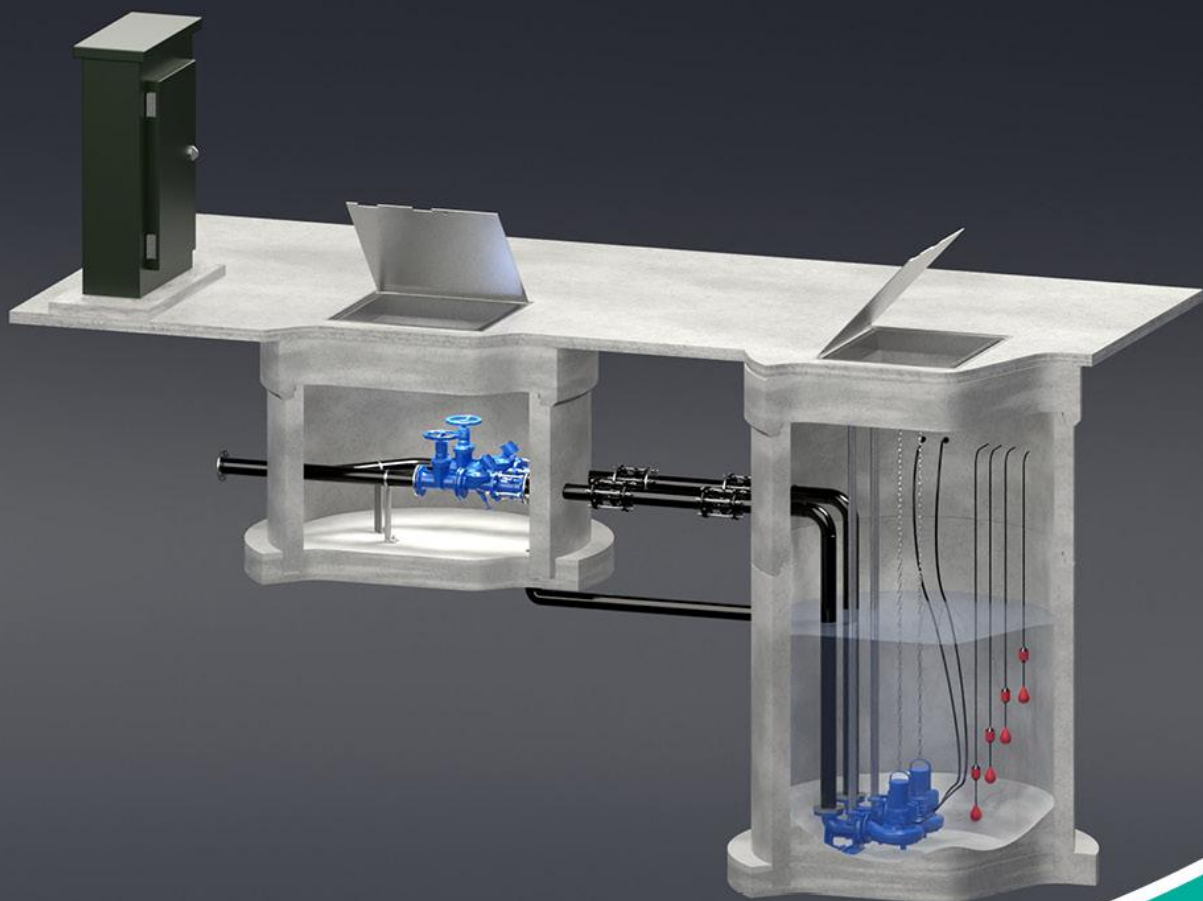


BRYMER FARM DEVELOPMENT WASTEWATER PUMP STATION A, HAMILTON TECHNICAL SPECIFICATIONS

MAVEN WAIKATO LTD

12 AUGUST 2026



Peter Carroll – Aquate Director
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www.aquate.co.nz

Foreward

This installation manual is a guide only. All relevant Health and Safety laws and codes of construction must be adhered to and take precedence over any information in this manual. Installers must practice good professional practice and are required to understand all National and Local regulations in respect to the installation of drainage materials.

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APPENDICES

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1.2 Pumps/Pump Performance

See full specifications in the Appendices

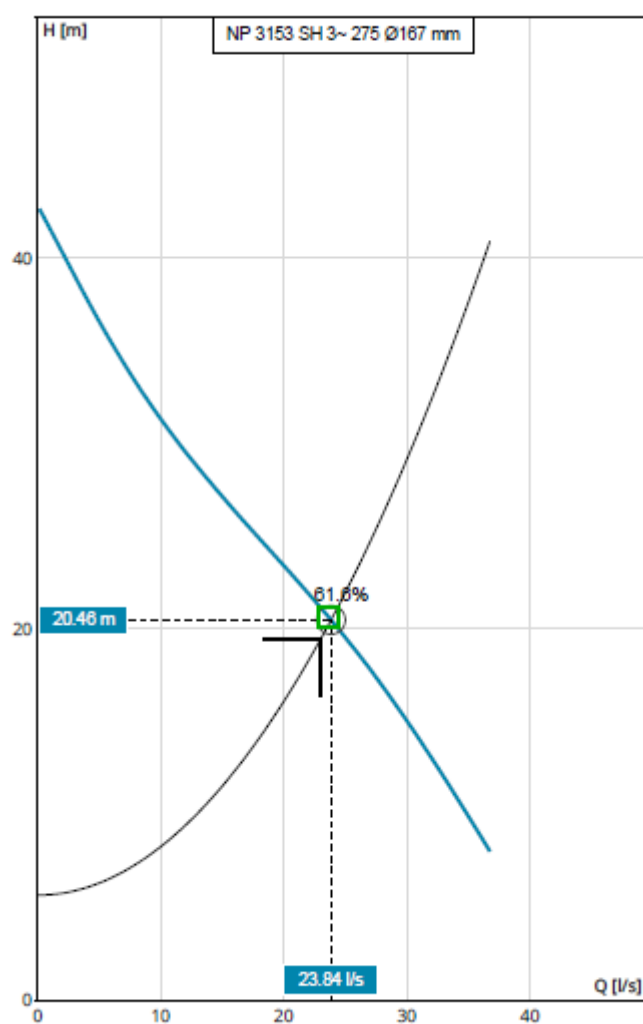
Manufacturer: Xylem Pumps

Type: Flygt NP3153 SH3 275

Connection: 415 V, 50 Hz

Power: 11 kW

Phases: Three



1.3 Design Information

1.3.1 Storage Calculations

The total Average Dry Weather flow has been calculated from the expected flow rate with the following assumption:

Average dry weather flow= 283.7 m³/day

Total emergency storage required is 9 hours = 106.39 m³

Total emergency storage in wet-well and emergency storage tank is 111.1 m³ so 9.4 hours storage has been provided.

1.3.2 Pump Design

The system above has been designed based on the information provided below.

Rising main length : 461 m

Static Lift : – 5.6 m

Rising main – PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm)

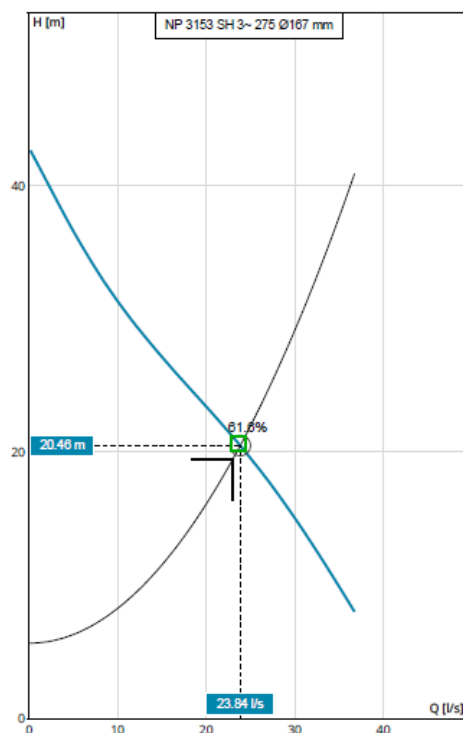
Pipe OD = 180mm , Pipe ID = 147.2mm

Option 1 K = 1.5

Flygt NP3153 - Flow rate = 23.84 l/s with a total head loss of 20.46 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.4 m/s

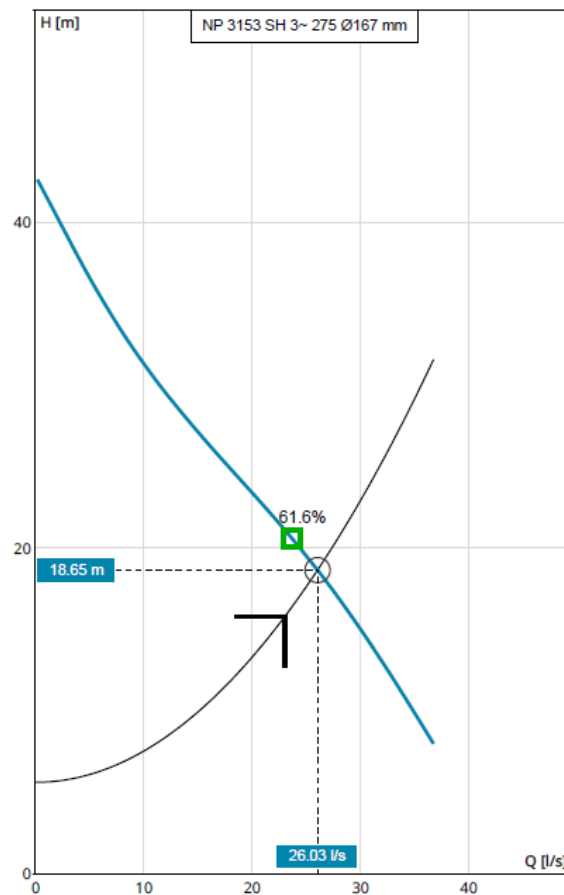


Option 2 $K = 0.5$

Flygt NP3153 - Flow rate = 26 l/s with a total head loss of 18.65 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.53m/s



1.3.3 Pump Operational Levels

The operational levels will be set as follows (dimensions taken from floor of wet-well) :

- High level alarm - 1150mm
- Assist Pump Start – 1050mm
- Duty Pump Start – 1000mm
- Both Pumps Stop – 350mm
- Low Level alarm : 300mm

1.3.4 Pump Stop/Start Calculations

Expected daily flow:	283700	litres
Infiltration (l/day)	0	litres
SWI (l/day)	0	litres
Peaking factor :	6.7	
ADDWF	3.28	l/s
PDDWF	8.77	l/s
PWWF	22.00	l/s
Pump Station diameter	1.8	m
Pump station depth (total)	5.5	m
Pump station depth (effective)	4.5	m
Volume (effective)	11.45	m ³
Pump Stop Level	0.4	m
Pump Start Level	1	m
Volume to pump:	1526	litres
Discharge rate:	26	l/s
Time to empty: (PDDWF)	1.5	minutes
Time to empty: (PWWF)	6.4	minutes
Time to fill (PDDWF)	2.9	minutes
Time to fill (PWWF)	1.2	minutes
No starts/ hour (PDDWF)	13.7	
No starts/ hour (PWWF)	8.0	
No starts per pump (PDDWF)	6.9	
No starts per pump (PWWF)	4.0	
Max Start/Hour permissible	30	Okay

1.4 Pipework, Valves and Fittings

Discharge connection:	100 mm diameter flange coupler
Inlet and outlets:	the inlet pipe to be installed on site and sealed by the drainage contractor. The outlet pipe is pre-installed in the factory.
Discharge pipework:	Includes a non-return valve, dismantling joint and an isolation valve.
Lifting chains:	a stainless steel chain is connected from the pump to the underside of the chamber for ease of pump removal if required.
Materials:	All pipework will be 100mm 316 Stainless steel Schedule 40 and will be manufactured to the relevant AUS/ NZ Standards

Guide rails: Stainless steel

1.5 Access lids

Steel access lids (1200 x 900mm) will be supplied as per the RITS design

1.6 Magflow metre

An ABB Process Master DN100 is included installed in a 1200mm diameter manhole

1.7 Level Sensors

1 off – ABB Black Box Hydrostatic level sensor

4 off – Flygt ENM10 float switches for Low level and High-level alarms

1.8 Electrical & Controls

This controller is designed on the latest 2023 HCC drawings which are quite different to their previous standards. Any comparison to a competing proposal should ensure that the same standards have been used in the pricing.

This allows for the design, including production of electrical drawings, build and factory acceptance testing (FAT) of the pump station controller.

The design will include::

- 1 x Allen Bradley Micro800 PLC and IO modules as per their standard design.
- 1 x programming of Allen Bradley PLC.
- 1 x Trio Radio unit for communicating to HCC's SCADA system.
- 1 x battery backup for communication and PLC 24VDC circuits.
- 1 x supply of aerial for radio communication to base station.
- 2 x DOL starting configuration with overload and short circuit protection as per HCC standards, for each pump.
- 2 x current transducers and amp meters.
- 2 x capacitors for power factor correction.
- 1 x phase failure relay with output to PLC.
- 1 x surge divertor with output to PLC.
- 1 x level indicator input.
- 1 x flow indicator input.
- 22mm dia push buttons and selector switches for pump circuitry and control.
- Cabinet door switches and internal lights.
- Anticondensation heaters for cabinet.
- 2 x isolation switches for the pumps.
- 1 x Cubic internal panel. Note this differs to the HCC drawing but is of an equal or better quality to the Bremca 250 series panel.
- 1 x generator connection with interlocked mains/generator breakers.
- RCD protected service plugs mounted within cabinet.

- 1 x painted aluminium pillar box approximately 1.95 x 1.525 x 0.5m (l x h x d) with multiple door access, and internal panels.
- 1 x full CAD drawings.

We have not allowed for any of the following:

- Supply of any boosting to the radio signal if the standard Trio radio unit and standard aerial is insufficient.
- Supply of any site metering although space left in cabinet for a smart meter.
- Any civil works including construction of plinth for controller to mount to.
- Any on site installation including running of cable to and from controller, or mounting revenue meter (if required), or installing any on site lighting, installing the aerial or aerial base. It is suggested the site electricians are engaged to do this where required.

1.9 Odour Control System

This has been excluded as per RITS standards. See section 5.3.7.16 RITS.

1.10 Protective lining

The wet-well including the underside of the lid will be lined with Blue-seal HDPE lining for sulphuric acid resistance (see Appendices)

1.11 Well-washer

A McBerns well washer has been specified by RITS – see appendices for details

A sprinkler system using BETE nozzles has been included in the storage tanks to RITS design

1.12 RPZ Cabinet

A steel cabinet to RITS design has been included along with an RPZ standpipe and two off solenoid valves for the well washer and sprinkler system

1.13 Inlet valve

A 150mm diameter knife-gate valve will be installed on the inlet pipe in to the wetwell. This includes a spindle to the underside of the lid

2 Construction

The pump station has been design using reinforced precast concrete components. The system will be fabricated off site and delivered to site ready for installation. The tank will have a 14800 litre capacity and a total depth of 5.65 m.

The pump stations will be delivered to site in a kit-set format and will need to be installed in the ground by the drainage contractor.

The construction and commissioning of the Aquate pump station will then be completed by a trained Hynds Environmental Construction Technician.

3 Safety in Design

This pump station has been designed to minimise any risk to operators and service personnel.

Access into the pump station should not be required for ongoing maintenance as almost all servicing work can be completed from ground level. The main components can be accessed as follows:

- Pumps – these can be removed from the pump station by lifting them up out of the wet-well and inspecting above ground. Note : the pumps weight 68 kg each.
- Floats – can be lifted from the connection points in the access hole in the lid.
- Non-return valves/Isolation valves –can be access from ground level without the need to enter the chamber
- Venting will be required and will need to be installed on site. The access lids are air-tight.

Risk register

The risk register is a live document which requires continuous monitoring updating. This will need to be completed by the maintenance company for the pump station. The items below are a guide only.

The safety and design and Hazops workshops have encompassed risks for normal operation of the vacuum wastewater pump station. Specific risks for the maintenance process are outlined below.

Risk matrix

			Consequence / potential severity				
			Minimal Non-injury or First Aid injury (FAI)	Minor Medical treatment injury	Moderate Medical treatment injury, with lost time (LTI)	Major Injury requiring hospital-/notifiable event	Catastrophic Fatality or multiple fatalities
Likelihood	Very high	Almost certain: Commonly occurs	3: Medium	4: High	4: High	5: Very high	5: Very high
	High	Likely: Could easily happen	2: Low	3: Medium	4: High	4: High	5: Very high
	Medium	Possible: Could happen or has been known to happen	2: Low	2: Low	3: Medium	4: High	4: High
	Low	Unlikely: Hasn't happened yet but could happen	1: Very Low	2: Low	3: Medium	3: Medium	4: High

	Very low	Rare: Very unlikely but could happen in exceptional circumstances	1: Very Low	2: Low	2: Low	3: Medium	4: High
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	Hazards (<i>one per line</i>)		Hazard controls – what do we need to do to make it safe?	
What are we doing? (<i>step by step</i>)	What could cause harm?	Existing risk level (<i>use risk matrix</i>)	Eliminate/ Controls	Residual risk level
Wet-well inspection	The wet-well is classified as a confined space, an inspection is required prior to wet commissioning.	3	Elimination: The vessel will be isolated from the system at all exit points and inspected from the access hole in the lid . Isolate/Engineering Controls/PPE: Entry will only be required if debris is identified and cannot be removed by any other means. Entry to the vessel should follow confined space protocols, including ensuring all persons involved have the required training, admin and PPE controls.	1 1
Sewage Pump Testing	The wet well will be filled up for wet testing. This is a potential drowning hazard.	3	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well. Engineering Controls/PPE: All essential persons to wear appropriate protection. Sewage pump shall only operate when required for wet testing..	1 1
Removing lids for access	Traffic moving through area Back strain	3 2	Isolate/Engineering Controls/PPE: Place cones around service area so vehicles cannot enter site Engineering Controls/PPE – use appropriate lifting equipment if lifting pumps / lids on site	
Removing pumps	This is a falling hazard	4	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well.	
Electrical checks	Electrical shock	3	Engineering Controls/PPE: Only fully certified electricians to complete electrical work	

4 Warrantees

Aquate guarantees the performance and quality of its pump stations provided:

- The product is only used for the intended purposes as stated in the quote
- The control panel and pump station is correctly installed and commissioned by a suitable installer
- The fault is due to a defect in design, materials or workmanship
- The fault is reported to an Aquate agent or representative during the guarantee period
- No pump station components have been replaced by alternative products
- This guarantee does not cover faults resulting from misuse of the system, blockages or breakdowns caused by the introduction of inappropriate materials into the system, incorrect electrical installation of the control unit, deficient maintenance or normal wear and tear.

Aquate assumes no liability for bodily harm, property damage or economic losses as a result of its pump stations.

4.1 Pumps

The pumps come with a 12 month year warranty against faulty components and/or workmanship. If prohibited substances are introduced to the system causing the pump to block and burn out, the warranty is null and void.

Flygt undertakes to remedy faults in products sold by Flygt provided that:

- The fault is due to defects in design, materials or workmanship;
- The fault is reported to a Flygt representative during the guarantee period;
- The product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;
- The monitoring equipment incorporated in the product is correctly connected;
- All service and repair work is done by a workshop authorized by Flygt or the original manufacturer;
- Genuine manufacturer's parts are used
- Storage should be in accordance with the care and maintenance manual.
- The equipment is operated and maintained in accordance with the Operation and Care and Maintenance Manual.

Failure to comply with these requirements will render warranty void unless, due to the nature of the warranty claim, such voiding of warranty is prevented by law, regulation, act and/or ordinance.

Hence, the guarantee does not cover faults caused by deficient maintenance, abuse, incorrectly executed repair work or normal wear and tear.

5 Maintenance schedule

A certain amount of system maintenance is required on an ongoing basis to ensure that the system is working correctly. This is the responsibility of the owner

5.1 Six monthly

The following procedures should be completed every six months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Lift the floats and test the alarm system/pump operation
- Consult with the electrical control supplier for additional checks

5.2 Annually

The following procedures should be completed at least once every 12 months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Lift the floats and test the alarm system/pump operation
- Press the mute button (audio alarms only) to check the audio alarm turns off.
- Visually check the pump station for any structural damage to the tank and pipework
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Have the pump station sucked out to remove any debris/stones if necessary

5.3 Maintenance requirements

The pump maintenance and repair operations must be carried out by workers authorised by the manufacturer; Failure to comply with these instructions will result in forfeiture of the warranty and jeopardise the unit's safety.

Before any cleaning and/ or maintenance operations are carried out on the electric pump, the power supply must be switched off.

To disconnect the submersible electric pump from the electricity mains, first disconnect the phase conductors, then the yellow –green earth wires.

Use the special handle to remove the submersible electric pump from the tank.

ATTENTION: Before carrying out any operations, check the pump temperature. Only work on the pump when it is at room temperature.

Clean the electric pump thoroughly, using a jet of water or specific products to clean all its parts. When disposing of the waste material, follow the antipollution rules in force.

Replace any broken or worn parts with original spare parts only.

Given the likelihood that work on the electric pump will be carried out in confined spaces such as vats, wells, cesspools, tanks or cisterns, do not underestimate the risks caused by potentially poisonous exhalations.

APPENDICES

General Arrangement Drawing – Plan

General Arrangement Drawing – Section

General Arrangement Drawing – Plan with tank

General Arrangement Drawing – Section with tank

Flygt NP3102 SH3 255 Specifications k 1.5

Flygt NP3102 SH3 255 Specifications k 0.1

McBerns well washing brochure

Hynds Retention Tank brochure

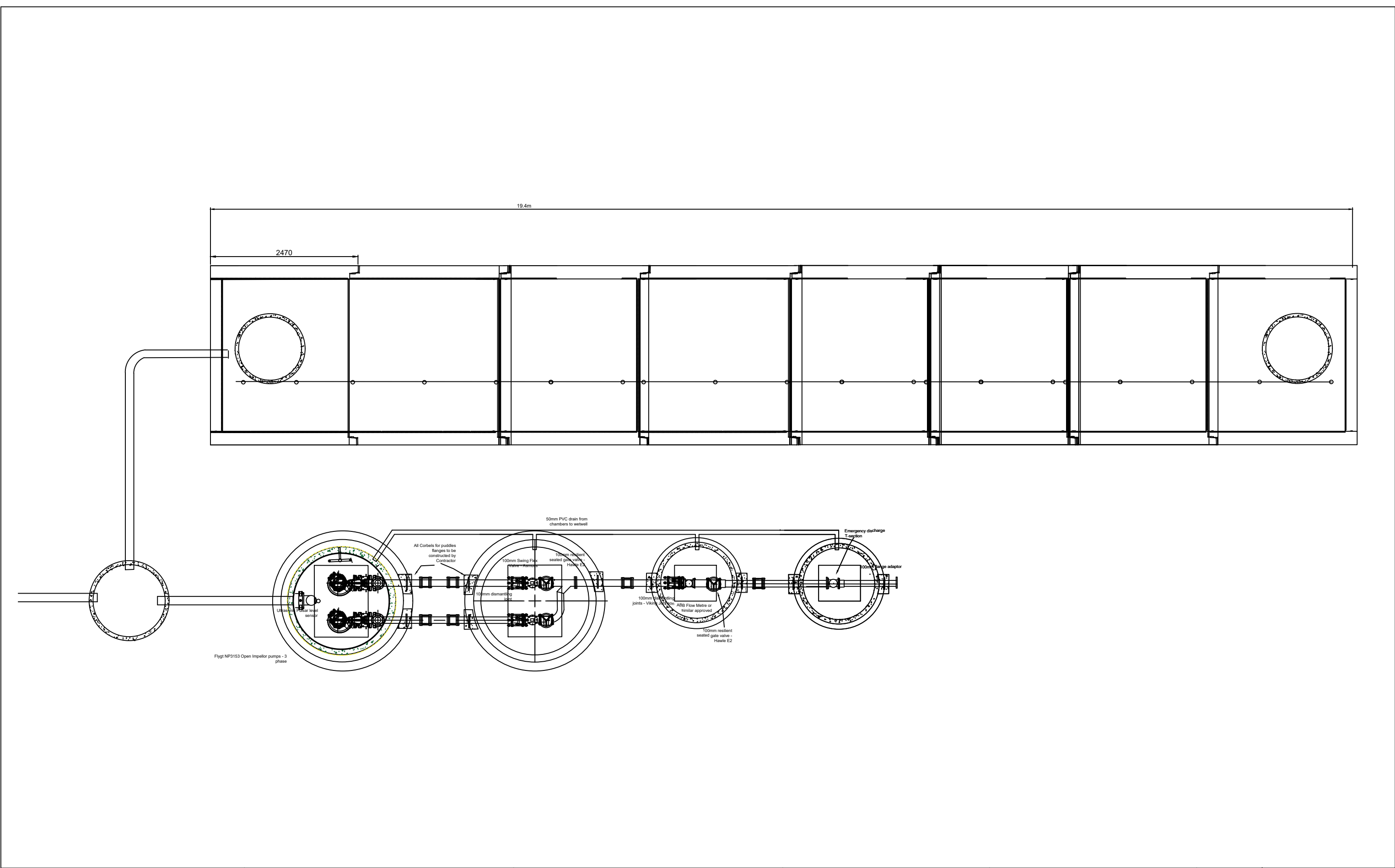
BlueSeal-AKS data sheet

Hyliner HDSPE liner – data sheet

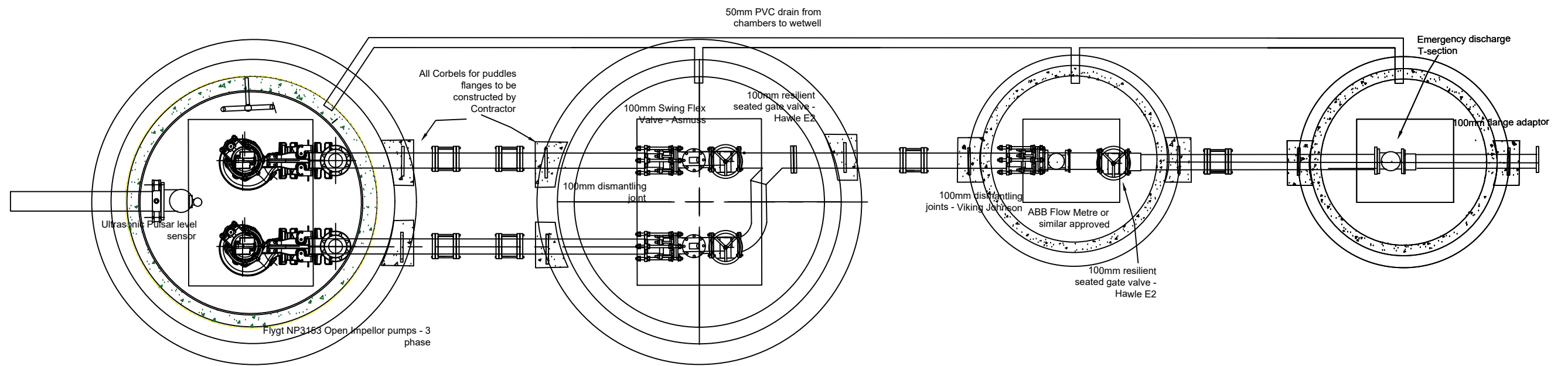
ABB Magflow Meter Specifications

ABB Blackbox level sensor specifications

Flygt ENM10 float switch specifications



NOTES: 1.	REVISIONS			PO Box 58142, Botany, Auckland, 2316 Tel: 09-274 0316 Fax: 09-272 7485 email: hwwsupport@hynds.co.nz  © 2025 HYNDS PIPE SYSTEMS LTD This drawing is the property of Hynds Pipe Systems Limited. Not to be disclosed to any other person without permission from Hynds Pipe Systems Limited. It is submitted for use only in connection with proposals and contracts of Hynds Pipe Systems Limited upon the express condition that it is not to be reproduced or copied in any form. Data to be used only with reference to products manufactured and supplied by Hynds Pipe Systems Limited. ISO 9001 CERTIFIED MANAGEMENT SYSTEM	PROJECT: WWPS A Brymer Farms Development Hamilton Wastewater Pump Station A		DRAWING TITLE: Plan View with tank		REFERENCE/QUOTE NUMBER: AQ2207A	
	REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:	DRAWN: PC		DESIGN: PC		CHECKED: JB	
	A	Preliminary design	29/7/26	PC	SIGNATURE:		SIGNATURE:		SIGNATURE:	
	B	Changed pump to NP3153, storage tank changed to 19m long	7/8/26	PC	SCALE: As Shown		Note: Do not scale drawing if in doubt ASK!!!		DATE: 29/7/26	
					PAPER SIZE: A3		DRAWING NUMBER: AQ2207A 3		SHEET NUMBER: of 4	
									REVISION NUMBER: B	



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REVISIONS

REV #	REVISION DESCRIPTION	DATE	DRAWN
A	Preliminary design	29/7/26	PC
B	Changed pump to NP3153	7/8/26	PC

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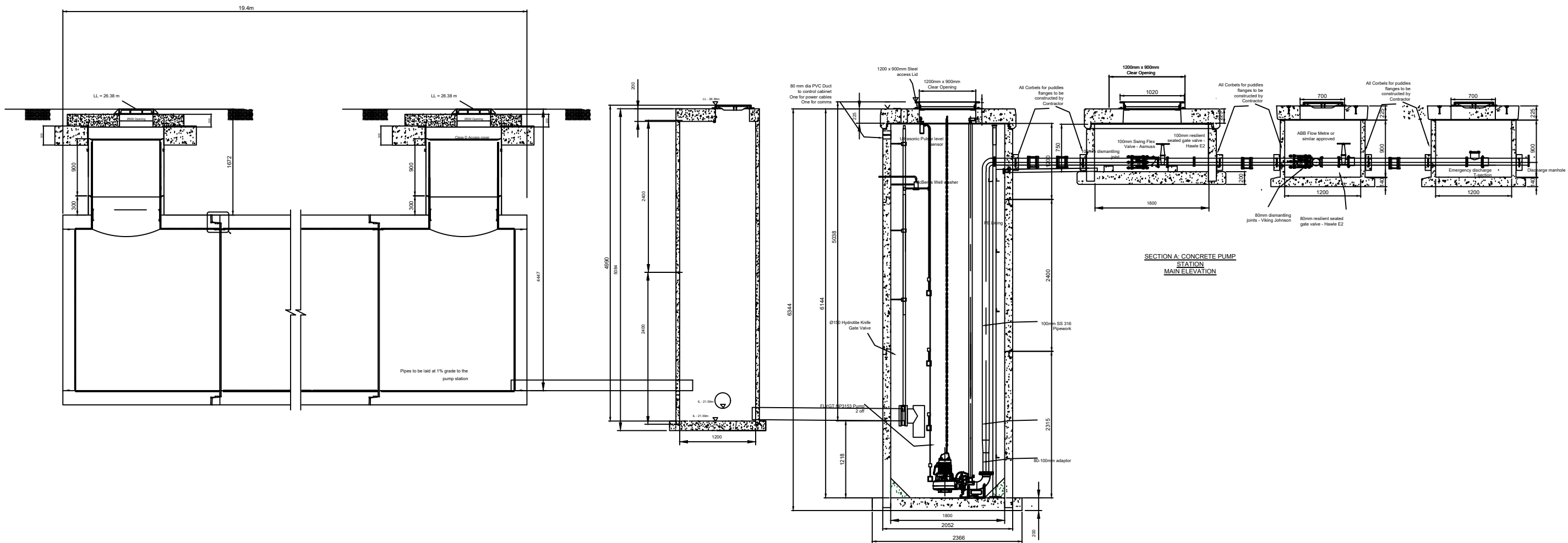
ISO 9001 CERTIFIED MANAGEMENT SYSTEM



PROJECT:
WWPS A
Brymer Farms Development
Hamilton
Wastewater Pump Station A

DRAWING TITLE:
Plan View

REFERENCE/QUOTE NUMBER:	AQ2207A	
DRAWN: PC	DESIGN: PC	CHECKED: JB
SIGNATURE:	SIGNATURE:	SIGNATURE:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	
PAPER SIZE: A3	DATE: 29/7/26	
DRAWING NUMBER: AQ2207A 3	SHEET NUMBER: of 4	REVISION NUMBER: B



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REVISIONS			
REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Preliminary design	29/7/26	PC
B	Increased depth of wetwell, lowered storage tank	3/8/26	PC
C	Changed pump to NP3153, storage tank changed to 19m long	7/8/26	PC

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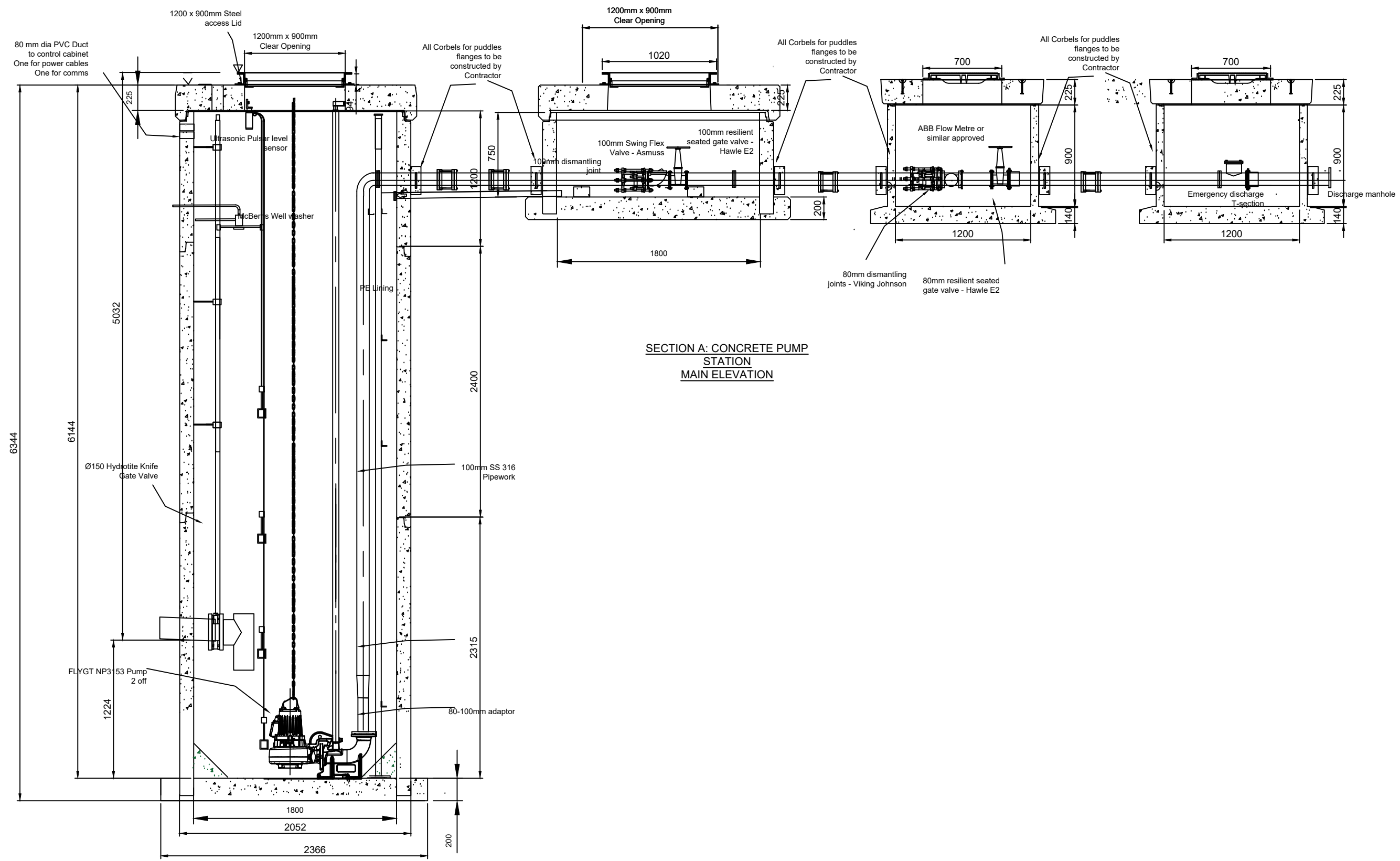
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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
WWPS A
Brymer Farms Development
Hamilton
Wastewater Pump Station A

DRAWING TITLE:
Section View with tank

REFERENCE/QUOTE NUMBER: AQ2207A		
DRAWN: PC SIGNATURE:	DESIGN: PC SIGNATURE:	CHECKED: JB SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt ASK!!!	DATE: 29/7/26
DRAWING NUMBER: AQ2207A 2	SHEET NUMBER: of 4	REVISION NUMBER: C



SECTION A: CONCRETE PUMP
STATION
MAIN ELEVATION

NOTES:

1.

REVISIONS			
REV #	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Preliminary design	29/7/26	PC
B	Increased depth of wetwell, lowered storage tank	3/8/26	PC
C	Changed pump to NP3153	7/8/26	PC

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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
WWPS A
Brymer Farms Development
Hamilton
Wastewater Pump Station A

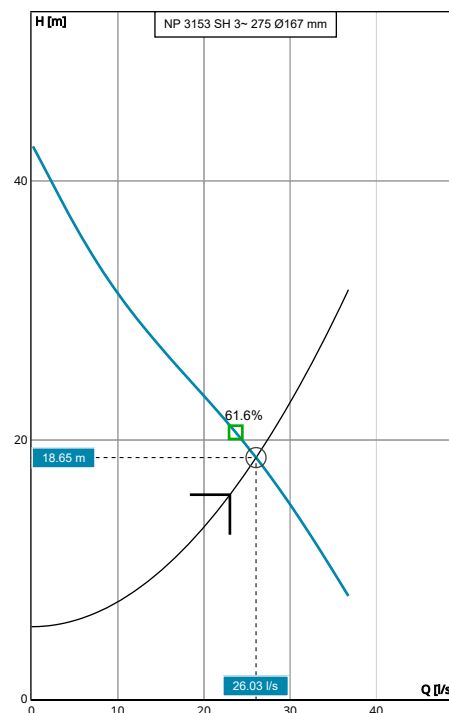
DRAWING TITLE:
Section View

REFERENCE/QUOTE NUMBER: AQ2207A		
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SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt ASK!!!	DATE: 29/7/26
DRAWING NUMBER: AQ2207A 1	SHEET NUMBER: of 4	REVISION NUMBER: C

NP 3153 SH 3~ 275 | Configuration Summary



Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	167 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material
Hard-Iron
Volute Material
Grey Cast Iron

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
Y	11 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3153 SH 3~ 275 | Product Details

Description

N 3153

The Flygt N-series are equipped with the Flygt invented N-technology with its innovative self-cleaning impeller. Solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet where it will be guided by a relief groove through the pump housing. This ensures a high sustained total efficiency over time. Due to the mechanical self-cleaning design, a sludge concentration of solids up to 8% can easily be pumped. The pump can easily be installed in either permanently or temporary submerged, or horizontally or vertically dry installations.

Flexible and Modular Design

The modular hydraulic design enables customization of the hydraulics to meet the requirements of many applications.

- Replaceable wear ring in two materials, gray iron or Hard Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-iron impeller for heavy duty wastewater applications containing abrasive and corrosive content
- Chopper ring intended for tough wastewater applications where cutting is required due to long fibres and solid concentrations up to 10-12%
- Stainless steel impeller for special applications that require duplex stainless steel

Robust and Reliable

- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Class H Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties.
- The Plug-in seal with Active Seal system eliminates the risk associated with incorrect installation and careless handling. All in one unit. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Motor cable SUBCAB® specially developed for submersible use
- Offers flexible cooling systems, e.g. closed-loop cooling system, media cooled or external cooling that allows full motor potential in dry installations.
- Premium brand bearings, greased for life, ensures a minimum of 50 000 hours of duty
- Leakage sensor and motor temperature sensor as standard

The N 3153 is available with the following options:

- ATEX, FM, CSA-approvals
- Premium efficiency motors
- Hard Iron hydraulic design
- Stainless Steel hydraulic design
- Vibration-sensor, extended motor temperature sensors, additional leakage-sensor, current-sensor and pump memory
- Compatible with SmartRun® Wastewater pump controller
- Compatible with MAS 801 monitoring system

Product Features

- State-of-the-art wastewater pump with N-technology
- Sustained high efficiency pumping with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

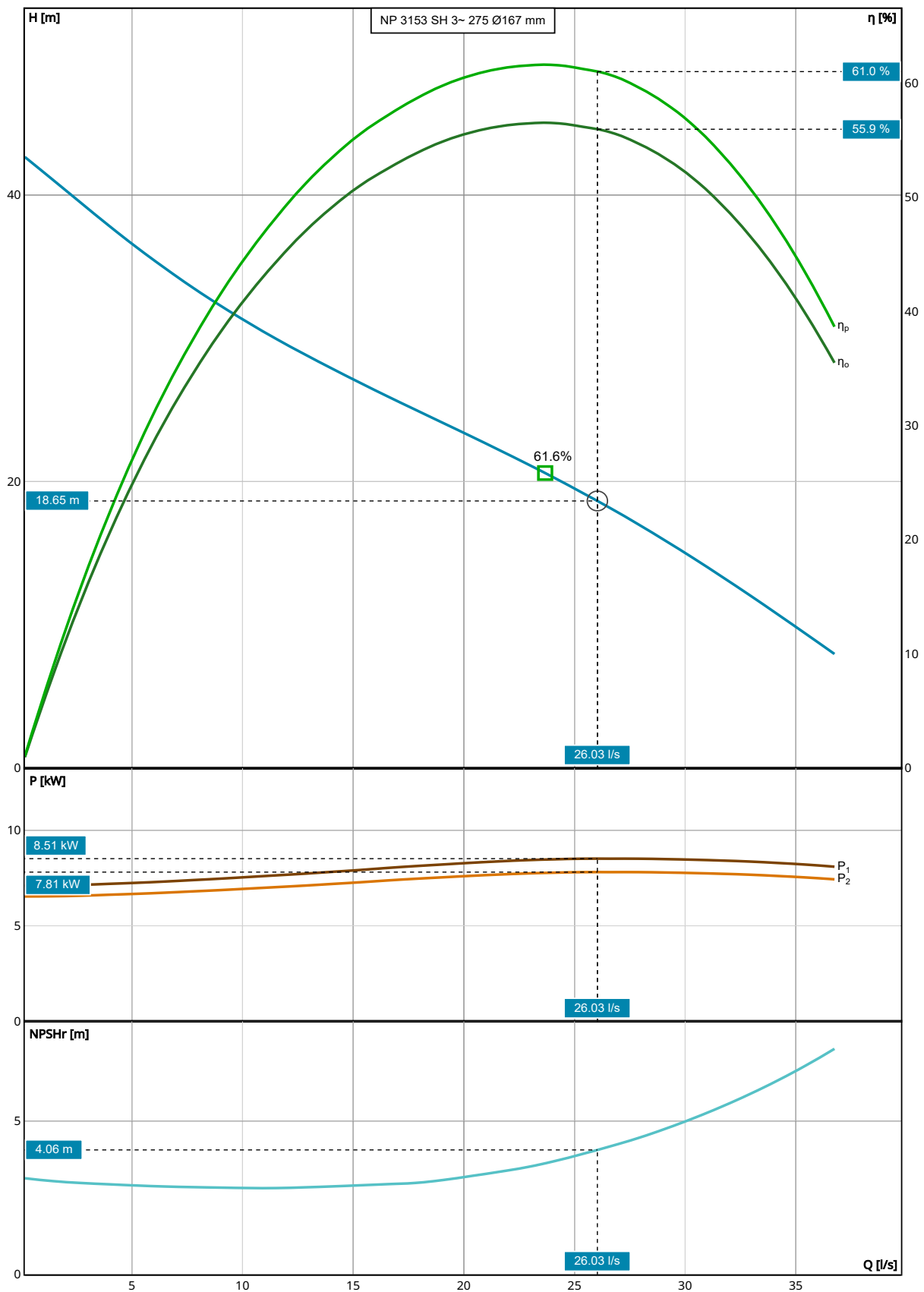
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	-

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
11 kW	3	7.59	10
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-18-2FB	2,905 RPM	H	H
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
185	19 A	0.03 kgm ²	0.94
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	142 A	S1	0.92
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
7.81 kW	142 A	2	0.87
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	47.33 A	101	90.4 %
			Efficiency 75%
			91.6 %
			Efficiency 50%
			92.1 %
			Cooling Jacket
			-

NP 3153 SH 3~ 275 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	275
Name	Impeller Diameter
NP 3153 SH 3~ 275	167 mm
Frequency	Inlet Diameter
50 Hz	150 mm
Total Flow	Outlet Diameter
23 l/s	80 mm
Total Head	Number Of Vanes
15.79 m	2
Pump Flow	
23 l/s	
Pump Head	
15.79 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
26.03 l/s	7.81 kW
Head	NPSHR
18.65 m	4.06 m
Overall Efficiency (η_o)	Speed
55.95 %	2,936 RPM
Pump Efficiency (η_p)	Static Head
61 %	5.6 m
Input Power (P1)	Flow To BEP Ratio
8.51 kW	109.96 %

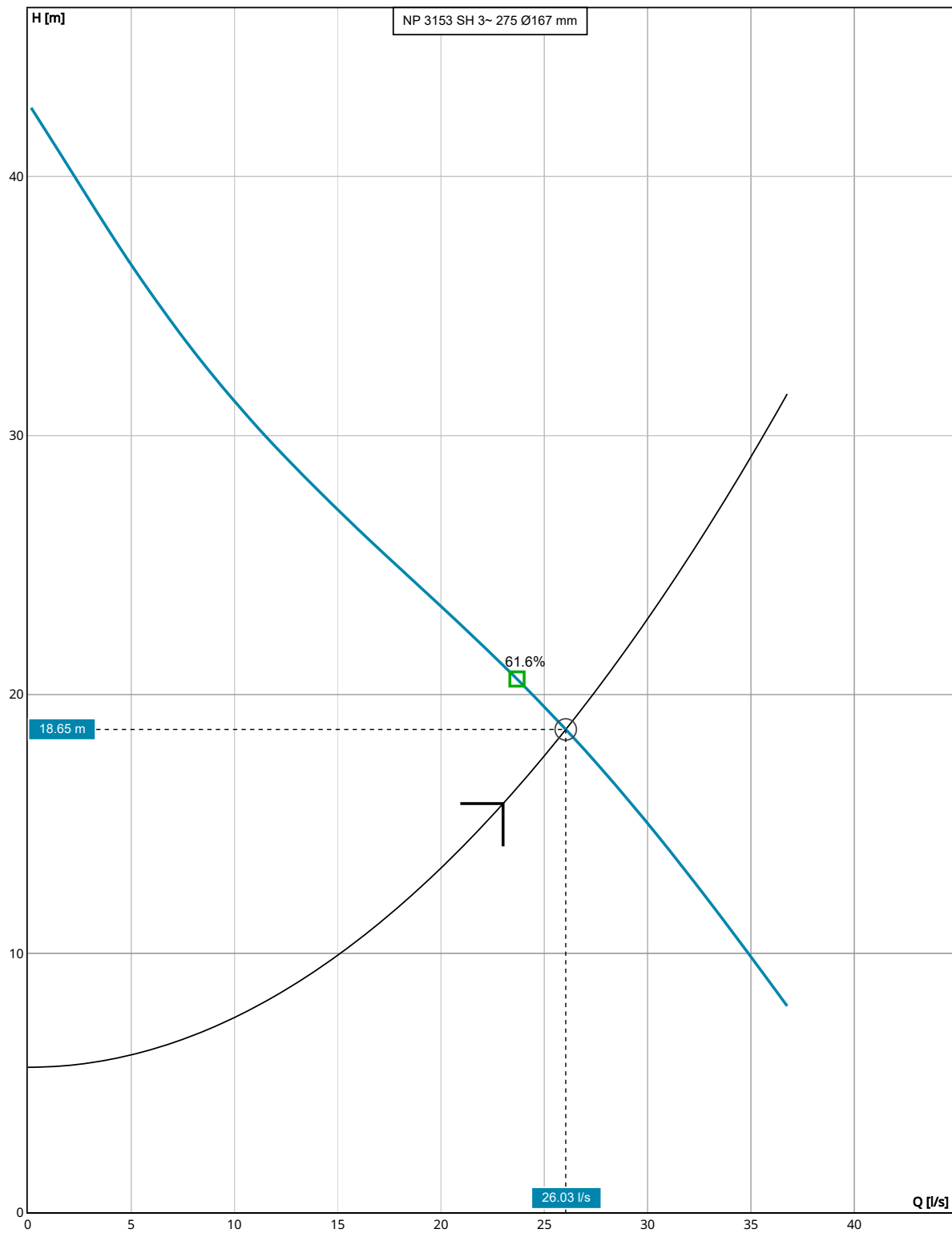
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	23.67 l/s
Max Flow	BEP Head
36.75 l/s	20.6 m
H@QMin	Max P2
42.66 m	7.81 kW
H@QMax	Specific Energy
7.97 m	0.09 kWh/m ³
BEP	
61.6 %	

NP 3153 SH 3~ 275 | Duty Analysis

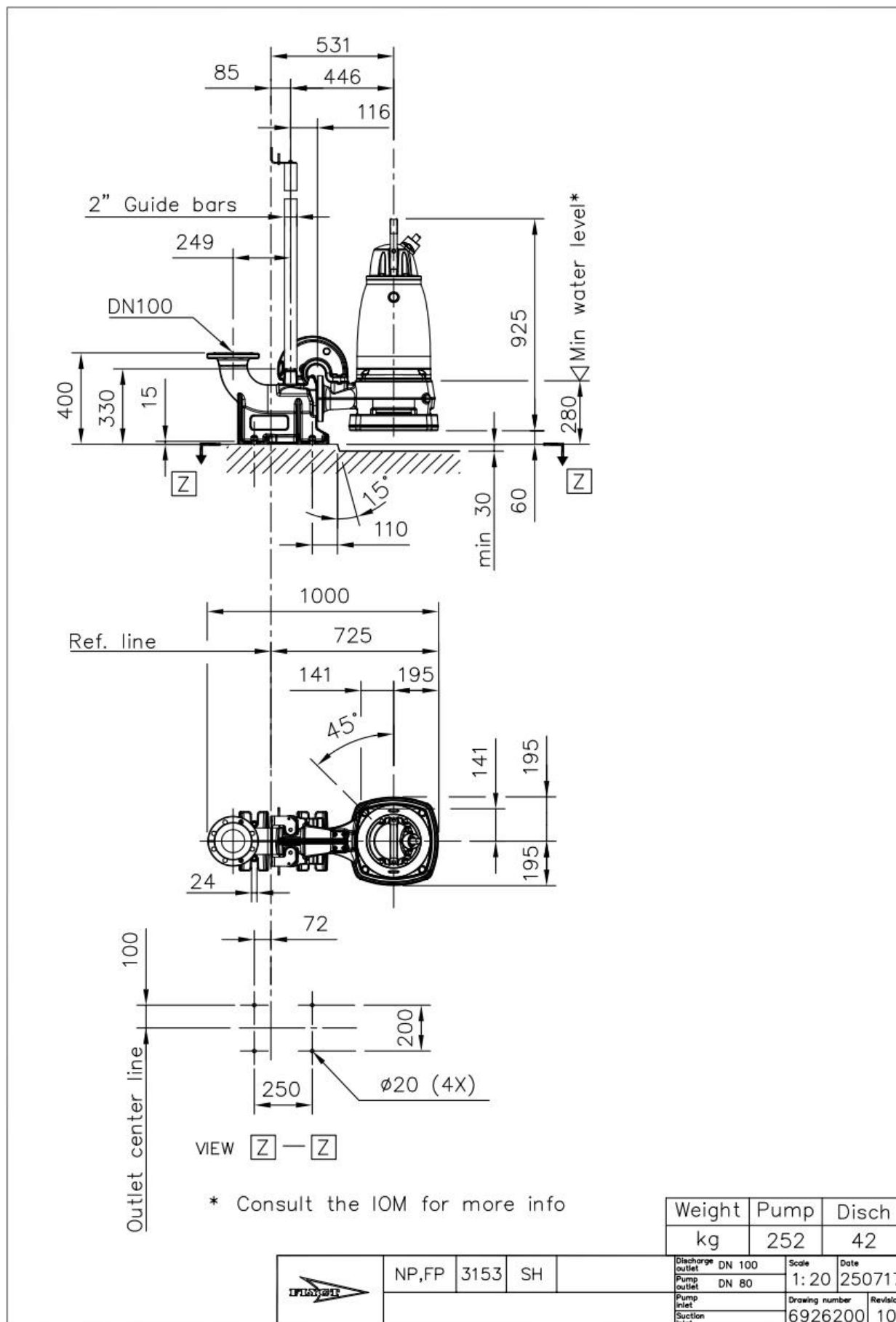


Curve: ISO 9906

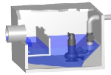
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	26.03	18.65	7.81	26.03	18.65	7.81	61	0.09	4.06

NP 3153 SH 3~ 275 | Dimensional Data & Drawing



NP 3153 SH 3~ 275 | Headloss Calculation



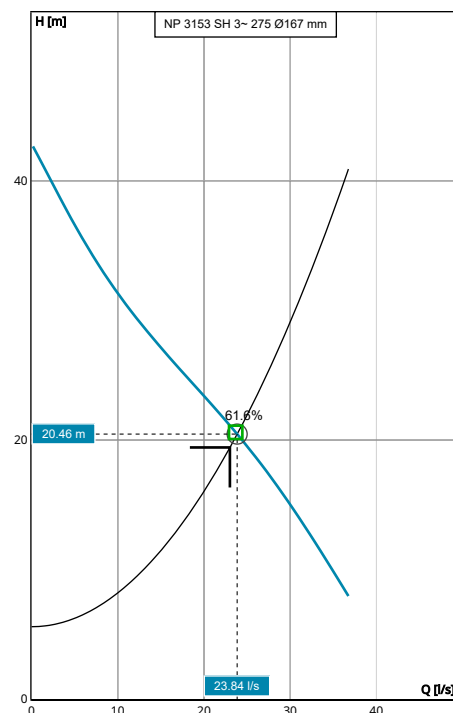
Fluid Type	Water	Total Flow	23 l/s	Kinematic Viscosity	0.000002 m ² /s
Static Head	5.6 m	Operating Pumps	1	System Type	Single Pump
Layout	Wet Installed Submersible Pumps	Calculation Model	Colebrook-White		

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / Pipe 1 / Stainless steel / PN 10 / DN 100 (104x2.0 mm) / New Pipes						
Pipe Length	100 mm	10 m	1	2.93 m/s	0.5 mm	1.35 m
90 Elbow	100 mm	0.3	1	2.93 m/s		0.13 m
Tee Line →  →	100 mm	0.1	1	2.93 m/s		0.04 m
Check Valve	100 mm	0.9	1	2.93 m/s		0.39 m
Gate Valve	100 mm	0.2	1	2.93 m/s		0.09 m
Total Head						2.01 m
Individual Discharge Piping / Pipe 2 / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm) / New Pipes						
Pipe Length	147.2 mm	461 m	1	1.35 m/s	0.5 mm	8.18 m
Total Head						8.18 m
Friction Loss Head						10.19 m
Static Head						5.6 m
Total Head						15.79 m

NP 3153 SH 3~ 275 | Configuration Summary



Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	167 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material
Hard-Iron
Volute Material
Grey Cast Iron

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
Y	11 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3153 SH 3~ 275 | Product Details

Description

N 3153

The Flygt N-series are equipped with the Flygt invented N-technology with its innovative self-cleaning impeller. Solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet where it will be guided by a relief groove through the pump housing. This ensures a high sustained total efficiency over time. Due to the mechanical self-cleaning design, a sludge concentration of solids up to 8% can easily be pumped. The pump can easily be installed in either permanently or temporary submerged, or horizontally or vertically dry installations.

Flexible and Modular Design

The modular hydraulic design enables customization of the hydraulics to meet the requirements of many applications.

- Replaceable wear ring in two materials, gray iron or Hard Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-Iron impeller for heavy duty wastewater applications containing abrasive and corrosive content
- Chopper ring intended for tough wastewater applications where cutting is required due to long fibres and solid concentrations up to 10-12%
- Stainless steel impeller for special applications that require duplex stainless steel

Robust and Reliable

- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Class H Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties.
- The Plug-in seal with Active Seal system eliminates the risk associated with incorrect installation and careless handling. All in one unit. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Motor cable SUBCAB® specially developed for submersible use
- Offers flexible cooling systems, e.g. closed-loop cooling system, media cooled or external cooling that allows full motor potential in dry installations.
- Premium brand bearings, greased for life, ensures a minimum of 50 000 hours of duty
- Leakage sensor and motor temperature sensor as standard

The N 3153 is available with the following options:

- ATEX, FM, CSA-approvals
- Premium efficiency motors
- Hard Iron hydraulic design
- Stainless Steel hydraulic design
- Vibration-sensor, extended motor temperature sensors, additional leakage-sensor, current-sensor and pump memory
- Compatible with SmartRun® Wastewater pump controller
- Compatible with MAS 801 monitoring system

Product Features

- State-of-the-art wastewater pump with N-technology
- Sustained high efficiency pumping with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

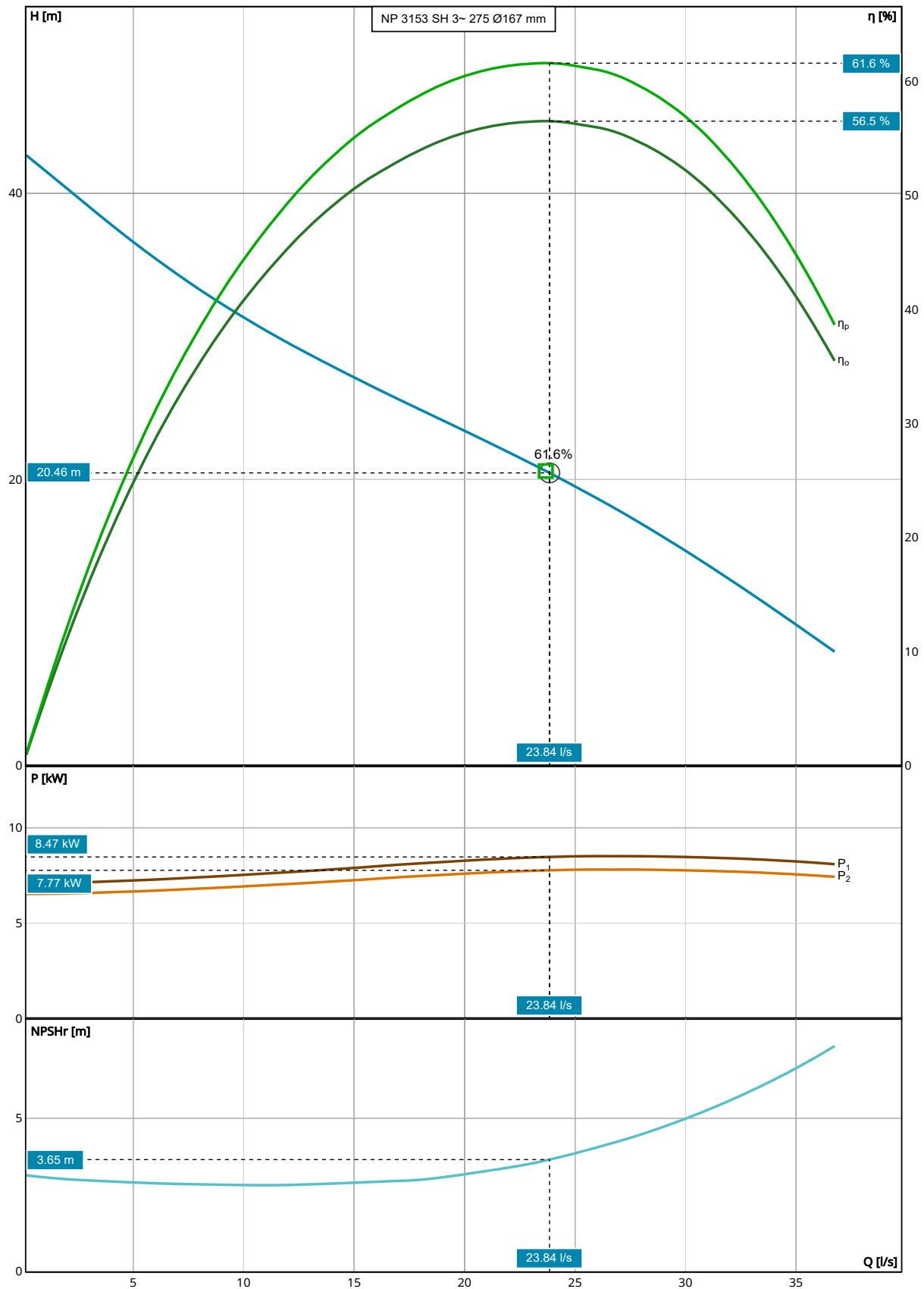
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	-

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
11 kW	3	7.59	10
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-18-2FB	2,905 RPM	H	H
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
185	19 A	0.03 kgm ²	0.94
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	142 A	S1	0.92
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
7.81 kW	142 A	2	0.87
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	47.33 A	101	90.4 %
			Efficiency 75%
			91.6 %
			Efficiency 50%
			92.1 %
			Cooling Jacket
			-

NP 3153 SH 3~ 275 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	275
Name	Impeller Diameter
NP 3153 SH 3~ 275	167 mm
Frequency	Inlet Diameter
50 Hz	150 mm
Total Flow	Outlet Diameter
23 l/s	80 mm
Total Head	Number Of Vanes
19.43 m	2
Pump Flow	
23 l/s	
Pump Head	
19.43 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
23.84 l/s	7.77 kW
Head	NPSHR
20.46 m	3.65 m
Overall Efficiency (η_o)	Speed
56.51 %	2,936 RPM
Pump Efficiency (η_p)	Static Head
61.6 %	5.6 m
Input Power (P1)	Flow To BEP Ratio
8.47 kW	100.71 %

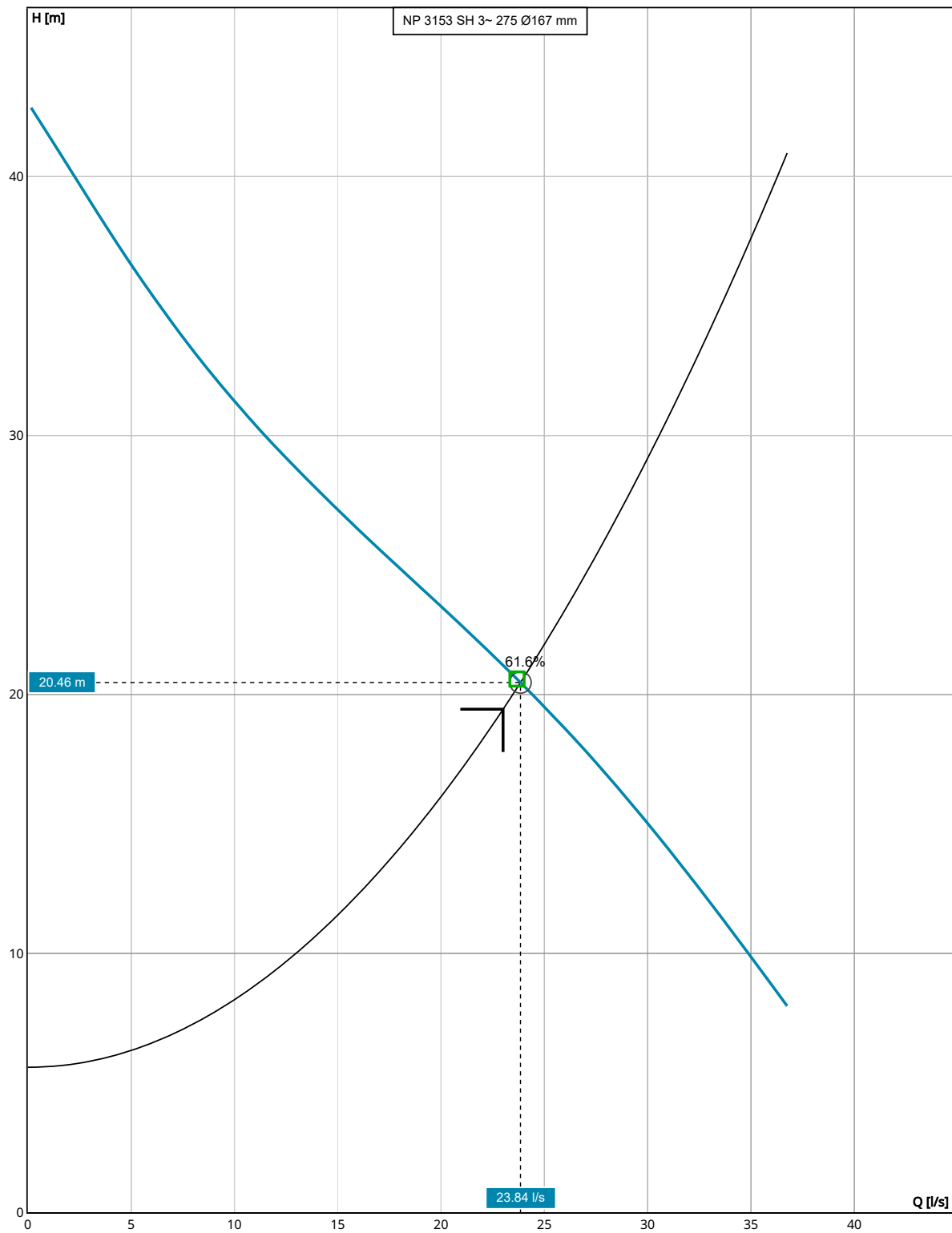
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	23.67 l/s
Max Flow	BEP Head
36.75 l/s	20.6 m
H@QMin	Max P2
42.66 m	7.81 kW
H@QMax	Specific Energy
7.97 m	0.1 kWh/m ³
BEP	
61.6 %	

NP 3153 SH 3~ 275 | Duty Analysis

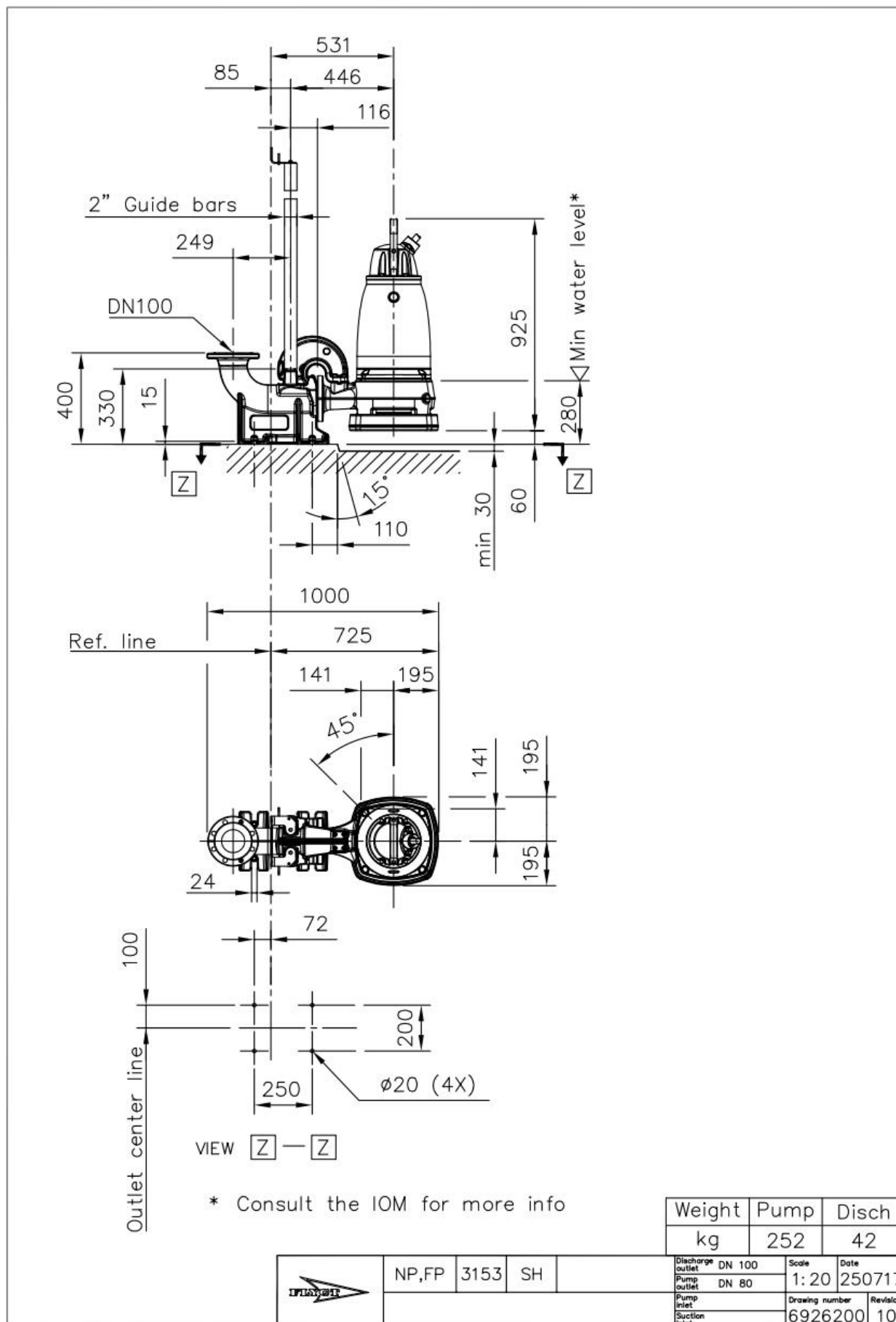


Curve: ISO 9906

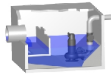
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	23.84	20.46	7.77	23.84	20.46	7.77	61.6	0.1	3.65

NP 3153 SH 3~ 275 | Dimensional Data & Drawing



NP 3153 SH 3~ 275 | Headloss Calculation



Fluid Type	Water	Total Flow	23 l/s	Kinematic Viscosity	0.000002 m ² /s
Static Head	5.6 m	Operating Pumps	1	System Type	Single Pump
Layout	Wet Installed Submersible Pumps	Calculation Model	Colebrook-White		

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / Pipe 1 / Stainless steel / PN 10 / DN 100 (104x2.0 mm) / New Pipes						
Pipe Length	100 mm	10 m	1	2.93 m/s	1.5 mm	1.92 m
90 Elbow	100 mm	0.3	1	2.93 m/s		0.13 m
Tee Line →  →	100 mm	0.1	1	2.93 m/s		0.04 m
Check Valve	100 mm	0.9	1	2.93 m/s		0.39 m
Gate Valve	100 mm	0.2	1	2.93 m/s		0.09 m
Total Head						2.58 m
Individual Discharge Piping / Pipe 2 / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm) / New Pipes						
Pipe Length	147.2 mm	461 m	1	1.35 m/s	1.5 mm	11.26 m
Total Head						11.26 m
Friction Loss Head						13.83 m
Static Head						5.6 m
Total Head						19.43 m



Scan for more
information

Hynds Retention Tank with Mul-T-Level™ Outlet

Technical Guide D5.15

Hynds strong and reliable retention tanks are available in Ring Joint Pipe Internal Base or Flange Base manhole types.



03.15 | DRAINAGE | D5.15 HYNDS RETENTION TANK

Applications

Stormwater retention & detention

Sewer storage

Product Attributes

Versatile Mul-T-Level™ outlet

Highly durable

Simple installation

Various design layouts and large capacity options available

Water tight

Proven history

Approvals/Standards

AS/NZS 4058:2007 Precast concrete pipes (pressure and non-pressure)

Quality

ISO 9001:2008 Quality Management

*The go to organisation for civil
and rural water product solutions*

HYNDS

Hynds strong and reliable retention tanks are available in Ring Joint Pipe, Internal Base or Flange Base Manhole types.

Design Specifications and Applications

RJ Retention Tank

- Generally used when the location permits the installation of a long narrow tank.
- Comprised of Hyspec reinforced concrete rubber ring joint pipes.
- Usually includes a spigot-plugged pipe, standard intermediate pipes and a collar-plugged pipe.
- The spigot and collar plugs are factory cast to ensure water tightness and integrity.
- A manhole offtake is factory fitted to one or more pipes to provide easy access for maintenance.

IB or FB Retention Tank

- Generally used in compact site conditions where relatively small volumes is required.
- Comprised of Hynds internal base or flange base manhole risers and a precast concrete lid.

Mul-T-Level™ outlet

- Enables the tank to be used for both detention and retention.
- Both the RJ and IB/FB retention tanks have a standard 100 or 150mm diameter PVC slip coupler and Mul-T-Level™ outlet cast-in or fitted during manufacturing.
- The required retention/detention volume is set by an orifice hole (of specified diameter) being drilled on the Mul-T-Level™ outlet at a pre-determined height.

General Specifications

- Manufactured from Hyspec spun concrete pipes, using the centrifugal spinning process.
- When the tank is installed in an aggressive environment, such as tidal areas, sewerage or mild acid solutions, the use of a special grade concrete is recommended. Contact Hynds Technical Team for more information.
- Retention tanks are available in various class types to suit specific site conditions, loading and applications.
- The diameter and length of the retention tank is dependent on:
 - Storage volume required
 - Site configuration and access equipment available
- Inspection and maintenance access is provided by a fitted inspection chamber or manhole riser starter.
- PVC slip couplers are fitted to end plugs to provide inlet and outlet connections to the retention tank.
- Non-standard couplers or starter types can be cast-in on request.
- Orifice holes are drilled at levels to suit the design requirements.
- Standard lids are available for access risers in the RJ type tanks.
- A light or heavy duty cast iron cover and frame will fit directly onto the 600mm diameter access riser.
- The 1050 mm diameter access riser requires a 1050 mm diameter manhole lid, which can be fitted with the cast iron manhole frame and cover.
- The IB or FB tanks require a lid, which can be fitted with a cast iron frame and cover to suit the riser diameter.
 - Note: Lid thickness is dependent on loads and application
 - Refer to Table 1 for RJ tank capacities and Tables 2 and 3 for IB/FB tank capacities.

TABLE 1 RJ type retention tank

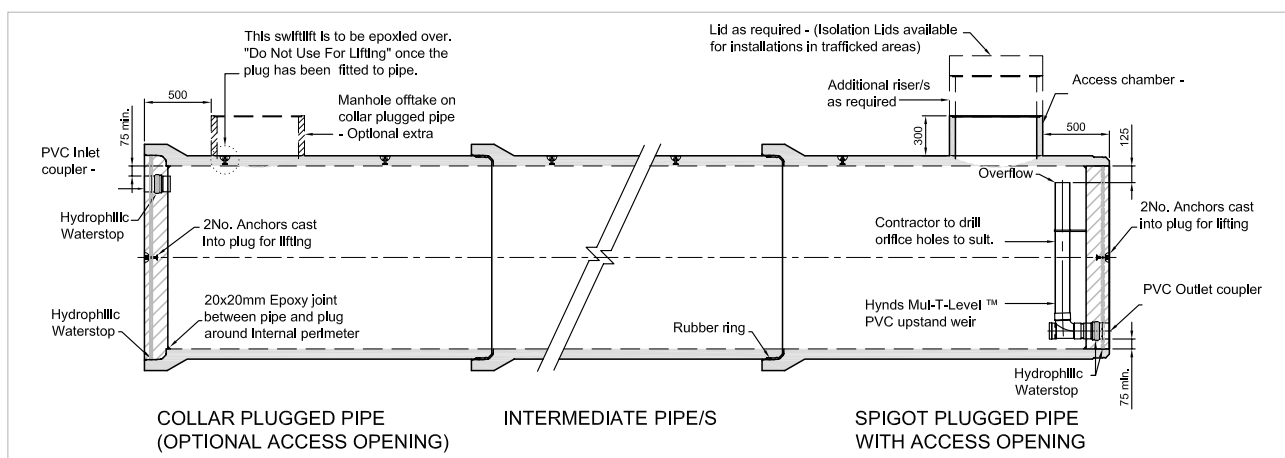
Nom Pipe Diameter and Joint Type	Pipe Effective Length (m)	Nom Vol per Pipe Length (m ³)	Nom Vol per Pipe Length (Litres)	Suggested Offtake Dia (mm)	Lifting plugged pipe anchor req.	Handling intermediate pipe anchor req.
675RJ	2.440	0.72	720	600	A1	A2
750RJ	2.440	0.92	920	600	A1	A2
825RJ	2.436	1.14	1140	600	A1	A2
900RJ	2.448	1.38	1380	600	A1	A2
975RJ	2.440	1.67	1670	600	B1	B2
1050RJ	2.440	1.94	1940	600	B1	B2
1200RJ	2.440	2.58	2580	600	B1	B2
1350RJ	2.454	3.31	3310	600/1050	B1	B2
1600RJ	2.440	4.51	4510	1050	C1	B2*
1800RJ	2.438	6.13	6130	1050	C1	C2
1950SRJ	2.440	7.05	7050	1050	C1	C2
2100SRJ	2.397	8.02	8020	1050	C1	C2
2300SRJ	2.735	11.01	11010	1050	C1	C2
2550SRJ	2.470	12.18	12180	1050	C1	C2

Key

- **A1** 1 Tonne
2 no. in plug
1 no. in pipe
- **A2** 1 Tonne
2 no. in pipe
- **B1** 2.5 Tonne
2 no. in plug
1 no. in pipe
- **B2** 2.5 Tonne
2 no. in pipe
- **C1** 5 Tonne
2 no. in plug
1 no. in pipe
- **C2** 5 Tonne
1 no. in pipe

Notes:

- All dimensions refer to Class 2 (X) pipes
- Outlet 75 mm minimum above bottom invert of pipe
- Overflow 125mm below top
- *1600 Ø retention tanks require both B2 & C1 type lifting clutches for offloading and installation
- See Fig 6 for 3 point lift on typical plugged end pipe

**FIG. 1** General layout of typical RJ type retention tank with Mul-T-Level™ outlet

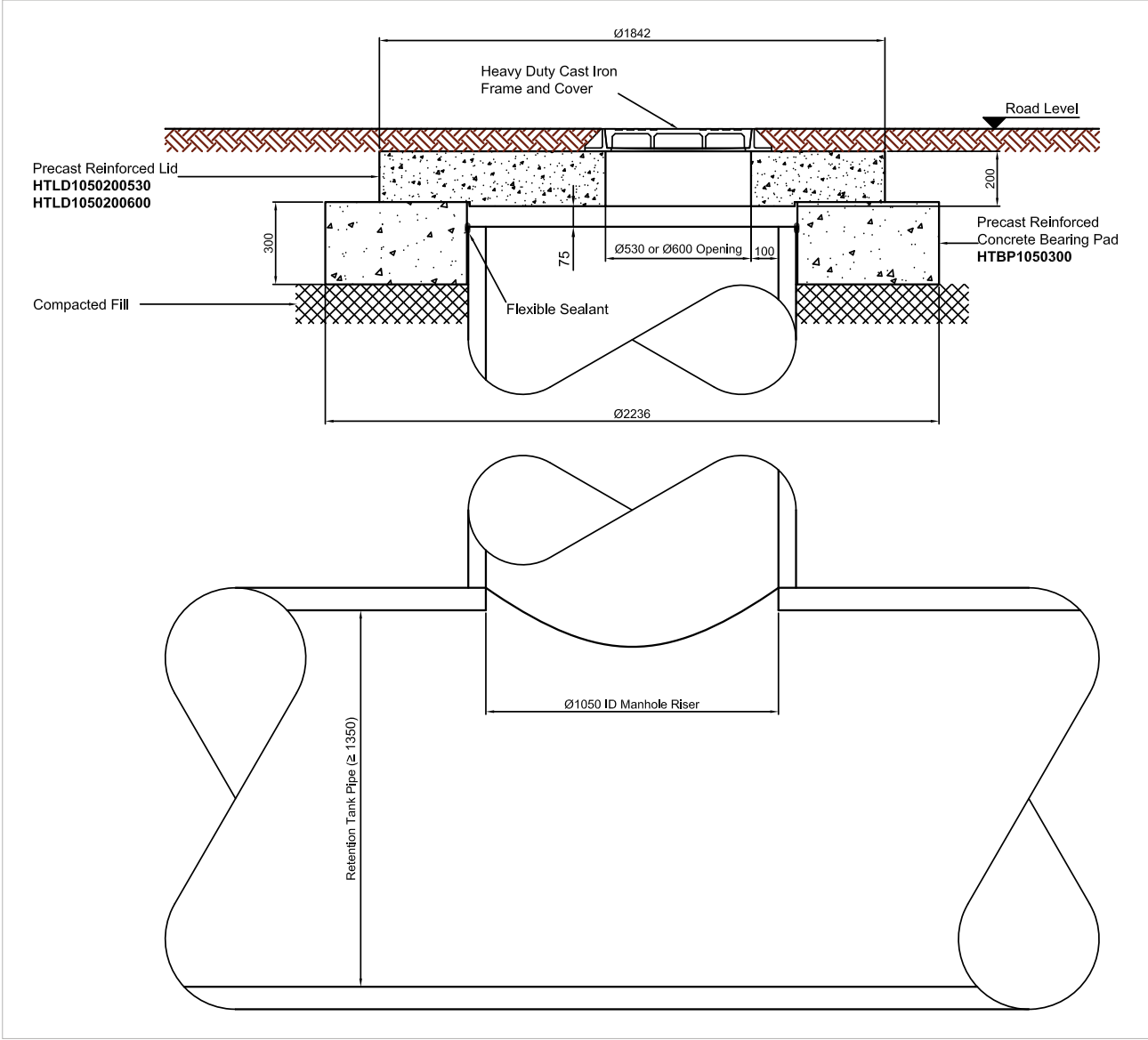
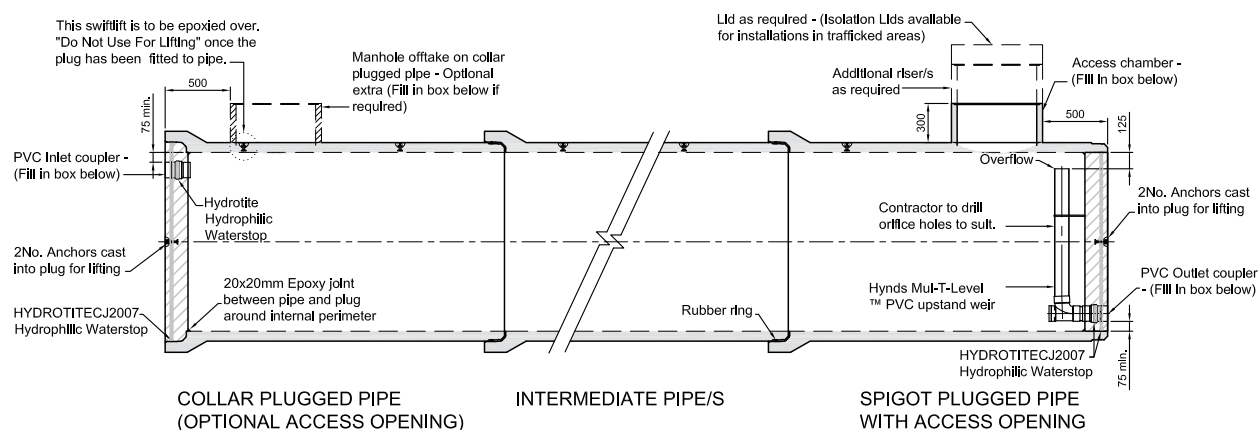


FIG. 2 Recommended detail for roadway installation



PIPE Ø

Mn Recommended Ø 675mm

JOB DETAILS

PIPE CLASS

TOTAL No. OF PIPES
(Incl. ends)

QUOTE No.

COVER TO INVERT

Inlet	Outlet

CO No.

PVC INLET FITTING Ø

Pipe Ø	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

PVC OUTLET FITTING Ø

Ø Pipe	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

ACCESS CHAMBER -
OUTLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

ACCESS CHAMBER
- OPTIONAL
INLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

I AUTHORISE HYNDS PIPE SYSTEMS LTD TO PROCEED WITH THE MANUFACTURING OF THIS PIPE SPECIAL AS DETAILED ABOVE. I ACKNOWLEDGE THAT ANY SPECIALS, ONCE MANUFACTURED, ARE DEEMED TO BE MY (CONTRACTOR'S) PROPERTY & ARE NON REFUNDABLE. STORAGE & HANDLING FEES WILL BE INCURRED FOR PRODUCTS THAT ARE NOT DELIVERED/COLLECTED WITHIN 1 MONTH OF THE DATE AGREED AT THE TIME OF ORDER. PRODUCT NOT DELIVERED/COLLECTED WITHIN 3 MONTHS OF THE DATE AGREED WILL BE DESTROYED AT MY EXPENSE.

NAME :- SIGNATURE :-

DATE :-

FIG. 3 RJ Retention Tank Order Form

Internal base type

TABLE 2 Internal base retention tank

Riser Height (mm)	450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid	580	730	1030	1330	1630	1930	2230	2530
O/A Height Incl 200mm Thick Lid	630	780	1080	1380	1680	1980	2280	2580
Effective Depth (mm)	225	375	675	975	1275	1575	1875	2175

Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			—	—	625	925	1225	—	—	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m³)							
2300	2.58	2.30	—	—	—	3.84	—	—	—	8.83
2550	2.85	2.55	—	—	3.19	—	6.26	—	—	10.85

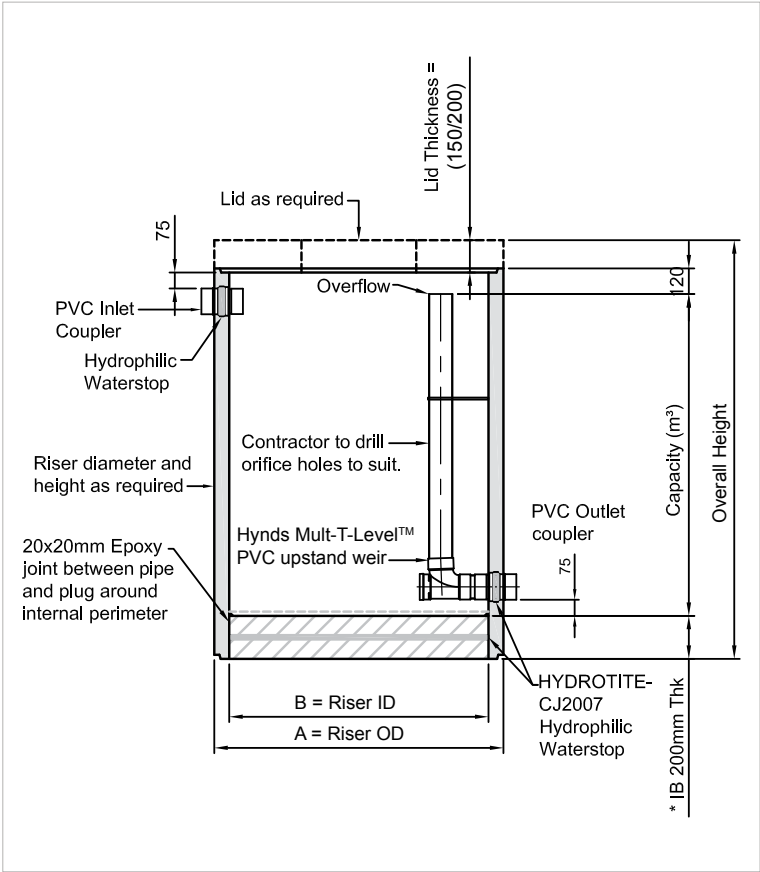


FIG. 4 Internal base

Flange base type

TABLE 3 Flange base retention tank

Riser Height (mm)			450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid			530	680	980	1280	1580	1880	2180	2480
O/A Height Incl 200mm Thick Lid			580	730	1030	1330	1630	1930	2230	2530
Effective Depth (mm)			225	375	675	975	1275	1575	1875	2175
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

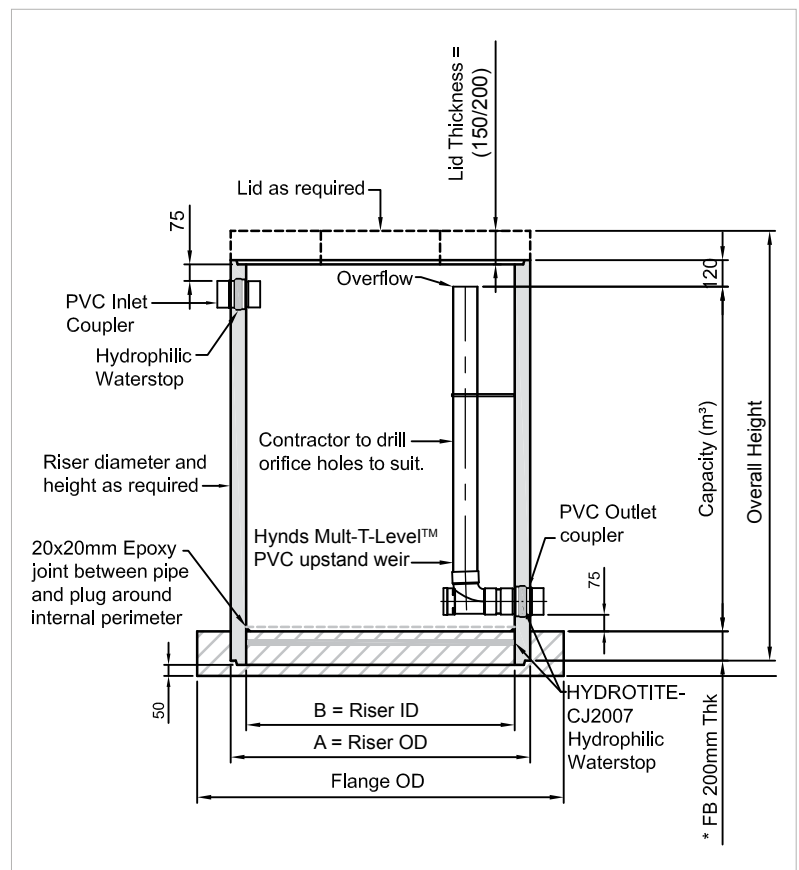


FIG. 5 Flange base

Installation

Mul-T-Level™ outlet

- Installation is simple and normally carried out by a drain layer using the same equipment and procedures as for the installation of concrete pipelines, or manholes.

RJ Retention Tank

- Similar installation to reinforced concrete rubber ring jointed pipes (including bedding requirements) and are dependent on site conditions and loading.
- Once the pipe sections have been installed and backfilled, the additional access risers are epoxied to the starter risers and brought up to the finished levels.
- The installation is then completed by fitting the required lids.
- The contractor must then drill the orifice holes at the required design levels.

Note: Refer to Figure 1 for a general layout of a typical RJ type tank.

RJ Retention Tank – Roadway Installation

- To minimise the effects of traffic, isolation of the manhole lid from the access riser is recommended.
- The depth of the modified flange base and riser must be kept to a minimum to enable maximum distribution of load above the tank.
- Refer to Figure 6 for 3 point lift of typical plugged end pipe.

IB or FB Retention Tank

- Similar installation to concrete manholes.
- Foundations should be prepared with compacted hardfill to prevent excessive settlement.
- Once the IB or FB tank is backfilled, the installation is completed by fitting the relevant concrete lid with the appropriate cast iron frame.



FIG. 6 Point lift of typical plugged end pipe

Branches Nationwide Support Office & Technical Services 09 274 0316

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.

Hyliner AKS HDPE Lining

Technical Guide D1.12

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.



04.20 | DRAINAGE | D1.12 HYLINER AKS HDPE LINING

Applications

Corrosion protection lining for precast concrete pipes in sewer pipelines

Corrosion protection lining for in-situ concrete structures in wastewater treatment plants

Abrasion protection lining in high abrasion environments

Broad range of application in both precast and cast in-situ concrete

Product Attributes

Available in white (sewer applications) and black (where high UV resistance is required)

12 mm long anchors are integrally formed with the sheet

Factory QA tested and welding of joints is 100% quality tested onsite

Quality

ISO 9001:2008 Quality Management Standard

We are the supply partner of choice for New Zealand's civil construction industry, specialising in water and infrastructure based solutions.

HYNDS
PIPE SYSTEMS

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.

Lining systems are able to bridge discontinuities in pipe or structure walls unlike other coating systems that rely on the integrity of the surface and quality of the surface preparation and the installer's expertise for functionality.

HyLiner AKS HDPE is a thermoplastic lining used to reduce the risk of sulphide attack or corrosion in sewage applications.

The high density polyethylene (*HDPE*) lining suits both precast and in-situ applications. Firmly anchored to the concrete surface of the pipe or structure, the lining requires only welding of joints to form a durable, chemically resistant concrete protection membrane with high abrasion resistance.

Installation

Installation procedures vary depending on the product:

Spun concrete pipe

The liner is inserted into the pipe prior to the completion of manufacture, with the pipe spinning process completed with the liner installed. This ensures that all the anchor knobs are well embedded in the spun concrete prior to the concrete curing and hardening.

Wet cast concrete pipe

The liner is securely attached to the inner mould before placement of reinforcement and casting of the pipe. The pipe once cast is cured in the normal manner using heat to accelerate the hardening process.

Precast concrete

This follows a similar process to the wet cast concrete pipe whereby the liner is attached to the mould prior to casting of the element.

In-situ concrete

This follows the same process as for precast concrete whereby the liner is attached to the formwork prior to casting of the concrete.

Installation Detail

In the case of concrete pipes, the liner need only be applied to the pipe's internal surface above low flow level during normal operating conditions as shown in fig 3.

Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min) as shown in fig 4 & 5. This joint is not usually welded as it allows any accumulation of moisture from external hydrostatic pressure to dissipate from behind the liner.

Where the fluid contents are themselves aggressive, such as trade waste discharges, a longitudinal weld can be provided to seal the pipe invert.



FIG. 1 Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min)

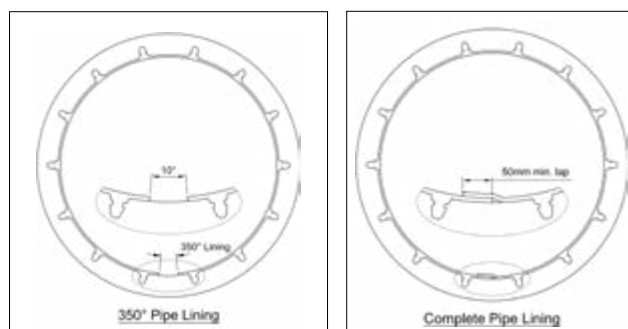


FIG. 3 Most concrete pipes only require the liner applied to the pipe's internal surface above low flow level during normal operating conditions.

FIG. 2 Invert overlap in a 1050Ø pipe.

Jointing

A continuous lining system is created through the use of extrusion welding carried out by trained, qualified operators. Generally overlapped welds are recommended.

Various details for welded joints for precast concrete pipes and components are shown in Figures 4 to 6. Other details for site installation and fixing of brackets are shown in Figures 7 to 12.

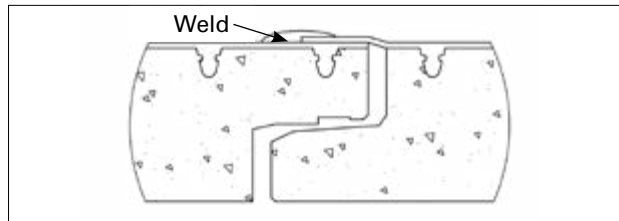


FIG. 4 HyLiner lined SRJ pipe (Lapped Joint)

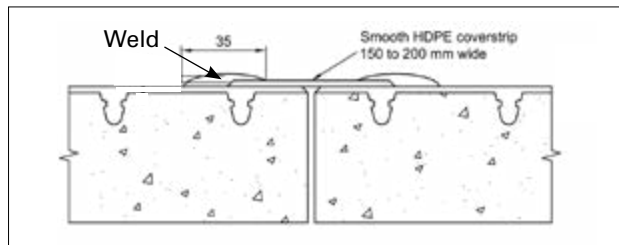


FIG. 5 Cover strip with 2 overlap welds

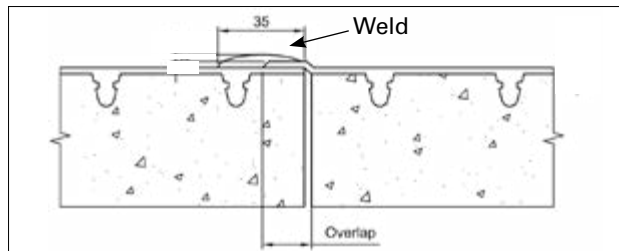


FIG. 6 Single overlap weld

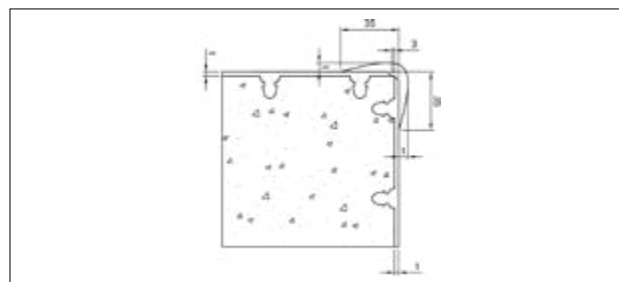


FIG. 7 Outside Corner Weld

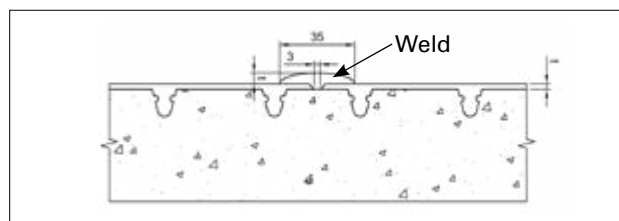


FIG. 8 Flat Extrusion Butt Weld

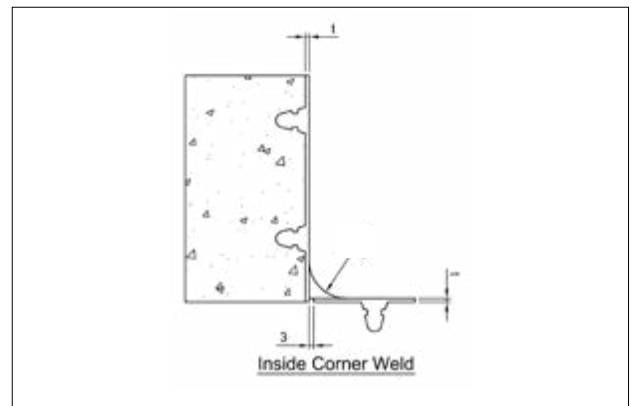


FIG. 9 Inside Corner Weld

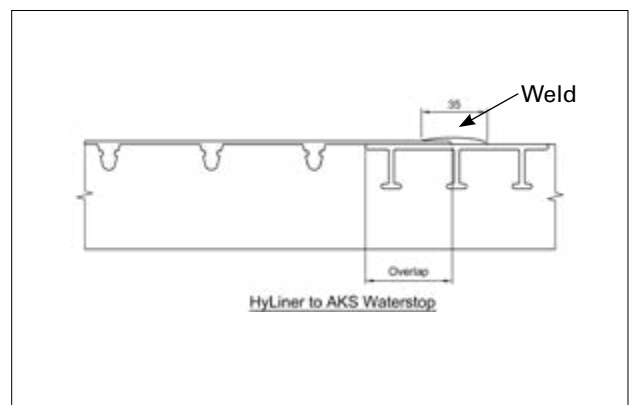


FIG. 10 HyLiner to AKS Waterstop

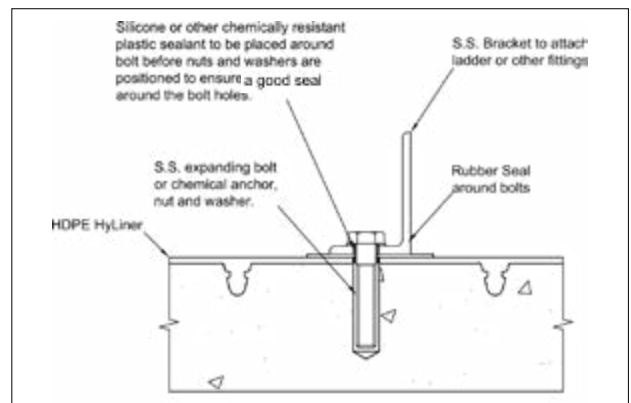


FIG. 11 Sealing of Brackets and Fittings to HyLiner Lined Structures

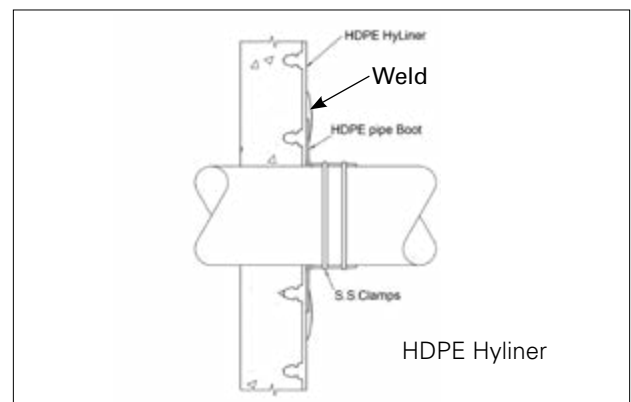


FIG. 12 Pipe Penetration Detail

Quality Control

In-plant quality control for the manufacture of the liner includes waviness, surface finish, knob shape and alignment, crimp height and depth of knobs, sheet thickness, density and tensile values.

Quality checks after casting into precast concrete pipes and components include effective anchor embedment, liner positioning on the product and spark testing for pin holes or damage.

All joints and the liner are spark tested after jointing is completed on site. This ensures the quality of the joints and identifies any damage in the liner as a result of handling and installation.

Abrasion resistance

HyLiner AKS HDPE has a good abrasion resistance when compared to other materials. A typical abrasion test value for HDPE liners is 0.3mm after 400 000 cycles (*Kirschmer, O., "Problems of Abrasion in Pipes", Steinzeugin Formationen, 1966, No 1, pp3-13*).

Wear rates are very slow even under continuous flow of abrasive slurry. Most drainage applications would have intermittent exposure to abrasion.

Suitable Structures for Lining

HyLiner AKS HDPE is suitable for installation in spun and wet cast concrete pipes from 1050–3000 mm diameter. HyLiner AKS HDPE is also suitable for lining a range of other concrete structures:

- Manhole risers and lids
- Rectangular or square precast concrete chambers and lids
- Precast concrete channels and lids
- Precast concrete pumpstations
- Insitu concrete structures such as tanks and chambers



FIG. 13 2300 Diameter Manhole Riser

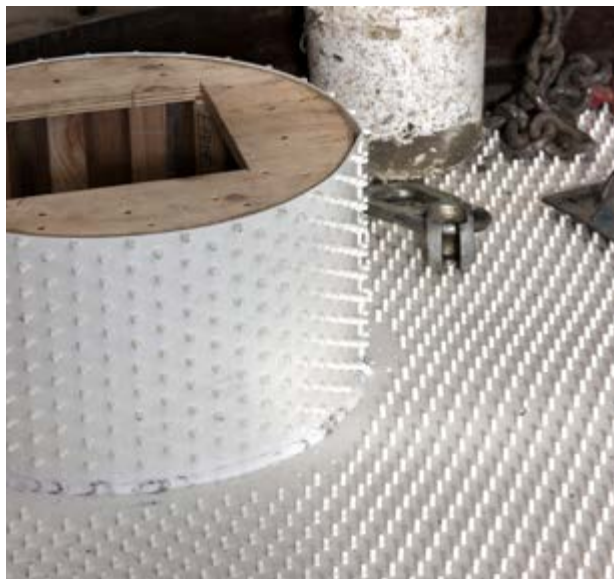


FIG. 14 Liner being installed for a manhole lid

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BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE



BluSeal Anchor Knob Sheet (AKS) is supplied and installed as a fully sealed and welded robust chemically resistant concrete protection lining.

BluSeal AKS is a synthetic membrane of HDPE sheet with integral anchors which are cast into concrete to form a flexible and durable corrosion protection lining. BluSeal AKS is used to protect concrete surfaces in chemically aggressive environments in sewerage tunnels, treatment works, pump stations, manholes and chemical retention bunds. It comes in a range of colours and thicknesses and can be applied to new and existing structures for protection or enhancement.

Application Advantages

- Fully welded homogenous lining
- Complete before 28-day concrete cure
- Factory assured thickness and absence of pinholes
- Retro-fitted lining is moisture compatible with assured bond

Lifecycle Advantages

- 100 year design life
- Membrane drainage eliminates negative pressure
- Chemical and impact resistant
- High anchor pull-out resistance
- Potable Water use to AS/NZS 4020:200
- Low coefficient of friction in lined conduits

About the Product

BluSeal AKS is supplied and installed as a fully sealed and welded, chemically resistant concrete protection system. The system includes propriety details for sealing around penetrations and against non-HDPE surfaces. Skilled applicators can fabricate the product into various shapes to suit irregular concrete formwork. All seams and joints are extrusion welded and then tested by spark or vacuum box testing. BluSeal AKS is designed and installed by approved applicators to international standards which are outlined in a manufacturer's installation manual. The elasticity of the membrane allows free drainage and relief of any hydrostatic pressure build-up in underground structures. The membrane can be cast into new structures or retrofitted by cement grouting onto the prepared surface of existing structures. AKS lined structures have an outstanding track record in aggressive environments, demonstrating a design life in excess of 100 years for the most demanding applications.

Application solutions

- Segmental sewer tunnels
- Inlet works and bioreactor tanks in WWTP
- Pump stations and manholes
- Tunnel waterproofing
- Chemical retention bunds
- Piles and foundation lining in aggressive ground conditions
- Sewer pipelines
- Slide pads on pipe plinths
- Concrete protection for industrial applications

Project Specification Clause

HDPE CORROSION PROTECTION LINING - The HDPE CPL membrane used for this project shall be supplied and installed as a fully sealed and welded ROBUST continuous membrane system. It shall be a factory produced product that has independent testing to validate the performance outlined in the technical data table on the following pages. BluSeal AKS supplied by Bluey Technologies or equivalent shall be acceptable.

Project Examples

Sewerage treatment plants, sewer pump stations, sewer manholes, trunk sewer mains, chemical processing plant bunds and trenches, gas pipelines (pipe plinths).





BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Application Specification

PREPARATION

- I.1 BluSeal AKS must be installed onto formwork under the direction of an approved, specialised applicator who will plan layout configurations of sheets and weld seam locations. The applicator may also prefabricate some corner or seam sections and pipe penetration pieces offsite.
- I.2 At joins in sheets the edge knobs are removed from one edge and the sheet is overlapped by 50mm to prevent egress of concrete fines and to provide a sound foundation for welding the seams.
- I.3 Formwork shall be cleaned and free of defects. Form release oils are not necessary where BluSeal AKS is applied. Formwork should be designed to avoid leaking.
- I.4 The sheets must be tensioned over the form within the yield elongation limit, prior to securing to the forms.
- I.5 BluSeal Formtak can be used to assist in holding the sheet against timber formwork. Securing against the formwork is by nailing or stapling through the sheets at edges where extrusion welds will cover later or into edges that will be redundant and trimmed after the pour.
- I.6 On circular forms, the sheets are wrapped and tensioned around and secured at the overlap by wires around the knobs and/or temporary speed welding along the seam.
- I.7 In precast concrete applications the moulds may be designed to secure the membrane at the edges.
- I.8 When BluSeal AKS is applied to an existing structure all corroded concrete and contaminants must be removed, leaving a surface profile greater or equal to CSP4 in accordance with ACI guidelines.
- I.9 Treat or replace exposed reinforcement in accordance with ACI guidelines.
- I.10 Refer to Bluey Technical Notes for recommendations regarding proving grout bond strength and design criteria.

APPLICATION

- 2.1 Always pour concrete or grout at a cooler ambient temperature than the temperature when the sheets were applied to the formwork. This will ensure the membrane is taut on the forms.
- 2.2 Anticipated maximum concrete temperature or accelerated curing temperature should not exceed 60 degrees Centigrade. Contact Bluey to discuss exceptions.
- 2.3 When grouting the sheets onto an existing structure, only grouts approved by Bluey such as BluCem HS200 shall be used, and mixing and placement shall be strictly in accordance with Bluey instructions. Fast set grouts, such as BluCem HE80, are recommended to be used for retrofitting the membrane in short time frames where assets must be returned to service quickly.
- 2.4 When grouting the membrane to floors, plan pours at times of the day where temperature changes before initial set of the grout are minimal. Avoid these pours in direct sunlight.
- 2.5 Concrete mix design, mixing, placement and compaction of concrete should follow standard civil construction practice to minimise voids and ensure full encapsulation of the anchors on the membrane.
- 2.6 Extrusion welding and weld testing at seams will be undertaken by approved applicators and in accordance with installation guidelines provided by the manufacturer and generally in accordance with DVS 2227. This includes proper preparation of the sheet surfaces to be welded and daily destructive seam peel tests sampled from trial welds. Welding technicians shall have formal industry training in extrusion welding techniques.
- 2.7 Non-destructive testing of completed welds will be either by vacuum box or spark testing.
- 2.8 Repairs and patching will be completed by extrusion welding over small defects or applying a minimum 200mm diameter patch over larger defects, with a minimum 80mm edge distance to the defect.
- 2.9 Destructive pull testing of anchors should be avoided.
- 2.10 Encapsulation of anchors can be easily checked by tapping across the surface of the membrane to detect any hollow sounds that indicate voids under the membrane. If voids are detected, they can be filled by injection of BluCem HS200 high flow grout through the lining. Repair by extrusion welding over the injection hole.



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Product Data

Please refer to Important Notice on following page

Length of Knobs (nominal)	12mm
Knobs per m ²	1230
Pull-off Resistance	>700N per knob or 850kPa (short term loading)
Membrane Thickness	2.0mm to 10mm*
Roll Widths	Up to 3.2m
Colours	Black for UV exposed applications and light colours (such as white) for underground or covered structures.

TESTED CHARACTERISTIC	STANDARD	RESULT			
Density	ASTM D 505/D 792	≥940kg/m ³			
Carbon Black Content**	ASTM D 1603	2.0 - 3.0%			
Carbon Black Dispersion**	ASTM D 5596	Category 1 or Category 2			
ESCR (NCTL)	ASTM D 5397	>300 hours			
OIT	D 3895	>100 minutes			
Coefficient of Linear Expansion	ASTM E 831	1.1 - 1.4E-4cm/cm/deg C			
Tensile Properties (Sheet Material)	ASTM D 6693-04	Yield Stress 15MPa	Break Stress 27MPa	Yield Elongation 12%	Break Elongation 700%
Shore Hardness	DIN 53505	>50 Shore D			
Tear Resistance	ASTM D 1004	120N/mm			
Puncture Resistance	ASTM D 4833	300N/mm			
Dimensional Stability	ASTM D 1204	<2.0% change			
Water Absorption	ASTM D 570	<0.09%			
Flammability	UL94***	V0			

* Average minimum thickness to ASTM D 5199. Minimum thickness membrane made to order

** Black AKS only

*** Plastics flammability standard released by Underwriters Laboratories of the USA



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

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IMPORTANT NOTICE

This Technical Data Sheet is provided for general information and instruction only. The properties and characteristics set out herein represent typical testing results under laboratory conditions. Results of actual product characteristics may vary slightly. Site-specific and project-specific conditions may affect product performance, including without limitation: surfaces, environmental conditions, contact conditions, storage conditions, storage timeframes, weather, and climatic or seasonal conditions. Not all product parameters are batch tested as part of the manufacturing quality control process, and performance may vary between batches.

If Bluey gives any express written product warranty in relation to the product, that warranty is subject to the foregoing qualifications, despite anything to the contrary in any other document. All other representations, advice, suggestions or promises regarding the product's performance or its implementation, whether verbal or in writing, and whenever given, including in the course of any field services, are expressly disclaimed. Without limiting the foregoing, Bluey will have no liability for loss or damage of any kind if any application specifications are not followed.

The foregoing is not intended to exclude any warranties or guarantees which by law cannot be excluded. Subject only to the foregoing provisions of this Notice, and to the extent permitted by law, Bluey disclaims all liability for loss or damage of any kind suffered as a result of or in connection with the product or its implementation. If such liability cannot be wholly excluded, Bluey's liability will, to the extent permitted by law, be limited to the replacement of the product itself or the direct cost of replacement of the product itself (not including any collateral or consequential loss or damage of any kind).

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ProcessMaster electromagnetic flowmeter

The perfect fit for the oil and gas industry



ABB has responded to the oil and gas industry's need for a rugged, reliable electromagnetic flowmeter

Measurement made easy

ProcessMaster flowmeters – perfect for the oil and gas industry

Expertise in measurement technology

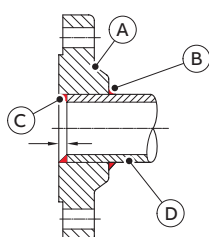
ABB's high pressure electromagnetic flowmeters are reliable, accurate and easily maintained. Customers worldwide have benefited from our application-oriented know-how and comprehensive service.

To learn more about our extensive portfolio, visit www.abb.com/measurement.

Designed specifically for oil and gas

We have added a two-tier, high-pressure version to our comprehensive range of electro-magnetic ProcessMaster flowmeters. It is available with either weld neck or slip-on flanges with RTJ and raised face connections.

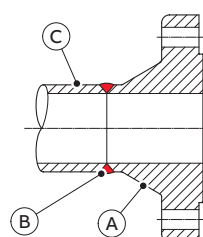
There are differences between X-Ray and dye penetrant test. For weld neck design we offer both dye penetrant and X-Ray tests; for slip-on design we offer only dye penetrant test.



(A) Slip-on flange (B) Fillet weld (outside) (C) Fillet weld (inside) (D) Pipe

Applications

- Slurries such as drilling mud
- Mixtures of fluids such as oil/water plus sand or produced water plus sand
- Injection fluids including sand and chemical additives for lubrication and corrosion prevention
- Sludge or sludge-like wastewater from produced water treatment
- Operating conditions such as high pressure or entrained gas in the fluid
- Harsh environmental conditions such as heat, moisture or vibration and explosive or corrosive atmospheres



(A) Weld neck flange (B) Butt weld (C) Pipe

Robust design for long life

The ProcessMaster flow sensor is designed for reliability in the demanding operating conditions found in oil and gas industry applications.

- Long lasting sensor lining materials withstand abrasion and corrosion, resulting in longer sensor service life and minimal maintenance requirements
- No additional pressure drop caused by protrusions into the pipe
- Optional self-cleaning measuring electrodes prevent issues caused by build-up of deposits
- Double sealed measuring electrodes minimize the risk of leakage and enhance reliability
- Optional all-316 stainless steel construction for corrosive offshore atmosphere
- Optional fully-welded sensor made from 316 material
- Protection of internal sensor components against moisture and vibration with potted Ex sensor

Range of certificates and test reports

- 3.1 material certificates and/or PMI certificates
- Certificates for non-destructive testing, X-Ray and/or dye penetration test
- Welder qualifications and procedures
- Hydrostatic pressure testing

Specification

Accuracy	Standard: 0.4 % of rate Enhanced: 0.2 % of rate
Nominal size range	DN 25 to 400 (1 to 18 in)
Nominal pressure	ASME CL 600 to 2500
Lining	Hard rubber, ETFE
Electrodes	Stainless steel, Hastelloy C
Process connection	Steel, stainless steel
IP rating	IP67, IP68
Fluid temperature	–25 to 130 °C (–13 to 266 °F)
Power supply	100 to 230 V AC, 24 V AC/DC
I/Os	Current, pulse status output
Communication *	HART protocol, PROFIBUS PA, FOUNDATION Fieldbus
Sensor housing material	Stainless steel 316
Transmitter housing material	Stainless steel
Wetted parts material	Option for NACE
Ex approvals	ATEX/IEC Zone 1.2, FM/cFM Cl1 Div.1, Cl1 Div.2
Marine approval	DNV
Verification	ScanMaster

* Acknowledgements

HART is a registered trademark of FieldComm Group, Austin, Texas, USA.

PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).



FEP630 high pressure magnetic flowmeter



FEP610 high pressure magnetic flowmeter

BLACKBOX

Technical Specifications:

Blackbox 130 is a compact low-cost intelligent controller that allows users to locally program the unit and give a readout of level. Economical and simple to program and operate, users benefit from extremely accurate and reliable digital echo processing with access to the dB and dBR range of transducers, measuring from 125 mm (4.9 in) right through to 40 m (131.2 ft).



PHYSICAL: MOUNTING OPTION SPECIFIC

Mounting Option:	Standard Wall Mount:	Large Wall Mount:
Controller Body Dimensions:	130 mm x 150 mm x 63.5 mm (5.1 in x 5.9 in x 2.5 in)	130 mm x 180 mm x 85 mm (5.1 in x 7.09 in x 3.3 in)
Weight:	Nominal 0.7 kg (1.4 lb)	Nominal 0.8 kg (1.7 lb)
Enclosure Material/Description:		ABS Base with polycarbonate lid, flammability rating UL 94 HB
Cable Entry Detail:	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable
Transducer Cable Extensions:	2-core screened (2 conductor 20 AWG screened)	
Nominal Separation:	1,000 m (3,280 ft), for greater separation distances please contact us	

ENVIRONMENTAL

IP Rating:	IP66/67
Max. & Min. Temperature (Electronics):	-20 °C to +55 °C (-4 °F to +131 °F)
Flammable Atmosphere Approval:	All Blackbox units must be mounted in a safe area. Compatible with approved dB Transducers
CE Approval:	See EU Declaration of Conformity in the manual
UL Approval:	UL Listed. UL Listed to Canadian Safety Standards. Certificate Number E257330.

PERFORMANCE

Accuracy/Repeatability:	0.25% of the measured range or 6 mm (0.2 in), <i>whichever is greater</i>
Resolution:	dBMAH3 0.3 mm (0.01 in), dB3 0.5 mm (0.02 in), dB6 and dB10 1 mm (0.04 in), dB15 1.5 mm (0.06 in), dB25 2.5 mm (0.1 in), and dB40 5 mm (0.2 in).
Min. & Max. Range:	Dependent on Transducer. Nominally 125 mm to 40 m (4.9 in to 130 ft)
Echo Processing:	DATM (Digital Adaptive Tracking of Echo Movement)
Rate Response:	Fully Adjustable

OUTPUTS

Analog Output:	Isolated output of 4-20mA or 0-20mA into 1 kΩ (user programmable and adjustable) 0.1% resolution
Digital Output:	RS232 for programming and data extraction
Volt Free Contacts, Number, & Rating:	2 form "C" (SPDT) rated at 2 A at 240 V AC
Display:	2 x 12 alpha numeric

PROGRAMMING

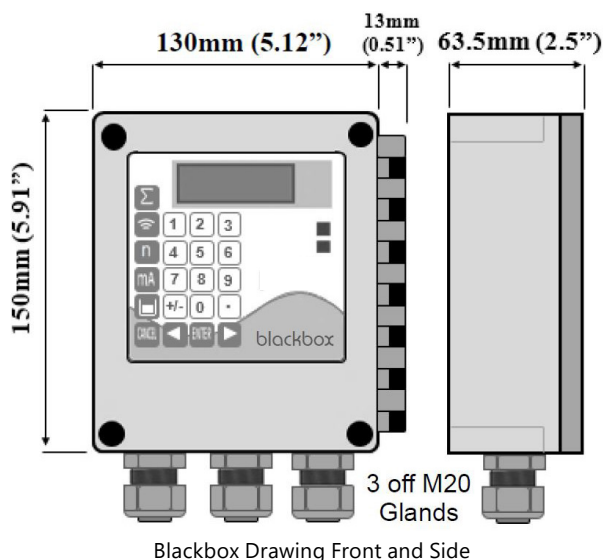
On-board Programming:	Via RS232 using supplied software
PC Programming:	Via RS232 using supplied software
Programming Security:	Via Passcode (user selectable and adjustable)
Programmed Data Integrity:	Via non-volatile RAM
Remote Programming:	Via RS232 using optional handheld calibrator

SUPPLY

Power Supply:	115 V AC +5% / -10% 50/60 Hz, 230 V AC +5% / -10% 50/60 Hz, 10-28 V DC, 10 W maximum power (typically 5 W)
Fuses:	50mA at 230 V AC, 100mA at 115 V AC

REMOTE COMMUNICATIONS

Power Supply:	Power supplied via Blackbox RS232 interface
----------------------	---



Blackbox Drawing Front and Side



INFO@PULSARMEASUREMENT.COM

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Rev 4.0

dB ULTRASONIC TRANSDUCERS

Technical Specifications:

The dB Transducer Series is a range of non-contacting ultrasonic transducers for level, volume, and flow measurement. Available in a variety of models and compatible with all Pulsar controllers so that you have a specific solution to suit your application requirements.



PHYSICAL: TRANSDUCER SPECIFIC

Model:	Dimensions:	Dia Face:	Weight:	Measurement Range:	Frequency:	Beam Angle:
dB3	78 (D) mm x 115 (H) mm (3.1 in x 4.5 in)	19 mm (0.7 in)	1.1 kg (2.4 lb)	125 mm to 3 m (4.9 in to 9.8 ft)	125kHz	<10°
dB6	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	30 mm (1.2 in)	1.1 kg (2.4 lb)	300 mm to 6 m (11.8 in to 19.7 ft)	75kHz	<10°
dB56	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	200 mm to 6 m (7.9 in to 19.7 ft)	50kHz	<10°
dB10	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	300 mm to 10 m (11.8 in to 32.8 ft)	50kHz	<10°
dB15	86 (D) mm x 122 (H) mm (3.4 in x 4.8 in)	60 mm (2.4 in)	1.2 kg (2.6 lb)	500 mm to 15 m (19.7 in to 49.2 ft)	41kHz	<8°
dB25	105 (D) mm x 142 (H) mm (4.1 in x 5.6 in)	78 mm (3.1 in)	1.4 kg (3.1 lb)	600 mm to 25 m (23.6 in to 82 ft)	30kHz	<6°
dB40	205 (D) mm x 223 (H) mm (8.1 in x 8.8 in)	160 mm (6.3 in)	6 kg (13.2 lb)	1.2 m to 40 m (3.9 ft to 131.2 ft)	20kHz	<5°

PHYSICAL: ALL TRANSDUCERS

Sensor Body Material:	Valox 357 U and syntactic foam face
Cable Lengths:	Standard = 5 m, 10 m, 20 m, or 30 m (16.4 ft, 32.8 ft, 65.6 ft, or 98.4 ft). Optional: up to 150 m (492 ft) maximum (increments of 10 m (32.8 ft) only)
Maximum Separation:	500 m (1,640 ft)
Mounting Connection:	BSP or 1" NPT

ENVIRONMENTAL

Enclosure Protection:	IP68 / NEMA 6P
Max. And Min. Temperature (Electronics):	Standard: -40° C to +90° C (-40° F to +194° F) Hazardous area versions: -40° C to +75° C (-40° F to +167° F)

APPROVALS

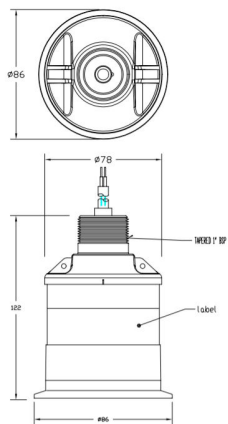
CE Approval:	2014/30/EU to EMC & 2014/34/EU ATEX Directives. Standards applied: EN 60079-0:2012+A11:2013/ EN 60079-11:2012 / EN 60079-18:2009 / EN 60079-26:2007 / EN 61326-1:2013
ATEX Approval:	Standard ATEX EEx m II T6 or optional EEx ia IIC T6. FM/FMC approval.

TRANSDUCER OPTIONS

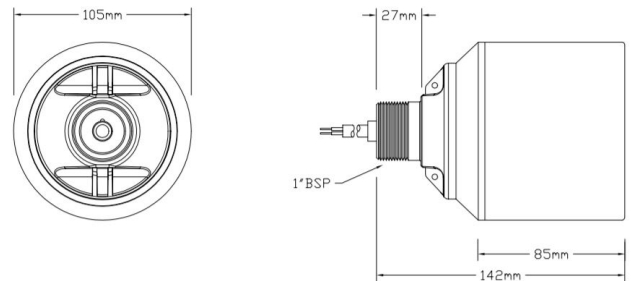
Model:	dB3	dBs6	dB6	dB10	dB15	dB25	dB40
PVDF		✓	✓	✓			
Front Threaded / PVDF	✓	✓	✓	✓			
Submergence Shield	✓	✓	✓	✓	✓	✓	
Flanged DIN/ANSI		✓	✓	✓	✓		
Foam Face		✓		✓	✓	✓	✓
Sanitary Flange		✓	✓	✓			
Intrinsically Safe of All the Above	✓	✓	✓	✓	✓	✓	✓

PERFORMANCE

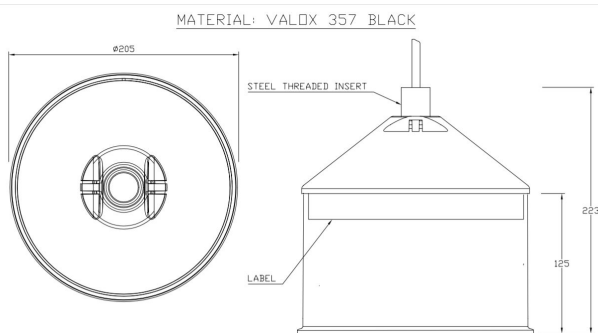
Accuracy:	0.25% or 6 mm (0.2 in) whichever is greater
Resolution:	0.01% or 2 mm (0.08 in) whichever is greater
Temp. Compensation:	Automatic, internal temperature sensor, ± 0.5 °C/°F



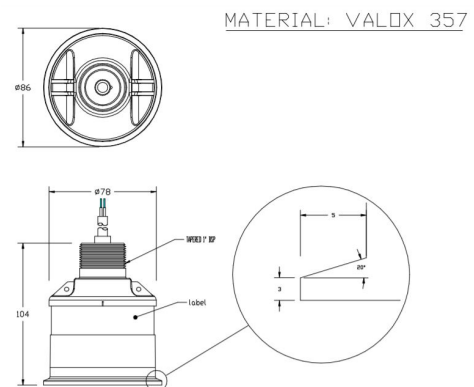
dB15 Transducer Drawing



dB25 Transducer Drawing



dB40 Transducer Drawing



dB6 & dB10 Transducer Drawing



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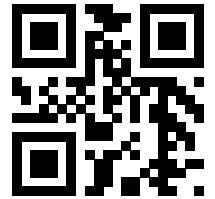
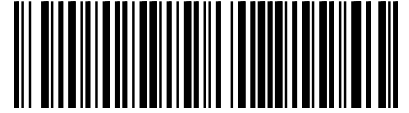
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Rev 7.0

Technical Specification

891480_17.0



ENM 10

Level switch

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1 Product Description

1.1 Product design

Usage

ENM-10 is a level regulator for level control applications. The level regulator starts and stops a pump or activates an alarm device when the liquid level reaches the regulator.

Materials

Denomination	Standard version	Ex version
Regulator casing	Polypropylene	Polypropylene with black conductive casing
Bend relief	EPDM rubber	NBR-PVC rubber
Cable sheath	PVC	NBR-PVC rubber

The plastic components are welded and screwed together.

1.2 Technical data

Application limits

Feature	Value
Liquid temperature	Minimum 0°C (32°F) Maximum 60°C (140°F)
Liquid density	Minimum 0.65 g/cm ³ Maximum 1.5 g/cm ³

Electrical specifications

Feature	Value
Degree of protection	IP68, 20 m (65 ft), 2 bars
Interrupting capacity of micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 30 V 5 A
Interrupting capacity of gold-plated micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 24 V 10 mA

Voltage limits are subject to local regulations.

Density ranges

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
0.65 – 0.80	194 (7 10/16)	100 (4)
0.80 – 0.95	177 (7)	100 (4)
0.95 – 1.10	162 (6 3/8)	100 (4)
1.05 – 1.20	142 (5 9/16)	100 (4)
1.20 – 1.30	133 (5 1/4)	100 (4)
1.30 – 1.40	130 (5 2/16)	100 (4)

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
1.40 - 1.50	126 (5)	100 (4)

Weight

A regulator with standard density and 20 m cable weighs approximately 2 kg (4.5 lb).

1.3 Cables

Lengths

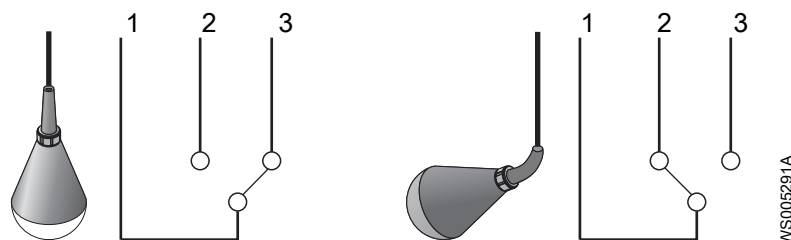
For liquids with specific density between 0.95 and 1.10 g/cm³, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (100 ft) • 50 m (167 ft)
Ex	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (98 ft) • 50 m (164 ft)

Diameter

The cable diameter for all product variants is 6.7 mm (0.26 in), +/- 0.2 mm (0.00787 in).

Color codes



Cable	1	2	3
Color	Grey	Black	Brown

1.4 Approvals and standards

Standard approvals

LVD approval according to EN61058
 CSA approval: Certificate Number 1330172
 Cl. I Zone 0, Gr. IIC
 CL.I Div.1 Gr A, B, C and D
 Cl.II Gr. E, F, and G

Ex approvals

IECEX ia IIC T4 Ga: -20°C ≤ Ta ≤ 60°C
 IECEX NEMKO 09.0008
 ATEX II 1G Ex ia IIC T4 Ga

NEMKO 10 ATEX 1082

Applied standards for ATEX and IEC

- EN 60079-0:2012 / IEC 60079-0:2011
- EN 60079-11:2012 / IEC 60079-11:2011

Intrinsically safe circuits are required for the automatic control system. Use a Zener barrier, for example, part number 84 01 07.

The electrical connections must comply with the Ex regulations of the national submitter.



2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

2.2 Product range

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 00	0.65–0.80	Blue	20	1	CE	International
582 88 01	0.80–0.95	Blue	20	1	CE	International
582 88 02	0.95–1.10	Blue	6	1	CE	International
582 88 03	0.95–1.10	Blue	13	1	CE	International
582 88 04	0.95–1.10	Blue	20	1	CE	International
582 88 05	1.05–1.20	Blue	20	1	CE	International
582 88 06	1.20–1.30	Blue	20	1	CE	International
582 88 07	1.30–1.40	Blue	20	1	CE	International
582 88 08	1.40–1.50	Blue	20	1	CE	International
582 88 09	0.65–0.80	Gray	20	3	CSA/CE	Canada
582 88 10	0.80–0.95	Gray	20	3	CSA/CE	Canada
582 88 11	0.95–1.10	Gray	6	3	CSA/CE	Canada
582 88 12	0.95–1.10	Gray	13	3	CSA/CE	Canada
582 88 13	0.95–1.10	Gray	20	3	CSA/CE	Canada
582 88 14	1.05–1.20	Gray	20	3	CSA/CE	Canada
582 88 15	1.20–1.30	Gray	20	3	CSA/CE	Canada
582 88 16	1.30–1.40	Gray	20	3	CSA/CE	Canada
582 88 17	1.40–1.50	Gray	20	3	CSA/CE	Canada
582 88 18	0.65–0.80	Gray	20	1	CSA/CE	Canada
582 88 19	0.80–0.95	Gray	20	1	CSA/CE	Canada
582 88 20	0.95–1.10	Gray	6	1	CSA/CE	Canada
582 88 21	0.95–1.10	Gray	13	1	CSA/CE	Canada
582 88 22	0.95–1.10	Gray	20	1	CSA/CE	Canada
582 88 23	1.05–1.20	Gray	20	1	CSA/CE	Canada
582 88 24	1.20–1.30	Gray	20	1	CSA/CE	Canada
582 88 25	1.30–1.40	Gray	20	1	CSA/CE	Canada
582 88 26	1.40–1.50	Gray	20	1	CSA/CE	Canada
582 88 36	0.95–1.10	Gray	30	3	CSA/CE	Canada
582 88 37	0.95–1.10	Gray	50	3	CSA/CE	Canada
582 88 38	0.95–1.10	Gray	100	3	CSA/CE	Canada
582 88 39	0.95–1.10	Gray	150	3	CSA/CE	Canada
582 88 51	0.95–1.10	Red	65	2	CE	International
582 88 52	0.95–1.10	Red	6	2	CE	International
582 88 53	0.95–1.10	Red	13	2	CE	International
582 88 54	0.95–1.10	Red	20	2	CE	International
582 88 57	0.95–1.10	Red	20	2	CE	Canada
582 88 70	0.65–0.80	Blue	20	3	CE	International
582 88 71	0.80–0.95	Blue	20	3	CE	International
582 88 72	0.95–1.10	Blue	6	3	CE	International
582 88 73	0.95–1.10	Blue	13	3	CE	International

¹ See *Type of cables* on page 9.

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 74	0.95–1.10	Blue	20	3	CE	International
582 88 75	1.05–1.20	Blue	20	3	CE	International
582 88 76	1.20–1.30	Blue	20	3	CE	International
582 88 77	1.30–1.40	Blue	20	3	CE	International
582 88 78	1.40–1.50	Blue	20	3	CE	International
582 88 79	0.95–1.10	Blue	65	1	CE	International
582 88 80	0.95–1.10	Blue	30	1	CE	International
582 88 81	0.95–1.10	Blue	50	1	CE	International
582 88 82	0.95–1.10	Gray	30	1	CSA/CE	Canada
582 88 83	0.95–1.10	Gray	50	1	CSA/CE	Canada
582 88 86	0.95–1.10	Red	30	2	CE	International
582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
594 79 10	0.95–1.10	Blue	70	3	CE	International
594 79 13	0.95–1.10	Blue	100	3	CE	International
594 79 18	0.95–1.10	Blue	150	3	CE	International
594 79 19 ²	0.95–1.10	Blue	20	3	CE	International
594 79 20 ²	0.95–1.10	Gray	20	3	CSA/CE	International
594 79 21 ²	0.95–1.10	Transparent	6	3	CE	For demonstration only.
594 79 40 ²	0.95–1.10	Black	6	3	ATEX/IECEX ³	International
594 79 41 ²	0.95–1.10	Black	13	3	ATEX/IECEX ³	International
594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
2	Red PVC	Grey/Brown/Black
3	Black nitrile rubber (NBR)/PVC	Grey/Brown/Black

¹ See *Type of cables* on page 9.

² Designed for low current, slow movements and oil. Includes micro switch with gold plated contacts.

³ Zener barrier 84 01 07 required.

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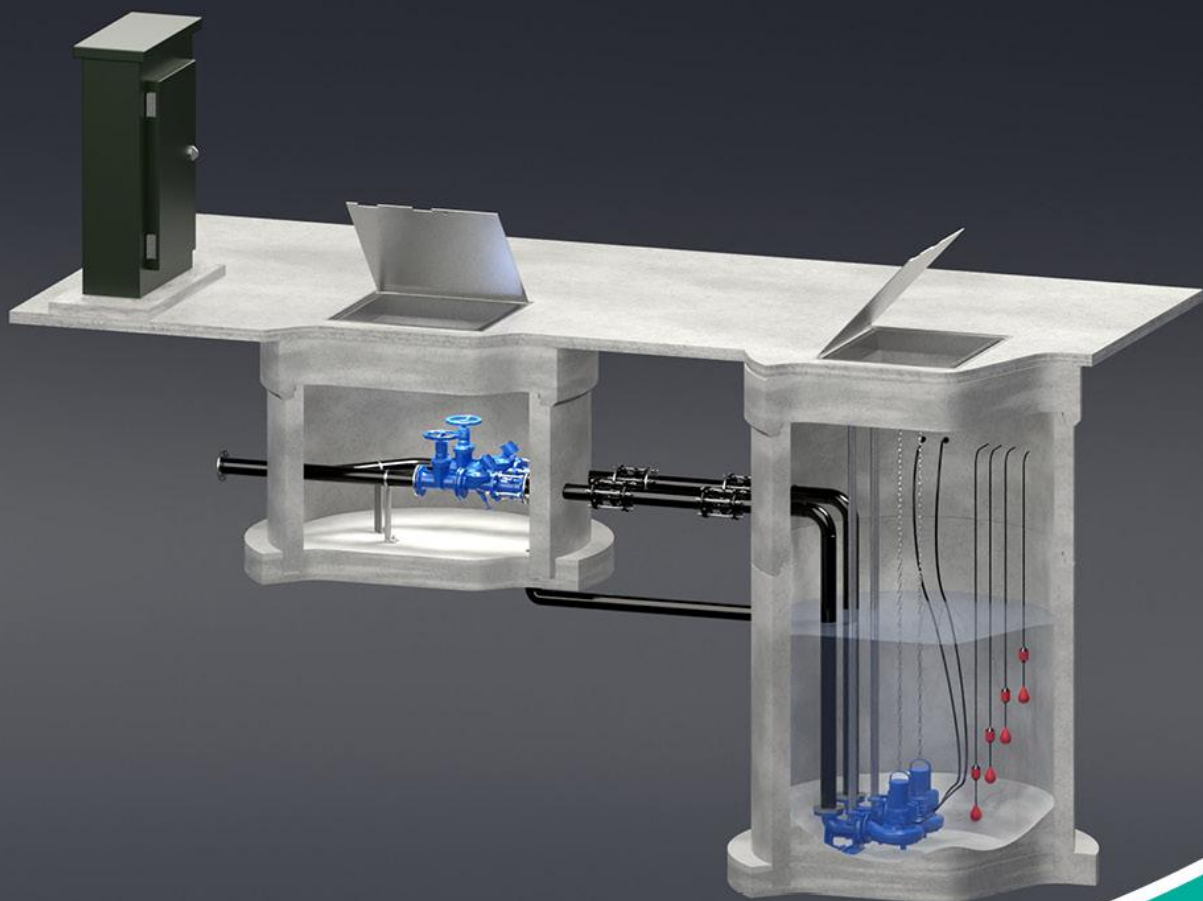
The original instruction is in English. All non-English instructions are translations of the original instruction.

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BRYMER FARM DEVELOPMENT WASTEWATER PUMP STATION B – STAGES 1-5 TECHNICAL SPECIFICATIONS

MAVEN WAIKATO LTD

12 AUGUST 2026



Peter Carroll – Aquate Director
BE Civil, MBA, CPEng, FEngNZ
www.aquate.co.nz

Foreward

This installation manual is a guide only. All relevant Health and Safety laws and codes of construction must be adhered to and take precedence over any information in this manual. Installers must practice good professional practice and are required to understand all National and Local regulations in respect to the installation of drainage materials.

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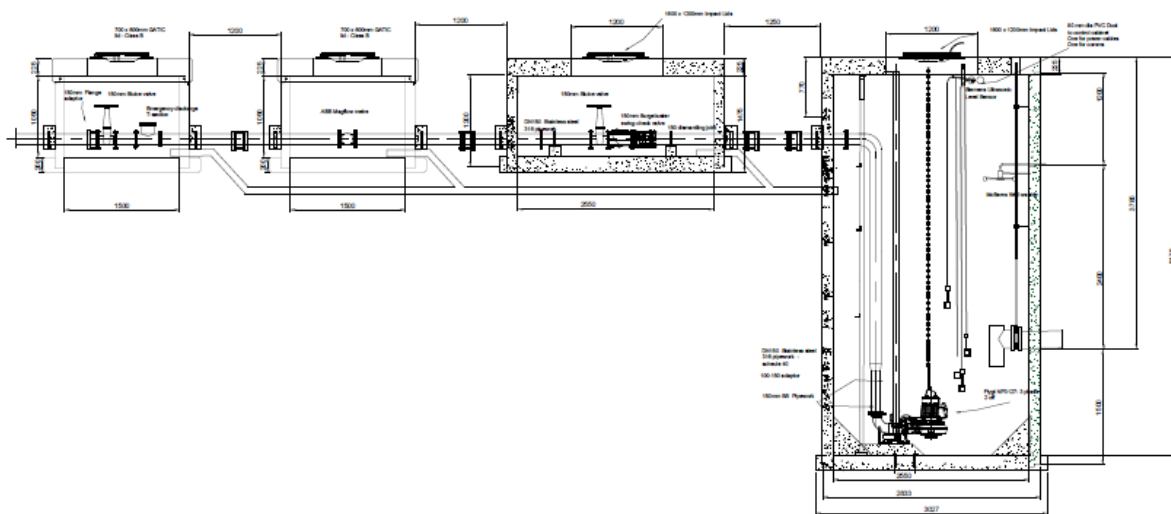
APPENDICES

12

1 Technical Specifications

1.1 Storage Chamber

Tank Volume:	25.5 m ³
Effective volume:	20.4 m ³
Storage tank vol:	62.8 m ³
Tank material:	Concrete
Manufacturing Std:	AS/NZS 4058:2007 and NZS 3101
Loading:	The standard lid is suitable for pedestrian loading only.
Inlet Connections:	the inlet pipe to be installed on site and sealed by the drainage contractor.
Outlet connection:	A flanged stainless steel is installed for connection to the outlet pressure pipe
Venting:	External venting required (see section 1.6 for venting details if required)
Dimensions:	see drawing below



1.2 Pumps/Pump Performance

See full specifications in the Appendices

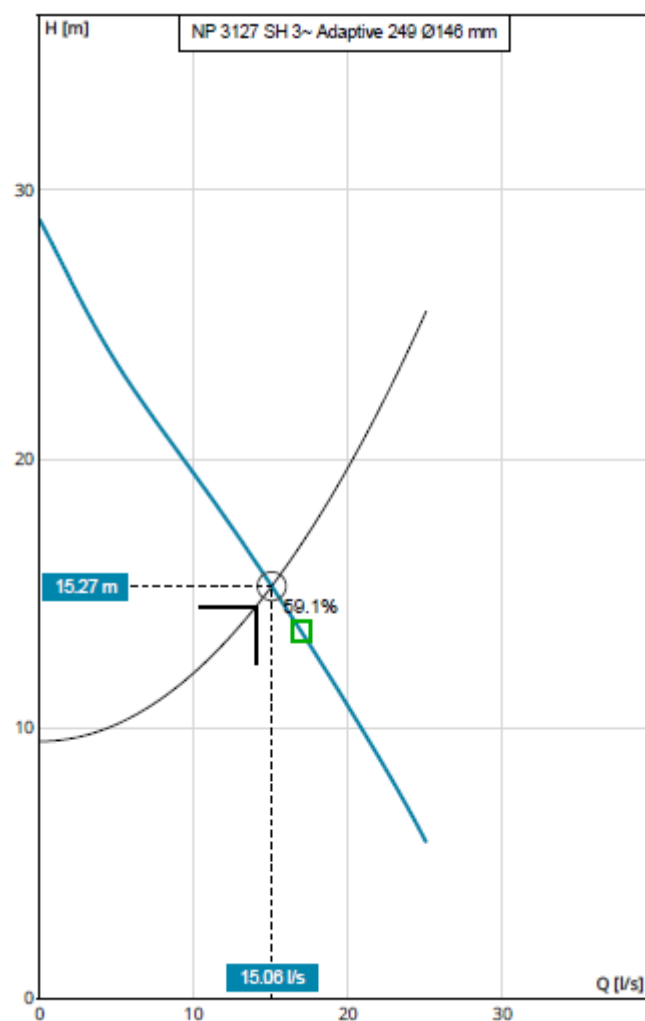
Manufacturer: Xylem Pumps

Type: Flygt NP3127 SH3 249

Connection: 415 V, 50 Hz

Power: 7.4 kW

Phases: Three



1.3 Design Information

1.3.1 Storage Calculations

The total Average Dry Weather flow has been calculated from the expected flow rate with the following assumption:

Average dry weather flow= 199.8 m³/day

Total emergency storage required is 9 hours = 74.93 m³

Total emergency storage in wet-well and emergency storage tank is 83.2 m³ so 10 hours storage has been provided.

1.3.2 Pump Design

The system above has been designed based on the information provided below.

Rising main length : 728 m

Static Lift : – 9.5 m

Rising main – PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm)

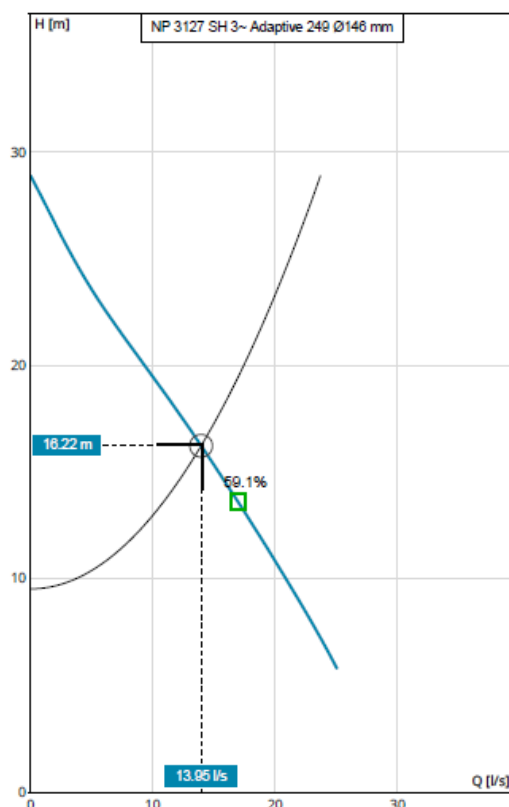
Pipe OD = 180mm , Pipe ID = 147.2mm

Option 1 K = 1.5

Flygt NP3127 - Flow rate = 13.95 l/s with a total head loss of 16.22 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 0.82 m/s

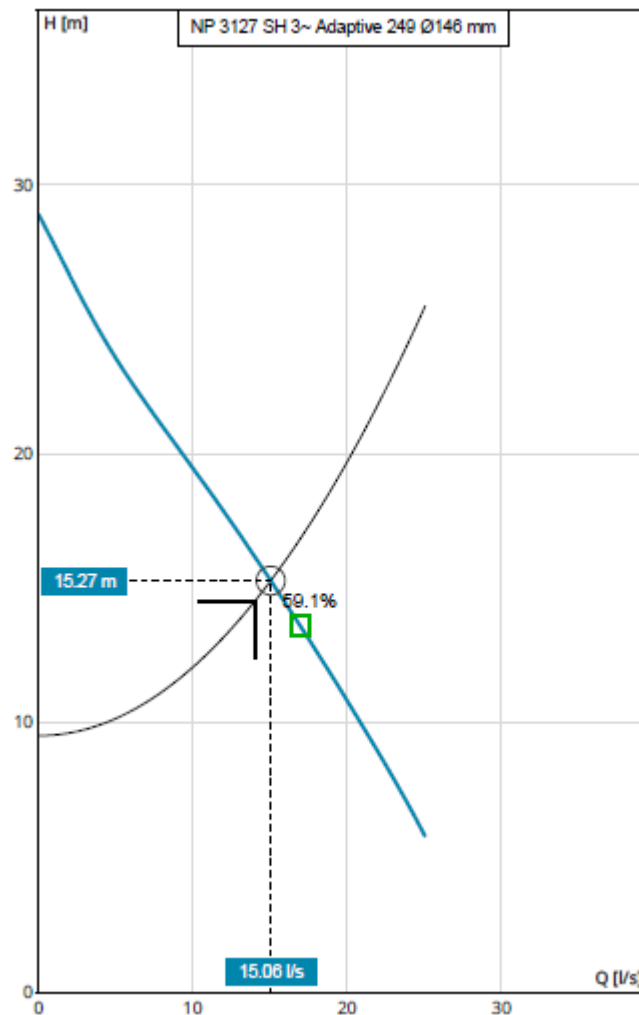


Option 2 $K = 0.5$

Flygt NP3127 - Flow rate = 15.06 l/s with a total head loss of 15.27 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 0.88 m/s



1.3.3 Pump Operational Levels

The operational levels will be set as follows (dimensions taken from floor of wet-well) :

- High level alarm - 1150mm
- Assist Pump Start – 1050mm
- Duty Pump Start – 1000mm
- Both Pumps Stop – 350mm
- Low Level alarm : 300mm

1.3.4 Pump Stop/Start Calculations

Expected daily flow:	66025	litres
Infiltration (l/day)	0	litres
SWI (l/day)	0	litres
Peaking factor :	6.7	
ADDWF	0.76	l/s
PDDWF	2.04	l/s
PWWF	5.12	l/s
Pump Station diameter	2.55	m
Pump station depth (total)	5.1	m
Pump station depth (effective)	4.1	m
Volume (effective)	20.93	m ³
Pump Stop Level	0.4	m
Pump Start Level	1	m
Volume to pump:	3063	litres
Discharge rate:	13.95	l/s
Time to empty: (PDDWF)	4.3	minutes
Time to empty: (PWWF)	5.8	minutes
Time to fill (PDDWF)	25.0	minutes
Time to fill (PWWF)	10.0	minutes
No starts/ hour (PDDWF)	2.0	
No starts/ hour (PWWF)	3.8	
No starts per pump (PDDWF)	1.0	
No starts per pump (PWWF)	1.9	
Max Start/Hour permissible	30	Okay

1.4 Pipework, Valves and Fittings

Discharge connection:	150 mm diameter flange coupler
Inlet and outlets:	the inlet pipe to be installed on site and sealed by the drainage contractor. The outlet pipe is pre-installed in the factory.
Discharge pipework:	Includes a non-return valve, dismantling joint and an isolation valve.
Lifting chains:	a stainless steel chain is connected from the pump to the underside of the chamber for ease of pump removal if required.
Materials:	All pipework will be 150mm 316 Stainless steel Schedule 40 and will be manufactured to the relevant AUS/ NZ Standards
Guide rails:	Stainless steel

1.5 Access lids

Steel access lids (1600 x 1200mm) will be supplied as per the RITS design

1.6 Magflow metre

An ABB Process Master DN150 is included installed in a 1200mm diameter manhole

1.7 Level Sensors

1 off – ABB Black Box Hydrostatic level sensor

4 off – Flygt ENM10 float switches for Low level and High-level alarms

1.8 Electrical & Controls

This controller is designed on the latest 2023 HCC drawings which are quite different to their previous standards. Any comparison to a competing proposal should ensure that the same standards have been used in the pricing.

This allows for the design, including production of electrical drawings, build and factory acceptance testing (FAT) of the pump station controller.

The design will include::

- 1 x Allen Bradley Micro800 PLC and IO modules as per their standard design.
- 1 x programming of Allen Bradley PLC.
- 1 x Trio Radio unit for communicating to HCC's SCADA system.
- 1 x battery backup for communication and PLC 24VDC circuits.
- 1 x supply of aerial for radio communication to base station.
- 1 x VSD starting configuration
- 2 x 30kW ABB VSDs
- 2 x current transducers and amp meters.
- 2 x capacitors for power factor correction.
- 1 x phase failure relay with output to PLC.
- 1 x surge divertor with output to PLC.
- 1 x level indicator input.
- 1 x flow indicator input.
- 22mm dia push buttons and selector switches for pump circuitry and control.
- Cabinet door switches and internal lights.
- Anticondensation heaters for cabinet.
- 2 x isolation switches for the pumps.
- 1 x Cubic internal panel. Note this differs to the HCC drawing but is of an equal or better quality to the Bremca 250 series panel.
- 1 x generator connection with interlocked mains/generator breakers.
- RCD protected service plugs mounted within cabinet.

- 1 x powder coated marine grade aluminium OR SS316 cabinet approximately 2.0 x 1.5 x 0.4m (l x h x d) with multiple door access, internal panels to protect from live wires
- 1 x full CAD drawings.

We have not allowed for any of the following:

- Supply of any boosting to the radio signal if the standard Trio radio unit and standard aerial is insufficient.
- Supply of any site metering although space left in cabinet for a smart meter.
- Any civil works including construction of plinth for controller to mount to.
- Any on site installation including running of cable to and from controller, or mounting revenue meter (if required), or installing any on site lighting, installing the aerial or aerial base. It is suggested the site electricians are engaged to do this where required.

1.9 Odour Control System

This has been excluded as per RITS standards. See section 5.3.7.16 RITS.

1.10 Protective lining

The wet-well including the underside of the lid will be lined with Blue-seal HDPE lining for sulphuric acid resistance (see Appendices)

1.11 Well-washer

A McBerns well washer has been specified by RITS – see appendices for details

A sprinkler system using BETE nozzles has been included in the storage tanks to RITS design

1.12 RPZ Cabinet

A steel cabinet to RITS design has been included along with an RPZ standpipe and two off solenoid valves for the well washer and sprinkler system

1.13 Inlet valve

A knife-gate valve will be installed on the inlet pipe in to the wetwell. This includes a spindle to the underside of the lid. The diameter of the inlet pipe to be confirmed

2 Construction

The pump station has been design using reinforced precast concrete components. The system will be fabricated off site and delivered to site ready for installation. The tank will have a 25100 litre capacity and a total depth of 5.25 m.

The pump stations will be delivered to site in a kit-set format and will need to be installed in the ground by the drainage contractor.

The construction and commissioning of the Aquate pump station will then be completed by a trained Hynds Construction Technician.

3 Safety in Design

This pump station has been designed to minimise any risk to operators and service personnel.

Access into the pump station should not be required for ongoing maintenance as almost all servicing work can be completed from ground level. The main components can be accessed as follows:

- Pumps – these can be removed from the pump station by lifting them up out of the wet-well and inspecting above ground. Note : the pumps weight 147 kg each.
- Floats – can be lifted from the connection points in the access hole in the lid.
- Non-return valves/Isolation valves –can be access from ground level without the need to enter the chamber
- Venting will be required and will need to be installed on site. The access lids are air-tight.

Risk register

The risk register is a live document which requires continuous monitoring updating. This will need to be completed by the maintenance company for the pump station. The items below are a guide only.

The safety and design and Hazops workshops have encompassed risks for normal operation of the vacuum wastewater pump station. Specific risks for the maintenance process are outlined below.

Risk matrix

			Consequence / potential severity				
			Minimal Non-injury or First Aid injury (FAI)	Minor Medical treatment injury	Moderate Medical treatment injury, with lost time (LTI)	Major Injury requiring hospital-/notifiable event	Catastrophic Fatality or multiple fatalities
Likelihood	Very high	Almost certain: Commonly occurs	3: Medium	4: High	4: High	5: Very high	5: Very high
	High	Likely: Could easily happen	2: Low	3: Medium	4: High	4: High	5: Very high
	Medium	Possible: Could happen or has been known to happen	2: Low	2: Low	3: Medium	4: High	4: High
	Low	Unlikely: Hasn't happened yet but could happen	1: Very Low	2: Low	3: Medium	3: Medium	4: High

	Very low	Rare: Very unlikely but could happen in exceptional circumstances	1: Very Low	2: Low	2: Low	3: Medium	4: High
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	Hazards (<i>one per line</i>)		Hazard controls – what do we need to do to make it safe?	
What are we doing? (<i>step by step</i>)	What could cause harm?	Existing risk level (<i>use risk matrix</i>)	Eliminate/ Controls	Residual risk level
Wet-well inspection	The wet-well is classified as a confined space, an inspection is required prior to wet commissioning.	3	Elimination: The vessel will be isolated from the system at all exit points and inspected from the access hole in the lid . Isolate/Engineering Controls/PPE: Entry will only be required if debris is identified and cannot be removed by any other means. Entry to the vessel should follow confined space protocols, including ensuring all persons involved have the required training, admin and PPE controls.	1 1
Sewage Pump Testing	The wet well will be filled up for wet testing. This is a potential drowning hazard.	3	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well. Engineering Controls/PPE: All essential persons to wear appropriate protection. Sewage pump shall only operate when required for wet testing..	1 1
Removing lids for access	Traffic moving through area Back strain	3 2	Isolate/Engineering Controls/PPE: Place cones around service area so vehicles cannot enter site Engineering Controls/PPE – use appropriate lifting equipment if lifting pumps / lids on site	
Removing pumps	This is a falling hazard	4	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well.	
Electrical checks	Electrical shock	3	Engineering Controls/PPE: Only fully certified electricians to complete electrical work	

4 Warrantees

Aquate guarantees the performance and quality of its pump stations provided:

- The product is only used for the intended purposes as stated in the quote
- The control panel and pump station is correctly installed and commissioned by a suitable installer
- The fault is due to a defect in design, materials or workmanship
- The fault is reported to an Aquate agent or representative during the guarantee period
- No pump station components have been replaced by alternative products
- This guarantee does not cover faults resulting from misuse of the system, blockages or breakdowns caused by the introduction of inappropriate materials into the system, incorrect electrical installation of the control unit, deficient maintenance or normal wear and tear.

Aquate assumes no liability for bodily harm, property damage or economic losses as a result of its pump stations.

4.1 Pumps

The pumps come with a 12 month year warranty against faulty components and/or workmanship. If prohibited substances are introduced to the system causing the pump to block and burn out, the warranty is null and void.

Flygt undertakes to remedy faults in products sold by Flygt provided that:

- The fault is due to defects in design, materials or workmanship;
- The fault is reported to a Flygt representative during the guarantee period;
- The product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;
- The monitoring equipment incorporated in the product is correctly connected;
- All service and repair work is done by a workshop authorized by Flygt or the original manufacturer;
- Genuine manufacturer's parts are used
- Storage should be in accordance with the care and maintenance manual.
- The equipment is operated and maintained in accordance with the Operation and Care and Maintenance Manual.

Failure to comply with these requirements will render warranty void unless, due to the nature of the warranty claim, such voiding of warranty is prevented by law, regulation, act and/or ordinance.

Hence, the guarantee does not cover faults caused by deficient maintenance, abuse, incorrectly executed repair work or normal wear and tear.

5 Maintenance schedule

A certain amount of system maintenance is required on an ongoing basis to ensure that the system is working correctly. This is the responsibility of the owner

5.1 Six monthly

The following procedures should be completed every six months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Lift the floats and test the alarm system/pump operation
- Consult with the electrical control supplier for additional checks

5.2 Annually

The following procedures should be completed at least once every 12 months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Lift the floats and test the alarm system/pump operation
- Press the mute button (audio alarms only) to check the audio alarm turns off.
- Visually check the pump station for any structural damage to the tank and pipework
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Have the pump station sucked out to remove any debris/stones if necessary

5.3 Maintenance requirements

The pump maintenance and repair operations must be carried out by workers authorised by the manufacturer; Failure to comply with these instructions will result in forfeiture of the warranty and jeopardise the unit's safety.

Before any cleaning and/ or maintenance operations are carried out on the electric pump, the power supply must be switched off.

To disconnect the submersible electric pump from the electricity mains, first disconnect the phase conductors, then the yellow –green earth wires.

Use the special handle to remove the submersible electric pump from the tank.

ATTENTION: Before carrying out any operations, check the pump temperature. Only work on the pump when it is at room temperature.

Clean the electric pump thoroughly, using a jet of water or specific products to clean all its parts. When disposing of the waste material, follow the antipollution rules in force.

Replace any broken or worn parts with original spare parts only.

Given the likelihood that work on the electric pump will be carried out in confined spaces such as vats, wells, cesspools, tanks or cisterns, do not underestimate the risks caused by potentially poisonous exhalations.

APPENDICES

General Arrangement Drawing – Plan

General Arrangement Drawing – Section

General Arrangement Drawing – Plan with tank

General Arrangement Drawing – Section with tank

Flygt NP3127 SH3 248 Specifications k 1.5

Flygt NP3127 SH3 248 Specifications k 0.1

McBerns well washing brochure

Hynds Retention Tank brochure

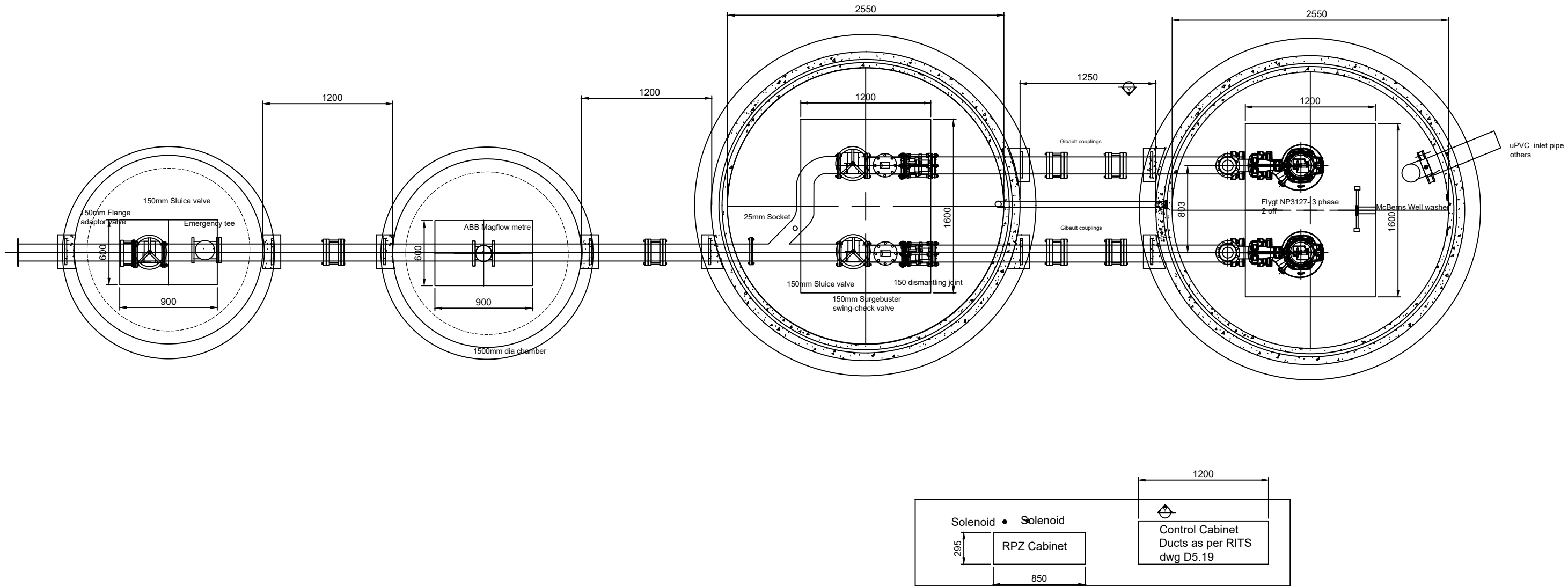
BlueSeal-AKS data sheet

Hyliner HDSPE liner – data sheet

ABB Magflow Meter Specifications

ABB Blackbox level sensor specifications

Flygt ENM10 float switch specifications



NOTES:
1.

REVISIONS			
REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Preliminary design	30/7/26	PC

PO Box 58142, Botany, Auckland, 2316
Tel: 09-274 0316
Fax: 09-272 7485
email: hwwsupport@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
Brymer Developments
WWPS B Stage 1-5 Design

WW Pump Station

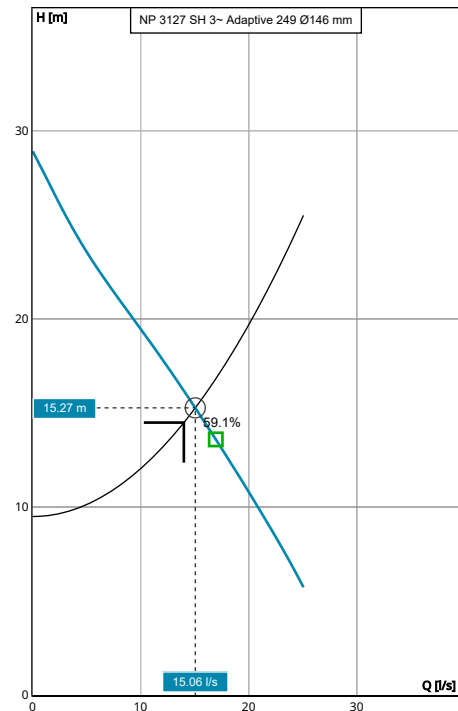
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SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 30/7/26
PAPER SIZE: A3		
DRAWING NUMBER: AQ2209 1	SHEET NUMBER: of 4	REVISION NUMBER: A

NP 3127 SH 3~ Adaptive 249 | Configuration Summary



Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	146 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material	Stator Cover Material
Hard-Iron	Grey Cast Iron
Volute Material	
Grey Cast Iron	

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
D	7.4 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3127 SH 3~ Adaptive 249 | Product Details

Description

N 3127

Wastewater N-Technology Pump With Adaptive N® Impeller

Flygt N-pumps take on the toughest applications and get the job done. Every component is designed and manufactured to deliver sustained high efficiency. Thanks to patented N-technology with its innovative self-cleaning impeller, Flygt N-pumps deliver the highest total efficiency. They lower your energy bill and reduce unplanned maintenance costs. That adds up to total peace of mind – and big savings over the long term. Most solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet. Due to the mechanical self-cleaning design, a sludge concentration up to 8% can easily be pumped.

Flexible and Modular Design

- This self-cleaning pump features innovative functions that make it the best choice for a broad range of applications. The modular hydraulic design enables you to tailor the hydraulics to meet the requirements of virtually any application.
- Replaceable wear ring in two materials, gray iron or Hard-Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-Iron impeller for abrasive and corrosive applications
- Stainless steel impeller for special applications that require duplex stainless steel
- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties
- The double mechanical seal system consists of two sets of mechanical shaft seals that work independently to provide double security. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Griploc mechanical face seal system secures locking to the shaft, no rubber friction, no grub screws and no shaft damage
- Motor cable SUBCAB ® specially developed for submersible use.

Product Features

- Sustained high efficiency
- Hardened cast iron, optional Duplex stainless steel and Hard-Iron impellers
- State-of-the-art wastewater pump with enhanced Adaptive N® hydraulic
- Sustained high efficiency with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

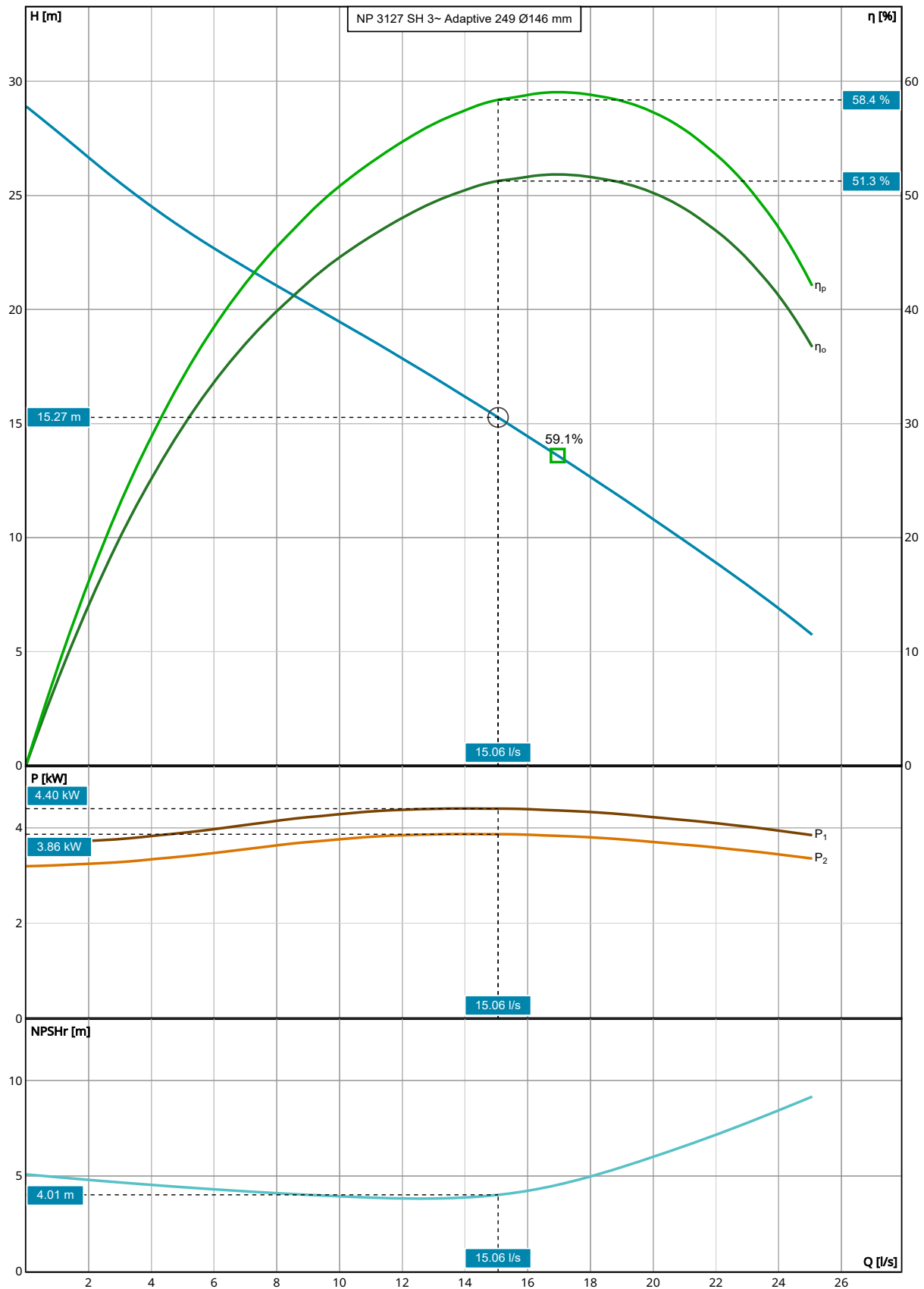
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	Grey Cast Iron

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
7.4 kW	3	8.28	12
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-11-2AL	2,900 RPM	H	J
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
060	14 A	0.02 kgm ²	0.89
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	114 A	S1	0.86
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
3.87 kW	114 A	2	0.78
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	38 A	164	87.3 %
			Efficiency 75%
			88.2 %
			Efficiency 50%
			87.7 %
			Cooling Jacket
			-

NP 3127 SH 3~ Adaptive 249 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	249
Name	Impeller Diameter
NP 3127 SH 3~ Adaptive 249	146 mm
Frequency	Inlet Diameter
50 Hz	100 mm
Total Flow	Outlet Diameter
14 l/s	80 mm
Total Head	Number Of Vanes
14.49 m	2
Pump Flow	
14 l/s	
Pump Head	
14.49 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
15.06 l/s	3.86 kW
Head	NPSHR
15.27 m	4.01 m
Overall Efficiency (η_o)	Speed
51.26 %	2,951 RPM
Pump Efficiency (η_p)	Static Head
58.37 %	9.5 m
Input Power (P1)	Flow To BEP Ratio
4.4 kW	88.8 %

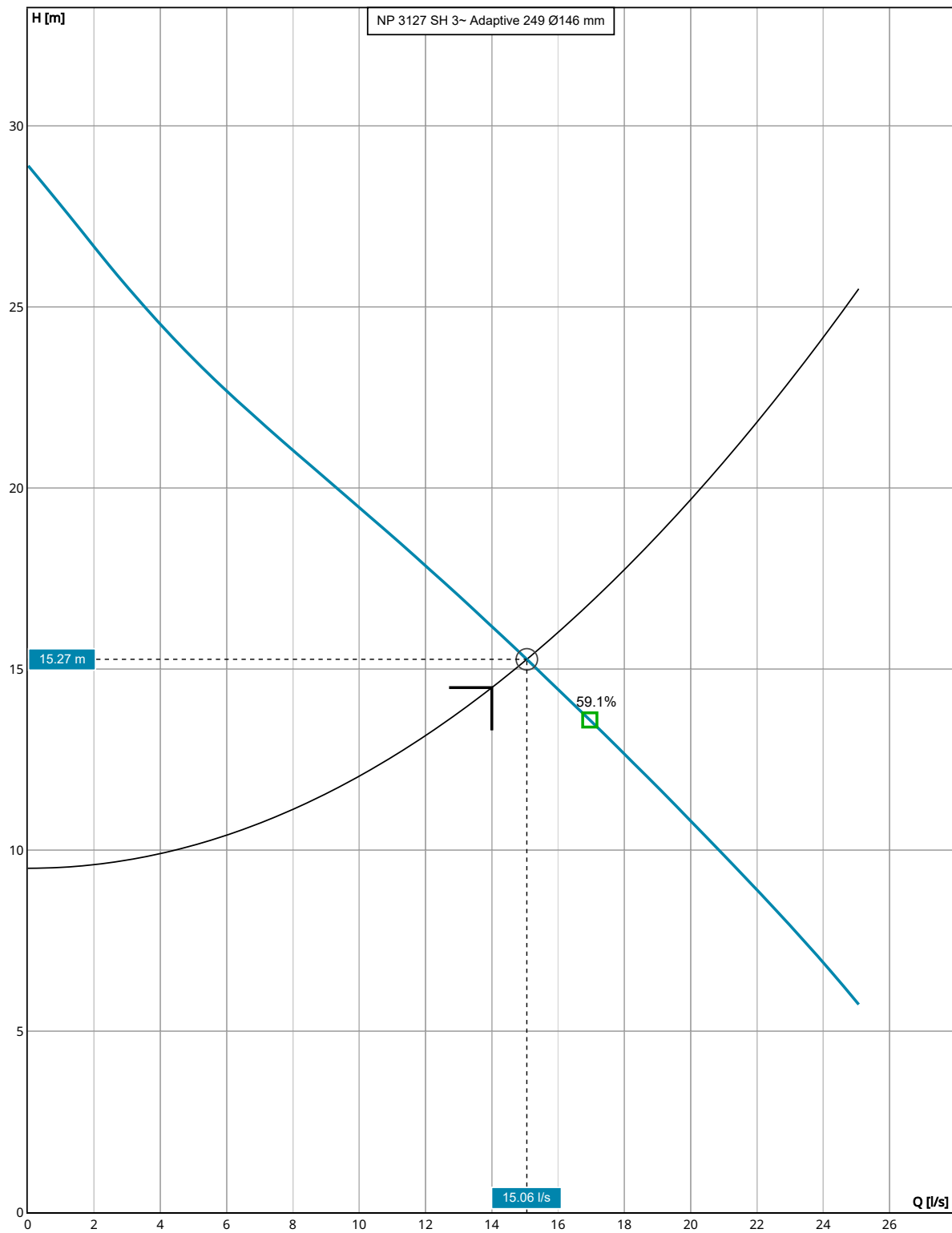
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	16.96 l/s
Max Flow	BEP Head
25.07 l/s	13.6 m
H@QMin	Max P2
28.9 m	3.87 kW
H@QMax	Specific Energy
5.74 m	0.08 kWh/m ³
BEP	
59.06 %	

NP 3127 SH 3~ Adaptive 249 | Duty Analysis

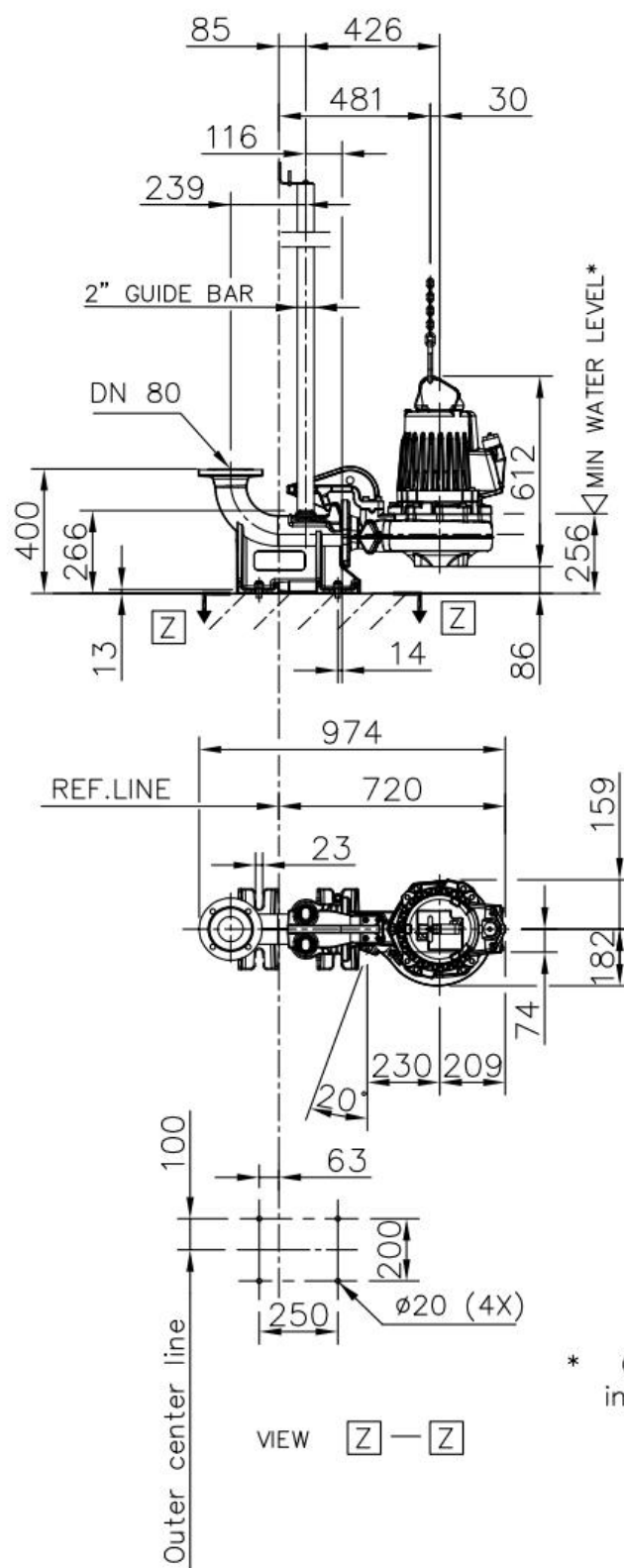


Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m ³]	NPSHr [m]
DP @ 1x	15.06	15.27	3.86	15.06	15.27	3.86	58.37	0.08	4.01

NP 3127 SH 3~ Adaptive 249 | Dimensional Data & Drawing

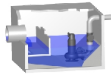


* Consult the IOM for more info

Weight (kg)	
Pump	Disch
147	35

	FP,NP	3127	SH		Discharge outlet DN 80	Scale	Date
	060,070,161,191,350,390,901,911,920,930				Pump outlet DN 80	1:20	250408
					Pump inlet	Drawing number	Revision
					Suction inlet	7319700	8

NP 3127 SH 3~ Adaptive 249 | Headloss Calculation



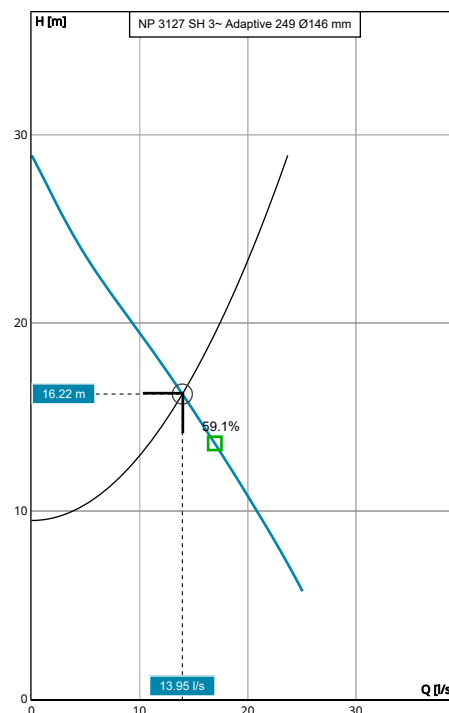
Fluid Type	Total Flow	Kinematic Viscosity
Water	14 l/s	0.000002 m ² /s
Static Head	Operating Pumps	System Type
9.5 m	1	Single Pump
Layout	Calculation Model	
Wet Installed Submersible Pumps	Colebrook-White	

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / Pipe 1 / Stainless steel / PN 10 / DN 150 (159x4.0 mm) / New Pipes						
Pipe Length	151 mm	10 m	1	0.78 m/s	0.5 mm	0.06 m
90 Elbow	151 mm	0.3	1	0.78 m/s		0.01 m
Tee Line →  →	151 mm	0.1	1	0.78 m/s		0.003 m
Check Valve	151 mm	0.9	1	0.78 m/s		0.03 m
Gate Valve	151 mm	0.2	1	0.78 m/s		0.01 m
Total Head						0.11 m
Individual Discharge Piping / Pipe 2 / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm) / New Pipes						
Pipe Length	147.2 mm	728 m	1	0.82 m/s	0.5 mm	4.88 m
Total Head						4.88 m
Friction Loss Head						4.99 m
Static Head						9.5 m
Total Head						14.49 m

NP 3127 SH 3~ Adaptive 249 | Configuration Summary



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Volute Material	
Grey Cast Iron	

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Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
D	7.4 kW

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Installation Type
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NP 3127 SH 3~ Adaptive 249 | Product Details

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- Flexible and modular design
- Robust and reliable

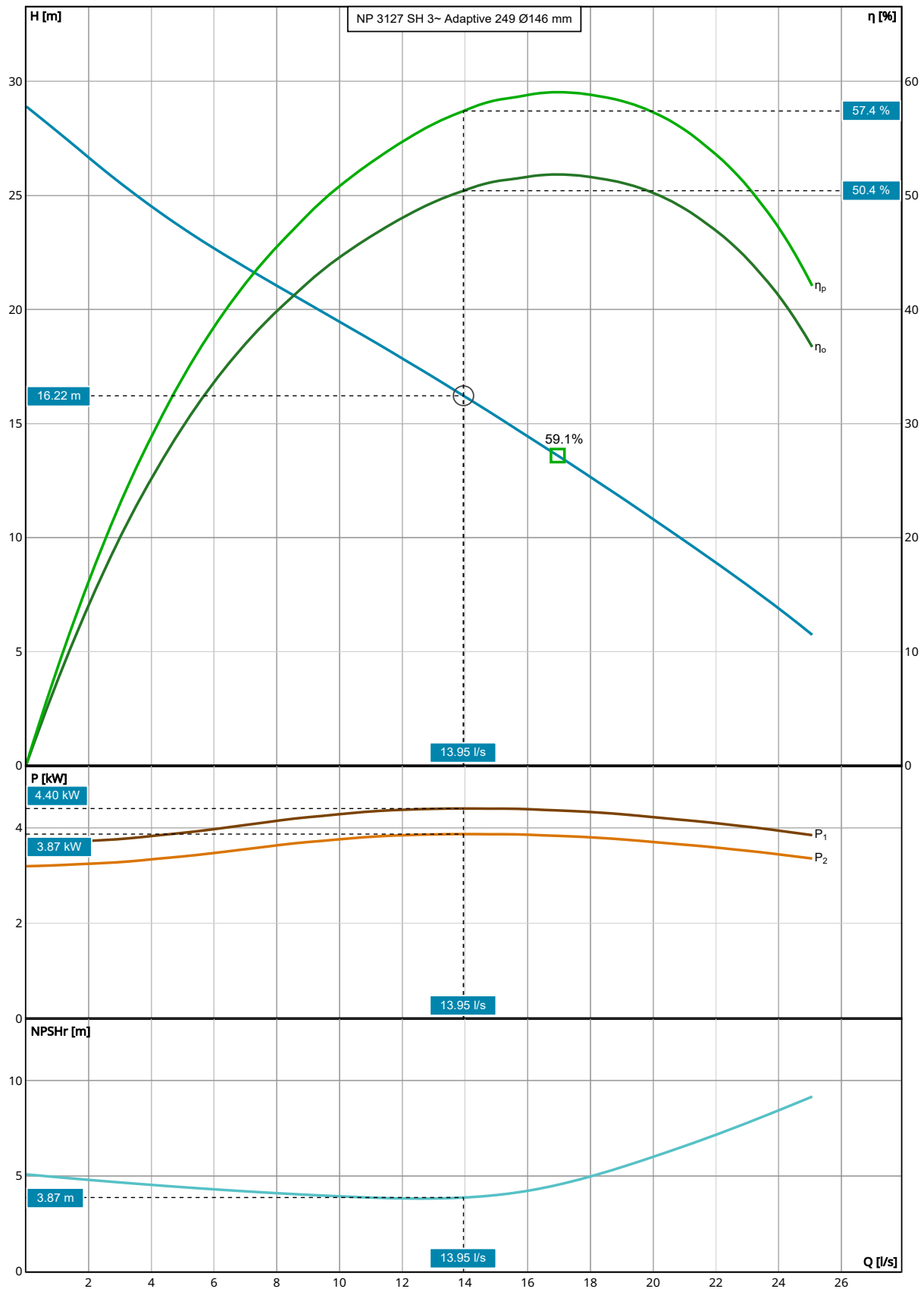
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	Grey Cast Iron

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
7.4 kW	3	8.28	12
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-11-2AL	2,900 RPM	H	J
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
060	14 A	0.02 kgm ²	0.89
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	114 A	S1	0.86
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
3.87 kW	114 A	2	0.78
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	38 A	164	87.3 %
			Efficiency 75%
			88.2 %
			Efficiency 50%
			87.7 %
			Cooling Jacket
			-

NP 3127 SH 3~ Adaptive 249 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	249
Name	Impeller Diameter
NP 3127 SH 3~ Adaptive 249	146 mm
Frequency	Inlet Diameter
50 Hz	100 mm
Total Flow	Outlet Diameter
14 l/s	80 mm
Total Head	Number Of Vanes
16.27 m	2
Pump Flow	
14 l/s	
Pump Head	
16.27 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
13.95 l/s	3.87 kW
Head	NPSHR
16.22 m	3.87 m
Overall Efficiency (η_o)	Speed
50.41 %	2,951 RPM
Pump Efficiency (η_p)	Static Head
57.4 %	9.5 m
Input Power (P1)	Flow To BEP Ratio
4.4 kW	82.28 %

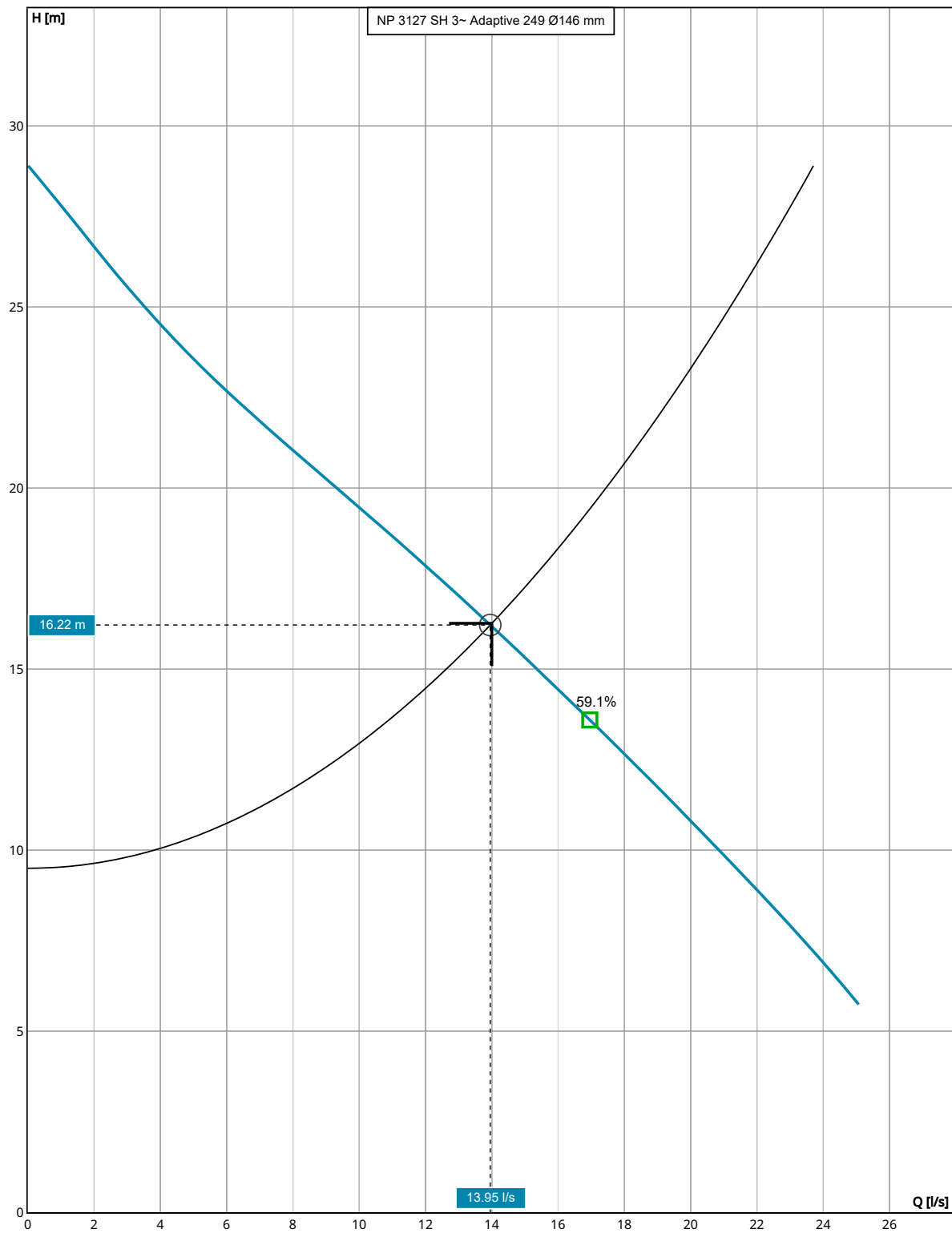
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	16.96 l/s
Max Flow	BEP Head
25.07 l/s	13.6 m
H@QMin	Max P2
28.9 m	3.87 kW
H@QMax	Specific Energy
5.74 m	0.09 kWh/m ³
BEP	
59.06 %	

NP 3127 SH 3~ Adaptive 249 | Duty Analysis

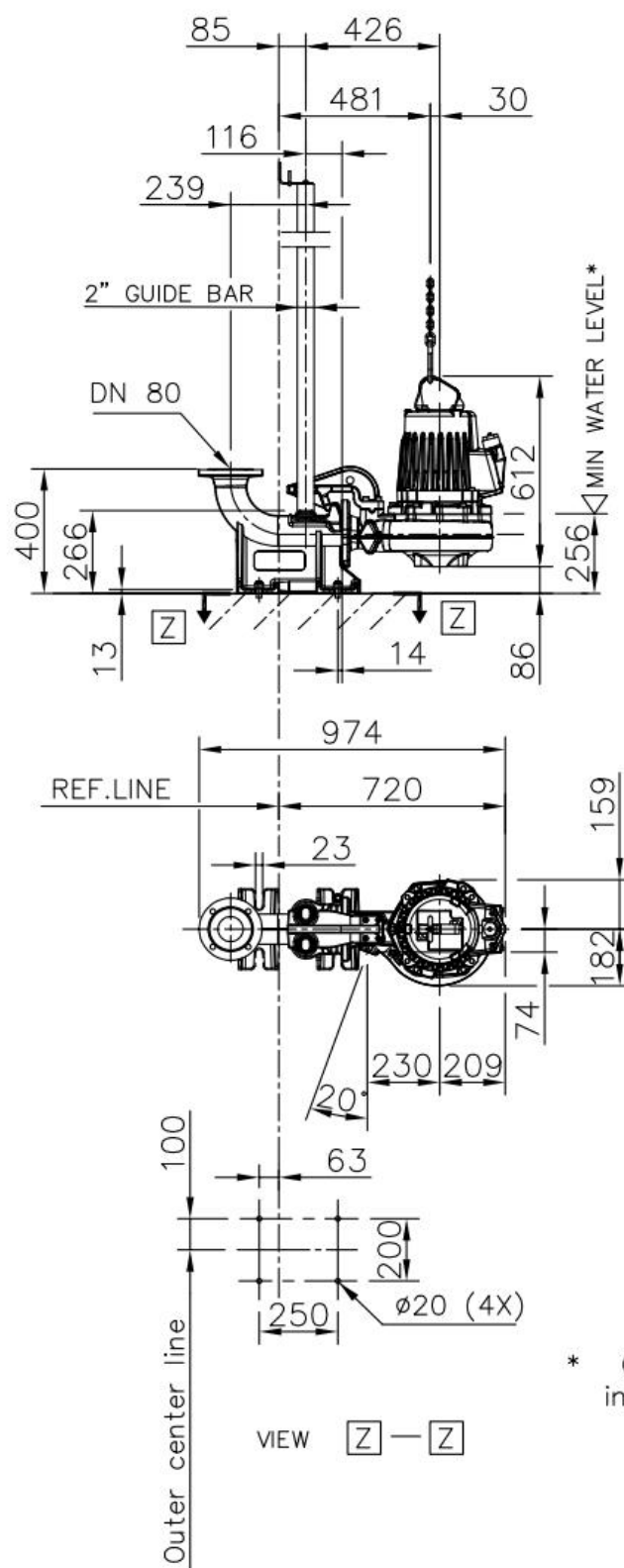


Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	13.95	16.22	3.87	13.95	16.22	3.87	57.4	0.09	3.87

NP 3127 SH 3~ Adaptive 249 | Dimensional Data & Drawing

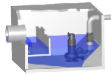


* Consult the IOM for more info

Weight (kg)	
Pump	Disch
147	35

	FP,NP	3127	SH		Discharge outlet DN 80	Scale	Date
	060,070,161,191,350,390,901,911,920,930				Pump outlet DN 80	1:20	250408
					Pump inlet	Drawing number	Revision
					Suction inlet	7319700	8

NP 3127 SH 3~ Adaptive 249 | Headloss Calculation



Fluid Type	Total Flow	Kinematic Viscosity
Water	14 l/s	0.000002 m ² /s
Static Head	Operating Pumps	System Type
9.5 m	1	Single Pump
Layout	Calculation Model	
Wet Installed Submersible Pumps	Colebrook-White	

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / Pipe 1 / Stainless steel / PN 10 / DN 150 (159x4.0 mm) / New Pipes						
Pipe Length	151 mm	10 m	1	0.78 m/s	1.5 mm	0.08 m
90 Elbow	151 mm	0.3	1	0.78 m/s		0.01 m
Tee Line →  →	151 mm	0.1	1	0.78 m/s		0.003 m
Check Valve	151 mm	0.9	1	0.78 m/s		0.03 m
Gate Valve	151 mm	0.2	1	0.78 m/s		0.01 m
Total Head						0.13 m
Individual Discharge Piping / Pipe 2 / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 150 (180x16.4 mm) / New Pipes						
Pipe Length	147.2 mm	728 m	1	0.82 m/s	1.5 mm	6.64 m
Total Head						6.64 m
Friction Loss Head						6.77 m
Static Head						9.5 m
Total Head						16.27 m



Scan for more
information

Hynds Retention Tank with Mul-T-Level™ Outlet

Technical Guide D5.15

Hynds strong and reliable retention tanks are available in Ring Joint Pipe Internal Base or Flange Base manhole types.



03.15 | DRAINAGE | D5.15 HYNDS RETENTION TANK

Applications

Stormwater retention & detention

Sewer storage

Product Attributes

Versatile Mul-T-Level™ outlet

Highly durable

Simple installation

Various design layouts and large capacity options available

Water tight

Proven history

Approvals/Standards

AS/NZS 4058:2007 Precast concrete pipes (pressure and non-pressure)

Quality

ISO 9001:2008 Quality Management

*The go to organisation for civil
and rural water product solutions*

HYNDS

Hynds strong and reliable retention tanks are available in Ring Joint Pipe, Internal Base or Flange Base Manhole types.

Design Specifications and Applications

RJ Retention Tank

- Generally used when the location permits the installation of a long narrow tank.
- Comprised of Hyspec reinforced concrete rubber ring joint pipes.
- Usually includes a spigot-plugged pipe, standard intermediate pipes and a collar-plugged pipe.
- The spigot and collar plugs are factory cast to ensure water tightness and integrity.
- A manhole offtake is factory fitted to one or more pipes to provide easy access for maintenance.

IB or FB Retention Tank

- Generally used in compact site conditions where relatively small volumes is required.
- Comprised of Hynds internal base or flange base manhole risers and a precast concrete lid.

Mul-T-Level™ outlet

- Enables the tank to be used for both detention and retention.
- Both the RJ and IB/FB retention tanks have a standard 100 or 150mm diameter PVC slip coupler and Mul-T-Level™ outlet cast-in or fitted during manufacturing.
- The required retention/detention volume is set by an orifice hole (of specified diameter) being drilled on the Mul-T-Level™ outlet at a pre-determined height.

General Specifications

- Manufactured from Hyspec spun concrete pipes, using the centrifugal spinning process.
- When the tank is installed in an aggressive environment, such as tidal areas, sewerage or mild acid solutions, the use of a special grade concrete is recommended. Contact Hynds Technical Team for more information.
- Retention tanks are available in various class types to suit specific site conditions, loading and applications.
- The diameter and length of the retention tank is dependent on:
 - Storage volume required
 - Site configuration and access equipment available
- Inspection and maintenance access is provided by a fitted inspection chamber or manhole riser starter.
- PVC slip couplers are fitted to end plugs to provide inlet and outlet connections to the retention tank.
- Non-standard couplers or starter types can be cast-in on request.
- Orifice holes are drilled at levels to suit the design requirements.
- Standard lids are available for access risers in the RJ type tanks.
- A light or heavy duty cast iron cover and frame will fit directly onto the 600mm diameter access riser.
- The 1050 mm diameter access riser requires a 1050 mm diameter manhole lid, which can be fitted with the cast iron manhole frame and cover.
- The IB or FB tanks require a lid, which can be fitted with a cast iron frame and cover to suit the riser diameter.
 - Note: Lid thickness is dependent on loads and application
 - Refer to Table 1 for RJ tank capacities and Tables 2 and 3 for IB/FB tank capacities.

TABLE 1 RJ type retention tank

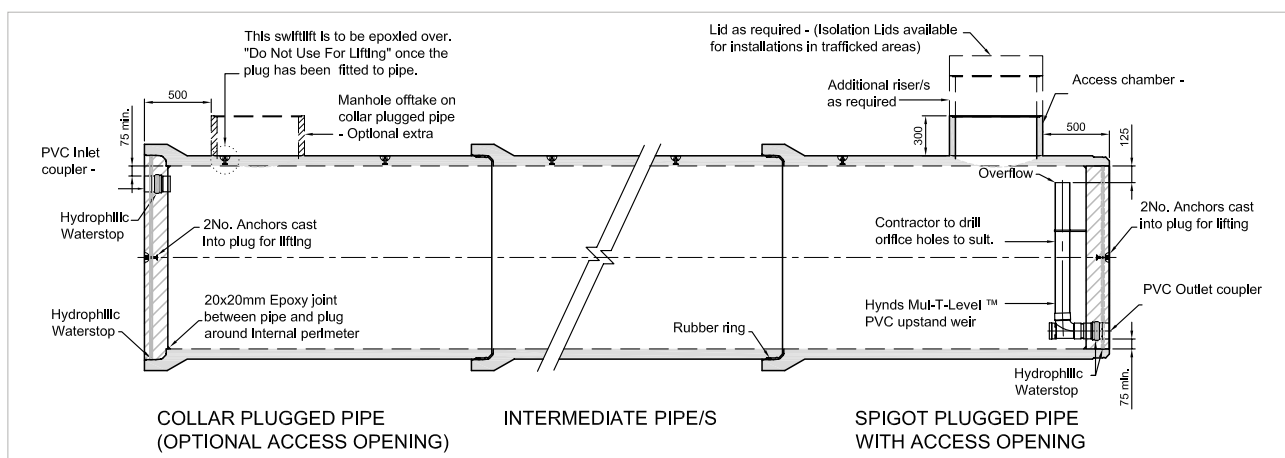
Nom Pipe Diameter and Joint Type	Pipe Effective Length (m)	Nom Vol per Pipe Length (m ³)	Nom Vol per Pipe Length (Litres)	Suggested Offtake Dia (mm)	Lifting plugged pipe anchor req.	Handling intermediate pipe anchor req.
675RJ	2.440	0.72	720	600	A1	A2
750RJ	2.440	0.92	920	600	A1	A2
825RJ	2.436	1.14	1140	600	A1	A2
900RJ	2.448	1.38	1380	600	A1	A2
975RJ	2.440	1.67	1670	600	B1	B2
1050RJ	2.440	1.94	1940	600	B1	B2
1200RJ	2.440	2.58	2580	600	B1	B2
1350RJ	2.454	3.31	3310	600/1050	B1	B2
1600RJ	2.440	4.51	4510	1050	C1	B2*
1800RJ	2.438	6.13	6130	1050	C1	C2
1950SRJ	2.440	7.05	7050	1050	C1	C2
2100SRJ	2.397	8.02	8020	1050	C1	C2
2300SRJ	2.735	11.01	11010	1050	C1	C2
2550SRJ	2.470	12.18	12180	1050	C1	C2

Key

- **A1** 1 Tonne
2 no. in plug
1 no. in pipe
- **A2** 1 Tonne
2 no. in pipe
- **B1** 2.5 Tonne
2 no. in plug
1 no. in pipe
- **B2** 2.5 Tonne
2 no. in pipe
- **C1** 5 Tonne
2 no. in plug
1 no. in pipe
- **C2** 5 Tonne
1 no. in pipe

Notes:

- All dimensions refer to Class 2 (X) pipes
- Outlet 75 mm minimum above bottom invert of pipe
- Overflow 125mm below top
- *1600 Ø retention tanks require both B2 & C1 type lifting clutches for offloading and installation
- See Fig 6 for 3 point lift on typical plugged end pipe

**FIG. 1** General layout of typical RJ type retention tank with Mul-T-Level™ outlet

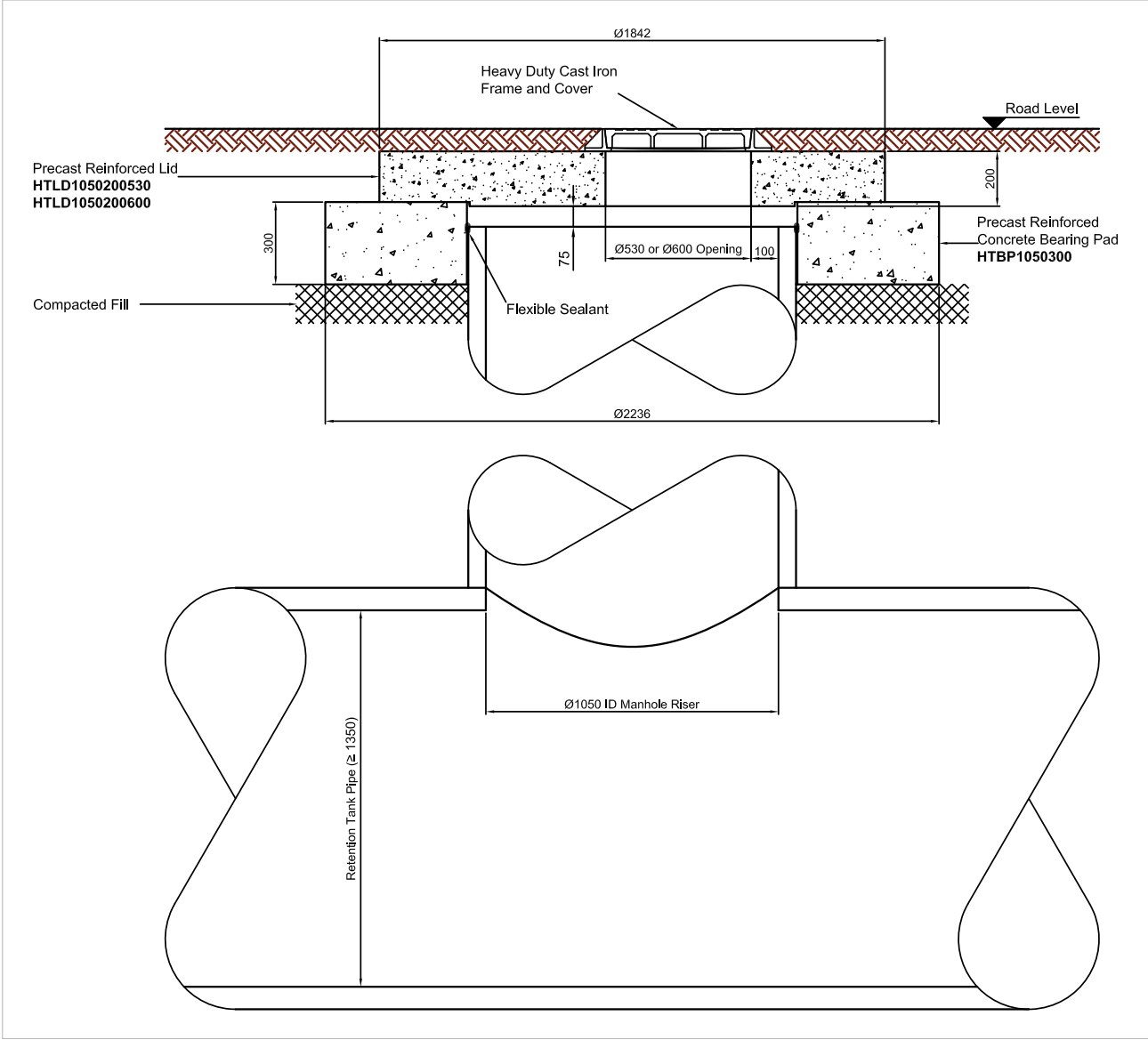
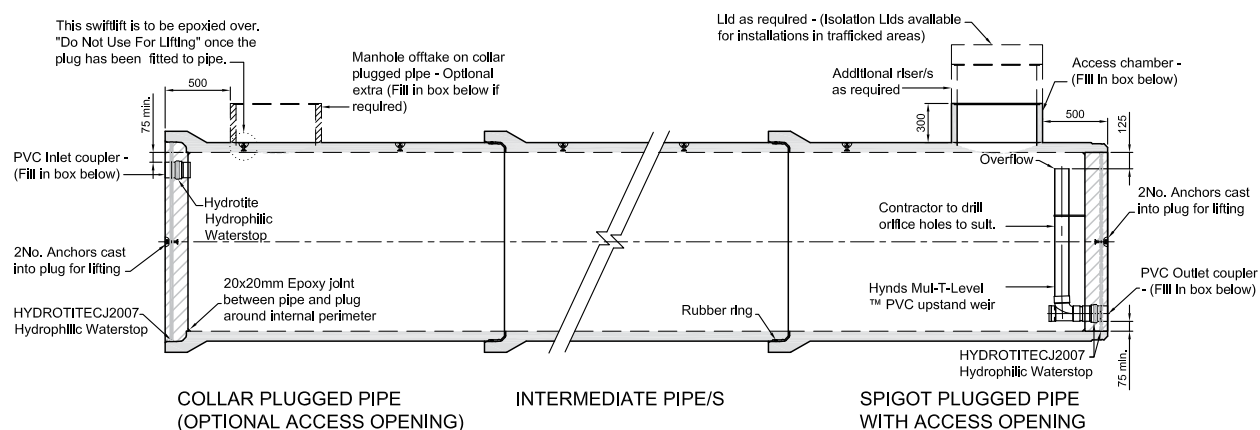


FIG. 2 Recommended detail for roadway installation



PIPE Ø

Mn Recommended Ø 675mm

JOB DETAILS

PIPE CLASS

TOTAL No. OF PIPES
(Incl. ends)

QUOTE No.

COVER TO INVERT

Inlet	Outlet

CO No.

PVC INLET FITTING Ø

Pipe Ø	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

PVC OUTLET FITTING Ø

Ø Pipe	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

ACCESS CHAMBER -
OUTLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

ACCESS CHAMBER
- OPTIONAL
INLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

I AUTHORISE HYNDS PIPE SYSTEMS LTD TO PROCEED WITH THE MANUFACTURING OF THIS PIPE SPECIAL AS DETAILED ABOVE. I ACKNOWLEDGE THAT ANY SPECIALS, ONCE MANUFACTURED, ARE DEEMED TO BE MY (CONTRACTOR'S) PROPERTY & ARE NON REFUNDABLE. STORAGE & HANDLING FEES WILL BE INCURRED FOR PRODUCTS THAT ARE NOT DELIVERED/COLLECTED WITHIN 1 MONTH OF THE DATE AGREED AT THE TIME OF ORDER. PRODUCT NOT DELIVERED/COLLECTED WITHIN 3 MONTHS OF THE DATE AGREED WILL BE DESTROYED AT MY EXPENSE.

NAME :- SIGNATURE :-

DATE :-

FIG. 3 RJ Retention Tank Order Form

Internal base type

TABLE 2 Internal base retention tank

Riser Height (mm)			450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid			580	730	1030	1330	1630	1930	2230	2530
O/A Height Incl 200mm Thick Lid			630	780	1080	1380	1680	1980	2280	2580
Effective Depth (mm)			225	375	675	975	1275	1575	1875	2175
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m3)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

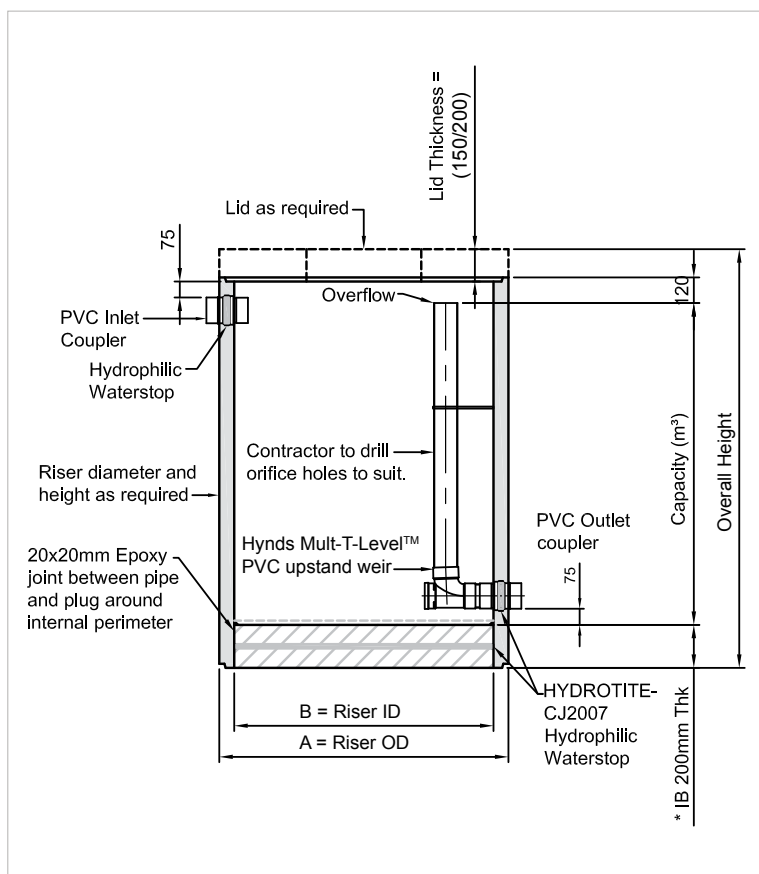


FIG. 4 Internal base

Flange base type

TABLE 3 Flange base retention tank

Riser Height (mm)			450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid			530	680	980	1280	1580	1880	2180	2480
O/A Height Incl 200mm Thick Lid			580	730	1030	1330	1630	1930	2230	2530
Effective Depth (mm)			225	375	675	975	1275	1575	1875	2175
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

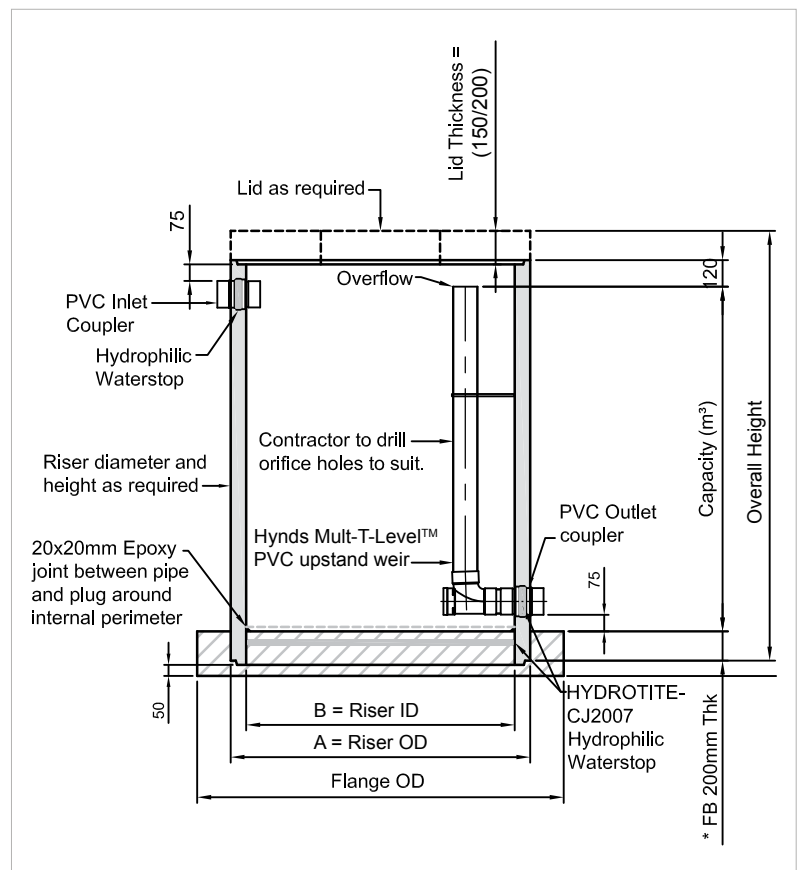


FIG. 5 Flange base

Installation

Mul-T-Level™ outlet

- Installation is simple and normally carried out by a drain layer using the same equipment and procedures as for the installation of concrete pipelines, or manholes.

RJ Retention Tank

- Similar installation to reinforced concrete rubber ring jointed pipes (including bedding requirements) and are dependent on site conditions and loading.
- Once the pipe sections have been installed and backfilled, the additional access risers are epoxied to the starter risers and brought up to the finished levels.
- The installation is then completed by fitting the required lids.
- The contractor must then drill the orifice holes at the required design levels.

Note: Refer to Figure 1 for a general layout of a typical RJ type tank.

RJ Retention Tank – Roadway Installation

- To minimise the effects of traffic, isolation of the manhole lid from the access riser is recommended.
- The depth of the modified flange base and riser must be kept to a minimum to enable maximum distribution of load above the tank.
- Refer to Figure 6 for 3 point lift of typical plugged end pipe.

IB or FB Retention Tank

- Similar installation to concrete manholes.
- Foundations should be prepared with compacted hardfill to prevent excessive settlement.
- Once the IB or FB tank is backfilled, the installation is completed by fitting the relevant concrete lid with the appropriate cast iron frame.



FIG. 6 Point lift of typical plugged end pipe

Branches Nationwide Support Office & Technical Services 09 274 0316

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.

Hyliner AKS HDPE Lining

Technical Guide D1.12

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.



04.20 | DRAINAGE | D1.12 HYLINER AKS HDPE LINING

Applications

Corrosion protection lining for precast concrete pipes in sewer pipelines

Corrosion protection lining for in-situ concrete structures in wastewater treatment plants

Abrasion protection lining in high abrasion environments

Broad range of application in both precast and cast in-situ concrete

Product Attributes

Available in white (sewer applications) and black (where high UV resistance is required)

12 mm long anchors are integrally formed with the sheet

Factory QA tested and welding of joints is 100% quality tested onsite

Quality

ISO 9001:2008 Quality Management Standard

We are the supply partner of choice for New Zealand's civil construction industry, specialising in water and infrastructure based solutions.

HYNDS
PIPE SYSTEMS

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.

Lining systems are able to bridge discontinuities in pipe or structure walls unlike other coating systems that rely on the integrity of the surface and quality of the surface preparation and the installer's expertise for functionality.

HyLiner AKS HDPE is a thermoplastic lining used to reduce the risk of sulphide attack or corrosion in sewage applications.

The high density polyethylene (*HDPE*) lining suits both precast and in-situ applications. Firmly anchored to the concrete surface of the pipe or structure, the lining requires only welding of joints to form a durable, chemically resistant concrete protection membrane with high abrasion resistance.

Installation

Installation procedures vary depending on the product:

Spun concrete pipe

The liner is inserted into the pipe prior to the completion of manufacture, with the pipe spinning process completed with the liner installed. This ensures that all the anchor knobs are well embedded in the spun concrete prior to the concrete curing and hardening.

Wet cast concrete pipe

The liner is securely attached to the inner mould before placement of reinforcement and casting of the pipe. The pipe once cast is cured in the normal manner using heat to accelerate the hardening process.

Precast concrete

This follows a similar process to the wet cast concrete pipe whereby the liner is attached to the mould prior to casting of the element.

In-situ concrete

This follows the same process as for precast concrete whereby the liner is attached to the formwork prior to casting of the concrete.

Installation Detail

In the case of concrete pipes, the liner need only be applied to the pipe's internal surface above low flow level during normal operating conditions as shown in fig 3.

Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min) as shown in fig 4 & 5. This joint is not usually welded as it allows any accumulation of moisture from external hydrostatic pressure to dissipate from behind the liner.

Where the fluid contents are themselves aggressive, such as trade waste discharges, a longitudinal weld can be provided to seal the pipe invert.



FIG. 1 Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min)

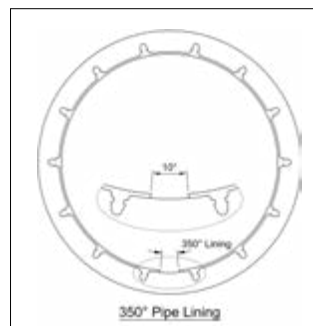


FIG. 3 Most concrete pipes only require the liner applied to the pipe's internal surface above low flow level during normal operating conditions.

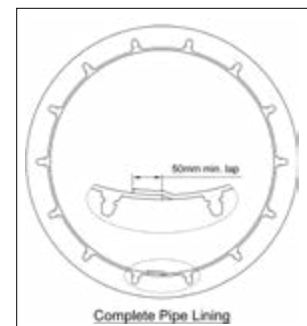


FIG. 2 Invert overlap in a 1050Ø pipe.

Jointing

A continuous lining system is created through the use of extrusion welding carried out by trained, qualified operators. Generally overlapped welds are recommended.

Various details for welded joints for precast concrete pipes and components are shown in Figures 4 to 6. Other details for site installation and fixing of brackets are shown in Figures 7 to 12.

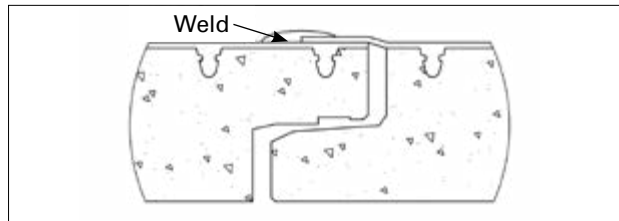


FIG. 4 HyLiner lined SRJ pipe (Lapped Joint)

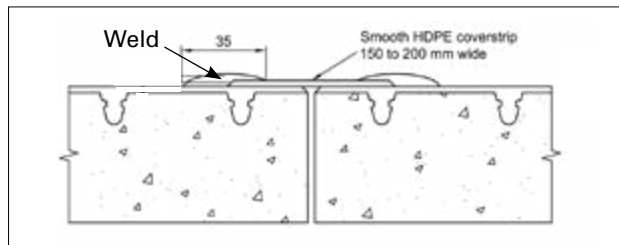


FIG. 5 Cover strip with 2 overlap welds

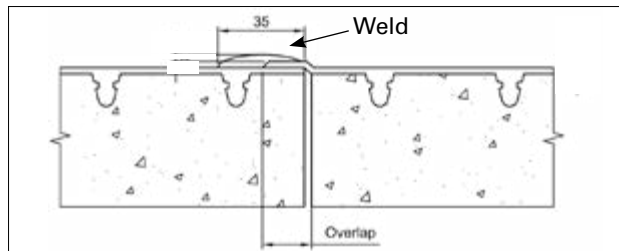


FIG. 6 Single overlap weld

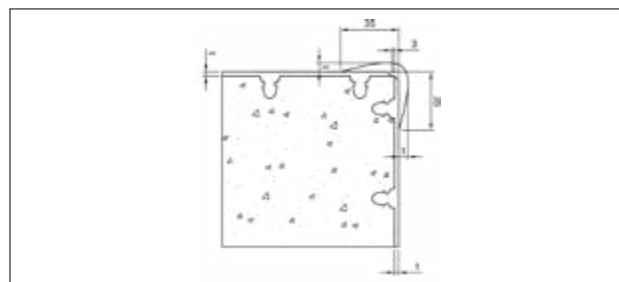


FIG. 7 Outside Corner Weld

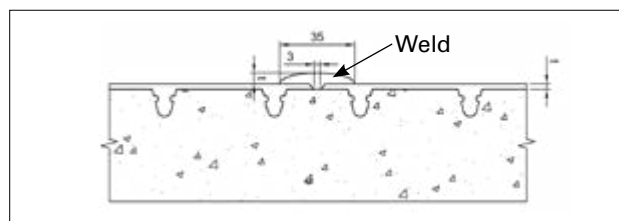


FIG. 8 Flat Extrusion Butt Weld

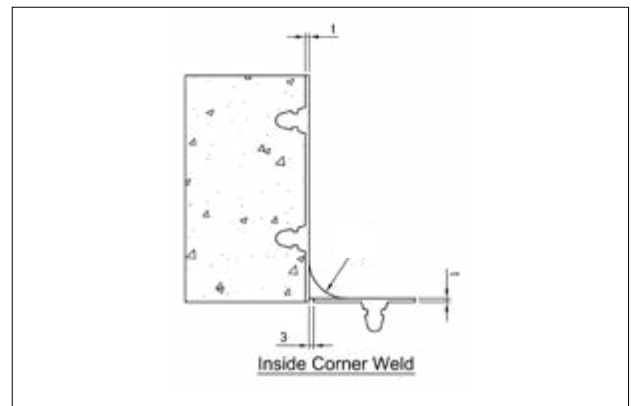


FIG. 9 Inside Corner Weld

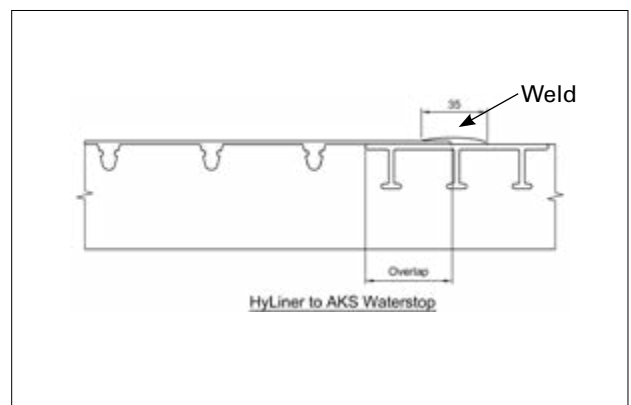


FIG. 10 HyLiner to AKS Waterstop

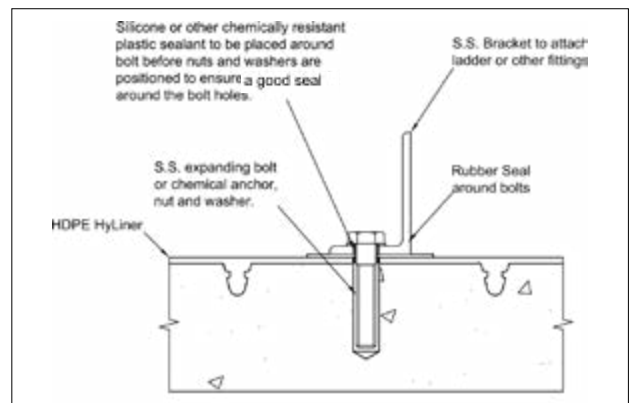


FIG. 11 Sealing of Brackets and Fittings to HyLiner Lined Structures

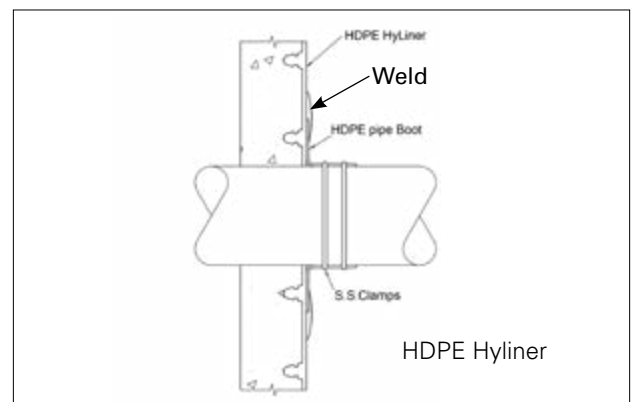


FIG. 12 Pipe Penetration Detail

Quality Control

In-plant quality control for the manufacture of the liner includes waviness, surface finish, knob shape and alignment, crimp height and depth of knobs, sheet thickness, density and tensile values.

Quality checks after casting into precast concrete pipes and components include effective anchor embedment, liner positioning on the product and spark testing for pin holes or damage.

All joints and the liner are spark tested after jointing is completed on site. This ensures the quality of the joints and identifies any damage in the liner as a result of handling and installation.

Abrasion resistance

HyLiner AKS HDPE has a good abrasion resistance when compared to other materials. A typical abrasion test value for HDPE liners is 0.3mm after 400 000 cycles (*Kirschmer, O., "Problems of Abrasion in Pipes", Steinzeugin Formationen, 1966, No 1, pp3-13*).

Wear rates are very slow even under continuous flow of abrasive slurry. Most drainage applications would have intermittent exposure to abrasion.

Suitable Structures for Lining

HyLiner AKS HDPE is suitable for installation in spun and wet cast concrete pipes from 1050–3000 mm diameter. HyLiner AKS HDPE is also suitable for lining a range of other concrete structures:

- Manhole risers and lids
- Rectangular or square precast concrete chambers and lids
- Precast concrete channels and lids
- Precast concrete pumpstations
- Insitu concrete structures such as tanks and chambers



FIG. 13 2300 Diameter Manhole Riser

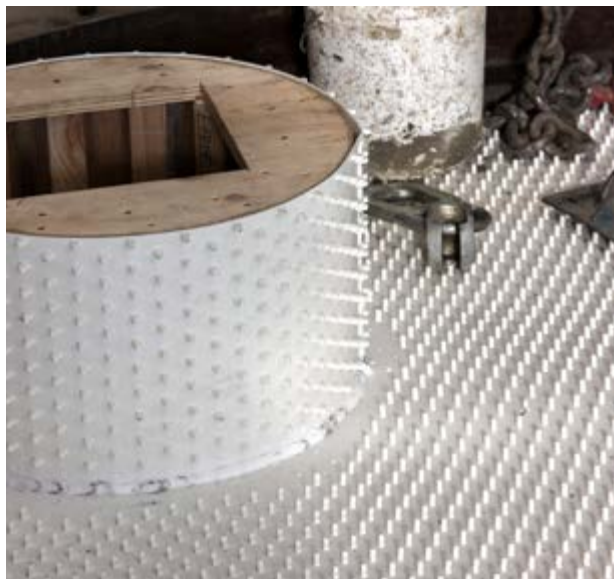


FIG. 14 Liner being installed for a manhole lid

Branches Nationwide Support Office & Technical Services 09 274 0316

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.

BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE



BluSeal Anchor Knob Sheet (AKS) is supplied and installed as a fully sealed and welded robust chemically resistant concrete protection lining.

BluSeal AKS is a synthetic membrane of HDPE sheet with integral anchors which are cast into concrete to form a flexible and durable corrosion protection lining. BluSeal AKS is used to protect concrete surfaces in chemically aggressive environments in sewerage tunnels, treatment works, pump stations, manholes and chemical retention bunds. It comes in a range of colours and thicknesses and can be applied to new and existing structures for protection or enhancement.

Application Advantages

- Fully welded homogenous lining
- Complete before 28-day concrete cure
- Factory assured thickness and absence of pinholes
- Retro-fitted lining is moisture compatible with assured bond

Lifecycle Advantages

- 100 year design life
- Membrane drainage eliminates negative pressure
- Chemical and impact resistant
- High anchor pull-out resistance
- Potable Water use to AS/NZS 4020:200
- Low coefficient of friction in lined conduits

About the Product

BluSeal AKS is supplied and installed as a fully sealed and welded, chemically resistant concrete protection system. The system includes propriety details for sealing around penetrations and against non-HDPE surfaces. Skilled applicators can fabricate the product into various shapes to suit irregular concrete formwork. All seams and joints are extrusion welded and then tested by spark or vacuum box testing. BluSeal AKS is designed and installed by approved applicators to international standards which are outlined in a manufacturer's installation manual. The elasticity of the membrane allows free drainage and relief of any hydrostatic pressure build-up in underground structures. The membrane can be cast into new structures or retrofitted by cement grouting onto the prepared surface of existing structures. AKS lined structures have an outstanding track record in aggressive environments, demonstrating a design life in excess of 100 years for the most demanding applications.

Application solutions

- Segmental sewer tunnels
- Inlet works and bioreactor tanks in WWTP
- Pump stations and manholes
- Tunnel waterproofing
- Chemical retention bunds
- Piles and foundation lining in aggressive ground conditions
- Sewer pipelines
- Slide pads on pipe plinths
- Concrete protection for industrial applications

Project Specification Clause

HDPE CORROSION PROTECTION LINING - The HDPE CPL membrane used for this project shall be supplied and installed as a fully sealed and welded ROBUST continuous membrane system. It shall be a factory produced product that has independent testing to validate the performance outlined in the technical data table on the following pages. BluSeal AKS supplied by Bluey Technologies or equivalent shall be acceptable.

Project Examples

Sewerage treatment plants, sewer pump stations, sewer manholes, trunk sewer mains, chemical processing plant bunds and trenches, gas pipelines (pipe plinths).





BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Application Specification

PREPARATION

- I.1 BluSeal AKS must be installed onto formwork under the direction of an approved, specialised applicator who will plan layout configurations of sheets and weld seam locations. The applicator may also prefabricate some corner or seam sections and pipe penetration pieces offsite.
- I.2 At joins in sheets the edge knobs are removed from one edge and the sheet is overlapped by 50mm to prevent egress of concrete fines and to provide a sound foundation for welding the seams.
- I.3 Formwork shall be cleaned and free of defects. Form release oils are not necessary where BluSeal AKS is applied. Formwork should be designed to avoid leaking.
- I.4 The sheets must be tensioned over the form within the yield elongation limit, prior to securing to the forms.
- I.5 BluSeal Formtak can be used to assist in holding the sheet against timber formwork. Securing against the formwork is by nailing or stapling through the sheets at edges where extrusion welds will cover later or into edges that will be redundant and trimmed after the pour.
- I.6 On circular forms, the sheets are wrapped and tensioned around and secured at the overlap by wires around the knobs and/or temporary speed welding along the seam.
- I.7 In precast concrete applications the moulds may be designed to secure the membrane at the edges.
- I.8 When BluSeal AKS is applied to an existing structure all corroded concrete and contaminants must be removed, leaving a surface profile greater or equal to CSP4 in accordance with ACI guidelines.
- I.9 Treat or replace exposed reinforcement in accordance with ACI guidelines.
- I.10 Refer to Bluey Technical Notes for recommendations regarding proving grout bond strength and design criteria.

APPLICATION

- 2.1 Always pour concrete or grout at a cooler ambient temperature than the temperature when the sheets were applied to the formwork. This will ensure the membrane is taut on the forms.
- 2.2 Anticipated maximum concrete temperature or accelerated curing temperature should not exceed 60 degrees Centigrade. Contact Bluey to discuss exceptions.
- 2.3 When grouting the sheets onto an existing structure, only grouts approved by Bluey such as BluCem HS200 shall be used, and mixing and placement shall be strictly in accordance with Bluey instructions. Fast set grouts, such as BluCem HE80, are recommended to be used for retrofitting the membrane in short time frames where assets must be returned to service quickly.
- 2.4 When grouting the membrane to floors, plan pours at times of the day where temperature changes before initial set of the grout are minimal. Avoid these pours in direct sunlight.
- 2.5 Concrete mix design, mixing, placement and compaction of concrete should follow standard civil construction practice to minimise voids and ensure full encapsulation of the anchors on the membrane.
- 2.6 Extrusion welding and weld testing at seams will be undertaken by approved applicators and in accordance with installation guidelines provided by the manufacturer and generally in accordance with DVS 2227. This includes proper preparation of the sheet surfaces to be welded and daily destructive seam peel tests sampled from trial welds. Welding technicians shall have formal industry training in extrusion welding techniques.
- 2.7 Non-destructive testing of completed welds will be either by vacuum box or spark testing.
- 2.8 Repairs and patching will be completed by extrusion welding over small defects or applying a minimum 200mm diameter patch over larger defects, with a minimum 80mm edge distance to the defect.
- 2.9 Destructive pull testing of anchors should be avoided.
- 2.10 Encapsulation of anchors can be easily checked by tapping across the surface of the membrane to detect any hollow sounds that indicate voids under the membrane. If voids are detected, they can be filled by injection of BluCem HS200 high flow grout through the lining. Repair by extrusion welding over the injection hole.



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Product Data

Please refer to Important Notice on following page

Length of Knobs (nominal)	12mm
Knobs per m ²	1230
Pull-off Resistance	>700N per knob or 850kPa (short term loading)
Membrane Thickness	2.0mm to 10mm*
Roll Widths	Up to 3.2m
Colours	Black for UV exposed applications and light colours (such as white) for underground or covered structures.

TESTED CHARACTERISTIC	STANDARD	RESULT			
Density	ASTM D 505/D 792	≥940kg/m ³			
Carbon Black Content**	ASTM D 1603	2.0 - 3.0%			
Carbon Black Dispersion**	ASTM D 5596	Category 1 or Category 2			
ESCR (NCTL)	ASTM D 5397	>300 hours			
OIT	D 3895	>100 minutes			
Coefficient of Linear Expansion	ASTM E 831	1.1 - 1.4E-4cm/cm/deg C			
Tensile Properties (Sheet Material)	ASTM D 6693-04	Yield Stress 15MPa	Break Stress 27MPa	Yield Elongation 12%	Break Elongation 700%
Shore Hardness	DIN 53505	>50 Shore D			
Tear Resistance	ASTM D 1004	120N/mm			
Puncture Resistance	ASTM D 4833	300N/mm			
Dimensional Stability	ASTM D 1204	<2.0% change			
Water Absorption	ASTM D 570	<0.09%			
Flammability	UL94***	V0			

* Average minimum thickness to ASTM D 5199. Minimum thickness membrane made to order

** Black AKS only

*** Plastics flammability standard released by Underwriters Laboratories of the USA



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

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IMPORTANT NOTICE

This Technical Data Sheet is provided for general information and instruction only. The properties and characteristics set out herein represent typical testing results under laboratory conditions. Results of actual product characteristics may vary slightly. Site-specific and project-specific conditions may affect product performance, including without limitation: surfaces, environmental conditions, contact conditions, storage conditions, storage timeframes, weather, and climatic or seasonal conditions. Not all product parameters are batch tested as part of the manufacturing quality control process, and performance may vary between batches.

If Bluey gives any express written product warranty in relation to the product, that warranty is subject to the foregoing qualifications, despite anything to the contrary in any other document. All other representations, advice, suggestions or promises regarding the product's performance or its implementation, whether verbal or in writing, and whenever given, including in the course of any field services, are expressly disclaimed. Without limiting the foregoing, Bluey will have no liability for loss or damage of any kind if any application specifications are not followed.

The foregoing is not intended to exclude any warranties or guarantees which by law cannot be excluded. Subject only to the foregoing provisions of this Notice, and to the extent permitted by law, Bluey disclaims all liability for loss or damage of any kind suffered as a result of or in connection with the product or its implementation. If such liability cannot be wholly excluded, Bluey's liability will, to the extent permitted by law, be limited to the replacement of the product itself or the direct cost of replacement of the product itself (not including any collateral or consequential loss or damage of any kind).

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ProcessMaster electromagnetic flowmeter

The perfect fit for the oil and gas industry



ABB has responded to the oil and gas industry's need for a rugged, reliable electromagnetic flowmeter

Measurement made easy

ProcessMaster flowmeters – perfect for the oil and gas industry

Expertise in measurement technology

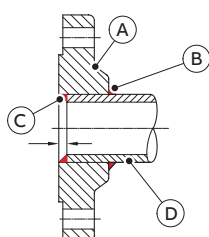
ABB's high pressure electromagnetic flowmeters are reliable, accurate and easily maintained. Customers worldwide have benefited from our application-oriented know-how and comprehensive service.

To learn more about our extensive portfolio, visit www.abb.com/measurement.

Designed specifically for oil and gas

We have added a two-tier, high-pressure version to our comprehensive range of electro-magnetic ProcessMaster flowmeters. It is available with either weld neck or slip-on flanges with RTJ and raised face connections.

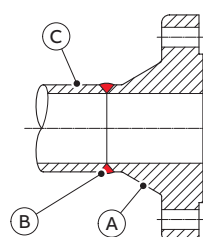
There are differences between X-Ray and dye penetrant test. For weld neck design we offer both dye penetrant and X-Ray tests; for slip-on design we offer only dye penetrant test.



(A) Slip-on flange (B) Fillet weld (outside) (C) Fillet weld (inside) (D) Pipe

Applications

- Slurries such as drilling mud
- Mixtures of fluids such as oil/water plus sand or produced water plus sand
- Injection fluids including sand and chemical additives for lubrication and corrosion prevention
- Sludge or sludge-like wastewater from produced water treatment
- Operating conditions such as high pressure or entrained gas in the fluid
- Harsh environmental conditions such as heat, moisture or vibration and explosive or corrosive atmospheres



(A) Weld neck flange (B) Butt weld (C) Pipe

Robust design for long life

The ProcessMaster flow sensor is designed for reliability in the demanding operating conditions found in oil and gas industry applications.

- Long lasting sensor lining materials withstand abrasion and corrosion, resulting in longer sensor service life and minimal maintenance requirements
- No additional pressure drop caused by protrusions into the pipe
- Optional self-cleaning measuring electrodes prevent issues caused by build-up of deposits
- Double sealed measuring electrodes minimize the risk of leakage and enhance reliability
- Optional all-316 stainless steel construction for corrosive offshore atmosphere
- Optional fully-welded sensor made from 316 material
- Protection of internal sensor components against moisture and vibration with potted Ex sensor

Range of certificates and test reports

- 3.1 material certificates and/or PMI certificates
- Certificates for non-destructive testing, X-Ray and/or dye penetration test
- Welder qualifications and procedures
- Hydrostatic pressure testing

Specification

Accuracy	Standard: 0.4 % of rate Enhanced: 0.2 % of rate
Nominal size range	DN 25 to 400 (1 to 18 in)
Nominal pressure	ASME CL 600 to 2500
Lining	Hard rubber, ETFE
Electrodes	Stainless steel, Hastelloy C
Process connection	Steel, stainless steel
IP rating	IP67, IP68
Fluid temperature	–25 to 130 °C (–13 to 266 °F)
Power supply	100 to 230 V AC, 24 V AC/DC
I/Os	Current, pulse status output
Communication *	HART protocol, PROFIBUS PA, FOUNDATION Fieldbus
Sensor housing material	Stainless steel 316
Transmitter housing material	Stainless steel
Wetted parts material	Option for NACE
Ex approvals	ATEX/IEC Zone 1.2, FM/cFM Cl1 Div.1, Cl1 Div.2
Marine approval	DNV
Verification	ScanMaster

* Acknowledgements

HART is a registered trademark of FieldComm Group, Austin, Texas, USA.

PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).



FEP630 high pressure magnetic flowmeter



FEP610 high pressure magnetic flowmeter

BLACKBOX

Technical Specifications:

Blackbox 130 is a compact low-cost intelligent controller that allows users to locally program the unit and give a readout of level. Economical and simple to program and operate, users benefit from extremely accurate and reliable digital echo processing with access to the dB and dBR range of transducers, measuring from 125 mm (4.9 in) right through to 40 m (131.2 ft).



PHYSICAL: MOUNTING OPTION SPECIFIC

Mounting Option:	Standard Wall Mount:	Large Wall Mount:
Controller Body Dimensions:	130 mm x 150 mm x 63.5 mm (5.1 in x 5.9 in x 2.5 in)	130 mm x 180 mm x 85 mm (5.1 in x 7.09 in x 3.3 in)
Weight:	Nominal 0.7 kg (1.4 lb)	Nominal 0.8 kg (1.7 lb)
Enclosure Material/Description:		ABS Base with polycarbonate lid, flammability rating UL 94 HB
Cable Entry Detail:	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable
Transducer Cable Extensions:	2-core screened (2 conductor 20 AWG screened)	
Nominal Separation:	1,000 m (3,280 ft), for greater separation distances please contact us	

ENVIRONMENTAL

IP Rating:	IP66/67
Max. & Min. Temperature (Electronics):	-20 °C to +55 °C (-4 °F to +131 °F)
Flammable Atmosphere Approval:	All Blackbox units must be mounted in a safe area. Compatible with approved dB Transducers
CE Approval:	See EU Declaration of Conformity in the manual
UL Approval:	UL Listed. UL Listed to Canadian Safety Standards. Certificate Number E257330.

PERFORMANCE

Accuracy/Repeatability:	0.25% of the measured range or 6 mm (0.2 in), <i>whichever is greater</i>
Resolution:	dBMAH3 0.3 mm (0.01 in), dB3 0.5 mm (0.02 in), dB6 and dB10 1 mm (0.04 in), dB15 1.5 mm (0.06 in), dB25 2.5 mm (0.1 in), and dB40 5 mm (0.2 in).
Min. & Max. Range:	Dependent on Transducer. Nominally 125 mm to 40 m (4.9 in to 130 ft)
Echo Processing:	DATM (Digital Adaptive Tracking of Echo Movement)
Rate Response:	Fully Adjustable

OUTPUTS

Analog Output:	Isolated output of 4-20mA or 0-20mA into 1 kΩ (user programmable and adjustable) 0.1% resolution
Digital Output:	RS232 for programming and data extraction
Volt Free Contacts, Number, & Rating:	2 form "C" (SPDT) rated at 2 A at 240 V AC
Display:	2 x 12 alpha numeric

PROGRAMMING

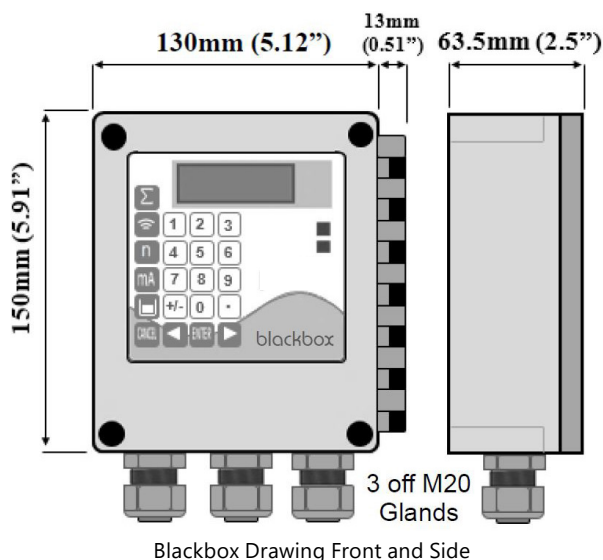
On-board Programming:	Via RS232 using supplied software
PC Programming:	Via RS232 using supplied software
Programming Security:	Via Passcode (user selectable and adjustable)
Programmed Data Integrity:	Via non-volatile RAM
Remote Programming:	Via RS232 using optional handheld calibrator

SUPPLY

Power Supply:	115 V AC +5% / -10% 50/60 Hz, 230 V AC +5% / -10% 50/60 Hz, 10-28 V DC, 10 W maximum power (typically 5 W)
Fuses:	50mA at 230 V AC, 100mA at 115 V AC

REMOTE COMMUNICATIONS

Power Supply:	Power supplied via Blackbox RS232 interface
----------------------	---



Blackbox Drawing Front and Side



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Rev 4.0

dB ULTRASONIC TRANSDUCERS

Technical Specifications:

The dB Transducer Series is a range of non-contacting ultrasonic transducers for level, volume, and flow measurement. Available in a variety of models and compatible with all Pulsar controllers so that you have a specific solution to suit your application requirements.



PHYSICAL: TRANSDUCER SPECIFIC

Model:	Dimensions:	Dia Face:	Weight:	Measurement Range:	Frequency:	Beam Angle:
dB3	78 (D) mm x 115 (H) mm (3.1 in x 4.5 in)	19 mm (0.7 in)	1.1 kg (2.4 lb)	125 mm to 3 m (4.9 in to 9.8 ft)	125kHz	<10°
dB6	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	30 mm (1.2 in)	1.1 kg (2.4 lb)	300 mm to 6 m (11.8 in to 19.7 ft)	75kHz	<10°
dB56	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	200 mm to 6 m (7.9 in to 19.7 ft)	50kHz	<10°
dB10	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	300 mm to 10 m (11.8 in to 32.8 ft)	50kHz	<10°
dB15	86 (D) mm x 122 (H) mm (3.4 in x 4.8 in)	60 mm (2.4 in)	1.2 kg (2.6 lb)	500 mm to 15 m (19.7 in to 49.2 ft)	41kHz	<8°
dB25	105 (D) mm x 142 (H) mm (4.1 in x 5.6 in)	78 mm (3.1 in)	1.4 kg (3.1 lb)	600 mm to 25 m (23.6 in to 82 ft)	30kHz	<6°
dB40	205 (D) mm x 223 (H) mm (8.1 in x 8.8 in)	160 mm (6.3 in)	6 kg (13.2 lb)	1.2 m to 40 m (3.9 ft to 131.2 ft)	20kHz	<5°

PHYSICAL: ALL TRANSDUCERS

Sensor Body Material:	Valox 357 U and syntactic foam face
Cable Lengths:	Standard = 5 m, 10 m, 20 m, or 30 m (16.4 ft, 32.8 ft, 65.6 ft, or 98.4 ft). Optional: up to 150 m (492 ft) maximum (increments of 10 m (32.8 ft) only)
Maximum Separation:	500 m (1,640 ft)
Mounting Connection:	BSP or 1" NPT

ENVIRONMENTAL

Enclosure Protection:	IP68 / NEMA 6P
Max. And Min. Temperature (Electronics):	Standard: -40° C to +90° C (-40° F to +194° F) Hazardous area versions: -40° C to +75° C (-40° F to +167° F)

APPROVALS

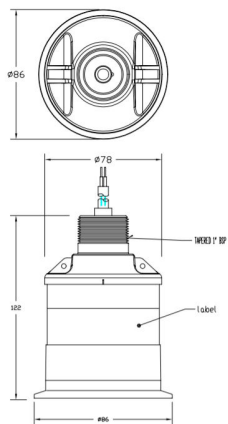
CE Approval:	2014/30/EU to EMC & 2014/34/EU ATEX Directives. Standards applied: EN 60079-0:2012+A11:2013/ EN 60079-11:2012 / EN 60079-18:2009 / EN 60079-26:2007 / EN 61326-1:2013
ATEX Approval:	Standard ATEX EEx m II T6 or optional EEx ia IIC T6. FM/FMC approval.

TRANSDUCER OPTIONS

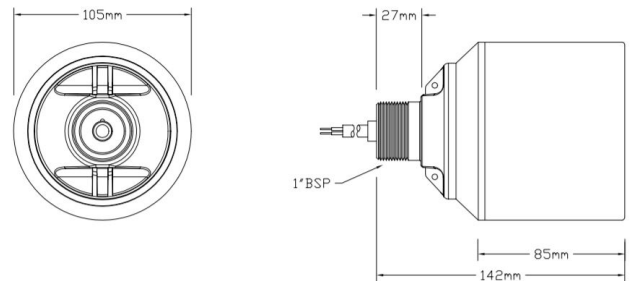
Model:	dB3	dBs6	dB6	dB10	dB15	dB25	dB40
PVDF		✓	✓	✓			
Front Threaded / PVDF	✓	✓	✓	✓			
Submergence Shield	✓	✓	✓	✓	✓	✓	
Flanged DIN/ANSI		✓	✓	✓	✓		
Foam Face		✓		✓	✓	✓	✓
Sanitary Flange		✓	✓	✓			
Intrinsically Safe of All the Above	✓	✓	✓	✓	✓	✓	✓

PERFORMANCE

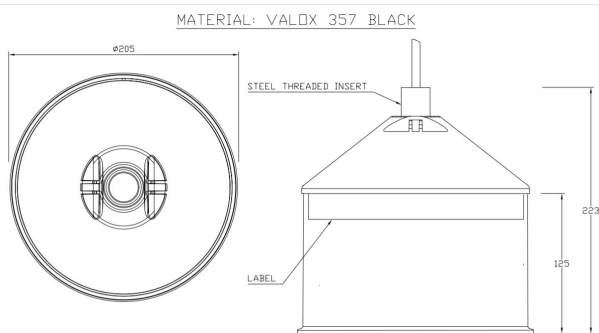
Accuracy:	0.25% or 6 mm (0.2 in) whichever is greater
Resolution:	0.01% or 2 mm (0.08 in) whichever is greater
Temp. Compensation:	Automatic, internal temperature sensor, ± 0.5 °C/°F



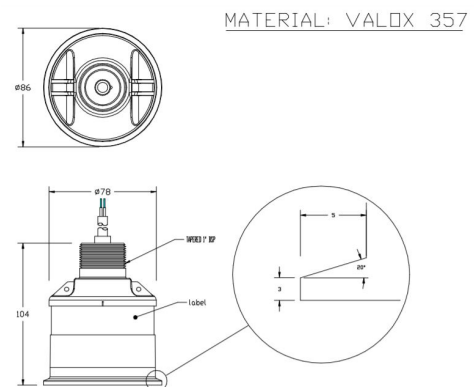
dB15 Transducer Drawing



dB25 Transducer Drawing



dB40 Transducer Drawing



dB6 & dB10 Transducer Drawing



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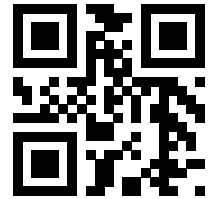
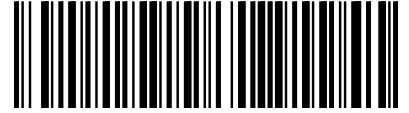
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pulsarmeasurement.com

Rev 7.0

Technical Specification

891480_17.0



ENM 10

Level switch

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1 Product Description

1.1 Product design

Usage

ENM-10 is a level regulator for level control applications. The level regulator starts and stops a pump or activates an alarm device when the liquid level reaches the regulator.

Materials

Denomination	Standard version	Ex version
Regulator casing	Polypropylene	Polypropylene with black conductive casing
Bend relief	EPDM rubber	NBR-PVC rubber
Cable sheath	PVC	NBR-PVC rubber

The plastic components are welded and screwed together.

1.2 Technical data

Application limits

Feature	Value
Liquid temperature	Minimum 0°C (32°F) Maximum 60°C (140°F)
Liquid density	Minimum 0.65 g/cm ³ Maximum 1.5 g/cm ³

Electrical specifications

Feature	Value
Degree of protection	IP68, 20 m (65 ft), 2 bars
Interrupting capacity of micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 30 V 5 A
Interrupting capacity of gold-plated micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 24 V 10 mA

Voltage limits are subject to local regulations.

Density ranges

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
0.65 – 0.80	194 (7 10/16)	100 (4)
0.80 – 0.95	177 (7)	100 (4)
0.95 – 1.10	162 (6 3/8)	100 (4)
1.05 – 1.20	142 (5 9/16)	100 (4)
1.20 – 1.30	133 (5 1/4)	100 (4)
1.30 – 1.40	130 (5 2/16)	100 (4)

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
1.40 - 1.50	126 (5)	100 (4)

Weight

A regulator with standard density and 20 m cable weighs approximately 2 kg (4.5 lb).

1.3 Cables

Lengths

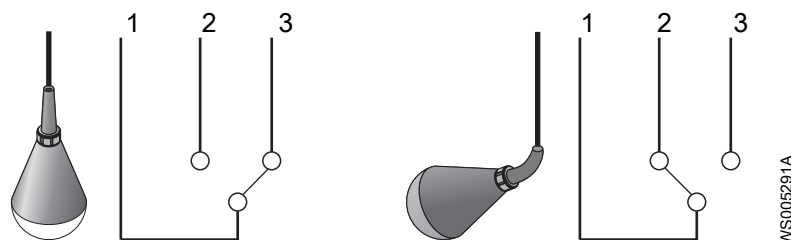
For liquids with specific density between 0.95 and 1.10 g/cm³, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (100 ft) • 50 m (167 ft)
Ex	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (98 ft) • 50 m (164 ft)

Diameter

The cable diameter for all product variants is 6.7 mm (0.26 in), +/- 0.2 mm (0.00787 in).

Color codes



Cable	1	2	3
Color	Grey	Black	Brown

1.4 Approvals and standards

Standard approvals

LVD approval according to EN61058
 CSA approval: Certificate Number 1330172
 Cl. I Zone 0, Gr. IIC
 CL.I Div.1 Gr A, B, C and D
 Cl.II Gr. E, F, and G

Ex approvals

IECEX ia IIC T4 Ga: -20°C ≤ Ta ≤ 60°C
 IECEX NEMKO 09.0008
 ATEX II 1G Ex ia IIC T4 Ga

NEMKO 10 ATEX 1082

Applied standards for ATEX and IEC

- EN 60079-0:2012 / IEC 60079-0:2011
- EN 60079-11:2012 / IEC 60079-11:2011

Intrinsically safe circuits are required for the automatic control system. Use a Zener barrier, for example, part number 84 01 07.

The electrical connections must comply with the Ex regulations of the national submitter.



2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

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Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

2.2 Product range

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 00	0.65–0.80	Blue	20	1	CE	International
582 88 01	0.80–0.95	Blue	20	1	CE	International
582 88 02	0.95–1.10	Blue	6	1	CE	International
582 88 03	0.95–1.10	Blue	13	1	CE	International
582 88 04	0.95–1.10	Blue	20	1	CE	International
582 88 05	1.05–1.20	Blue	20	1	CE	International
582 88 06	1.20–1.30	Blue	20	1	CE	International
582 88 07	1.30–1.40	Blue	20	1	CE	International
582 88 08	1.40–1.50	Blue	20	1	CE	International
582 88 09	0.65–0.80	Gray	20	3	CSA/CE	Canada
582 88 10	0.80–0.95	Gray	20	3	CSA/CE	Canada
582 88 11	0.95–1.10	Gray	6	3	CSA/CE	Canada
582 88 12	0.95–1.10	Gray	13	3	CSA/CE	Canada
582 88 13	0.95–1.10	Gray	20	3	CSA/CE	Canada
582 88 14	1.05–1.20	Gray	20	3	CSA/CE	Canada
582 88 15	1.20–1.30	Gray	20	3	CSA/CE	Canada
582 88 16	1.30–1.40	Gray	20	3	CSA/CE	Canada
582 88 17	1.40–1.50	Gray	20	3	CSA/CE	Canada
582 88 18	0.65–0.80	Gray	20	1	CSA/CE	Canada
582 88 19	0.80–0.95	Gray	20	1	CSA/CE	Canada
582 88 20	0.95–1.10	Gray	6	1	CSA/CE	Canada
582 88 21	0.95–1.10	Gray	13	1	CSA/CE	Canada
582 88 22	0.95–1.10	Gray	20	1	CSA/CE	Canada
582 88 23	1.05–1.20	Gray	20	1	CSA/CE	Canada
582 88 24	1.20–1.30	Gray	20	1	CSA/CE	Canada
582 88 25	1.30–1.40	Gray	20	1	CSA/CE	Canada
582 88 26	1.40–1.50	Gray	20	1	CSA/CE	Canada
582 88 36	0.95–1.10	Gray	30	3	CSA/CE	Canada
582 88 37	0.95–1.10	Gray	50	3	CSA/CE	Canada
582 88 38	0.95–1.10	Gray	100	3	CSA/CE	Canada
582 88 39	0.95–1.10	Gray	150	3	CSA/CE	Canada
582 88 51	0.95–1.10	Red	65	2	CE	International
582 88 52	0.95–1.10	Red	6	2	CE	International
582 88 53	0.95–1.10	Red	13	2	CE	International
582 88 54	0.95–1.10	Red	20	2	CE	International
582 88 57	0.95–1.10	Red	20	2	CE	Canada
582 88 70	0.65–0.80	Blue	20	3	CE	International
582 88 71	0.80–0.95	Blue	20	3	CE	International
582 88 72	0.95–1.10	Blue	6	3	CE	International
582 88 73	0.95–1.10	Blue	13	3	CE	International

¹ See *Type of cables* on page 9.

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 74	0.95–1.10	Blue	20	3	CE	International
582 88 75	1.05–1.20	Blue	20	3	CE	International
582 88 76	1.20–1.30	Blue	20	3	CE	International
582 88 77	1.30–1.40	Blue	20	3	CE	International
582 88 78	1.40–1.50	Blue	20	3	CE	International
582 88 79	0.95–1.10	Blue	65	1	CE	International
582 88 80	0.95–1.10	Blue	30	1	CE	International
582 88 81	0.95–1.10	Blue	50	1	CE	International
582 88 82	0.95–1.10	Gray	30	1	CSA/CE	Canada
582 88 83	0.95–1.10	Gray	50	1	CSA/CE	Canada
582 88 86	0.95–1.10	Red	30	2	CE	International
582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
594 79 10	0.95–1.10	Blue	70	3	CE	International
594 79 13	0.95–1.10	Blue	100	3	CE	International
594 79 18	0.95–1.10	Blue	150	3	CE	International
594 79 19 ²	0.95–1.10	Blue	20	3	CE	International
594 79 20 ²	0.95–1.10	Gray	20	3	CSA/CE	International
594 79 21 ²	0.95–1.10	Transparent	6	3	CE	For demonstration only.
594 79 40 ²	0.95–1.10	Black	6	3	ATEX/IECEX ³	International
594 79 41 ²	0.95–1.10	Black	13	3	ATEX/IECEX ³	International
594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
2	Red PVC	Grey/Brown/Black
3	Black nitrile rubber (NBR)/PVC	Grey/Brown/Black

¹ See *Type of cables* on page 9.

² Designed for low current, slow movements and oil. Includes micro switch with gold plated contacts.

³ Zener barrier 84 01 07 required.

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0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

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582 88 04	0.95–1.10	Blue	20	1	CE	International
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582 88 07	1.30–1.40	Blue	20	1	CE	International
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582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
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594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
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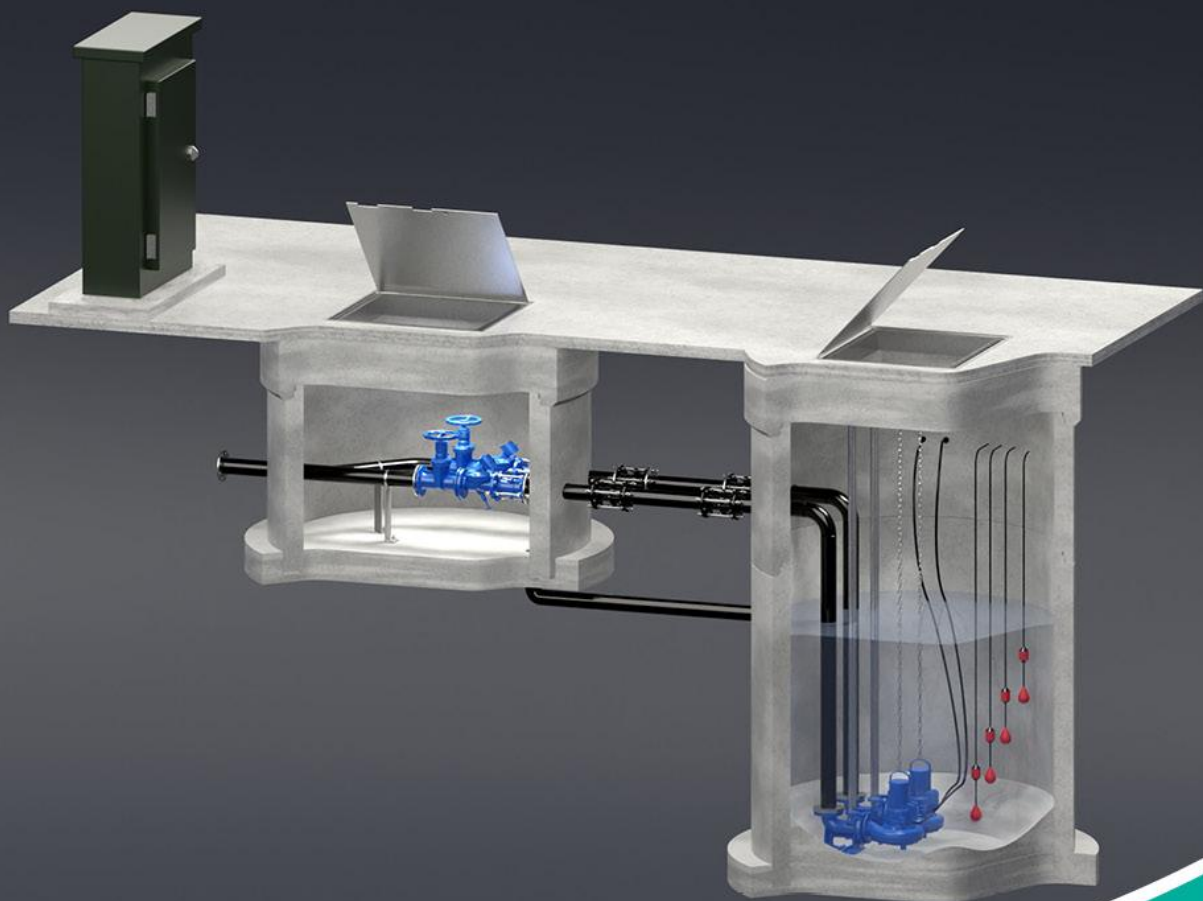
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BRYMER FARM DEVELOPMENT WASTEWATER PUMP STATION B – STAGE 6 TECHNICAL SPECIFICATIONS

MAVEN WAIKATO LTD

12 AUGUST 2026



Peter Carroll – Aquate Director
BE Civil, MBA, CPEng, FEngNZ
www.aquate.co.nz

Foreward

This installation manual is a guide only. All relevant Health and Safety laws and codes of construction must be adhered to and take precedence over any information in this manual. Installers must practice good professional practice and are required to understand all National and Local regulations in respect to the installation of drainage materials.

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APPENDICES

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1.2 Pumps/Pump Performance

See full specifications in the Appendices

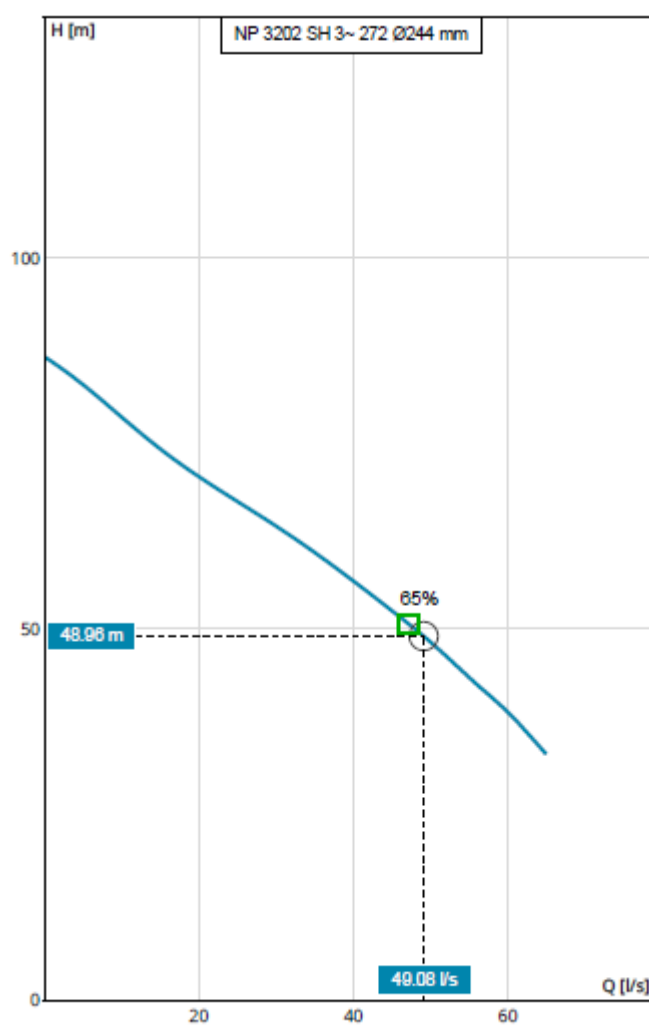
Manufacturer: Xylem Pumps

Type: Flygt NP3202 SH3 272

Connection: 415 V, 50 Hz

Power: 47 kW

Phases: Three



1.3 Design Information

1.3.1 Storage Calculations

The total Average Dry Weather flow has been calculated from the expected flow rate with the following assumption:

Average dry weather flow= 199.8 m³/day

Total emergency storage required is 9 hours = 74.93 m³

Total emergency storage in wet-well and emergency storage tank is 83.2 m³ so 10 hours storage has been provided.

1.3.2 Pump Design

The system above has been designed based on the information provided below.

Rising main length : 2948 m

Static Lift : – 24.5 m

Rising main – PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 250 (280x25.4 mm)

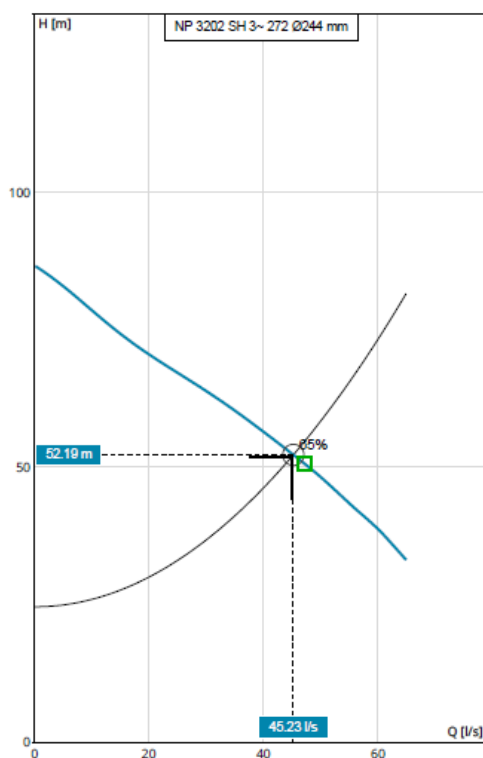
Pipe OD = 280mm , Pipe ID = 229.2mm

Option 1 $K = 1.5$

Flygt NP3202 - Flow rate = 45.23 l/s with a total head loss of 52.2 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.1 m/s

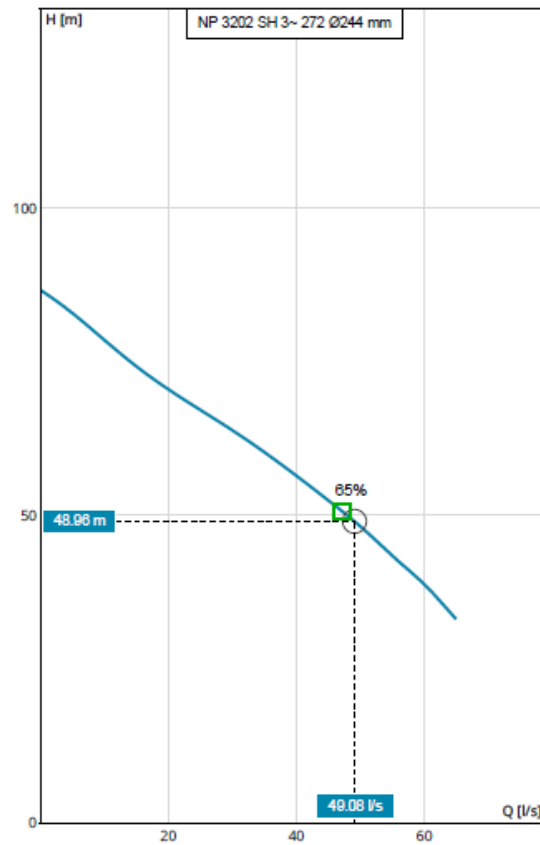


Option 2 $K = 0.5$

Flygt NP3202 - Flow rate = 49.08 l/s with a total head loss of 48.96 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.18 m/s



1.3.3 Pump Operational Levels

The operational levels will be set as follows (dimensions taken from floor of wet-well) :

- High level alarm - 1150mm
- Assist Pump Start – 1050mm
- Duty Pump Start – 1000mm
- Both Pumps Stop – 350mm
- Low Level alarm : 300mm

1.3.4 Pump Stop/Start Calculations

Expected daily flow:	560310	litres
Infiltration (l/day)	0	litres
SWI (l/day)	0	litres
Peaking factor :	6.7	
ADDWF	6.49	l/s
PDDWF	17.33	l/s
PWWF	43.45	l/s
Pump Station diameter	2.55	m
Pump station depth (total)	5.1	m
Pump station depth (effective)	4.1	m
Volume (effective)	20.93	m ³
Pump Stop Level	0.4	m
Pump Start Level	1	m
Volume to pump:	3063	litres
Discharge rate:	45.23	l/s
Time to empty: (PDDWF)	1.8	minutes
Time to empty: (PWWF)	28.7	minutes
Time to fill (PDDWF)	2.9	minutes
Time to fill (PWWF)	1.2	minutes
No starts/ hour (PDDWF)	12.6	
No starts/ hour (PWWF)	2.0	
No starts per pump (PDDWF)	6.3	
No starts per pump (PWWF)	1.0	
Max Start/Hour permissible	30	Okay

1.4 Pipework, Valves and Fittings

Discharge connection:	150 mm diameter flange coupler
Inlet and outlets:	the inlet pipe to be installed on site and sealed by the drainage contractor. The outlet pipe is pre-installed in the factory.
Discharge pipework:	Includes a non-return valve, dismantling joint and an isolation valve.
Lifting chains:	a stainless steel chain is connected from the pump to the underside of the chamber for ease of pump removal if required.
Materials:	All pipework will be 150mm 316 Stainless steel Schedule 40 and will be manufactured to the relevant AUS/ NZ Standards
Guide rails:	Stainless steel

1.5 Access lids

Steel access lids (1600 x 1200mm) will be supplied as per the RITS design

1.6 Magflow metre

An ABB Process Master DN150 is included installed in a 1200mm diameter manhole

1.7 Level Sensors

1 off – ABB Black Box Hydrostatic level sensor

4 off – Flygt ENM10 float switches for Low level and High-level alarms

1.8 Electrical & Controls

This controller is designed on the latest 2023 HCC drawings which are quite different to their previous standards. Any comparison to a competing proposal should ensure that the same standards have been used in the pricing.

This allows for the design, including production of electrical drawings, build and factory acceptance testing (FAT) of the pump station controller.

The design will include::

- 1 x Allen Bradley Micro800 PLC and IO modules as per their standard design.
- 1 x programming of Allen Bradley PLC.
- 1 x Trio Radio unit for communicating to HCC's SCADA system.
- 1 x battery backup for communication and PLC 24VDC circuits.
- 1 x supply of aerial for radio communication to base station.
- 1 x VSD starting configuration
- 2 x 30kW ABB VSDs
- 2 x current transducers and amp meters.
- 2 x capacitors for power factor correction.
- 1 x phase failure relay with output to PLC.
- 1 x surge divertor with output to PLC.
- 1 x level indicator input.
- 1 x flow indicator input.
- 22mm dia push buttons and selector switches for pump circuitry and control.
- Cabinet door switches and internal lights.
- Anticondensation heaters for cabinet.
- 2 x isolation switches for the pumps.
- 1 x Cubic internal panel. Note this differs to the HCC drawing but is of an equal or better quality to the Bremca 250 series panel.
- 1 x generator connection with interlocked mains/generator breakers.
- RCD protected service plugs mounted within cabinet.

- 1 x powder coated marine grade aluminium OR SS316 cabinet approximately 2.0 x 1.5 x 0.4m (l x h x d) with multiple door access, internal panels to protect from live wires
- 1 x full CAD drawings.

We have not allowed for any of the following:

- Supply of any boosting to the radio signal if the standard Trio radio unit and standard aerial is insufficient.
- Supply of any site metering although space left in cabinet for a smart meter.
- Any civil works including construction of plinth for controller to mount to.
- Any on site installation including running of cable to and from controller, or mounting revenue meter (if required), or installing any on site lighting, installing the aerial or aerial base. It is suggested the site electricians are engaged to do this where required.

1.9 Odour Control System

This has been excluded as per RITS standards. See section 5.3.7.16 RITS.

1.10 Protective lining

The wet-well including the underside of the lid will be lined with Blue-seal HDPE lining for sulphuric acid resistance (see Appendices)

1.11 Well-washer

A McBerns well washer has been specified by RITS – see appendices for details

A sprinkler system using BETE nozzles has been included in the storage tanks to RITS design

1.12 RPZ Cabinet

A steel cabinet to RITS design has been included along with an RPZ standpipe and two off solenoid valves for the well washer and sprinkler system

1.13 Inlet valve

A knife-gate valve will be installed on the inlet pipe in to the wetwell. This includes a spindle to the underside of the lid. The diameter of the inlet pipe to be confirmed

2 Construction

The pump station has been design using reinforced precast concrete components. The system will be fabricated off site and delivered to site ready for installation. The tank will have a 25100 litre capacity and a total depth of 5.25 m.

The pump stations will be delivered to site in a kit-set format and will need to be installed in the ground by the drainage contractor.

The construction and commissioning of the Aquate pump station will then be completed by a trained Hynds Construction Technician.

3 Safety in Design

This pump station has been designed to minimise any risk to operators and service personnel.

Access into the pump station should not be required for ongoing maintenance as almost all servicing work can be completed from ground level. The main components can be accessed as follows:

- Pumps – these can be removed from the pump station by lifting them up out of the wet-well and inspecting above ground. Note : the pumps weight 500 kg each.
- Floats – can be lifted from the connection points in the access hole in the lid.
- Non-return valves/Isolation valves –can be access from ground level without the need to enter the chamber
- Venting will be required and will need to be installed on site. The access lids are air-tight.

Risk register

The risk register is a live document which requires continuous monitoring updating. This will need to be completed by the maintenance company for the pump station. The items below are a guide only.

The safety and design and Hazops workshops have encompassed risks for normal operation of the vacuum wastewater pump station. Specific risks for the maintenance process are outlined below.

Risk matrix

			Consequence / potential severity				
			Minimal Non-injury or First Aid injury (FAI)	Minor Medical treatment injury	Moderate Medical treatment injury, with lost time (LTI)	Major Injury requiring hospital-/notifiable event	Catastrophic Fatality or multiple fatalities
Likelihood	Very high	Almost certain: Commonly occurs	3: Medium	4: High	4: High	5: Very high	5: Very high
	High	Likely: Could easily happen	2: Low	3: Medium	4: High	4: High	5: Very high
	Medium	Possible: Could happen or has been known to happen	2: Low	2: Low	3: Medium	4: High	4: High
	Low	Unlikely: Hasn't happened yet but could happen	1: Very Low	2: Low	3: Medium	3: Medium	4: High

	Very low	Rare: Very unlikely but could happen in exceptional circumstances	1: Very Low	2: Low	2: Low	3: Medium	4: High
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	Hazards (<i>one per line</i>)		Hazard controls – what do we need to do to make it safe?	
What are we doing? (<i>step by step</i>)	What could cause harm?	Existing risk level (<i>use risk matrix</i>)	Eliminate/ Controls	Residual risk level
Wet-well inspection	The wet-well is classified as a confined space, an inspection is required prior to wet commissioning.	3	Elimination: The vessel will be isolated from the system at all exit points and inspected from the access hole in the lid . Isolate/Engineering Controls/PPE: Entry will only be required if debris is identified and cannot be removed by any other means. Entry to the vessel should follow confined space protocols, including ensuring all persons involved have the required training, admin and PPE controls.	1 1
Sewage Pump Testing	The wet well will be filled up for wet testing. This is a potential drowning hazard.	3	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well. Engineering Controls/PPE: All essential persons to wear appropriate protection. Sewage pump shall only operate when required for wet testing..	1 1
Removing lids for access	Traffic moving through area Back strain	3 2	Isolate/Engineering Controls/PPE: Place cones around service area so vehicles cannot enter site Engineering Controls/PPE – use appropriate lifting equipment if lifting pumps / lids on site	
Removing pumps	This is a falling hazard	4	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well.	
Electrical checks	Electrical shock	3	Engineering Controls/PPE: Only fully certified electricians to complete electrical work	

4 Warrantees

Aquate guarantees the performance and quality of its pump stations provided:

- The product is only used for the intended purposes as stated in the quote
- The control panel and pump station is correctly installed and commissioned by a suitable installer
- The fault is due to a defect in design, materials or workmanship
- The fault is reported to an Aquate agent or representative during the guarantee period
- No pump station components have been replaced by alternative products
- This guarantee does not cover faults resulting from misuse of the system, blockages or breakdowns caused by the introduction of inappropriate materials into the system, incorrect electrical installation of the control unit, deficient maintenance or normal wear and tear.

Aquate assumes no liability for bodily harm, property damage or economic losses as a result of its pump stations.

4.1 Pumps

The pumps come with a 12 month year warranty against faulty components and/or workmanship. If prohibited substances are introduced to the system causing the pump to block and burn out, the warranty is null and void.

Flygt undertakes to remedy faults in products sold by Flygt provided that:

- The fault is due to defects in design, materials or workmanship;
- The fault is reported to a Flygt representative during the guarantee period;
- The product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;
- The monitoring equipment incorporated in the product is correctly connected;
- All service and repair work is done by a workshop authorized by Flygt or the original manufacturer;
- Genuine manufacturer's parts are used
- Storage should be in accordance with the care and maintenance manual.
- The equipment is operated and maintained in accordance with the Operation and Care and Maintenance Manual.

Failure to comply with these requirements will render warranty void unless, due to the nature of the warranty claim, such voiding of warranty is prevented by law, regulation, act and/or ordinance.

Hence, the guarantee does not cover faults caused by deficient maintenance, abuse, incorrectly executed repair work or normal wear and tear.

5 Maintenance schedule

A certain amount of system maintenance is required on an ongoing basis to ensure that the system is working correctly. This is the responsibility of the owner

5.1 Six monthly

The following procedures should be completed every six months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Lift the floats and test the alarm system/pump operation
- Consult with the electrical control supplier for additional checks

5.2 Annually

The following procedures should be completed at least once every 12 months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Lift the floats and test the alarm system/pump operation
- Press the mute button (audio alarms only) to check the audio alarm turns off.
- Visually check the pump station for any structural damage to the tank and pipework
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Have the pump station sucked out to remove any debris/stones if necessary

5.3 Maintenance requirements

The pump maintenance and repair operations must be carried out by workers authorised by the manufacturer; Failure to comply with these instructions will result in forfeiture of the warranty and jeopardise the unit's safety.

Before any cleaning and/ or maintenance operations are carried out on the electric pump, the power supply must be switched off.

To disconnect the submersible electric pump from the electricity mains, first disconnect the phase conductors, then the yellow –green earth wires.

Use the special handle to remove the submersible electric pump from the tank.

ATTENTION: Before carrying out any operations, check the pump temperature. Only work on the pump when it is at room temperature.

Clean the electric pump thoroughly, using a jet of water or specific products to clean all its parts. When disposing of the waste material, follow the antipollution rules in force.

Replace any broken or worn parts with original spare parts only.

Given the likelihood that work on the electric pump will be carried out in confined spaces such as vats, wells, cesspools, tanks or cisterns, do not underestimate the risks caused by potentially poisonous exhalations.

APPENDICES

General Arrangement Drawing – Plan

General Arrangement Drawing – Section

General Arrangement Drawing – Plan with tank

General Arrangement Drawing – Section with tank

Flygt NP3202 SH3 273 Specifications k 1.5

Flygt NP3202 SH3 273 Specifications k 0.5

McBerns well washing brochure

Hynds Retention Tank brochure

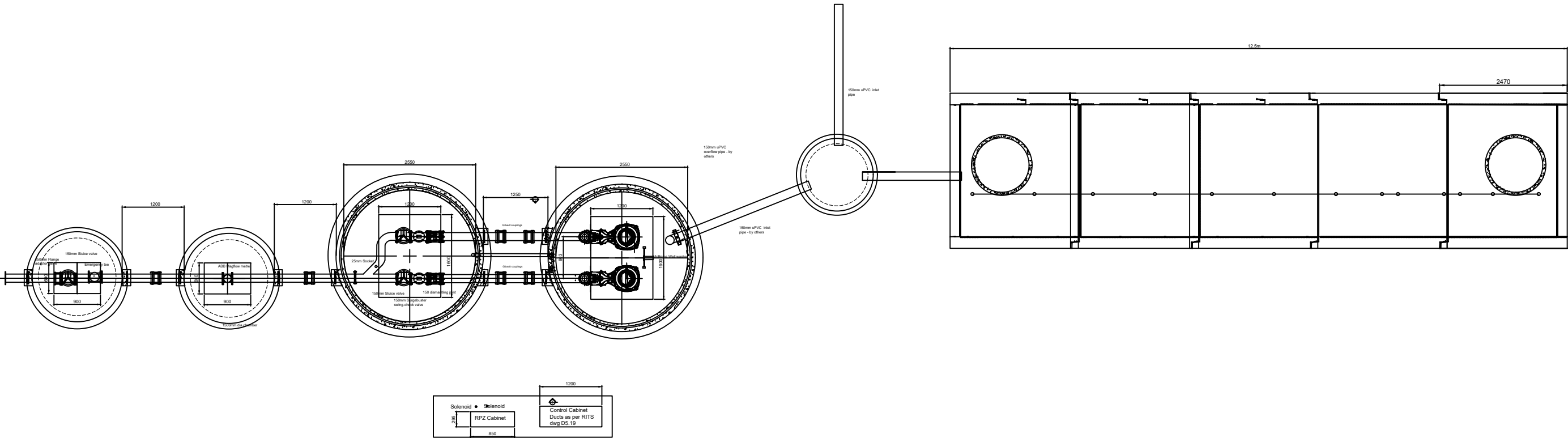
BlueSeal-AKS data sheet

Hyliner HDSPE liner – data sheet

ABB Magflow Meter Specifications

ABB Blackbox level sensor specifications

Flygt ENM10 float switch specifications



NOTES:

1.

REVISIONS			
REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Preliminary design	30/7/26	PC

PO Box 58142, Botany, Auckland, 2316
Tel: 09-274 0316
Fax: 09-272 7485
email: hwvsupport@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:

Brymer Developments

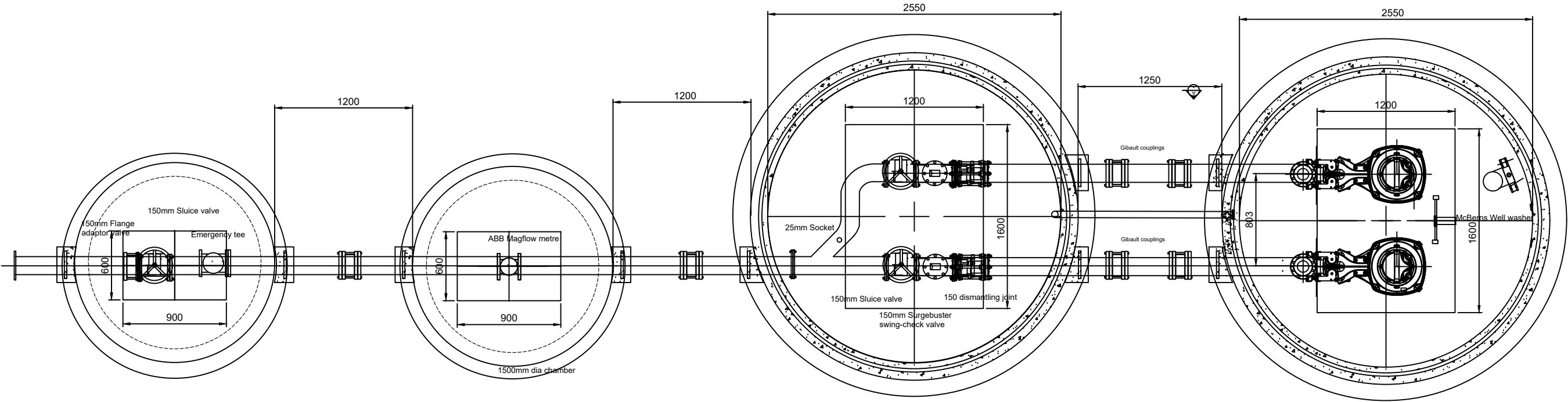
WWPS B Stage 6 Design

WW Pump Station

DRAWING TITLE:

Plan View with tank

REFERENCE/QUOTE NUMBER:			AQ2209
DRAWN: PC	DESIGN: PC	CHECKED: JB	
SIGNATURE:	SIGNATURE:	SIGNATURE:	
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE:	30/7/26
PAPER SIZE: A3			
DRAWING NUMBER:	SHEET NUMBER:	REVISION NUMBER:	
AQ2209 2	of 4	A	



NOTES:

1.

REVISIONS			
REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Preliminary design	30/7/26	PC

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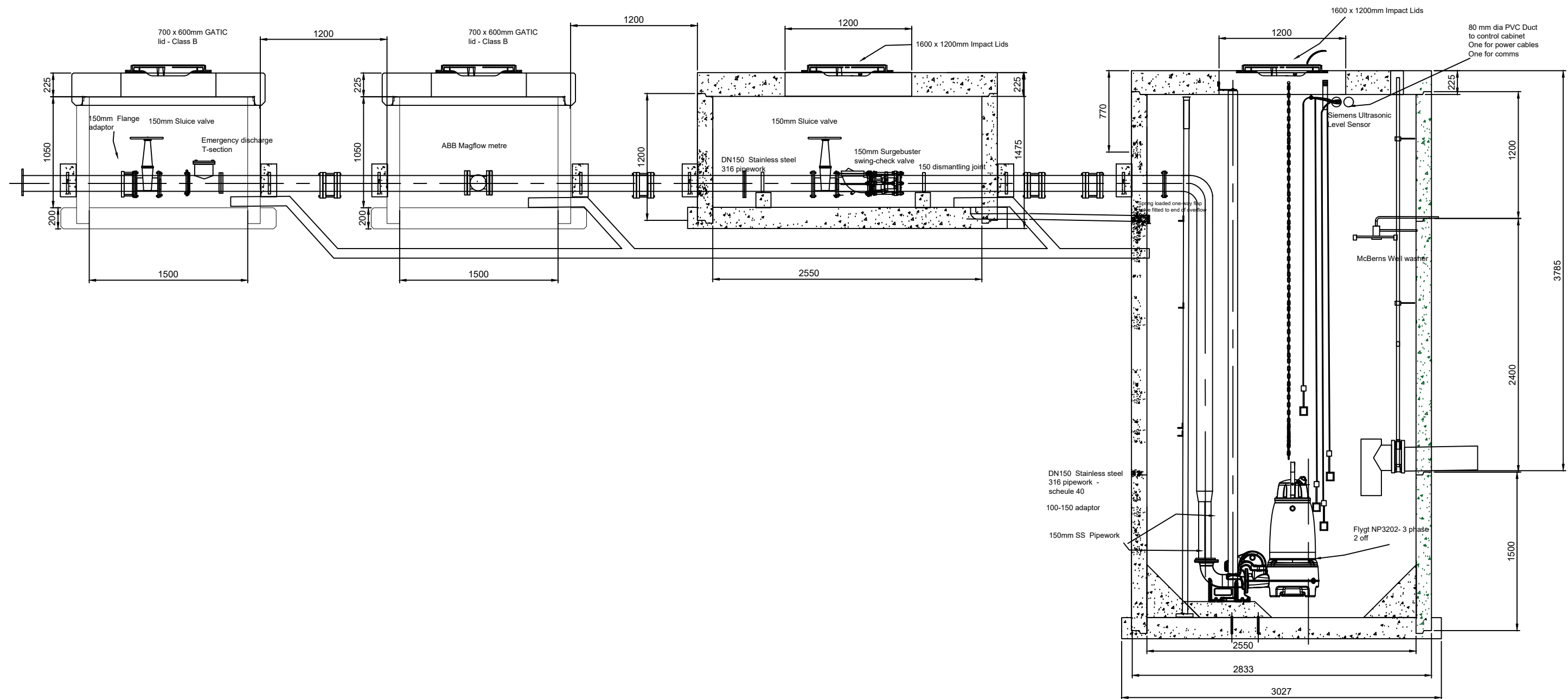
ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
Brymer Developments
WWPS B Stage 6 Design

WW Pump Station

DRAWING TITLE:
Plan View

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DRAWN: PC	DESIGN: PC	CHECKED: JB
SIGNATURE:	SIGNATURE:	SIGNATURE:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 30/7/26
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DRAWING NUMBER: AQ2209 1	SHEET NUMBER: of 4	REVISION NUMBER: A



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REVISIONS

REV #	REVISION DESCRIPTION	DATE	DRAWN
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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:

Brymer Developments
WWPS B Stage 6 Design

WW Pump Station

DRAWING TITLE:

Section View

REFERENCE/QUOTE
NUMBER:

AQ2209

DRAWN: PC
SIGNATURE:

DESIGN: PC
SIGNATURE:

CHECKED: JB
SIGNATURE:

SCALE: As Shown
PAPER SIZE: A3

Note:
Do not scale drawing
if in doubt **ASK!!!**

DATE:
30/7/26

DRAWING NUMBER:
AQ2209 3

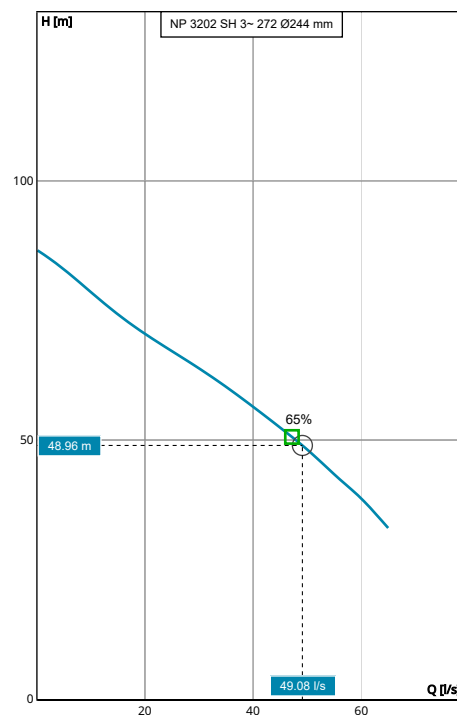
SHEET NUMBER:
of 4

REVISION NUMBER:
A

NP 3202 SH 3~ 272 | Configuration Summary



Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	244 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material
Hard-Iron
Volute Material
Grey Cast Iron

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
D	47 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3202 SH 3~ 272 | Product Details

Description

N 3202

The Flygt N-series are equipped with the Flygt invented N-technology with its innovative self-cleaning impeller. Solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet where it will be guided by a relief groove through the pump housing. This ensures a high sustained total efficiency over time. Due to the mechanical self-cleaning design, a sludge concentration of solids up to 8% can easily be pumped. The pump can easily be installed in either permanently or temporary submerged, or horizontally or vertically dry installations.

Flexible and Modular Design

The modular hydraulic design enables customization of the hydraulics to meet the requirements of many applications.

- Replaceable wear ring in two materials, gray iron or Hard Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-Iron impeller for heavy duty wastewater applications containing abrasive and corrosive content
- Chopper ring intended for tough wastewater applications where cutting is required due to long fibres and solid concentrations up to 10-12%
- Stainless steel impeller for special applications that require duplex stainless steel

Robust and Reliable

- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Class H Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties.
- The Plug-in seal with Active Seal system eliminates the risk associated with incorrect installation and careless handling. All in one unit. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Motor cable SUBCAB® specially developed for submersible use
- Offers flexible cooling systems, e.g. closed-loop cooling system, media cooled or external cooling that allows full motor potential in dry installations.
- Premium brand bearings, greased for life, ensures a minimum of 50 000 hours of duty
- Leakage sensor and motor temperature sensor as standard

The N 3202 is available with the following options

- ATEX, FM, CSA-approvals
- Premium efficiency motors
- Hard Iron hydraulic design
- Stainless Steel hydraulic design
- Vibration-sensor, extended motor temperature sensors, additional leakage-sensor, current-sensor and pump memory
- Compatible with SmartRun® Wastewater pump controller
- Compatible with MAS 801 monitoring system

Product Features

- State-of-the-art wastewater pump with N-technology
- Sustained high efficiency pumping with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

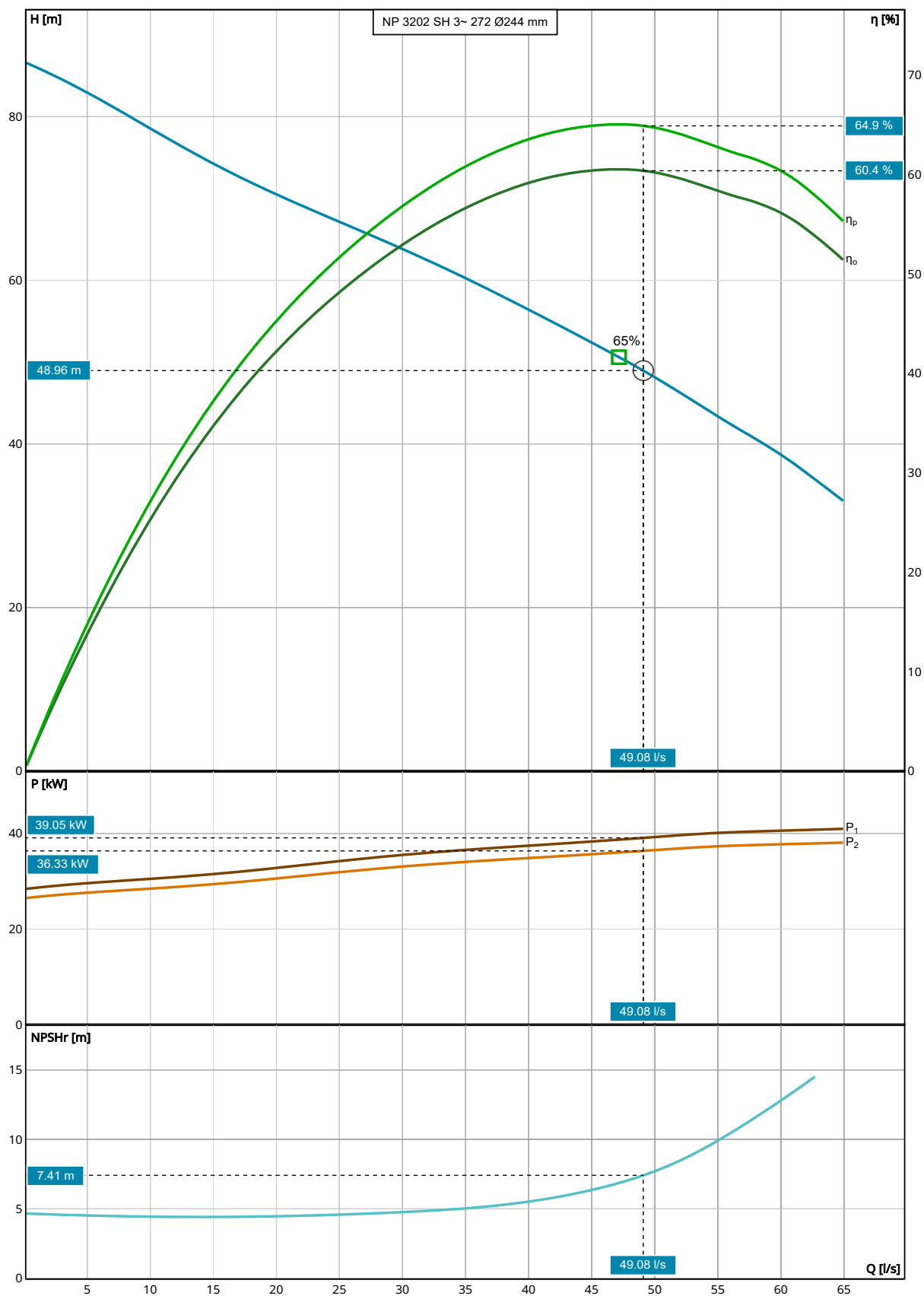
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	-

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
47 kW	3	7	11
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
30-27-2AA	2,950 RPM	H	G
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
185	79 A	0.21 kgm ²	0.92
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	555 A	S1	0.91
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
38.06 kW	555 A	1	0.86
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	185 A	110	92.6 %
			Efficiency 75%
			93.2 %
			Efficiency 50%
			92.9 %
			Cooling Jacket
			-

NP 3202 SH 3~ 272 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	272
Name	Impeller Diameter
NP 3202 SH 3~ 272	244 mm
Frequency	Inlet Diameter
50 Hz	150 mm
Total Flow	Outlet Diameter
45 l/s	100 mm
Total Head	Number Of Vanes
45.06 m	2
Pump Flow	
45 l/s	
Pump Head	
45.06 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
49.08 l/s	36.33 kW
Head	NPSHR
48.96 m	7.41 m
Overall Efficiency (η_o)	Speed
60.37 %	2,964 RPM
Pump Efficiency (η_p)	Static Head
64.88 %	24.5 m
Input Power (P1)	Flow To BEP Ratio
39.05 kW	104.09 %

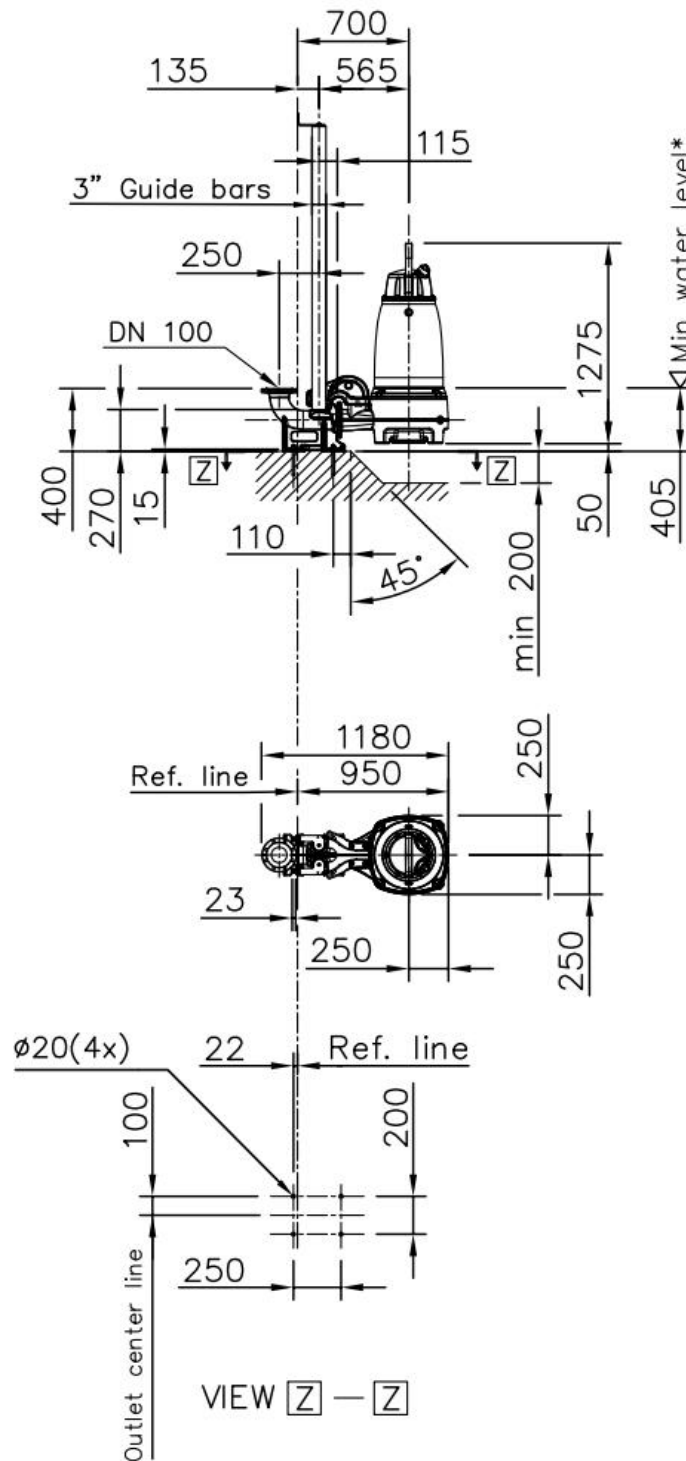
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	47.15 l/s
Max Flow	BEP Head
64.93 l/s	50.6 m
H@QMin	Max P2
86.58 m	38.06 kW
H@QMax	Specific Energy
33.04 m	0.22 kWh/m ³
BEP	
65.02 %	

NP 3202 SH 3~ 272 | Dimensional Data & Drawing



* Consult the IOM for more info.

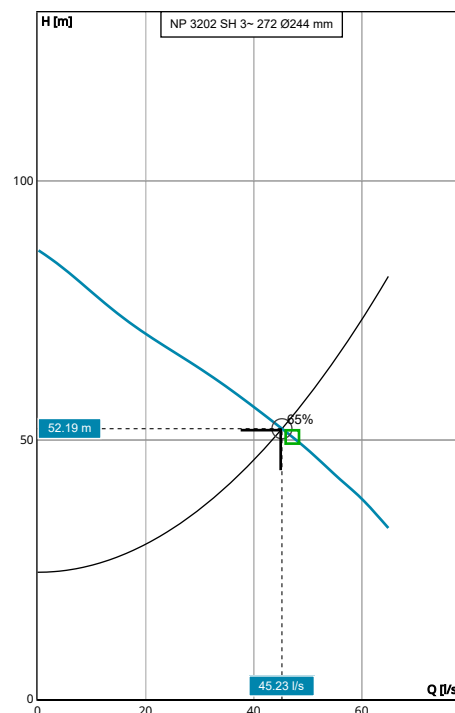
Weight (kg)	Pump	Discharge
with cooling jacket	550	42
without cooling jacket	500	42

	FP,NP	3202	SH		Discharge outlet DN 100	Scale	Date
	095,185,350,390,660,670				Pump outlet DN 100	1:40	250718
					Pump inlet	Drawing number	Revision
					Suction inlet	7632100	6

NP 3202 SH 3~ 272 | Configuration Summary



Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	244 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material
Hard-Iron
Volute Material
Grey Cast Iron

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
D	47 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3202 SH 3~ 272 | Product Details

Description

N 3202

The Flygt N-series are equipped with the Flygt invented N-technology with its innovative self-cleaning impeller. Solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet where it will be guided by a relief groove through the pump housing. This ensures a high sustained total efficiency over time. Due to the mechanical self-cleaning design, a sludge concentration of solids up to 8% can easily be pumped. The pump can easily be installed in either permanently or temporary submerged, or horizontally or vertically dry installations.

Flexible and Modular Design

The modular hydraulic design enables customization of the hydraulics to meet the requirements of many applications.

- Replaceable wear ring in two materials, gray iron or Hard Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-Iron impeller for heavy duty wastewater applications containing abrasive and corrosive content
- Chopper ring intended for tough wastewater applications where cutting is required due to long fibres and solid concentrations up to 10-12%
- Stainless steel impeller for special applications that require duplex stainless steel

Robust and Reliable

- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Class H Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties.
- The Plug-in seal with Active Seal system eliminates the risk associated with incorrect installation and careless handling. All in one unit. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Motor cable SUBCAB® specially developed for submersible use
- Offers flexible cooling systems, e.g. closed-loop cooling system, media cooled or external cooling that allows full motor potential in dry installations.
- Premium brand bearings, greased for life, ensures a minimum of 50 000 hours of duty
- Leakage sensor and motor temperature sensor as standard

The N 3202 is available with the following options

- ATEX, FM, CSA-approvals
- Premium efficiency motors
- Hard Iron hydraulic design
- Stainless Steel hydraulic design
- Vibration-sensor, extended motor temperature sensors, additional leakage-sensor, current-sensor and pump memory
- Compatible with SmartRun® Wastewater pump controller
- Compatible with MAS 801 monitoring system

Product Features

- State-of-the-art wastewater pump with N-technology
- Sustained high efficiency pumping with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

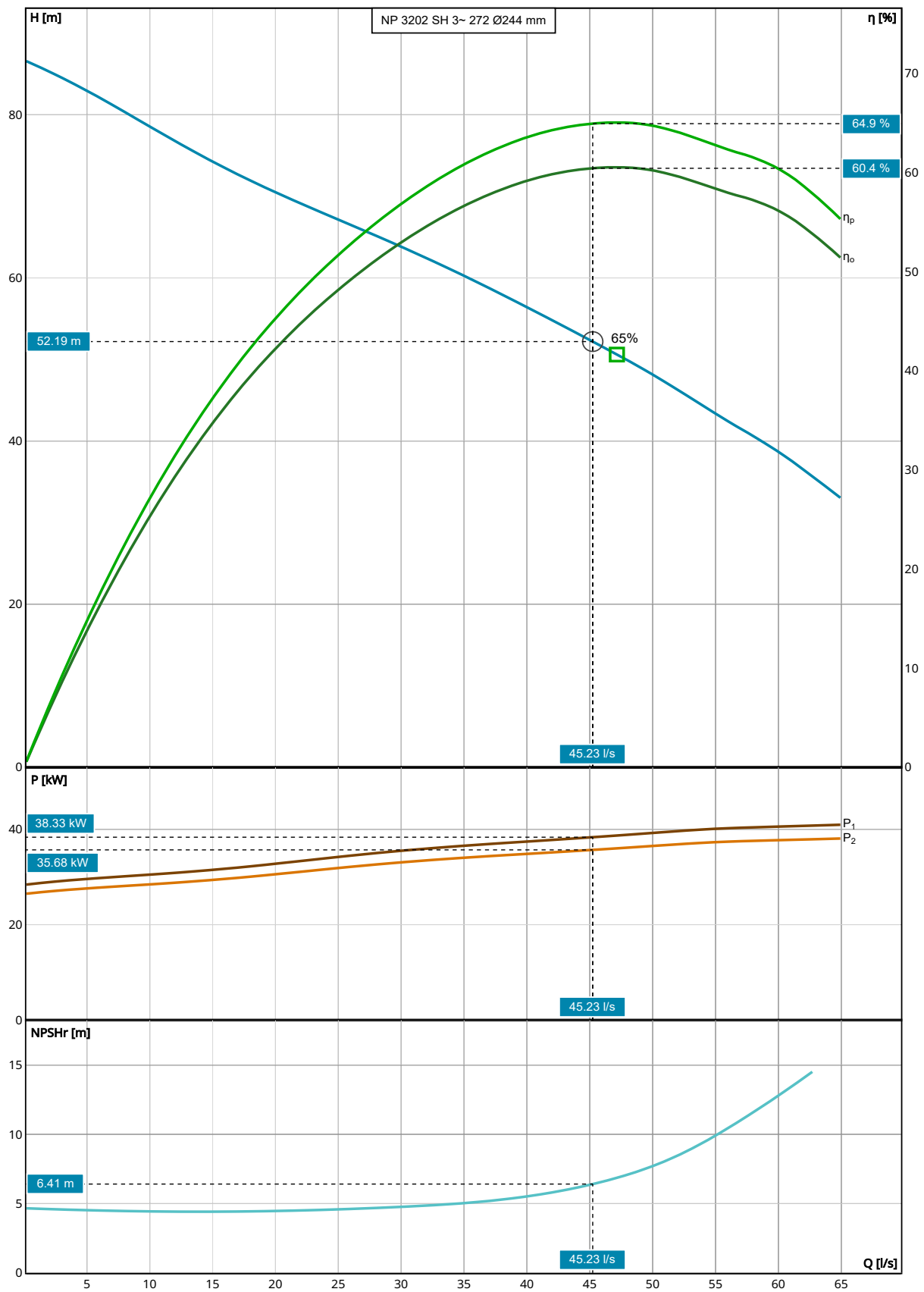
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Hard-Iron	Grey Cast Iron	-

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
47 kW	3	7	11
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
30-27-2AA	2,950 RPM	H	G
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
185	79 A	0.21 kgm ²	0.92
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	555 A	S1	0.91
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
38.06 kW	555 A	1	0.86
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	185 A	110	92.6 %
			Efficiency 75%
			93.2 %
			Efficiency 50%
			92.9 %
			Cooling Jacket
			-

NP 3202 SH 3~ 272 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
N 3000	272
Name	Impeller Diameter
NP 3202 SH 3~ 272	244 mm
Frequency	Inlet Diameter
50 Hz	150 mm
Total Flow	Outlet Diameter
45 l/s	100 mm
Total Head	Number Of Vanes
51.91 m	2
Pump Flow	
45 l/s	
Pump Head	
51.91 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft power (P2)
45.23 l/s	35.68 kW
Head	NPSHR
52.19 m	6.41 m
Overall Efficiency (η_o)	Speed
60.41 %	2,964 RPM
Pump Efficiency (η_p)	Static Head
64.91 %	24.5 m
Input Power (P1)	Flow To BEP Ratio
38.33 kW	95.92 %

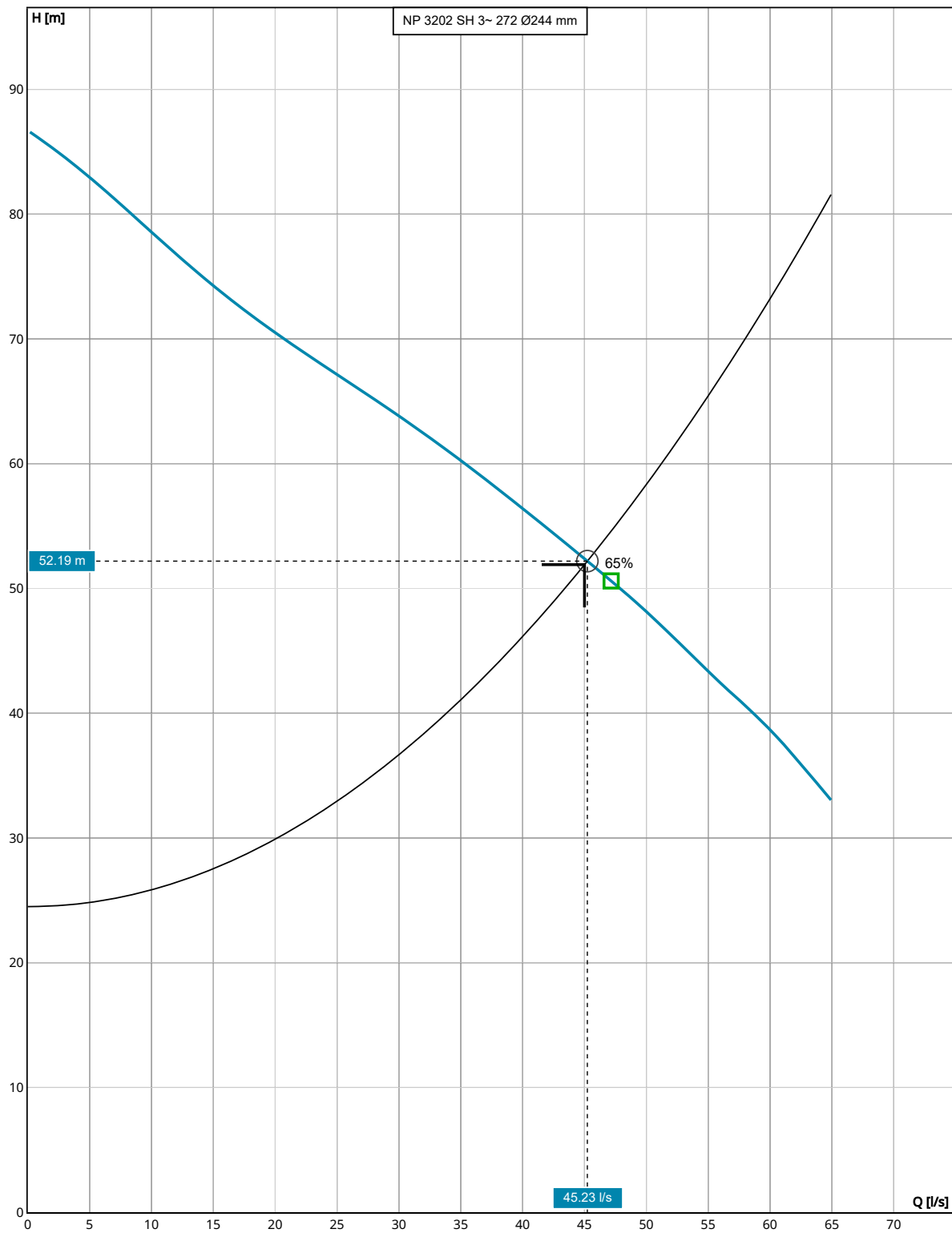
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	47.15 l/s
Max Flow	BEP Head
64.93 l/s	50.6 m
H@QMin	Max P2
86.58 m	38.06 kW
H@QMax	Specific Energy
33.04 m	0.24 kWh/m ³
BEP	
65.02 %	

NP 3202 SH 3~ 272 | Duty Analysis

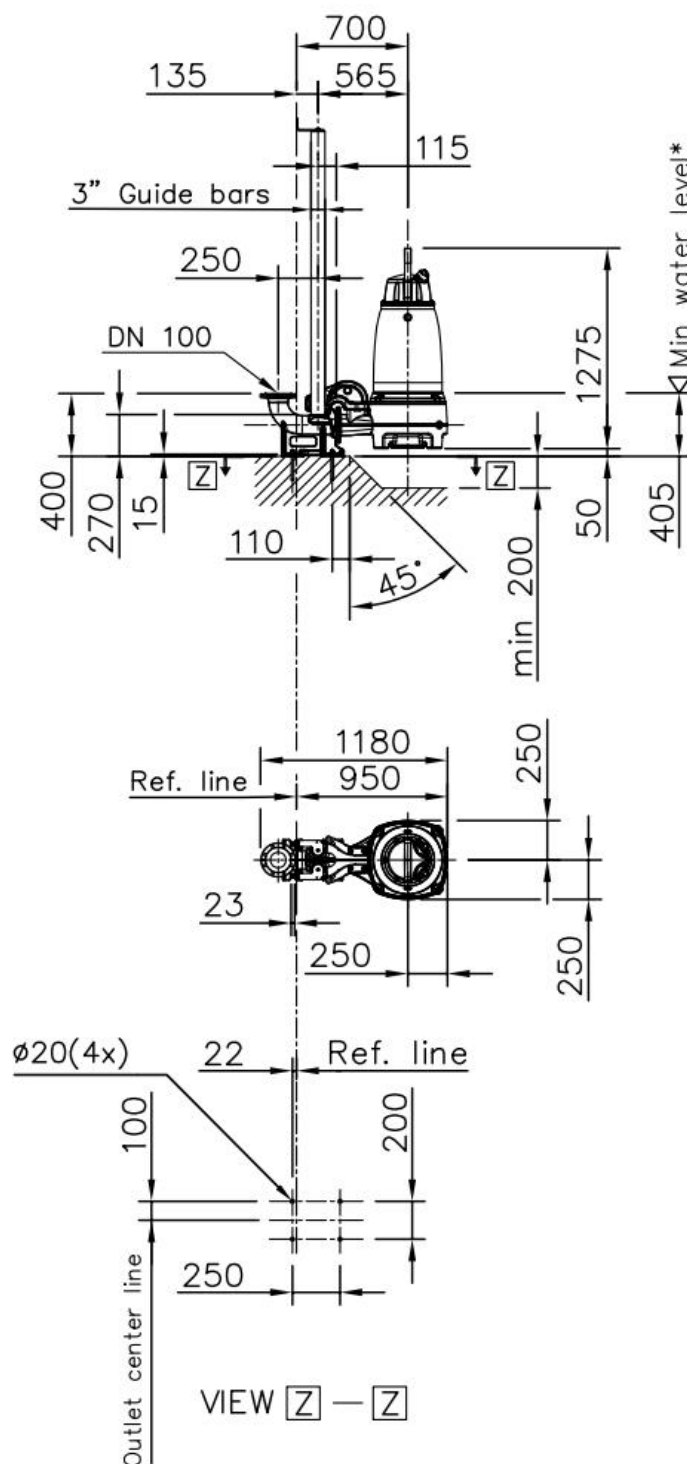


Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	45.23	52.19	35.68	45.23	52.19	35.68	64.91	0.24	6.41

NP 3202 SH 3~ 272 | Dimensional Data & Drawing

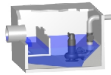


* Consult the IOM for more info.

Weight (kg)	Pump	Discharge
with cooling jacket	550	42
without cooling jacket	500	42

	FP,NP	3202	SH		Discharge outlet DN 100	Scale	Date
	095,185,350,390,660,670				Pump outlet DN 100	1:40	250718
					Pump inlet	Drawing number	Revision
					Suction inlet	7632100	6

NP 3202 SH 3~ 272 | Headloss Calculation



Fluid Type	Total Flow	Kinematic Viscosity
Water	45 l/s	0.000002 m ² /s
Static Head	Operating Pumps	System Type
24.5 m	1	Single Pump
Layout	Calculation Model	
Wet Installed Submersible Pumps	Colebrook-White	

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / Pipe 1 / Stainless steel / PN 10 / DN 150 (159x4.0 mm) / New Pipes						
Pipe Length	151 mm	10 m	1	2.51 m/s	1.5 mm	0.81 m
90 Elbow	151 mm	0.3	1	2.51 m/s		0.1 m
Tee Line →  →	151 mm	0.1	1	2.51 m/s		0.03 m
Check Valve	151 mm	0.9	1	2.51 m/s		0.29 m
Gate Valve	151 mm	0.2	1	2.51 m/s		0.06 m
Total Head						1.29 m
Individual Discharge Piping / Pipe 2 / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 250 (280x25.4 mm) / New Pipes						
Pipe Length	229.2 mm	2,948 m	1	1.09 m/s	1.5 mm	26.12 m
Total Head						26.12 m
Friction Loss Head						27.41 m
Static Head						24.5 m
Total Head						51.91 m



Scan for more
information

Hynds Retention Tank with Mul-T-Level™ Outlet

Technical Guide D5.15

Hynds strong and reliable retention tanks are available in Ring Joint Pipe Internal Base or Flange Base manhole types.



03.15 | DRAINAGE | D5.15 HYNDS RETENTION TANK

Applications

Stormwater retention & detention

Sewer storage

Product Attributes

Versatile Mul-T-Level™ outlet

Highly durable

Simple installation

Various design layouts and large capacity options available

Water tight

Proven history

Approvals/Standards

AS/NZS 4058:2007 Precast concrete pipes (pressure and non-pressure)

Quality

ISO 9001:2008 Quality Management

*The go to organisation for civil
and rural water product solutions*

HYNDS

Hynds strong and reliable retention tanks are available in Ring Joint Pipe, Internal Base or Flange Base Manhole types.

Design Specifications and Applications

RJ Retention Tank

- Generally used when the location permits the installation of a long narrow tank.
- Comprised of Hyspec reinforced concrete rubber ring joint pipes.
- Usually includes a spigot-plugged pipe, standard intermediate pipes and a collar-plugged pipe.
- The spigot and collar plugs are factory cast to ensure water tightness and integrity.
- A manhole offtake is factory fitted to one or more pipes to provide easy access for maintenance.

IB or FB Retention Tank

- Generally used in compact site conditions where relatively small volumes is required.
- Comprised of Hynds internal base or flange base manhole risers and a precast concrete lid.

Mul-T-Level™ outlet

- Enables the tank to be used for both detention and retention.
- Both the RJ and IB/FB retention tanks have a standard 100 or 150mm diameter PVC slip coupler and Mul-T-Level™ outlet cast-in or fitted during manufacturing.
- The required retention/detention volume is set by an orifice hole (of specified diameter) being drilled on the Mul-T-Level™ outlet at a pre-determined height.

General Specifications

- Manufactured from Hyspec spun concrete pipes, using the centrifugal spinning process.
- When the tank is installed in an aggressive environment, such as tidal areas, sewerage or mild acid solutions, the use of a special grade concrete is recommended. Contact Hynds Technical Team for more information.
- Retention tanks are available in various class types to suit specific site conditions, loading and applications.
- The diameter and length of the retention tank is dependent on:
 - Storage volume required
 - Site configuration and access equipment available
- Inspection and maintenance access is provided by a fitted inspection chamber or manhole riser starter.
- PVC slip couplers are fitted to end plugs to provide inlet and outlet connections to the retention tank.
- Non-standard couplers or starter types can be cast-in on request.
- Orifice holes are drilled at levels to suit the design requirements.
- Standard lids are available for access risers in the RJ type tanks.
- A light or heavy duty cast iron cover and frame will fit directly onto the 600mm diameter access riser.
- The 1050 mm diameter access riser requires a 1050 mm diameter manhole lid, which can be fitted with the cast iron manhole frame and cover.
- The IB or FB tanks require a lid, which can be fitted with a cast iron frame and cover to suit the riser diameter.
 - Note: Lid thickness is dependent on loads and application
 - Refer to Table 1 for RJ tank capacities and Tables 2 and 3 for IB/FB tank capacities.

TABLE 1 RJ type retention tank

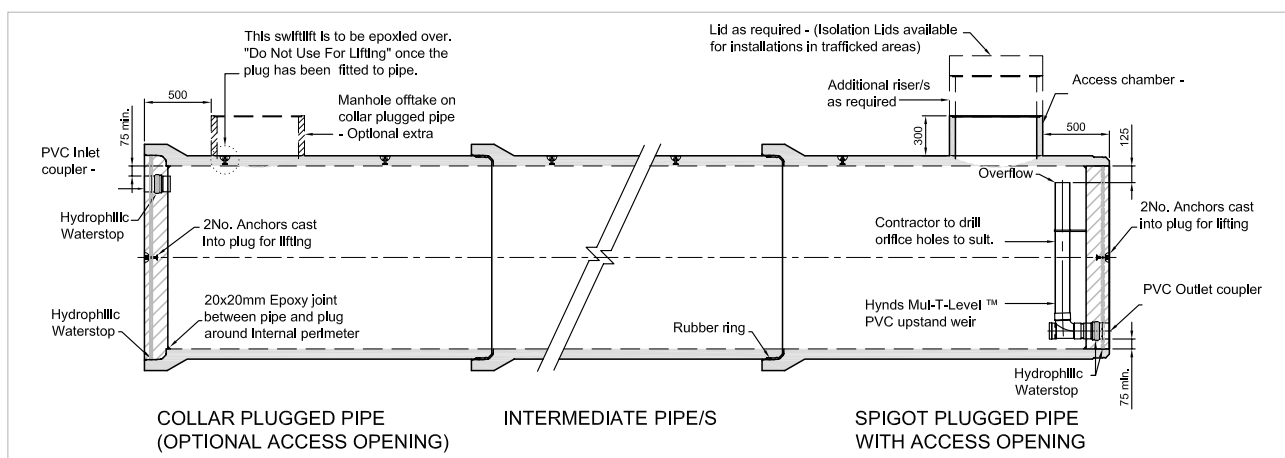
Nom Pipe Diameter and Joint Type	Pipe Effective Length (m)	Nom Vol per Pipe Length (m ³)	Nom Vol per Pipe Length (Litres)	Suggested Offtake Dia (mm)	Lifting plugged pipe anchor req.	Handling intermediate pipe anchor req.
675RJ	2.440	0.72	720	600	A1	A2
750RJ	2.440	0.92	920	600	A1	A2
825RJ	2.436	1.14	1140	600	A1	A2
900RJ	2.448	1.38	1380	600	A1	A2
975RJ	2.440	1.67	1670	600	B1	B2
1050RJ	2.440	1.94	1940	600	B1	B2
1200RJ	2.440	2.58	2580	600	B1	B2
1350RJ	2.454	3.31	3310	600/1050	B1	B2
1600RJ	2.440	4.51	4510	1050	C1	B2*
1800RJ	2.438	6.13	6130	1050	C1	C2
1950SRJ	2.440	7.05	7050	1050	C1	C2
2100SRJ	2.397	8.02	8020	1050	C1	C2
2300SRJ	2.735	11.01	11010	1050	C1	C2
2550SRJ	2.470	12.18	12180	1050	C1	C2

Key

- **A1** 1 Tonne
2 no. in plug
1 no. in pipe
- **A2** 1 Tonne
2 no. in pipe
- **B1** 2.5 Tonne
2 no. in plug
1 no. in pipe
- **B2** 2.5 Tonne
2 no. in pipe
- **C1** 5 Tonne
2 no. in plug
1 no. in pipe
- **C2** 5 Tonne
1 no. in pipe

Notes:

- All dimensions refer to Class 2 (X) pipes
- Outlet 75 mm minimum above bottom invert of pipe
- Overflow 125mm below top
- *1600 Ø retention tanks require both B2 & C1 type lifting clutches for offloading and installation
- See Fig 6 for 3 point lift on typical plugged end pipe

**FIG. 1** General layout of typical RJ type retention tank with Mul-T-Level™ outlet

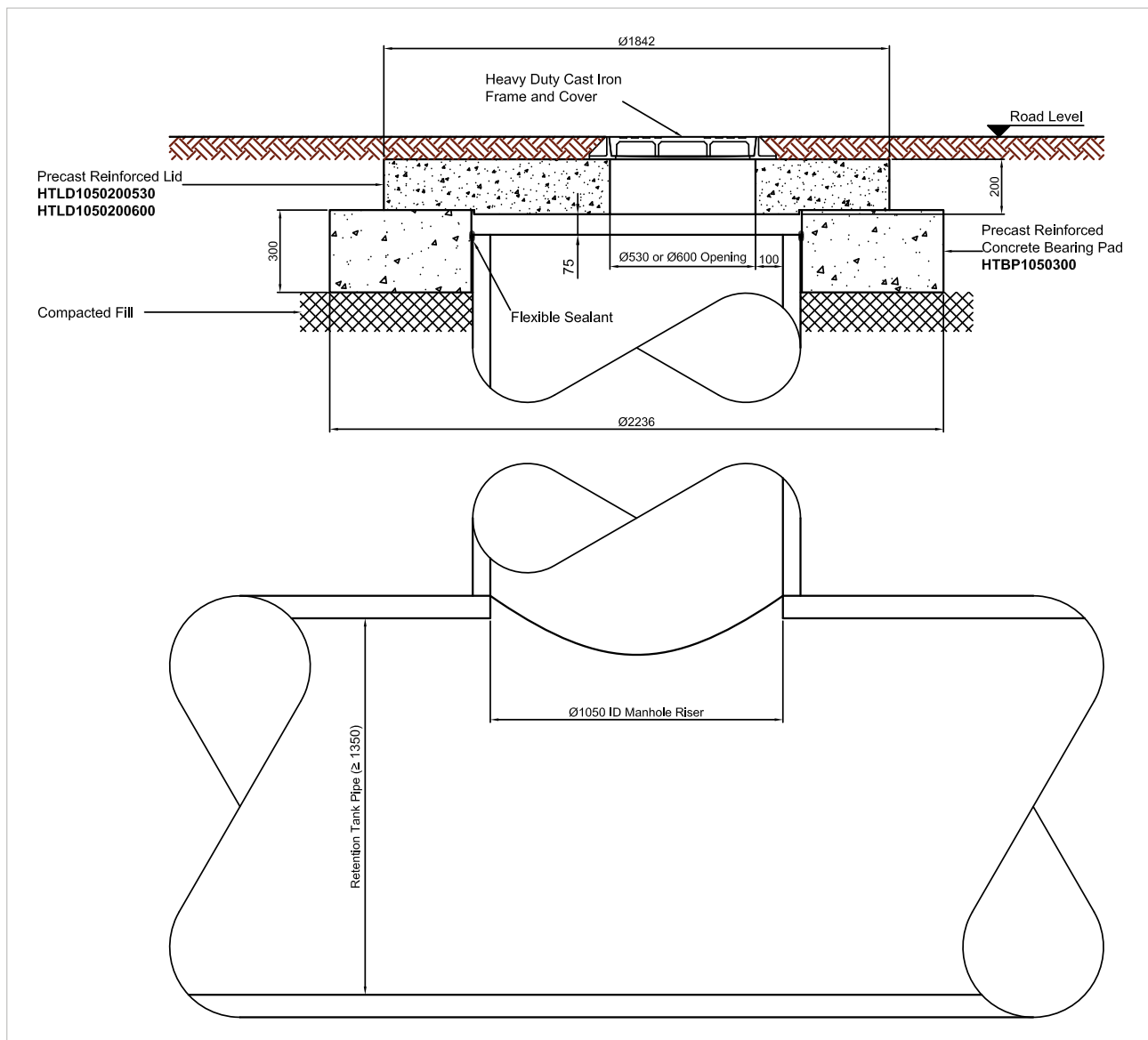
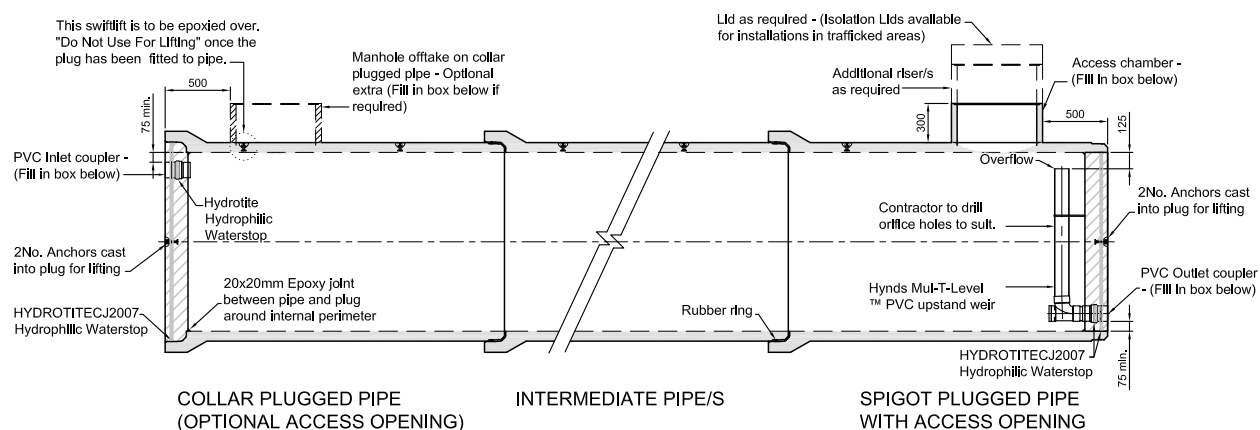


FIG. 2 Recommended detail for roadway installation



PIPE Ø

Mn Recommended Ø 675mm

JOB DETAILS

PIPE CLASS

TOTAL No. OF PIPES
(Incl. ends)

QUOTE No.

COVER TO INVERT

Inlet	Outlet

CO No.

PVC INLET FITTING Ø

Pipe Ø	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

PVC OUTLET FITTING Ø

Ø Pipe	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

ACCESS CHAMBER -
OUTLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

ACCESS CHAMBER
- OPTIONAL
INLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

I AUTHORISE HYNDS PIPE SYSTEMS LTD TO PROCEED WITH THE MANUFACTURING OF THIS PIPE SPECIAL AS DETAILED ABOVE. I ACKNOWLEDGE THAT ANY SPECIALS, ONCE MANUFACTURED, ARE DEEMED TO BE MY (CONTRACTOR'S) PROPERTY & ARE NON REFUNDABLE. STORAGE & HANDLING FEES WILL BE INCURRED FOR PRODUCTS THAT ARE NOT DELIVERED/COLLECTED WITHIN 1 MONTH OF THE DATE AGREED AT THE TIME OF ORDER. PRODUCT NOT DELIVERED/COLLECTED WITHIN 3 MONTHS OF THE DATE AGREED WILL BE DESTROYED AT MY EXPENSE.

NAME :- SIGNATURE :-

DATE :-

FIG. 3 RJ Retention Tank Order Form

Internal base type

TABLE 2 Internal base retention tank

Riser Height (mm)	450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid	580	730	1030	1330	1630	1930	2230	2530
O/A Height Incl 200mm Thick Lid	630	780	1080	1380	1680	1980	2280	2580
Effective Depth (mm)	225	375	675	975	1275	1575	1875	2175

Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			—	—	625	925	1225	—	—	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m³)							
2300	2.58	2.30	—	—	—	3.84	—	—	—	8.83
2550	2.85	2.55	—	—	3.19	—	6.26	—	—	10.85

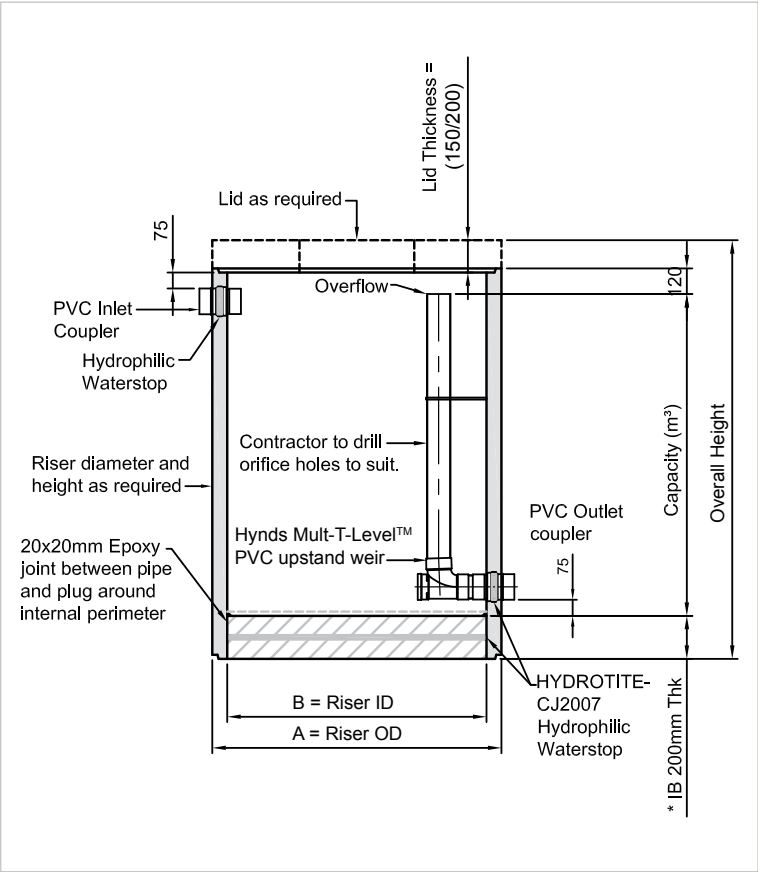


FIG. 4 Internal base

Flange base type

TABLE 3 Flange base retention tank

Riser Height (mm)			450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid			530	680	980	1280	1580	1880	2180	2480
O/A Height Incl 200mm Thick Lid			580	730	1030	1330	1630	1930	2230	2530
Effective Depth (mm)			225	375	675	975	1275	1575	1875	2175
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

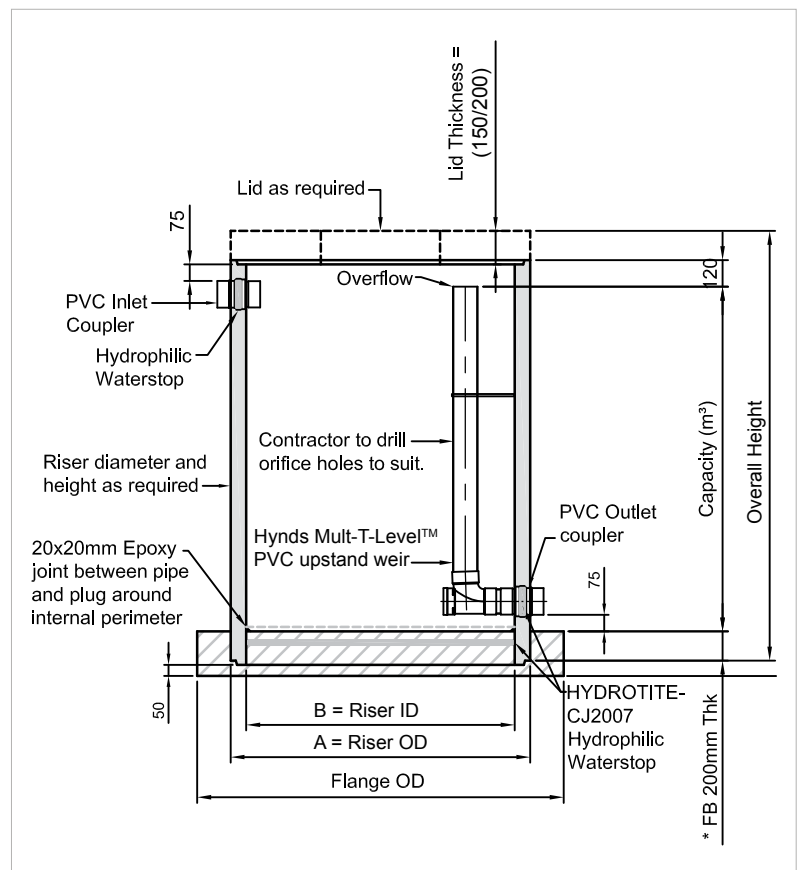


FIG. 5 Flange base

Installation

Mul-T-Level™ outlet

- Installation is simple and normally carried out by a drain layer using the same equipment and procedures as for the installation of concrete pipelines, or manholes.

RJ Retention Tank

- Similar installation to reinforced concrete rubber ring jointed pipes (including bedding requirements) and are dependent on site conditions and loading.
- Once the pipe sections have been installed and backfilled, the additional access risers are epoxied to the starter risers and brought up to the finished levels.
- The installation is then completed by fitting the required lids.
- The contractor must then drill the orifice holes at the required design levels.

Note: Refer to Figure 1 for a general layout of a typical RJ type tank.

RJ Retention Tank – Roadway Installation

- To minimise the effects of traffic, isolation of the manhole lid from the access riser is recommended.
- The depth of the modified flange base and riser must be kept to a minimum to enable maximum distribution of load above the tank.
- Refer to Figure 6 for 3 point lift of typical plugged end pipe.

IB or FB Retention Tank

- Similar installation to concrete manholes.
- Foundations should be prepared with compacted hardfill to prevent excessive settlement.
- Once the IB or FB tank is backfilled, the installation is completed by fitting the relevant concrete lid with the appropriate cast iron frame.



FIG. 6 Point lift of typical plugged end pipe

Branches Nationwide Support Office & Technical Services 09 274 0316

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.

Hyliner AKS HDPE Lining

Technical Guide D1.12

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.



04.20 | DRAINAGE | D1.12 HYLINER AKS HDPE LINING

Applications

Corrosion protection lining for precast concrete pipes in sewer pipelines

Corrosion protection lining for in-situ concrete structures in wastewater treatment plants

Abrasion protection lining in high abrasion environments

Broad range of application in both precast and cast in-situ concrete

Product Attributes

Available in white (sewer applications) and black (where high UV resistance is required)

12 mm long anchors are integrally formed with the sheet

Factory QA tested and welding of joints is 100% quality tested onsite

Quality

ISO 9001:2008 Quality Management Standard

We are the supply partner of choice for New Zealand's civil construction industry, specialising in water and infrastructure based solutions.

HYNDS
PIPE SYSTEMS

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.

Lining systems are able to bridge discontinuities in pipe or structure walls unlike other coating systems that rely on the integrity of the surface and quality of the surface preparation and the installer's expertise for functionality.

HyLiner AKS HDPE is a thermoplastic lining used to reduce the risk of sulphide attack or corrosion in sewage applications.

The high density polyethylene (*HDPE*) lining suits both precast and in-situ applications. Firmly anchored to the concrete surface of the pipe or structure, the lining requires only welding of joints to form a durable, chemically resistant concrete protection membrane with high abrasion resistance.

Installation

Installation procedures vary depending on the product:

Spun concrete pipe

The liner is inserted into the pipe prior to the completion of manufacture, with the pipe spinning process completed with the liner installed. This ensures that all the anchor knobs are well embedded in the spun concrete prior to the concrete curing and hardening.

Wet cast concrete pipe

The liner is securely attached to the inner mould before placement of reinforcement and casting of the pipe. The pipe once cast is cured in the normal manner using heat to accelerate the hardening process.

Precast concrete

This follows a similar process to the wet cast concrete pipe whereby the liner is attached to the mould prior to casting of the element.

In-situ concrete

This follows the same process as for precast concrete whereby the liner is attached to the formwork prior to casting of the concrete.

Installation Detail

In the case of concrete pipes, the liner need only be applied to the pipe's internal surface above low flow level during normal operating conditions as shown in fig 3.

Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min) as shown in fig 4 & 5. This joint is not usually welded as it allows any accumulation of moisture from external hydrostatic pressure to dissipate from behind the liner.

Where the fluid contents are themselves aggressive, such as trade waste discharges, a longitudinal weld can be provided to seal the pipe invert.



FIG. 1 Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min)

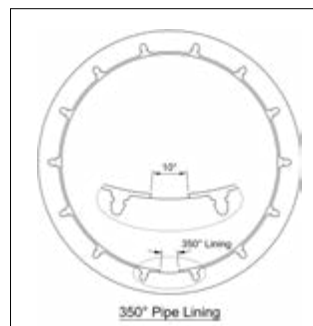


FIG. 3 Most concrete pipes only require the liner applied to the pipe's internal surface above low flow level during normal operating conditions.

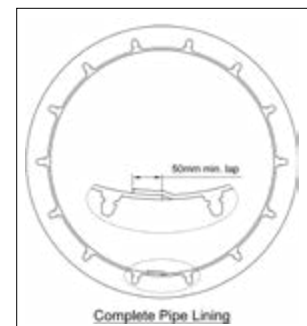


FIG. 2 Invert overlap in a 1050Ø pipe.

Jointing

A continuous lining system is created through the use of extrusion welding carried out by trained, qualified operators. Generally overlapped welds are recommended.

Various details for welded joints for precast concrete pipes and components are shown in Figures 4 to 6. Other details for site installation and fixing of brackets are shown in Figures 7 to 12.

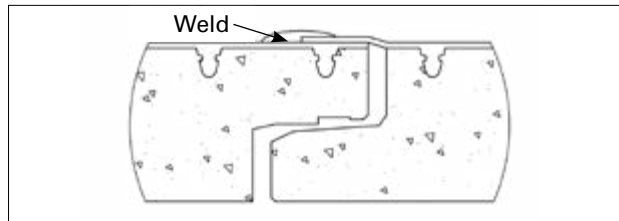


FIG. 4 HyLiner lined SRJ pipe (Lapped Joint)

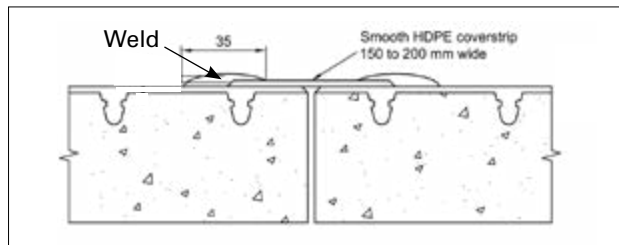


FIG. 5 Cover strip with 2 overlap welds

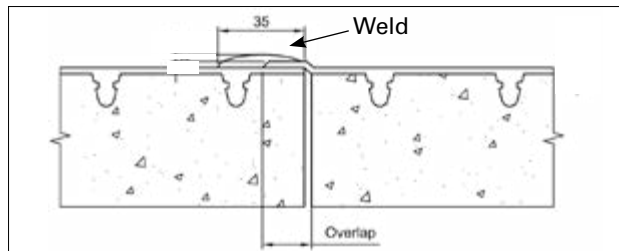


FIG. 6 Single overlap weld

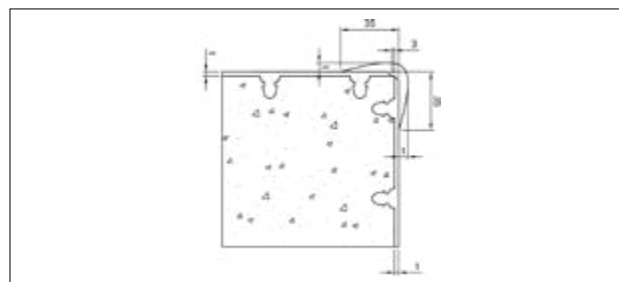


FIG. 7 Outside Corner Weld

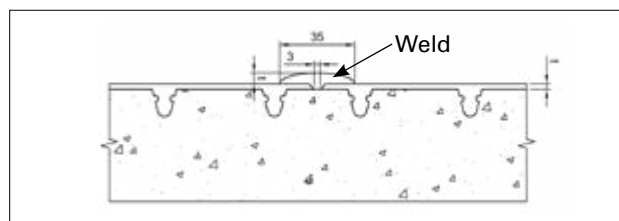


FIG. 8 Flat Extrusion Butt Weld

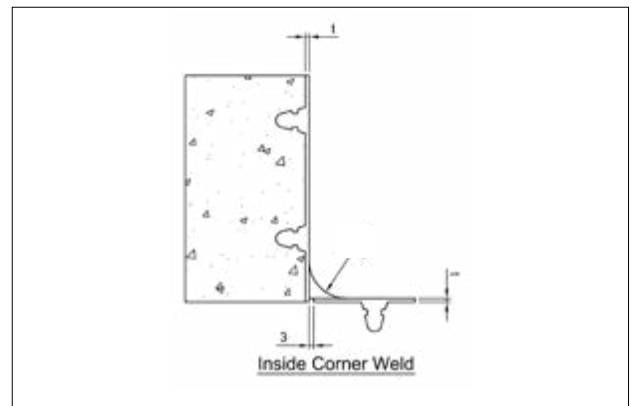


FIG. 9 Inside Corner Weld

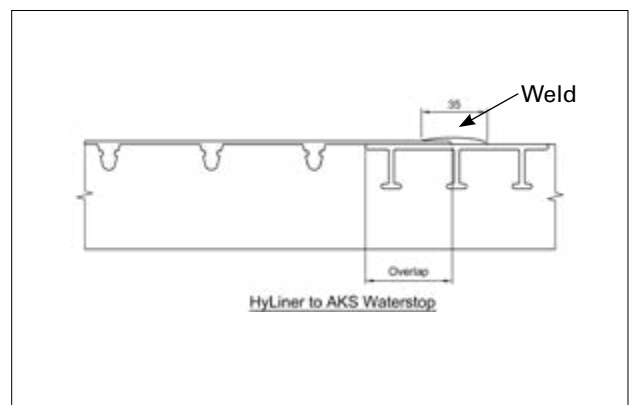


FIG. 10 HyLiner to AKS Waterstop

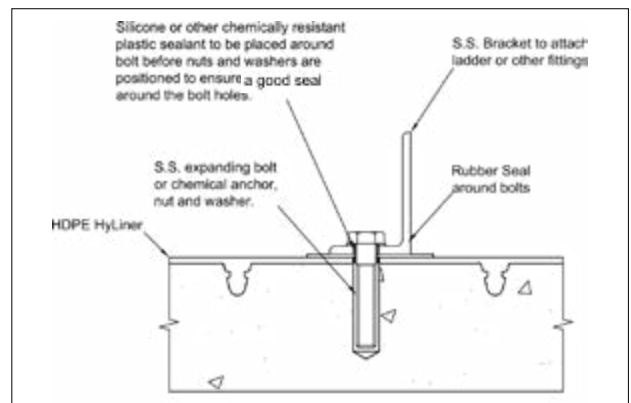


FIG. 11 Sealing of Brackets and Fittings to HyLiner Lined Structures

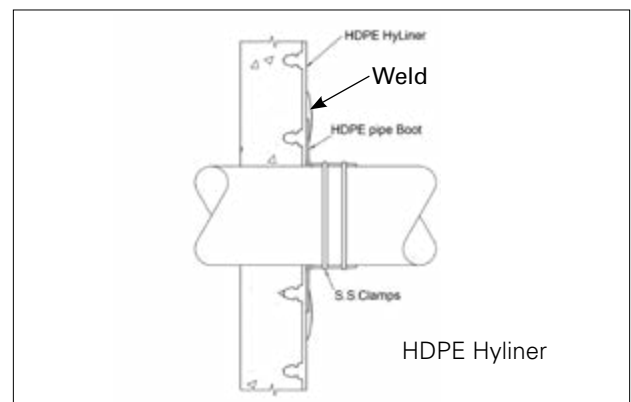


FIG. 12 Pipe Penetration Detail

Quality Control

In-plant quality control for the manufacture of the liner includes waviness, surface finish, knob shape and alignment, crimp height and depth of knobs, sheet thickness, density and tensile values.

Quality checks after casting into precast concrete pipes and components include effective anchor embedment, liner positioning on the product and spark testing for pin holes or damage.

All joints and the liner are spark tested after jointing is completed on site. This ensures the quality of the joints and identifies any damage in the liner as a result of handling and installation.

Abrasion resistance

HyLiner AKS HDPE has a good abrasion resistance when compared to other materials. A typical abrasion test value for HDPE liners is 0.3mm after 400 000 cycles (*Kirschmer, O., "Problems of Abrasion in Pipes", Steinzeugin Formationen, 1966, No 1, pp3-13*).

Wear rates are very slow even under continuous flow of abrasive slurry. Most drainage applications would have intermittent exposure to abrasion.

Suitable Structures for Lining

HyLiner AKS HDPE is suitable for installation in spun and wet cast concrete pipes from 1050–3000 mm diameter. HyLiner AKS HDPE is also suitable for lining a range of other concrete structures:

- Manhole risers and lids
- Rectangular or square precast concrete chambers and lids
- Precast concrete channels and lids
- Precast concrete pumpstations
- Insitu concrete structures such as tanks and chambers



FIG. 13 2300 Diameter Manhole Riser

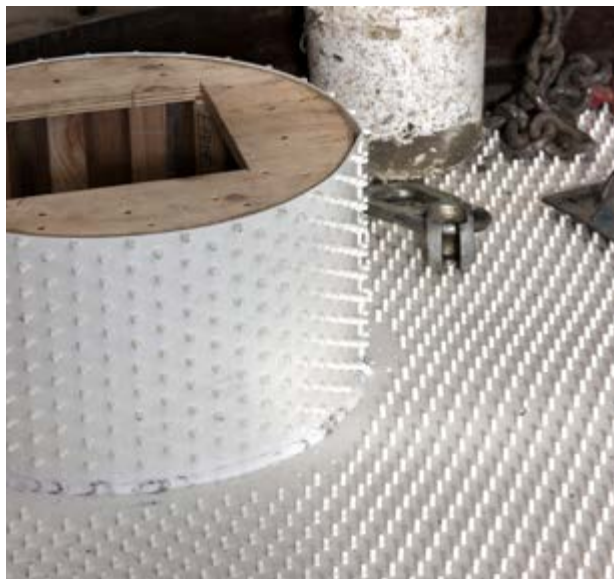


FIG. 14 Liner being installed for a manhole lid

Branches Nationwide Support Office & Technical Services 09 274 0316

Disclaimer: While every effort has been made to ensure that the information in this document is correct and accurate, users of Hynds product or information within this document must make their own assessment of suitability for their particular application. Product dimensions are nominal only, and should be verified if critical to a particular installation. No warranty is either expressed, implied, or statutory made by Hynds unless expressly stated in any sale and purchase agreement entered into between Hynds and the user.

BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE



BluSeal Anchor Knob Sheet (AKS) is supplied and installed as a fully sealed and welded robust chemically resistant concrete protection lining.

BluSeal AKS is a synthetic membrane of HDPE sheet with integral anchors which are cast into concrete to form a flexible and durable corrosion protection lining. BluSeal AKS is used to protect concrete surfaces in chemically aggressive environments in sewerage tunnels, treatment works, pump stations, manholes and chemical retention bunds. It comes in a range of colours and thicknesses and can be applied to new and existing structures for protection or enhancement.

Application Advantages

- Fully welded homogenous lining
- Complete before 28-day concrete cure
- Factory assured thickness and absence of pinholes
- Retro-fitted lining is moisture compatible with assured bond

Lifecycle Advantages

- 100 year design life
- Membrane drainage eliminates negative pressure
- Chemical and impact resistant
- High anchor pull-out resistance
- Potable Water use to AS/NZS 4020:200
- Low coefficient of friction in lined conduits

About the Product

BluSeal AKS is supplied and installed as a fully sealed and welded, chemically resistant concrete protection system. The system includes propriety details for sealing around penetrations and against non-HDPE surfaces. Skilled applicators can fabricate the product into various shapes to suit irregular concrete formwork. All seams and joints are extrusion welded and then tested by spark or vacuum box testing. BluSeal AKS is designed and installed by approved applicators to international standards which are outlined in a manufacturer's installation manual. The elasticity of the membrane allows free drainage and relief of any hydrostatic pressure build-up in underground structures. The membrane can be cast into new structures or retrofitted by cement grouting onto the prepared surface of existing structures. AKS lined structures have an outstanding track record in aggressive environments, demonstrating a design life in excess of 100 years for the most demanding applications.

Application solutions

- Segmental sewer tunnels
- Inlet works and bioreactor tanks in WWTP
- Pump stations and manholes
- Tunnel waterproofing
- Chemical retention bunds
- Piles and foundation lining in aggressive ground conditions
- Sewer pipelines
- Slide pads on pipe plinths
- Concrete protection for industrial applications

Project Specification Clause

HDPE CORROSION PROTECTION LINING - The HDPE CPL membrane used for this project shall be supplied and installed as a fully sealed and welded ROBUST continuous membrane system. It shall be a factory produced product that has independent testing to validate the performance outlined in the technical data table on the following pages. BluSeal AKS supplied by Bluey Technologies or equivalent shall be acceptable.

Project Examples

Sewerage treatment plants, sewer pump stations, sewer manholes, trunk sewer mains, chemical processing plant bunds and trenches, gas pipelines (pipe plinths).





BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Application Specification

PREPARATION

- I.1 BluSeal AKS must be installed onto formwork under the direction of an approved, specialised applicator who will plan layout configurations of sheets and weld seam locations. The applicator may also prefabricate some corner or seam sections and pipe penetration pieces offsite.
- I.2 At joins in sheets the edge knobs are removed from one edge and the sheet is overlapped by 50mm to prevent egress of concrete fines and to provide a sound foundation for welding the seams.
- I.3 Formwork shall be cleaned and free of defects. Form release oils are not necessary where BluSeal AKS is applied. Formwork should be designed to avoid leaking.
- I.4 The sheets must be tensioned over the form within the yield elongation limit, prior to securing to the forms.
- I.5 BluSeal Formtak can be used to assist in holding the sheet against timber formwork. Securing against the formwork is by nailing or stapling through the sheets at edges where extrusion welds will cover later or into edges that will be redundant and trimmed after the pour.
- I.6 On circular forms, the sheets are wrapped and tensioned around and secured at the overlap by wires around the knobs and/or temporary speed welding along the seam.
- I.7 In precast concrete applications the moulds may be designed to secure the membrane at the edges.
- I.8 When BluSeal AKS is applied to an existing structure all corroded concrete and contaminants must be removed, leaving a surface profile greater or equal to CSP4 in accordance with ACI guidelines.
- I.9 Treat or replace exposed reinforcement in accordance with ACI guidelines.
- I.10 Refer to Bluey Technical Notes for recommendations regarding proving grout bond strength and design criteria.

APPLICATION

- 2.1 Always pour concrete or grout at a cooler ambient temperature than the temperature when the sheets were applied to the formwork. This will ensure the membrane is taut on the forms.
- 2.2 Anticipated maximum concrete temperature or accelerated curing temperature should not exceed 60 degrees Centigrade. Contact Bluey to discuss exceptions.
- 2.3 When grouting the sheets onto an existing structure, only grouts approved by Bluey such as BluCem HS200 shall be used, and mixing and placement shall be strictly in accordance with Bluey instructions. Fast set grouts, such as BluCem HE80, are recommended to be used for retrofitting the membrane in short time frames where assets must be returned to service quickly.
- 2.4 When grouting the membrane to floors, plan pours at times of the day where temperature changes before initial set of the grout are minimal. Avoid these pours in direct sunlight.
- 2.5 Concrete mix design, mixing, placement and compaction of concrete should follow standard civil construction practice to minimise voids and ensure full encapsulation of the anchors on the membrane.
- 2.6 Extrusion welding and weld testing at seams will be undertaken by approved applicators and in accordance with installation guidelines provided by the manufacturer and generally in accordance with DVS 2227. This includes proper preparation of the sheet surfaces to be welded and daily destructive seam peel tests sampled from trial welds. Welding technicians shall have formal industry training in extrusion welding techniques.
- 2.7 Non-destructive testing of completed welds will be either by vacuum box or spark testing.
- 2.8 Repairs and patching will be completed by extrusion welding over small defects or applying a minimum 200mm diameter patch over larger defects, with a minimum 80mm edge distance to the defect.
- 2.9 Destructive pull testing of anchors should be avoided.
- 2.10 Encapsulation of anchors can be easily checked by tapping across the surface of the membrane to detect any hollow sounds that indicate voids under the membrane. If voids are detected, they can be filled by injection of BluCem HS200 high flow grout through the lining. Repair by extrusion welding over the injection hole.



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Product Data

Please refer to Important Notice on following page

Length of Knobs (nominal)	12mm
Knobs per m ²	1230
Pull-off Resistance	>700N per knob or 850kPa (short term loading)
Membrane Thickness	2.0mm to 10mm*
Roll Widths	Up to 3.2m
Colours	Black for UV exposed applications and light colours (such as white) for underground or covered structures.

TESTED CHARACTERISTIC	STANDARD	RESULT			
Density	ASTM D 505/D 792	≥940kg/m ³			
Carbon Black Content**	ASTM D 1603	2.0 - 3.0%			
Carbon Black Dispersion**	ASTM D 5596	Category 1 or Category 2			
ESCR (NCTL)	ASTM D 5397	>300 hours			
OIT	D 3895	>100 minutes			
Coefficient of Linear Expansion	ASTM E 831	1.1 - 1.4E-4cm/cm/deg C			
Tensile Properties (Sheet Material)	ASTM D 6693-04	Yield Stress 15MPa	Break Stress 27MPa	Yield Elongation 12%	Break Elongation 700%
Shore Hardness	DIN 53505	>50 Shore D			
Tear Resistance	ASTM D 1004	120N/mm			
Puncture Resistance	ASTM D 4833	300N/mm			
Dimensional Stability	ASTM D 1204	<2.0% change			
Water Absorption	ASTM D 570	<0.09%			
Flammability	UL94***	V0			

* Average minimum thickness to ASTM D 5199. Minimum thickness membrane made to order

** Black AKS only

*** Plastics flammability standard released by Underwriters Laboratories of the USA



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

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IMPORTANT NOTICE

This Technical Data Sheet is provided for general information and instruction only. The properties and characteristics set out herein represent typical testing results under laboratory conditions. Results of actual product characteristics may vary slightly. Site-specific and project-specific conditions may affect product performance, including without limitation: surfaces, environmental conditions, contact conditions, storage conditions, storage timeframes, weather, and climatic or seasonal conditions. Not all product parameters are batch tested as part of the manufacturing quality control process, and performance may vary between batches.

If Bluey gives any express written product warranty in relation to the product, that warranty is subject to the foregoing qualifications, despite anything to the contrary in any other document. All other representations, advice, suggestions or promises regarding the product's performance or its implementation, whether verbal or in writing, and whenever given, including in the course of any field services, are expressly disclaimed. Without limiting the foregoing, Bluey will have no liability for loss or damage of any kind if any application specifications are not followed.

The foregoing is not intended to exclude any warranties or guarantees which by law cannot be excluded. Subject only to the foregoing provisions of this Notice, and to the extent permitted by law, Bluey disclaims all liability for loss or damage of any kind suffered as a result of or in connection with the product or its implementation. If such liability cannot be wholly excluded, Bluey's liability will, to the extent permitted by law, be limited to the replacement of the product itself or the direct cost of replacement of the product itself (not including any collateral or consequential loss or damage of any kind).

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ProcessMaster electromagnetic flowmeter

The perfect fit for the oil and gas industry



ABB has responded to the oil and gas industry's need for a rugged, reliable electromagnetic flowmeter

Measurement made easy

ProcessMaster flowmeters – perfect for the oil and gas industry

Expertise in measurement technology

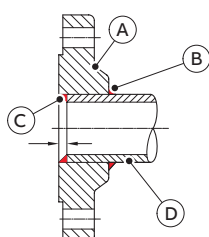
ABB's high pressure electromagnetic flowmeters are reliable, accurate and easily maintained. Customers worldwide have benefited from our application-oriented know-how and comprehensive service.

To learn more about our extensive portfolio, visit www.abb.com/measurement.

Designed specifically for oil and gas

We have added a two-tier, high-pressure version to our comprehensive range of electro-magnetic ProcessMaster flowmeters. It is available with either weld neck or slip-on flanges with RTJ and raised face connections.

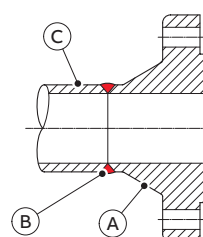
There are differences between X-Ray and dye penetrant test. For weld neck design we offer both dye penetrant and X-Ray tests; for slip-on design we offer only dye penetrant test.



(A) Slip-on flange (B) Fillet weld (outside) (C) Fillet weld (inside) (D) Pipe

Applications

- Slurries such as drilling mud
- Mixtures of fluids such as oil/water plus sand or produced water plus sand
- Injection fluids including sand and chemical additives for lubrication and corrosion prevention
- Sludge or sludge-like wastewater from produced water treatment
- Operating conditions such as high pressure or entrained gas in the fluid
- Harsh environmental conditions such as heat, moisture or vibration and explosive or corrosive atmospheres



(A) Weld neck flange (B) Butt weld (C) Pipe

Robust design for long life

The ProcessMaster flow sensor is designed for reliability in the demanding operating conditions found in oil and gas industry applications.

- Long lasting sensor lining materials withstand abrasion and corrosion, resulting in longer sensor service life and minimal maintenance requirements
- No additional pressure drop caused by protrusions into the pipe
- Optional self-cleaning measuring electrodes prevent issues caused by build-up of deposits
- Double sealed measuring electrodes minimize the risk of leakage and enhance reliability
- Optional all-316 stainless steel construction for corrosive offshore atmosphere
- Optional fully-welded sensor made from 316 material
- Protection of internal sensor components against moisture and vibration with potted Ex sensor

Range of certificates and test reports

- 3.1 material certificates and/or PMI certificates
- Certificates for non-destructive testing, X-Ray and/or dye penetration test
- Welder qualifications and procedures
- Hydrostatic pressure testing

Specification

Accuracy	Standard: 0.4 % of rate Enhanced: 0.2 % of rate
Nominal size range	DN 25 to 400 (1 to 18 in)
Nominal pressure	ASME CL 600 to 2500
Lining	Hard rubber, ETFE
Electrodes	Stainless steel, Hastelloy C
Process connection	Steel, stainless steel
IP rating	IP67, IP68
Fluid temperature	–25 to 130 °C (–13 to 266 °F)
Power supply	100 to 230 V AC, 24 V AC/DC
I/Os	Current, pulse status output
Communication *	HART protocol, PROFIBUS PA, FOUNDATION Fieldbus
Sensor housing material	Stainless steel 316
Transmitter housing material	Stainless steel
Wetted parts material	Option for NACE
Ex approvals	ATEX/IEC Zone 1.2, FM/cFM Cl1 Div.1, Cl1 Div.2
Marine approval	DNV
Verification	ScanMaster

* Acknowledgements

HART is a registered trademark of FieldComm Group, Austin, Texas, USA.

PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).



FEP630 high pressure magnetic flowmeter



FEP610 high pressure magnetic flowmeter

BLACKBOX

Technical Specifications:

Blackbox 130 is a compact low-cost intelligent controller that allows users to locally program the unit and give a readout of level. Economical and simple to program and operate, users benefit from extremely accurate and reliable digital echo processing with access to the dB and dBR range of transducers, measuring from 125 mm (4.9 in) right through to 40 m (131.2 ft).



PHYSICAL: MOUNTING OPTION SPECIFIC

Mounting Option:	Standard Wall Mount:	Large Wall Mount:
Controller Body Dimensions:	130 mm x 150 mm x 63.5 mm (5.1 in x 5.9 in x 2.5 in)	130 mm x 180 mm x 85 mm (5.1 in x 7.09 in x 3.3 in)
Weight:	Nominal 0.7 kg (1.4 lb)	Nominal 0.8 kg (1.7 lb)
Enclosure Material/Description:		ABS Base with polycarbonate lid, flammability rating UL 94 HB
Cable Entry Detail:	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable
Transducer Cable Extensions:	2-core screened (2 conductor 20 AWG screened)	
Nominal Separation:	1,000 m (3,280 ft), for greater separation distances please contact us	

ENVIRONMENTAL

IP Rating:	IP66/67
Max. & Min. Temperature (Electronics):	-20 °C to +55 °C (-4 °F to +131 °F)
Flammable Atmosphere Approval:	All Blackbox units must be mounted in a safe area. Compatible with approved dB Transducers
CE Approval:	See EU Declaration of Conformity in the manual
UL Approval:	UL Listed. UL Listed to Canadian Safety Standards. Certificate Number E257330.

PERFORMANCE

Accuracy/Repeatability:	0.25% of the measured range or 6 mm (0.2 in), <i>whichever is greater</i>
Resolution:	dBMAH3 0.3 mm (0.01 in), dB3 0.5 mm (0.02 in), dB6 and dB10 1 mm (0.04 in), dB15 1.5 mm (0.06 in), dB25 2.5 mm (0.1 in), and dB40 5 mm (0.2 in).
Min. & Max. Range:	Dependent on Transducer. Nominally 125 mm to 40 m (4.9 in to 130 ft)
Echo Processing:	DATM (Digital Adaptive Tracking of Echo Movement)
Rate Response:	Fully Adjustable

OUTPUTS

Analog Output:	Isolated output of 4-20mA or 0-20mA into 1 kΩ (user programmable and adjustable) 0.1% resolution
Digital Output:	RS232 for programming and data extraction
Volt Free Contacts, Number, & Rating:	2 form "C" (SPDT) rated at 2 A at 240 V AC
Display:	2 x 12 alpha numeric

PROGRAMMING

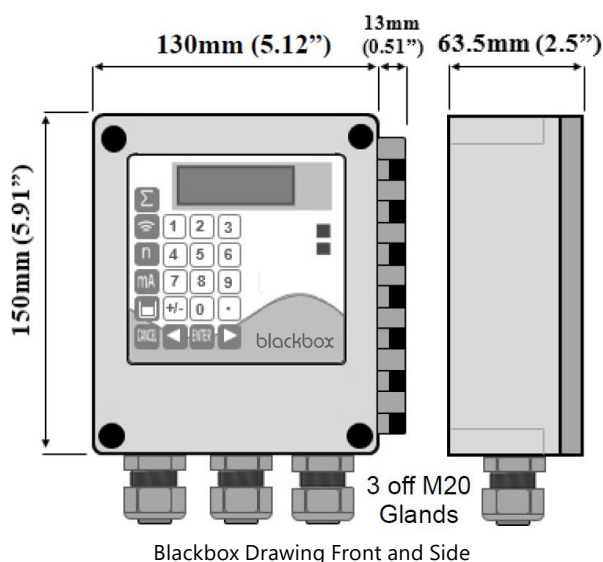
On-board Programming:	Via RS232 using supplied software
PC Programming:	Via RS232 using supplied software
Programming Security:	Via Passcode (user selectable and adjustable)
Programmed Data Integrity:	Via non-volatile RAM
Remote Programming:	Via RS232 using optional handheld calibrator

SUPPLY

Power Supply:	115 V AC +5% / -10% 50/60 Hz, 230 V AC +5% / -10% 50/60 Hz, 10-28 V DC, 10 W maximum power (typically 5 W)
Fuses:	50mA at 230 V AC, 100mA at 115 V AC

REMOTE COMMUNICATIONS

Power Supply: Power supplied via Blackbox RS232 interface



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Rev 4.0

dB ULTRASONIC TRANSDUCERS

Technical Specifications:

The dB Transducer Series is a range of non-contacting ultrasonic transducers for level, volume, and flow measurement. Available in a variety of models and compatible with all Pulsar controllers so that you have a specific solution to suit your application requirements.



PHYSICAL: TRANSDUCER SPECIFIC

Model:	Dimensions:	Dia Face:	Weight:	Measurement Range:	Frequency:	Beam Angle:
dB3	78 (D) mm x 115 (H) mm (3.1 in x 4.5 in)	19 mm (0.7 in)	1.1 kg (2.4 lb)	125 mm to 3 m (4.9 in to 9.8 ft)	125kHz	<10°
dB6	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	30 mm (1.2 in)	1.1 kg (2.4 lb)	300 mm to 6 m (11.8 in to 19.7 ft)	75kHz	<10°
dB56	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	200 mm to 6 m (7.9 in to 19.7 ft)	50kHz	<10°
dB10	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	300 mm to 10 m (11.8 in to 32.8 ft)	50kHz	<10°
dB15	86 (D) mm x 122 (H) mm (3.4 in x 4.8 in)	60 mm (2.4 in)	1.2 kg (2.6 lb)	500 mm to 15 m (19.7 in to 49.2 ft)	41kHz	<8°
dB25	105 (D) mm x 142 (H) mm (4.1 in x 5.6 in)	78 mm (3.1 in)	1.4 kg (3.1 lb)	600 mm to 25 m (23.6 in to 82 ft)	30kHz	<6°
dB40	205 (D) mm x 223 (H) mm (8.1 in x 8.8 in)	160 mm (6.3 in)	6 kg (13.2 lb)	1.2 m to 40 m (3.9 ft to 131.2 ft)	20kHz	<5°

PHYSICAL: ALL TRANSDUCERS

Sensor Body Material:	Valox 357 U and syntactic foam face
Cable Lengths:	Standard = 5 m, 10 m, 20 m, or 30 m (16.4 ft, 32.8 ft, 65.6 ft, or 98.4 ft). Optional: up to 150 m (492 ft) maximum (increments of 10 m (32.8 ft) only)
Maximum Separation:	500 m (1,640 ft)
Mounting Connection:	BSP or 1" NPT

ENVIRONMENTAL

Enclosure Protection:	IP68 / NEMA 6P
Max. And Min. Temperature (Electronics):	Standard: -40° C to +90° C (-40° F to +194° F) Hazardous area versions: -40° C to +75° C (-40° F to +167° F)

APPROVALS

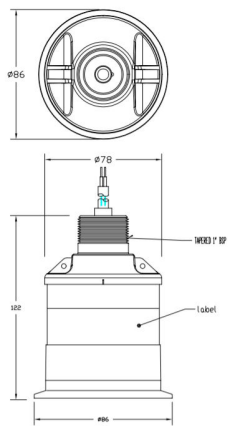
CE Approval:	2014/30/EU to EMC & 2014/34/EU ATEX Directives. Standards applied: EN 60079-0:2012+A11:2013/ EN 60079-11:2012 / EN 60079-18:2009 / EN 60079-26:2007 / EN 61326-1:2013
ATEX Approval:	Standard ATEX EEx m II T6 or optional EEx ia IIC T6. FM/FMC approval.

TRANSDUCER OPTIONS

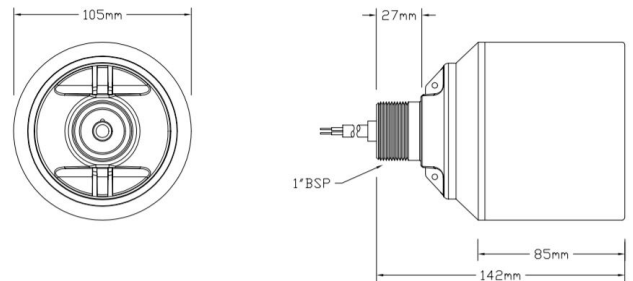
Model:	dB3	dBs6	dB6	dB10	dB15	dB25	dB40
PVDF		✓	✓	✓			
Front Threaded / PVDF	✓	✓	✓	✓			
Submergence Shield	✓	✓	✓	✓	✓	✓	
Flanged DIN/ANSI		✓	✓	✓	✓		
Foam Face		✓		✓	✓	✓	✓
Sanitary Flange		✓	✓	✓			
Intrinsically Safe of All the Above	✓	✓	✓	✓	✓	✓	✓

PERFORMANCE

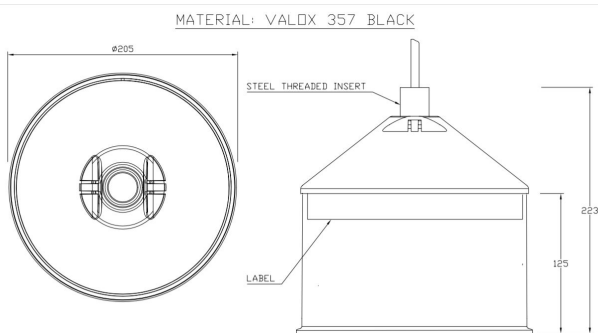
Accuracy:	0.25% or 6 mm (0.2 in) whichever is greater
Resolution:	0.01% or 2 mm (0.08 in) whichever is greater
Temp. Compensation:	Automatic, internal temperature sensor, ± 0.5 °C/°F



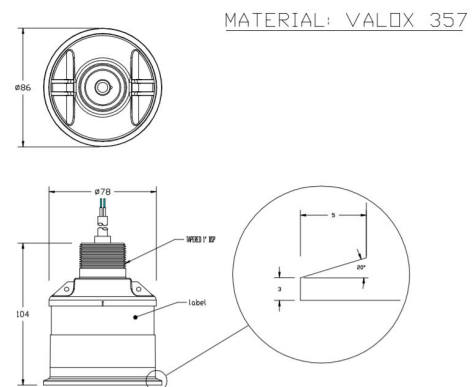
dB15 Transducer Drawing



dB25 Transducer Drawing



dB40 Transducer Drawing



dB6 & dB10 Transducer Drawing



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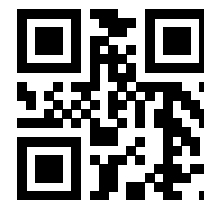
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pulsarmeasurement.com

Rev 7.0

Technical Specification

891480_17.0



ENM 10

Level switch

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1 Product Description

1.1 Product design

Usage

ENM-10 is a level regulator for level control applications. The level regulator starts and stops a pump or activates an alarm device when the liquid level reaches the regulator.

Materials

Denomination	Standard version	Ex version
Regulator casing	Polypropylene	Polypropylene with black conductive casing
Bend relief	EPDM rubber	NBR-PVC rubber
Cable sheath	PVC	NBR-PVC rubber

The plastic components are welded and screwed together.

1.2 Technical data

Application limits

Feature	Value
Liquid temperature	Minimum 0°C (32°F) Maximum 60°C (140°F)
Liquid density	Minimum 0.65 g/cm ³ Maximum 1.5 g/cm ³

Electrical specifications

Feature	Value
Degree of protection	IP68, 20 m (65 ft), 2 bars
Interrupting capacity of micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 30 V 5 A
Interrupting capacity of gold-plated micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 24 V 10 mA

Voltage limits are subject to local regulations.

Density ranges

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
0.65 – 0.80	194 (7 10/16)	100 (4)
0.80 – 0.95	177 (7)	100 (4)
0.95 – 1.10	162 (6 3/8)	100 (4)
1.05 – 1.20	142 (5 9/16)	100 (4)
1.20 – 1.30	133 (5 1/4)	100 (4)
1.30 – 1.40	130 (5 2/16)	100 (4)

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
1.40 - 1.50	126 (5)	100 (4)

Weight

A regulator with standard density and 20 m cable weighs approximately 2 kg (4.5 lb).

1.3 Cables

Lengths

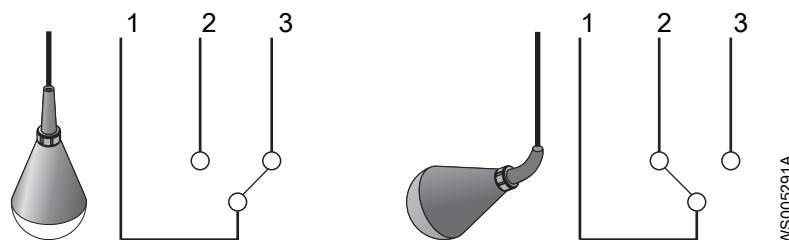
For liquids with specific density between 0.95 and 1.10 g/cm³, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (100 ft) • 50 m (167 ft)
Ex	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (98 ft) • 50 m (164 ft)

Diameter

The cable diameter for all product variants is 6.7 mm (0.26 in), +/- 0.2 mm (0.00787 in).

Color codes



Cable	1	2	3
Color	Grey	Black	Brown

1.4 Approvals and standards

Standard approvals

LVD approval according to EN61058
 CSA approval: Certificate Number 1330172
 Cl. I Zone 0, Gr. IIC
 CL.I Div.1 Gr A, B, C and D
 Cl.II Gr. E, F, and G

Ex approvals

IECEX ia IIC T4 Ga: -20°C ≤ Ta ≤ 60°C
 IECEX NEMKO 09.0008
 ATEX II 1G Ex ia IIC T4 Ga

NEMKO 10 ATEX 1082

Applied standards for ATEX and IEC

- EN 60079-0:2012 / IEC 60079-0:2011
- EN 60079-11:2012 / IEC 60079-11:2011

Intrinsically safe circuits are required for the automatic control system. Use a Zener barrier, for example, part number 84 01 07.

The electrical connections must comply with the Ex regulations of the national submitter.



2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

2.2 Product range

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 00	0.65–0.80	Blue	20	1	CE	International
582 88 01	0.80–0.95	Blue	20	1	CE	International
582 88 02	0.95–1.10	Blue	6	1	CE	International
582 88 03	0.95–1.10	Blue	13	1	CE	International
582 88 04	0.95–1.10	Blue	20	1	CE	International
582 88 05	1.05–1.20	Blue	20	1	CE	International
582 88 06	1.20–1.30	Blue	20	1	CE	International
582 88 07	1.30–1.40	Blue	20	1	CE	International
582 88 08	1.40–1.50	Blue	20	1	CE	International
582 88 09	0.65–0.80	Gray	20	3	CSA/CE	Canada
582 88 10	0.80–0.95	Gray	20	3	CSA/CE	Canada
582 88 11	0.95–1.10	Gray	6	3	CSA/CE	Canada
582 88 12	0.95–1.10	Gray	13	3	CSA/CE	Canada
582 88 13	0.95–1.10	Gray	20	3	CSA/CE	Canada
582 88 14	1.05–1.20	Gray	20	3	CSA/CE	Canada
582 88 15	1.20–1.30	Gray	20	3	CSA/CE	Canada
582 88 16	1.30–1.40	Gray	20	3	CSA/CE	Canada
582 88 17	1.40–1.50	Gray	20	3	CSA/CE	Canada
582 88 18	0.65–0.80	Gray	20	1	CSA/CE	Canada
582 88 19	0.80–0.95	Gray	20	1	CSA/CE	Canada
582 88 20	0.95–1.10	Gray	6	1	CSA/CE	Canada
582 88 21	0.95–1.10	Gray	13	1	CSA/CE	Canada
582 88 22	0.95–1.10	Gray	20	1	CSA/CE	Canada
582 88 23	1.05–1.20	Gray	20	1	CSA/CE	Canada
582 88 24	1.20–1.30	Gray	20	1	CSA/CE	Canada
582 88 25	1.30–1.40	Gray	20	1	CSA/CE	Canada
582 88 26	1.40–1.50	Gray	20	1	CSA/CE	Canada
582 88 36	0.95–1.10	Gray	30	3	CSA/CE	Canada
582 88 37	0.95–1.10	Gray	50	3	CSA/CE	Canada
582 88 38	0.95–1.10	Gray	100	3	CSA/CE	Canada
582 88 39	0.95–1.10	Gray	150	3	CSA/CE	Canada
582 88 51	0.95–1.10	Red	65	2	CE	International
582 88 52	0.95–1.10	Red	6	2	CE	International
582 88 53	0.95–1.10	Red	13	2	CE	International
582 88 54	0.95–1.10	Red	20	2	CE	International
582 88 57	0.95–1.10	Red	20	2	CE	Canada
582 88 70	0.65–0.80	Blue	20	3	CE	International
582 88 71	0.80–0.95	Blue	20	3	CE	International
582 88 72	0.95–1.10	Blue	6	3	CE	International
582 88 73	0.95–1.10	Blue	13	3	CE	International

¹ See *Type of cables* on page 9.

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 74	0.95–1.10	Blue	20	3	CE	International
582 88 75	1.05–1.20	Blue	20	3	CE	International
582 88 76	1.20–1.30	Blue	20	3	CE	International
582 88 77	1.30–1.40	Blue	20	3	CE	International
582 88 78	1.40–1.50	Blue	20	3	CE	International
582 88 79	0.95–1.10	Blue	65	1	CE	International
582 88 80	0.95–1.10	Blue	30	1	CE	International
582 88 81	0.95–1.10	Blue	50	1	CE	International
582 88 82	0.95–1.10	Gray	30	1	CSA/CE	Canada
582 88 83	0.95–1.10	Gray	50	1	CSA/CE	Canada
582 88 86	0.95–1.10	Red	30	2	CE	International
582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
594 79 10	0.95–1.10	Blue	70	3	CE	International
594 79 13	0.95–1.10	Blue	100	3	CE	International
594 79 18	0.95–1.10	Blue	150	3	CE	International
594 79 19 ²	0.95–1.10	Blue	20	3	CE	International
594 79 20 ²	0.95–1.10	Gray	20	3	CSA/CE	International
594 79 21 ²	0.95–1.10	Transparent	6	3	CE	For demonstration only.
594 79 40 ²	0.95–1.10	Black	6	3	ATEX/IECEX ³	International
594 79 41 ²	0.95–1.10	Black	13	3	ATEX/IECEX ³	International
594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
2	Red PVC	Grey/Brown/Black
3	Black nitrile rubber (NBR)/PVC	Grey/Brown/Black

¹ See *Type of cables* on page 9.

² Designed for low current, slow movements and oil. Includes micro switch with gold plated contacts.

³ Zener barrier 84 01 07 required.

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The original instruction is in English. All non-English
instructions are translations of the original instruction.

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2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

2.2 Product range

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 00	0.65–0.80	Blue	20	1	CE	International
582 88 01	0.80–0.95	Blue	20	1	CE	International
582 88 02	0.95–1.10	Blue	6	1	CE	International
582 88 03	0.95–1.10	Blue	13	1	CE	International
582 88 04	0.95–1.10	Blue	20	1	CE	International
582 88 05	1.05–1.20	Blue	20	1	CE	International
582 88 06	1.20–1.30	Blue	20	1	CE	International
582 88 07	1.30–1.40	Blue	20	1	CE	International
582 88 08	1.40–1.50	Blue	20	1	CE	International
582 88 09	0.65–0.80	Gray	20	3	CSA/CE	Canada
582 88 10	0.80–0.95	Gray	20	3	CSA/CE	Canada
582 88 11	0.95–1.10	Gray	6	3	CSA/CE	Canada
582 88 12	0.95–1.10	Gray	13	3	CSA/CE	Canada
582 88 13	0.95–1.10	Gray	20	3	CSA/CE	Canada
582 88 14	1.05–1.20	Gray	20	3	CSA/CE	Canada
582 88 15	1.20–1.30	Gray	20	3	CSA/CE	Canada
582 88 16	1.30–1.40	Gray	20	3	CSA/CE	Canada
582 88 17	1.40–1.50	Gray	20	3	CSA/CE	Canada
582 88 18	0.65–0.80	Gray	20	1	CSA/CE	Canada
582 88 19	0.80–0.95	Gray	20	1	CSA/CE	Canada
582 88 20	0.95–1.10	Gray	6	1	CSA/CE	Canada
582 88 21	0.95–1.10	Gray	13	1	CSA/CE	Canada
582 88 22	0.95–1.10	Gray	20	1	CSA/CE	Canada
582 88 23	1.05–1.20	Gray	20	1	CSA/CE	Canada
582 88 24	1.20–1.30	Gray	20	1	CSA/CE	Canada
582 88 25	1.30–1.40	Gray	20	1	CSA/CE	Canada
582 88 26	1.40–1.50	Gray	20	1	CSA/CE	Canada
582 88 36	0.95–1.10	Gray	30	3	CSA/CE	Canada
582 88 37	0.95–1.10	Gray	50	3	CSA/CE	Canada
582 88 38	0.95–1.10	Gray	100	3	CSA/CE	Canada
582 88 39	0.95–1.10	Gray	150	3	CSA/CE	Canada
582 88 51	0.95–1.10	Red	65	2	CE	International
582 88 52	0.95–1.10	Red	6	2	CE	International
582 88 53	0.95–1.10	Red	13	2	CE	International
582 88 54	0.95–1.10	Red	20	2	CE	International
582 88 57	0.95–1.10	Red	20	2	CE	Canada
582 88 70	0.65–0.80	Blue	20	3	CE	International
582 88 71	0.80–0.95	Blue	20	3	CE	International
582 88 72	0.95–1.10	Blue	6	3	CE	International
582 88 73	0.95–1.10	Blue	13	3	CE	International

¹ See *Type of cables* on page 9.

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 74	0.95–1.10	Blue	20	3	CE	International
582 88 75	1.05–1.20	Blue	20	3	CE	International
582 88 76	1.20–1.30	Blue	20	3	CE	International
582 88 77	1.30–1.40	Blue	20	3	CE	International
582 88 78	1.40–1.50	Blue	20	3	CE	International
582 88 79	0.95–1.10	Blue	65	1	CE	International
582 88 80	0.95–1.10	Blue	30	1	CE	International
582 88 81	0.95–1.10	Blue	50	1	CE	International
582 88 82	0.95–1.10	Gray	30	1	CSA/CE	Canada
582 88 83	0.95–1.10	Gray	50	1	CSA/CE	Canada
582 88 86	0.95–1.10	Red	30	2	CE	International
582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
594 79 10	0.95–1.10	Blue	70	3	CE	International
594 79 13	0.95–1.10	Blue	100	3	CE	International
594 79 18	0.95–1.10	Blue	150	3	CE	International
594 79 19 ²	0.95–1.10	Blue	20	3	CE	International
594 79 20 ²	0.95–1.10	Gray	20	3	CSA/CE	International
594 79 21 ²	0.95–1.10	Transparent	6	3	CE	For demonstration only.
594 79 40 ²	0.95–1.10	Black	6	3	ATEX/IECEX ³	International
594 79 41 ²	0.95–1.10	Black	13	3	ATEX/IECEX ³	International
594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
2	Red PVC	Grey/Brown/Black
3	Black nitrile rubber (NBR)/PVC	Grey/Brown/Black

¹ See *Type of cables* on page 9.

² Designed for low current, slow movements and oil. Includes micro switch with gold plated contacts.

³ Zener barrier 84 01 07 required.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com



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and more information

The original instruction is in English. All non-English
instructions are translations of the original instruction.

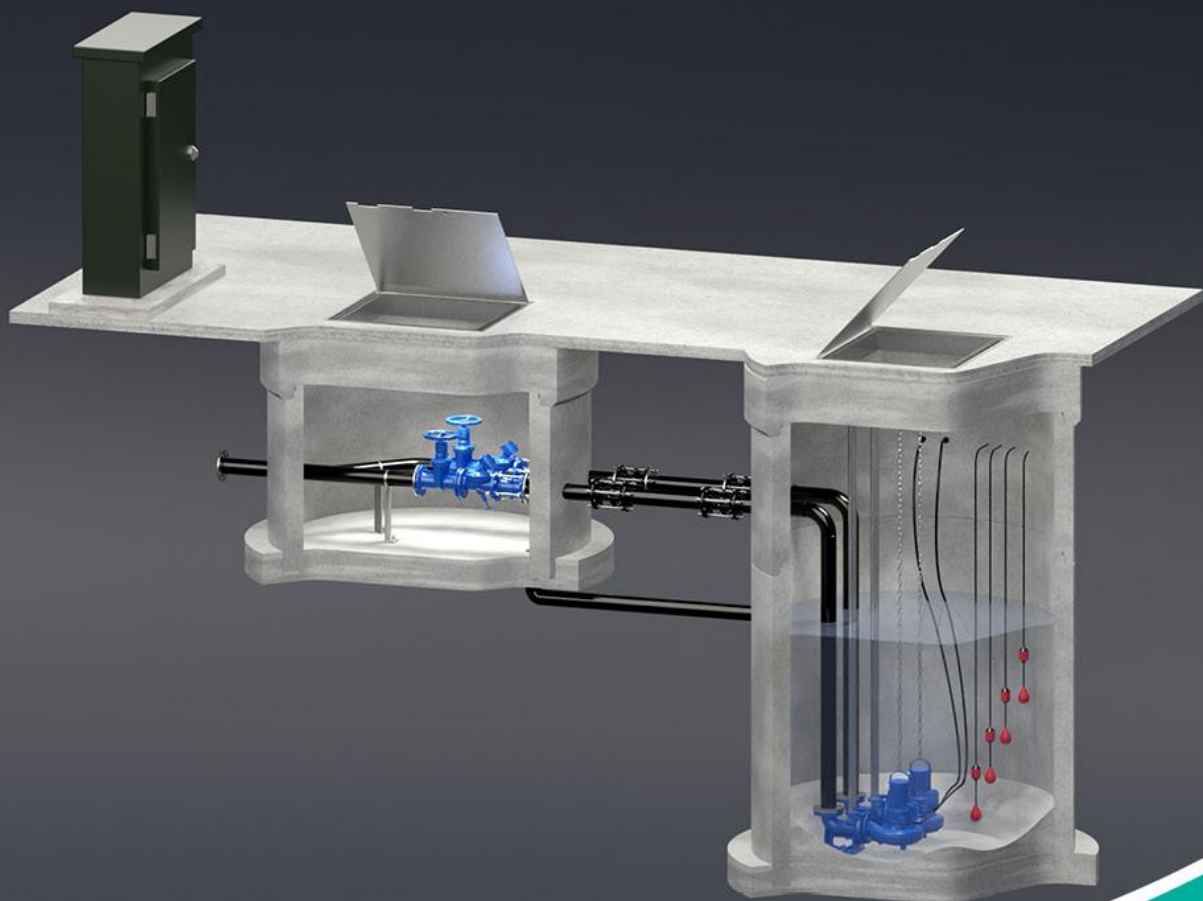
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BRYMER FARM DEVELOPMENT CATCHMENT D, HAMILTON

TECHNICAL SPECIFICATIONS

MAVEN CONSULTANTS LTD

25 June 2026



Peter Carroll – Aquate Director
BE Civil, MBA, CPEng, FEngNZ
www.aquate.co.nz

Foreward

This installation manual is a guide only. All relevant Health and Safety laws and codes of construction must be adhered to and take precedence over any information in this manual. Installers must practice good professional practice and are required to understand all National and Local regulations in respect to the installation of drainage materials.

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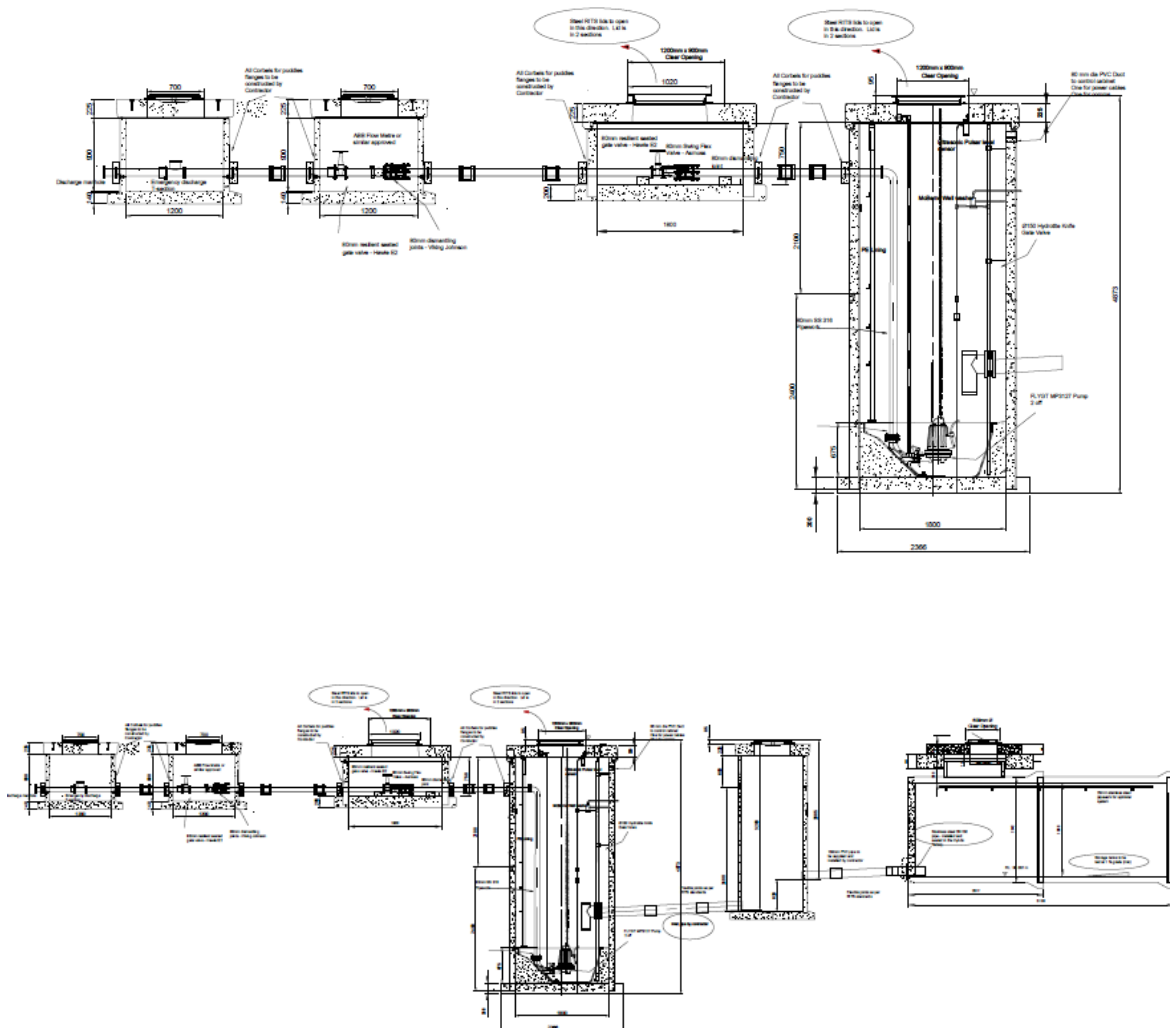
APPENDICES

12

1 Technical Specifications

1.1 Storage Chamber

Tank Volume:	11.7 m ³
Effective volume:	9.16 m ³
Storage tank vol:	12.2 m ³
Tank material:	Concrete
Manufacturing Std:	AS/NZS 4058:2007 and NZS 3101
Loading:	The standard lid is suitable for pedestrian loading only.
Inlet Connections:	the inlet pipe to be installed on site and sealed by the drainage contractor.
Outlet connection:	A flanged stainless steel is installed for connection to the outlet pressure pipe
Venting:	External venting required (see section 1.6 for venting details if required)
Dimensions:	see drawing below



1.2 Pumps/Pump Performance

See full specifications in the Appendices

Manufacturer: Xylem Pumps

Type: Flygt MP3127 HT3 252

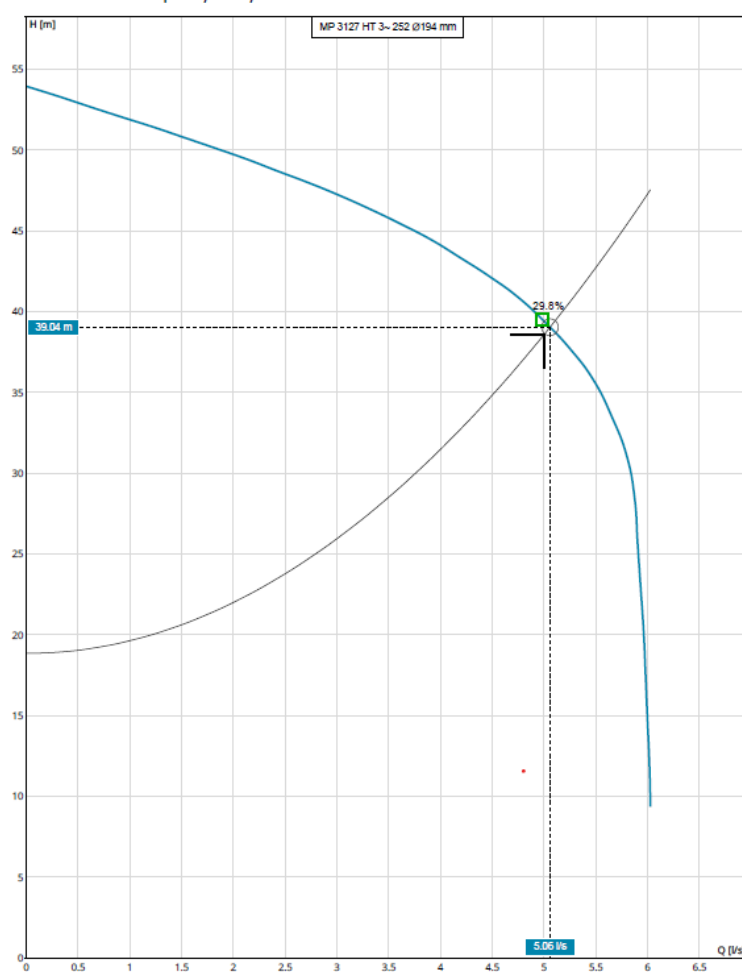
Connection: 415 V, 50 Hz

Power: 7.4 kW

Phases: Three



MP 3127 HT 3~ 252 | Duty Analysis



1.3 Design Information

1.3.1 Storage Calculations

The total Average Dry Weather flow has been calculated from the expected flow rate with the following assumption:

Average dry weather flow= 43.73 m³/day

Total emergency storage required is 9 hours = 16.4 m³

Total emergency storage in wet-well and emergency storage tank is 21.4 m³ so 11.7 hours storage has been provided.

1.3.2 Pump Design

The system above has been designed based on the information provided below.

Rising main length : 585 m

Static Lift : – 18.85 m

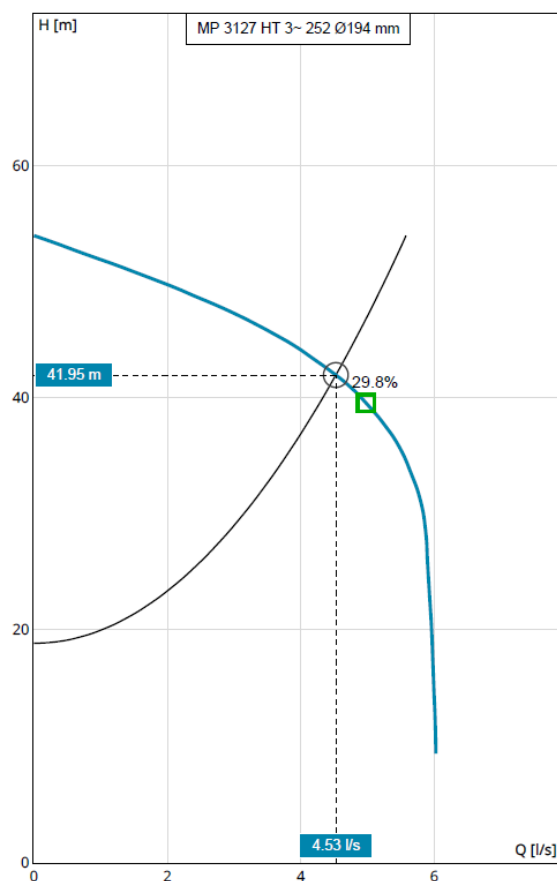
Rising main – PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 80 (90x8.2 mm)

Option 1 K = 1.5

Flygt MP3127 - Flow rate = 4.53 l/s with a total head loss of 41.95 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.06 m/s



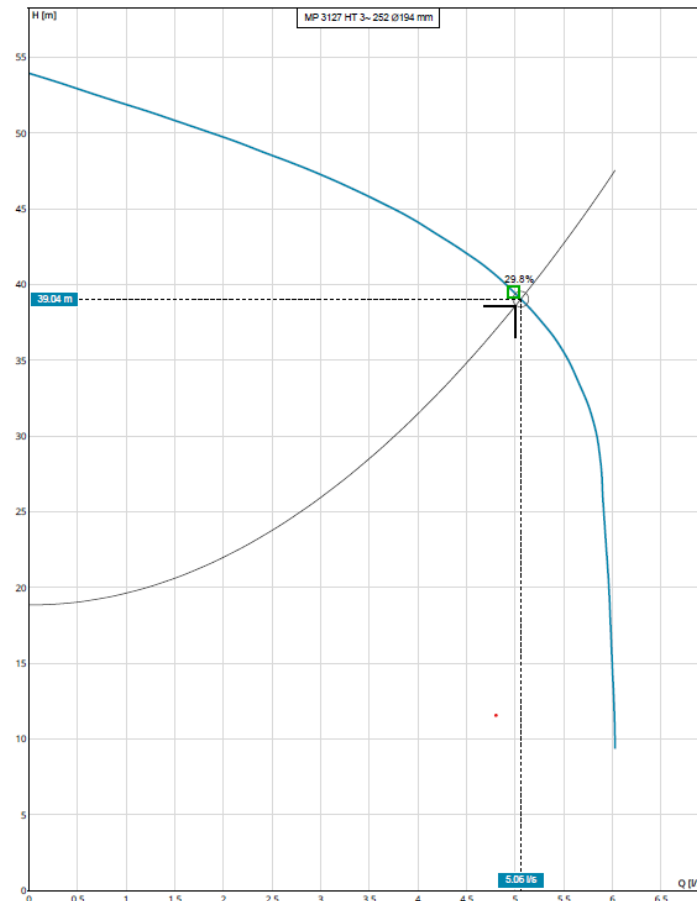
Option 2 $K = 0.5$

Flygt MP3127 - Flow rate = 5.05 l/s with a total head loss of 39.04 m (single pump).

Pumps to operate in a duty / assist / standby function

Velocity in PE pipe = 1.19 m/s

MP 3127 HT 3~ 252 | Duty Analysis



1.3.3 Pump Operational Levels

The operational levels will be set as follows (dimensions taken from floor of wet-well) :

- High level alarm - 1150mm
- Assist Pump Start – 1050mm
- Duty Pump Start – 1000mm
- Both Pumps Stop – 350mm
- Low Level Alarm : 300mm

1.3.4 Pump Stop/Start Calculations

Expected daily flow:	43733	litres
Infiltration (l/day)	0	litres
SWI (l/day)	0	litres
Peaking factor :	3	
ADDWF	0.51	l/s
PDDWF	1.40	l/s
PWWF	2.60	l/s
Pump Station diameter	1.8	m
Pump station depth (total)	4.6	m
Pump station depth (effective)	3.6	m
Volume (effective)	9.16	m ³
Pump Stop Level	0.4	m
Pump Start Level	1	m
Volume to pump:	1526	litres
Discharge rate:	5.05	l/s
Time to empty: (PDDWF)	7.0	minutes
Time to empty: (PWWF)	10.4	minutes
Time to fill (PDDWF)	18.2	minutes
Time to fill (PWWF)	9.8	minutes
No starts/ hour (PDDWF)	2.4	
No starts/ hour (PWWF)	3.0	
No starts per pump (PDDWF)	1.2	
No starts per pump (PWWF)	1.5	
Max Start/Hour permissible	10	Okay

1.4 Pipework, Valves and Fittings

Discharge connection: 80 mm diameter flange coupler

Inlet and outlets: the inlet pipe to be installed on site and sealed by the drainage contractor.
The outlet pipe is pre-installed in the factory.

Discharge pipework: Includes a non-return valve, dismantling joint and an isolation valve.

Lifting chains: a stainless steel chain is connected from the pump to the underside of the chamber for ease of pump removal if required.

Materials: All pipework will be 80mm 316 Stainless steel Schedule 40 and will be manufactured to the relevant AUS/ NZ Standards

Guide rails: Stainless steel

1.5 Access lids

Steel access lids (1200 x 900mm) will be supplied as per the RITS design

1.6 Magflow metre

An ABB ProcessMaster DN80 is included installed in a 1200mm diameter manhole

1.7 Level Sensors

1 off – ABB Black Box Hydrostatic level sensor

4 off – Flygt ENM10 float switches for Low level and High-level alarms

1.8 Electrical & Controls

This controller is designed on the latest 2023 HCC drawings which are quite different to their previous standards. Any comparison to a competing proposal should ensure that the same standards have been used in the pricing.

This allows for the design, including production of electrical drawings, build and factory acceptance testing (FAT) of the pump station controller.

The design will include::

- 1 x Allen Bradley Micro800 PLC and IO modules as per their standard design.
- 1 x programming of Allen Bradley PLC.
- 1 x Trio Radio unit for communicating to HCC's SCADA system.
- 1 x battery backup for communication and PLC 24VDC circuits.
- 1 x supply of aerial for radio communication to base station.
- 2 x DOL starting configuration with overload and short circuit protection as per HCC standards, for each pump.
- 2 x current transducers and amp meters.
- 2 x capacitors for power factor correction.
- 1 x phase failure relay with output to PLC.
- 1 x surge divertor with output to PLC.
- 1 x level indicator input.
- 1 x flow indicator input.
- 22mm dia push buttons and selector switches for pump circuitry and control.
- Cabinet door switches and internal lights.
- Anticondensation heaters for cabinet.
- 2 x isolation switches for the pumps.

- 1 x Cubic internal panel. Note this differs to the HCC drawing but is of an equal or better quality to the Bremca 250 series panel.
- 1 x generator connection with interlocked mains/generator breakers.
- RCD protected service plugs mounted within cabinet.
- 1 x painted aluminium pillar box approximately 1.95 x 1.525 x 0.5m (l x h x d) with multiple door access, and internal panels.
- 1 x full CAD drawings.

We have not allowed for any of the following:

- Supply of any boosting to the radio signal if the standard Trio radio unit and standard aerial is insufficient.
- Supply of any site metering although space left in cabinet for a smart meter.
- Any civil works including construction of plinth for controller to mount to.
- Any on site installation including running of cable to and from controller, or mounting revenue meter (if required), or installing any on site lighting, installing the aerial or aerial base. It is suggested the site electricians are engaged to do this where required.

1.9 Odour Control System

This has been excluded as per RITS standards. See section 5.3.7.16 RITS.

1.10 Protective lining

The wet-well including the underside of the lid will be lined with Blue-seal HDPE lining for sulphuric acid resistance (see Appendices)

1.11 Well-washer

A McBerns well washer has been specified by RITS – see appendices for details

A sprinkler system using BETE nozzles has been included in the storage tanks to RITS design

1.12 RPZ Cabinet

A steel cabinet to RITS design has been included along with an RPZ standpipe and two off solenoid valves for the well washer and sprinkler system

1.13 Inlet valve

A 150mm diameter knife-gate valve will be installed on the inlet pipe in to the wetwell. This includes a spindle to the underside of the lid

2 Construction

The pump station has been design using reinforced precast concrete components. The system will be fabricated off site and delivered to site ready for installation. The tank will have a 11700 litre capacity and a total depth of 4.5 m.

The pump stations will be delivered to site in a kit-set format and will need to be installed in the ground by the drainage contractor.

The construction and commissioning of the Aquate pump station will then be completed by a trained Hynds Environmental Construction Technician.

3 Safety in Design

This pump station has been designed to minimise any risk to operators and service personnel.

Access into the pump station should not be required for ongoing maintenance as almost all servicing work can be completed from ground level. The main components can be accessed as follows:

- Pumps – these can be removed from the pump station by lifting them up out of the wet-well and inspecting above ground. Note : the pumps weight 68 kg each.
- Floats – can be lifted from the connection points in the access hole in the lid.
- Non-return valves/Isolation valves –can be access from ground level without the need to enter the chamber
- Venting will be required and will need to be installed on site. The access lids are air-tight.

Risk register

The risk register is a live document which requires continuous monitoring updating. This will need to be completed by the maintenance company for the pump station. The items below are a guide only.

The safety and design and Hazops workshops have encompassed risks for normal operation of the vacuum wastewater pump station. Specific risks for the maintenance process are outlined below.

Risk matrix

			Consequence / potential severity				
			Minimal Non-injury or First Aid injury (FAI)	Minor Medical treatment injury	Moderate Medical treatment injury, with lost time (LTI)	Major Injury requiring hospital-/notifiable event	Catastrophic Fatality or multiple fatalities
Likelihood	Very high	Almost certain: Commonly occurs	3: Medium	4: High	4: High	5: Very high	5: Very high
	High	Likely: Could easily happen	2: Low	3: Medium	4: High	4: High	5: Very high
	Medium	Possible: Could happen or has been known to happen	2: Low	2: Low	3: Medium	4: High	4: High
	Low	Unlikely: Hasn't happened yet but could happen	1: Very Low	2: Low	3: Medium	3: Medium	4: High
	Very low	Rare: Very unlikely but could happen in exceptional circumstances	1: Very Low	2: Low	2: Low	3: Medium	4: High

	Hazards (<i>one per line</i>)		Hazard controls – what do we need to do to make it safe?	
What are we doing? (<i>step by step</i>)	What could cause harm?	Existing risk level (<i>use risk matrix</i>)	Eliminate/ Controls	Residual risk level
Wet-well inspection	The wet-well is classified as a confined space, an inspection is required prior to wet commissioning.	3	Elimination: The vessel will be isolated from the system at all exit points and inspected from the access hole in the lid . Isolate/Engineering Controls/PPE: Entry will only be required if debris is identified and cannot be removed by any other means. Entry to the vessel should follow confined space protocols, including ensuring all persons involved have the required training, admin and PPE controls.	1 1
Sewage Pump Testing	The wet well will be filled up for wet testing. This is a potential drowning hazard.	3	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well. Engineering Controls/PPE: All essential persons to wear appropriate protection. Sewage pump shall only operate when required for wet testing..	1 1
Removing lids for access	Traffic moving through area Back strain	3 2	Isolate/Engineering Controls/PPE: Place cones around service area so vehicles cannot enter site Engineering Controls/PPE – use appropriate lifting equipment if lifting pumps / lids on site	
Removing pumps	This is a falling hazard	4	Elimination Barriers around the access hatch to be erected so no one can enter the wet-well.	
Electrical checks	Electrical shock	3	Engineering Controls/PPE: Only fully certified electricians to complete electrical work	

4 Warrantees

Aquate guarantees the performance and quality of its pump stations provided:

- The product is only used for the intended purposes as stated in the quote
- The control panel and pump station is correctly installed and commissioned by a suitable installer
- The fault is due to a defect in design, materials or workmanship
- The fault is reported to an Aquate agent or representative during the guarantee period
- No pump station components have been replaced by alternative products
- This guarantee does not cover faults resulting from misuse of the system, blockages or breakdowns caused by the introduction of inappropriate materials into the system, incorrect electrical installation of the control unit, deficient maintenance or normal wear and tear.

Aquate assumes no liability for bodily harm, property damage or economic losses as a result of its pump stations.

4.1 Pumps

The pumps come with a 12 month year warranty against faulty components and/or workmanship. If prohibited substances are introduced to the system causing the pump to block and burn out, the warranty is null and void.

Flygt undertakes to remedy faults in products sold by Flygt provided that:

- The fault is due to defects in design, materials or workmanship;
- The fault is reported to a Flygt representative during the guarantee period;
- The product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;
- The monitoring equipment incorporated in the product is correctly connected;
- All service and repair work is done by a workshop authorized by Flygt or the original manufacturer;
- Genuine manufacturer's parts are used
- Storage should be in accordance with the care and maintenance manual.
- The equipment is operated and maintained in accordance with the Operation and Care and Maintenance Manual.

Failure to comply with these requirements will render warranty void unless, due to the nature of the warranty claim, such voiding of warranty is prevented by law, regulation, act and/or ordinance.

Hence, the guarantee does not cover faults caused by deficient maintenance, abuse, incorrectly executed repair work or normal wear and tear.

5 Maintenance schedule

A certain amount of system maintenance is required on an ongoing basis to ensure that the system is working correctly. This is the responsibility of the owner

5.1 Six monthly

The following procedures should be completed every six months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Lift the floats and test the alarm system/pump operation
- Consult with the electrical control supplier for additional checks

5.2 Annually

The following procedures should be completed at least once every 12 months:

- The pumping station should be inspected to check the build-up of grease and fat particularly on the float switches and pumps. They may need to be withdrawn for cleaning.
- Visually inspect the pump station walls and hose down if necessary
- Lift the floats and test the alarm system/pump operation
- Press the mute button (audio alarms only) to check the audio alarm turns off.
- Visually check the pump station for any structural damage to the tank and pipework
- Ensure the pump station access lid is securely fastened and bolted down.
- Lift the pumps and inspect for any damage or blockages around the impellers
- Have the pump station sucked out to remove any debris/stones if necessary

5.3 Maintenance requirements

The pump maintenance and repair operations must be carried out by workers authorised by the manufacturer; Failure to comply with these instructions will result in forfeiture of the warranty and jeopardise the unit's safety.

Before any cleaning and/ or maintenance operations are carried out on the electric pump, the power supply must be switched off.

To disconnect the submersible electric pump from the electricity mains, first disconnect the phase conductors, then the yellow –green earth wires.

Use the special handle to remove the submersible electric pump from the tank.

ATTENTION: Before carrying out any operations, check the pump temperature. Only work on the pump when it is at room temperature.

Clean the electric pump thoroughly, using a jet of water or specific products to clean all its parts. When disposing of the waste material, follow the antipollution rules in force.

Replace any broken or worn parts with original spare parts only.

Given the likelihood that work on the electric pump will be carried out in confined spaces such as vats, wells, cesspools, tanks or cisterns, do not underestimate the risks caused by potentially poisonous exhalations.

APPENDICES

General Arrangement Drawing – Plan

General Arrangement Drawing – Section

General Arrangement Drawing – Plan with tank

General Arrangement Drawing – Section with tank

Flygt MP3127 HT3 252 Specifications k 1.5

Flygt MP3127 HT3 252 Specifications k 0.5

McBerns well washing brochure

Hynds Retention Tank brochure

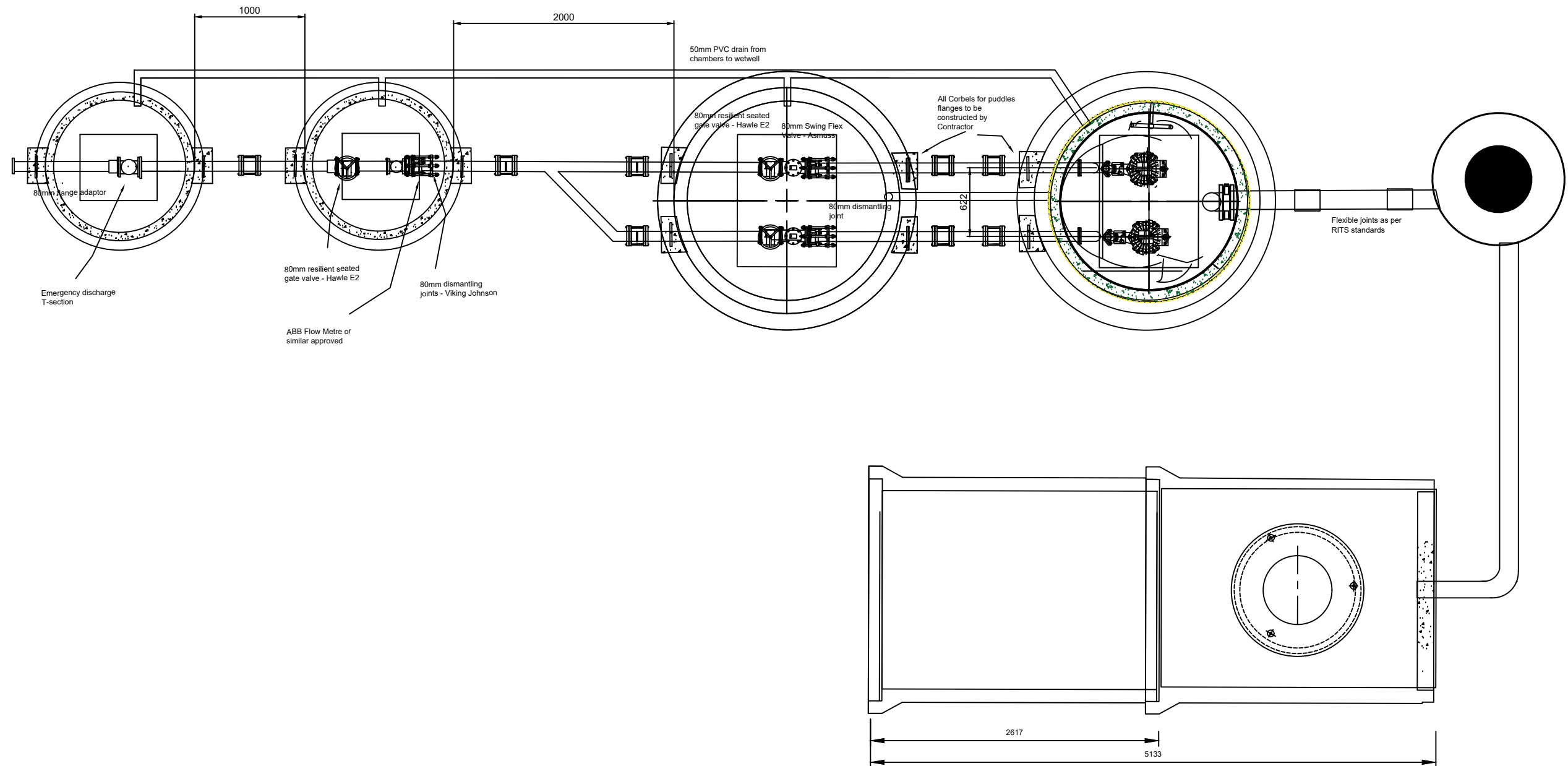
BlueSeal-AKS data sheet

Hyliner HDSPE liner – data sheet

ABB Magflow Meter Specifications

ABB Blackbox level sensor specifications

Flygt ENM10 float switch specifications



Emergency storage
chamber - 1800 dia x
5.1m long

NOTES:

1.

REVISIONS

REV #	REVISION DESCRIPTION	DATE	DRAWN
A	Preliminary design	26/6/26	PC

PO Box 58142, Botany, Auckland, 2316
Tel: 09-274 0316
Fax: 09-272 7485
email: hwwsupport@hynds.co.nz

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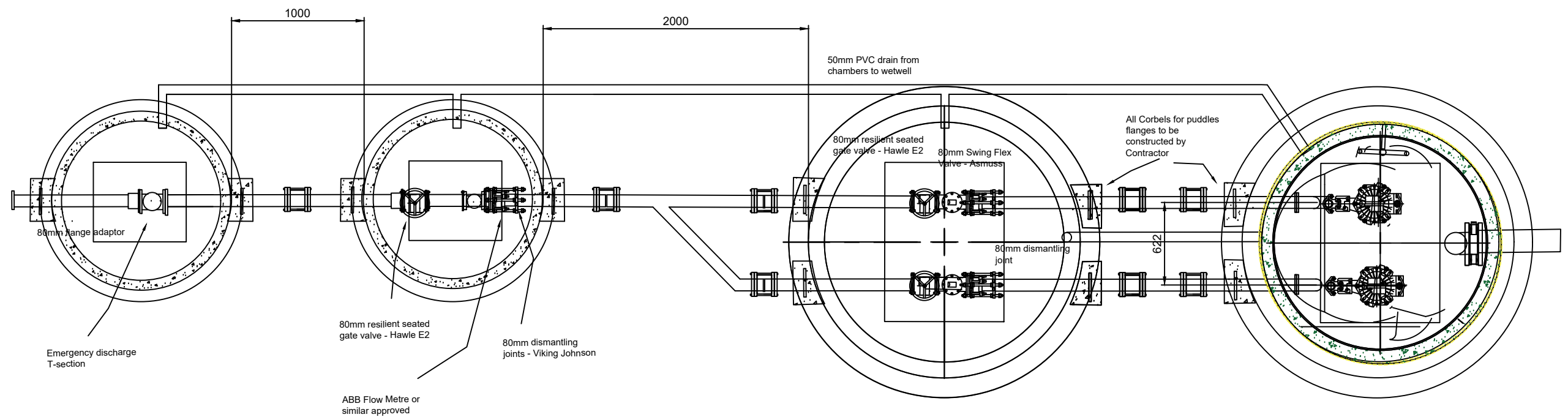
ISO 9001 CERTIFIED MANAGEMENT SYSTEM



PROJECT:
Catchment D
Brymer Development
Hamilton
Wastewater Pump Station

DRAWING TITLE:
Plan View with tank

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DRAWN: PC	DESIGN: PC	CHECKED: JB
SIGNATURE:	SIGNATURE:	SIGNATURE:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 26/6/26
PAPER SIZE: A3		
DRAWING NUMBER: AQ2209-D 4	SHEET NUMBER: of 4	REVISION NUMBER: A



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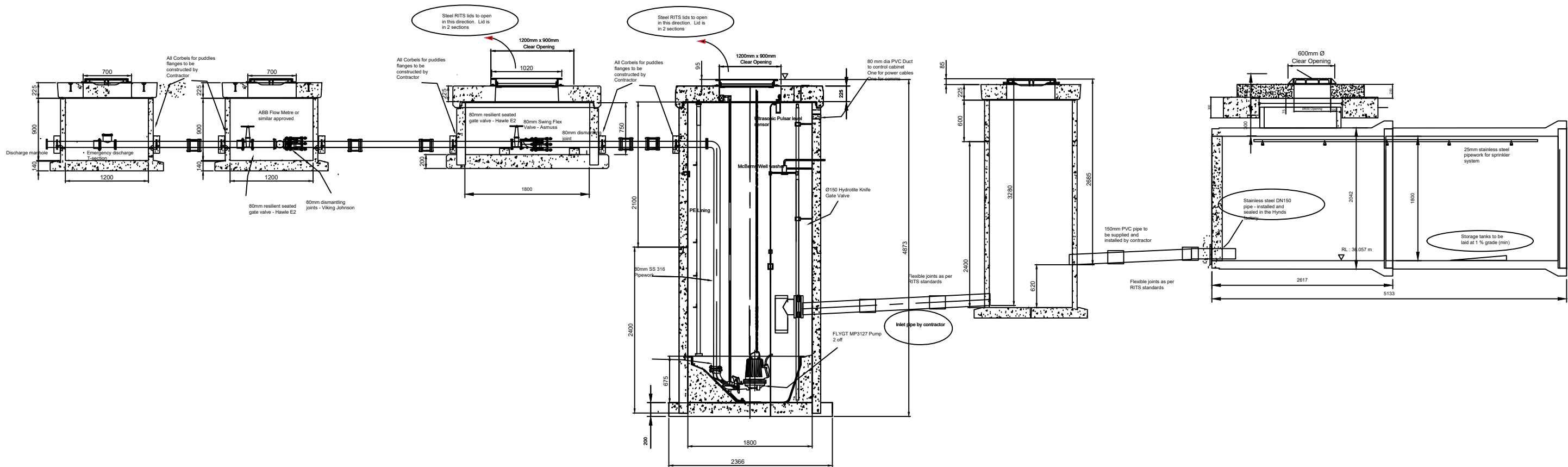
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Brymer Development
Hamilton
Wastewater Pump Station

DRAWING TITLE:
Plan View

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DRAWN: PC	DESIGN: PC	CHECKED: JB
SIGNATURE:	SIGNATURE:	SIGNATURE:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 26/6/26
PAPER SIZE: A3		
DRAWING NUMBER: AQ2209-D 3	SHEET NUMBER: of 4	REVISION NUMBER: A



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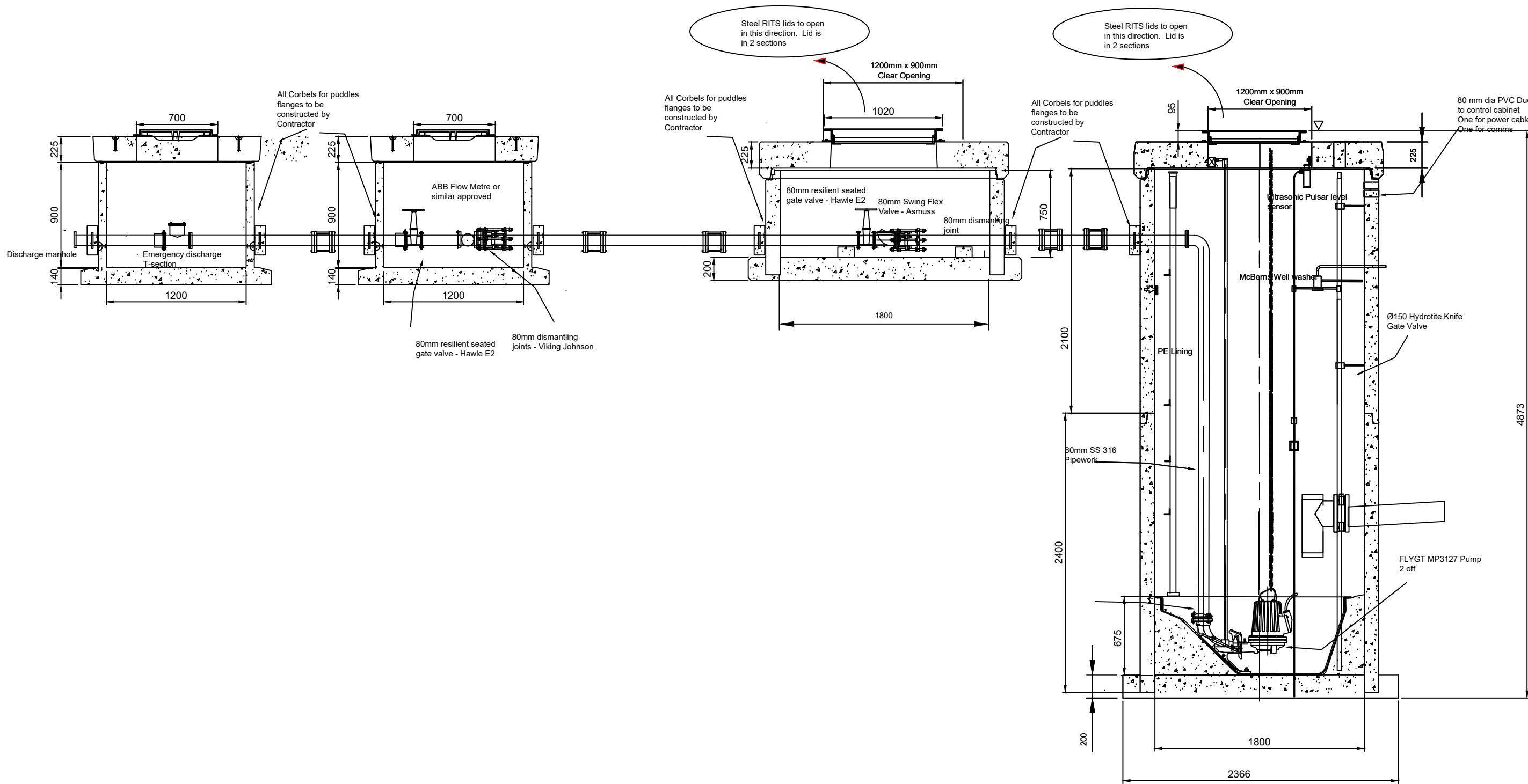
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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT:
Catchment D
Brymer Development
Hamilton
Wastewater Pump Station

DRAWING TITLE:
Section View with tank

REFERENCE/QUOTE NUMBER: AQ2209-D		
DRAWN: PC	DESIGN: PC	CHECKED: JB
SIGNATURE:	SIGNATURE:	SIGNATURE:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 26/6/26
PAPER SIZE: A3		
DRAWING NUMBER: AQ2209-D 2	SHEET NUMBER: of 4	REVISION NUMBER: A



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

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Hamilton
Wastewater Pump Station

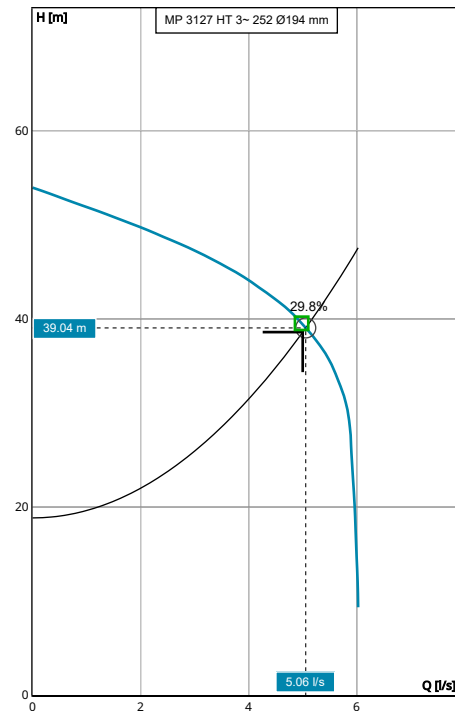
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Section View

REFERENCE/QUOTE NUMBER:			AQ2209-D
DRAWN: PC	DESIGN: PC	CHECKED: JB	
SIGNATURE:	SIGNATURE:	SIGNATURE:	
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!		DATE: 26/6/26
PAPER SIZE: A3			
DRAWING NUMBER: AQ2209-D 1	SHEET NUMBER: of 4	REVISION NUMBER: A	

MP 3127 HT 3~ 252 | Configuration Summary



The Flygt M 3000 grinder pumps are high-performing submersible, centrifugal pumps with axial cutters. Excellent for pumping wastewater in residential, commercial and agricultural applications. These grinder pumps reduce waste content to fine slurry, pumped through small-diameter pipes.



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof	Impeller Diameter
No	194 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material	Stator Cover Material
Grey Cast Iron	Grey Cast Iron
Volute Material	
Grey Cast Iron	

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
Y	7.4 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

MP 3127 HT 3~ 252 | Product Details

Description

M 3127

Hard Working, Heavy-Duty Grinder Pump

The Flygt M 3127 grinder pump is a high-performing submersible, centrifugal pump. Excellent for pumping wastewater in residential, commercial and agricultural applications. The grinder pump reduces waste content to fine slurry, pumped through small-diameter pipes. The main application for Flygt M 3127 is pressurized sewage systems that are generally used when flat land, uphill topography, surface rock and high water tables pose tough challenges for conventional gravity systems. Whether you need a single grinder pump, a complete pump station or an entire wastewater system, Xylem offers a smart and economical delivery of wastewater to the nearest pump station or sewer main.

Reliable Operation

The M 3127 is engineered to meet the challenges of wastewater systems. It comes equipped with a unique impeller for optimum hydraulic efficiency and a heavy-duty cutting device, which grinds solids into small particles for easy transport through small-diameter pipes. This eliminates the risk of clogging. All components are specially designed and manufactured to optimize operation and prolong pump service life.

- Double mechanical seal system. Two sets of mechanical shaft seals work independently to provide double security. They are available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Made of robust and durable cast iron
- Spin-out outer seal protection design that protect seals from abrasive particles
- Motor cable SUBCAB® specially developed for submersible use

Product Features

- Use for heavy-duty shredding applications
- Non-clogging design
- Reliable operation
- Heavy-duty cutting device

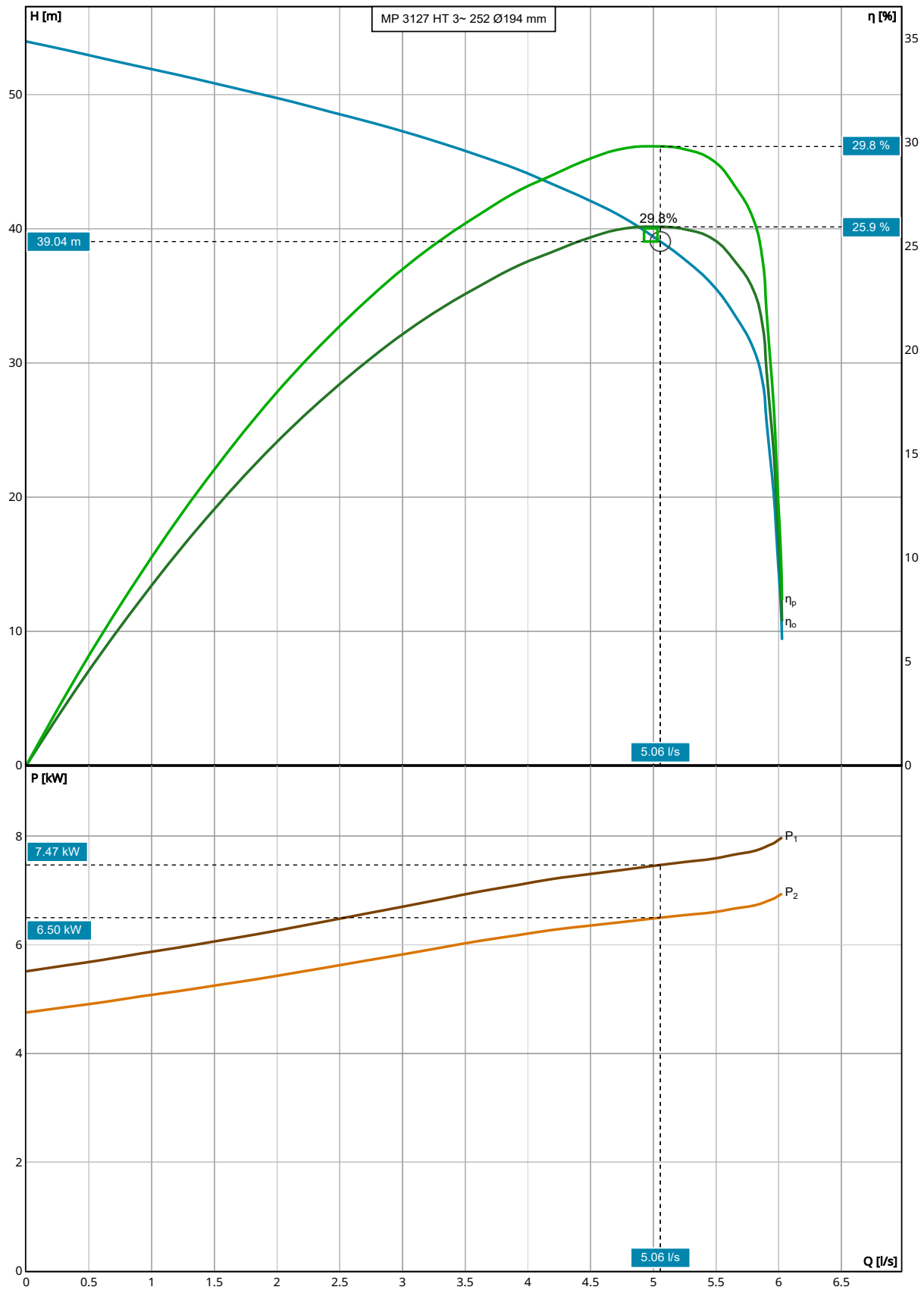
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Grey Cast Iron	Grey Cast Iron	Grey Cast Iron

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
7.4 kW	3	8.38	13
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-11-2AL	2,900 RPM	H	K
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total Moment Of Inertia	Power Factor 100%
170	14 A	0.01 kgm ²	0.89
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	115 A	S1	0.86
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
6.94 kW	115 A	1	0.78
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	38.33 A	160	87.4 %
			Efficiency 75%
			88.3 %
			Efficiency 50%
			87.7 %
			Cooling Jacket
			-

MP 3127 HT 3~ 252 | Hydraulic Data & Performance Curve



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
M 3000	252
Name	Impeller Diameter
MP 3127 HT 3~ 252	194 mm
Frequency	Inlet Diameter
50 Hz	50 mm
Total Flow	Outlet Diameter
5 l/s	50 mm
Total Head	Number Of Vanes
38.59 m	6
Pump Flow	
5 l/s	
Pump Head	
38.59 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft Power (P2)
5.06 l/s	6.5 kW
Head	Speed
39.04 m	2,914 RPM
Overall Efficiency (η_o)	Static Head
25.93 %	18.85 m
Pump Efficiency (η_p)	Flow To BEP Ratio
29.8 %	101.53 %
Input Power (P1)	
7.47 kW	

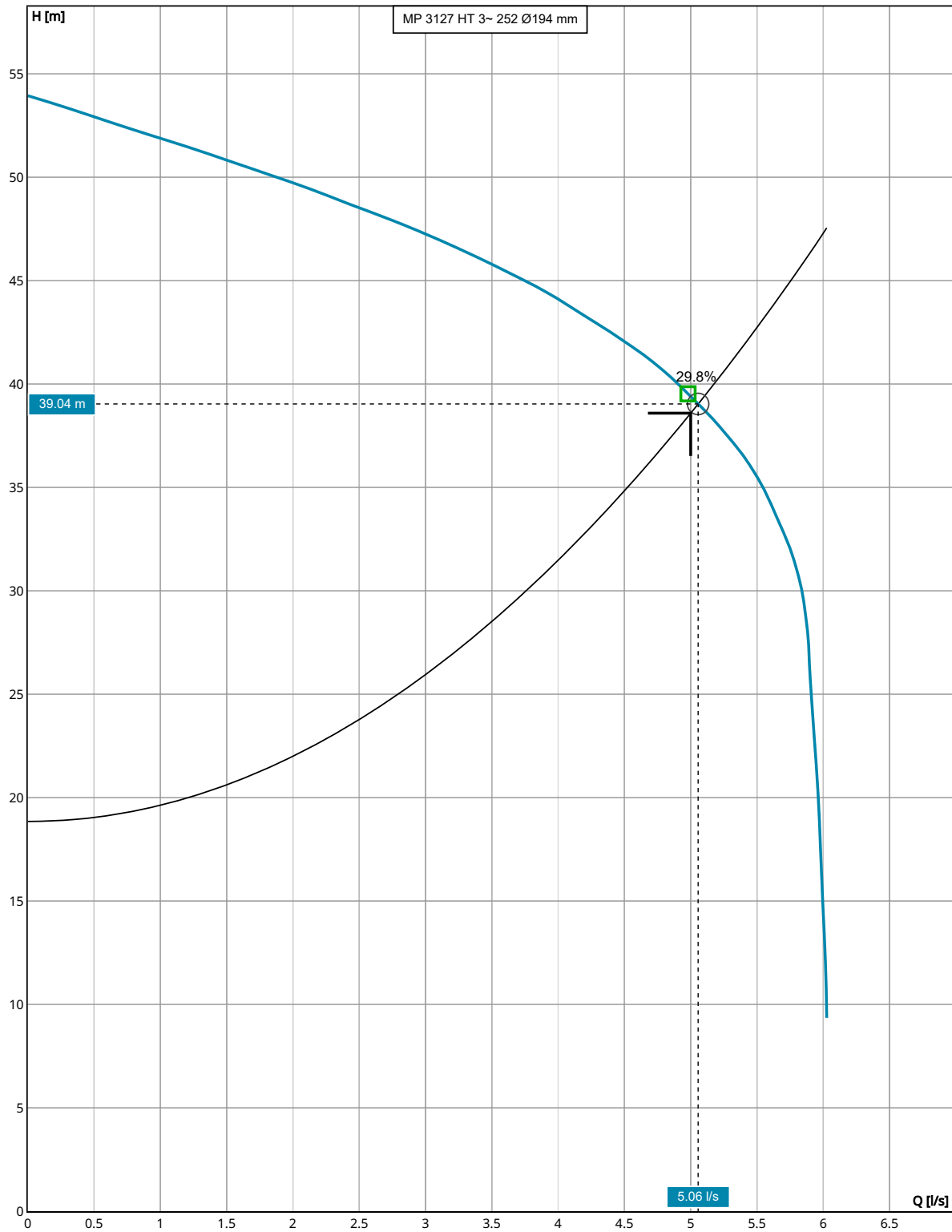
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	4.98 l/s
Max Flow	BEP Head
6.03 l/s	39.53 m
H@QMin	Max P2
53.95 m	6.94 kW
H@QMax	Specific Energy
9.35 m	0.41 kWh/m ³
BEP	
29.81 %	

MP 3127 HT 3~ 252 | Duty Analysis

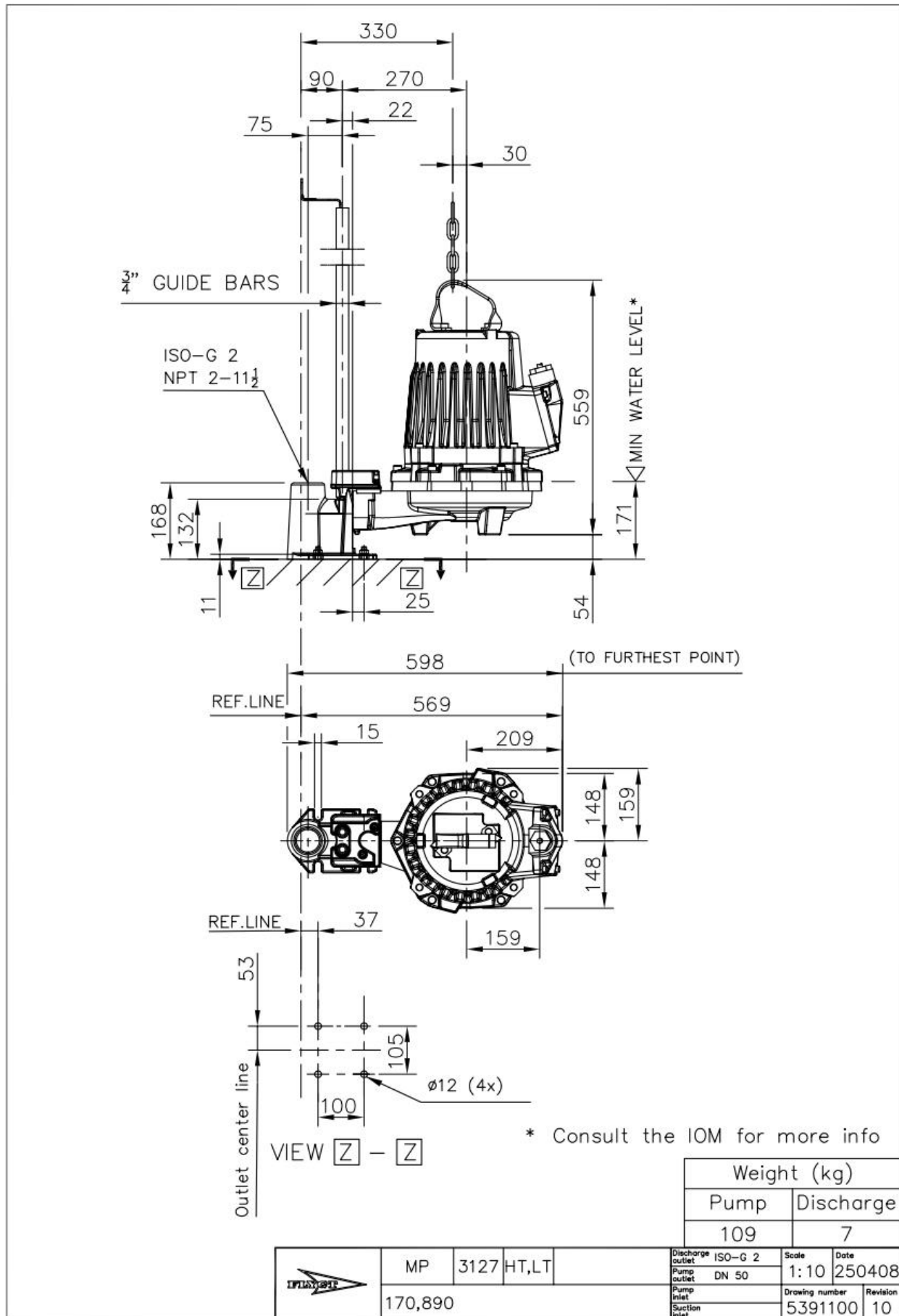


Curve: ISO 9906

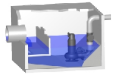
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Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	5.06	39.04	6.5	5.06	39.04	6.5	29.8	0.41	0

MP 3127 HT 3~ 252 | Dimensional Data & Drawing



MP 3127 HT 3~ 252 | Headloss Calculation



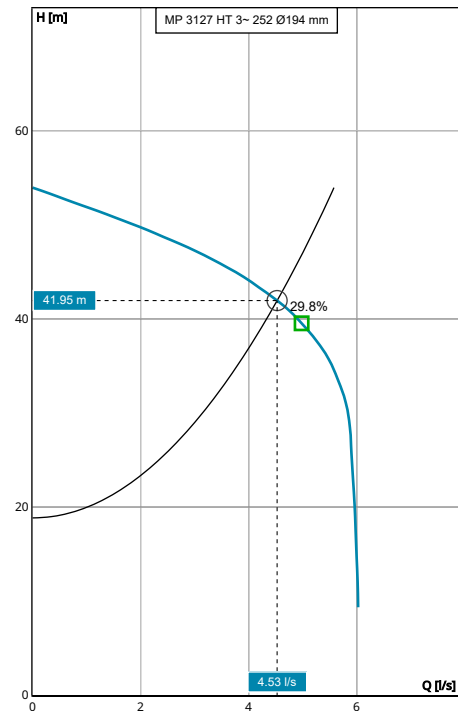
Fluid Type	Total Flow	Kinematic Viscosity
Water	5 l/s	0.000002 m ² /s
Static Head	Operating Pumps	System Type
18.85 m	1	Single Pump
Layout	Calculation Model	
Wet Installed Submersible Pumps	Colebrook-White	

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / SS Wetwell / Stainless steel / PN 10 / DN 80 (84x2.0 mm) / New Pipes						
Pipe Length	80 mm	10 m	1	1.19 m/s	0.5 mm	0.22 m
90 Elbow	80 mm	0.3	1	1.19 m/s		0.02 m
Tee Line →  →	80 mm	0.1	1	1.19 m/s		0.01 m
Check Valve	80 mm	0.9	1	1.19 m/s		0.05 m
Gate Valve	80 mm	0.2	1	1.19 m/s		0.01 m
Total Head						0.29 m
Individual Discharge Piping / Rising main / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 80 (90x8.2 mm) / New Pipes						
Pipe Length	73.6 mm	585 m	1	1.18 m/s	0.5 mm	19.45 m
Total Head						19.45 m
Friction Loss Head						19.74 m
Static Head						18.85 m
Total Head						38.59 m

MP 3127 HT 3~ 252 | Configuration Summary



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Curve: ISO 9906

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GENERAL

Explosion Proof	Impeller Diameter
No	194 mm
Max. Pumped Media Temp.	
40 °C	

MATERIAL AND COATING

Impeller Material	Stator Cover Material
Grey Cast Iron	Grey Cast Iron
Volute Material	
Grey Cast Iron	

MOTOR

Rated Voltage	Motor Efficiency Class
400 V	Standard
Coupling	Rated Power
D	7.4 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

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Description

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Product Features

- Use for heavy-duty shredding applications
- Non-clogging design
- Reliable operation
- Heavy-duty cutting device

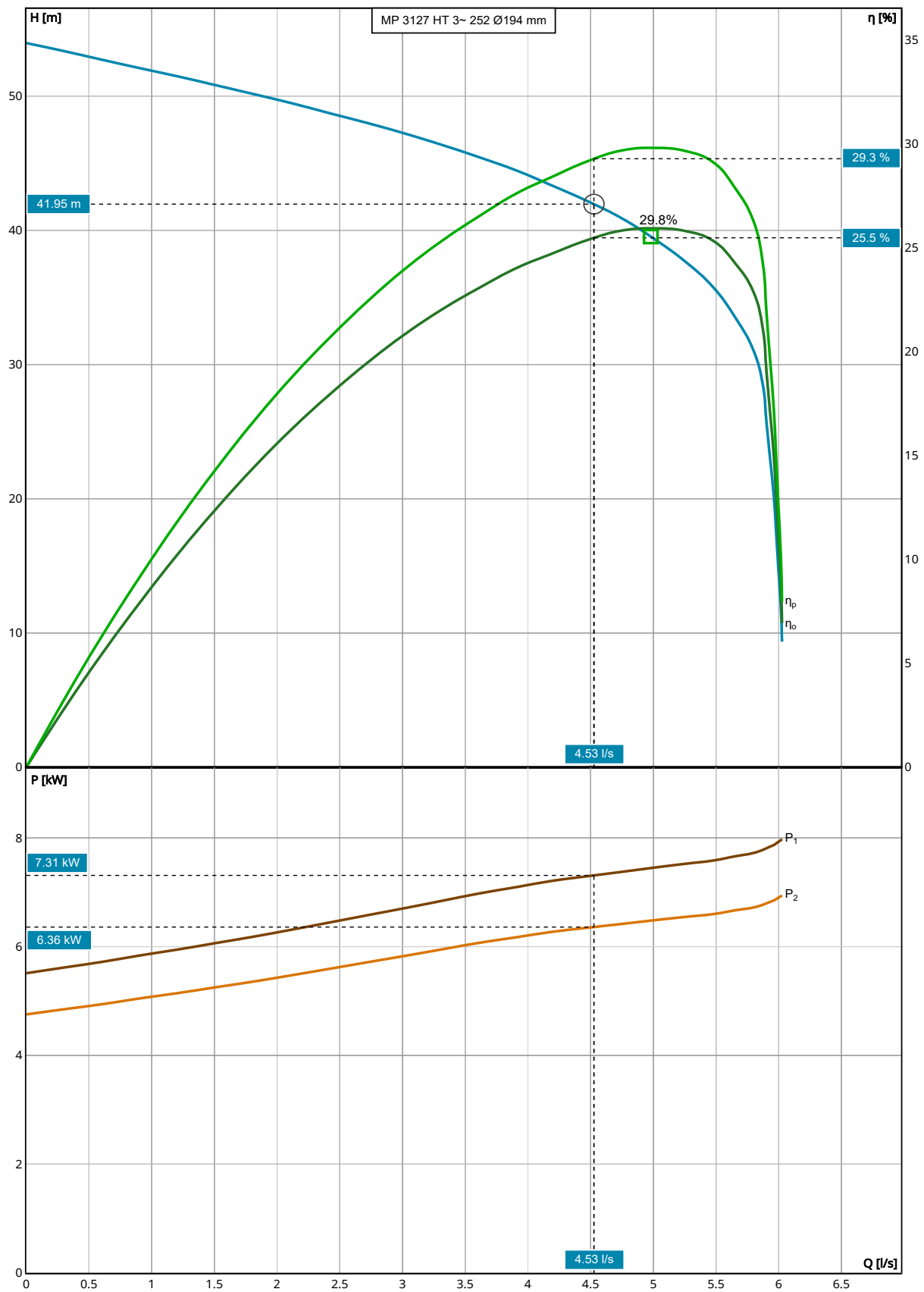
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Grey Cast Iron	Grey Cast Iron	Grey Cast Iron

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
7.4 kW	3	8.28	12
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-11-2AL	2,900 RPM	H	J
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	400 V	STD	30
Version Code	Rated Current	Total Moment Of Inertia	Power Factor 100%
170	14 A	0.01 kgm ²	0.89
Frequency	Start Current	Type of duty	Power Factor 75%
50 Hz	114 A	S1	0.86
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
6.94 kW	114 A	2	0.78
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
2	38 A	161	87.3 %
			Efficiency 75%
			88.2 %
			Efficiency 50%
			87.7 %
			Cooling Jacket
			-

MP 3127 HT 3~ 252 | Hydraulic Data & Performance Curve



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Selection

Series	Curve Code
M 3000	252
Name	Impeller Diameter
MP 3127 HT 3~ 252	194 mm
Frequency	Inlet Diameter
50 Hz	50 mm
Total Flow	Outlet Diameter
5 l/s	50 mm
Total Head	Number Of Vanes
47.03 m	6
Pump Flow	
5 l/s	
Pump Head	
47.03 m	
System Type	
Single Pump	
Operating Pumps	
1	
Standby Pumps	
No Standby Pump	

Design Point

Flow	Shaft Power (P2)
4.53 l/s	6.36 kW
Head	Speed
41.95 m	2,915 RPM
Overall Efficiency (η_o)	Static Head
25.48 %	18.85 m
Pump Efficiency (η_p)	Flow To BEP Ratio
29.28 %	90.9 %
Input Power (P1)	
7.31 kW	

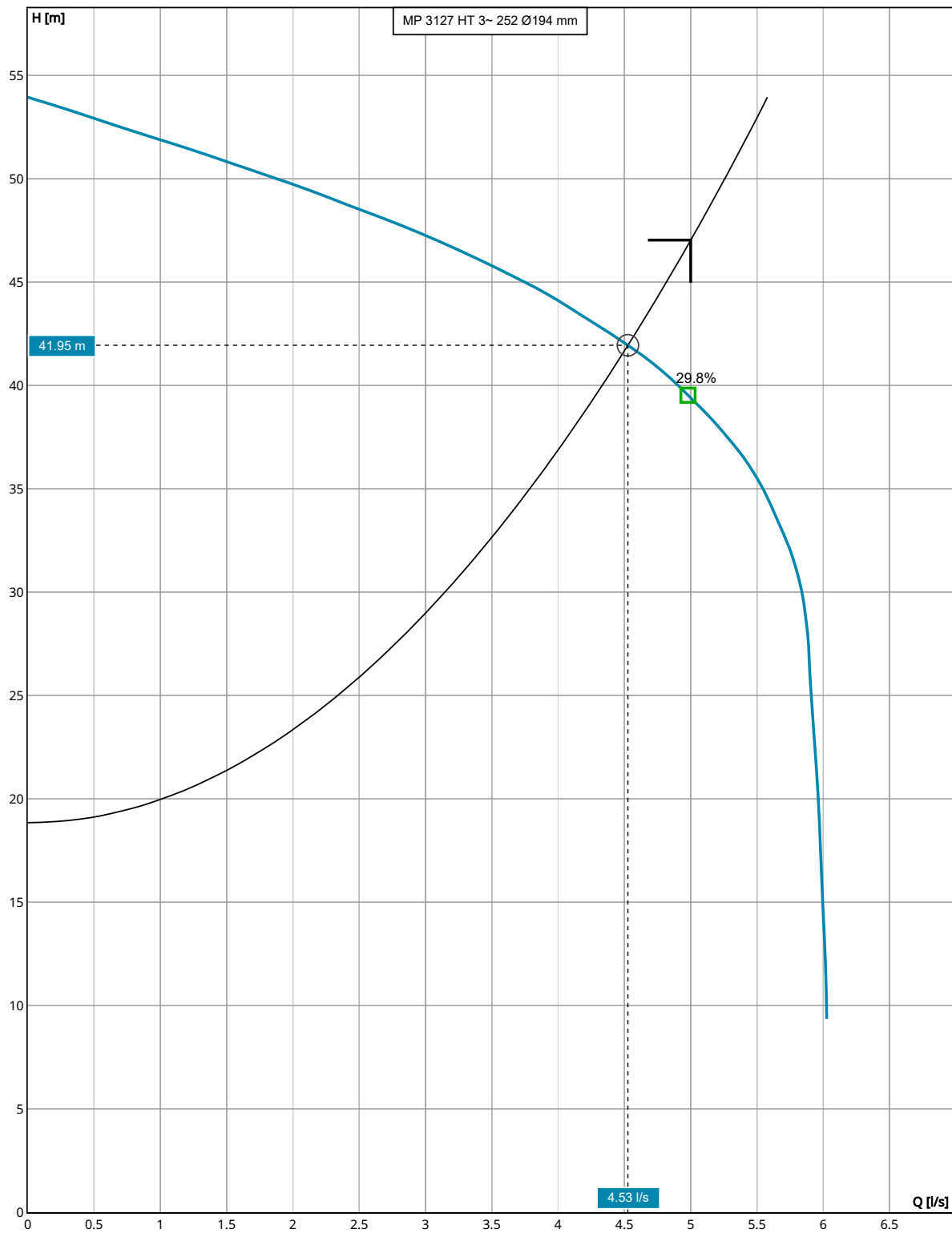
Fluid and Operating Conditions

Fluid Type	Density
Water	1,000 kg/m ³
Fluid Temperature	Dynamic Viscosity
4 °C	0.002 Pa·s
Specific Gravity	Fluid Vapor Pressure
1	8.14 mbar
	Atmospheric Pressure
	1,013.53 mbar
	Elevation
	0 m
	Ambient Temperature
	20 °C
	NPSH Available
	10.27 m
	Submergence
	0 m

Design Curve

Rated Speed	BEP Flow
50 Hz	4.98 l/s
Max Flow	BEP Head
6.03 l/s	39.53 m
H@QMin	Max P2
53.95 m	6.94 kW
H@QMax	Specific Energy
9.35 m	0.45 kWh/m ³
BEP	
29.81 %	

MP 3127 HT 3~ 252 | Duty Analysis

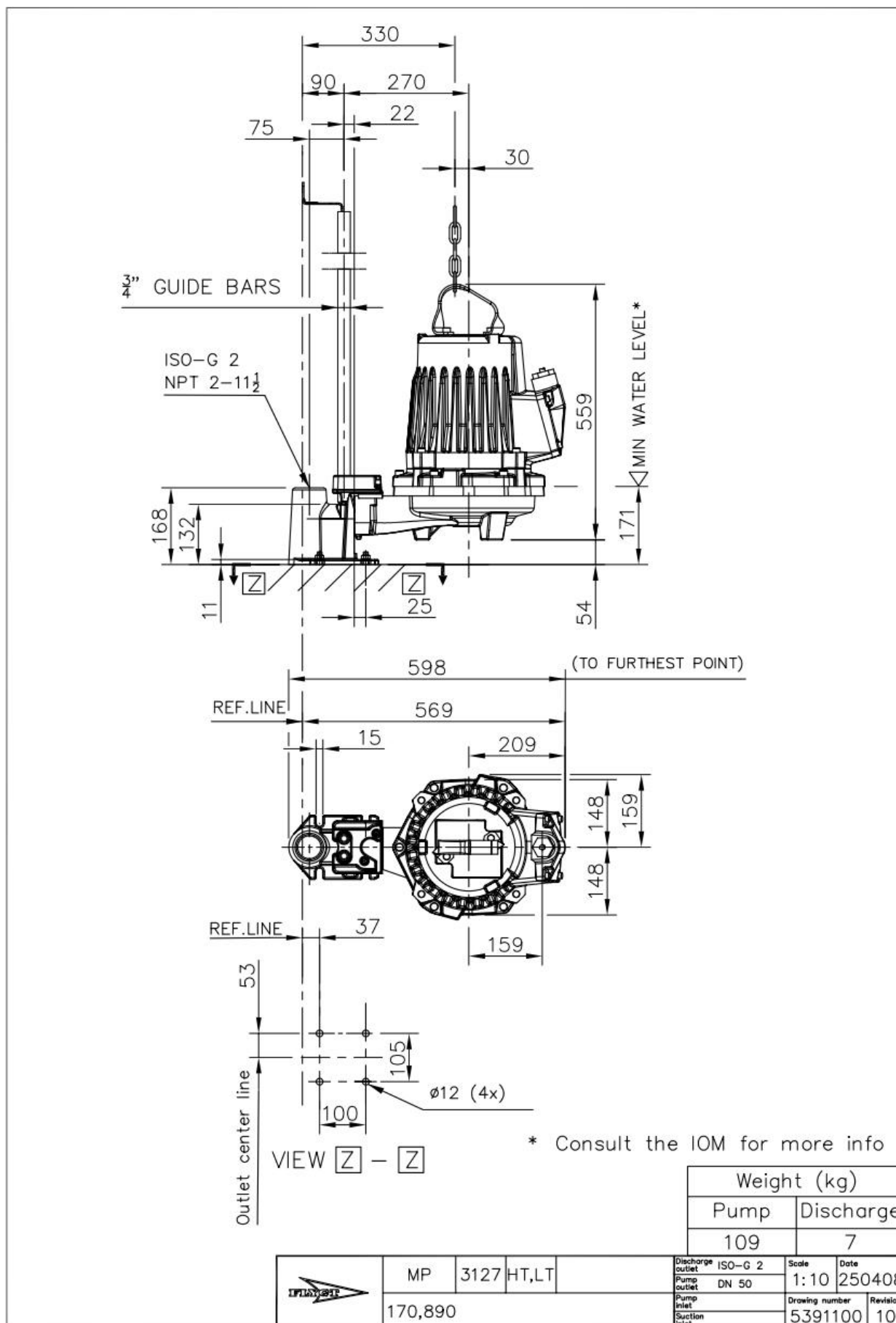


Curve: ISO 9906

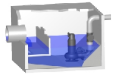
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Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	η_p [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	4.53	41.95	6.36	4.53	41.95	6.36	29.28	0.45	0

MP 3127 HT 3~ 252 | Dimensional Data & Drawing



MP 3127 HT 3~ 252 | Headloss Calculation



Fluid Type	Total Flow	Kinematic Viscosity
Water	5 l/s	0.000002 m ² /s
Static Head	Operating Pumps	System Type
18.85 m	1	Single Pump
Layout	Calculation Model	
Wet Installed Submersible Pumps	Colebrook-White	

Type	Pipe Inner Diameter [mm]	Length / K Factor	Quantity	Velocity [m/s]	Pipe Roughness [mm]	Headloss [m]
Individual Discharge Piping / SS Wetwell / Stainless steel / PN 10 / DN 80 (84x2.0 mm) / New Pipes						
Pipe Length	80 mm	10 m	1	1.19 m/s	1.5 mm	0.3 m
90 Elbow	80 mm	0.3	1	1.19 m/s		0.02 m
Tee Line →  →	80 mm	0.1	1	1.19 m/s		0.01 m
Check Valve	80 mm	0.9	1	1.19 m/s		0.05 m
Gate Valve	80 mm	0.2	1	1.19 m/s		0.01 m
Total Head						0.38 m
Individual Discharge Piping / Rising main / PE100 (HDPE) PE 4710 / SDR 11 (PN 16) / DN 80 (90x8.2 mm) / New Pipes						
Pipe Length	73.6 mm	585 m	1	1.18 m/s	1.5 mm	27.8 m
Total Head						27.8 m
Friction Loss Head						28.18 m
Static Head						18.85 m
Total Head						47.03 m

MCBERNS

INNOVATIVE SOLUTIONS

WELL WASHERS



Why choose a McBerns Well Washer?

- Eliminates fat & grease build up on infrastructure & Walls
- No power required
- Operates with mains pressure water
- Uses less than 100 lts water per/day
- Cleaner level sensor probes
- Reduces overflows caused by fogs
- Reduces odour
- Reduces confined space entries
- Reduces infrastructure corrosion
- Reduces maintenance
- Improved safety at pump stations
- Reduces customer complaints
- Healthier environment
- Optional pre-programmed with 5 cleaning cycle durations

McBerns Well Washers

The Well Washer has been in the Australasian marketplace for 25 years and is still the preferred method in keeping pump stations fat free. The AutoWellWasher™ will reduce maintenance in wet wells and tanks that accumulate fats, oils and greases (FOGs). Our design uses town water or recycled treated effluent at mains pressure to keep pump stations clean.

It can be installed using existing telemetry or with our pre-programmed timing device that activates towards the end of the pump out cycle.

Installing a wellwasher will eliminate large fatty build-up in pump stations, this then reduces blockages in pumps

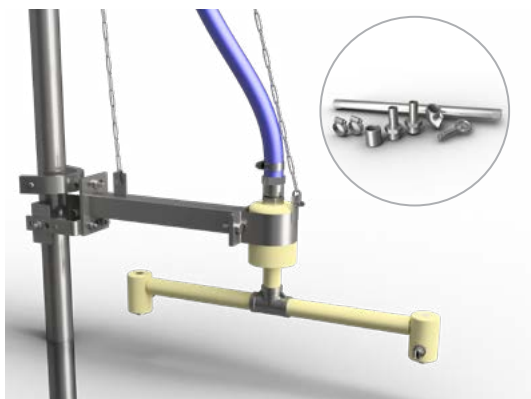
and downstream sewers. The level sensors remain clean so the pumps work more efficiently, reducing the risk of overflows due to FOG build-up. It has also been shown to significantly reduce sulphide corrosion on concrete walls, pumps and other internal infrastructure components. There are fewer confined space entries required, only when essential maintenance tasks are needed.

The Well Washer is wholly designed and manufactured in Australia and has Australian, United States & International Patents.

'The total water usage for a single washer is as little as 100 litres per day.'

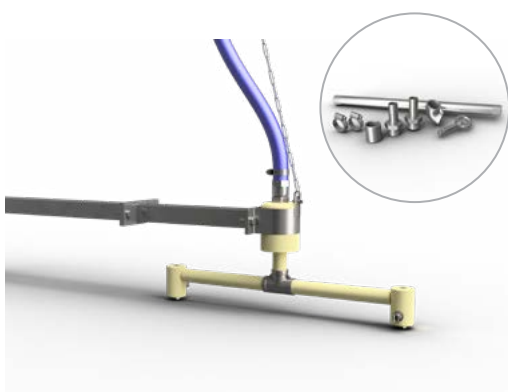
The principle behind the design is simple:
The Well Washer cleans the fat and grease away before it solidifies.





Well Washer Kit Guide Rail Mount

Part Number:	WWKITGRMOUNT
Description:	Kit includes washer, brackets and install hose & fittings
Application:	Eliminates fat & grease build up on infrastructure and walls
Material / Finish:	Austlon, 316 S/S
Dimensions:	Taking the infrastructure into account we can design to specific requirements
Weight:	6 kg
General Specifications:	40/60 PSI, 30 l/min, 5-6m (Diameter)



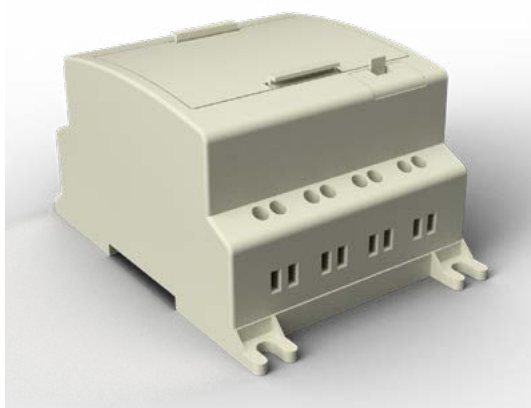
Well Washer Kit Wall Mount

Part Number:	WWKITWALLMOUNT
Description:	Kit includes washer, brackets and install hose & fittings
Application:	Eliminates fat & grease build up on infrastructure and walls
Material / Finish:	Austlon, 316 S/S
Dimensions:	600mm to 900mm Diameter
Weight:	6 kg
General Specifications:	40/60 PSI, 30 l/min, 5-6m (Diameter)



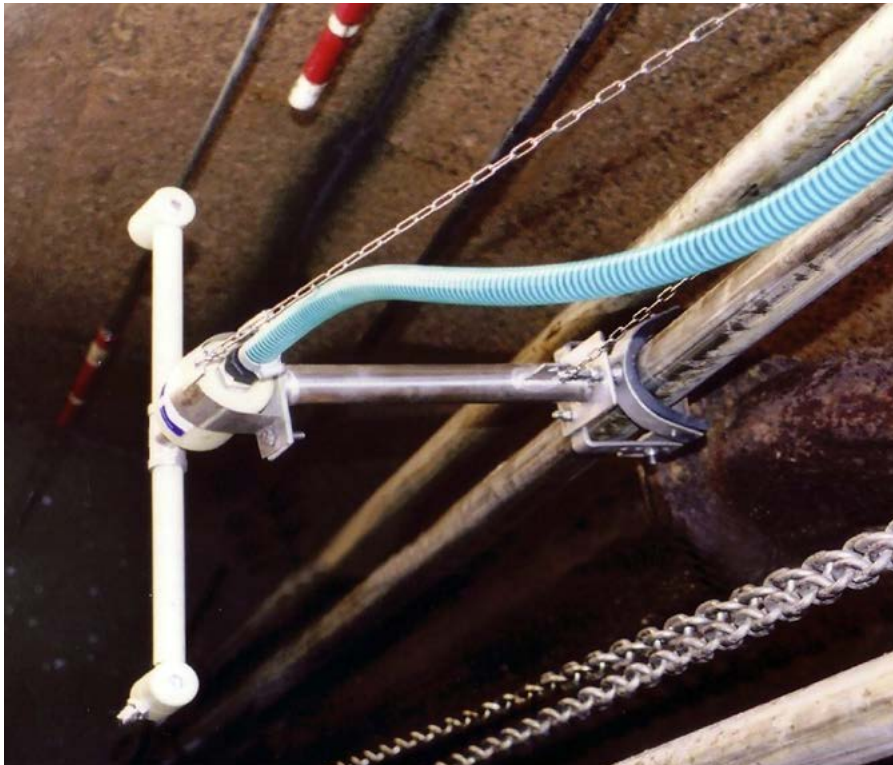
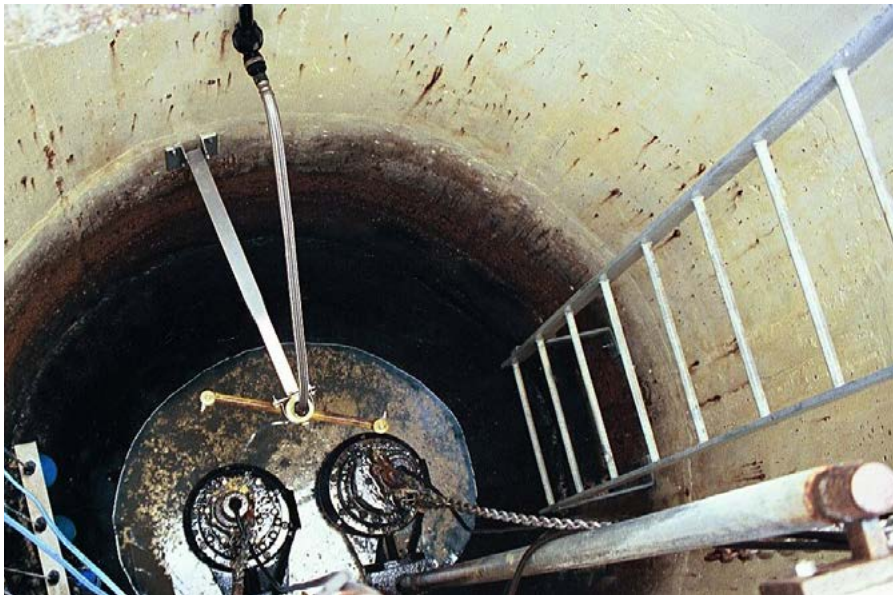
Optional Solenoid Valve

Part Number:	WWSOLENROID
Description:	Optional Solenoid Valves for water supply
Application:	Once energised allows water to flow to wellwasher
Material / Finish:	Glass reinforced nylon
Dimensions:	600mm to 900mm Diameter
Weight:	500 g
General Specifications:	Continuous operation 100% ED c/w LED connector plug IP65



Optional Pre-Programmed Allen-Bradley Micro810 Smart Relay

Part Number:	WWTIMER
Description:	Pre programmed with 5 cleaning cycle durations
Application:	Water Conservation, Minimise manual control
Material / Finish:	PVC
Dimensions:	600mm to 900mm Diameter
Weight:	500 g
General Specifications:	Less than 100 L daily



MCBERNS

INNOVATIVE SOLUTIONS

ODOUR MANAGEMENT
SAFETY ACCESS COVERS
DESIGN & FABRICATION
DATA ANALYTICS

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Address: 11 Tectonic Crescent,
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Email: mail@mcbarns.com

Noel Southern: 0411 745 458
Paul O'Kane: 0459 396 157
Stuart Darby: 0413 436 683

www.mcbarns.com



Scan for more
information

Hynds Retention Tank with Mul-T-Level™ Outlet

Technical Guide D5.15

Hynds strong and reliable retention tanks are available in Ring Joint Pipe Internal Base or Flange Base manhole types.



03.15 | DRAINAGE | D5.15 HYND'S RETENTION TANK

Applications

Stormwater retention & detention

Sewer storage

Product Attributes

Versatile Mul-T-Level™ outlet

Highly durable

Simple installation

Various design layouts and large capacity options available

Water tight

Proven history

Approvals/Standards

AS/NZS 4058:2007 Precast concrete pipes (pressure and non-pressure)

Quality

ISO 9001:2008 Quality Management

*The go to organisation for civil
and rural water product solutions*

HYNDS

Hynds strong and reliable retention tanks are available in Ring Joint Pipe, Internal Base or Flange Base Manhole types.

Design Specifications and Applications

RJ Retention Tank

- Generally used when the location permits the installation of a long narrow tank.
- Comprised of Hyspec reinforced concrete rubber ring joint pipes.
- Usually includes a spigot-plugged pipe, standard intermediate pipes and a collar-plugged pipe.
- The spigot and collar plugs are factory cast to ensure water tightness and integrity.
- A manhole offtake is factory fitted to one or more pipes to provide easy access for maintenance.

IB or FB Retention Tank

- Generally used in compact site conditions where relatively small volumes is required.
- Comprised of Hynds internal base or flange base manhole risers and a precast concrete lid.

Mul-T-Level™ outlet

- Enables the tank to be used for both detention and retention.
- Both the RJ and IB/FB retention tanks have a standard 100 or 150mm diameter PVC slip coupler and Mul-T-Level™ outlet cast-in or fitted during manufacturing.
- The required retention/detention volume is set by an orifice hole (of specified diameter) being drilled on the Mul-T-Level™ outlet at a pre-determined height.

General Specifications

- Manufactured from Hyspec spun concrete pipes, using the centrifugal spinning process.
- When the tank is installed in an aggressive environment, such as tidal areas, sewerage or mild acid solutions, the use of a special grade concrete is recommended. Contact Hynds Technical Team for more information.
- Retention tanks are available in various class types to suit specific site conditions, loading and applications.
- The diameter and length of the retention tank is dependent on:
 - Storage volume required
 - Site configuration and access equipment available
- Inspection and maintenance access is provided by a fitted inspection chamber or manhole riser starter.
- PVC slip couplers are fitted to end plugs to provide inlet and outlet connections to the retention tank.
- Non-standard couplers or starter types can be cast-in on request.
- Orifice holes are drilled at levels to suit the design requirements.
- Standard lids are available for access risers in the RJ type tanks.
- A light or heavy duty cast iron cover and frame will fit directly onto the 600mm diameter access riser.
- The 1050 mm diameter access riser requires a 1050 mm diameter manhole lid, which can be fitted with the cast iron manhole frame and cover.
- The IB or FB tanks require a lid, which can be fitted with a cast iron frame and cover to suit the riser diameter.
 - Note: Lid thickness is dependent on loads and application
 - Refer to Table 1 for RJ tank capacities and Tables 2 and 3 for IB/FB tank capacities.

TABLE 1 RJ type retention tank

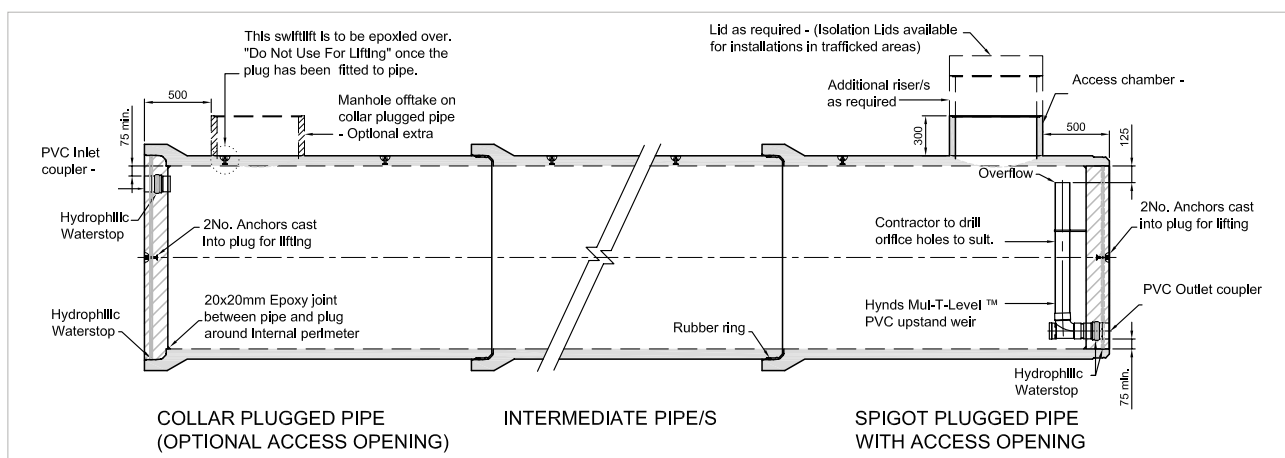
Nom Pipe Diameter and Joint Type	Pipe Effective Length (m)	Nom Vol per Pipe Length (m ³)	Nom Vol per Pipe Length (Litres)	Suggested Offtake Dia (mm)	Lifting plugged pipe anchor req.	Handling intermediate pipe anchor req.
675RJ	2.440	0.72	720	600	A1	A2
750RJ	2.440	0.92	920	600	A1	A2
825RJ	2.436	1.14	1140	600	A1	A2
900RJ	2.448	1.38	1380	600	A1	A2
975RJ	2.440	1.67	1670	600	B1	B2
1050RJ	2.440	1.94	1940	600	B1	B2
1200RJ	2.440	2.58	2580	600	B1	B2
1350RJ	2.454	3.31	3310	600/1050	B1	B2
1600RJ	2.440	4.51	4510	1050	C1	B2*
1800RJ	2.438	6.13	6130	1050	C1	C2
1950SRJ	2.440	7.05	7050	1050	C1	C2
2100SRJ	2.397	8.02	8020	1050	C1	C2
2300SRJ	2.735	11.01	11010	1050	C1	C2
2550SRJ	2.470	12.18	12180	1050	C1	C2

Key

- **A1** 1 Tonne
2 no. in plug
1 no. in pipe
- **A2** 1 Tonne
2 no. in pipe
- **B1** 2.5 Tonne
2 no. in plug
1 no. in pipe
- **B2** 2.5 Tonne
2 no. in pipe
- **C1** 5 Tonne
2 no. in plug
1 no. in pipe
- **C2** 5 Tonne
1 no. in pipe

Notes:

- All dimensions refer to Class 2 (X) pipes
- Outlet 75 mm minimum above bottom invert of pipe
- Overflow 125mm below top
- *1600 Ø retention tanks require both B2 & C1 type lifting clutches for offloading and installation
- See Fig 6 for 3 point lift on typical plugged end pipe

**FIG. 1** General layout of typical RJ type retention tank with Mul-T-Level™ outlet

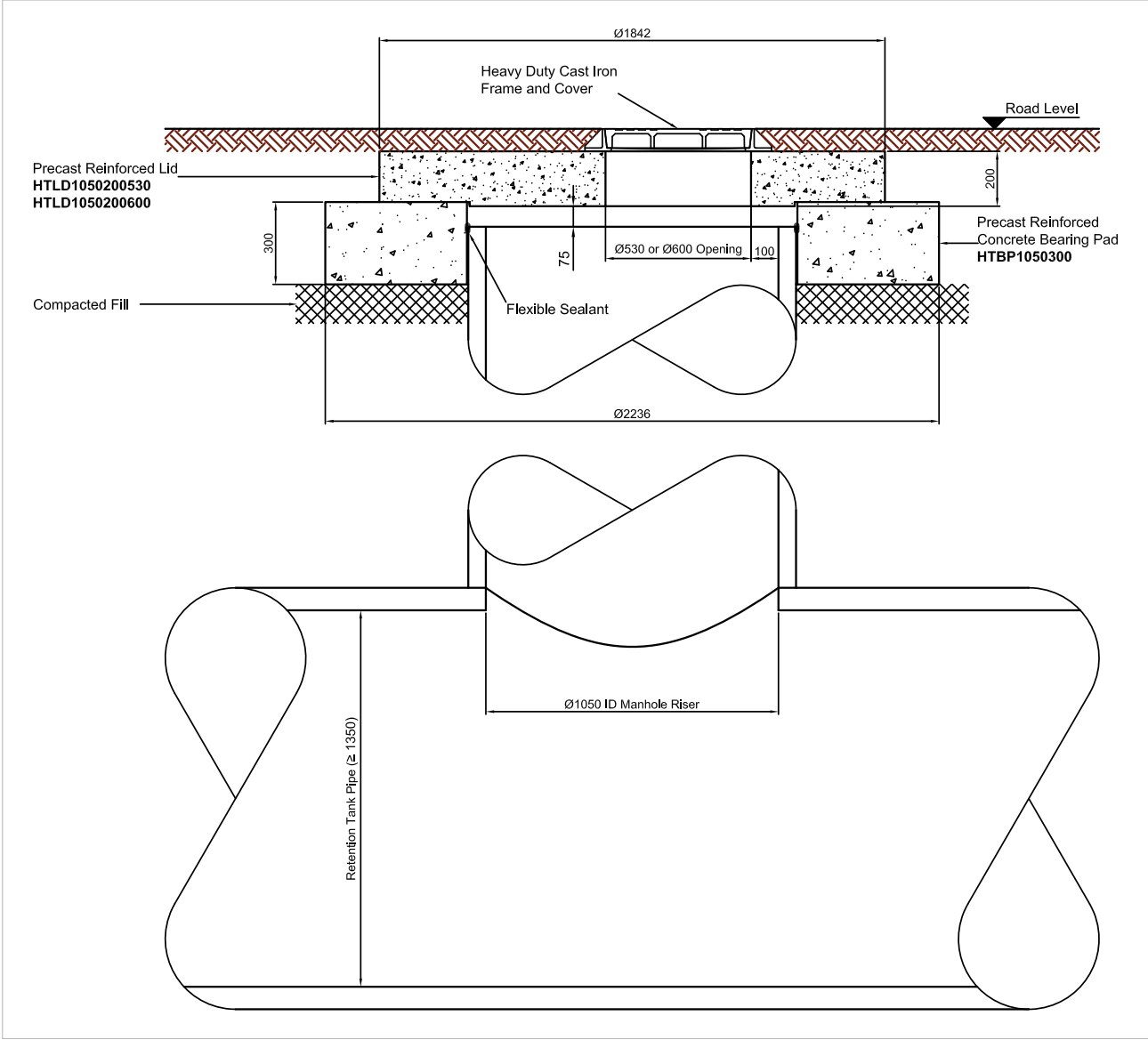
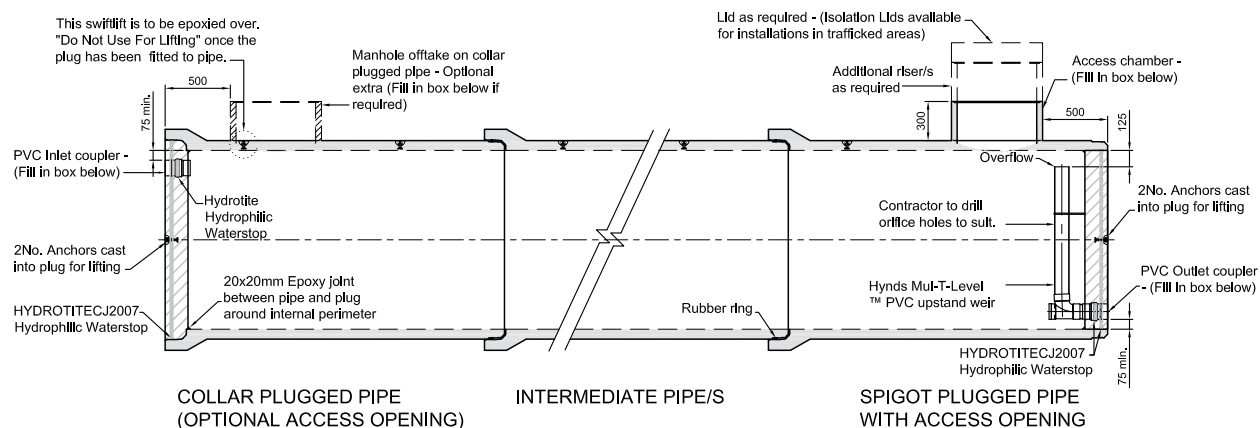


FIG. 2 Recommended detail for roadway installation



PIPE Ø

Mn Recommended Ø 675mm

JOB DETAILS

PIPE CLASS

TOTAL No. OF PIPES
(Incl. ends)

QUOTE No.

COVER TO INVERT

Inlet	Outlet

CO No.

PVC INLET FITTING Ø

Pipe Ø	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

PVC OUTLET FITTING Ø

Ø Pipe	Standard Fitting Ø	Ø Required
Ø675 to 1200mm	Ø100mm	
Ø1350 to 3000mm	Ø150mm	

ACCESS CHAMBER -
OUTLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

ACCESS CHAMBER
- OPTIONAL
INLET SIDE Ø

Ø Pipe	Standard Offtake Ø	Ø Required
Ø675 to 1200mm	Ø600mm	
Ø1350 to 3000mm	Ø1050mm	
Ø1350 to 3000mm	Specify	

I AUTHORISE HYNDS PIPE SYSTEMS LTD TO PROCEED WITH THE MANUFACTURING OF THIS PIPE SPECIAL AS DETAILED ABOVE. I ACKNOWLEDGE THAT ANY SPECIALS, ONCE MANUFACTURED, ARE DEEMED TO BE MY (CONTRACTOR'S) PROPERTY & ARE NON REFUNDABLE. STORAGE & HANDLING FEES WILL BE INCURRED FOR PRODUCTS THAT ARE NOT DELIVERED/COLLECTED WITHIN 1 MONTH OF THE DATE AGREED AT THE TIME OF ORDER. PRODUCT NOT DELIVERED/COLLECTED WITHIN 3 MONTHS OF THE DATE AGREED WILL BE DESTROYED AT MY EXPENSE.

NAME :- SIGNATURE :-

DATE :-

FIG. 3 RJ Retention Tank Order Form

Internal base type

TABLE 2 Internal base retention tank

Riser Height (mm)	450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid	580	730	1030	1330	1630	1930	2230	2530
O/A Height Incl 200mm Thick Lid	630	780	1080	1380	1680	1980	2280	2580
Effective Depth (mm)	225	375	675	975	1275	1575	1875	2175

Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	IB Capacity (m³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

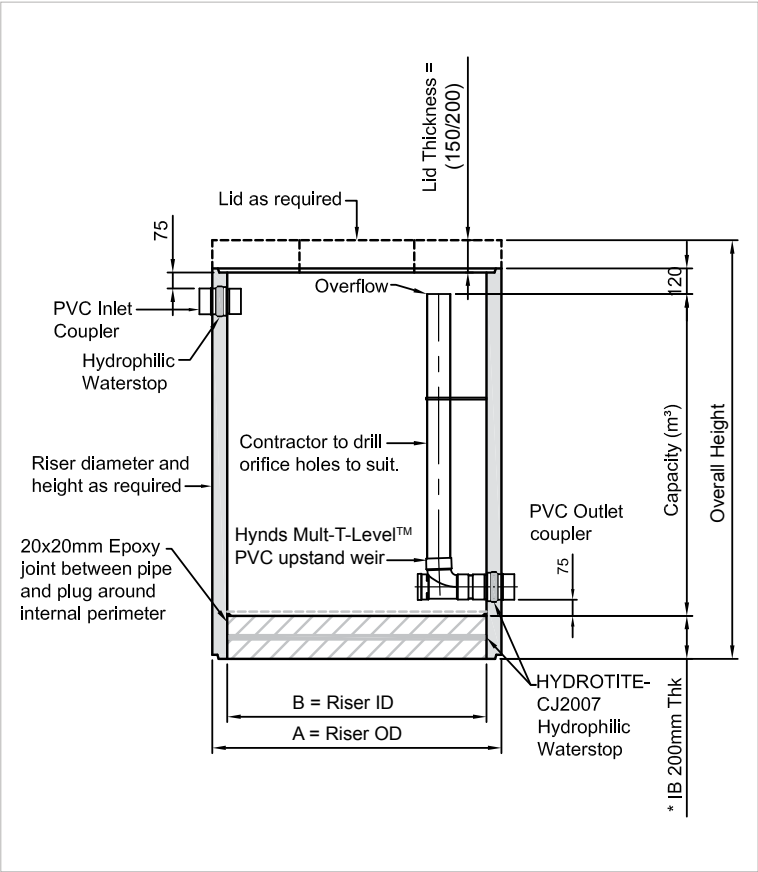


FIG. 4 Internal base

Flange base type

TABLE 3 Flange base retention tank

Riser Height (mm)			450	600	900	1200	1500	1800	2100	2400
O/A Height Incl 150mm Thick Lid			530	680	980	1280	1580	1880	2180	2480
O/A Height Incl 200mm Thick Lid			580	730	1030	1330	1630	1930	2230	2530
Effective Depth (mm)			225	375	675	975	1275	1575	1875	2175
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
1050	1.194	1.066	0.20	0.33	0.60	0.87	1.14	1.41	1.67	1.94
1200	1.347	1.207	0.26	0.43	0.77	1.12	1.46	1.80	2.15	2.49
1400	1.524	1.372	0.33	0.55	1.00	1.44	1.88	2.33	2.77	3.22
1500	1.677	1.523	0.41	0.68	1.23	1.78	2.32	2.87	3.42	3.96
1650	1.842	1.676	0.50	0.83	1.49	2.15	2.81	3.47	4.14	4.80
1800	2.007	1.829	0.59	0.99	1.77	2.56	3.35	4.14	4.93	5.71
2050	2.236	2.036	0.73	1.22	2.20	3.17	4.15	5.13	6.10	7.08

Effective Depth (mm)			-	-	625	925	1225	-	-	2125
Nominal Diameter	A = Riser OD (m)	B = Riser ID (m)	FB Capacity (m ³)							
2300	2.58	2.30	-	-	-	3.84	-	-	-	8.83
2550	2.85	2.55	-	-	3.19	-	6.26	-	-	10.85

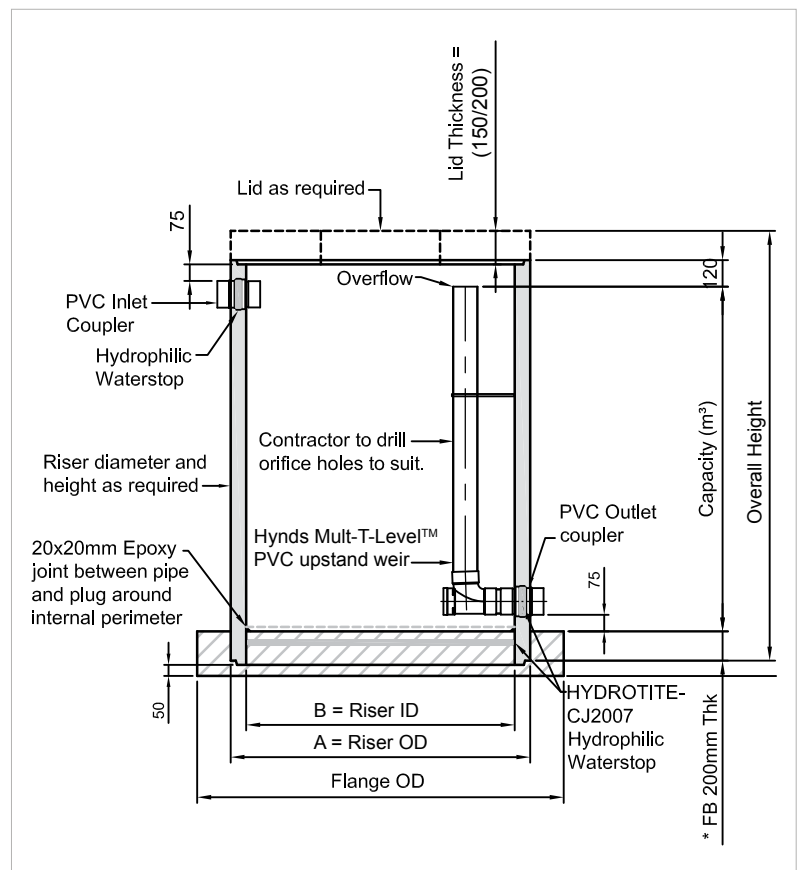


FIG. 5 Flange base

Installation

Mul-T-Level™ outlet

- Installation is simple and normally carried out by a drain layer using the same equipment and procedures as for the installation of concrete pipelines, or manholes.

RJ Retention Tank

- Similar installation to reinforced concrete rubber ring jointed pipes (including bedding requirements) and are dependent on site conditions and loading.
- Once the pipe sections have been installed and backfilled, the additional access risers are epoxied to the starter risers and brought up to the finished levels.
- The installation is then completed by fitting the required lids.
- The contractor must then drill the orifice holes at the required design levels.

Note: Refer to Figure 1 for a general layout of a typical RJ type tank.

RJ Retention Tank – Roadway Installation

- To minimise the effects of traffic, isolation of the manhole lid from the access riser is recommended.
- The depth of the modified flange base and riser must be kept to a minimum to enable maximum distribution of load above the tank.
- Refer to Figure 6 for 3 point lift of typical plugged end pipe.

IB or FB Retention Tank

- Similar installation to concrete manholes.
- Foundations should be prepared with compacted hardfill to prevent excessive settlement.
- Once the IB or FB tank is backfilled, the installation is completed by fitting the relevant concrete lid with the appropriate cast iron frame.



FIG. 6 Point lift of typical plugged end pipe

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Hyliner AKS HDPE Lining

Technical Guide D1.12

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.



04.20 | DRAINAGE | D1.12 HYLINER AKS HDPE LINING

Applications

Corrosion protection lining for precast concrete pipes in sewer pipelines

Corrosion protection lining for in-situ concrete structures in wastewater treatment plants

Abrasion protection lining in high abrasion environments

Broad range of application in both precast and cast in-situ concrete

Product Attributes

Available in white (sewer applications) and black (where high UV resistance is required)

12 mm long anchors are integrally formed with the sheet

Factory QA tested and welding of joints is 100% quality tested onsite

Quality

ISO 9001:2008 Quality Management Standard

We are the supply partner of choice for New Zealand's civil construction industry, specialising in water and infrastructure based solutions.

HYNDS
PIPE SYSTEMS

HyLiner AKS HDPE is used as corrosion protection lining in precast and cast in-situ concrete elements or structures to increase durability and reduce the risk of abrasion.

Lining systems are able to bridge discontinuities in pipe or structure walls unlike other coating systems that rely on the integrity of the surface and quality of the surface preparation and the installer's expertise for functionality.

HyLiner AKS HDPE is a thermoplastic lining used to reduce the risk of sulphide attack or corrosion in sewage applications.

The high density polyethylene (*HDPE*) lining suits both precast and in-situ applications. Firmly anchored to the concrete surface of the pipe or structure, the lining requires only welding of joints to form a durable, chemically resistant concrete protection membrane with high abrasion resistance.

Installation

Installation procedures vary depending on the product:

Spun concrete pipe

The liner is inserted into the pipe prior to the completion of manufacture, with the pipe spinning process completed with the liner installed. This ensures that all the anchor knobs are well embedded in the spun concrete prior to the concrete curing and hardening.

Wet cast concrete pipe

The liner is securely attached to the inner mould before placement of reinforcement and casting of the pipe. The pipe once cast is cured in the normal manner using heat to accelerate the hardening process.

Precast concrete

This follows a similar process to the wet cast concrete pipe whereby the liner is attached to the mould prior to casting of the element.

In-situ concrete

This follows the same process as for precast concrete whereby the liner is attached to the formwork prior to casting of the concrete.

Installation Detail

In the case of concrete pipes, the liner need only be applied to the pipe's internal surface above low flow level during normal operating conditions as shown in fig 3.

Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min) as shown in fig 4 & 5. This joint is not usually welded as it allows any accumulation of moisture from external hydrostatic pressure to dissipate from behind the liner.

Where the fluid contents are themselves aggressive, such as trade waste discharges, a longitudinal weld can be provided to seal the pipe invert.



FIG. 1 Where 360° cover is required, the liner is fitted with an overlap at the invert (50 mm min)

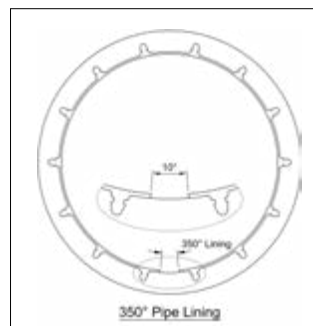


FIG. 3 Most concrete pipes only require the liner applied to the pipe's internal surface above low flow level during normal operating conditions.

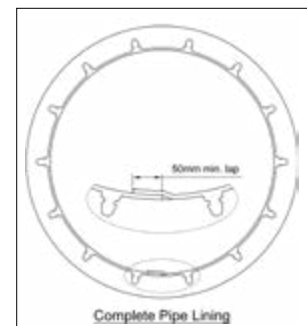


FIG. 2 Invert overlap in a 1050Ø pipe.

Jointing

A continuous lining system is created through the use of extrusion welding carried out by trained, qualified operators. Generally overlapped welds are recommended.

Various details for welded joints for precast concrete pipes and components are shown in Figures 4 to 6. Other details for site installation and fixing of brackets are shown in Figures 7 to 12.

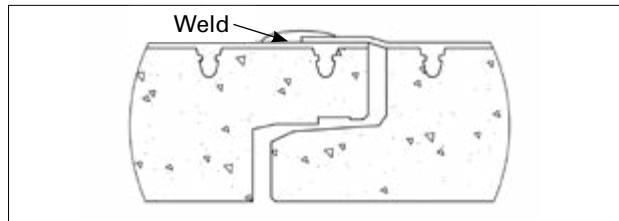


FIG. 4 HyLiner lined SRJ pipe (Lapped Joint)

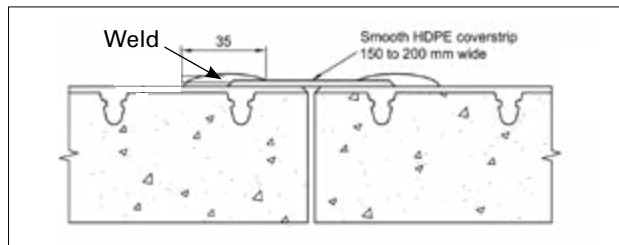


FIG. 5 Cover strip with 2 overlap welds

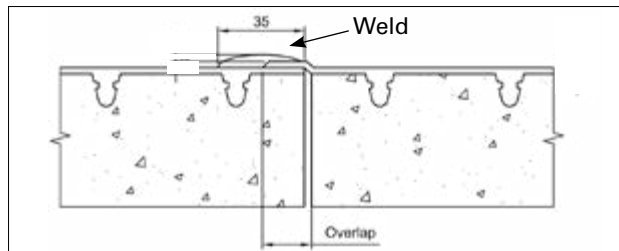


FIG. 6 Single overlap weld

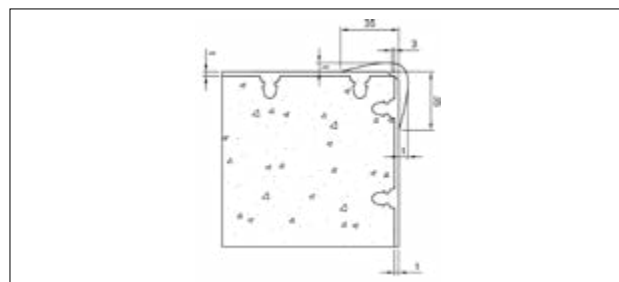


FIG. 7 Outside Corner Weld

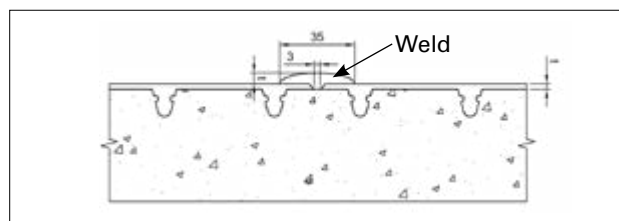


FIG. 8 Flat Extrusion Butt Weld

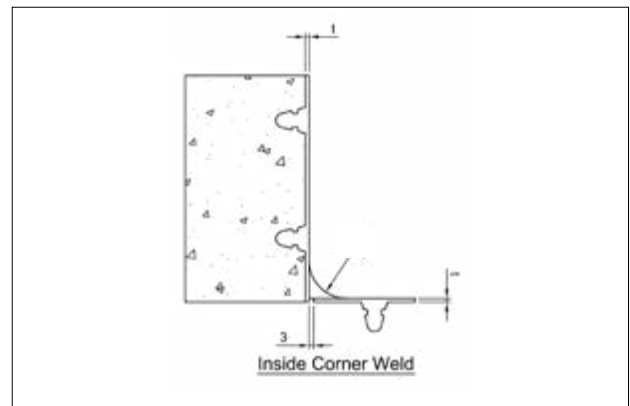


FIG. 9 Inside Corner Weld

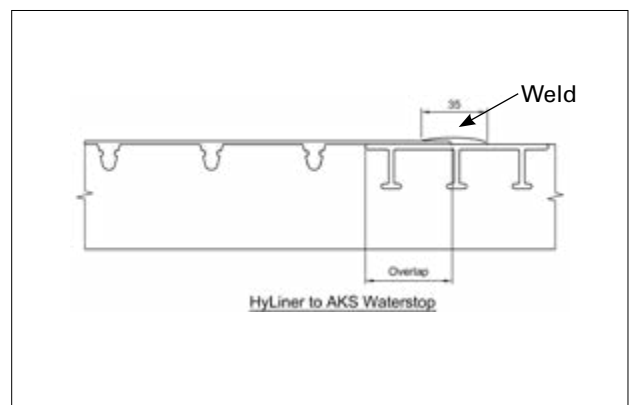


FIG. 10 HyLiner to AKS Waterstop

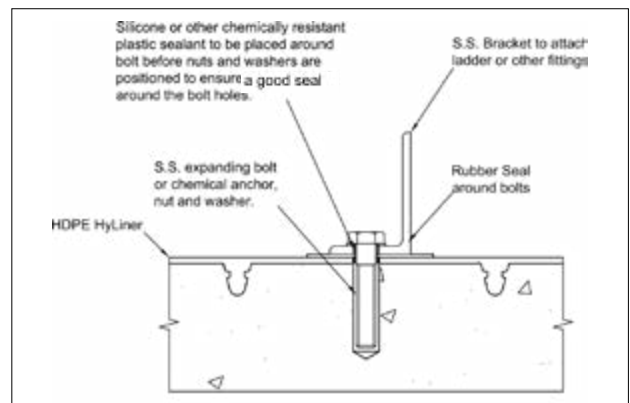


FIG. 11 Sealing of Brackets and Fittings to HyLiner Lined Structures

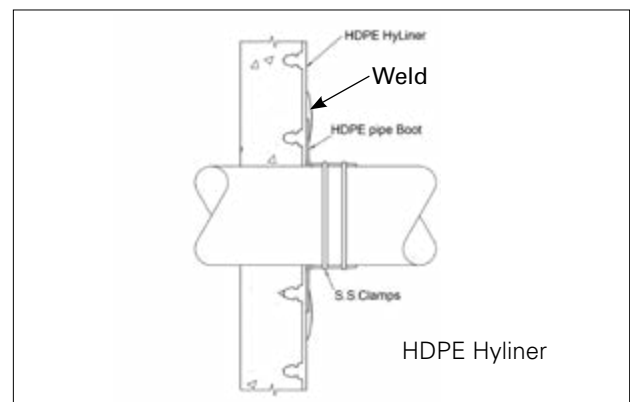


FIG. 12 Pipe Penetration Detail

Quality Control

In-plant quality control for the manufacture of the liner includes waviness, surface finish, knob shape and alignment, crimp height and depth of knobs, sheet thickness, density and tensile values.

Quality checks after casting into precast concrete pipes and components include effective anchor embedment, liner positioning on the product and spark testing for pin holes or damage.

All joints and the liner are spark tested after jointing is completed on site. This ensures the quality of the joints and identifies any damage in the liner as a result of handling and installation.

Abrasion resistance

HyLiner AKS HDPE has a good abrasion resistance when compared to other materials. A typical abrasion test value for HDPE liners is 0.3mm after 400 000 cycles (*Kirschmer, O., "Problems of Abrasion in Pipes", Steinzeugin Formationen, 1966, No 1, pp3-13*).

Wear rates are very slow even under continuous flow of abrasive slurry. Most drainage applications would have intermittent exposure to abrasion.

Suitable Structures for Lining

HyLiner AKS HDPE is suitable for installation in spun and wet cast concrete pipes from 1050–3000 mm diameter. HyLiner AKS HDPE is also suitable for lining a range of other concrete structures:

- Manhole risers and lids
- Rectangular or square precast concrete chambers and lids
- Precast concrete channels and lids
- Precast concrete pumpstations
- Insitu concrete structures such as tanks and chambers



FIG. 13 2300 Diameter Manhole Riser



FIG. 14 Liner being installed for a manhole lid

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BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE



BluSeal Anchor Knob Sheet (AKS) is supplied and installed as a fully sealed and welded robust chemically resistant concrete protection lining.

BluSeal AKS is a synthetic membrane of HDPE sheet with integral anchors which are cast into concrete to form a flexible and durable corrosion protection lining. BluSeal AKS is used to protect concrete surfaces in chemically aggressive environments in sewerage tunnels, treatment works, pump stations, manholes and chemical retention bunds. It comes in a range of colours and thicknesses and can be applied to new and existing structures for protection or enhancement.

Application Advantages

- Fully welded homogenous lining
- Complete before 28-day concrete cure
- Factory assured thickness and absence of pinholes
- Retro-fitted lining is moisture compatible with assured bond

Lifecycle Advantages

- 100 year design life
- Membrane drainage eliminates negative pressure
- Chemical and impact resistant
- High anchor pull-out resistance
- Potable Water use to AS/NZS 4020:200
- Low coefficient of friction in lined conduits

About the Product

BluSeal AKS is supplied and installed as a fully sealed and welded, chemically resistant concrete protection system. The system includes propriety details for sealing around penetrations and against non-HDPE surfaces. Skilled applicators can fabricate the product into various shapes to suit irregular concrete formwork. All seams and joints are extrusion welded and then tested by spark or vacuum box testing. BluSeal AKS is designed and installed by approved applicators to international standards which are outlined in a manufacturer's installation manual. The elasticity of the membrane allows free drainage and relief of any hydrostatic pressure build-up in underground structures. The membrane can be cast into new structures or retrofitted by cement grouting onto the prepared surface of existing structures. AKS lined structures have an outstanding track record in aggressive environments, demonstrating a design life in excess of 100 years for the most demanding applications.

Application solutions

- Segmental sewer tunnels
- Inlet works and bioreactor tanks in WWTP
- Pump stations and manholes
- Tunnel waterproofing
- Chemical retention bunds
- Piles and foundation lining in aggressive ground conditions
- Sewer pipelines
- Slide pads on pipe plinths
- Concrete protection for industrial applications

Project Specification Clause

HDPE CORROSION PROTECTION LINING - The HDPE CPL membrane used for this project shall be supplied and installed as a fully sealed and welded ROBUST continuous membrane system. It shall be a factory produced product that has independent testing to validate the performance outlined in the technical data table on the following pages. BluSeal AKS supplied by Bluey Technologies or equivalent shall be acceptable.

Project Examples

Sewerage treatment plants, sewer pump stations, sewer manholes, trunk sewer mains, chemical processing plant bunds and trenches, gas pipelines (pipe plinths).





BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Application Specification

PREPARATION

- I.1 BluSeal AKS must be installed onto formwork under the direction of an approved, specialised applicator who will plan layout configurations of sheets and weld seam locations. The applicator may also prefabricate some corner or seam sections and pipe penetration pieces offsite.
- I.2 At joins in sheets the edge knobs are removed from one edge and the sheet is overlapped by 50mm to prevent egress of concrete fines and to provide a sound foundation for welding the seams.
- I.3 Formwork shall be cleaned and free of defects. Form release oils are not necessary where BluSeal AKS is applied. Formwork should be designed to avoid leaking.
- I.4 The sheets must be tensioned over the form within the yield elongation limit, prior to securing to the forms.
- I.5 BluSeal Formtak can be used to assist in holding the sheet against timber formwork. Securing against the formwork is by nailing or stapling through the sheets at edges where extrusion welds will cover later or into edges that will be redundant and trimmed after the pour.
- I.6 On circular forms, the sheets are wrapped and tensioned around and secured at the overlap by wires around the knobs and/or temporary speed welding along the seam.
- I.7 In precast concrete applications the moulds may be designed to secure the membrane at the edges.
- I.8 When BluSeal AKS is applied to an existing structure all corroded concrete and contaminants must be removed, leaving a surface profile greater or equal to CSP4 in accordance with ACI guidelines.
- I.9 Treat or replace exposed reinforcement in accordance with ACI guidelines.
- I.10 Refer to Bluey Technical Notes for recommendations regarding proving grout bond strength and design criteria.

APPLICATION

- 2.1 Always pour concrete or grout at a cooler ambient temperature than the temperature when the sheets were applied to the formwork. This will ensure the membrane is taut on the forms.
- 2.2 Anticipated maximum concrete temperature or accelerated curing temperature should not exceed 60 degrees Centigrade. Contact Bluey to discuss exceptions.
- 2.3 When grouting the sheets onto an existing structure, only grouts approved by Bluey such as BluCem HS200 shall be used, and mixing and placement shall be strictly in accordance with Bluey instructions. Fast set grouts, such as BluCem HE80, are recommended to be used for retrofitting the membrane in short time frames where assets must be returned to service quickly.
- 2.4 When grouting the membrane to floors, plan pours at times of the day where temperature changes before initial set of the grout are minimal. Avoid these pours in direct sunlight.
- 2.5 Concrete mix design, mixing, placement and compaction of concrete should follow standard civil construction practice to minimise voids and ensure full encapsulation of the anchors on the membrane.
- 2.6 Extrusion welding and weld testing at seams will be undertaken by approved applicators and in accordance with installation guidelines provided by the manufacturer and generally in accordance with DVS 2227. This includes proper preparation of the sheet surfaces to be welded and daily destructive seam peel tests sampled from trial welds. Welding technicians shall have formal industry training in extrusion welding techniques.
- 2.7 Non-destructive testing of completed welds will be either by vacuum box or spark testing.
- 2.8 Repairs and patching will be completed by extrusion welding over small defects or applying a minimum 200mm diameter patch over larger defects, with a minimum 80mm edge distance to the defect.
- 2.9 Destructive pull testing of anchors should be avoided.
- 2.10 Encapsulation of anchors can be easily checked by tapping across the surface of the membrane to detect any hollow sounds that indicate voids under the membrane. If voids are detected, they can be filled by injection of BluCem HS200 high flow grout through the lining. Repair by extrusion welding over the injection hole.



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

Product Data

Please refer to Important Notice on following page

Length of Knobs (nominal)	12mm
Knobs per m ²	1230
Pull-off Resistance	>700N per knob or 850kPa (short term loading)
Membrane Thickness	2.0mm to 10mm*
Roll Widths	Up to 3.2m
Colours	Black for UV exposed applications and light colours (such as white) for underground or covered structures.

TESTED CHARACTERISTIC	STANDARD	RESULT			
Density	ASTM D 505/D 792	≥940kg/m ³			
Carbon Black Content**	ASTM D 1603	2.0 - 3.0%			
Carbon Black Dispersion**	ASTM D 5596	Category 1 or Category 2			
ESCR (NCTL)	ASTM D 5397	>300 hours			
OIT	D 3895	>100 minutes			
Coefficient of Linear Expansion	ASTM E 831	1.1 - 1.4E-4cm/cm/deg C			
Tensile Properties (Sheet Material)	ASTM D 6693-04	Yield Stress 15MPa	Break Stress 27MPa	Yield Elongation 12%	Break Elongation 700%
Shore Hardness	DIN 53505	>50 Shore D			
Tear Resistance	ASTM D 1004	120N/mm			
Puncture Resistance	ASTM D 4833	300N/mm			
Dimensional Stability	ASTM D 1204	<2.0% change			
Water Absorption	ASTM D 570	<0.09%			
Flammability	UL94***	V0			

* Average minimum thickness to ASTM D 5199. Minimum thickness membrane made to order

** Black AKS only

*** Plastics flammability standard released by Underwriters Laboratories of the USA



BluSeal AKS

HDPE CONCRETE PROTECTION MEMBRANE

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This Technical Data Sheet is provided for general information and instruction only. The properties and characteristics set out herein represent typical testing results under laboratory conditions. Results of actual product characteristics may vary slightly. Site-specific and project-specific conditions may affect product performance, including without limitation: surfaces, environmental conditions, contact conditions, storage conditions, storage timeframes, weather, and climatic or seasonal conditions. Not all product parameters are batch tested as part of the manufacturing quality control process, and performance may vary between batches.

If Bluey gives any express written product warranty in relation to the product, that warranty is subject to the foregoing qualifications, despite anything to the contrary in any other document. All other representations, advice, suggestions or promises regarding the product's performance or its implementation, whether verbal or in writing, and whenever given, including in the course of any field services, are expressly disclaimed. Without limiting the foregoing, Bluey will have no liability for loss or damage of any kind if any application specifications are not followed.

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ProcessMaster electromagnetic flowmeter

The perfect fit for the oil and gas industry



ABB has responded to the oil and gas industry's need for a rugged, reliable electromagnetic flowmeter

Measurement made easy

ProcessMaster flowmeters – perfect for the oil and gas industry

Expertise in measurement technology

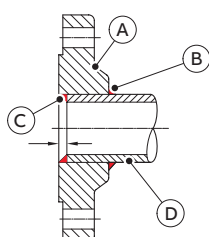
ABB's high pressure electromagnetic flowmeters are reliable, accurate and easily maintained. Customers worldwide have benefited from our application-oriented know-how and comprehensive service.

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Designed specifically for oil and gas

We have added a two-tier, high-pressure version to our comprehensive range of electro-magnetic ProcessMaster flowmeters. It is available with either weld neck or slip-on flanges with RTJ and raised face connections.

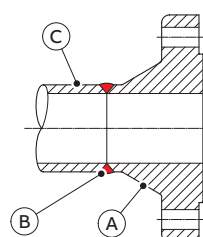
There are differences between X-Ray and dye penetrant test. For weld neck design we offer both dye penetrant and X-Ray tests; for slip-on design we offer only dye penetrant test.



(A) Slip-on flange (B) Fillet weld (outside) (C) Fillet weld (inside) (D) Pipe

Applications

- Slurries such as drilling mud
- Mixtures of fluids such as oil/water plus sand or produced water plus sand
- Injection fluids including sand and chemical additives for lubrication and corrosion prevention
- Sludge or sludge-like wastewater from produced water treatment
- Operating conditions such as high pressure or entrained gas in the fluid
- Harsh environmental conditions such as heat, moisture or vibration and explosive or corrosive atmospheres



(A) Weld neck flange (B) Butt weld (C) Pipe

Robust design for long life

The ProcessMaster flow sensor is designed for reliability in the demanding operating conditions found in oil and gas industry applications.

- Long lasting sensor lining materials withstand abrasion and corrosion, resulting in longer sensor service life and minimal maintenance requirements
- No additional pressure drop caused by protrusions into the pipe
- Optional self-cleaning measuring electrodes prevent issues caused by build-up of deposits
- Double sealed measuring electrodes minimize the risk of leakage and enhance reliability
- Optional all-316 stainless steel construction for corrosive offshore atmosphere
- Optional fully-welded sensor made from 316 material
- Protection of internal sensor components against moisture and vibration with potted Ex sensor

Range of certificates and test reports

- 3.1 material certificates and/or PMI certificates
- Certificates for non-destructive testing, X-Ray and/or dye penetration test
- Welder qualifications and procedures
- Hydrostatic pressure testing

Specification

Accuracy	Standard: 0.4 % of rate Enhanced: 0.2 % of rate
Nominal size range	DN 25 to 400 (1 to 18 in)
Nominal pressure	ASME CL 600 to 2500
Lining	Hard rubber, ETFE
Electrodes	Stainless steel, Hastelloy C
Process connection	Steel, stainless steel
IP rating	IP67, IP68
Fluid temperature	–25 to 130 °C (–13 to 266 °F)
Power supply	100 to 230 V AC, 24 V AC/DC
I/Os	Current, pulse status output
Communication *	HART protocol, PROFIBUS PA, FOUNDATION Fieldbus
Sensor housing material	Stainless steel 316
Transmitter housing material	Stainless steel
Wetted parts material	Option for NACE
Ex approvals	ATEX/IEC Zone 1.2, FM/cFM Cl1 Div.1, Cl1 Div.2
Marine approval	DNV
Verification	ScanMaster

* Acknowledgements

HART is a registered trademark of FieldComm Group, Austin, Texas, USA.

PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).



FEP630 high pressure magnetic flowmeter



FEP610 high pressure magnetic flowmeter

BLACKBOX

Technical Specifications:

Blackbox 130 is a compact low-cost intelligent controller that allows users to locally program the unit and give a readout of level. Economical and simple to program and operate, users benefit from extremely accurate and reliable digital echo processing with access to the dB and dBR range of transducers, measuring from 125 mm (4.9 in) right through to 40 m (131.2 ft).



PHYSICAL: MOUNTING OPTION SPECIFIC

Mounting Option:	Standard Wall Mount:	Large Wall Mount:
Controller Body Dimensions:	130 mm x 150 mm x 63.5 mm (5.1 in x 5.9 in x 2.5 in)	130 mm x 180 mm x 85 mm (5.1 in x 7.09 in x 3.3 in)
Weight:	Nominal 0.7 kg (1.4 lb)	Nominal 0.8 kg (1.7 lb)
Enclosure Material/Description:		ABS Base with polycarbonate lid, flammability rating UL 94 HB
Cable Entry Detail:	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable	Underside fitted with 3 x M20, nylon cable glands suitable for 6 mm to 12 mm (0.2 in to 0.5 in) cable
Transducer Cable Extensions:	2-core screened (2 conductor 20 AWG screened)	
Nominal Separation:	1,000 m (3,280 ft), for greater separation distances please contact us	

ENVIRONMENTAL

IP Rating:	IP66/67
Max. & Min. Temperature (Electronics):	-20 °C to +55 °C (-4 °F to +131 °F)
Flammable Atmosphere Approval:	All Blackbox units must be mounted in a safe area. Compatible with approved dB Transducers
CE Approval:	See EU Declaration of Conformity in the manual
UL Approval:	UL Listed. UL Listed to Canadian Safety Standards. Certificate Number E257330.

PERFORMANCE

Accuracy/Repeatability:	0.25% of the measured range or 6 mm (0.2 in), <i>whichever is greater</i>
Resolution:	dBMAH3 0.3 mm (0.01 in), dB3 0.5 mm (0.02 in), dB6 and dB10 1 mm (0.04 in), dB15 1.5 mm (0.06 in), dB25 2.5 mm (0.1 in), and dB40 5 mm (0.2 in).
Min. & Max. Range:	Dependent on Transducer. Nominally 125 mm to 40 m (4.9 in to 130 ft)
Echo Processing:	DATM (Digital Adaptive Tracking of Echo Movement)
Rate Response:	Fully Adjustable

OUTPUTS

Analog Output:	Isolated output of 4-20mA or 0-20mA into 1 kΩ (user programmable and adjustable) 0.1% resolution
Digital Output:	RS232 for programming and data extraction
Volt Free Contacts, Number, & Rating:	2 form "C" (SPDT) rated at 2 A at 240 V AC
Display:	2 x 12 alpha numeric

PROGRAMMING

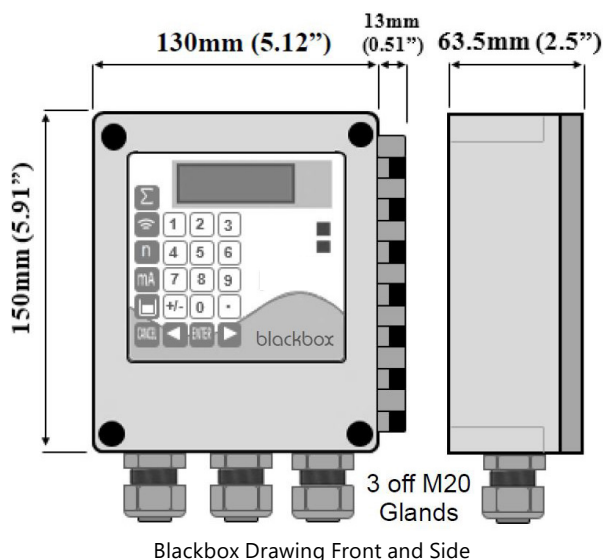
On-board Programming:	Via RS232 using supplied software
PC Programming:	Via RS232 using supplied software
Programming Security:	Via Passcode (user selectable and adjustable)
Programmed Data Integrity:	Via non-volatile RAM
Remote Programming:	Via RS232 using optional handheld calibrator

SUPPLY

Power Supply:	115 V AC +5% / -10% 50/60 Hz, 230 V AC +5% / -10% 50/60 Hz, 10-28 V DC, 10 W maximum power (typically 5 W)
Fuses:	50mA at 230 V AC, 100mA at 115 V AC

REMOTE COMMUNICATIONS

Power Supply:	Power supplied via Blackbox RS232 interface
----------------------	---



Blackbox Drawing Front and Side



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Rev 4.0

dB ULTRASONIC TRANSDUCERS

Technical Specifications:

The dB Transducer Series is a range of non-contacting ultrasonic transducers for level, volume, and flow measurement. Available in a variety of models and compatible with all Pulsar controllers so that you have a specific solution to suit your application requirements.



PHYSICAL: TRANSDUCER SPECIFIC

Model:	Dimensions:	Dia Face:	Weight:	Measurement Range:	Frequency:	Beam Angle:
dB3	78 (D) mm x 115 (H) mm (3.1 in x 4.5 in)	19 mm (0.7 in)	1.1 kg (2.4 lb)	125 mm to 3 m (4.9 in to 9.8 ft)	125kHz	<10°
dB6	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	30 mm (1.2 in)	1.1 kg (2.4 lb)	300 mm to 6 m (11.8 in to 19.7 ft)	75kHz	<10°
dB56	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	200 mm to 6 m (7.9 in to 19.7 ft)	50kHz	<10°
dB10	86 (D) mm x 106 (H) mm (3.4 in x 4.2 in)	45 mm (1.8 in)	1.1 kg (2.4 lb)	300 mm to 10 m (11.8 in to 32.8 ft)	50kHz	<10°
dB15	86 (D) mm x 122 (H) mm (3.4 in x 4.8 in)	60 mm (2.4 in)	1.2 kg (2.6 lb)	500 mm to 15 m (19.7 in to 49.2 ft)	41kHz	<8°
dB25	105 (D) mm x 142 (H) mm (4.1 in x 5.6 in)	78 mm (3.1 in)	1.4 kg (3.1 lb)	600 mm to 25 m (23.6 in to 82 ft)	30kHz	<6°
dB40	205 (D) mm x 223 (H) mm (8.1 in x 8.8 in)	160 mm (6.3 in)	6 kg (13.2 lb)	1.2 m to 40 m (3.9 ft to 131.2 ft)	20kHz	<5°

PHYSICAL: ALL TRANSDUCERS

Sensor Body Material:	Valox 357 U and syntactic foam face
Cable Lengths:	Standard = 5 m, 10 m, 20 m, or 30 m (16.4 ft, 32.8 ft, 65.6 ft, or 98.4 ft). Optional: up to 150 m (492 ft) maximum (increments of 10 m (32.8 ft) only)
Maximum Separation:	500 m (1,640 ft)
Mounting Connection:	BSP or 1" NPT

ENVIRONMENTAL

Enclosure Protection:	IP68 / NEMA 6P
Max. And Min. Temperature (Electronics):	Standard: -40° C to +90° C (-40° F to +194° F) Hazardous area versions: -40° C to +75° C (-40° F to +167° F)

APPROVALS

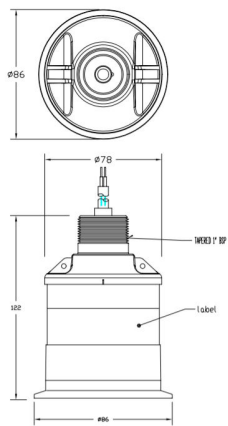
CE Approval:	2014/30/EU to EMC & 2014/34/EU ATEX Directives. Standards applied: EN 60079-0:2012+A11:2013/ EN 60079-11:2012 / EN 60079-18:2009 / EN 60079-26:2007 / EN 61326-1:2013
ATEX Approval:	Standard ATEX EEx m II T6 or optional EEx ia IIC T6. FM/FMC approval.

TRANSDUCER OPTIONS

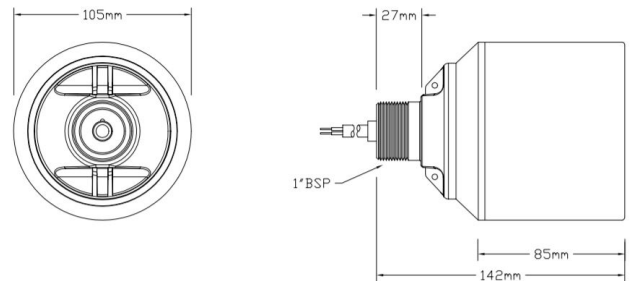
Model:	dB3	dBs6	dB6	dB10	dB15	dB25	dB40
PVDF		✓	✓	✓			
Front Threaded / PVDF	✓	✓	✓	✓			
Submergence Shield	✓	✓	✓	✓	✓	✓	
Flanged DIN/ANSI		✓	✓	✓	✓		
Foam Face		✓		✓	✓	✓	✓
Sanitary Flange		✓	✓	✓			
Intrinsically Safe of All the Above	✓	✓	✓	✓	✓	✓	✓

PERFORMANCE

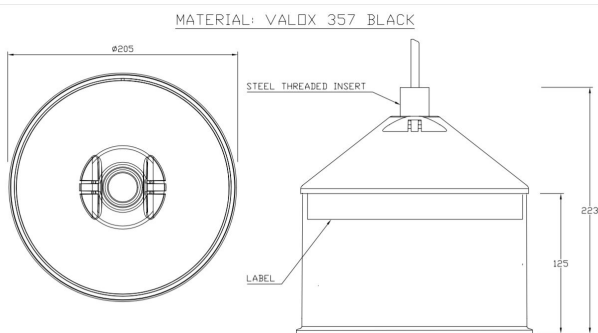
Accuracy:	0.25% or 6 mm (0.2 in) whichever is greater
Resolution:	0.01% or 2 mm (0.08 in) whichever is greater
Temp. Compensation:	Automatic, internal temperature sensor, ± 0.5 °C/°F



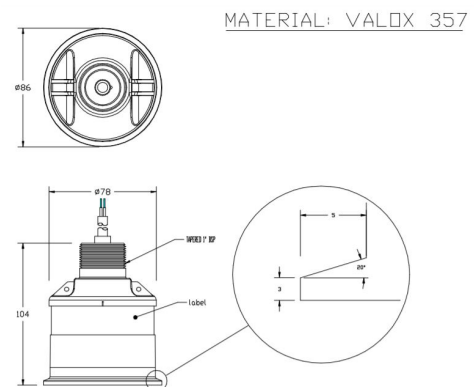
dB15 Transducer Drawing



dB25 Transducer Drawing



dB40 Transducer Drawing



dB6 & dB10 Transducer Drawing



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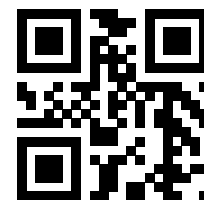
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Rev 7.0

Technical Specification

891480_17.0



ENM 10

Level switch

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1 Product Description

1.1 Product design

Usage

ENM-10 is a level regulator for level control applications. The level regulator starts and stops a pump or activates an alarm device when the liquid level reaches the regulator.

Materials

Denomination	Standard version	Ex version
Regulator casing	Polypropylene	Polypropylene with black conductive casing
Bend relief	EPDM rubber	NBR-PVC rubber
Cable sheath	PVC	NBR-PVC rubber

The plastic components are welded and screwed together.

1.2 Technical data

Application limits

Feature	Value
Liquid temperature	Minimum 0°C (32°F) Maximum 60°C (140°F)
Liquid density	Minimum 0.65 g/cm ³ Maximum 1.5 g/cm ³

Electrical specifications

Feature	Value
Degree of protection	IP68, 20 m (65 ft), 2 bars
Interrupting capacity of micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 30 V 5 A
Interrupting capacity of gold-plated micro switch	AC, resistive load, 250 V 10 A AC, inductive load, 250 V 3 A $\cos \phi = 0.5$ DC, 24 V 10 mA

Voltage limits are subject to local regulations.

Density ranges

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
0.65 – 0.80	194 (7 10/16)	100 (4)
0.80 – 0.95	177 (7)	100 (4)
0.95 – 1.10	162 (6 3/8)	100 (4)
1.05 – 1.20	142 (5 9/16)	100 (4)
1.20 – 1.30	133 (5 1/4)	100 (4)
1.30 – 1.40	130 (5 2/16)	100 (4)

Density g/cm ³	Regulator length mm (in.)	Diameter mm (in.)
1.40 - 1.50	126 (5)	100 (4)

Weight

A regulator with standard density and 20 m cable weighs approximately 2 kg (4.5 lb).

1.3 Cables

Lengths

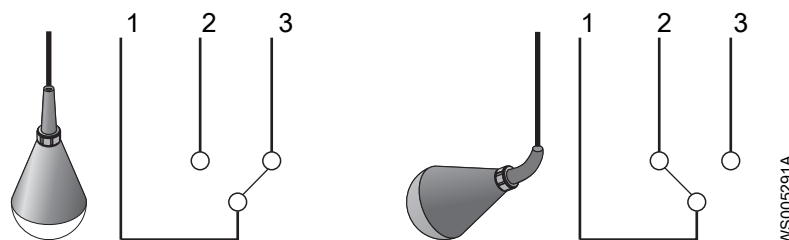
For liquids with specific density between 0.95 and 1.10 g/cm³, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (100 ft) • 50 m (167 ft)
Ex	• 6 m (20 ft) • 13 m (42 ft) • 20 m (65 ft) • 30 m (98 ft) • 50 m (164 ft)

Diameter

The cable diameter for all product variants is 6.7 mm (0.26 in), +/- 0.2 mm (0.00787 in).

Color codes



Cable	1	2	3
Color	Grey	Black	Brown

1.4 Approvals and standards

Standard approvals

LVD approval according to EN61058
 CSA approval: Certificate Number 1330172
 Cl. I Zone 0, Gr. IIC
 CL.I Div.1 Gr A, B, C and D
 Cl.II Gr. E, F, and G

Ex approvals

IECEX ia IIC T4 Ga: -20°C ≤ Ta ≤ 60°C
 IECEX NEMKO 09.0008
 ATEX II 1G Ex ia IIC T4 Ga

NEMKO 10 ATEX 1082

Applied standards for ATEX and IEC

- EN 60079-0:2012 / IEC 60079-0:2011
- EN 60079-11:2012 / IEC 60079-11:2011

Intrinsically safe circuits are required for the automatic control system. Use a Zener barrier, for example, part number 84 01 07.

The electrical connections must comply with the Ex regulations of the national submitter.



2 References

2.1 Chemical resistance tables

The tables show the degree of resistance the level regulator has to different chemicals at two different temperatures. The density of the liquid determines the buoyancy of the regulator.

Acids

Acid	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic acid 50%	1	2	0	0
Acetic acid 75%	2	2	0	0
Benzoic acid	2	2	0	0
Boric acid 5%	0	–	0	0
Butyric acid	2	2	2	2
Chromic acid 10%	0	2	2	2
Citric acid	0	1	0	0
Hydrobromic acid 5%	1	2	0	0
Hydrochloric acid 10%	0	1	0	1
Hydrochloric acid 37%	1	2	0	2
Hydrocyanic acid 10%	0	0	1	2
Hydrofluoric acid 5%	0	2	0	1
Hypochloric acid	1	2	2	2
Maleic acid	2	2	2	2
Nitric acid 5%	1	1	1	1
Nitric acid 65%	2	2	2	2
Oleic acid	1	2	2	2
Oxalic acid 50%	1	1	1	2
Phosphoric acid 25%	0	0	1	2
Phosphoric acid 85%	0	0	1	2
Sulphuric acid 10%	1	2	1	2
Sulphuric acid 78%	2	2	2	2
Tannic acid	0	0	0	0
Tartaric acid	1	1	1	1

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Alkalis

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Ammonium hydroxide	0	–	0	0
Calcium hydroxide	0	0	0	0

Alkali	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Potassium hydroxide	1	2	0	0
Sodium hydroxide	1	2	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Salts

Salt	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminum chloride	0	0	0	0
Calcium sulphate	0	0	0	0
Calcium chloride	0	0	0	0
Calcium nitrate	0	0	0	0
Copper chloride	0	0	0	0
Copper sulphate	0	0	0	0
Ferric chloride	0	0	0	0
Ferrous sulphate	0	0	0	0
Magnesium chloride	0	0	0	0
Potassium sulphate	0	0	0	0
Potassium nitrate	0	0	0	0
Potassium carbonate	1	1	1	1
Potassium bicarbonate	0	0	0	0
Sodium sulphate	0	0	0	0
Sodium chloride	0	0	0	0
Sodium nitrate	0	0	0	0
Sodium bicarbonate	0	0	0	0
Sodium carbonate	0	0	0	0
Tin chloride	1	1	1	1
Zinc sulphate	0	0	0	0
Zinc chloride	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Oils

Oil	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Castor oil	1	1	1	1
Coconut oil	0	–	0	2
Corn oil	2	2	2	2
Diesel oil	2	2	2	2
Linseed oil	2	2	2	2
Mineral oils	2	2	2	2
Olive oil	1	1	1	1
Silicone oils	0	0	0	0

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Solvents and miscellaneous

Chemical	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetone	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl alcohol	2	2	0	1
Carbon tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl alcohol	2	2	0	1
Ethyl ether	2	2	2	2
Ethyl acetate	2	2	2	2
Ethylene dichloride	2	2	2	2
Ethylene chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl alcohol	2	2	0	0
Methyl ethyl ketone	2	2	2	2
Methylene chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

Gases

Gas	PVC cable		NBR/PVC cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Carbon dioxide	0	0	0	0
Carbon monoxide	0	0	0	0
Chlorine - wet	2	2	2	2
Hydrogen sulfide	0	0	1	1
Sulphur dioxide - wet	1	1	2	2

0 = No effect. 1 = Minor to moderate effect. 2 = Severe effect. – = No available information.

2.2 Product range

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 00	0.65–0.80	Blue	20	1	CE	International
582 88 01	0.80–0.95	Blue	20	1	CE	International
582 88 02	0.95–1.10	Blue	6	1	CE	International
582 88 03	0.95–1.10	Blue	13	1	CE	International
582 88 04	0.95–1.10	Blue	20	1	CE	International
582 88 05	1.05–1.20	Blue	20	1	CE	International
582 88 06	1.20–1.30	Blue	20	1	CE	International
582 88 07	1.30–1.40	Blue	20	1	CE	International
582 88 08	1.40–1.50	Blue	20	1	CE	International
582 88 09	0.65–0.80	Gray	20	3	CSA/CE	Canada
582 88 10	0.80–0.95	Gray	20	3	CSA/CE	Canada
582 88 11	0.95–1.10	Gray	6	3	CSA/CE	Canada
582 88 12	0.95–1.10	Gray	13	3	CSA/CE	Canada
582 88 13	0.95–1.10	Gray	20	3	CSA/CE	Canada
582 88 14	1.05–1.20	Gray	20	3	CSA/CE	Canada
582 88 15	1.20–1.30	Gray	20	3	CSA/CE	Canada
582 88 16	1.30–1.40	Gray	20	3	CSA/CE	Canada
582 88 17	1.40–1.50	Gray	20	3	CSA/CE	Canada
582 88 18	0.65–0.80	Gray	20	1	CSA/CE	Canada
582 88 19	0.80–0.95	Gray	20	1	CSA/CE	Canada
582 88 20	0.95–1.10	Gray	6	1	CSA/CE	Canada
582 88 21	0.95–1.10	Gray	13	1	CSA/CE	Canada
582 88 22	0.95–1.10	Gray	20	1	CSA/CE	Canada
582 88 23	1.05–1.20	Gray	20	1	CSA/CE	Canada
582 88 24	1.20–1.30	Gray	20	1	CSA/CE	Canada
582 88 25	1.30–1.40	Gray	20	1	CSA/CE	Canada
582 88 26	1.40–1.50	Gray	20	1	CSA/CE	Canada
582 88 36	0.95–1.10	Gray	30	3	CSA/CE	Canada
582 88 37	0.95–1.10	Gray	50	3	CSA/CE	Canada
582 88 38	0.95–1.10	Gray	100	3	CSA/CE	Canada
582 88 39	0.95–1.10	Gray	150	3	CSA/CE	Canada
582 88 51	0.95–1.10	Red	65	2	CE	International
582 88 52	0.95–1.10	Red	6	2	CE	International
582 88 53	0.95–1.10	Red	13	2	CE	International
582 88 54	0.95–1.10	Red	20	2	CE	International
582 88 57	0.95–1.10	Red	20	2	CE	Canada
582 88 70	0.65–0.80	Blue	20	3	CE	International
582 88 71	0.80–0.95	Blue	20	3	CE	International
582 88 72	0.95–1.10	Blue	6	3	CE	International
582 88 73	0.95–1.10	Blue	13	3	CE	International

¹ See *Type of cables* on page 9.

Version	For density (g/cm ³)	Color of level switch	Length of cable (m)	Type of cable ¹	Approvals	For market
582 88 74	0.95–1.10	Blue	20	3	CE	International
582 88 75	1.05–1.20	Blue	20	3	CE	International
582 88 76	1.20–1.30	Blue	20	3	CE	International
582 88 77	1.30–1.40	Blue	20	3	CE	International
582 88 78	1.40–1.50	Blue	20	3	CE	International
582 88 79	0.95–1.10	Blue	65	1	CE	International
582 88 80	0.95–1.10	Blue	30	1	CE	International
582 88 81	0.95–1.10	Blue	50	1	CE	International
582 88 82	0.95–1.10	Gray	30	1	CSA/CE	Canada
582 88 83	0.95–1.10	Gray	50	1	CSA/CE	Canada
582 88 86	0.95–1.10	Red	30	2	CE	International
582 88 87	0.95–1.10	Red	50	2	CE	International
582 88 90	0.95–1.10	Blue	30	3	CE	International
582 88 91	0.95–1.10	Blue	50	3	CE	International
582 88 92	0.95–1.10	Red	6	2	CE	Japan
582 88 93	0.95–1.10	Red	13	2	CE	Japan
582 88 94	0.95–1.10	Red	20	2	CE	Japan
582 88 95	0.95–1.10	Blue	6	1	CE	Japan
582 88 96	0.95–1.10	Blue	13	1	CE	Japan
582 88 98	0.95–1.10	Blue	50	1	CE	Japan
594 79 10	0.95–1.10	Blue	70	3	CE	International
594 79 13	0.95–1.10	Blue	100	3	CE	International
594 79 18	0.95–1.10	Blue	150	3	CE	International
594 79 19 ²	0.95–1.10	Blue	20	3	CE	International
594 79 20 ²	0.95–1.10	Gray	20	3	CSA/CE	International
594 79 21 ²	0.95–1.10	Transparent	6	3	CE	For demonstration only.
594 79 40 ²	0.95–1.10	Black	6	3	ATEX/IECEX ³	International
594 79 41 ²	0.95–1.10	Black	13	3	ATEX/IECEX ³	International
594 79 42 ²	0.95–1.10	Black	20	3	ATEX/IECEX ³	International
594 79 49 ²	0.95–1.10	Black	30	3	ATEX/IECEX ³	International
594 79 50 ²	0.95–1.10	Black	50	3	ATEX/IECEX ³	International

Type of cables

Type of cable	Jacket	Color coding of wires
1	Blue polyvinyl chloride (PVC)	Grey/Brown/Black
2	Red PVC	Grey/Brown/Black
3	Black nitrile rubber (NBR)/PVC	Grey/Brown/Black

¹ See *Type of cables* on page 9.

² Designed for low current, slow movements and oil. Includes micro switch with gold plated contacts.

³ Zener barrier 84 01 07 required.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

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The original instruction is in English. All non-English
instructions are translations of the original instruction.

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Appendix F – CMW Geotechnical Investigation Report (Bound Separately)

Appendix G – Service Provisions

Your Ref:

6 November 2025

Deon Joubert
Maven Canterbury Ltd
169 Madras St
CHRISTCHURCH

Dear Deon

RE: PROPOSED SUBDIVISION – BRYMER DEVELOPMENT

Thank you for your enquiry regarding the power availability for the proposed 1500+ lot subdivision of the area known as Brymer Development.

We have investigated the electricity supply requirements for the above proposed subdivision and we are able to supply the electrical reticulation.

In order for us to give clearance to the Hamilton City Council it will be necessary for the power to be extended to the boundary of all lots.

An easement will be required in favour of WEL Networks Ltd over any existing reticulation which currently runs through this property.

An easement will be required in favour of WEL Networks Ltd over any electrical reticulation installed along private right of ways. The requirement for this will be confirmed at time of design.

WEL will prepare the easement but any costs associated with this, the survey, LINZ registration fees, and landowner legal fees will be the developer's responsibility.

If you wish us to proceed with pricing for the installation of the electrical reticulation please contact us at www.wel.co.nz/get-connected/subdivision . Please attach this consent letter with your application.

We thank you for your enquiry. If you have any further queries or require additional information, please do not hesitate to contact me.

Yours faithfully



Miranda McLean
PROJECT MANAGER



29 September 2025

**CONDITIONAL ACCEPTANCE BY TUATAHI FIRST FIBRE LIMITED AS
TELECOMMUNICATIONS OPERATOR**

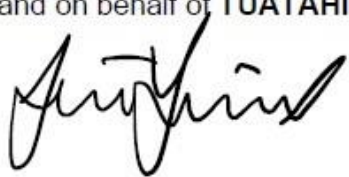
Development: Brymer Road Development, Brymer Road, Hamilton (O'Brien Rd, Rotokauri and 584 SHW 23, Temple View and 10 Harrogate Pl, Grandview Heights)

Legal Description: LOT 1 DPS 87291, LOT 3 DP 385271 BLK XVI NEWCASTLE SD INT IN ESMTS and ALLOT 365 PUKETE PSH SO 42733, PT LOT 2 DP 18355 and LOT 22 DPS 79526

1. Tuatahi First Fibre Limited (TFF) confirms that a TFF telecommunications connection will be made available for each site in the development, **providing the developer was to sign a TFF Installation Agreement**. Upon approval of this agreement, TFF will undertake to become the telecommunications operator of the telecommunications reticulation in the proposed development and any proposed public roads at Brymer Road Development (the "**Subdivision**"), to provide network connections to all lots / units in the Subdivision (the "**Reticulation**").
2. The Reticulation will be installed in accordance with:
 - (a) the requirements and standards set by the Hamilton City Council and advised to TFF via the Council's website; and
 - (b) the requirements of the Telecommunications Act 2001 and all other applicable laws, regulations and codes (as amended).
3. The Reticulation will be installed by our preferred provider to TFF's satisfaction.
4. TFF will be the owner, operator and maintainer of the Reticulation.
5. One or more retail service providers will be available to supply telecommunications services over the completed Reticulation when service is available, provided that TFF shall not be responsible if the retail service provider's offer to supply such telecommunications services or the number of such providers varies from time to time.

SIGNED for and on behalf of **TUATAHI FIRST FIBRE LIMITED** by:

Signature:



Name:

Dan Fenwick



First Gas Limited
Private Bag 2020, New Plymouth, 4342
New Zealand
P 0800 NEW GAS (0800 639 427)

18 November 2025

Brymer Farms Limited
c/- Maven Canterbury Limited
Level 1, 169 Madras St
Christchurch

Attention: Deon Joubert

Enquiries To
Paul Bird
DDI: (027) 531 0060

Dear Deon,

BRYMER FARMS LIMITED – Natural Gas Availability

I refer to your email regarding the proposed High-Level Masterplan for Brymer Farms.
Firstgas confirms that natural gas is available for this subdivision.

When the development begins, please contact us for an installation plan and pricing.

We look forward to working with you.

Kind regards

A handwritten signature in blue ink, appearing to read "Paul Bird".

Paul Bird
Distribution Development Manager
Firstgas

Appendix I – WSP Wastewater Modelling Report



Hamilton City Council

Brymer Farms - Wastewater Modelling Results

02-07-2026

3-WLASS.AL



Document distribution

Hamilton City Council

Brymer Farms - Wastewater Modelling Results

02-07-2026

3-WLASS.AL

Prepared for

Hamilton City Council

Prepared by

WSP New Zealand Limited

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Quality control	Name	Date
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Approved by:	Ryan Mackinnon	02-07--2026

Revisions

Rev	Date	Details
1	21-05-2026	Draft for Client Review
2	23-06-2026	Draft for Client Review (additional scenarios added)
3	02-07-2026	Final

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1. Preface

1.1 Jurisdictional Context

IAWAI is a newly established water services Council Controlled Organisation (CCO) jointly owned by Waikato District Council (WDC) and Hamilton City Council (HCC). IAWAI's statutory jurisdiction is limited to the existing HCC and WDC administrative boundaries.

The Brymer Farms site's proximity to the Hamilton City boundary and the existing Hamilton water and wastewater networks has prompted developers to investigate whether servicing via HCC/IAWAI infrastructure may be technically feasible. Accordingly, technical assessments are underway to explore potential water and wastewater servicing options for Brymer Farms using existing and/or planned HCC/IAWAI infrastructure.

1.2 Disclaimers and Limitations

The water and wastewater servicing assessments, including the scope and content of the attached assessment, have been prepared collaboratively by HCC and IAWAI in good faith and on a without prejudice basis.

This report is intended solely to assess the potential for servicing options and does not confer, imply, or guarantee any right or ability for Brymer Farms—or any other development—to connect to the HCC/IAWAI water or wastewater networks.

This assessment does not represent:

- Any commitment (actual or implied) by HCC or IAWAI to provide services
- Any confirmation of available network capacity
- Any approval for connection or use of existing or future infrastructure.

Such approvals to use HCC/IAWAI infrastructure are contingent on appropriate statutory approvals and commercial agreements being established and agreed between the parties.

2. Introduction

2.1 Background

Hamilton City Council (HCC) engaged WSP to assess water and wastewater servicing for the proposed Brymer Farms development on the city's outer fringe, outside the current boundary. Brymer Farms is expected to seek approval to develop under the NZ Government Fast Track Approvals regime.

New servicing solutions are necessary as the required infrastructure is not included in HCC's existing network planning or the 2024–2034 Long-Term Plan. Figure 2-1 shows the location of the proposed Brymer Farms development in reference to the existing HCC wastewater network.

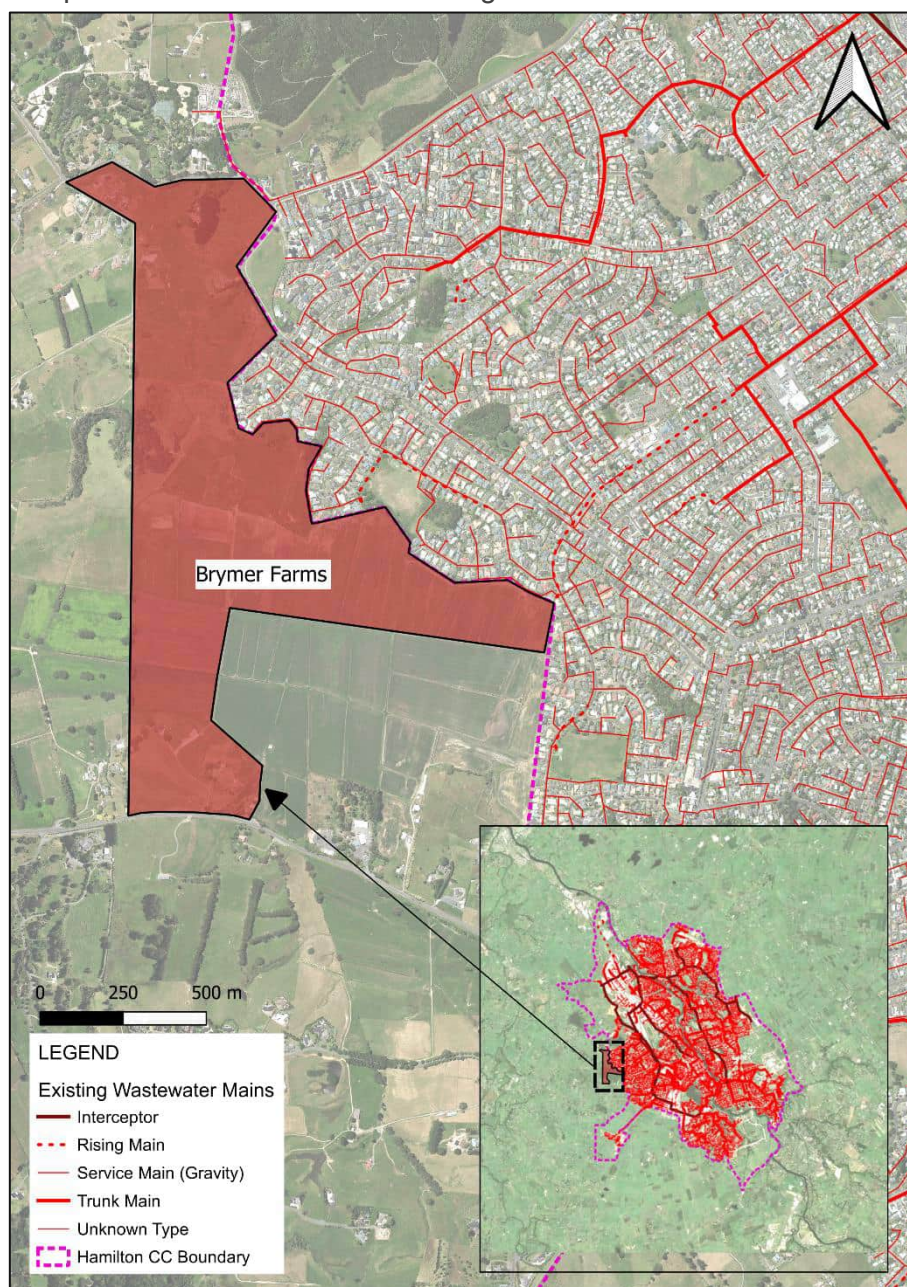


Figure 2-1: Proposed Brymer Farms development

Due to the proximity of the Brymer Farms development to other confirmed and potential Fast Track developments in the surrounding area, the wastewater modelling assessment has been undertaken on a combined basis, considering the overall demands from all developments in the vicinity.

The overall development area comprises the Brymer Farms and Wallace Road developments, along with several future potential development areas. The extent of each development component is shown in Figure 2-2, and the details are summarised in Table 2-1.

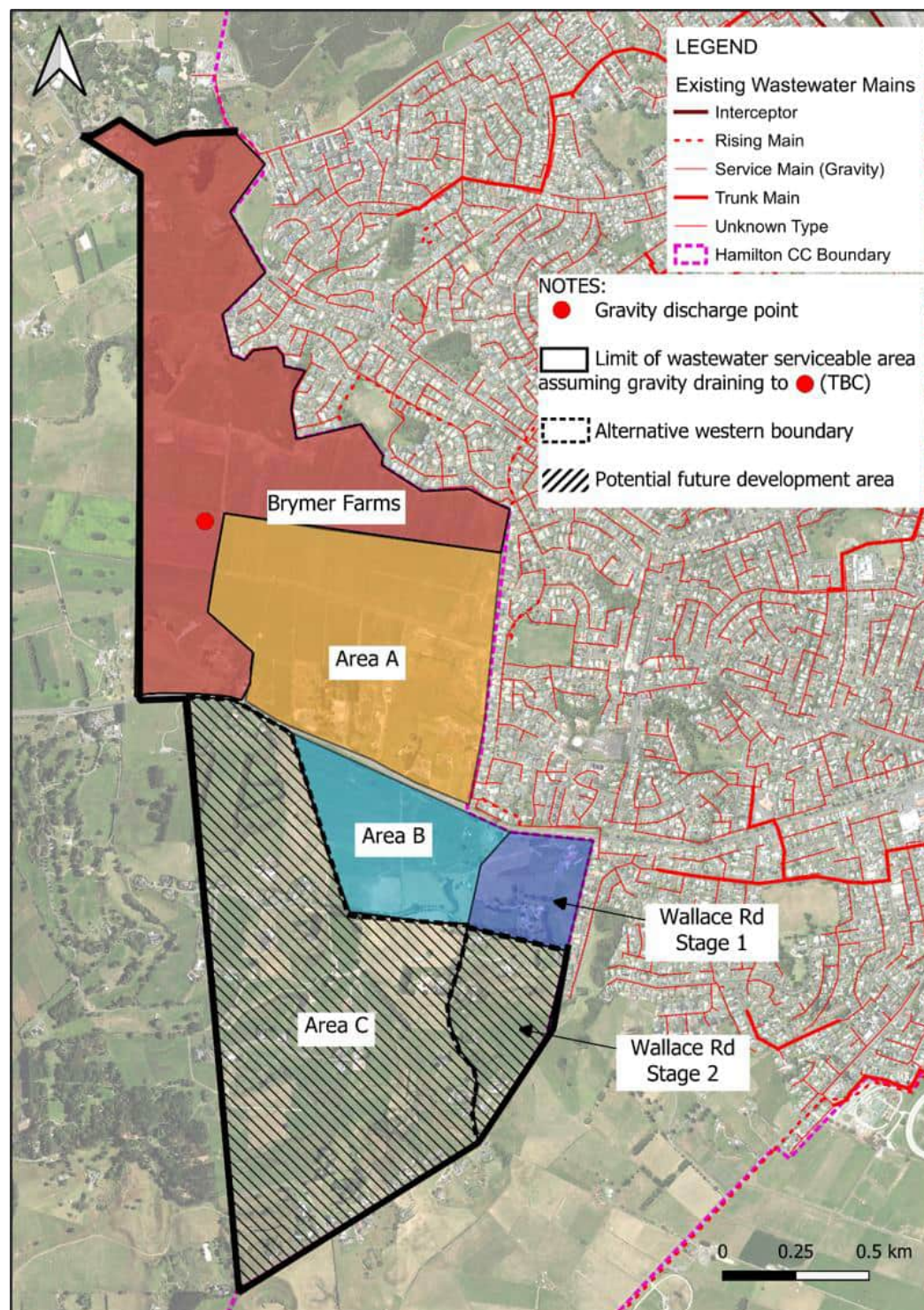


Figure 2-2: Development areas plan

Table 2-1: Summary of the development components

Description	Area (ha)	Population Equivalent	Peak Wet Weather Flow (PWWF) (L/s)
Brymer Farms	62	4,160	38.59
Area A	66	2,970	32.89
Area B	35	1,575	18.17
Area C	139	6,255	67.81
WA (Wallace Road) Stage 1	~12.5	2,700	7.61
WA (Wallace Road) Stage 2	~15		15.23

Note: The peak wet weather flows (PWWF) for each development were provided by the respective developers and calculated in accordance with the Regional Infrastructure Technical Specification (RITS), Version 1.

2.2 Scope

A wastewater modelling assessment was undertaken as part of the overall assessment for the Brymer Farms and Wallace Road developments. The purpose of the assessment was to identify the impact of the PWWF resulting from the proposed developments on the existing HCC wastewater network.

The assessment has focused on three demand scenarios listed in Table 2-2.

Table 2-2: Demand scenario description

Demand Scenario	Description	Total Area	PWWF (L/s)
1	Only considers the PWWF from Brymer Farms	62	38.59
2	Resulting PWWF demands from Brymer Farms, Area A, Area B and WA Stage 1	175.5	97.26
3	Demand from Scenario 2 + Resulting PWWF demands from Area C and WA Stage 2	329.5	180.3

2.3 Assumptions and Limitations

- This assessment considers the impact of the Brymer Farms development as a standalone scenario, as well as the combined impact of the proposed Brymer Farms and Wallace Road developments on the existing HCC network, both with and without the inclusion of future potential service areas.
- This assessment has been prepared solely to evaluate the impact on the existing HCC wastewater network and may not provide sufficient detail to inform capital investment contributions or other financial contributions.
- No cumulative assessments have been completed to evaluate the potential implications of other Fast Track development proposals on the Western network.

3. Modelling Assessment

Hydraulic modelling was undertaken by Stantec using the HCC model and methods consistent with previous development assessments.

3.1 Modelling Scenarios

The modelling scenarios summarised in Table 3-1 have been carried out for both the 2041 and 2061 planning horizons. Modelling has been undertaken for each of the demand scenarios listed in Table 2-2.

Table 3-1: Summary of the modelling scenarios

No.	Model Scenario	Description
1	Baseline	The 'baseline models' are referred to as the models containing 2041 and 2061 wastewater demands, excluding the demand for Brymer Farms and Wallace Road development (or any land development outside of the current HCC boundary).
2	Baseline + Funded Strategic Upgrades	The Council funded strategic upgrades that are confirmed to be implemented by each planning horizon (2041 and 2061), are added to the baseline models developed in Scenario 1.
3	Baseline + Fast Track Developments	The demand for proposed for the Fast Track development components are added to the baseline (2041 and 2061) models developed in Scenario 1 (with no strategic upgrades).
4	Baseline + Funded Strategic Upgrades + Fast Track Developments	The demand for proposed for the Fast Track development components are added to the (2041 and 2061) models developed in Scenario 2.

Note 1: The Council funded strategic upgrades included in the modelling assessment are Upper Western network (Kahikatea Greenwood, storage and pre-treatment at Lorne St, 5th Ave diversion), Hillcrest bulk storage, Eastern interceptor mid-section storage, Eastern interceptor upper section storage, Te Anau Splitt diversion, Western interceptor mid-section storage, Enderley trunk main upgrade, Collins Rd storage.

Note 2: Demand Scenario 3 was only undertaken in the 2061 planning horizon.

3.2 Model Results Interpretation

Wastewater modelling was undertaken to assess the potential impact of Brymer Farms and Wallace Road development demands on the wider existing network.

The modelling outputs include key performance indicators such as manhole overflow volumes, pipe filling ratios, and pipe velocities. Peak pipe utilisation (where a value of 1 represents 100% utilisation) indicates surcharging when wastewater levels reach the soffit of the pipe. Manhole overflow volumes quantify the extent of wastewater discharge when system capacity is exceeded, highlighting potential environmental risks. Pipe velocities were assessed to confirm they are sufficient to maintain self-cleansing conditions while remaining low enough to prevent excessive wear, erosion, and structural damage.

3.3 Connection Points and Assessment Extent

The modelling assessment has been undertaken based on the following:

- Flows from the Brymer Farms and Wallace Road developments, including future potential areas (Area C and Wallace Road Stage 2), will gravitate to a common point located within Brymer Farms.
- Flows will be conveyed from the gravity discharge point via a dedicated rising main and discharged into existing manhole WWP15002 on the Western Interceptor.
- Flows will be conveyed from manhole WWP15002 (at the intersection of Grandview Road and Avalon Drive), via the Western Interceptor and the Rotokauri Interceptor to the Pukete WWTP.

The proposed Brymer Farms and Wallace Road developments discharge directly into the Western Interceptor. Therefore, the assessment extent for all three demand scenarios is limited to the following:

- Western Interceptor section between the discharge point (manhole WWP15002) and existing manhole WWO13061.
- Rotokauri Interceptor section between the existing manhole WWO13061 and Pukete WWTP.

The assessment extent is shown in Figure 3-1.

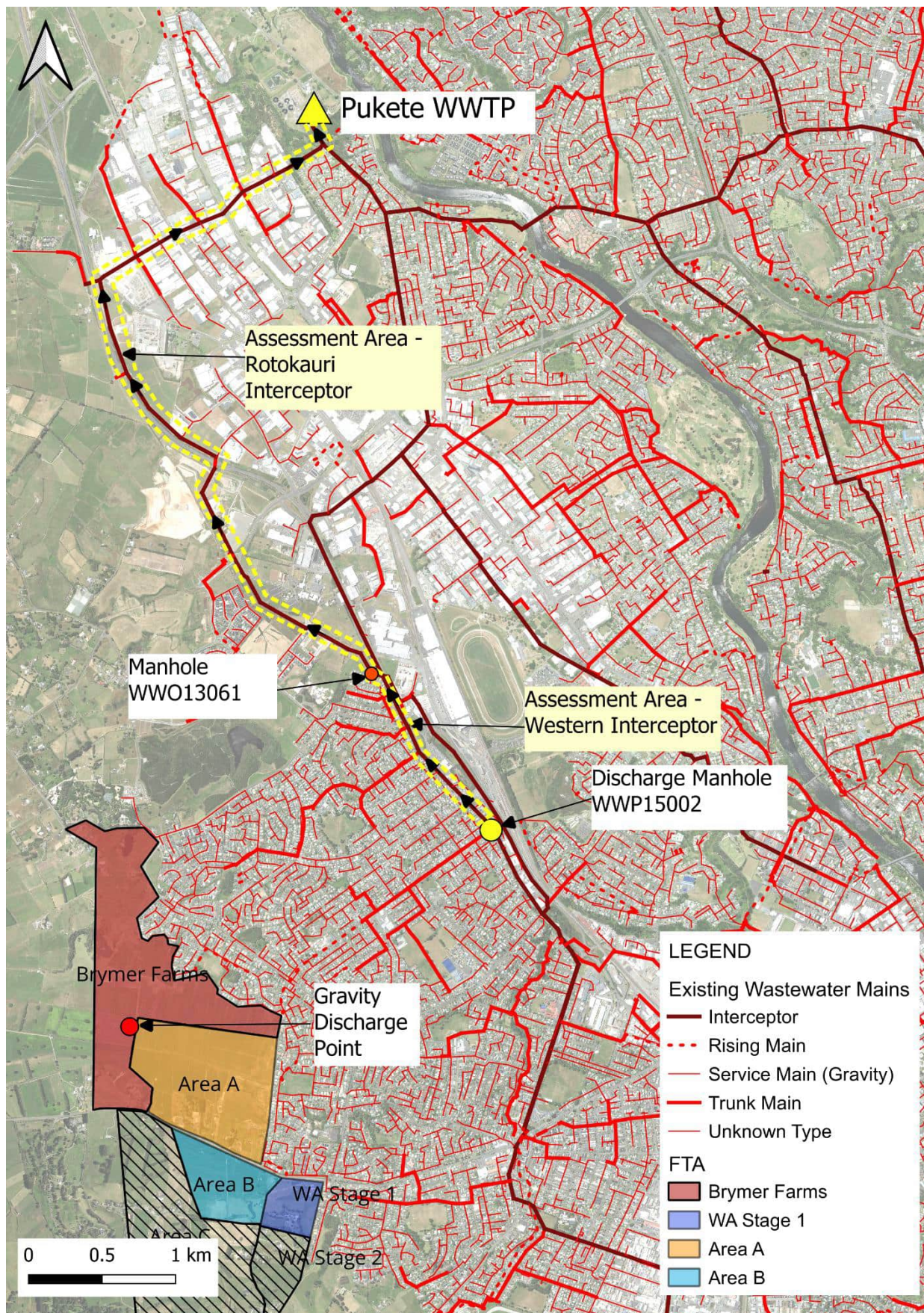


Figure 3-1: Connection points and assessment extent

4. Results – Demand Scenario 1

This section presents the modelling results for Demand Scenario 1, which considers only the PWWF associated with Brymer Farms (shown in Figure 2-2) as a standalone development.

4.1 Pipe Utilisation

Table 4-1 presents the pipe filling results for the Western and Rotokauri Interceptor sections between the Grandview Road/Avalon Drive intersection and Pukete WWTP (Figure 3-1), comparing pre- and post-development conditions for both 2041 and 2061 (without funded strategic upgrades). For the pipe sections highlighted in red, utilisation exceeds 100% when the development demand is included, either in both 2041 and 2061 or only in 2061.

Table 4-1: Demand Scenario 1 pipe filling ratio pre and post development (without funded strategic upgrades)

MUID	PIPE FILLING RATIO 2041		PIPE FILLING RATIO 2061	
	Pre-development	Post-development	Pre-development	Post-development
41200	0.93	1.07	0.98	1.12
40259	0.92	1.03	0.96	1.07
40258	0.91	1.01	0.95	1.05
40257	0.93	1.01	0.96	1.04
40256	0.84	0.89	0.86	0.92
40255	0.67	0.7	0.69	0.72
38154	0.72	0.75	0.74	0.77
38153	0.71	0.74	0.73	0.75
38152	0.61	0.63	0.63	0.63
568518	0.55	0.57	0.57	0.58
517368	0.68	0.72	0.7	0.73
517367	0.63	0.66	0.65	0.68
517366	0.68	0.71	0.7	0.73
517365	0.72	0.75	0.74	0.77
517364	0.68	0.71	0.7	0.73
517363	0.64	0.67	0.66	0.7
517362	0.67	0.7	0.69	0.73
517361	0.59	0.62	0.61	0.68

MUID	PIPE FILLING RATIO 2041		PIPE FILLING RATIO 2061	
	Pre-development	Post-development	Pre-development	Post-development
517360	0.6	0.63	0.63	0.7
517359	0.61	0.64	0.65	0.77
517357	0.59	0.79	0.63	0.93
517356	0.62	0.65	0.67	0.91
517355	0.71	0.75	0.77	1.01
517354	0.7	0.74	0.78	1.06
323396	0.74	0.78	0.84	1.12
323395	0.75	0.79	0.91	1.17
323394	0.74	0.78	0.95	1.19
323393	0.76	0.79	1	1.21
323392	0.76	0.8	1.03	1.2
323391	0.79	0.83	1.04	1.19
323390	0.79	0.83	1.04	1.17
323389	0.8	0.84	1.01	1.12
323387	0.78	0.82	0.97	1.06
323388	0.77	0.81	0.95	1.03
265628	0.79	0.82	0.96	1.03
167218	0.76	0.79	0.92	0.97
171656	0.77	0.8	0.9	0.94
171657	0.76	0.79	0.89	0.93
8490	0.77	0.8	0.87	0.9
8489	0.75	0.78	0.83	0.85
6337	0.74	0.77	0.82	0.84
239627	0.71	0.73	0.77	0.79
6352	0.65	0.67	0.7	0.72
6351	0.45	0.46	0.48	0.49
6350	0.47	0.47	0.5	0.51

In general, pipe filling ratios for each pipe section increase following the addition of the proposed Brymer Farms development demands. The fill ratios decrease following the implementation of the funded strategic upgrades. However, utilisation still exceeds 100% in the pipe sections highlighted when the development demands are included. The pipe utilisation results for all scenarios are presented in the maps provided in Appendix A.

Long section plots were produced along the modelled pipe alignment (assessment extent), showing the variation in ground levels, pipe invert levels, and modelled water levels along the alignment. Figure 4-1 (2041) and Figure 4-2 (2061) presents the long section plot for each modelling scenario listed in Table 3-1.

The long section plots show the general increase in pipe water levels when Brymer Farms development demand is added to the baseline scenarios, particularly in 2061. The introduction of funded strategic upgrades results in a marginal reduction in water levels. These trends are consistent with the pipe filling ratios summarised in Table 4-1.

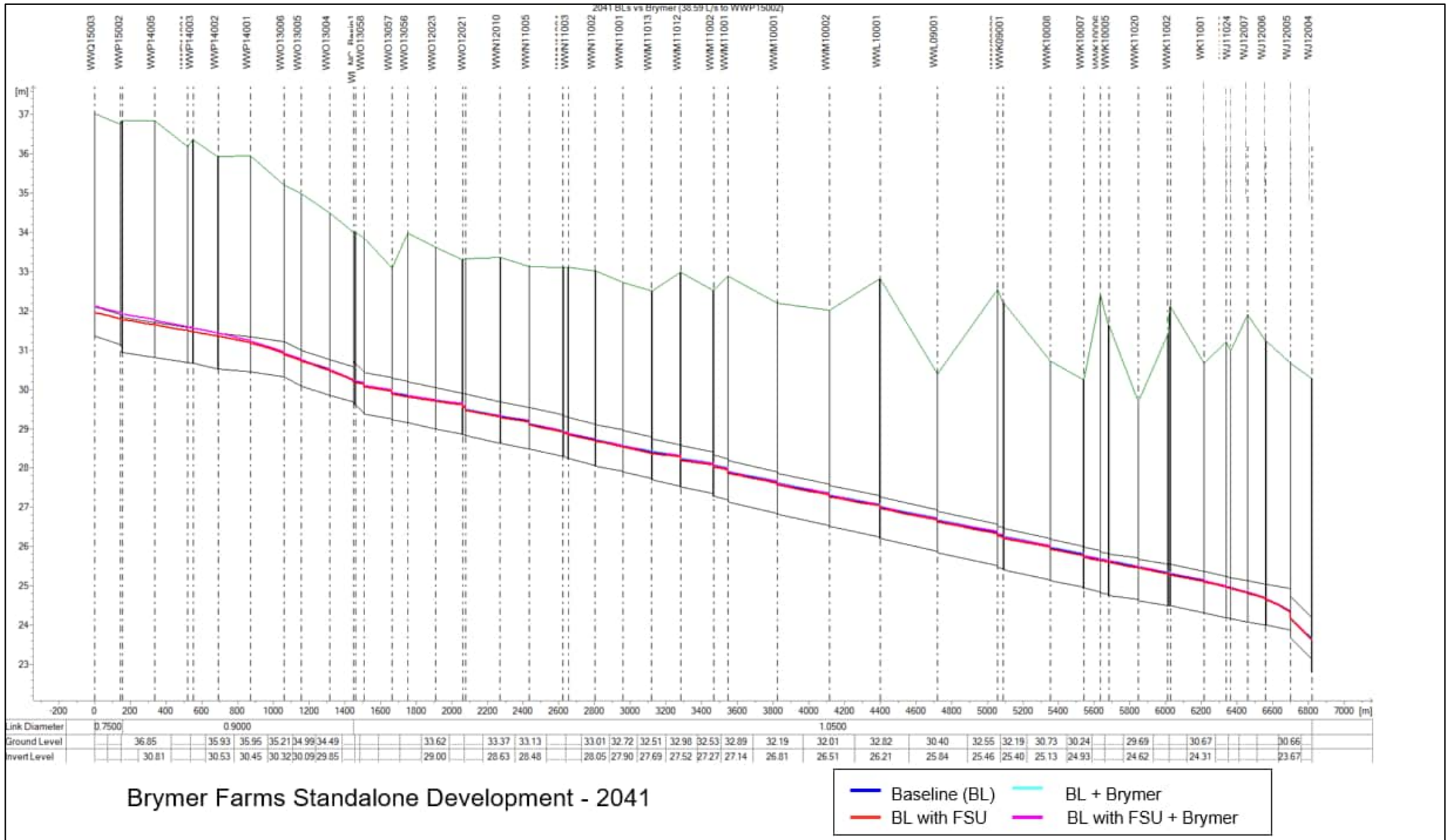


Figure 4-1: Long section plot comparing 2041 baseline versus baseline plus the development demands (Demand Scenario 1)

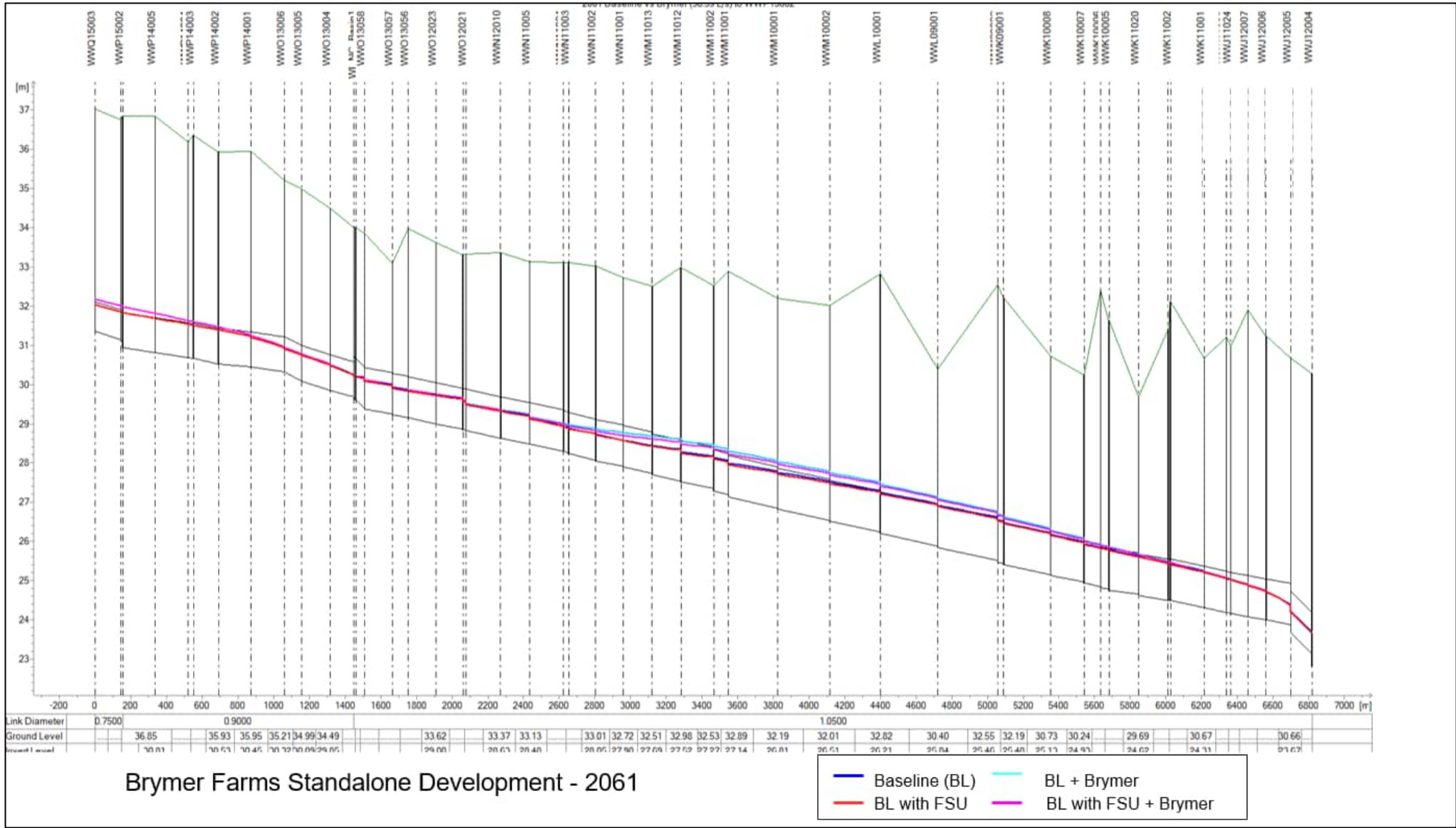


Figure 4-2: Long section plot comparing 2061 baseline versus baseline plus the development demands (Demand Scenario 1)

4.2 Manhole Overflow Volumes

The modelling results have not identified any manhole overflows along the assessment extent after adding the Brymer Farms development demand.

Detailed manhole overflow volume results for each scenario are provided in the maps included in Appendix A.

4.3 Pipe Velocity

No significant differences in pipe velocities (within the assessment extent) were observed before and after the addition of Brymer Farms development demands in both 2041 and 2061.

Detailed pipe velocity results for each scenario are provided in the maps included in Appendix A.

5. Results - Demand Scenario 2

This section discusses the modelling results for Demand Scenario 2, which considers only the PWWF demands from Brymer Farms, Area A, Area B, and Wallace Road Stage 1 (shown in Figure 2-2).

5.1 Pipe Utilisation

Table 5-1 presents the pipe filling results for the Western and Rotokauri Interceptor sections between the Grandview Road/Avalon Drive intersection and Pukete WWTP (Figure 3-1), comparing pre- and post-development conditions for both 2041 and 2061 (without funded strategic upgrades). For the pipe sections highlighted in red, utilisation exceeds 100% when the development demand is included, either in both 2041 and 2061 or only in 2061.

Table 5-1: Demand Scenario 2 pipe filling ratio pre and post development (without funded strategic upgrades)

MUID	PIPE FILLING RATIO 2041		PIPE FILLING RATIO 2061	
	Pre-development	Post-development	Pre-development	Post-development
41200	0.93	1.29	0.98	1.34
40259	0.92	1.2	0.96	1.24
40258	0.91	1.18	0.95	1.22
40257	0.93	1.14	0.96	1.18
40256	0.84	0.98	0.86	1.01
40255	0.67	0.75	0.69	0.77
38154	0.72	0.8	0.74	0.82
38153	0.71	0.78	0.73	0.8
38152	0.61	0.65	0.63	0.7
568518	0.55	0.58	0.57	0.65
517368	0.68	0.75	0.7	0.86
517367	0.63	0.7	0.65	0.85
517366	0.68	0.75	0.7	0.92
517365	0.72	0.79	0.74	0.98
517364	0.68	0.74	0.7	0.96
517363	0.64	0.71	0.66	1.01

MUID	PIPE FILLING RATIO 2041		PIPE FILLING RATIO 2061	
	Pre-development	Post-development	Pre-development	Post-development
517362	0.67	0.73	0.69	1.07
517361	0.59	0.65	0.61	1.11
517360	0.6	0.66	0.63	1.15
517359	0.61	0.68	0.65	1.22
517357	0.59	0.67	0.63	1.27
517356	0.62	0.71	0.67	1.35
517355	0.71	0.82	0.77	1.44
517354	0.7	0.83	0.78	1.46
323396	0.74	0.88	0.84	1.51
323395	0.75	0.91	0.91	1.53
323394	0.74	0.92	0.95	1.51
323393	0.76	0.93	1	1.5
323392	0.76	0.94	1.03	1.46
323391	0.79	0.95	1.04	1.4
323390	0.79	0.95	1.04	1.37
323389	0.8	0.93	1.01	1.28
323387	0.78	0.9	0.97	1.19
323388	0.77	0.88	0.95	1.15
265628	0.79	0.9	0.96	1.15
167218	0.76	0.85	0.92	1.08
171656	0.77	0.84	0.9	1.03
171657	0.76	0.83	0.89	1.02
8490	0.77	0.83	0.87	0.96
8489	0.75	0.81	0.83	0.9
6337	0.74	0.79	0.82	0.88
239627	0.71	0.75	0.77	0.82
6352	0.65	0.69	0.7	0.74
6351	0.45	0.47	0.48	0.5

MUID	PIPE FILLING RATIO 2041		PIPE FILLING RATIO 2061	
	Pre-development	Post-development	Pre-development	Post-development
6350	0.47	0.48	0.5	0.54

Similar to Demand Scenario 1, pipe filling ratios increase across all sections with the addition of the proposed Brymer Farms and Wallace Road development demands. The post-development filling ratios are generally higher than those observed in Demand Scenario 1. The fill ratios decrease following the implementation of the funded strategic upgrades. However, utilisation still exceeds 100% in the pipe sections highlighted when the development demands are included.

The pipe utilisation results for all scenarios are presented in the maps provided in Appendix A.

Long section plots were produced along the modelled pipe alignment (assessment extent) extending to Pukete WWTP, showing the variation in ground levels, pipe invert levels, and modelled water levels along the alignment. Figure 5-1 to Figure 5-4 shows the long section plots for following scenarios.

1. 2041 baseline versus 2041 baseline + Brymer Farms + WA Stage 1 + Area A + Area B demands
2. 2041 baseline with FSU versus 2041 baseline with FSU + Brymer Farms + WA Stage 1 + Area A + Area B demands
3. 2061 baseline versus 2061 baseline + Brymer Farms + WA Stage 1 + Area A + Area B demands
4. 2061 baseline with FSU versus 2061 baseline with FSU + Brymer Farms + WA Stage 1 + Area A + Area B demands

The long section plots indicate an increase in pipe water levels when development demand is added to the baseline scenarios. The introduction of funded strategic upgrades results in a marginal reduction in water levels. These trends are consistent with the pipe filling ratios summarised in Table 5-1.

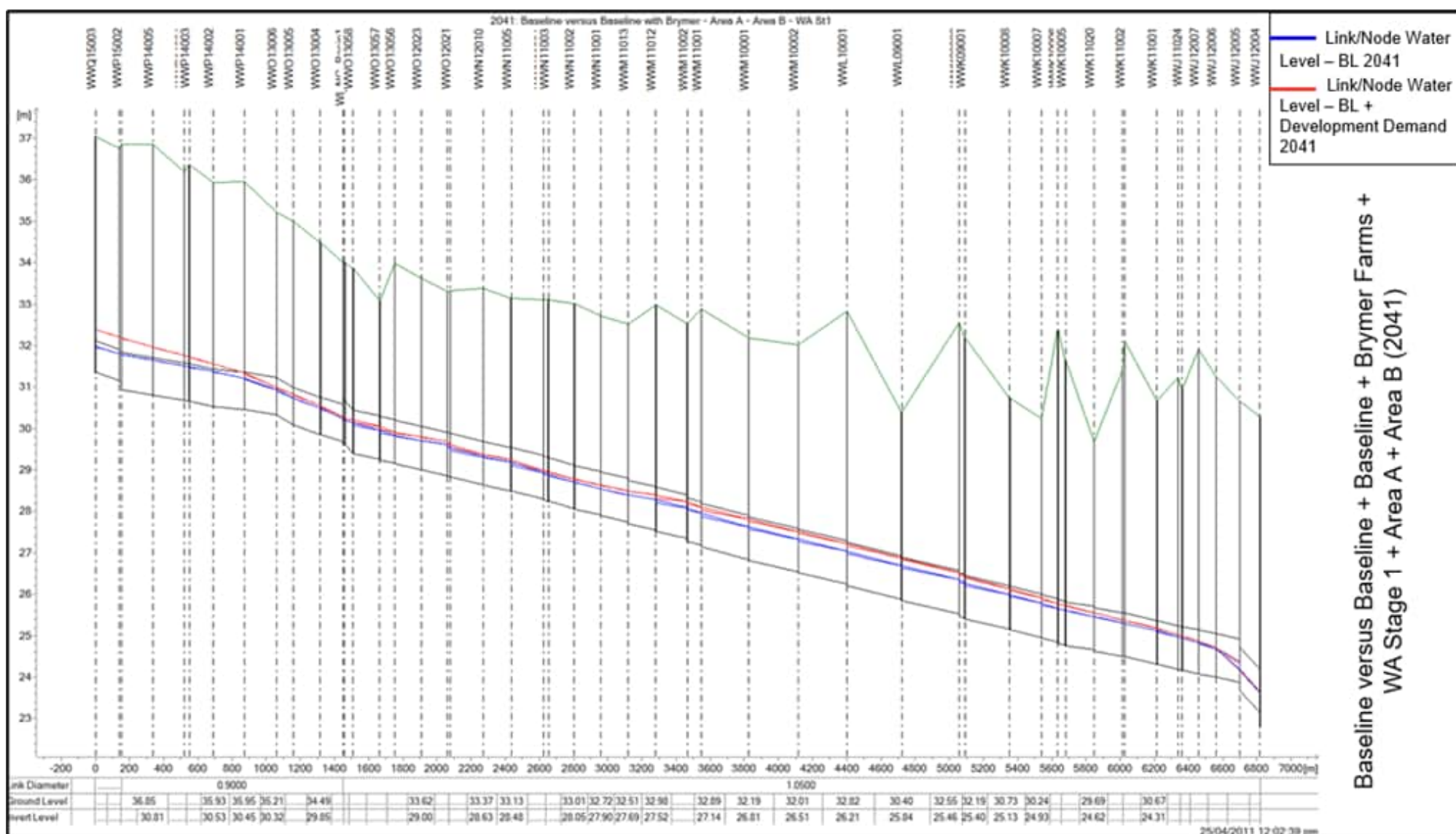


Figure 5-1: Long section plot comparing 2041 baseline versus baseline plus the development demands (Demand Scenario 2)

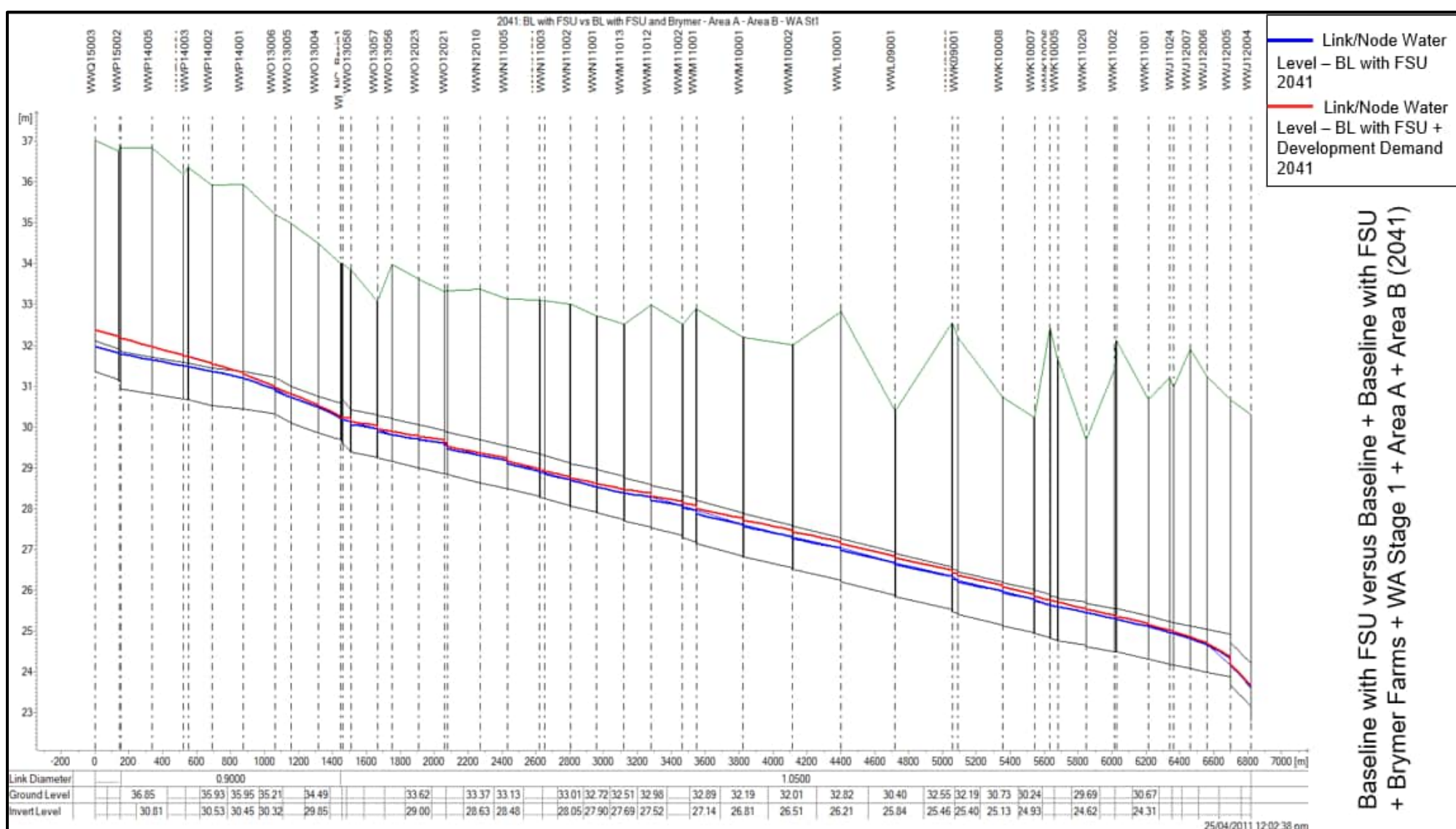


Figure 5-2: Long section plot comparing 2041 baseline with FSU versus baseline with FSU plus the development demands (Demand Scenario 2)

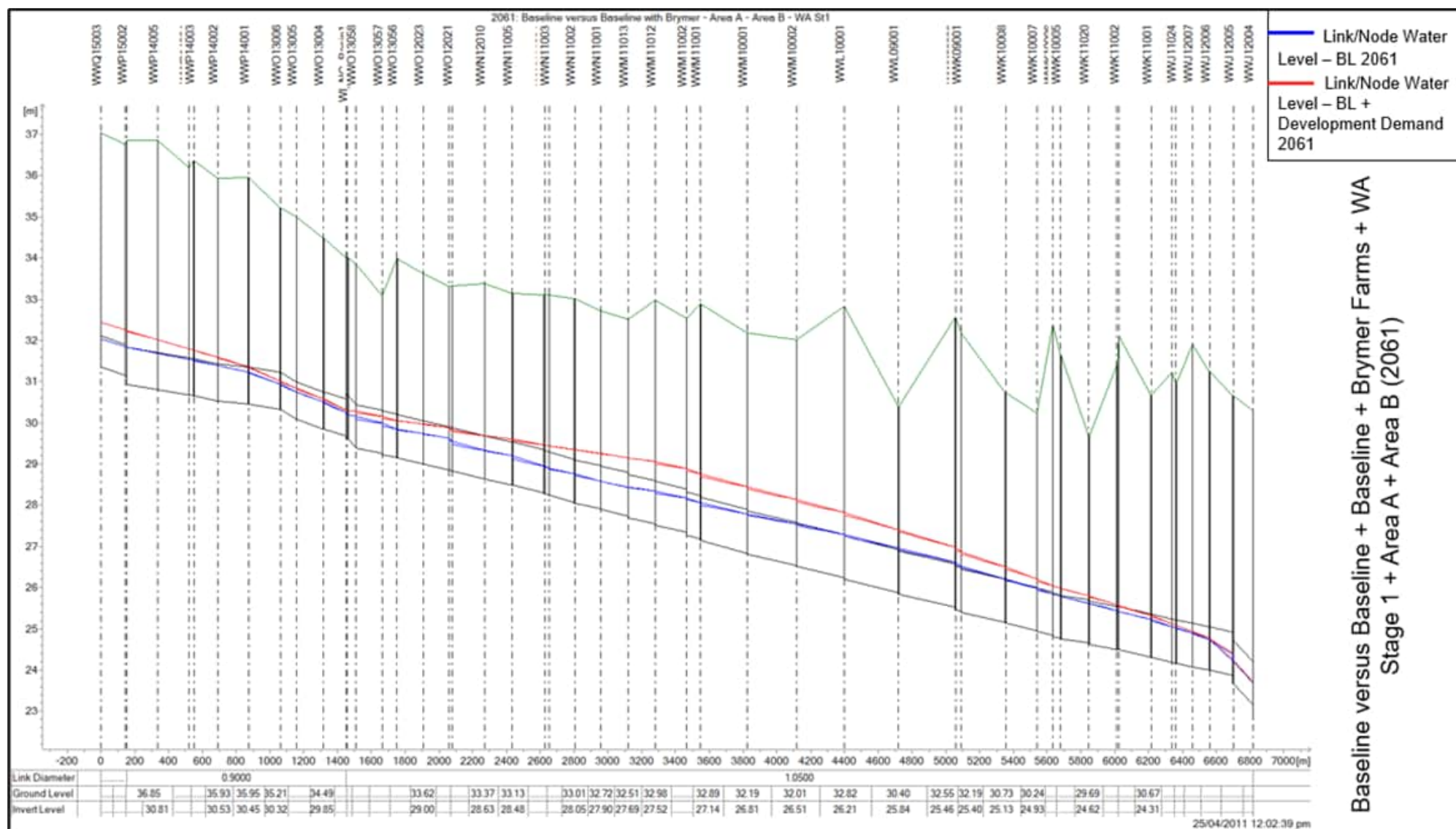


Figure 5-3: Long section plot comparing 2061 baseline versus baseline plus the development demands (Demand Scenario 2)

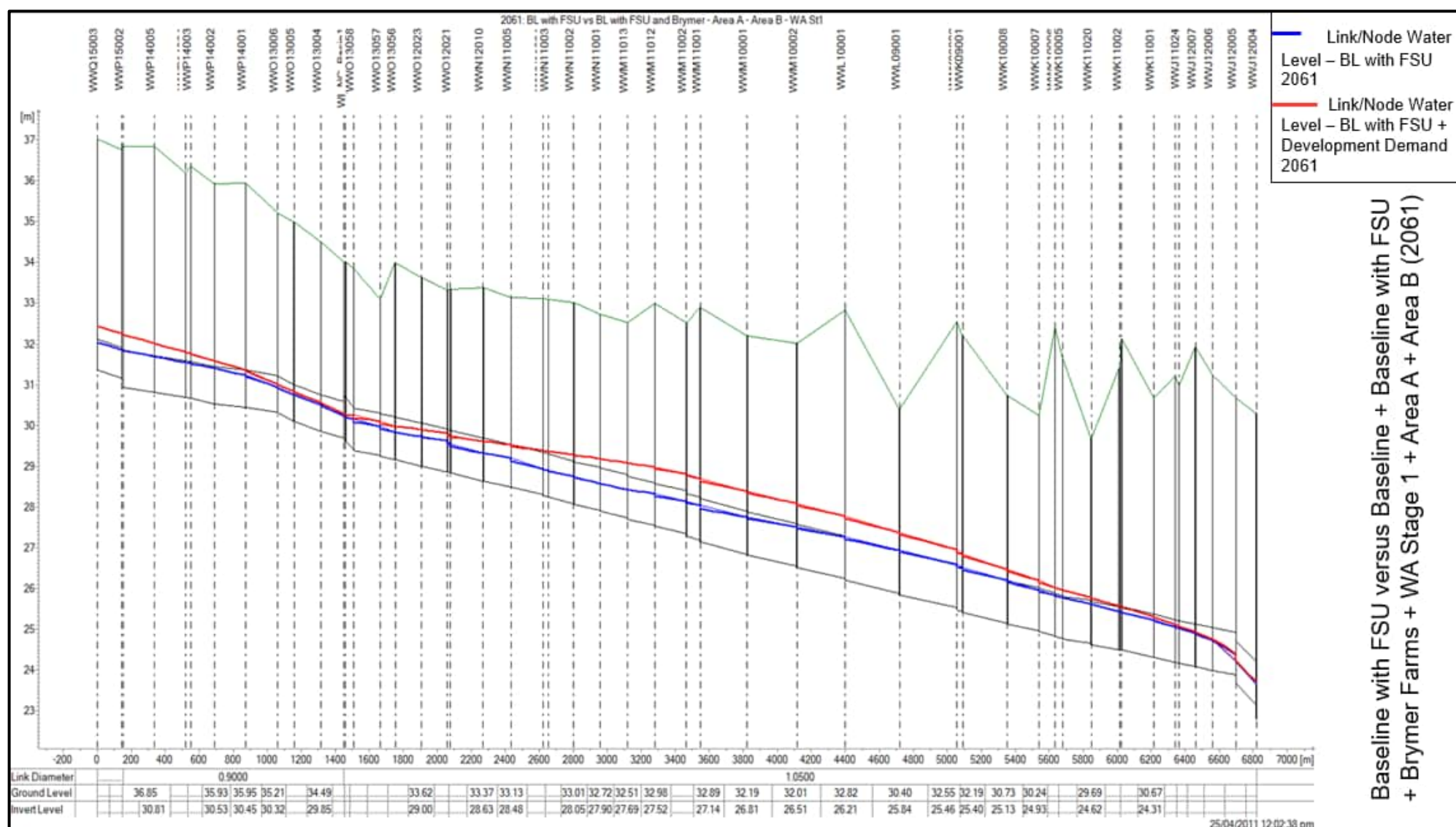


Figure 5-4: Long section plot comparing 2061 baseline with FSU versus baseline with FSU plus the development demands (Demand Scenario 2)

5.2 Manhole Overflow Volumes

The modelling results have not identified any manhole overflows along the assessment extent after adding the Brymer Farms and Wallace Road development demands.

Detailed manhole overflow volume results for each scenario are provided in the maps included in Appendix A.

5.3 Pipe Velocity

The pipe velocity within the assessment extent slightly increases in each pipe section with the addition of Brymer Farms and Wallace Road development demands in both 2041 and 2061. The maximum increase in velocity within any pipe section is approximately 7% in both 2041 and 2061.

Detailed pipe velocity results for each scenario are provided in the maps included in Appendix A.

6. Results - Demand Scenario 3

This section presents the modelling results for Demand Scenario 3, which considers the PWWF associated with the Brymer Farms and Wallace Road developments (Brymer Farms, Area A, Area B, and Wallace Road Stage 1), including the future potential areas (Area C and Wallace Road Stage 2). Refer to Figure 2-2 for the plan of the development areas. This demand scenario was modelled only for the 2061 planning horizon, as full development of all future potential areas is only anticipated post 2041.

6.1 Pipe Utilisation

Table 6-1 presents the pipe filling results for the Western and Rotokauri Interceptor sections between the Grandview Road/Avalon Drive intersection and Pukete WWTP (Figure 3-1), comparing pre- and post-development conditions in 2061 (without funded strategic upgrades). For the pipe sections highlighted in red, utilisation exceeds 100% when the development demand is included in 2061.

Table 6-1: Demand Scenario 3 pipe filling ratio pre and post development (without funded strategic upgrades)

MUID	PIPE FILLING RATIO 2061	
	Pre-development	Post-development
41200	0.98	1.8
40259	0.96	1.64
40258	0.95	1.6
40257	0.96	1.51
40256	0.86	1.28
40255	0.69	0.98
38154	0.74	1.03
38153	0.73	0.97
38152	0.63	0.87
568518	0.57	0.81
517368	0.7	1.04
517367	0.65	1.04
517366	0.7	1.11
517365	0.74	1.17
517364	0.7	1.15

MUID	PIPE FILLING RATIO 2061	
	Pre-development	Post-development
517363	0.66	1.21
517362	0.69	1.27
517361	0.61	1.32
517360	0.63	1.35
517359	0.65	1.44
517357	0.63	1.14
517356	0.67	1.56
517355	0.77	1.66
517354	0.78	1.69
323396	0.84	1.74
323395	0.91	1.76
323394	0.95	1.76
323393	1	1.75
323392	1.03	1.7
323391	1.04	1.64
323390	1.04	1.61
323389	1.01	1.5
323387	0.97	1.39
323388	0.95	1.33
265628	0.96	1.33
167218	0.92	1.23
171656	0.9	1.15
171657	0.89	1.14
8490	0.87	1.05
8489	0.83	0.96
6337	0.82	0.94
239627	0.77	0.86
6352	0.7	0.77

MUID	PIPE FILLING RATIO 2061	
	Pre-development	Post-development
6351	0.48	0.52
6350	0.5	0.55

The addition of PWWF associated with the Brymer Farms and Wallace Road developments, including future potential areas, increases pipe filling ratios across all sections within the assessment extent. Compared to Demand Scenario 2, the inclusion of future potential development areas results in a greater number of pipe sections exceeding a filling ratio of 1. Following the implementation of the funded strategic upgrades, filling ratios decrease; however, utilisation remains above 100% in the highlighted pipe sections when development demands are considered. The pipe utilisation results for all scenarios are presented in the maps provided in Appendix A.

Long section plots were generated along the modelled pipe alignment within the assessment extent, showing variations in ground levels, pipe invert levels, and modelled water levels. Figure 6-1 presents the long section plots for each modelling scenario outlined in Table 3-1. The plots indicate an increase in pipe water levels when the development demand is applied to the baseline scenarios. The implementation of funded strategic upgrades provides a slight reduction in water levels, although overall trends remain consistent with the pipe filling ratios summarised in Table 6-1.

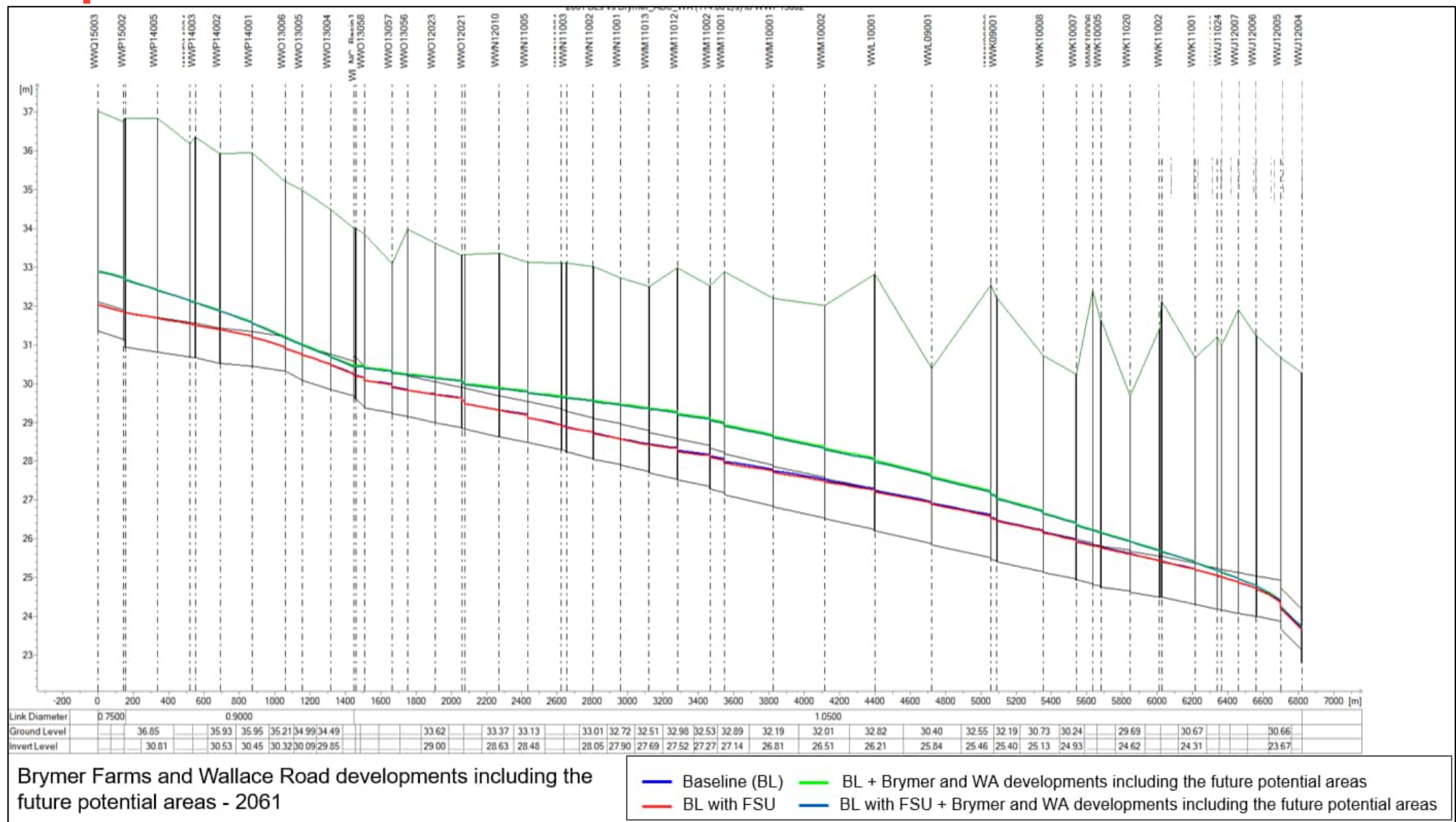


Figure 6-1: Long section plot comparing 2061 baseline versus baseline plus the development demands (Demand Scenario 3)

Note: The Baseline + FSU + developments scenario closely overlaps with the Baseline + developments (green line) results, as the difference between the two scenarios is minimal.

6.2 Manhole Overflow Volumes

The modelling results have not identified any manhole overflows along the assessment extent after adding the Brymer Farms and Wallace Road development demands.

Detailed manhole overflow volume results for each scenario are provided in the maps included in Appendix A.

6.3 Pipe Velocity

The addition of Brymer Farms and Wallace Road development demands results in a slight increase in pipe velocities across the assessment extent for both the 2041 and 2061 scenarios. The maximum increase in velocity observed within any pipe section is approximately 9% in both 2041 and 2061.

Detailed pipe velocity results for each scenario are provided in the maps included in Appendix A.

7. Summary

This assessment focused on analysing the wastewater modelling results to evaluate the impacts of the proposed Brymer Farms development demands, along with demand from other potential development areas in the vicinity, on the existing HCC wastewater network. Four Model Scenarios were assessed for both the 2041 and 2061 planning horizons.

- **Model Scenario 1** – Baseline
- **Model Scenario 2** – Baseline + Funded Strategic Upgrades
- **Model Scenario 3** – Baseline + Proposed development components in each demand scenario
- **Model Scenario 4** – Baseline + Funded Strategic Upgrades + Proposed development components in each demand scenario

This assessment evaluates the impacts of the proposed standalone Brymer Farms development, as well as the combined impacts of Brymer Farms and other nearby developments on the existing HCC wastewater network. The assessment is intended to inform network performance only and does not consider capital investment or other financial decisions.

Three Demand Scenarios were developed and assessed, reflecting alternative combinations of the proposed development area components.

- **Demand Scenario 1** – Resulting PWWF demands from Brymer Farms as a standalone development (38.59 L/s)
- **Demand Scenario 2** – Resulting PWWF demands from Brymer Farms, Area A, Area B and WA Stage 1 (97.26 L/s)
- **Demand Scenario 3** – Demand from Scenario 2 + Resulting PWWF demands from Area C and WA Stage 2 (180.3 L/s)

The findings from the assessment are summarised in Table 7-1.

Table 7-1: Summary of the modelling results

Demand Scenario	Pipe Filling Ratio	Manhole Spilling	Velocity
1	■ Pipe utilisation increases across the Western and Rotokauri Interceptor sections with the addition of Brymer Farms demands for both the 2041 and 2061 scenarios. ■ Several pipe sections that operate below full capacity under pre-development	■ No manhole overflows were identified within the assessment extent.	■ No significant changes in pipe velocities were observed within the assessment extent before and after adding the demands of demand scenario 1.

Demand Scenario	Pipe Filling Ratio	Manhole Spilling	Velocity
	conditions are predicted to surcharge once development demands are included in the 2041 scenario, with pipe utilisation increasing from below 100% to approximately 101–107 %. The number of pipe sections exceeding 100% utilisation further increases in 2061, with some sections exceeding 117%.		
2	- Pipe utilisation increases across the assessed Western and Rotokauri Interceptor sections following the addition of the Brymer Farms and Wallace Road development demands for both the 2041 and 2061 planning horizons. - Several pipe sections that are below capacity under pre-development conditions are predicted to surcharge in 2041, with utilisation increasing to approximately 114–130% once development demands are included. - The number of pipe sections exceeding 100% utilisation further increases in 2061, with some sections exceeding 150%.	No manhole overflows were identified within the assessment extent.	Pipe velocities increase slightly across the assessment extent with the addition of Brymer Farms and Wallace Road development demands in both 2041 and 2061, with a maximum increase of approximately 7%.
3	- Pipe utilisation increases across the assessed Western and Rotokauri Interceptor sections following the addition of the Brymer Farms and Wallace Road development demands along with the future potential developments in 2061. - The pipe utilisation increases between a broad range (approximately 102–180%) once development demands are included.	No manhole overflows were identified within the assessment extent.	Pipe velocities increase slightly across the assessment extent with development demands in both 2041 and 2061, with a maximum increase of approximately 9%.

In addition to the above, the broader network was reviewed to confirm that no local overflows occur under any scenario due to the additional flows introduced into the Western and Rotokauri Interceptors.

8. Limitations Statement

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The Services and Report are subject to the assumptions, qualifications, exclusions and limitations set out in the Contract, the Report itself and/or otherwise communicated to the Client.

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APPENDICES



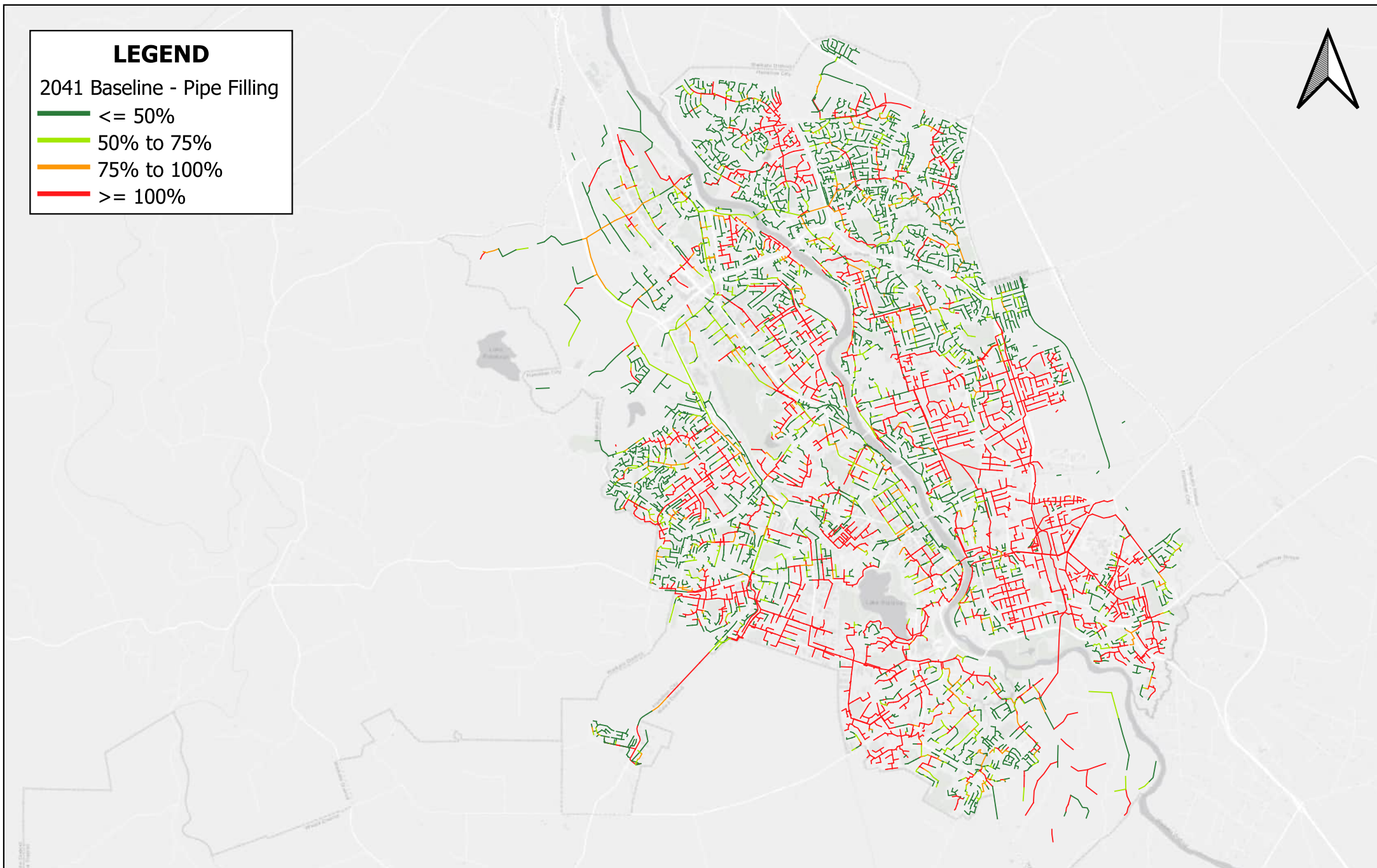
Appendix A Wastewater Modelling Results – Maps

2041 Baseline Model

LEGEND

2041 Baseline - Pipe Filling

-  $\leq 50\%$
-  50% to 75%
-  75% to 100%
-  $\geq 100\%$



Wastewater Network Plan

2041 Baseline Pipe Filling

Project

3-WLASS.AL

Date

2026-05-21

Number

01

Client



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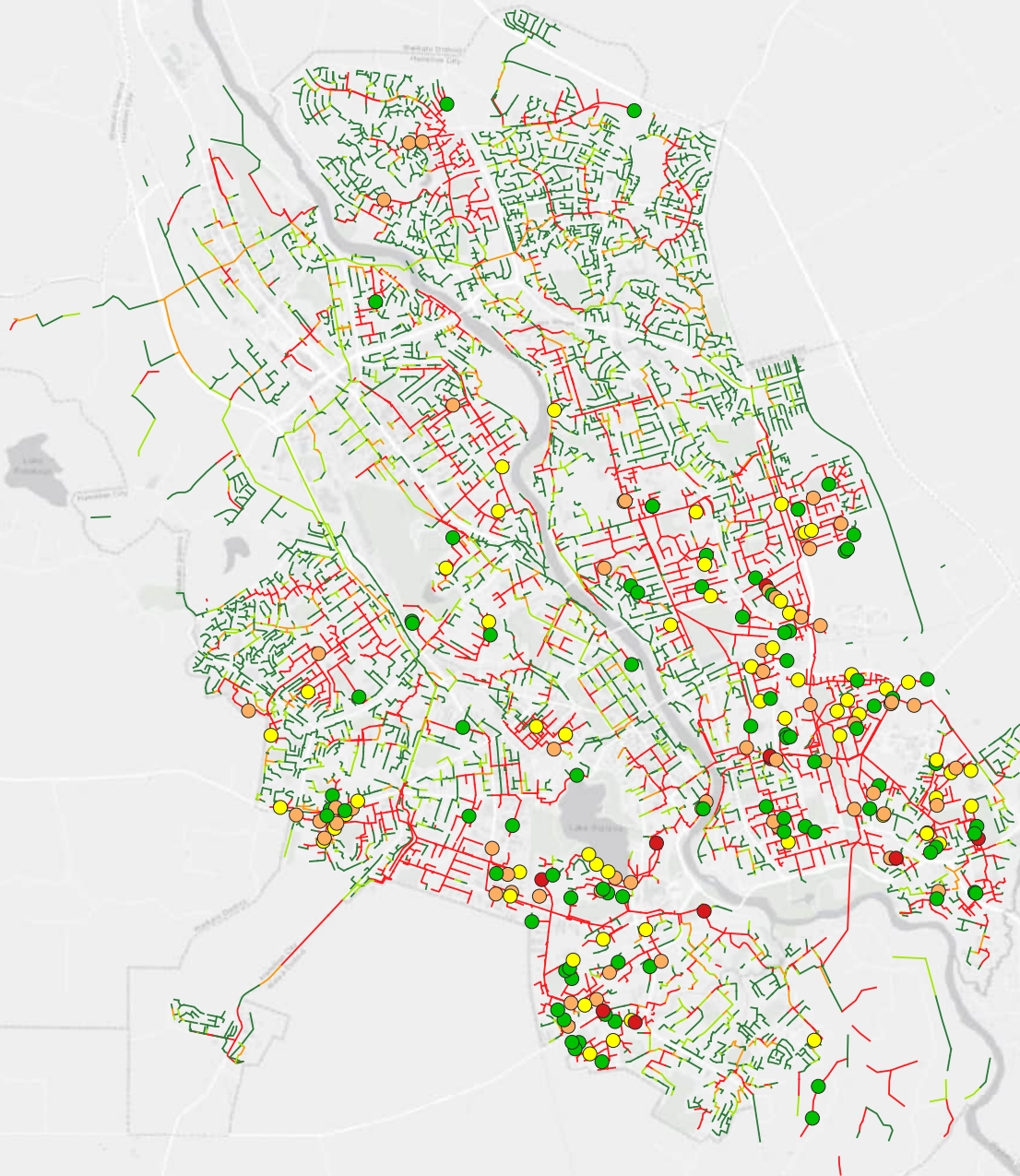
LEGEND

2041 Baseline - Pipe Filling

- ≤ 50%
- 50% to 75%
- 75% to 100%
- ≥ 100%

2041 Baseline - Manhole Overflow

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³



Wastewater Network Plan

2041 Baseline Pipe Filling and Manhole Spill Volumes

Project

3-WLASS.AL

Date

2026-05-21

Number

02

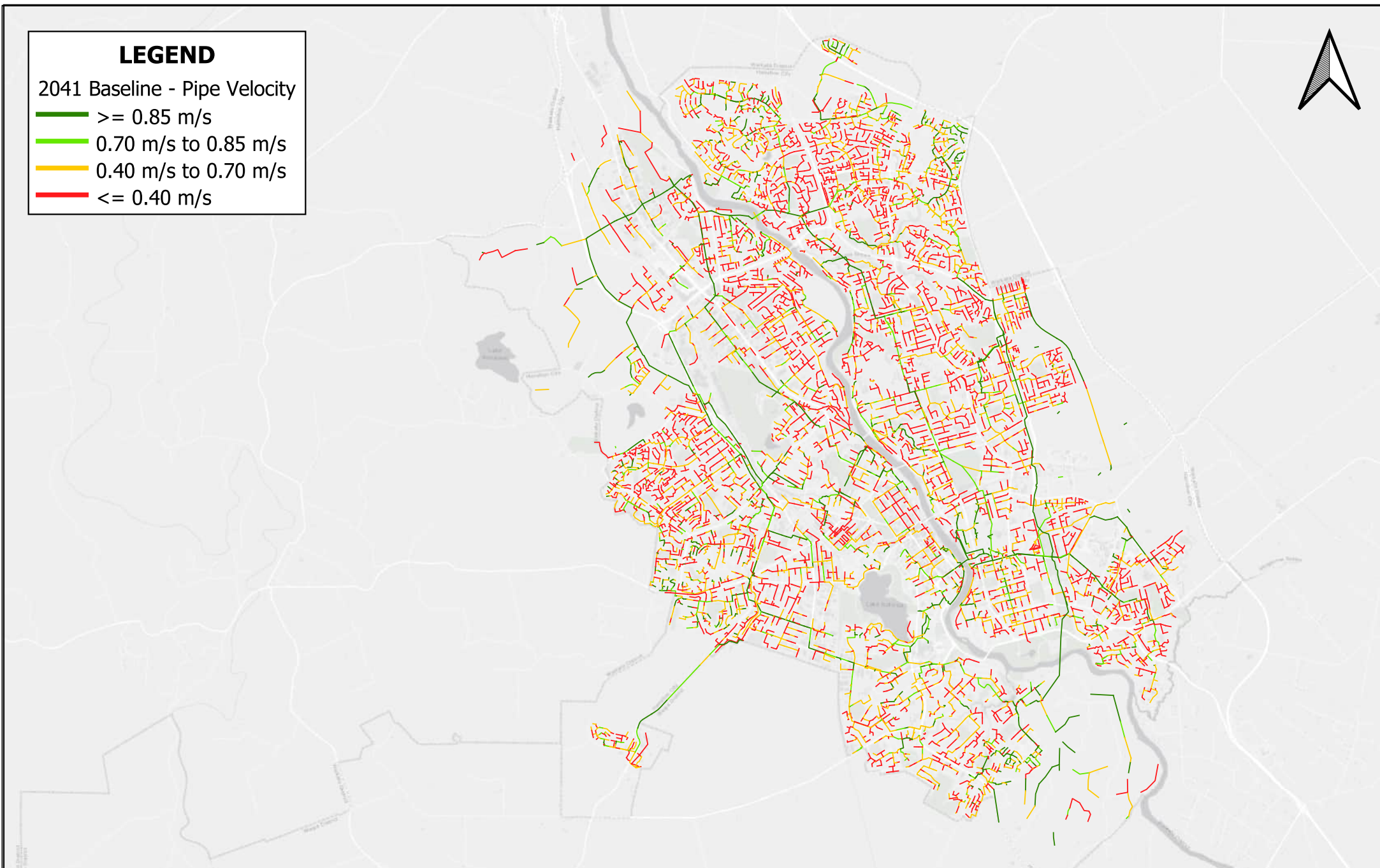
Client



LEGEND

2041 Baseline - Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s



Wastewater Network Plan

2041 Baseline Pipe flow Velocity

Project

3-WLASS.AL

Date

2026-05-21

Number

03

Client



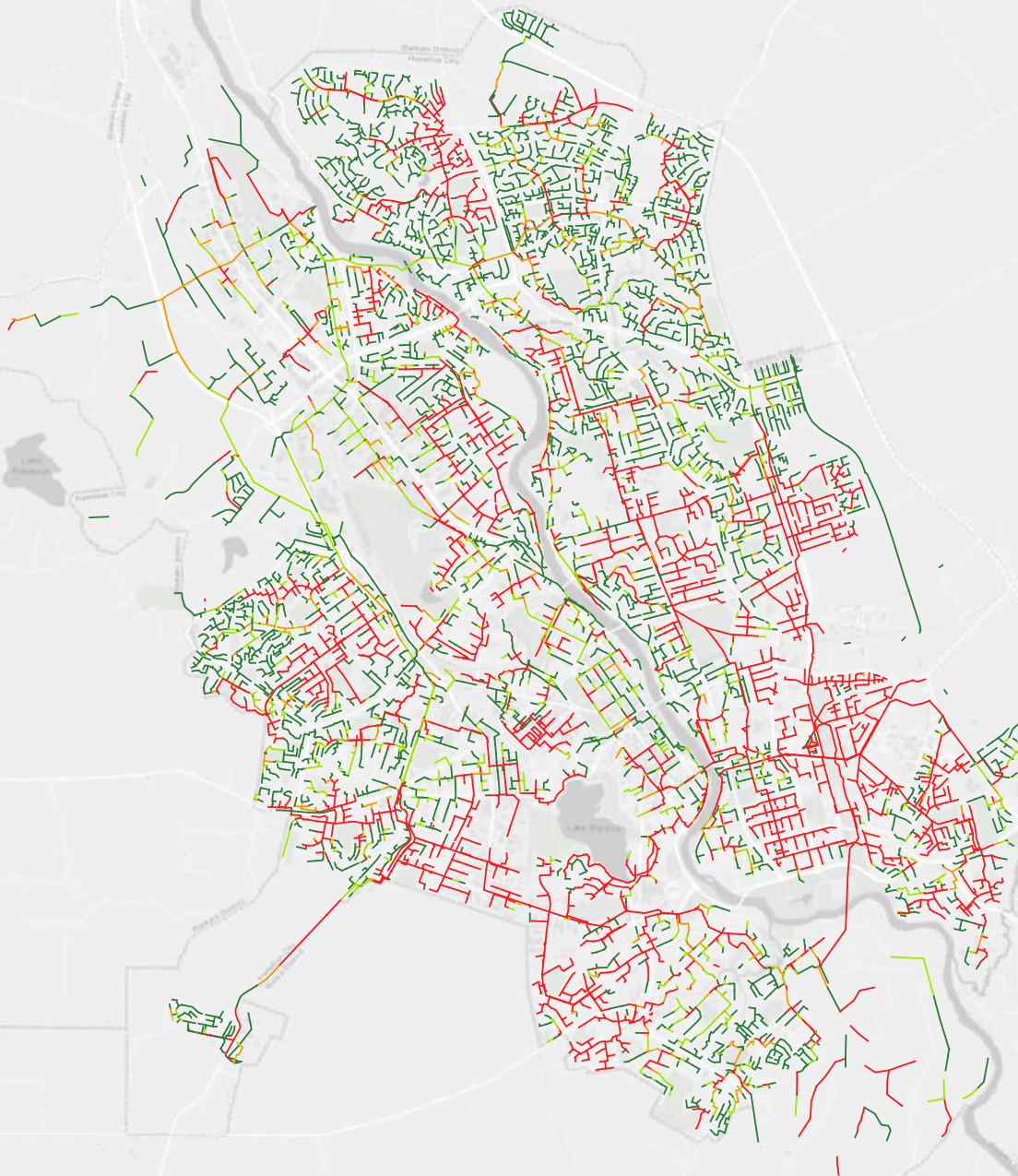
Hamilton City Council
Te kaunihera o Kirikiriroa

2041 Baseline Model + Funded Strategic Upgrades

LEGEND

2041 FSU - Pipe Filling

-  $\leq 50\%$
-  50% to 75%
-  75% to 100%
-  $\geq 100\%$



Wastewater Network Plan

2041 FSU Pipe Filling

Project

3-WLASS.AL

Date

2026-05-21

Number

04

Client





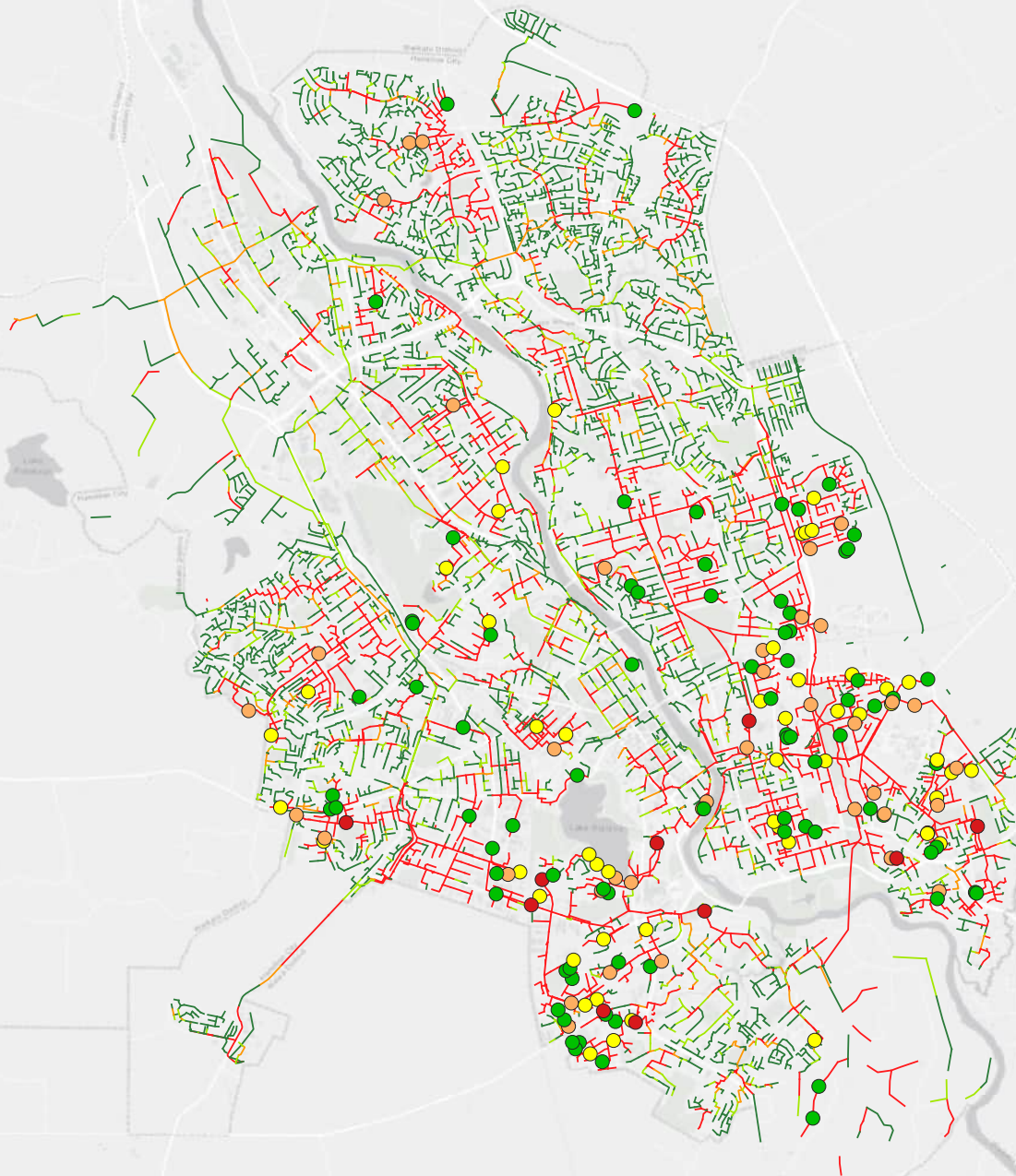
LEGEND

2041 FSU - Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

2041 FSU - Manhole Overflow

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³



Wastewater Network Plan

2041 FSU Pipe Filling and Manhole Spill Volumes

Project

3-WLASS.AL

Date

2026-05-21

Number

05

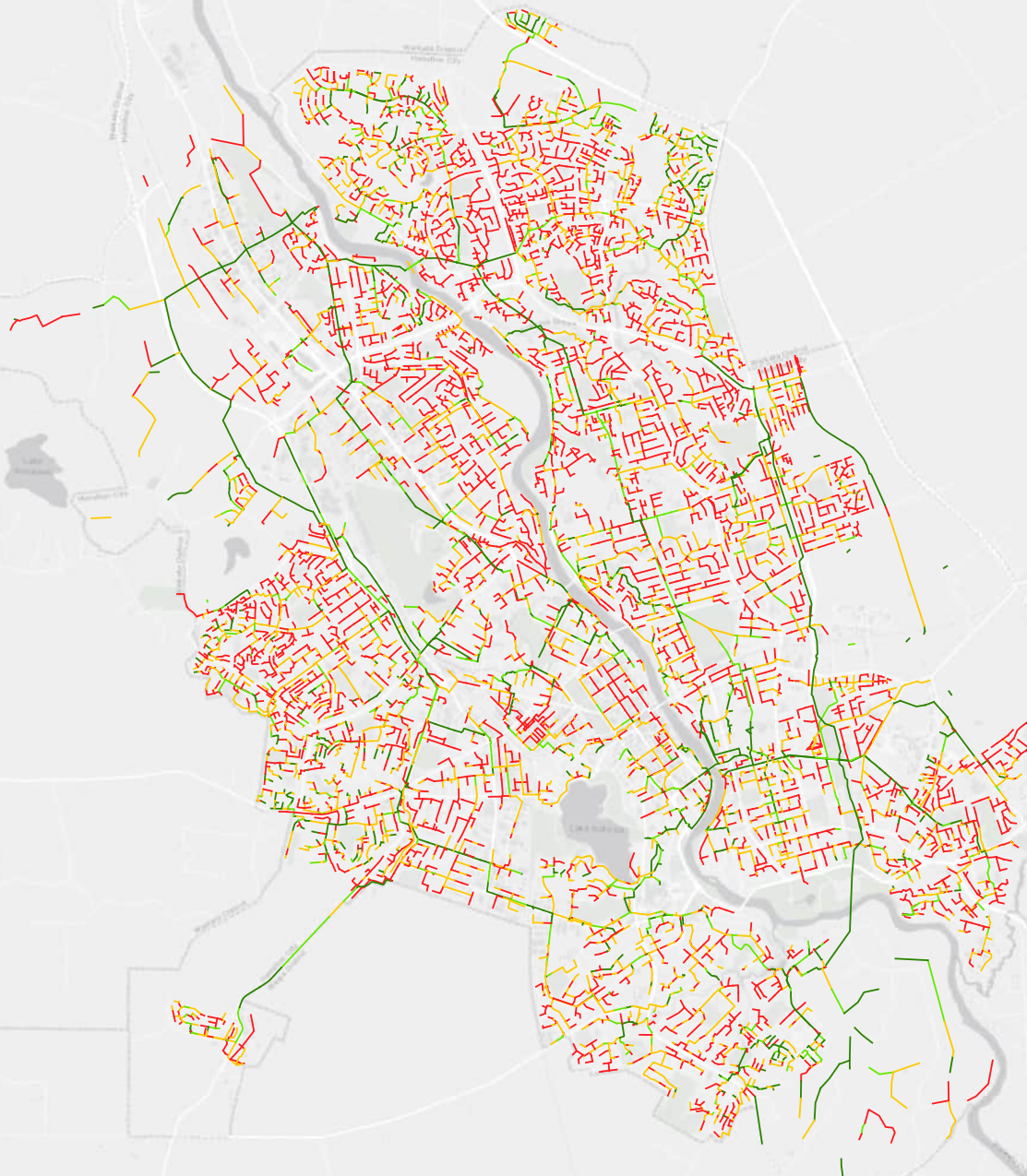
Client



LEGEND

2041 FSU - Pipe Velocity

-  ≥ 0.85 m/s
-  0.70 m/s to 0.85 m/s
-  0.40 m/s to 0.70 m/s
-  ≤ 0.40 m/s



Wastewater Network Plan

2041 FSU Pipe flow Velocity

Project

3-WLASS.AL

Date

2026-05-21

Number

06

Client



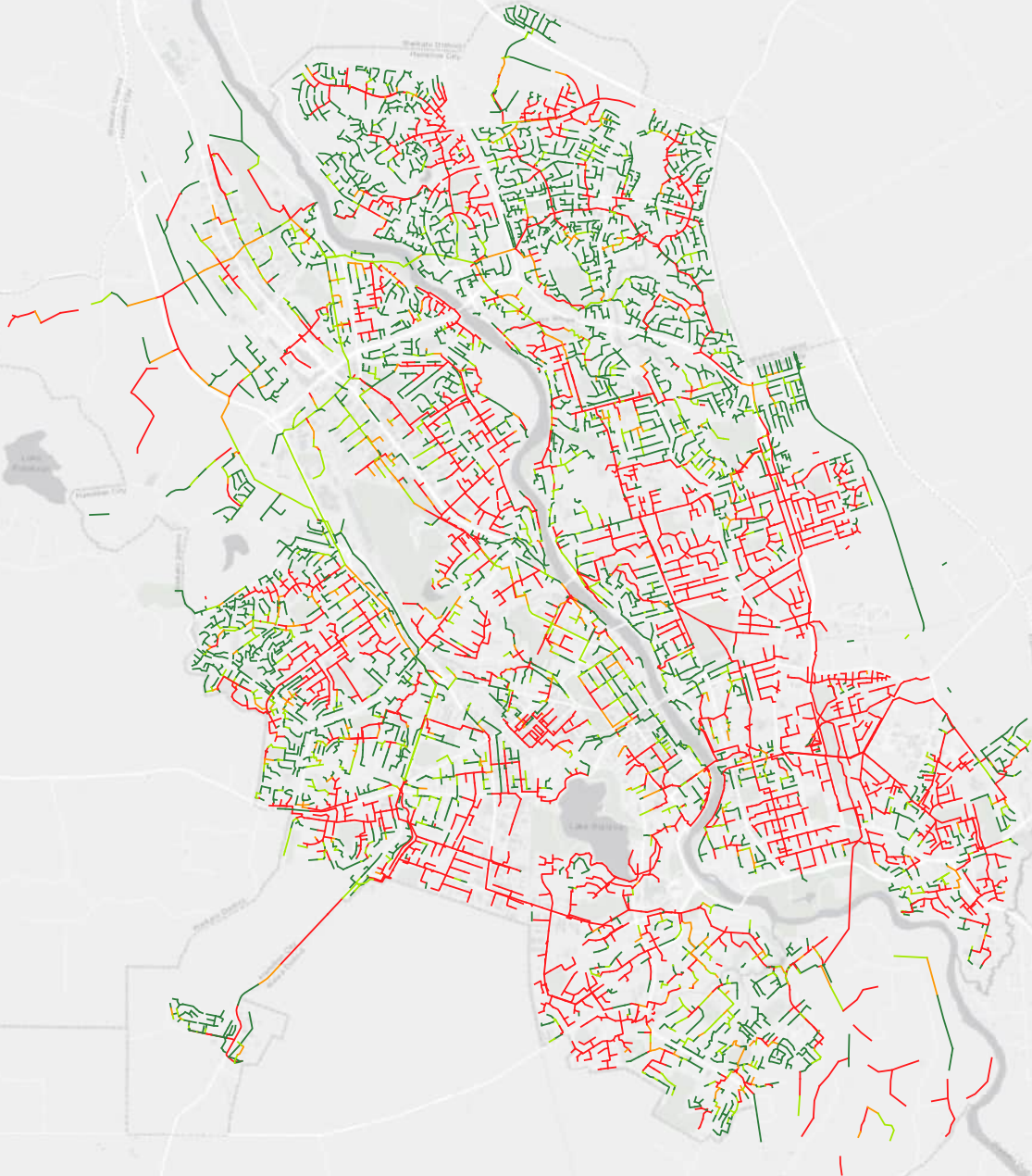
Hamilton City Council
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2061 Baseline Model

LEGEND

2061 Baseline - Pipe Filling

-  $\leq 50\%$
-  50% to 75%
-  75% to 100%
-  $\geq 100\%$



Wastewater Network Plan

2061 Baseline Pipe Filling

Project

3-WLASS.AL

Date

2026-05-21

Number

07

Client



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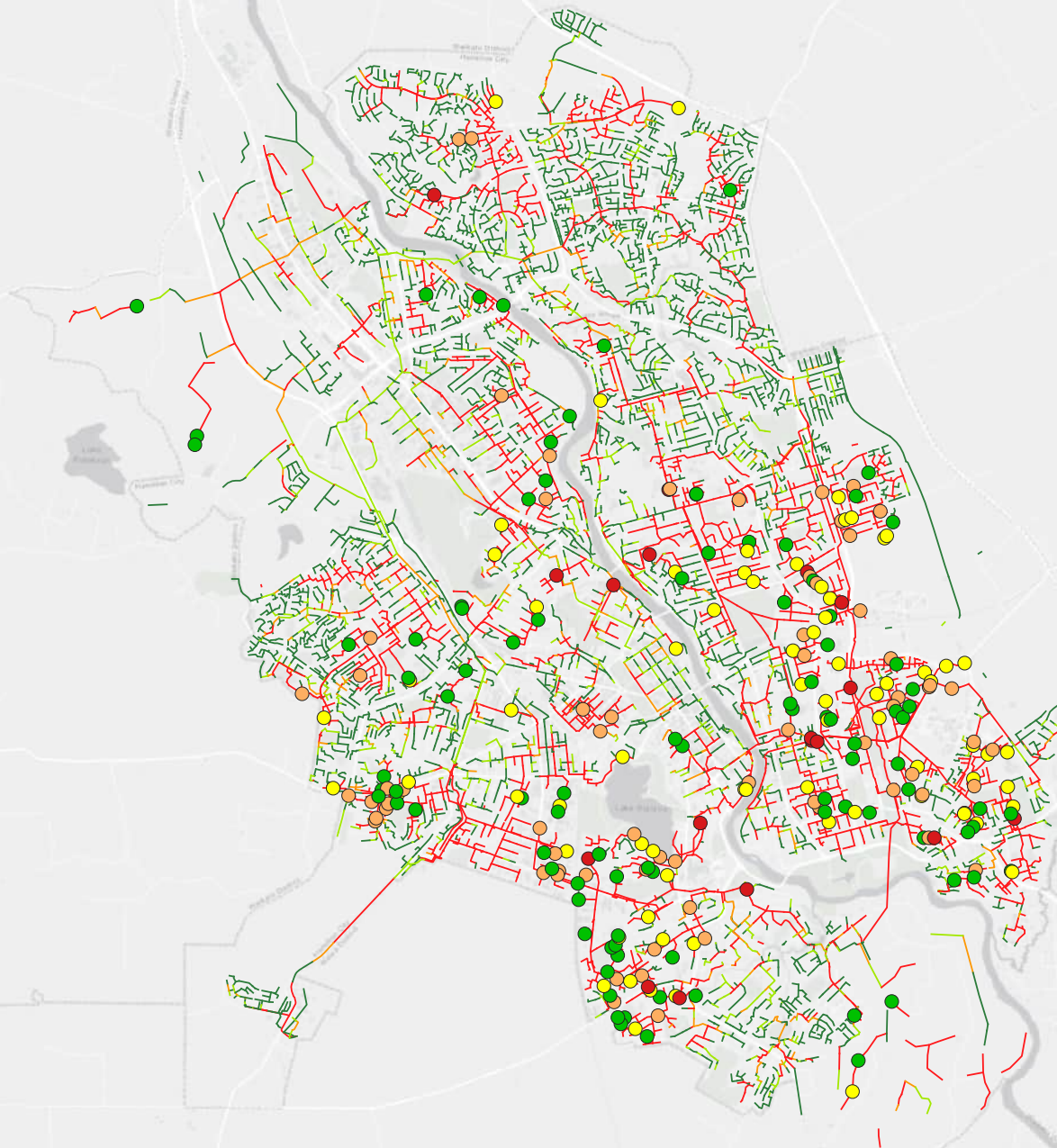
LEGEND

2061 Baseline - Pipe Filling

- ≤ 50%
- 50% to 75%
- 75% to 100%
- ≥ 100%

2061 Baseline - Manhole Overflow

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³



Wastewater Network Plan

2061 Baseline Pipe Filling and Manhole Spill Volumes

Project

3-WLASS.AL

Date

2026-05-21

Number

08

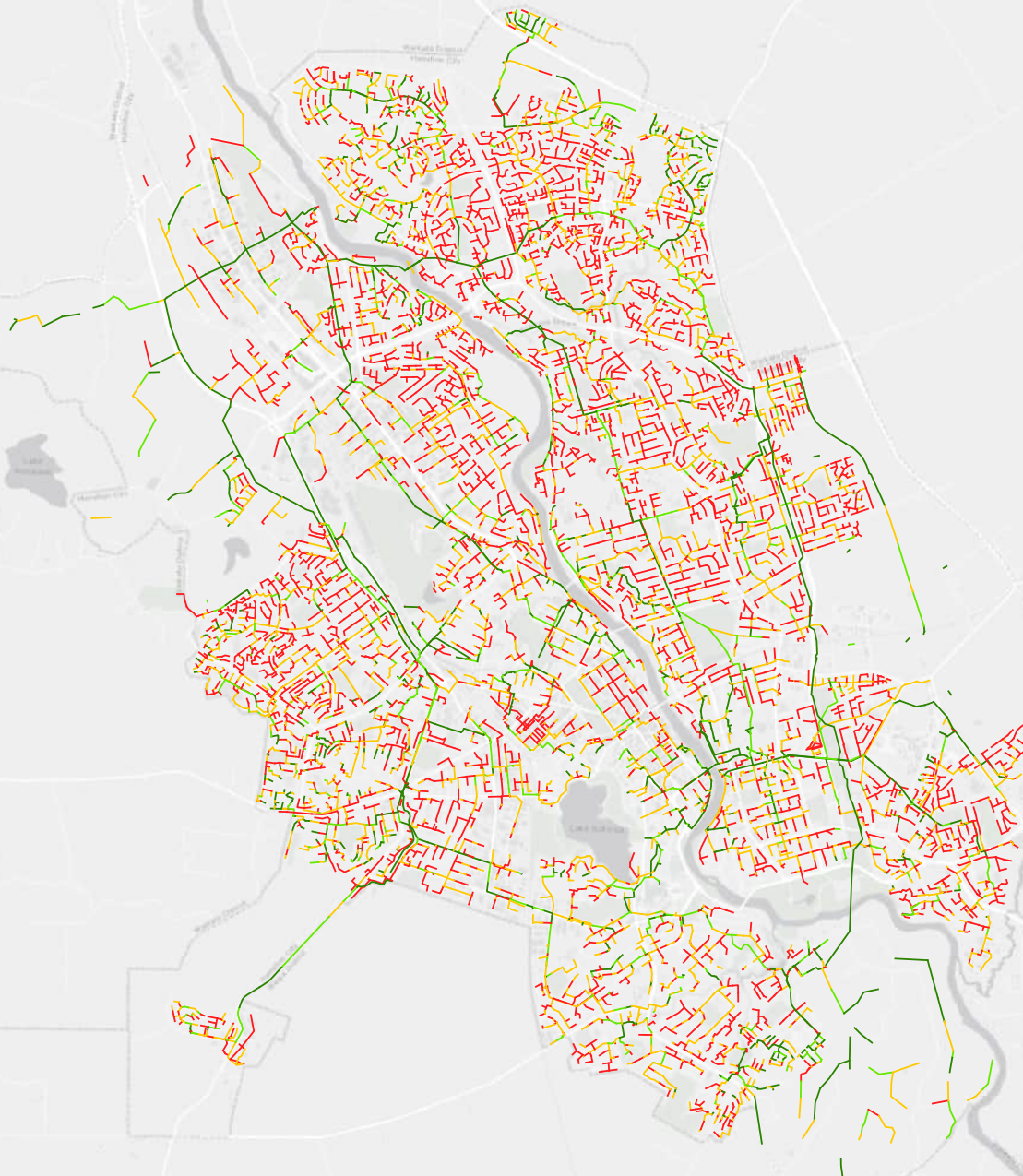
Client



LEGEND

2061 Baseline - Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s



Wastewater Network Plan

2061 Baseline Pipe flow Velocity

Project

3-WLASS.AL

Date

2026-05-21

Number

09

Client

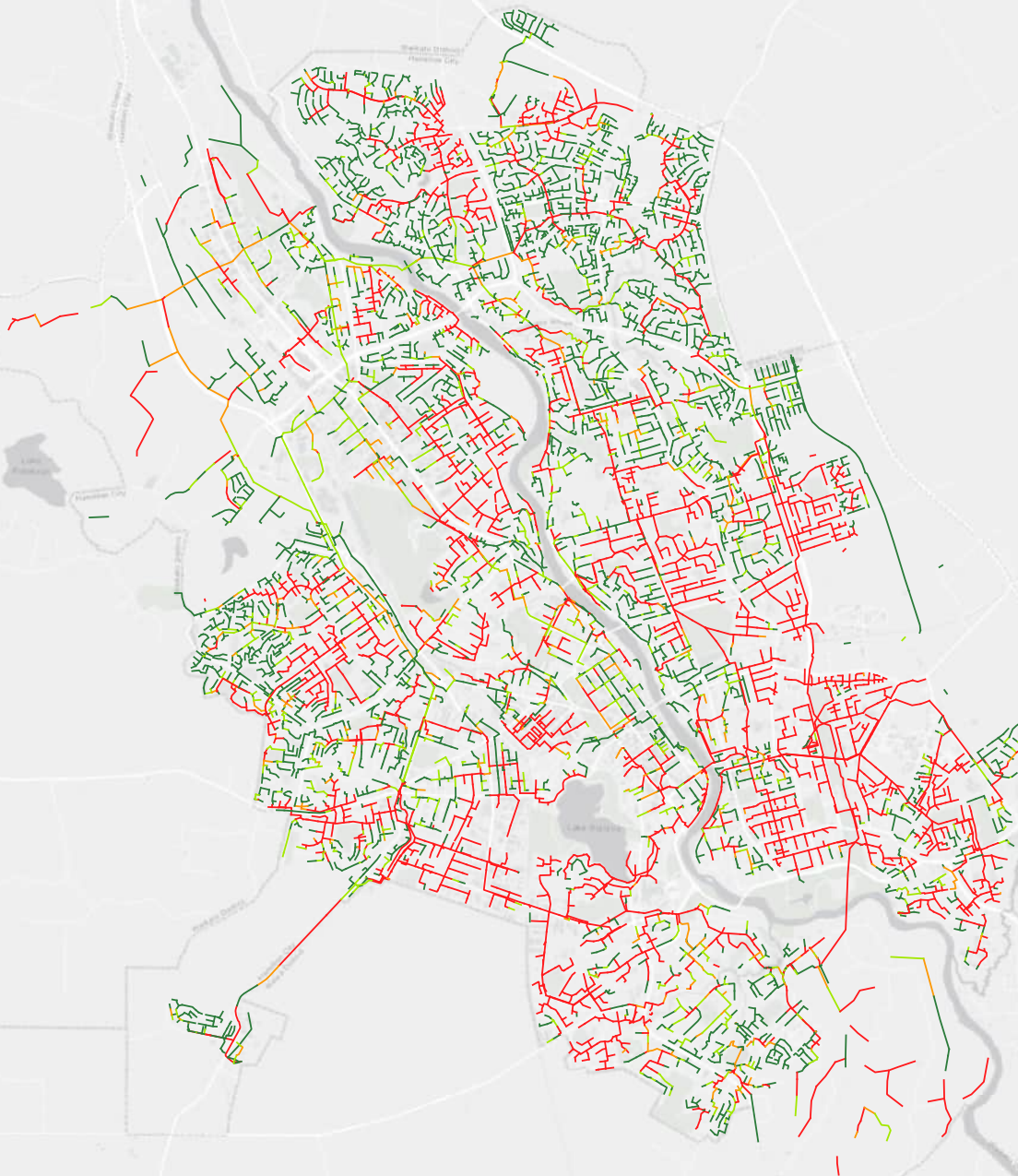


2061 Baseline Model + Funded Strategic Upgrades

LEGEND

2061 FSU - Pipe Filling

-  $\leq 50\%$
-  50% to 75%
-  75% to 100%
-  $\geq 100\%$



Wastewater Network Plan

2061 FSU Pipe Filling

Project

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Date

2026-05-21

Number

10

Client





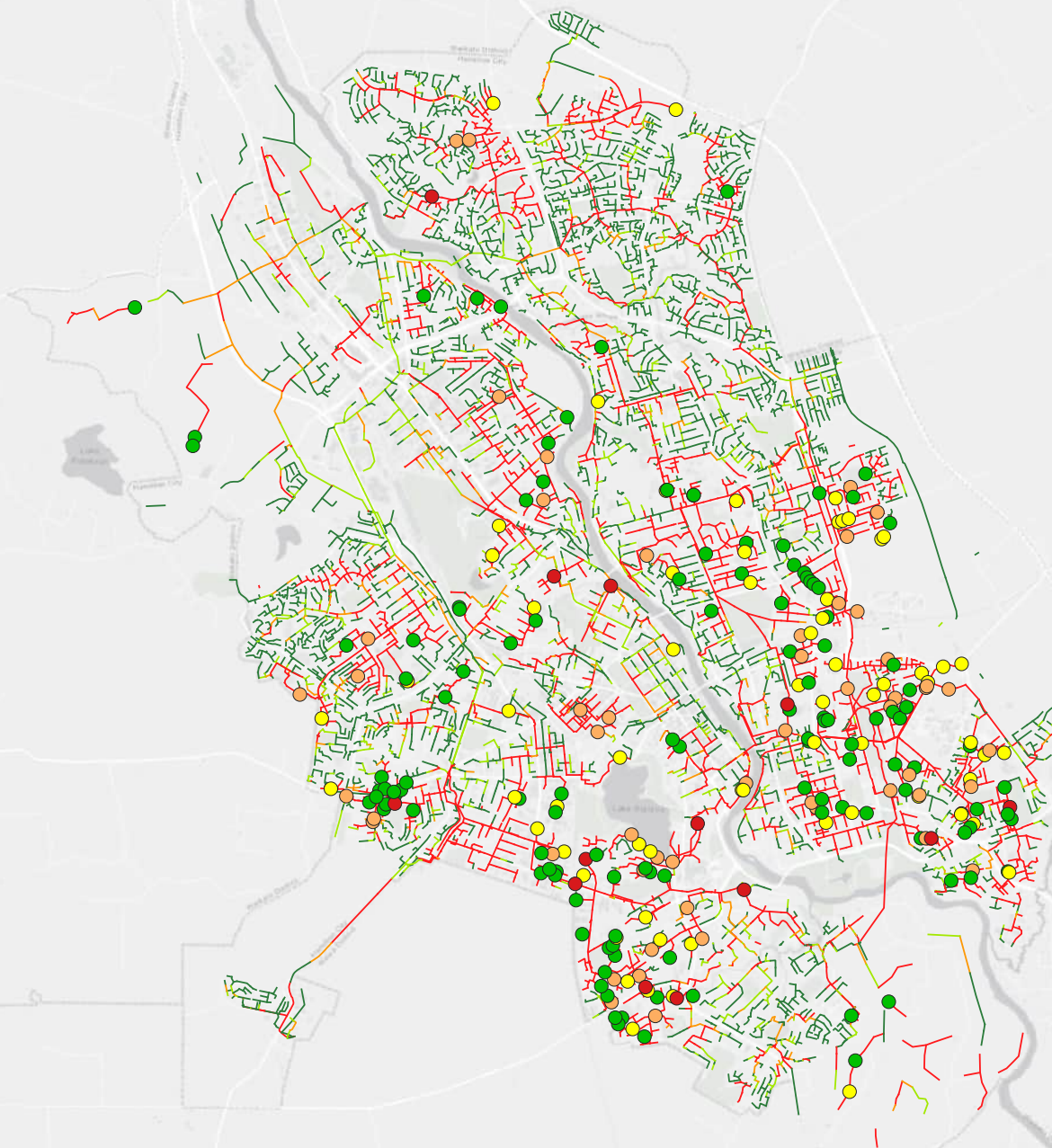
LEGEND

2061 FSU - Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

2061 FSU - Manhole Overflow

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³



Wastewater Network Plan
2061 FSU Pipe Filling and Manhole Spill Volumes

Project
3-WLASS.AL

Date
2026-05-21

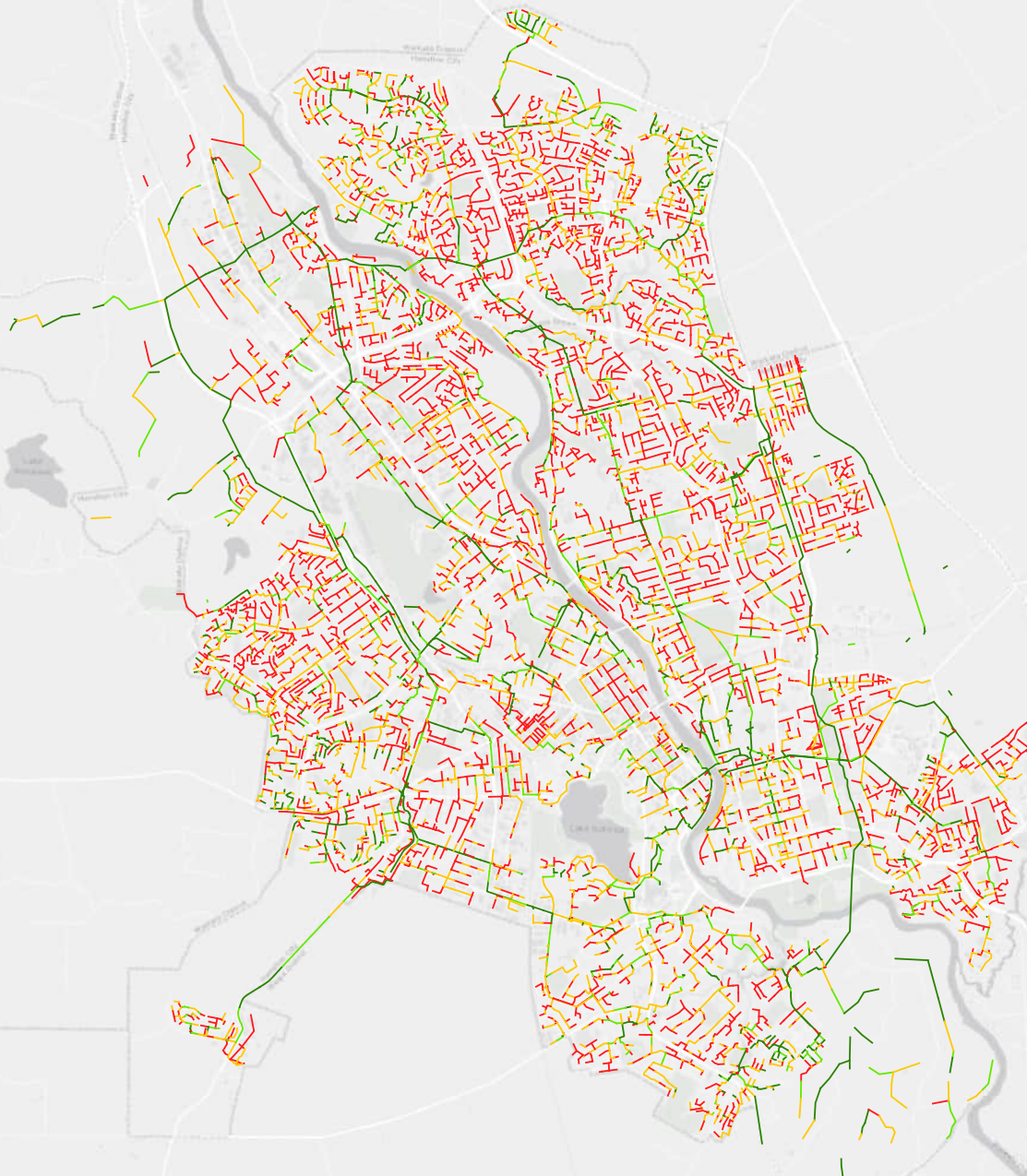
Number
11

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LEGEND

2061 FSU - Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s



Wastewater Network Plan

2061 FSU Pipe flow Velocity

Project

3-WLASS.AL

Date

2026-05-21

Number

12

Client



Hamilton City Council
Te kaunihera o Kirikiriroa

Demand Scenario 1

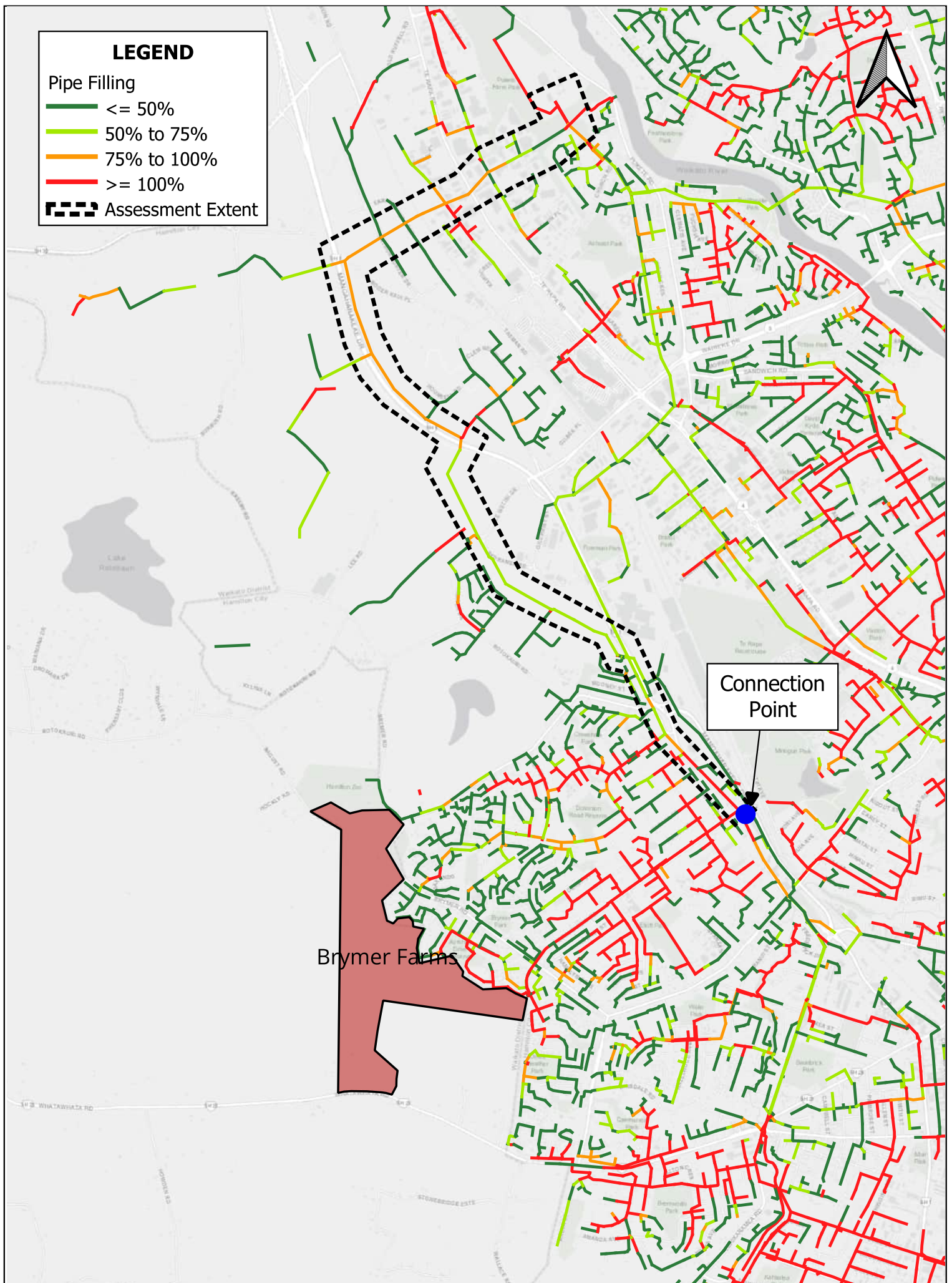
2041 Baseline Model +
Brymer Farms Development

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



Connection
Point

Brymer Farms

LEGEND

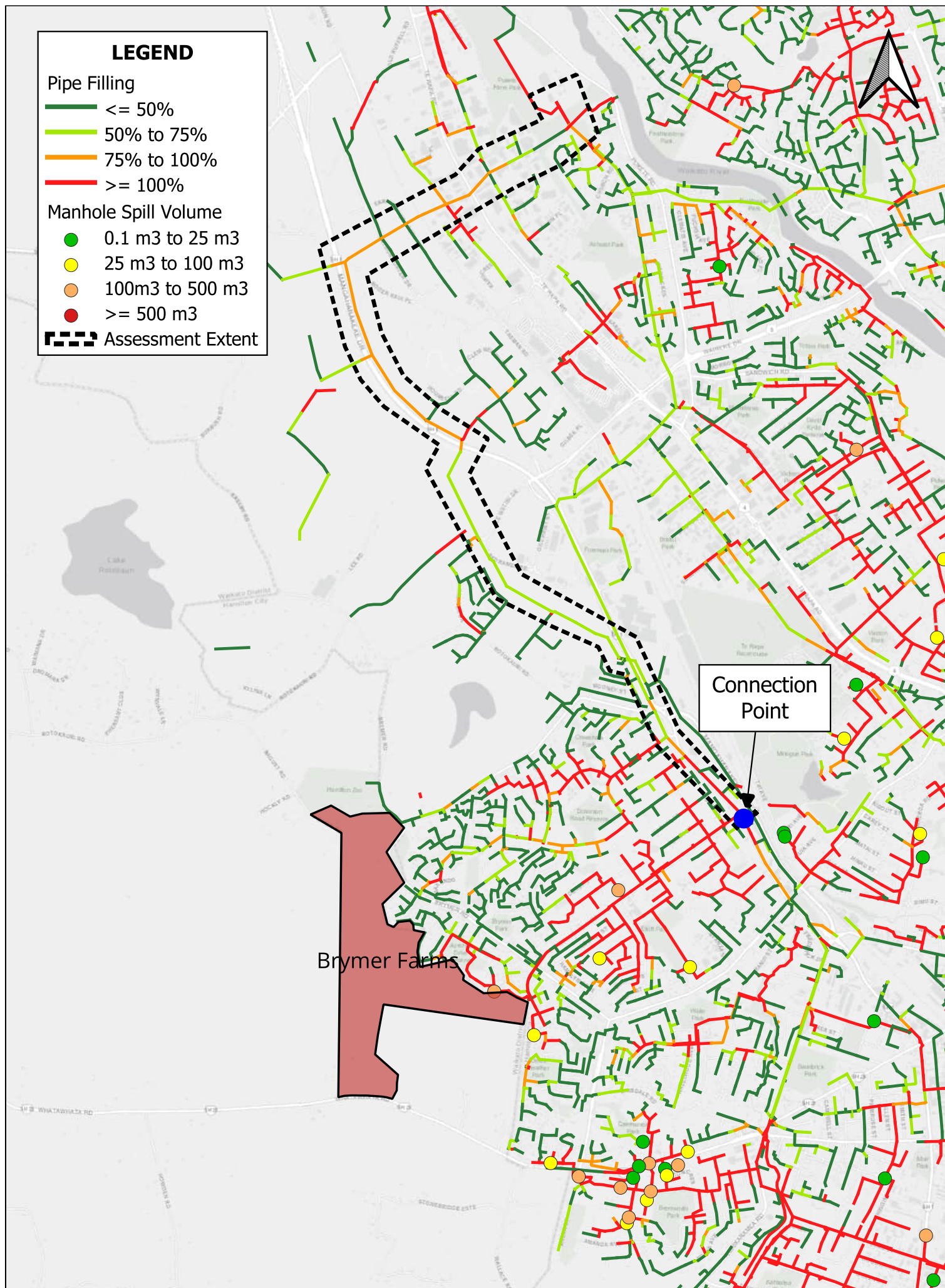
Pipe Filling

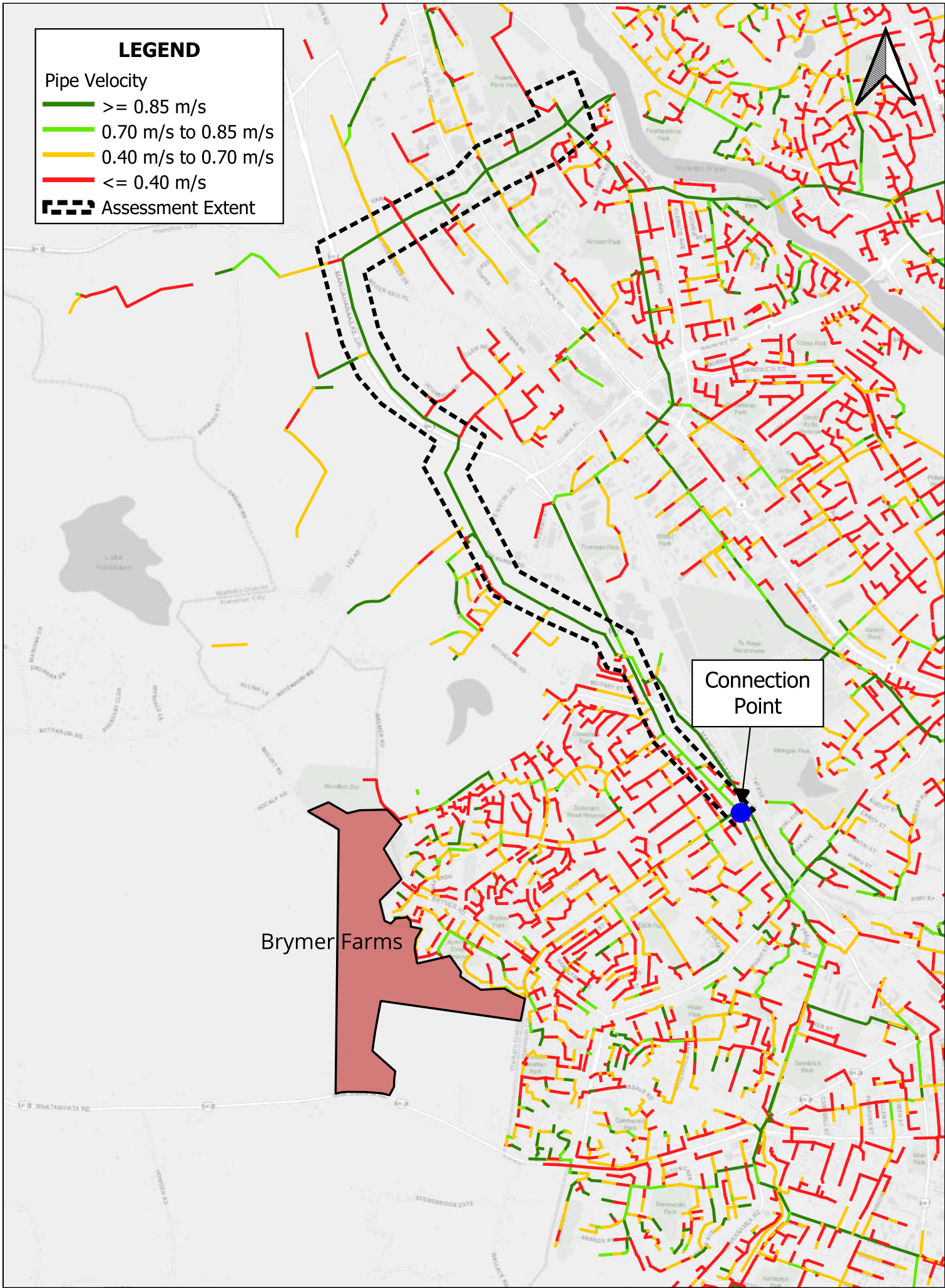
- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

- - - Assessment Extent





LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent

Brymer Farms

Connection
Point

	Wastewater Network Plan 2041 Baseline + Brymer Farms Development	Project 3-WLASS.AL	Date 2026-06-11	Number 15	Client  Hamilton City Council Te kaunihera o Kirikiriroa
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Demand Scenario 1

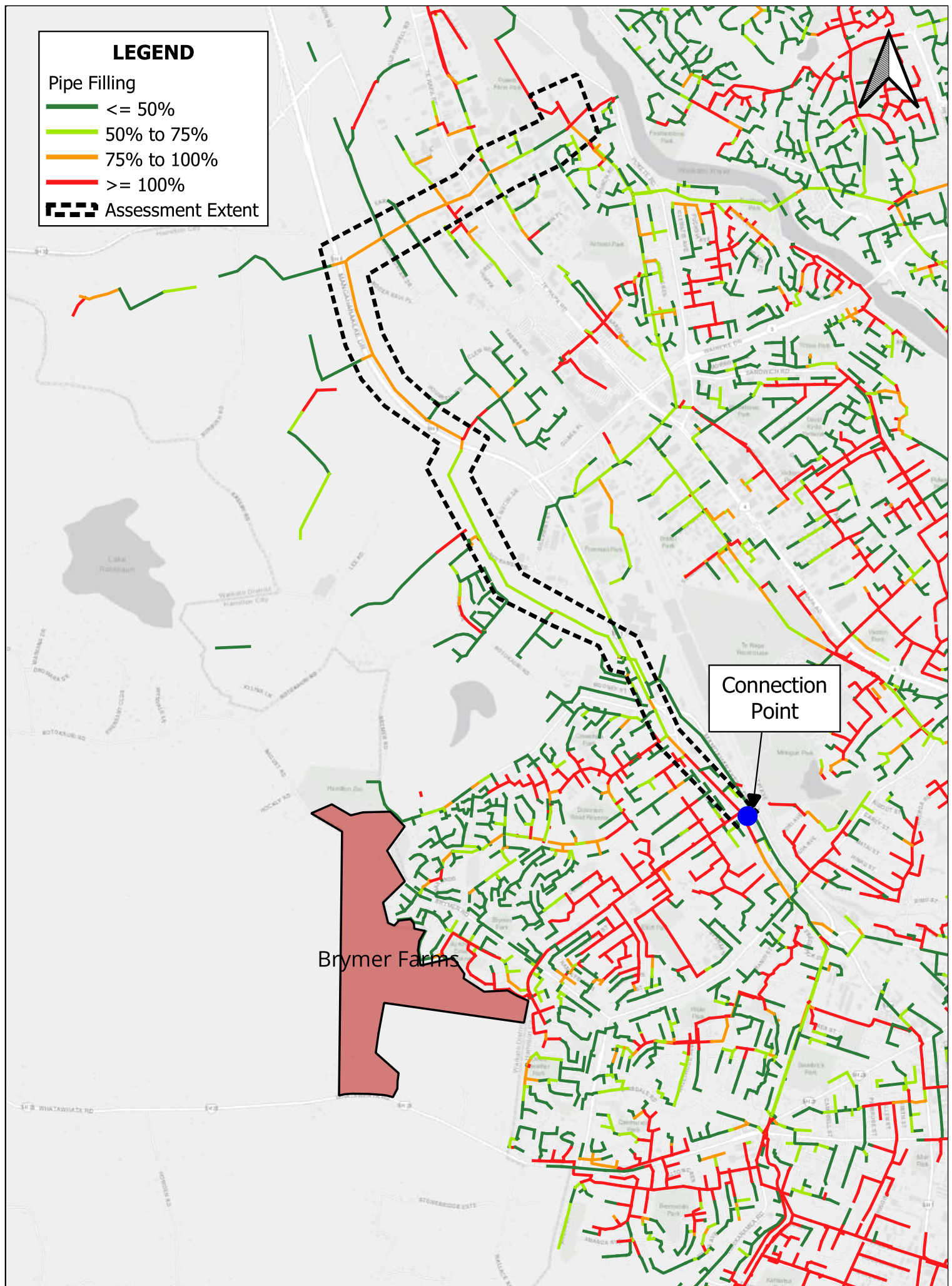
2041 Baseline Model +
Funded Strategic Upgrades +
Brymer Farms Development

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



Brymer Farms

Connection
Point



Wastewater Network Plan
2041 Baseline + FSU + Brymer Farms
Development

Project
3-WLASS.AL

Date
2026-06-11

Number
16

Client
 Hamilton City Council
Te kaunihera o Kiriikiriroa

LEGEND

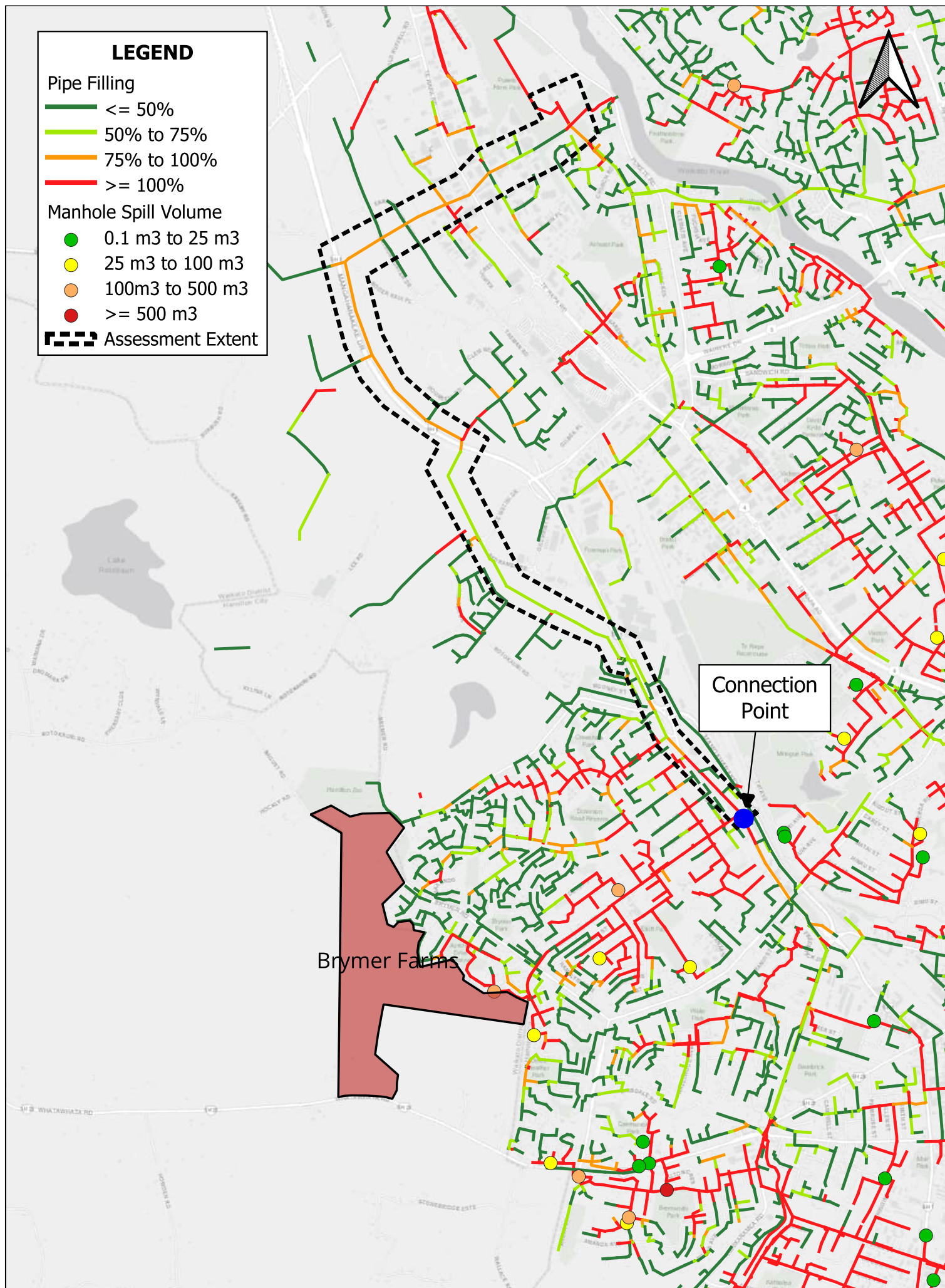
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent



Brymer Farms

Connection
Point



Wastewater Network Plan
2041 Baseline + FSU + Brymer Farms
Development

Project
3-WLASS.AL

Date
2026-06-11

Number
17

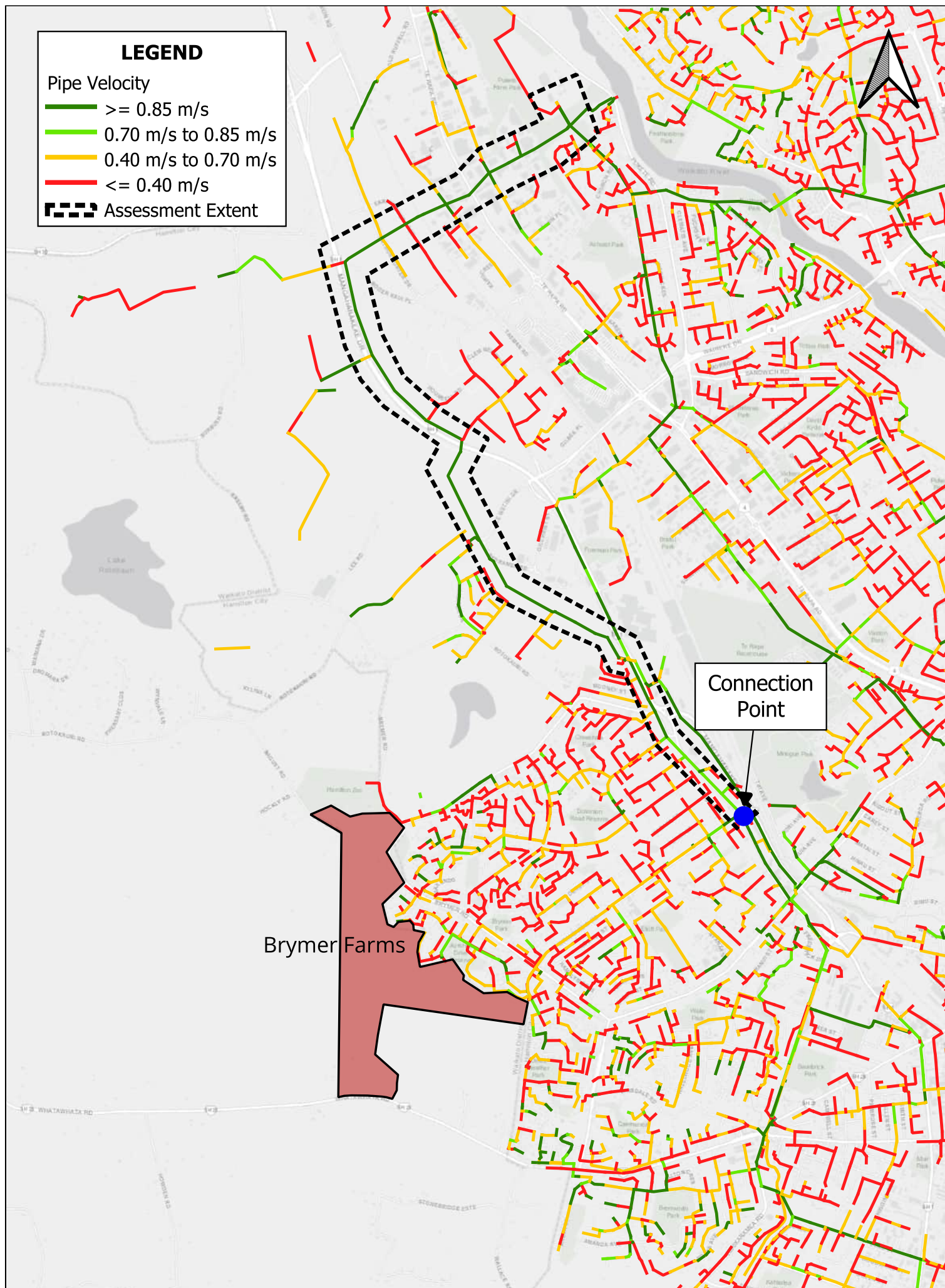
Client
 **Hamilton City Council**
Te kaunihera o Kirikiriroa

LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Brymer Farms

Connection
Point



Wastewater Network Plan
2041 Baseline + FSU + Brymer Farms
Development

Project
3-WLASS.AL

Date
2026-06-11

Number
18

Client
 **Hamilton City Council**
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Demand Scenario 1

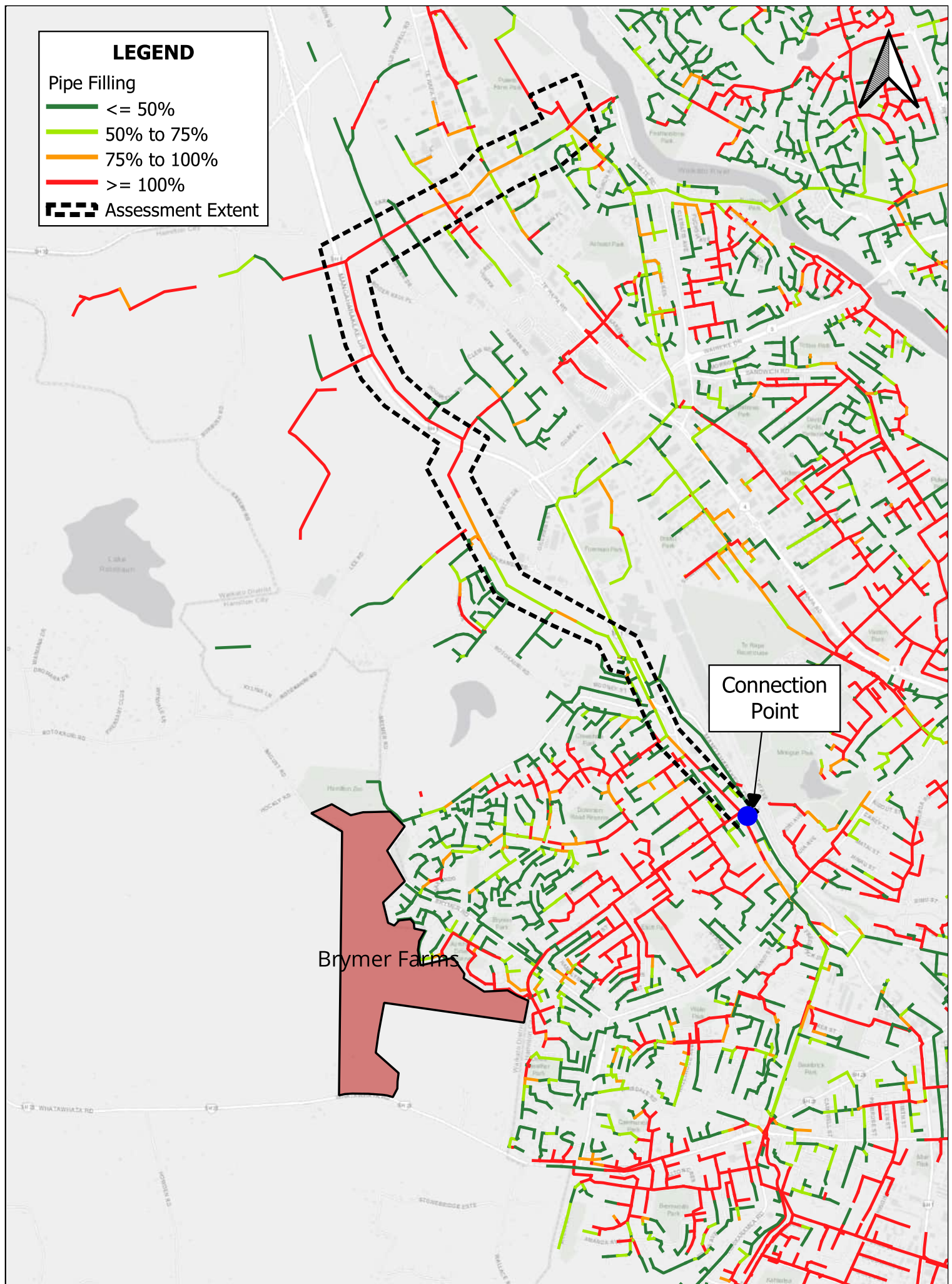
2061 Baseline Model +
Brymer Farms Development

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



Brymer Farms

Connection
Point

LEGEND

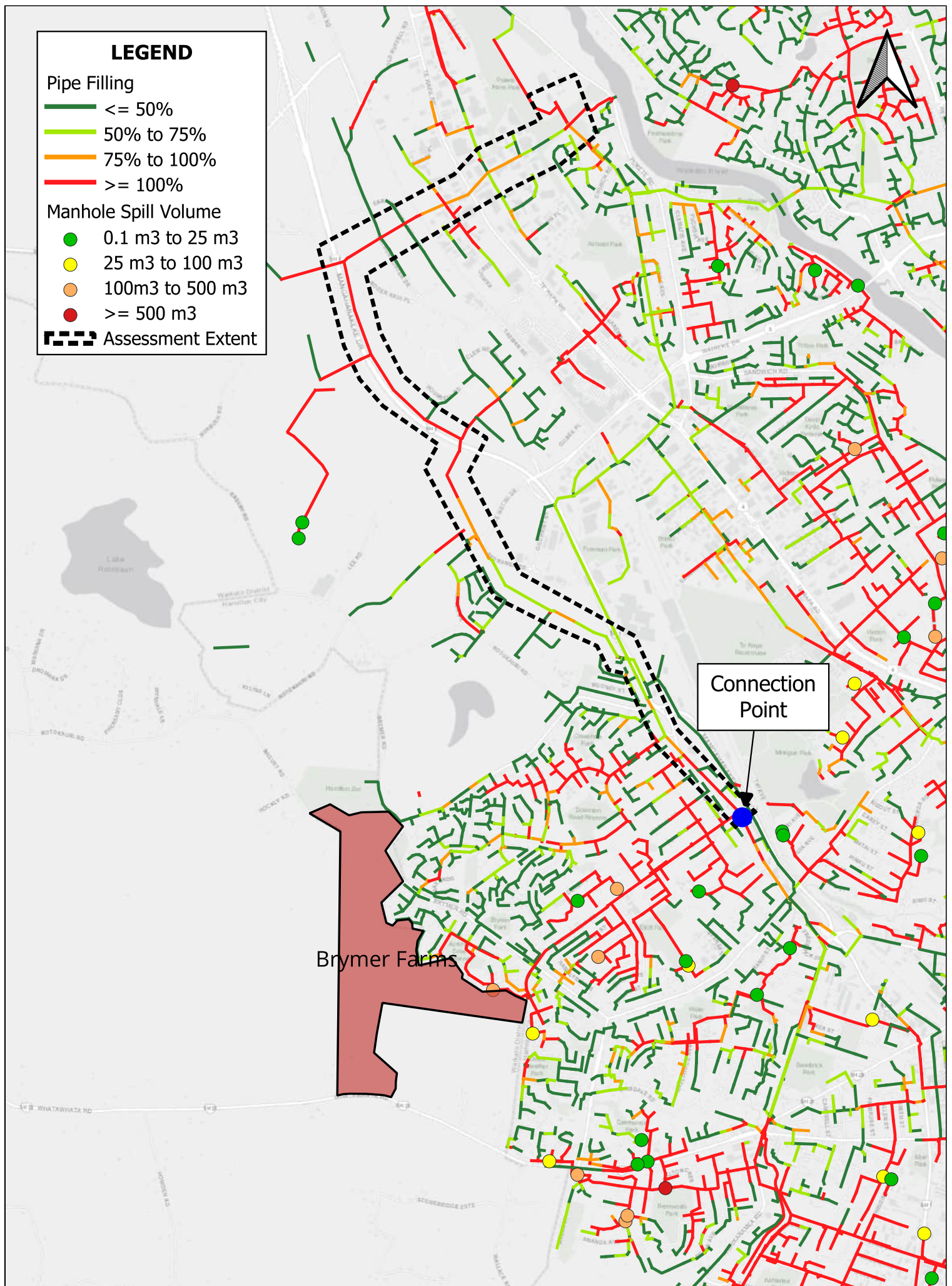
Pipe Filling

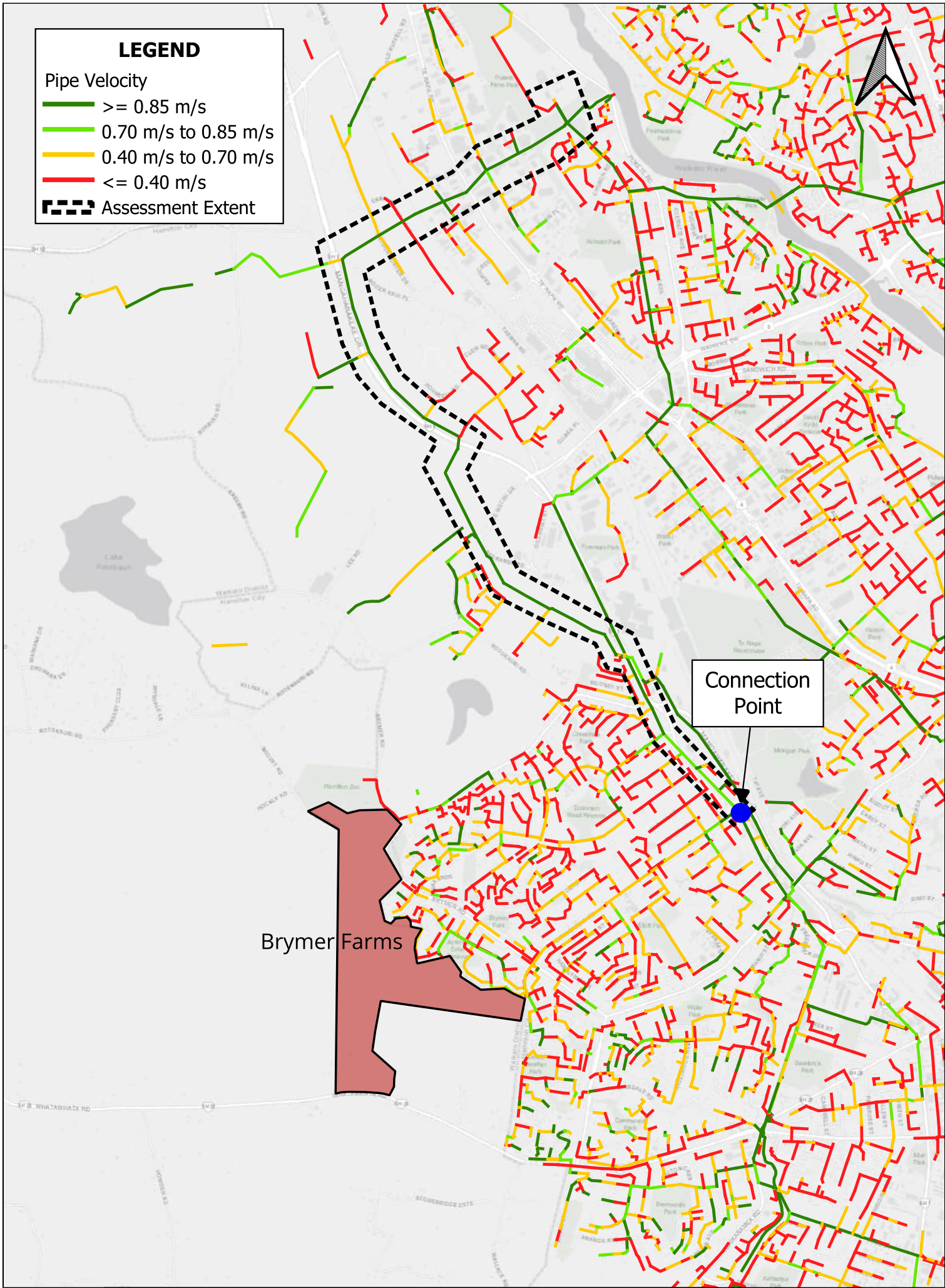
- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent





LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

Assessment Extent

Brymer Farms

Connection
Point

	Wastewater Network Plan 2061 Baseline + Brymer Farms Development	Project 3-WLASS.AL	Date 2026-06-11	Number 21	Client  Hamilton City Council Te kaunihera o Kiriikiriroa
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Demand Scenario 1

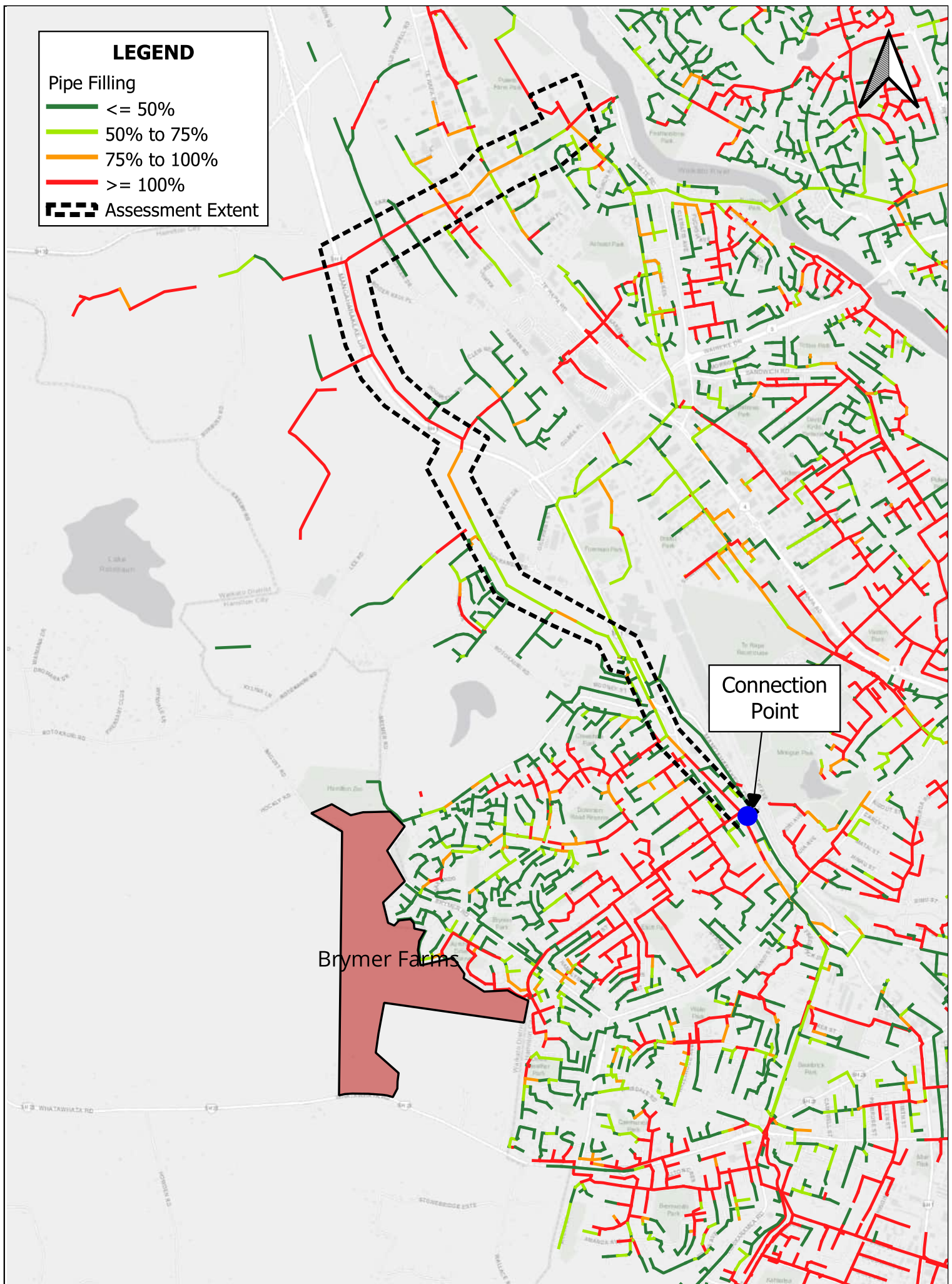
2061 Baseline Model +
Funded Strategic Upgrades +
Brymer Farms Development

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



Brymer Farms

Connection
Point



Wastewater Network Plan
2061 Baseline + FSU + Brymer Farms
Development

Project
3-WLASS.AL

Date
2026-06-11

Number
22

Client
 **Hamilton City Council**
Te kaunihera o Kiriikiriroa

LEGEND

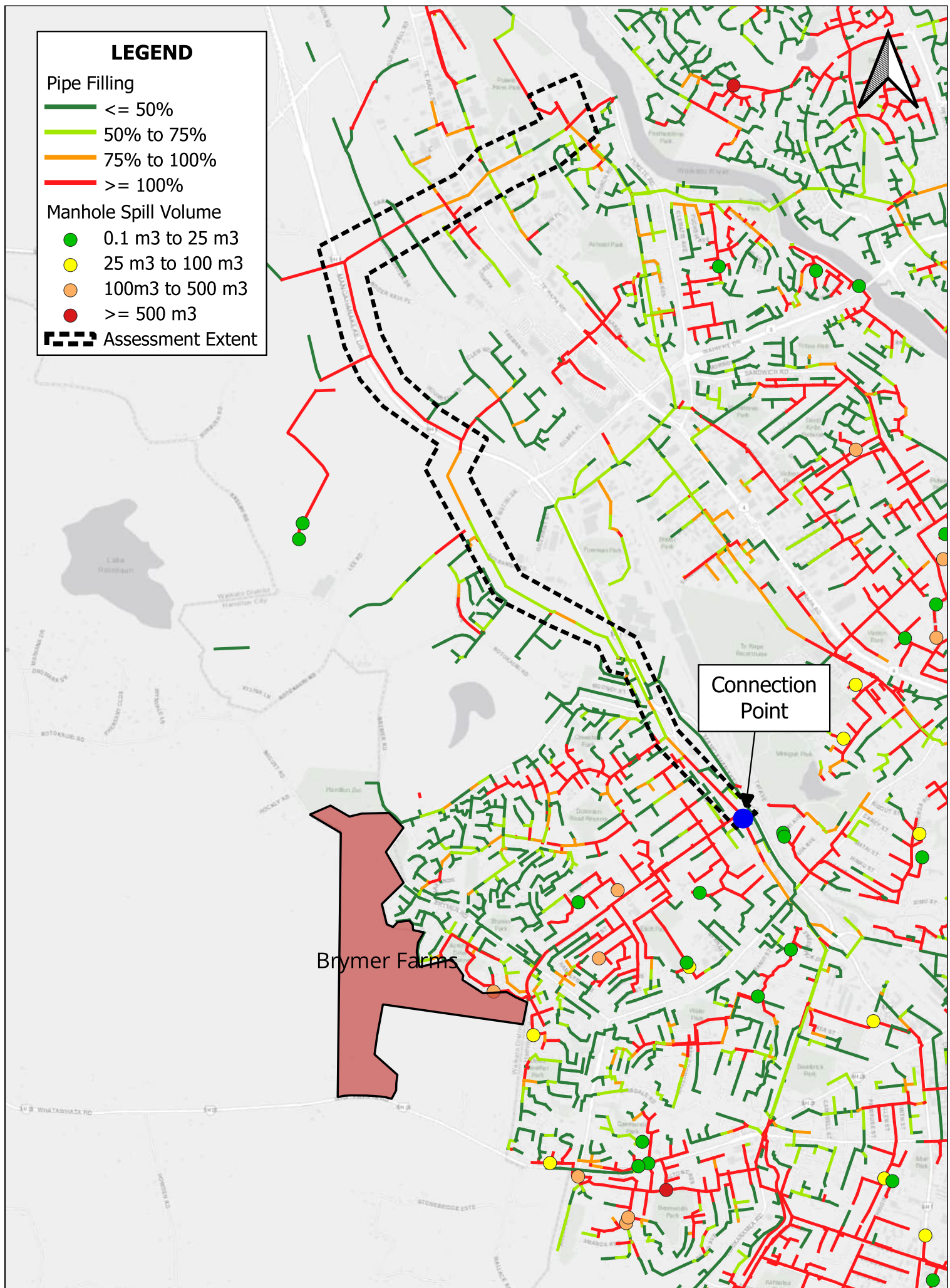
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent



Brymer Farms

Connection
Point



Wastewater Network Plan
2061 Baseline + FSU + Brymer Farms
Development

Project
3-WLASS.AL

Date
2026-06-11

Number
23

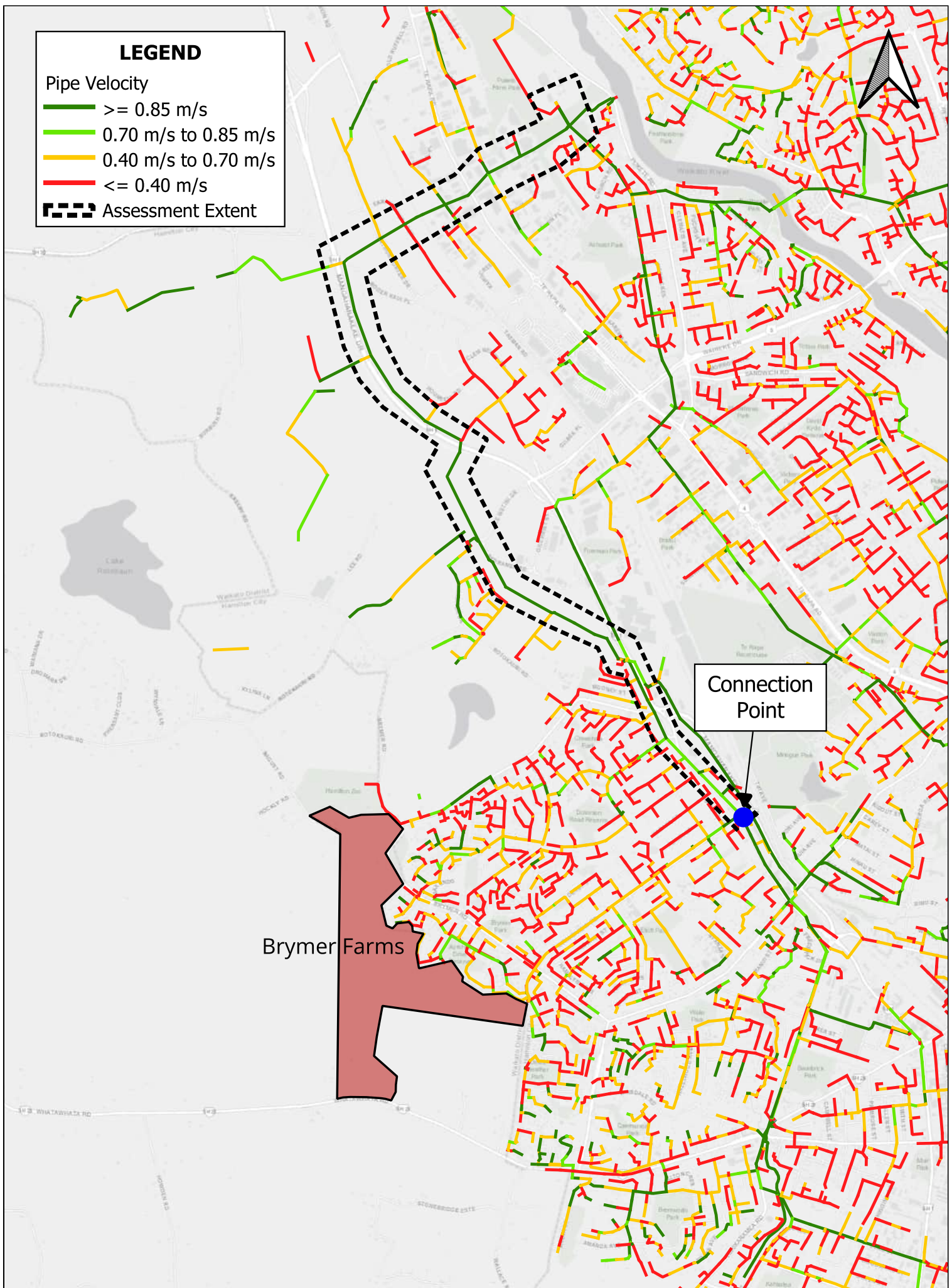
Client
 **Hamilton City Council**
Te kaunihera o Kirikiriroa

LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Demand Scenario 2

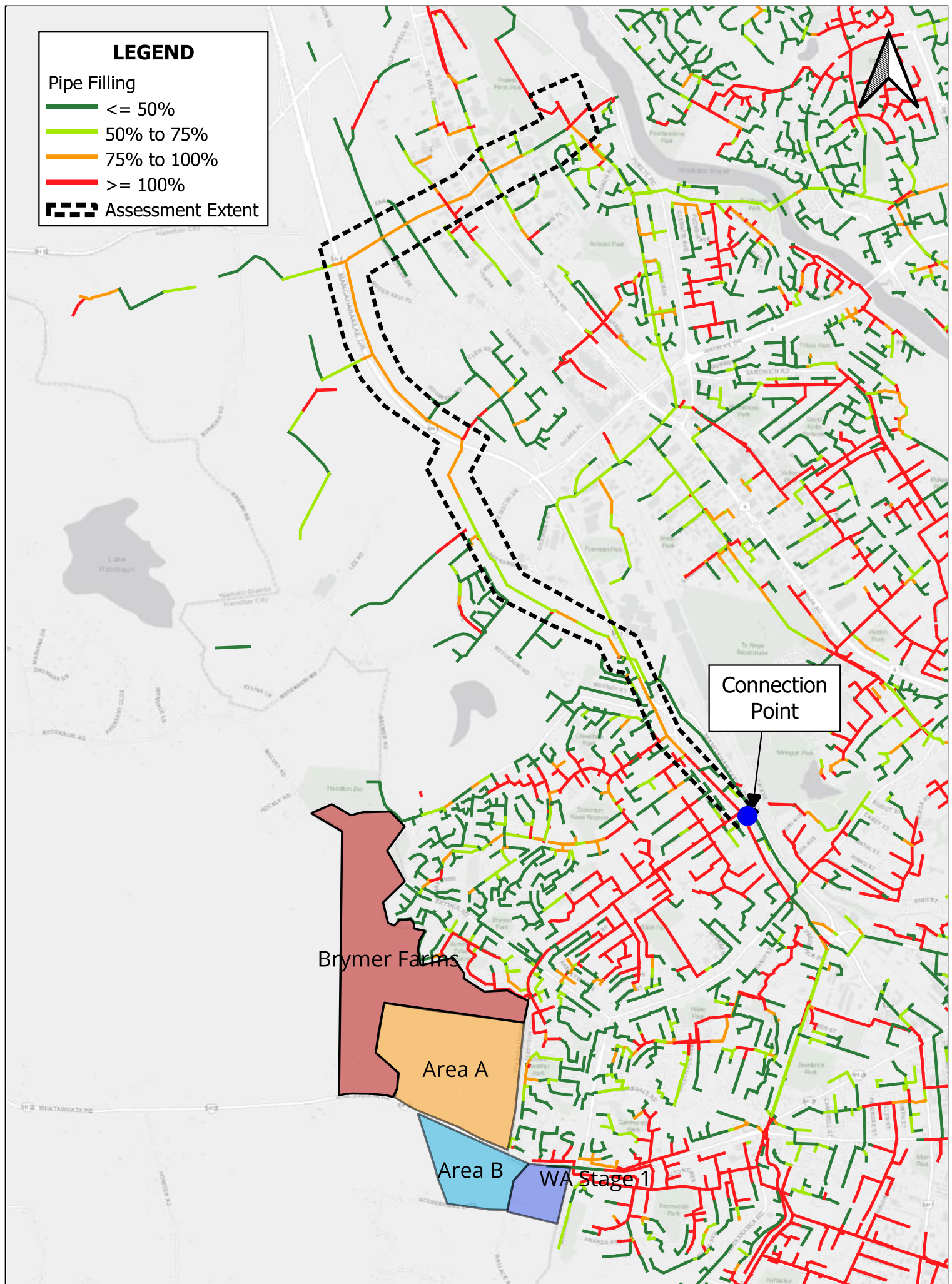
2041 Baseline Model +
Brymer Farms and Wallace
Road Developments

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



Brymer Farms

Area A

Area B

WA Stage 1

Connection
Point



Wastewater Network Plan
2041 Baseline + Brymer and WA Developments
Pipe Filling

Project
3-WLASS.AL

Date
2026-05-21

Number
25

Client
 **Hamilton City Council**
Te kaunihera o Kiriikiriroa

LEGEND

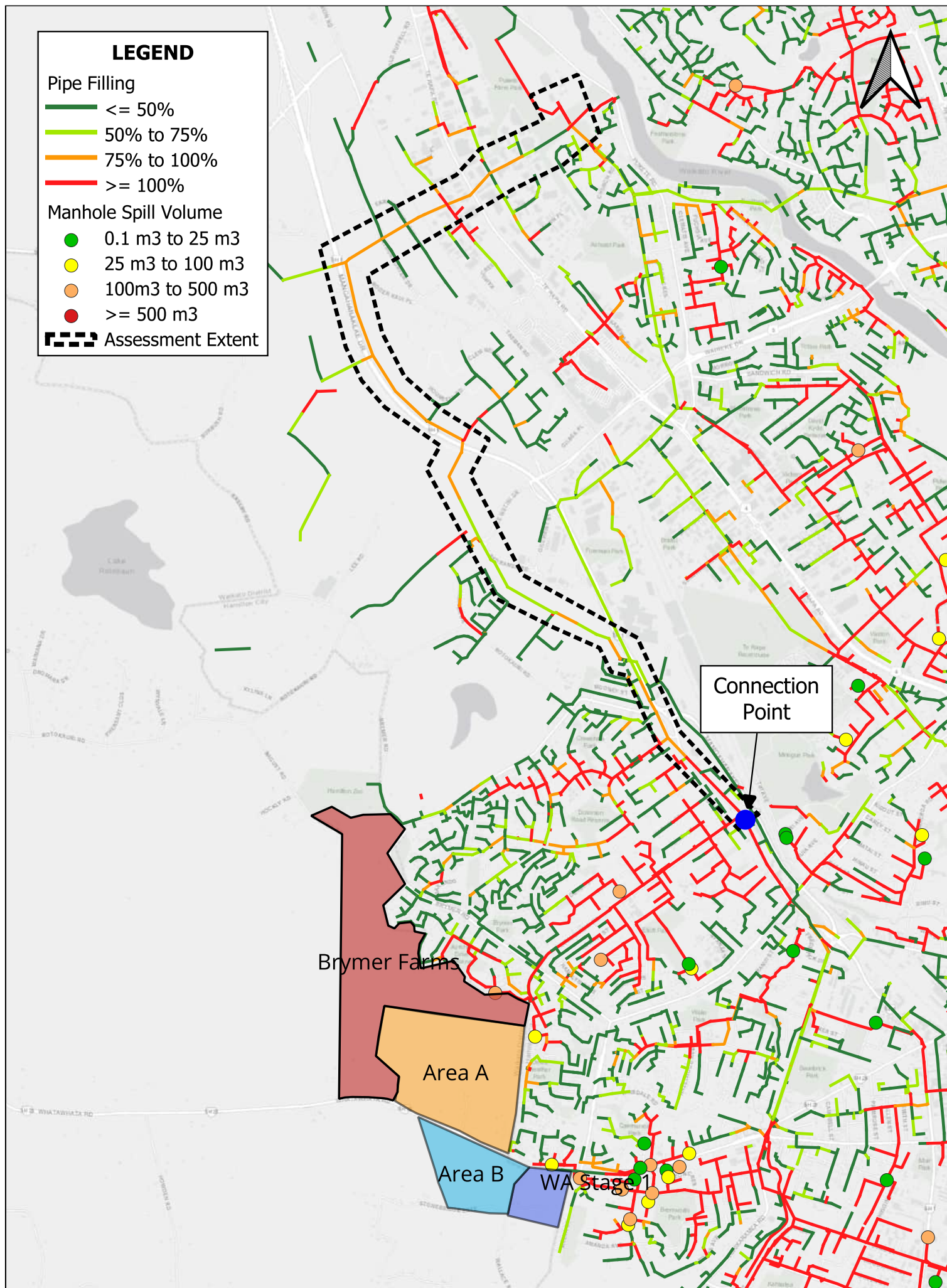
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

- - - Assessment Extent

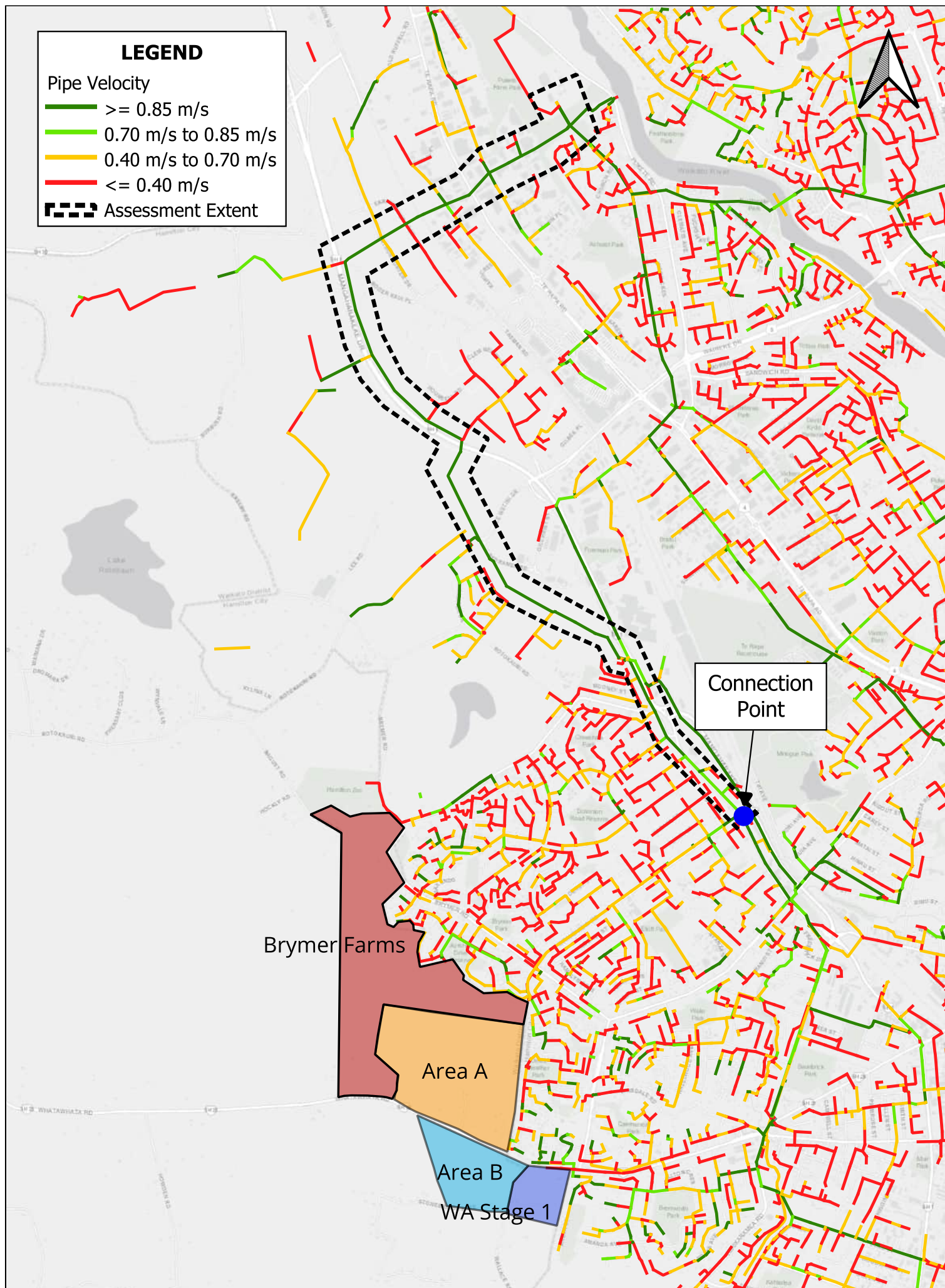


LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Brymer Farms

Area A

Area B

WA Stage 1

Connection
Point



Wastewater Network Plan
2041 Baseline + Brymer and WA Developments
Pipe flow Velocity

Project
3-WLASS.AL

Date
2026-05-21

Number
27

Client
 Hamilton City Council
Te kaunihera o Kiriikiriroa

Demand Scenario 2

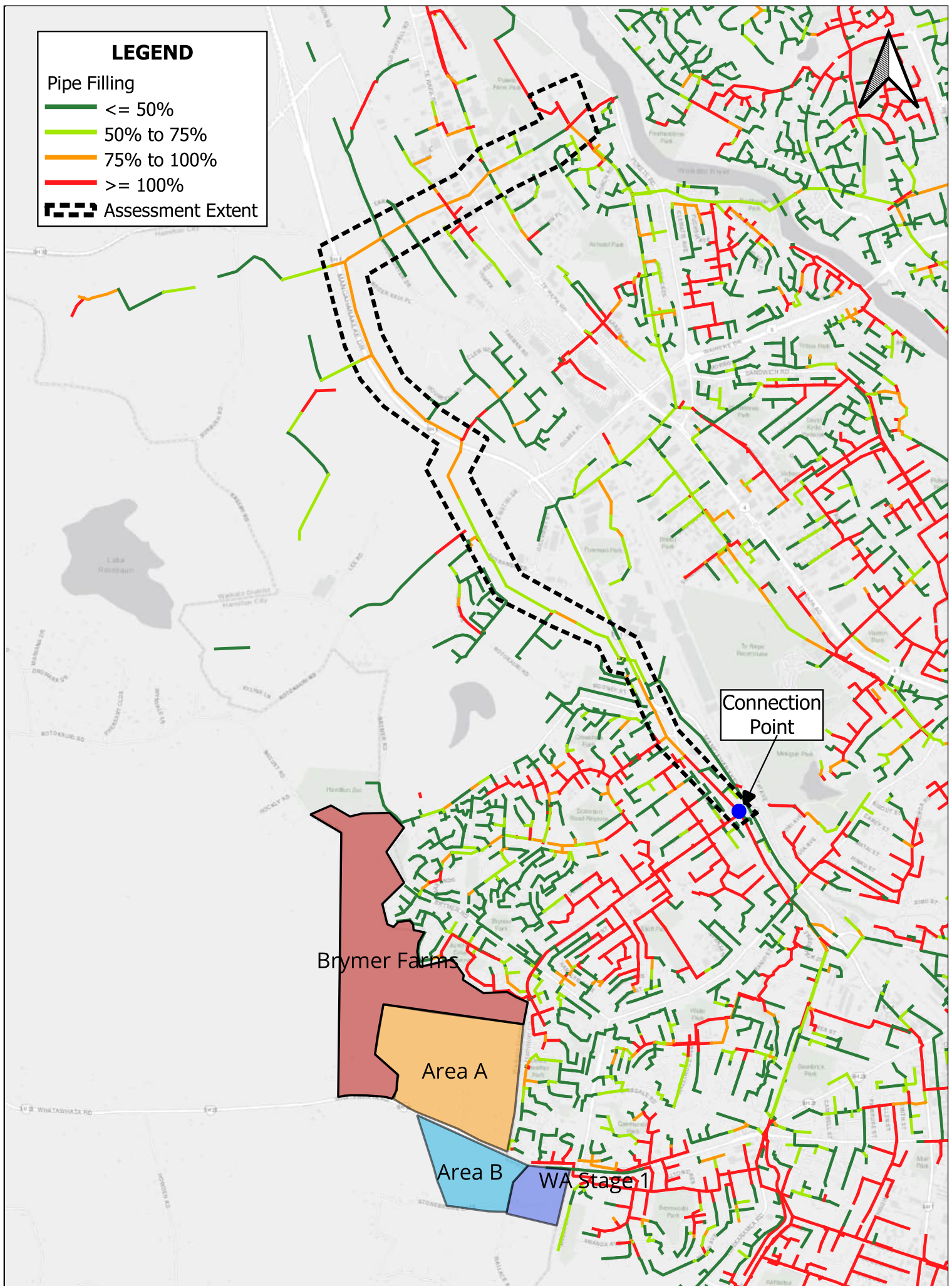
2041 Baseline Model +
Funded Strategic Upgrades +
Brymer Farms and Wallace
Road Developments

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



LEGEND

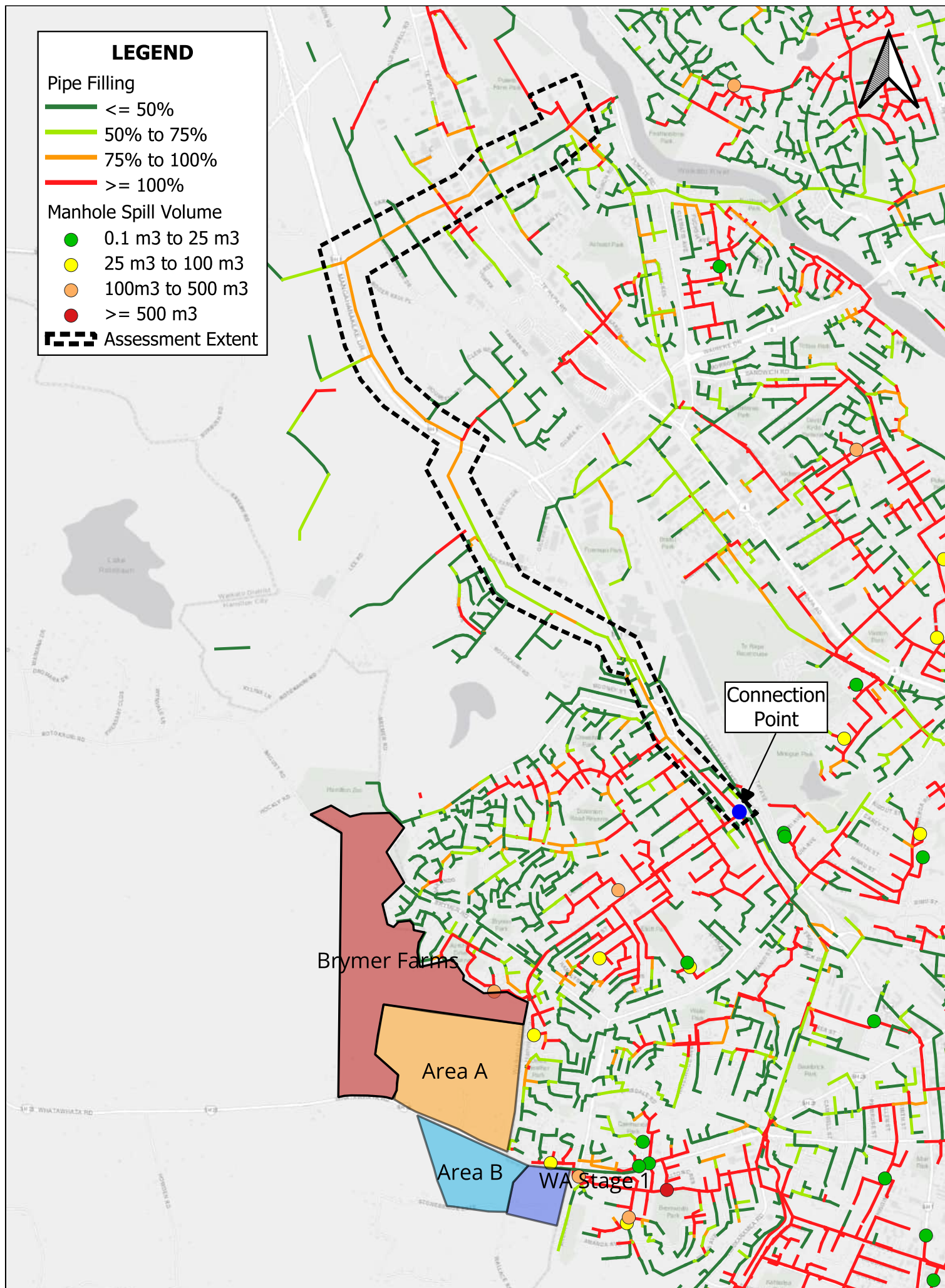
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

- - - Assessment Extent

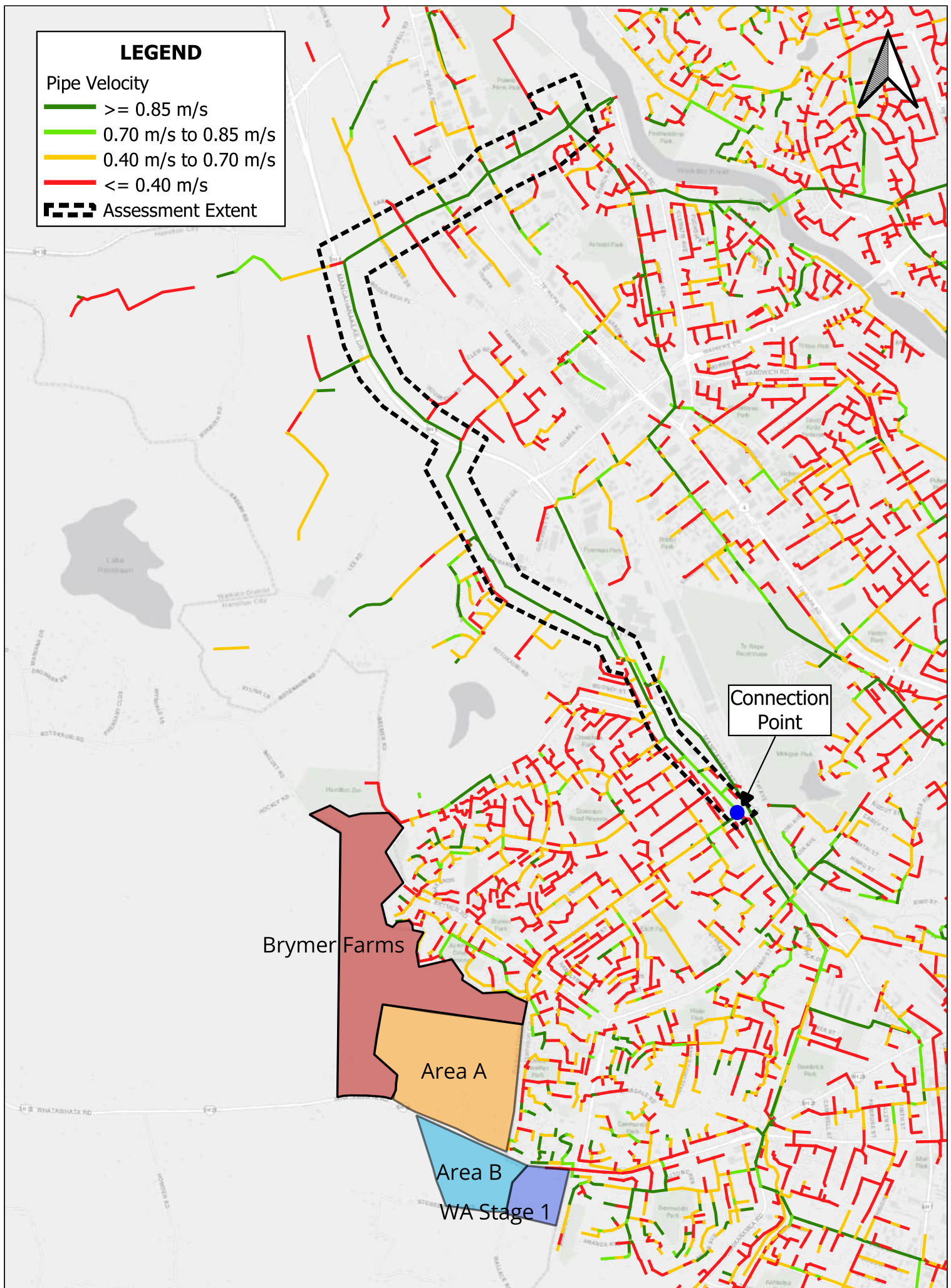


LEGEND

Pipe Velocity

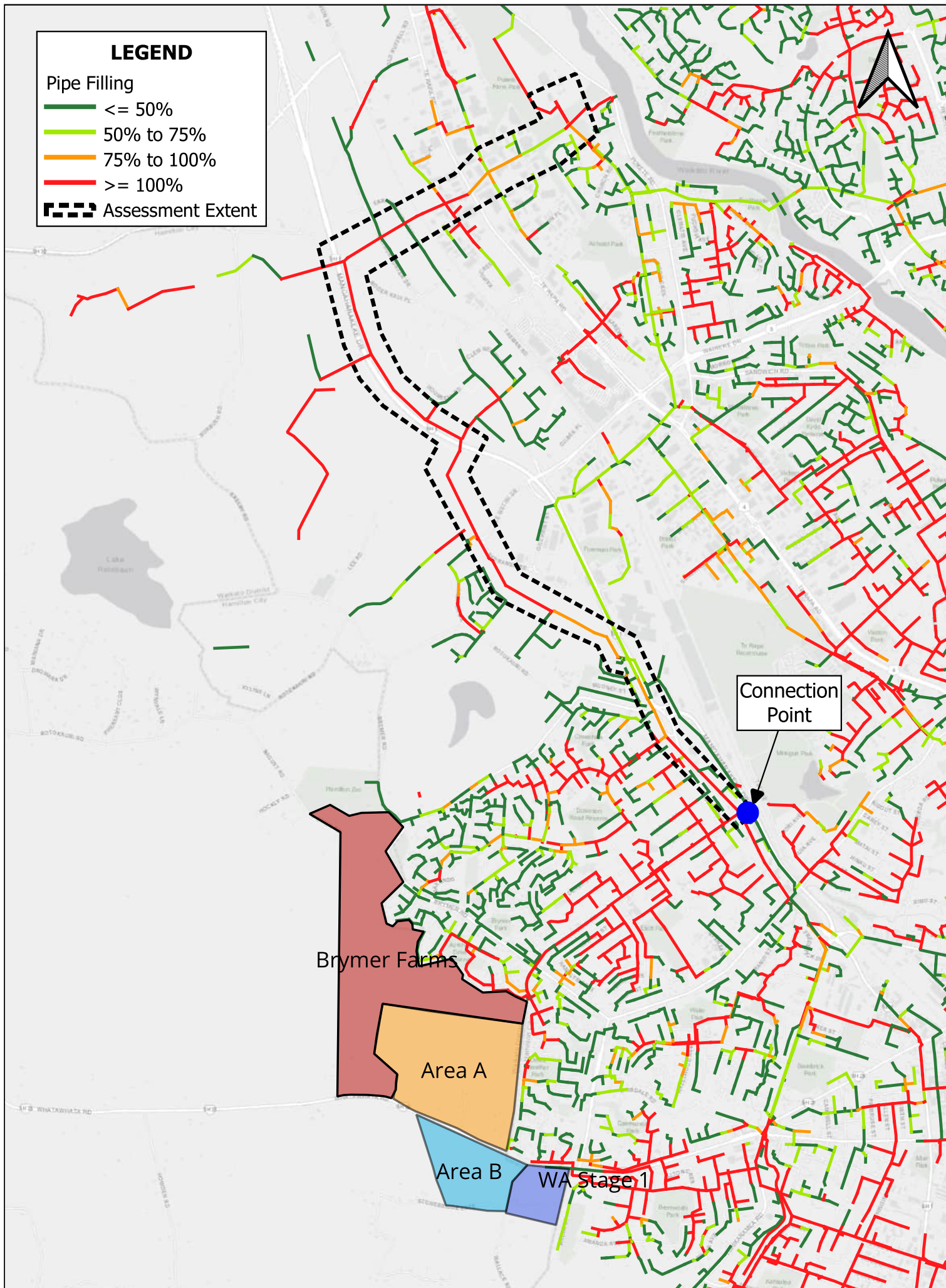
- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Demand Scenario 2

2061 Baseline Model +
Brymer Farms and Wallace
Road Developments



LEGEND

Pipe Filling

<= 50%

50% to 75%

75% to 100%

>= 100%

Assessment Extent

	Wastewater Network Plan 2061 Baseline + Brymer and WA Developments Pipe Filling	Project 3-WLASS.AL	Date 2026-05-21	Number 31	Client Hamilton City Council Te kaunihera o Kirikiriroa
--	--	------------------------------	---------------------------	---------------------	--

LEGEND

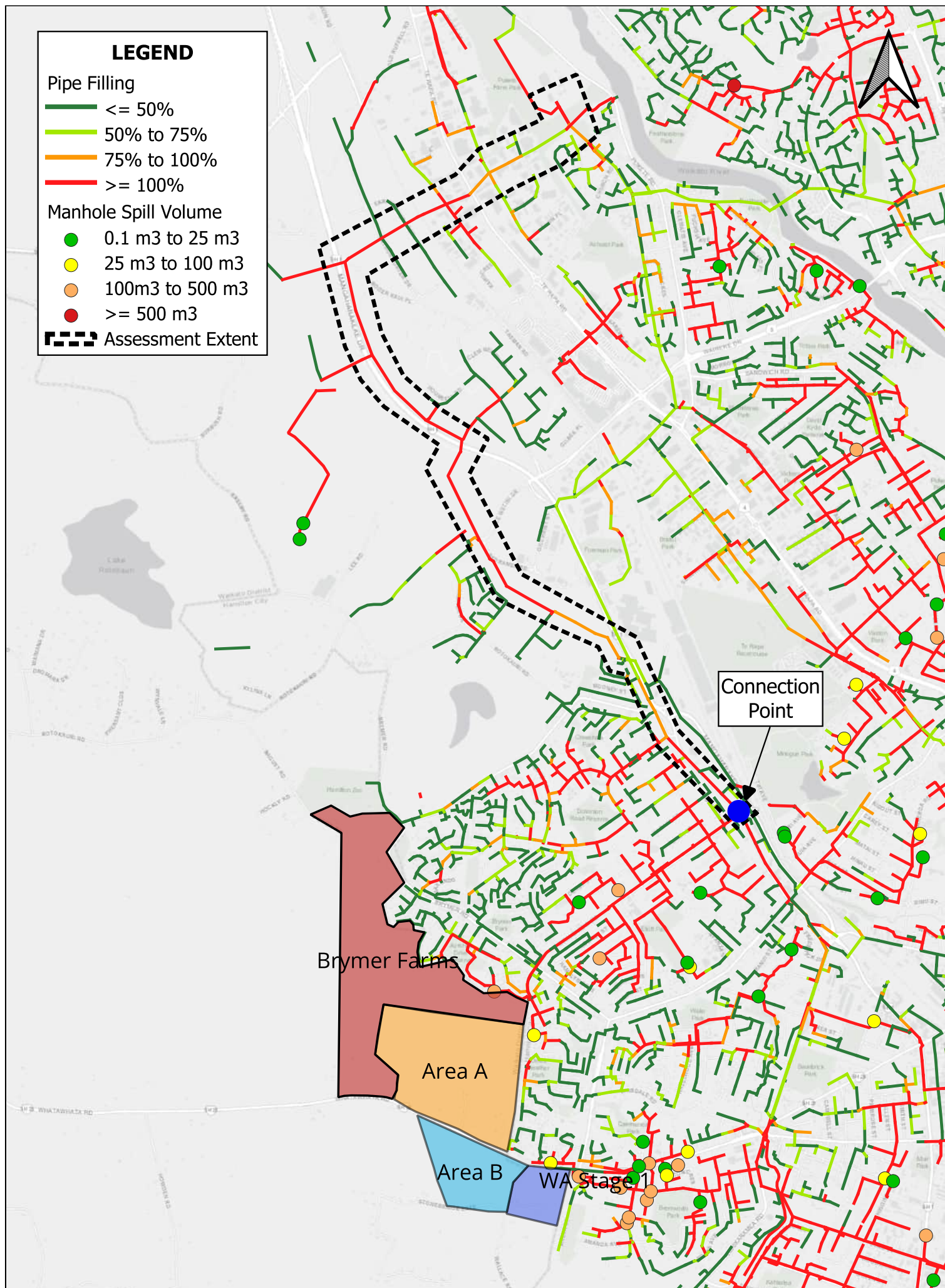
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent

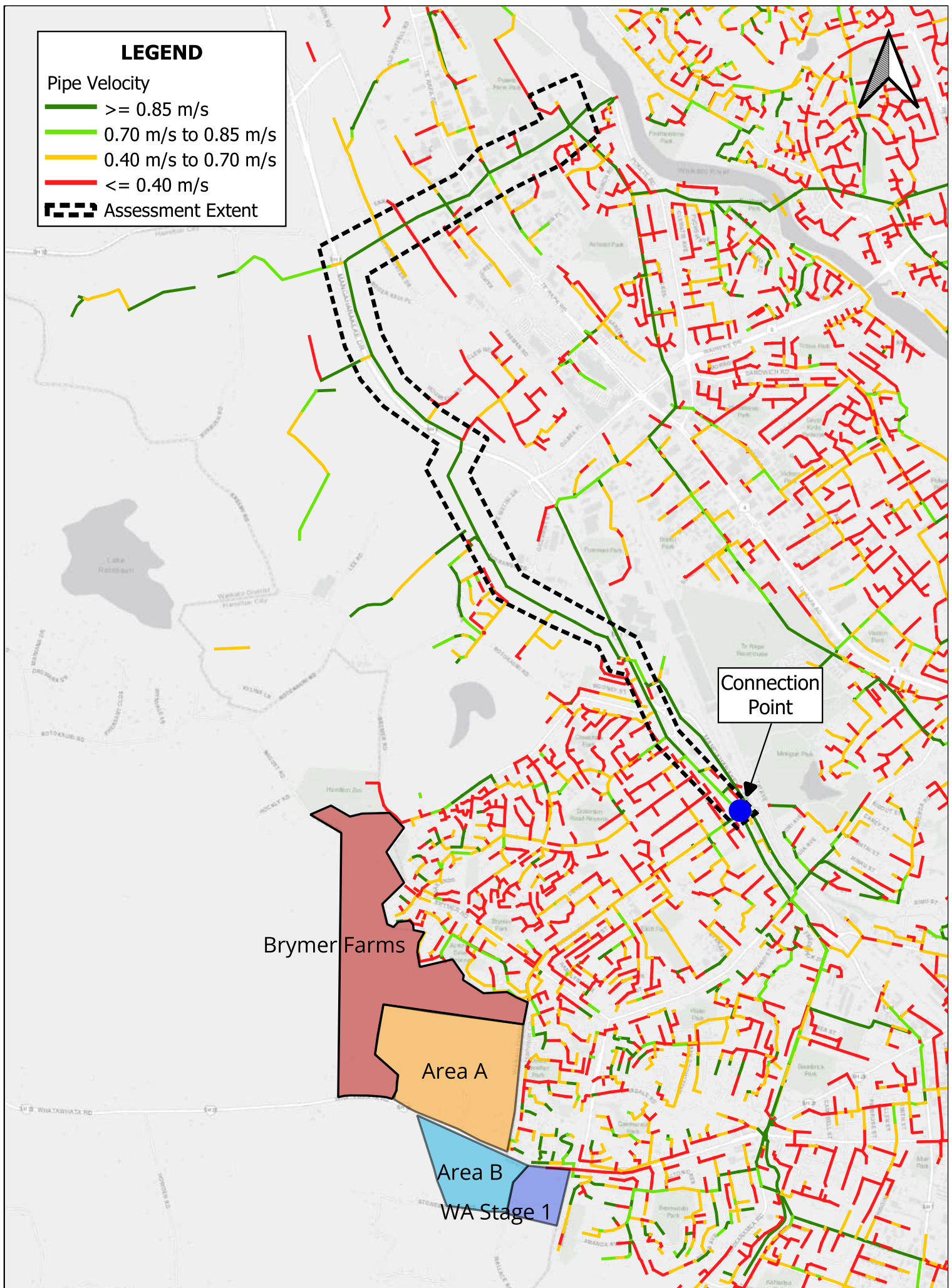


LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Brymer Farms

Area A

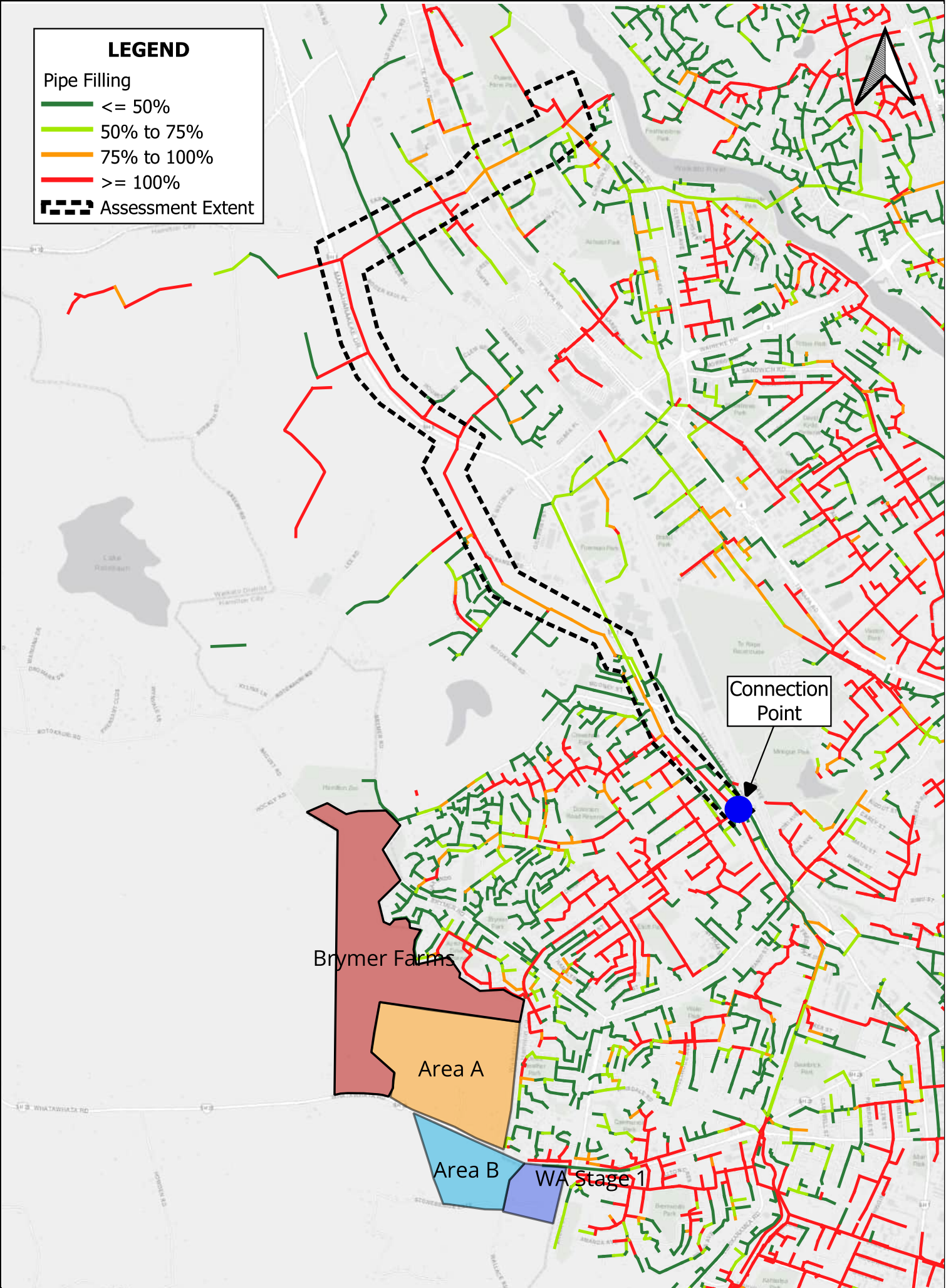
Area B

WA Stage 1

Connection
Point

Demand Scenario 2

2061 Baseline Model +
Funded Strategic Upgrades +
Brymer Farms and Wallace
Road Developments



	Wastewater Network Plan 2061 Baseline + Brymer and WA Developments + FSU: Pipe Filling	Project 3-WLASS.AL	Date 2026-05-21	Number 34	Client  Hamilton City Council Te kaunihera o Kirikiriroa
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LEGEND

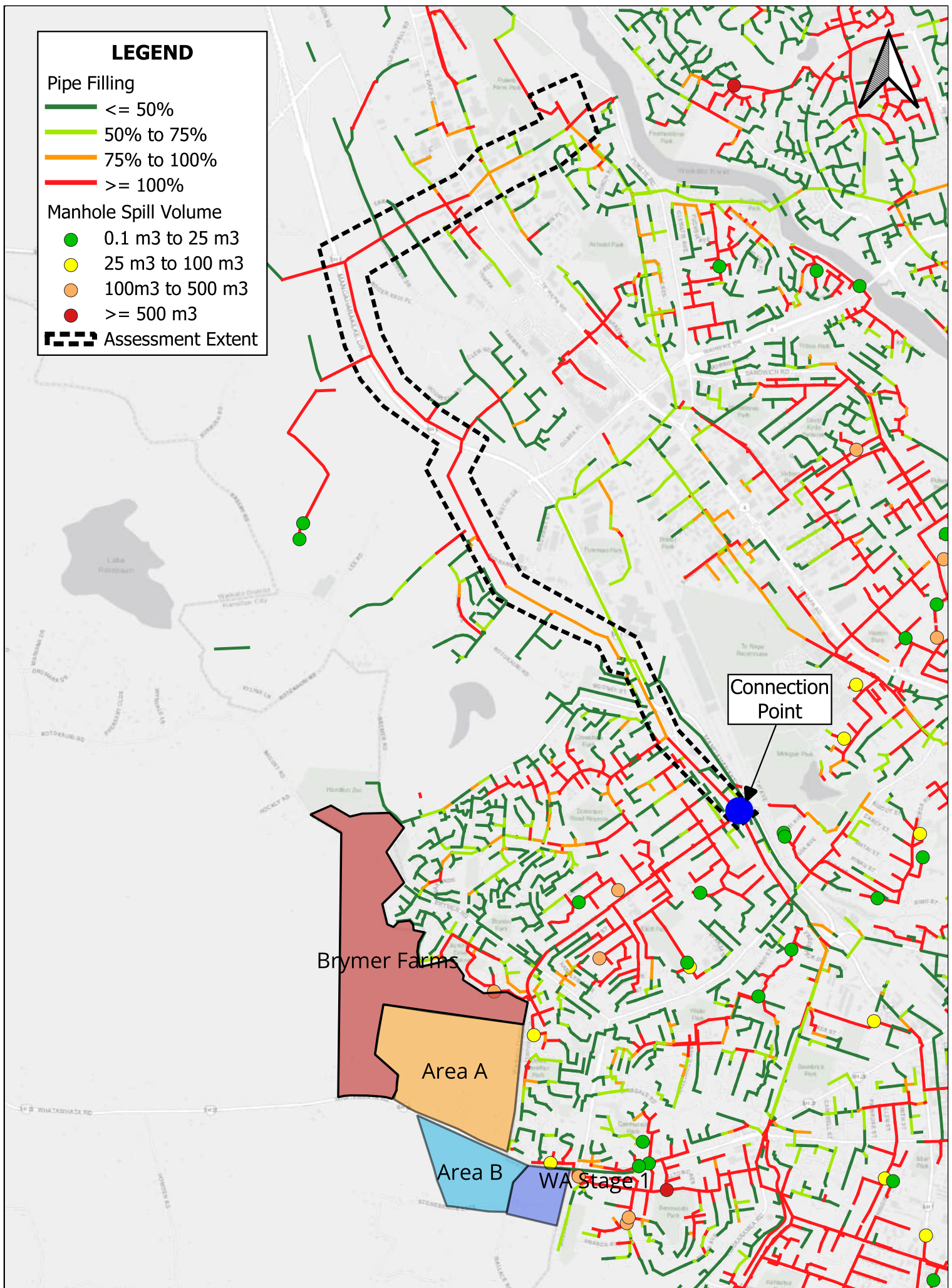
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent

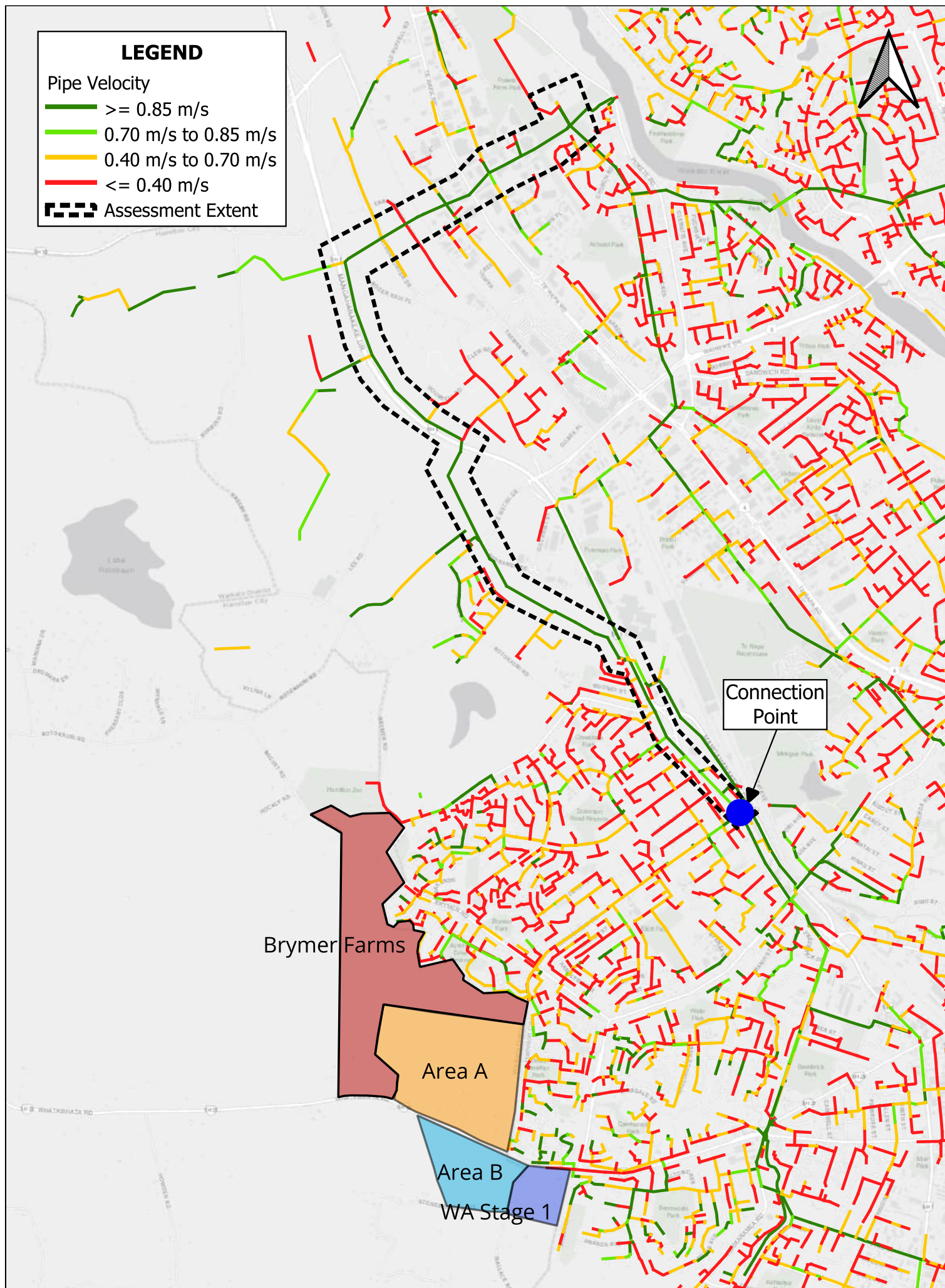


LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Brymer Farms

Area A

Area B

WA Stage 1

Connection
Point



Wastewater Network Plan

2061 Baseline + Brymer and WA
Developments + FSU: Pipe Flow Velocity

Project

3-WLASS.AL

Date

2026-05-21

Number

36

Client

 **Hamilton City Council**
Te kaunihera o Kiriikiriroa

Demand Scenario 3

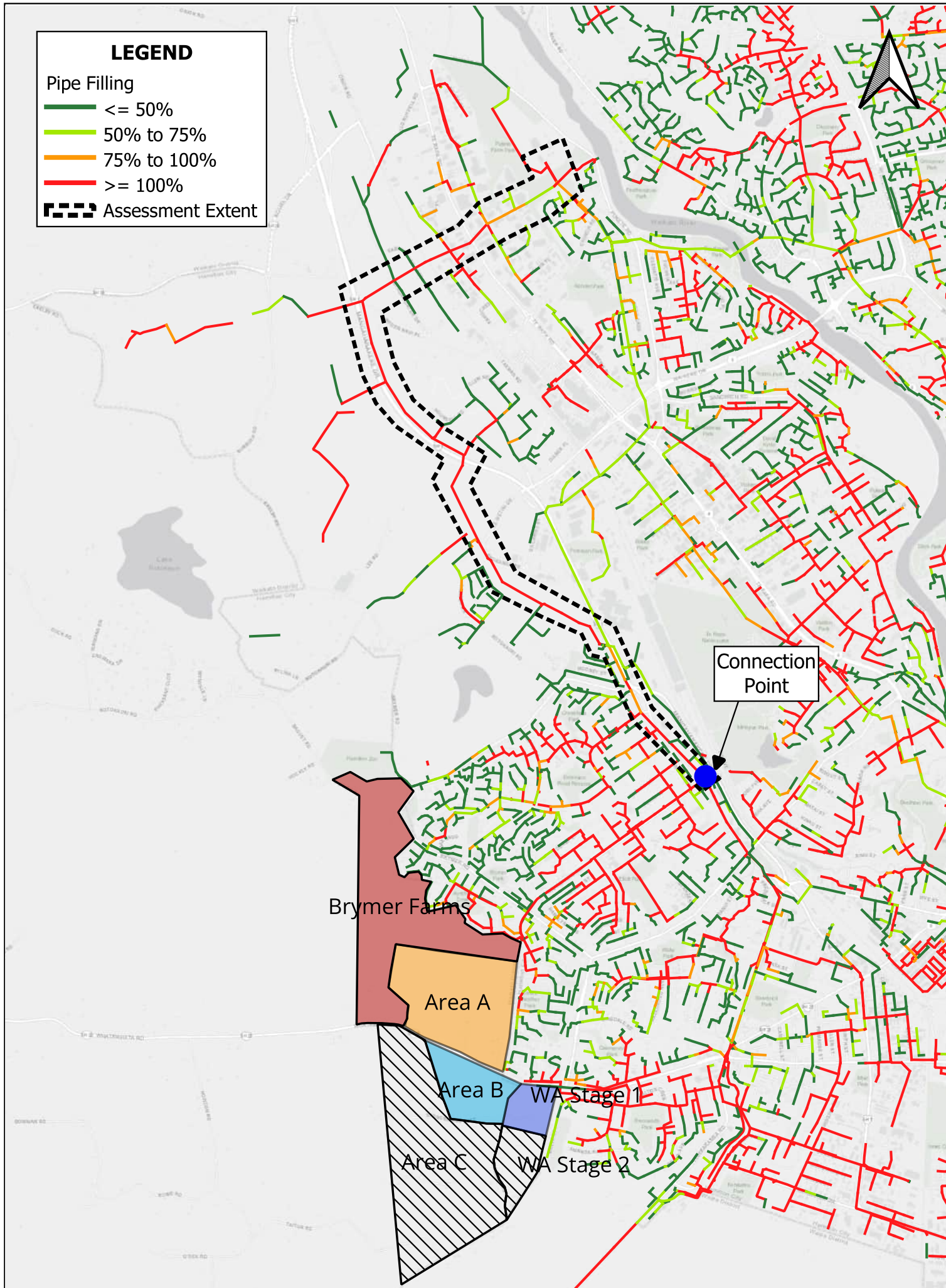
2061 Baseline Model + Brymer Farms
and Wallace Road Developments +
Future Potential Areas

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



LEGEND

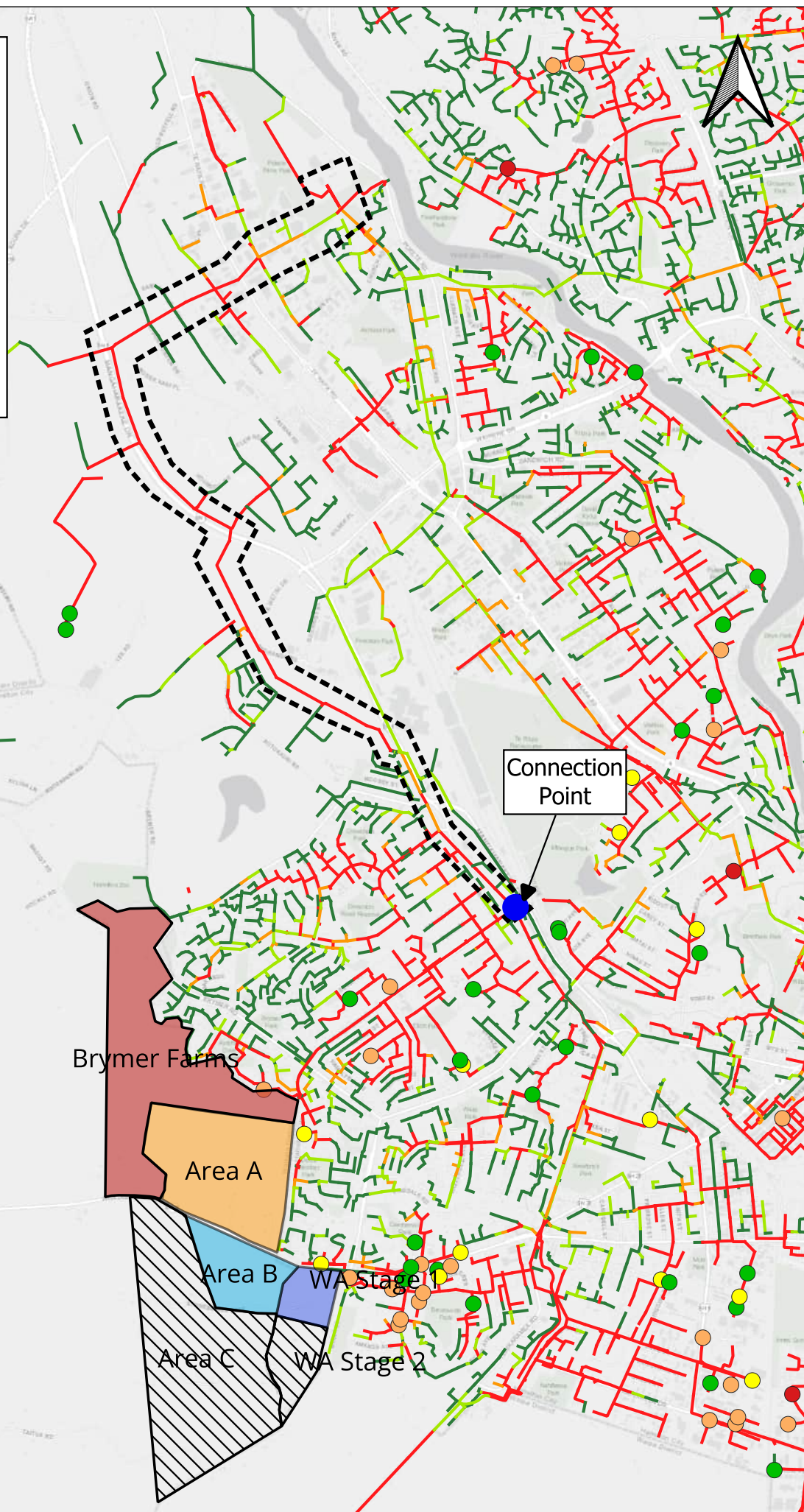
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent

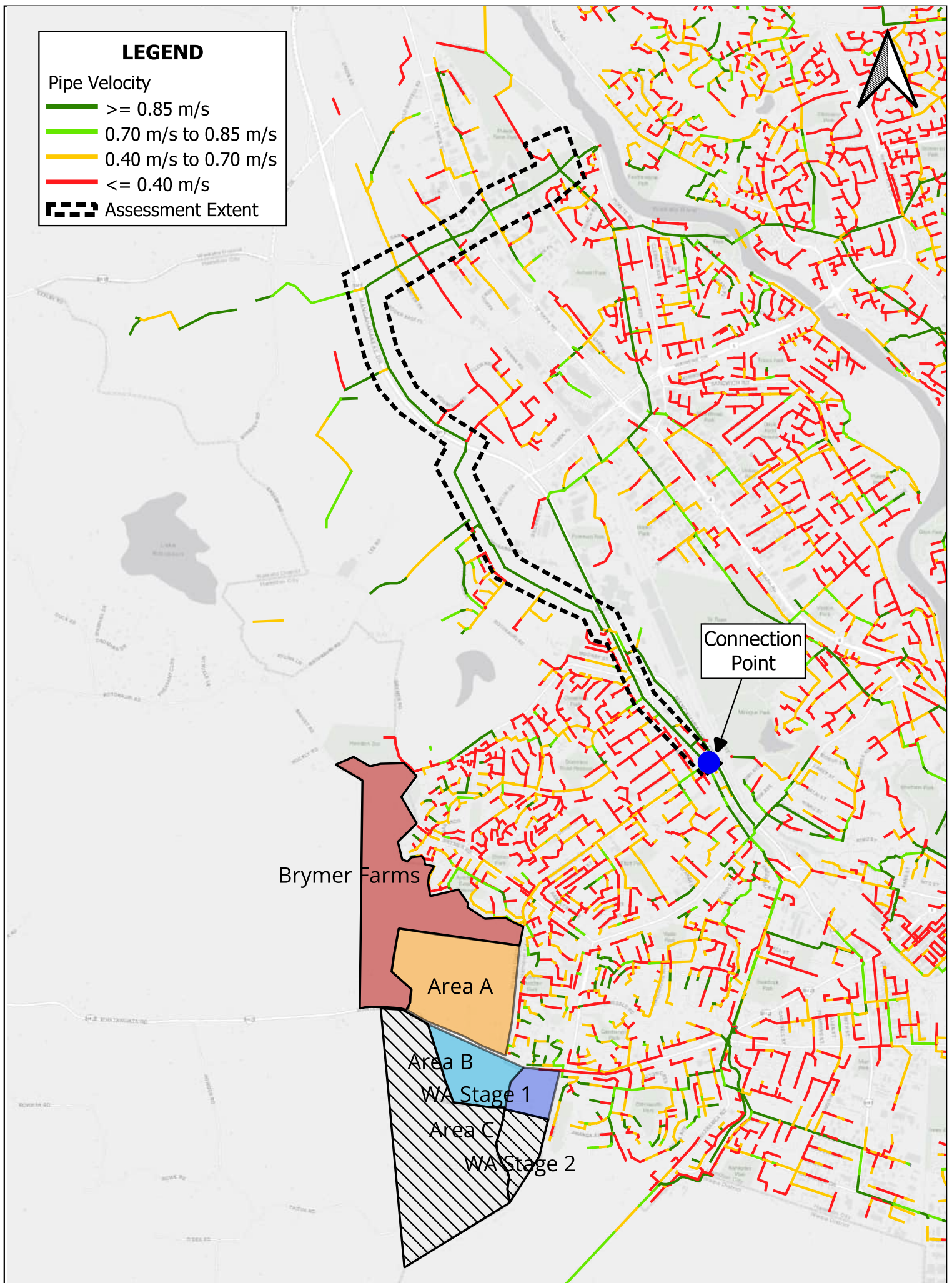


LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



Demand Scenario 3

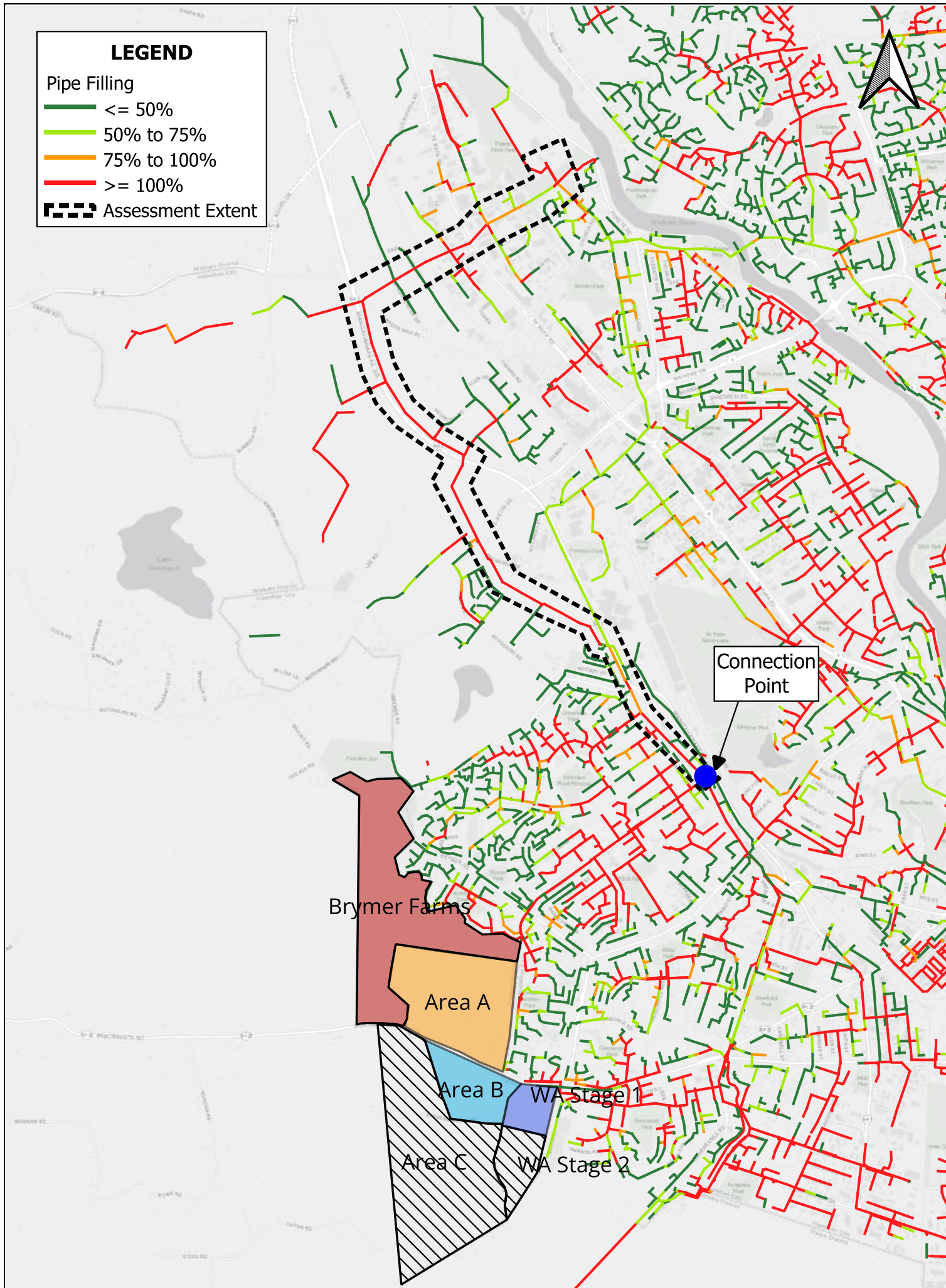
2061 Baseline Model + Funded
Strategic Upgrades + Brymer Farms
and Wallace Road Developments +
Future Potential Areas

LEGEND

Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

 Assessment Extent



LEGEND

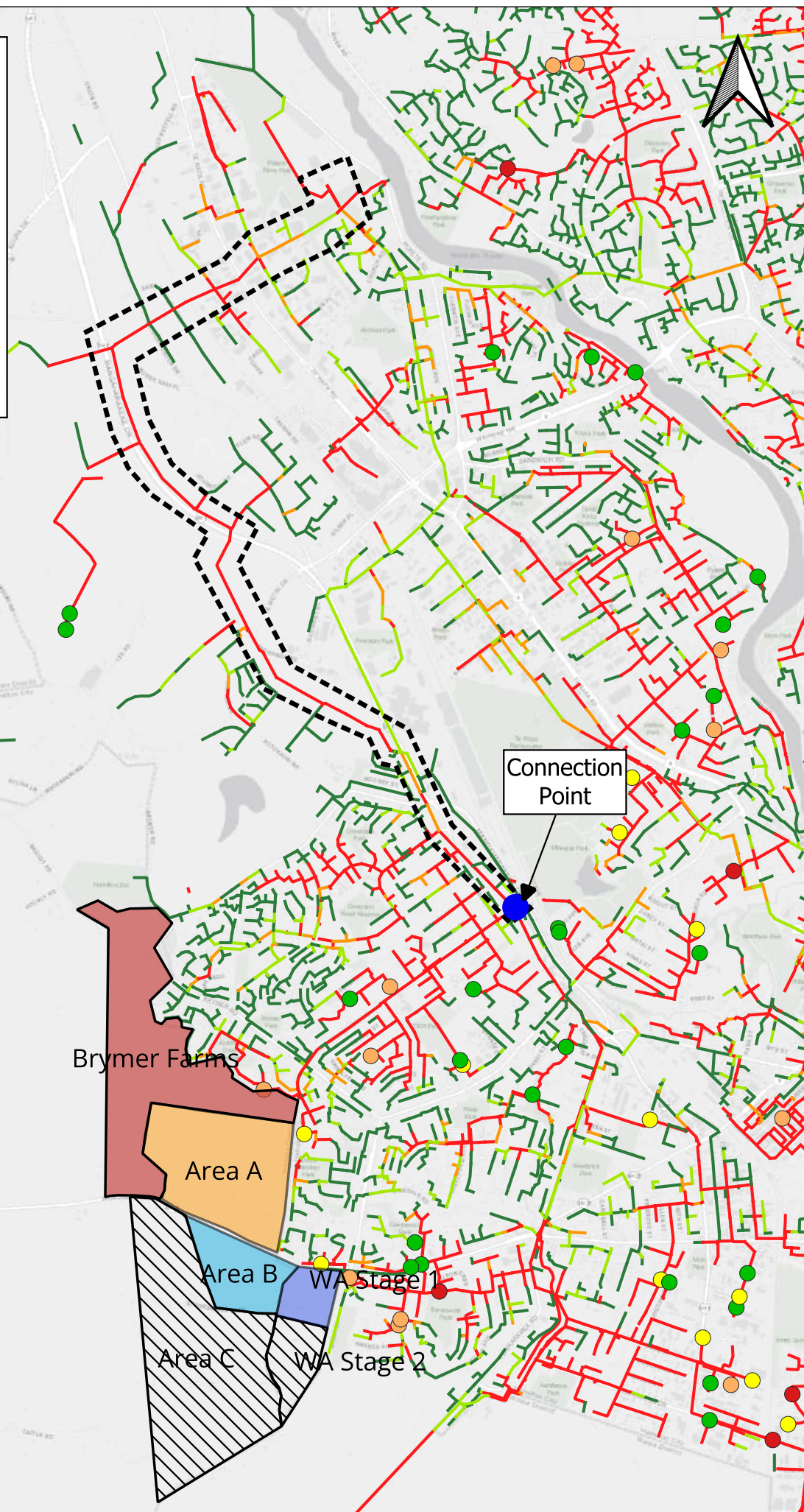
Pipe Filling

- $\leq 50\%$
- 50% to 75%
- 75% to 100%
- $\geq 100\%$

Manhole Spill Volume

- 0.1 m³ to 25 m³
- 25 m³ to 100 m³
- 100m³ to 500 m³
- ≥ 500 m³

 Assessment Extent

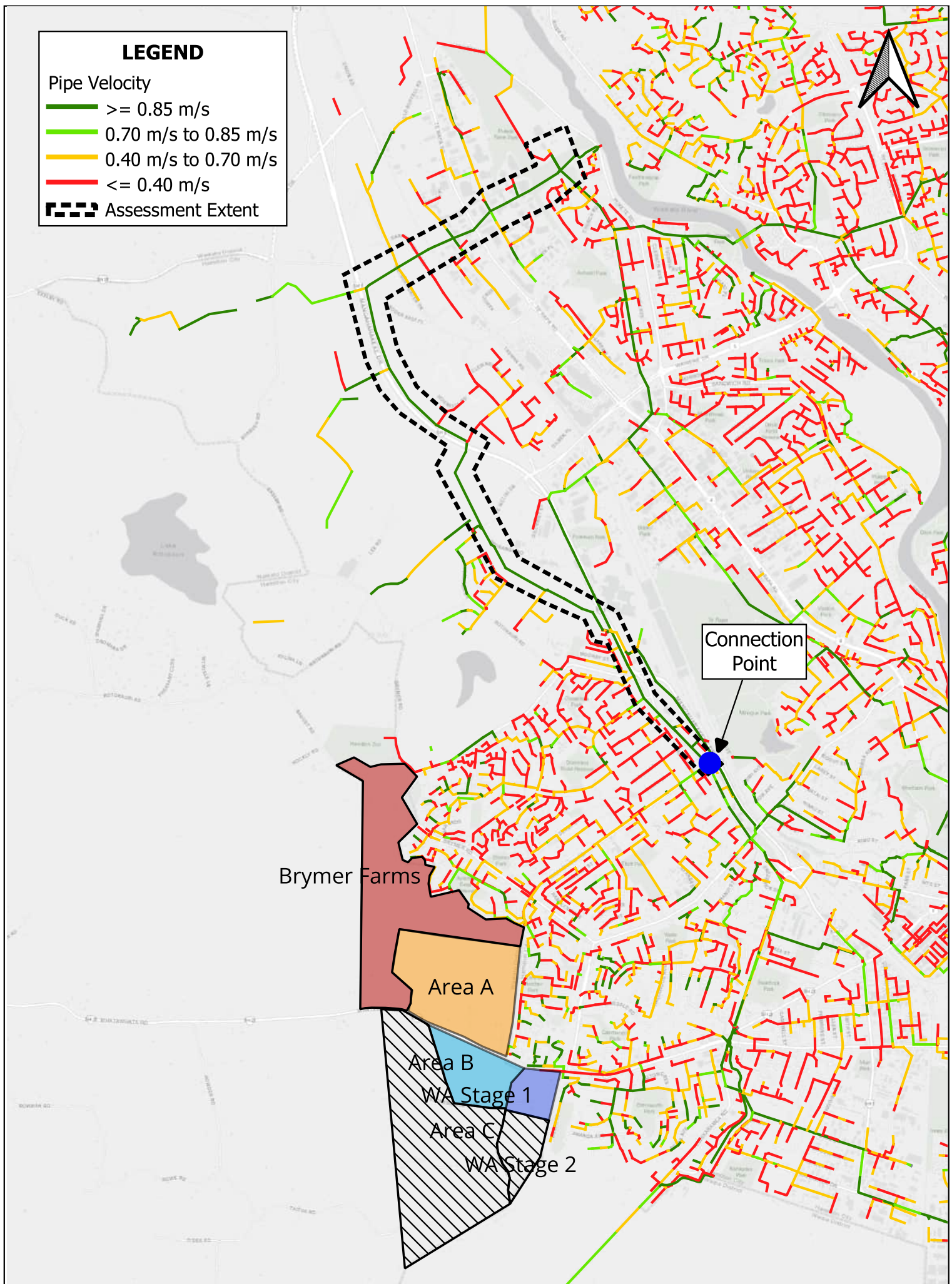


LEGEND

Pipe Velocity

- ≥ 0.85 m/s
- 0.70 m/s to 0.85 m/s
- 0.40 m/s to 0.70 m/s
- ≤ 0.40 m/s

 Assessment Extent



wsp



Appendix J – Wastewater Servicing Drawings



STAGE 1A - ONSITE TREATMENT

PROPOSED WASTEWATER
PUMP STATION D

PROPOSED WASTEWATER
PUMP STATION A

PROPOSED WASTEWATER
PUMP STATION B

PROPOSED PE100
RISING MAIN

STAGE 1 - 118 LOTS DRAINING TO
PUMPSTATION B VIA GRAVITY

PUMPSTATION
STORAGE 15m³
PROVIDING FLOW
ATTENUATION

PROPOSED AMALGAMATED LOT BDY

EXISTING WASTEWATER
PUMP STATION SPS098

RISING MAIN DISCHARGE TO WETWELL

INSERT - GRANDVIEW ROAD CONNECTION

BRYMER ROAD
AYRSHIRE DRIVE

EXISTING 2250D RISING
MAIN

EXISTING WASTEWATER
PUMP STATION SPS098
STORAGE TO BE
UPGRADED WITHIN
#232-234 GRANDVIEW
ROAD - REFER TO INSERT

GRANDVIEW ROAD

WHATAWHATA ROAD

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M
 3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
 4. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
 5. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS, ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
 6. ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

- | | |
|-------|-------------------|
| — | EX BDY |
| — | PROP BDY |
| - - - | EX WASTEWATER |
| - - - | INITIAL STAGE BDY |
| - - - | PROP WASTEWATER |
| - - - | RISING MAIN |
| - - - | PROP WASTEWATER |
| ○ | EX/PROP WWMH |
| ○ | PR WW LOT CON |
| ○ | AIR VALVE |
| ○ | SCOUR VALVE |

A	FAST TRACK	TCH	08/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		09/2025
Drawn	AJP		09/2025
Checked			



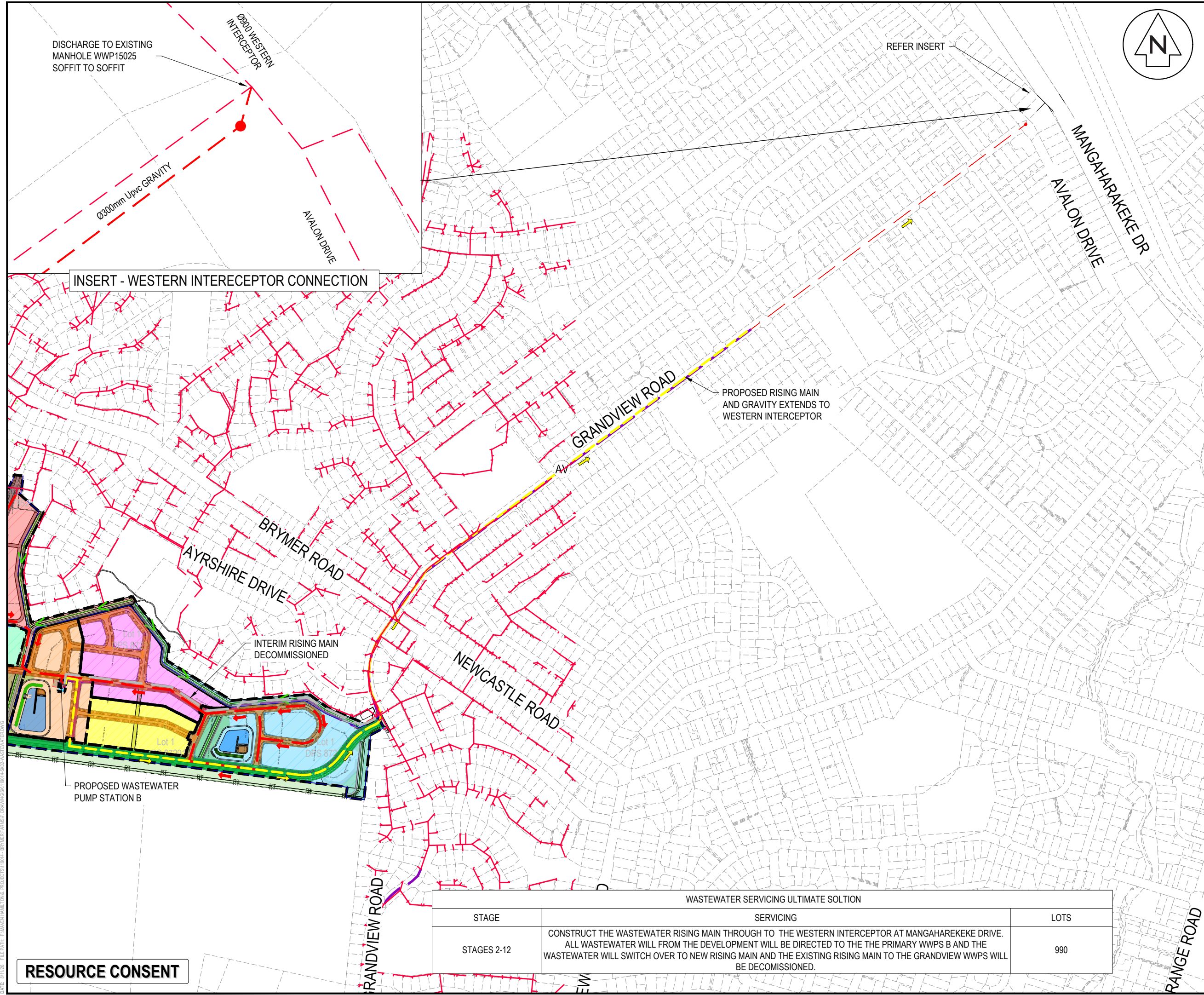
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
STAGE 1**

Project no.	119014
Scale	1:7500 @A3
Cad file	119014-SK02-WASTEWATER.DWG
Drawing no.	SK02-2
Rev	A

INITIAL WASTEWATER SERVICING		
STAGE	SERVICING	LOTS
STAGE 1	CONSTRUCT WASTEWATER PUMP STATION B, AND PUMP THE WASTEWATER VIA A NEW 1100D HDPE WASTEWATER RISING MAIN THROUGH TO THE EXISTING WASTEWATER PUMPSTATION WWR19589	118

RESOURCE CONSENT



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 0.2594M
 3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
 4. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
 5. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS, ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
 6. ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	INITIAL STAGE BDY
	PROP WASTEWATER RISING MAIN
	PROP WASTEWATER
	EX/PROP WWMH
	PR WW LOT CON
	AIR VALVE
	SCOUR VALVE

A	FAST TRACK	TCH	08/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		09/2025
Drawn	AJP		09/2025
Checked			



Maven Waikato
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

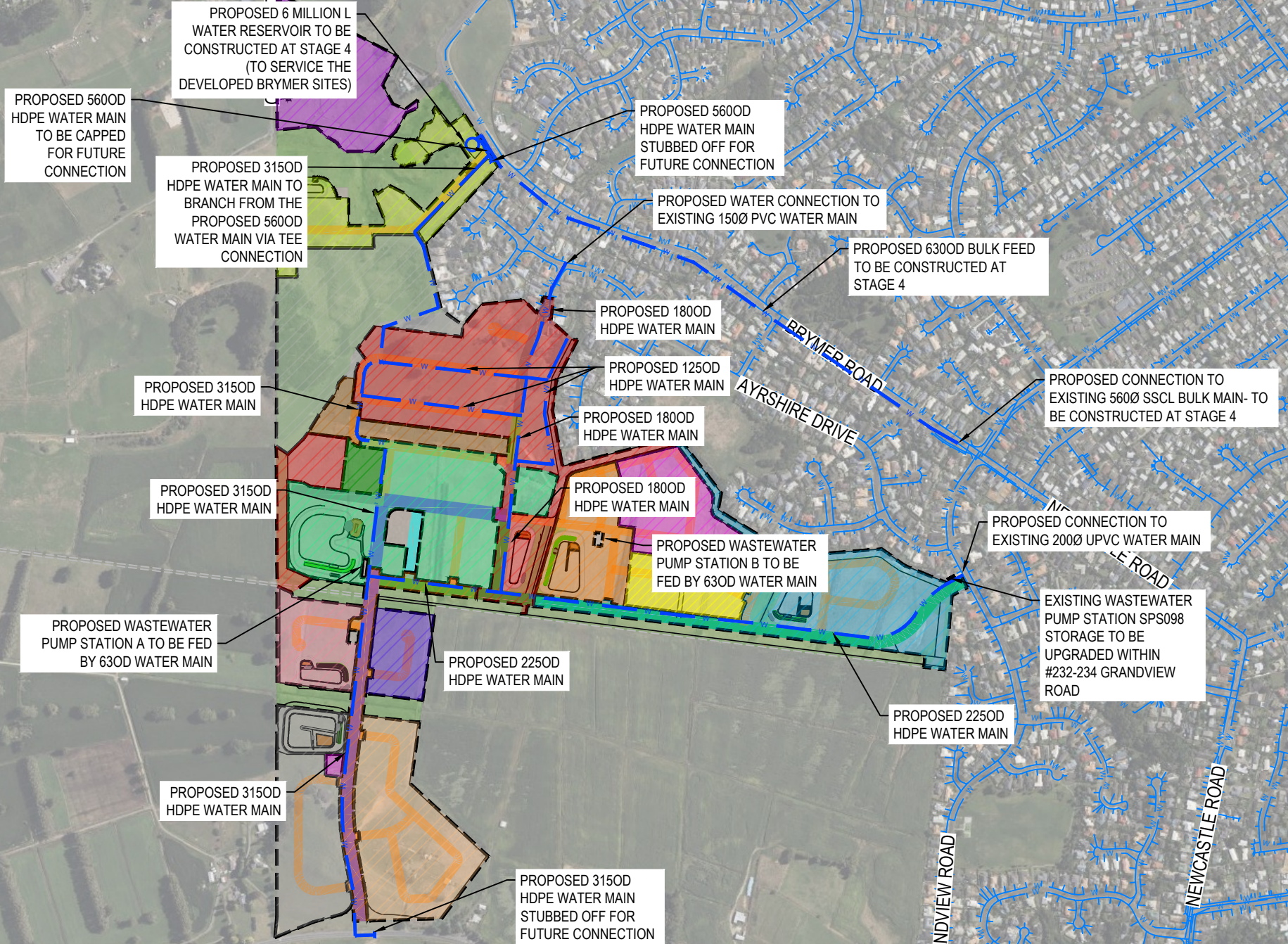
Title
**PROPOSED
WASTEWATER
STAGE 1-12**

Project no.	119014
Scale	1:7500 @A3
Cad file	119014-SK02-WASTEWATER.DWG
Drawing no.	SK02-3
Rev	A

WASTEWATER SERVICING ULTIMATE SOLTION		
STAGE	SERVICING	LOTS
STAGES 2-12	CONSTRUCT THE WASTEWATER RISING MAIN THROUGH TO THE WESTERN INTERCEPTOR AT MANGAHAREKEKE DRIVE. ALL WASTEWATER WILL FROM THE DEVELOPMENT WILL BE DIRECTED TO THE THE PRIMARY WWPS B AND THE WASTEWATER WILL SWITCH OVER TO NEW RISING MAIN AND THE EXISTING RISING MAIN TO THE GRANDVIEW WWPS WILL BE DECOMISSIONED.	990

RESOURCE CONSENT

Appendix K – Water Supply Servicing Drawings



WHATAWHATA ROAD

WATER SUPPLY SERVICING		
STAGE	PROPOSED SERVICING/ CONSENT TRIGGER	LOTS
STAGE 1	CONNECT TO THE EXISTING 150 mm uPVC WATER MAIN IN AYRSHIRE DRIVE AND EXTEND A 180 mm OD WATER MAIN THROUGH STAGE 1 TO ROAD 8 TO FORM A LOOPED NETWORK. TRANSFER THE EXISTING HARROWGATE CONNECTIONS TO THE NEW WATER MAIN AND DECOMMISSION THE REDUNDANT MAIN.	118
STAGES 2-3	CONNECT TO THE EXISTING 200 mm uPVC WATER MAIN IN GRANDVIEW ROAD AND EXTEND A 225 mm OD PE100 WATER MAIN ALONG ROAD 8. CONNECT TO THE STAGE 1 180 mm OD WATER MAIN TO FORM A LOOPED NETWORK.	UP TO 215 LOTS IN TOTAL
215 LOT TRIGGER	CONSTRUCT THE 6 MILLION LITRE RESERVOIR SOUTH OF 127 BRYMER ROAD AND THE ASSOCIATED 630 mm OD BULK FEEDER FROM BRYMER ROAD. RESERVOIR SHALL BE CONSTRUCTED/ CONSTRUCTION COMMENCED WITHIN 10 YEARS.	215
STAGES 4 TO 12	CONSTRUCT THE RESERVOIR AND ASSOCIATED 315 mm OD WATERMAIN IN ACCORDANCE WITH THE APPROVED SERVICING STRATEGY. CAP THE WATERMAIN AT SH23 FOR FUTURE CONNECTION, AS SHOWN ON THE SERVICING PLAN.	BALANCE OF DEVELOPMENT

DRAFT FOR REVIEW

- NOTES
- ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 - CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 - IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ANY UNDERGROUND SERVICES PRIOR TO THE COMMENCEMENT OF WORKS.
 - MINIMUM COVER SHALL BE:
ROADS AND FRONT1M OF BERM: 900MM
BERMS 600MM
SERVICE CONNECTIONS: 450MM
 - WATERMAINS LAID ACROSS ROADS SHALL BE BACKFILLED WITH HARDFILL COMPACTED IN 200MM LAYERS ABOVE THE EMBEDMENT MATERIAL.
 - ALL UPVC PIPE SHALL BE PN12 MINIMUM PRESSURE RATED WITH SPIGNOT AND SOCKET RUBBER RING JOINTS.
 - ALL PE PIPE SHALL BE PN12.5 MINIMUM PRESSURE RATED WITH BUTT-WELDED. WELD BEADS SHALL BE REMOVED TO PROVIDE A SMOOTH BORE.
 - ALL NON-METALIC PIPES ARE TO HAVE TRACER WIRE FITTED TO COUNCIL STANDARDS.
 - PIPES SHALL BE BEDDED AND SURROUNDED TO 150MM ABOVE THE PIPE SOFFIT WITH SAND OR AP20.
 - METAL DETECTOR TAPE PRINTED WITH 'WATER PIPE BELOW' SHALL BE LAID 150MM ABOVE ALL WATERMAINS.
 - A YELLOW ISOSCELES TRIANGLE PAINTED NEAR THE ROAD CENTRE POINTING TO FH FOR SEALED ROADS AND BLUE CATS EYE ON THE ROAD CENTRE.
 - ALL VALVES TO BE MARKED WITH SAWCUT KERB AND BLUE PAINT.
 - ALL FLANGE JOINTS TO BE PROTECTED WITH DENSO TAPE OR SIMILAR APPROVED BY THE ENGINEER.

LEGEND	
	EX BDY
	PROP BDY
	EX WATERMAIN
	PROP WATERMAIN
	PR WATER PRIVATE
	EX/PROP HYDRANT
	EX/PROP METER
	EX SLUICE VALVE
	EX PEET VALVE
	PROP SLUICE VALVE
	PROP PEET VALVE

E	FOR INFORMATION	TCH	07/2026
D	FOR INFORMATION	TCH	03/2026
C	FOR INFORMATION	TCH	12/2025
B	FOR INFORMATION	TCH	11/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	TCH		09/2025
Drawn	TCH		09/2025
Checked			



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WATER SUPPLY
STAGES 1 - 12**

Project no.	119014
Scale	1:10000 @ A3
Cad file	119014-SK01-WATERSUPPLY.DWG
Drawing no.	SK01-1
Rev	E

Appendix L – Mott Macdonald Water Supply Modelling Report

Fast Track – Water Supply Modelling Brymer Development

Project:	Water supply modelling for Fast Track – Brymer Development		
Our reference:	705100854	Revision	B
Prepared by:	Cristina Miralles Rivera	Date:	24/07/2026
Approved by:	Julie Plessis	Checked by:	David Kang
Subject:	Brymer Water Supply Modelling – Interim Report		

1 Introduction

The Fast Track Approvals Act (Fast Track), which aims to provide an accelerated pathway for projects by bypassing the standard Resource Management Act 1991 planning process, came into effect at the end of 2024. The Brymer development is currently looking to use the Fast Track to progress their development in collaboration with Hamilton City Council.

Hamilton City Council (HCC) has engaged Mott MacDonald Limited under PS 3239-2025 to assess the impact of the various Fast Track developments areas on the water network, including Brymer development. This work supports planning decisions by assessing network capacity and system performance against Level of Service (LoS) criteria for HCC.

2 Modelling process and assumptions

The principal modelling assumptions and methodological considerations are outlined below:

- The base hydraulic model was updated using Master Plan 4 (MP4) demand forecasts for the 2041 and 2061 horizons, with adjustments for expected demand reductions from Universal Water Metering (UWM).
- The baseline scenarios incorporate the existing network along with funded strategic upgrades (2024-34 Long Term Plan), including reservoirs, pump station upgrades, bulk mains and trunk mains. Note, this does not include the reduction in the extent of the Dinsdale zone following implementation of the Rotokauri zone as this work is not funded in the 2024-34 LTP due to being planned for implementation in 2041.
- The Brymer development was assessed independently; cumulative impacts from other Fast Track developments are outside the current scope.

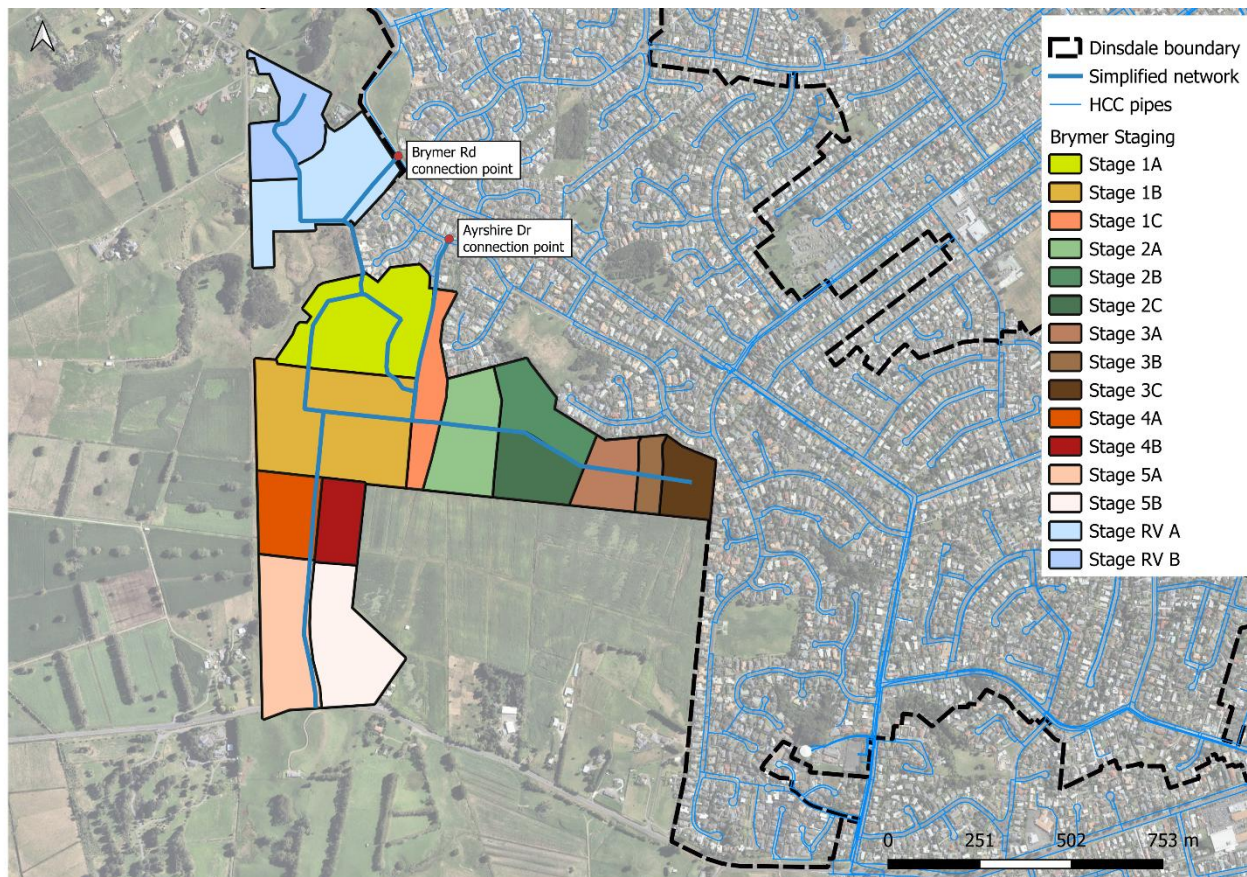
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We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

The Brymer development is located west of the Dinsdale zone and the extent of Brymer development is illustrated in Figure 2-1 below.

Figure 2-1 Brymer development map



2.1 Growth assessment in 2041 and 2061 Horizons

The growth assessment quantifies the projected population increase within the Dinsdale Zone between the 2041 and 2061 planning horizons, using the current Dinsdale zone boundary as the basis for analysis.

Table 2-1 Dinsdale growth assessment in 2041 and 2061 horizons

	Population 2041	Population 2061	Absolute growth (2061-2041)	Population ratio (2041/2061)
Residential	10,531	11,043	512	95%
School/Student	2,052	2,052	0	100%
Employee	542	606	64	89%
Total	13,125	13,701	576	96%

2.2 Demand calculations for the Brymer development

The adjusted modelled demands for the 2041 and 2061 PDD scenarios, including the projected demands across the full HCC water supply network, are presented in Section 2.1 of the Phase 1 – Base Model and System Performance memorandum.

The demand data supplied by Maven Waikato was adopted as its underlying assumptions, listed below, align with the Regional Infrastructure Technical Specification (RITS) V1 2018:

- 2.7 people per dwelling
- 260 l/person/day
- Peak demand factor: 5

The demand calculations for each stage are listed in Table 2-2 below.

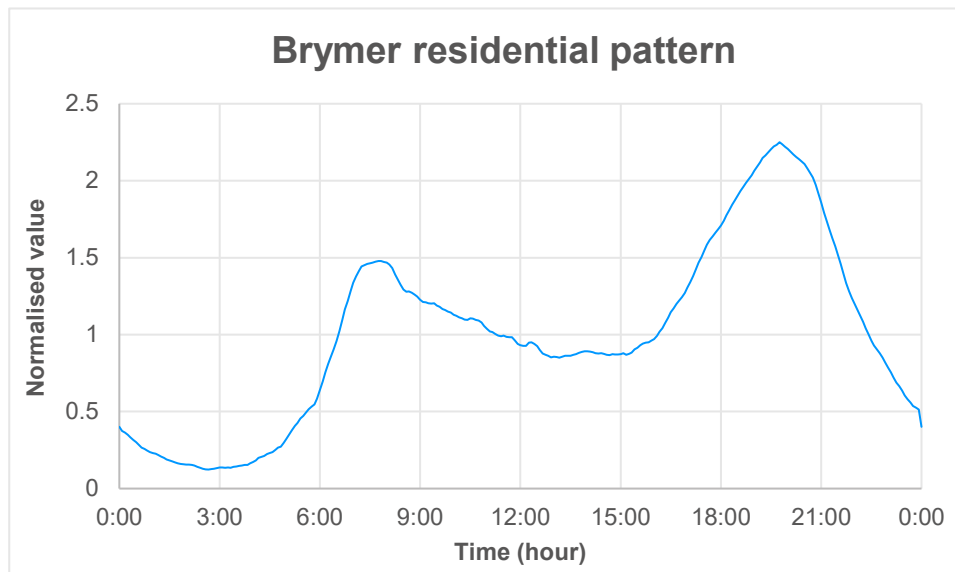
Table 2-2 Brymer development demand per staging

Staging	Area (ha)	Dwellings	Occupancy	Pop. Density (p/ha)	ADD (l/s)	PDD (l/s)
Stage 1A	9.3	133	359	39	1.1	5.4
Stage 1B	12.5	602	1625	130	4.9	24.5
Stage 1C	3.5	50	135	39	0.4	2.0
Stage 2A	5.4	65	175	33	0.5	2.6
Stage 2B	3.7	73	197	53	0.6	3.0
Stage 2C	3.7	72	194	53	0.6	2.9
Stage 3A	3.0	21	56	19	0.2	0.9
Stage 3B	1.3	28	75	59	0.2	1.1
Stage 3C	2.6	38	102	39	0.3	1.5
Stage 4A	3.7	49	132	36	0.4	2.0
Stage 4B	2.7	51	137	52	0.4	2.1
Stage 5A	5.9	58	156	27	0.5	2.4
Stage 5B	6.6	141	380	58	1.2	5.7
Stage RV A	7.9	110	297	38	0.9	4.5
Stage RV B	4.6	40	108	24	0.3	1.6
Total	76.1	1531	4133	54	12.4	62.2

ADD: Average day demand

PDD: Peak day demand

The Brymer development is predominantly a residential area, and the residential demand pattern was therefore considered the most appropriate representation of water-use behaviour for this area. The pattern applied in the model, shown in Figure 2-2, was developed by averaging the observed peak day residential demand profiles from Hamilton's District Metered Areas. This provided a representative profile of typical residential usage characteristics in Hamilton.

Figure 2-2 Residential demand pattern

2.3 Overview of proposed modelling scenarios

The following scenarios were assessed for the 2041 and 2061 PDD horizons, considering the inclusion of the development within the Dinsdale Zone.

- Scenarios 1 and 2 aimed to **assess the maximum number of lots able to be connected** without breaching the Dinsdale Zone system performance critical criteria under different network configurations.
- The provisional scenario (Scenario 3) was to be assessed only if all lots from Stage 1A to Stage 5B could be connected to the existing network without adversely affecting the Level of Service. As this condition could not be achieved, Scenario 3 was not assessed.
- This interim version of the report does not include the strategic solution. This will be added to a later version.

Table 2-3 Scenarios investigated

Scenario	Horizon	Network
Scenario 1	2061 and 2041	Base + one ended 150mm connection on Ayrshire Dr – testing maximum number of lots able to be connected
Scenario 2	2061 and 2041	Base + 250mm loop main connected on Brymer Rd and Ayrshire Dr – testing maximum number of lots able to be connected from Stage 1A to Stage 5B
Provisional: Scenario 3	2061 and 2041	Base + Brymer Retirement Village + 250mm loop main connected on Brymer Rd and Ayrshire Dr – testing maximum number of lots able to be connected

2.4 Level of service

Each scenario was evaluated against the system performance criteria listed in Table 2-4.

Two sets of system performance criteria were included in this table:

- **Thresholds** represent the target level of service that HCC aims to achieve under normal operating and planning conditions. These values reflect good practice system performance and are used to guide design and infrastructure planning.

- **Critical conditions** define the minimum acceptable level of service. If these limits are reached or exceeded, the system is considered to be performing unacceptably. These criteria are used to identify the maximum number of lots that can be connected to the existing network.

Table 2-4 System performance assessment criteria

Criteria	Threshold	Critical criteria
WTP Capacity	Capacity $\geq$ PDD	
Reservoir level	Must not drain within 3 PDD days	
Storage	New reservoir design: Effective storage = 24 hours of 1.15*peak day demand	Replacement timing: Effective storage < 18 hours of 1.15*peak day demand
Pressure	● Minimum pressure >20m ● Maximum pressure <80m	● Pressure reduction greater than 0.5 m in areas with a minimum pressure between 18 m and 20 m. ● Pressure reduction greater than 0.1 m in areas where pressure is already below 18 m.
Head losses	● New pipe design: – $\leq 5\text{m/km}$ for 50mm to 249mm diameter pipes – $\leq 3\text{m/km}$ for 250mm to 599mm diameter pipes – $\leq 2\text{m/km}$ for $\geq 600\text{mm}$ diameter pipes ● Existing pipe replacement timing: – 10m/km for 50mm to 249mm diameter pipes – 5m/km for 250mm to 599mm diameter pipes – 3m/km for $\geq 600\text{mm}$ diameter pipes	● Head loss criteria exceeded where it was not exceeded before
Fire fighting	Testing 25l/s (FW2) and 50l/s (FW3) with 10m residual pressure at the hydrant flowed an 1m residual pressure everywhere else in the network.	● Firefighting capacity dropping below 25L/s where previously met. ● Firefighting capacity reducing by more than 1 L/s where residential requirements previously not met.

3 Modelling results

3.1 Dinsdale storage capacity results

The effective storage capacity of the Dinsdale Reservoir is insufficient to meet the current and projected 2041 and 2061 target of 18 hours of storage at 115% of Peak Day Demand (PDD). As such it is unable to accommodate any additional development within its zone including the Brymer fast track area.

The Dinsdale Reservoir has an effective storage capacity of 3.1ML. This is based on operational constraints provided by the operator, specifically a lowest acceptable operating level of 2 m as defined in the Dinsdale reservoir emptying management plan. The current peak day demand is 4.6MLD, the projected water demand for the 2041 planning horizon is 4.1 MLD, and the projected demand for 2061 is 4.0 MLD, as presented in Section 3.3 of the Phase 1 – Base Model and System Performance memorandum (the demand reduction predicted is due to the impact of the Universal water metering on the water demand applied to the model).

Rezoning to allow the first phases of the Brymer development to be included in the Pukete zone to address the above storage capacity issues was not considered. This was because the highest elevation on Brymer Rd is 63m RL, which is approximately 12m higher than the highest point in Pukete. Due to the distance from

the Pukete Reservoir, to meet levels of service the pressure would need to be increased by at least 17m in the entire Pukete zone, which would bring the maximum pressure to 74m along Delamare Rd.

3.1.1 Storage capacity by development stages

The storage requirement assessment was carried out by comparing the reservoir's effective storage with the volume corresponding to 18 hours at 115% of the peak day demand. to present the demands for the Dinsdale zone under each proposed development stage, along with the spare capacity relative to the effective storage. The tables report the cumulative demands against this threshold to determine compliance with Level of Service requirements.

Table 3-1 Current PDD reservoir storage capacity (2020-2025)

Zone	N lots	24h demand (MLD)	18h demand * 1.15 (MLD)	Cumulative 18h demand * 1.15 (MLD)	Spare capacity (18 hr)
Dinsdale - Current PDD	---	4.6	3.9	3.9	-0.8

Table 3-2: 2041 PDD reservoir storage capacity by development stages

Zone	N lots	24h demand (MLD)	18h demand * 1.15 (MLD)	Cumulative 18h demand * 1.15 (MLD)	Spare capacity (18 hr)
Dinsdale - 2041 PDD	---	4.1	3.5	3.5	-0.4
Stage 1A	133	0.2	0.2	3.7	-0.6
Stage 1B	602	0.9	0.8	4.5	-1.4
Stage 1C	50	0.1	0.1	4.6	-1.5
Stage 2A	65	0.1	0.1	4.7	-1.6
Stage 2B	73	0.1	0.1	4.8	-1.7
Stage 2C	72	0.1	0.1	4.9	-1.8
Stage3A	21	0.03	0.03	4.9	-1.8
Stage 3B	28	0.04	0.04	4.9	-1.8
Stage 3C	38	0.1	0.1	5.0	-1.9
Stage 4A	49	0.1	0.1	5.1	-2.0
Stage 4B	51	0.1	0.1	5.1	-2.0
Stage 5A	58	0.1	0.1	5.2	-2.1
Stage 5B	141	0.2	0.2	5.4	-2.3
Stage RV A	110	0.2	0.1	5.5	-2.4
Stage RV B	40	0.1	0.1	5.6	-2.5

Table 3-3 2061 PDD reservoir storage capacity by development stages

Zone	N lots	24h demand (MLD)	18h demand * 1.15 (MLD)	Cumulative 18h demand * 1.15 (MLD)	Spare capacity (18 hr)
Dinsdale - 2061 PDD	---	4.0	3.5	3.5	-0.4
Stage 1A	133	0.2	0.2	3.6	-0.5
Stage 1B	602	0.9	0.8	4.4	-1.3
Stage 1C	50	0.1	0.1	4.5	-1.4
Stage 2A	65	0.1	0.1	4.6	-1.5
Stage 2B	73	0.1	0.1	4.7	-1.6
Stage 2C	72	0.1	0.1	4.8	-1.7
Stage3A	21	0.03	0.03	4.8	-1.7

Zone	N lots	24h demand (MLD)	18h demand * 1.15 (MLD)	Cumulative 18h demand * 1.15 (MLD)	Spare capacity (18 hr)
Stage 3B	28	0.04	0.04	4.9	-1.8
Stage 3C	38	0.1	0.1	4.9	-1.8
Stage 4A	49	0.1	0.1	5.0	-1.9
Stage 4B	51	0.1	0.1	5.0	-1.9
Stage 5A	58	0.1	0.1	5.1	-2.0
Stage 5B	141	0.2	0.2	5.3	-2.2
Stage RV A	110	0.2	0.1	5.5	-2.4
Stage RV B	40	0.1	0.1	5.5	-2.4

3.1.2 Storage capacity by modelled scenarios

The following assessment compares the reservoir's effective storage with the demand associated with the number of properties simulated under each scenario (as detailed in Section 3.2 and 3.3 below). The tables report the cumulative demands against this threshold to determine compliance with Level of Service requirements. Table 3-4 and Table 3-5 summarise the scenario assumptions and the resulting spare capacity for the 2041 and 2061 horizon respectively, considering:

- Scenario 1 is modelled based on a total of 135 lots (133 from Stage 1A and 2 from Stage 1B)
- Scenario 2 considers a total of 551 lots (133 from Stage 1A and 418 from Stage 1B)

Table 3-4 2041 PDD reservoir storage capacity by modelled scenarios

Zone	N lots	24h demand (MLD)	Cumulative 18h demand *1.15 (MLD)	Spare capacity (18 h)
Dinsdale - 2041 PDD	---	4.1	3.5	-0.4
Scenario 1	135	4.3	3.7	-0.6
Scenario 2	551	5.0	4.3	-1.1

Table 3-5 2061 PDD reservoir storage capacity by modelled scenarios

Zone	N lots	24h demand (MLD)	Cumulative 18h demand *1.15 (MLD)	Spare capacity (18 hr)
Dinsdale - 2061 PDD	---	4.0	3.5	-0.4
Scenario 1	135	4.2	3.6	-0.6
Scenario 2	551	4.9	4.2	-1.1

3.2 Scenario 1 – one ended 150mm connection on Ayrshire Dr

This section looks into the number of additional dwellings that could be accommodated via a one ended 150mm connection on Ayrshire Drive **excluding reservoir capacity considerations**.

An additional 135 lots in the Brymer Development can be connected via a one ended 150mm connection on Ayrshire Drive and meet all expected levels of service with the exception of Reservoir Storage. This is on the basis that:

- Under the Regional Infrastructure Technical Specifications (RITS), a 150 mm watermain is limited to servicing a maximum of 150 lots. We have assumed that the 15 existing lots adjacent to the pipes in red in Figure 3-1 were included in this 150 as (under RITS) the new 150mm diameter pipe will need to replace the existing 100mm diameter pipe on Harrogate Place.

- The resultant minimum pressure is 26 m and maximum head loss is 0.8 m/km within the proposed development area, assuming the 135 lots are located in Stage 1A and 1B area.
- 25L/s fire flow (FW2) can be achieved in Stage 1A and 1B area.
- The inclusion of demand from the proposed 135 lots within the Brymer development does not result in any exceedance of acceptable limits for pressure, head loss, or fire flow within the existing network. This is demonstrated in Table 3-6 and Appendix A (Scenario 1).

Figure 3-1 Dwellings to be connected to the proposed 'one-ended' 150mm Watermain connected to Ayrshire Dr. – Source: Hamilton City Council



Table 3-6 Modelling results summary - Scenario 1

System performance criteria	Critical criteria	Scenario 1 (135 lots)
Storage capacity	115% 18hr Demand < 3.4 ML	✗
Pressure	Pressure reduction less than 0.5 m in areas with a minimum pressure between 18 m and 20 m	✓
	Pressure reduction less than 0.1 m in areas where pressure is already below 18 m	✓
Head losses	Head loss criteria not exceeded where it was not exceeded before	✓
Firefighting	Firefighting capacity NOT dropping below 25L/s where previously met.	✓
	Firefighting capacity NOT reducing by more than 1 L/s where residential requirements previously not met.	✓

3.3 Scenario 2 – Two connections on Brymer Rd and Ayrshire Dr

This section looks at the number of additional dwellings that could be accommodated via two connections on Brymer Rd and Ayrshire Drive **excluding reservoir capacity considerations**.

The hydraulic model indicates that a maximum of 551 additional lots can be connected to the existing network while maintaining compliance with the critical performance criteria outlined in Table 2-4 above, except reservoir capacity. The primary constraint is the 250 mm filling main supplying the Dinsdale

Reservoir, where headloss is predicted to reach 4.99 m/km under the additional demand associated with 551 lots.

Key findings are summarised below:

- Within the proposed development, minimum pressure of 24.6 m is maintained, and maximum headloss does not exceed 1.2 m/km, meeting design criteria.
- 50L/s (FW3) fire flow requirement can be achieved across the development, assuming all 551 lots are delivered within Stages 1 and 2.
- In terms of head losses, the existing network remains largely compliant, with no breach of the head loss critical criteria outlined in Table 2-4. While some head losses exceeding the Level of Service (LoS) are predicted in the network prior to the development connection, these are not exacerbated by the proposed development.
- A pressure reduction greater than 0.1 m is predicted along the reservoir filling main in sections where pressure drops below 18 m. However, as this does not impact customer supply levels, it is considered acceptable.
- The additional demand from the Brymer development does not result in any fire flow non-compliance within the existing network.

Table 3-7 presents a summary of the modelling results. Detailed outputs are included in Appendix B.

Table 3-7 Modelling results summary - Scenario 2

System performance criteria	Critical criteria	Scenario 2
		(551 lots)
Storage capacity	115% 18hr Demand < 3.4 ML	✗
Pressure	Pressure reduction less than 0.5 m in areas with a minimum pressure between 18 m and 20 m	✓
	Pressure reduction less than 0.1 m in areas where pressure is already below 18 m	Breach found but not affecting customers
Head losses	Head loss criteria not exceeded where it was not exceeded before	✓
Firefighting	Firefighting capacity NOT dropping below 25L/s where previously met.	✓
	Firefighting capacity NOT reducing by more than 1 L/s where residential requirements previously not met.	✓

4 Conclusions

Key findings are summarised as follows and in Table 4-1 below:

- The effective storage volume of the Dinsdale Reservoir is insufficient to meet the required 18 hours of storage at 115% of peak day demand for both scenarios, as the reservoir is already operating below the required storage capacity. The reservoir capacity issue requires addressing.
- The hydraulic assessment indicates that, should the reservoir capacity issue be addressed, up to 135 additional lots (150 total lots minus 15 existing lots) can be serviced via a single-ended 150 mm main on Ayrshire Drive.

- The hydraulic modelling further indicates that, should the reservoir capacity issue be addressed, a maximum of 551 additional lots can be serviced via two connections on Ayrshire Drive and Brymer Rd. The primary constraint is the 250 mm filling main supplying the Dinsdale Reservoir, where headloss is predicted to reach 4.99 m/km under the additional demand associated with this level of development.

Table 4-1 Modelling results summary - Scenario 1 and 2

System performance criteria	Critical criteria	Scenario 1	Scenario 2
		(135 lots)	(551 lots)
Storage capacity	115% 18hr Demand < 3.4 ML	X	X
Pressure	Pressure reduction less than 0.5 m in areas with a minimum pressure between 18 m and 20 m	✓	✓
	Pressure reduction less than 0.1 m in areas where pressure is already below 18 m	✓	Breach found but not affecting customers
Head losses	Head loss criteria not exceeded where it was not exceeded before	✓	✓
Firefighting	Firefighting capacity NOT dropping below 25L/s where previously met.	✓	✓
	Firefighting capacity NOT reducing by more than 1 L/s where residential requirements previously not met.	✓	✓

A. Modelling Results for Scenario 1

B. Modelling Results for Scenario 2