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ANALYSIS
DESIGN
ASSESSMENT
CERTIFICATION

SEWER SERVICING

SEWER SERVICING REPORT

Revision 4 — Council Information Request
Gravity servicing and network capacity

134 South Street
Thornlands QLD 4164



Prepared for
Development application
MCU26/0056



Lot 1 on RP124525



Multiple dwelling, 15 units
(12 two-bedroom and 3 three-bedroom)

Site context only — adopted gravity
alignment shown in report

SEWER SERVICING
WASTEWATER NETWORKS
CIVIL INFRASTRUCTURE
DEVELOPMENT ENGINEERING



Council ref:
MCU26/0056



Council IR:
Item 5



Prepared by:
Craig Harris,
RPEQ 13194



15 October 2026
Revision 4
Public issue



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DOCUMENT CONTROL

CURRENT ISSUE
SEWER SERVICING & NETWORK CAPACITY ASSESSMENT

REVISION 4
Public issue

PROJECT PARTICULARS

Site / project	134 South Street, Thornlands QLD 4164
Lot on plan	Lot 1 on RP124525
Land area	1,010.8 m ² (adopted sewer concept site area)
Development / scope	Multiple dwelling, 15 units (12 two-bedroom and 3 three-bedroom); gravity sewer connection and receiving-network capacity
Client / Council reference	MCU26/0056 (pre-lodgement meeting PLM25/0045)
External / agency reference	Redland City Council Information Request, 9 June 2026, Item 5
Prepared for	Development application MCU26/0056; response to sewer Information Request Item 5

ISSUE & AUTHORISATION

Role	Name	Position	Registration / credential
Prepared by	Craig Harris	RPEQ Civil Engineer	RPEQ 13194
Reviewed by	Craig Harris	RPEQ Civil Engineer	—
Approved for issue	Craig Harris	Approved 15 October 2026	—
REVISION DATE 15 October 2026	DOCUMENT STATUS Revision 4, Public issue		ISSUE RESTRICTION / PURPOSE Public issue of the approved response to RCC Item 5, MCU26/0056

REVISION HISTORY

Table 1: Revision history

Rev.	Date	Status	Description
2	9 January 2026	DA application baseline	Original sewer servicing assessment; gravity and pumped options.
3	21 September 2026	Approved for issue	RCC Item 5 response: Route 1 gravity concept, receiving-network and shared-pump assessment, source maps, levels and pump curves. Approved by Craig Harris, RPEQ 13194.
4	15 October 2026	Public issue	Public issue of Revision 3: internal file and data-table names removed from source notes and appendices; no change to engineering content.

CURRENT: Revision 4 is the public issue of Revision 3, the sewer response to RCC Information Request Item 5 that superseded Revision 2. Internal working references are removed; the engineering content is unchanged.

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1. INTRODUCTION

This Sewer Servicing and Network Capacity Assessment supports development application MCU26/0056 for a 15-unit multiple dwelling development at 134 South Street, Thornlands (Lot 1 RP124525). It is Revision 4, the public issue of Revision 3, which superseded Revision 2 dated 9 January 2026.

Revision 3 responds to Item 5 of Redland City Council's Information Request dated 9 June 2026. The complete sewer item on page 3 of that request reads:

"The property is not located within Council's serviced area. As such, no loading has been applied to our sewer model for this property. Provide a sewer network capacity analysis to confirm the capacity of the network is capable to accept loads from this development."

"The applicant provided two (2) options to connect the development to sewer infrastructure. Council does not support option B to connect the proposed onsite pump station connected to an existing rising main of 375mm diameter. A gravity system must be provided to connect the development to the local network."

"Provide concept engineering plans, demonstrating how the proposed development will connect to Council's gravity sewer network. In doing so, demonstrate compliance with performance outcomes PO5, PO6, PO7, PO9, and PO11 of infrastructure works code."

"Note: Council will provide our hydraulic model to the applicant upon request."

"Advice: Where sewer extensions are required on adjoining lots, owner's consent will be required."

This revision withdraws Option B and adopts a gravity connection through road reserve and Lot 14 SP127463 to asset 55349. The completed static assessment finds adequate normal-flow capacity on the receiving gravity route and combined capacity at SPS139. It identifies specific existing downstream operating constraints at SPS141 and the shared rising-main system for Council confirmation. Sections 5-8 provide the concept, calculations and easement position; section 9 responds to the performance outcomes. This report is approved for issue. The capacity conclusion remains subject to the Council confirmations stated in section 7.6.

1.1 Information relied upon

Following the Information Request, Council provided its Cleveland wastewater model and supporting spatial data through Objective Connect, received in full on 26 August 2026. The following sources are relied upon in this revision:

Table 2: Information sources relied upon in Revision 3

Source	Description	Use in this assessment
Redland City Council Cleveland wastewater model	MIKE+ project and SQLite input database, 2023	Network configuration, inherited loads, pump curves, levels and rising mains
Redland City Council ASSETIC_SEW_MAIN	Gravity sewer asset spatial layer, plan D028884	Asset identifiers, diameters, grades, alignment
Redland City Council Red-e-Map	Public asset mapping	Surface and invert levels; land, lot and easement layers
Digital Cadastral Database (DCDB Lite)	Queensland cadastral boundaries	Lot boundaries and road reserve extent; easements excluded from DCDB Lite
Council 0.25 m contours	Red-e-Map surface layer, queried 21 September 2026; accuracy not stated	Indicative surface levels along the proposed alignment
Architectural plans	Interworks Architects Issue C, 15 June 2026; ground floor drawing 2.1 unchanged from the lodged Issue A, 30 October 2025	Unit mix and equivalent person loading
SEQ Water Supply and Sewerage Design Criteria	Version 3.0, 30 May 2025; Table 10 and sections 12.2.2, 13.2 and 13.3.1	Flow, depth, pump, storage and static-assessment criteria

No detail survey of the site or the proposed corridor has been undertaken at development application stage. Levels used in this assessment are taken from Council asset data where available and otherwise interpolated from Council's published 0.25 m contours (Red-e-Map surface layer, queried 21 September 2026). Concept levels are stated to 0.1 m. The concept is presented on that basis and requires confirmation by detail survey at Operational Works stage.

2. DEVELOPMENT DESCRIPTION

The proposed development comprises:

- 15 multiple dwelling units, comprising 12 two-bedroom units and three three-bedroom units;
- residential use only, with no non-residential or commercial wastewater sources; and
- associated internal access, parking and landscaping.

The site is not currently connected to Council's reticulated sewerage network. The existing dwelling is understood to be serviced by an on-site wastewater treatment system.

3. EXISTING SEWER INFRASTRUCTURE

3.1 Gravity network

The nearest Council gravity sewers are located east and south-east of the site, on plan D028884. Two existing structures are relevant to a gravity connection:

Table 3: Existing gravity structures relevant to the connection

Structure or asset	Description	Levels (m AHD)
MH 1/5	Existing maintenance hole at the south-east of the intervening land, receiving asset 55339 and discharging to asset 55340	Surface 29.34; inlet invert 27.48; outlet invert 27.40
Asset 55349	DN150 uPVC gravity sewer inside Lot 14 SP127463, about 1 m south of its common boundary with Lot 3 SP127463; its upstream end is a pipe end, not a maintenance hole, on which new MH D is proposed	Upstream invert 25.98; downstream invert 24.25

Both structures drain to the same downstream junction node and then east through asset 55350 to the pump station catchment serving the Cleveland treatment plant.

3.2 Rising main

Council's 375 mm uPVC rising main associated with pump station PS138 runs along South Street at the site frontage. Council does not support connection to this asset. It is identified here for completeness only and is not part of the servicing strategy.

4. WASTEWATER DEMAND ASSESSMENT

4.1 Methodology

The assessment adopts:

- equivalent persons (EP) methodology using the provisional occupancy assumptions stated below;
- average dry weather flow (ADWF) of 210 L/EP/day; and
- peak wet weather flow (PWWF) of five times ADWF.

The adopted planning assumptions of 2.2 EP per two-bedroom dwelling and 3.0 EP per three-bedroom dwelling give 35.4 EP. These occupancy rates remain subject to Council acceptance. ADWF of 210 L/EP/day is the existing-conventional-sewer baseline in SEQ Design Criteria version 3.0 (30 May 2025), Table 10 D2, page 34; new RIGSS uses 200 L/EP/day. Retaining 210 is conservative for the development increment. Table 10 D4 supports the five-times-ADWF RIGSS peak factor. Section 7 applies the supplied model's assigned existing loads and adds the full development load.

4.2 Development demand

Table 4: Estimated development wastewater demand

Unit type	Number	EP rate	Total EP	ADWF (L/s)	PWWF (L/s)
Two-bedroom	12	2.2 EP/unit	26.4	0.0642	0.3208
Three-bedroom	3	3.0 EP/unit	9.0	0.0219	0.1094
Total	15	-	35.4	0.0860	0.4302

ADWF equals EP multiplied by 210 L/EP/day. PWWF equals five times ADWF. The development therefore generates 35.4 EP, an average dry weather flow of 0.0860 L/s (7.434 kL/day) and a peak wet weather flow of 0.4302 L/s.

Council's hydraulic model contains load point 28000 and the corresponding property polygon for 134 South Street carrying 2.7 EP in the current case and 12.9 EP in the ultimate case. Those allowances are understood to be planning allocations. This assessment conservatively treats the full 35.4 EP as an addition to the network rather than deducting the existing allowance. Council is asked to confirm

whether the development load replaces, supplements or is reallocated from that allowance, and to confirm the occupancy basis it requires.

5. GRAVITY SERVICING STRATEGY

5.1 Withdrawal of Option B

Revision 2 nominated Option B, an on-site pump station discharging to Council's existing 375 mm rising main, as the preferred servicing strategy. Council's Information Request states that Council does not support that option and that a gravity system must be provided.

Option B is withdrawn. It is no longer proposed, no longer assessed as an alternative, and the preference expressed for it in Revision 2 is superseded by this revision. The development will be serviced by a gravity connection to Council's local gravity network.

5.2 Land tenure and route selection

The site adjoins public land only at its South Street frontage. Every gravity sewer within reach to the east and south lies within freehold land, and the nearest gravity assets in road reserve are north of South Street at invert levels above the site's connection level, so they are not available by gravity. Some length of works on adjoining land is therefore unavoidable, and route selection has been driven by minimising it.

Cadastral boundaries were checked against the Digital Cadastral Database and Council's Red-e-Map land layers. The unnamed road east of the site is road reserve for its full length; a 35 m² Council access restriction strip, Lot 4 RP144189, lies along its eastern edge. Council's published easement layer, checked on 21 September 2026, shows no mapped easement on the assessed corridor lots. Mapping does not establish the complete registered title position. The concept therefore provides for a new easement, with title and legal documentation addressed with the easement survey. Two alignments were assessed:

Table 5: Comparison of assessed gravity alignments

	Route 1 – adopted	Route 3 – alternative
Description	South Street verge east, south through the unnamed road reserve, then east inside Lot 14 SP127463, parallel to and about 1 m south of its boundary with Lot 3 SP127463, to the upstream pipe end of asset 55349	South Street verge east, south through the unnamed road reserve, then south along the common boundary of Lot 5 SP117647 and Lot 15 SP127463 to MH 1/5
Off-site length	approximately 80 m	approximately 109 m
Within road reserve	approximately 64 m, plus 0.5 m of Council land	approximately 86 m
On adjoining freehold land	approximately 15 m inside one lot, Lot 14 SP127463	approximately 23.5 m along the common boundary of Lot 5 SP117647 and Lot 15 SP127463
Adjoining owners whose consent is required	one: the owner of Lot 14 SP127463 (126 Morris Circuit); no easement shown on Council's published layer	one: the owner of Lot 5 SP117647 (132 South Street)
Receiving structure	pipe end of asset 55349, with a new maintenance hole MH D constructed on Council's main	existing maintenance hole MH 1/5
Grades achievable	1 in 18, then 1 in 27, then 1 in 28	1 in 24, then 1 in 82, then 1 in 81

Route 1 is adopted. Both routes burden one adjoining owner. Route 1 is about 30 m shorter, keeps a similar proportion in road reserve, places its private length inside the lot that already contains Council's sewer, holds grades of about 1 in 18 to 1 in 28 and bypasses the flat 1:152 reach downstream of MH 1/5. Its receiving structure is a new maintenance hole on the pipe end of asset 55349, a standard connection to an existing main, subject to Council confirming the structure at that pipe end. Route 3 remains the alternative if consent from the owner of Lot 14 SP127463 is not obtained.

5.3 Adopted concept alignment

The adopted concept is a DN150 uPVC gravity extension from the site's north-east corner to the upstream pipe end of Council asset 55349, with four new maintenance holes, the last of which, MH D, is constructed on the existing pipe end. Levels and grades are:

Table 6: Concept alignment levels and grades, Route 1

Structure	Chainage (m)	Surface level (m AHD)	Invert level (m AHD)	Depth (m)	Grade to next
MH A - site connection	0.0	30.4	29.3	1.1	1 in 18
MH B - head of the unnamed road	23.5	29.1	28.0	1.1	1 in 27
MH C - road reserve, opposite the pipe end	62.0	28.7	26.6	2.1	1 in 28
MH D - new, on the upstream pipe end of asset 55349	79.6	28.1	25.98	2.1	-

Surface levels at all four structures are interpolated from Council's published 0.25 m contours, which supersede the 1 m LiDAR contours used in the earlier revision, and are stated to 0.1 m. The invert at MH D is Council's recorded upstream invert of asset 55349, 25.98. The 31.0 contour near the front boundary represents existing ground; the coordinated finished slab and driveway levels are set out in section 5.4.

From Table 6, the nominal falls are 1.3 m, 1.4 m and 0.6 m over 23.5 m, 38.5 m and 17.6 m, giving grades of about 1:18, 1:27 and 1:28. These are steeper than the conservative DN150 1:100 criterion in SEQ Design Criteria version 3.0, Table 10 D8, page 35. This checks the tabulated concept only. The 1.1 m entries are depths to invert, not cover: an assumed 150 mm internal bore leaves about 0.95 m to the internal crown before wall thickness. Actual minimum cover along each reach is unverified. The 38.5 m maximum maintenance-hole spacing and cover criteria require the integrated SEQ Gravity Sewerage Code and verified corridor levels.

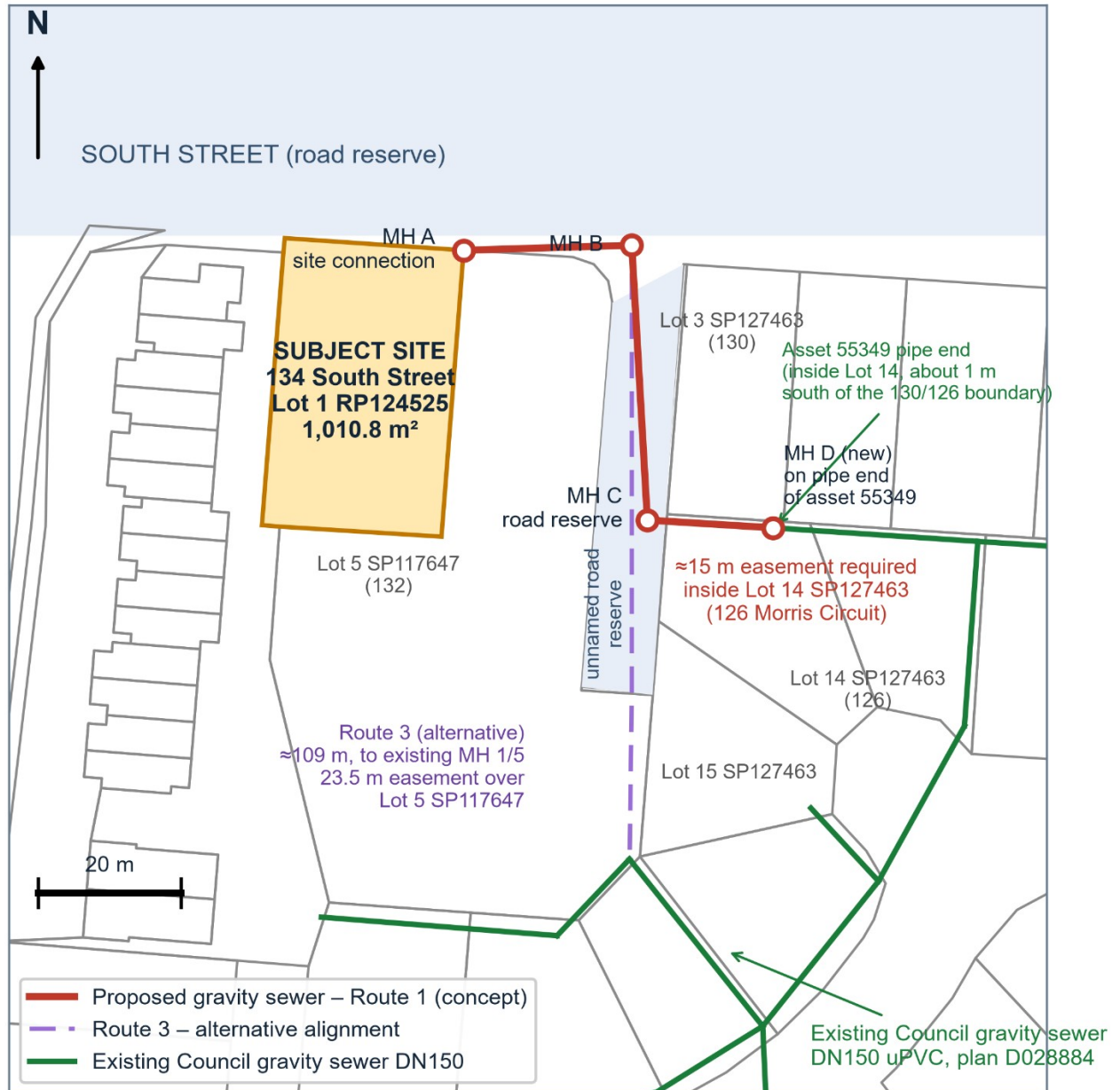
5.4 Internal reticulation and site drainage

The internal concept comprises sanitary stacks from the upper-floor dwellings, provisional DN100 branches and a DN150 gravity collector to MH A at the north-east corner (IL 29.30 m). The ground floor is an open car park with the bin store, lift and stair. The coordinated slab level is RL 31.00, matching the Stormwater Management Plan Revision 3, section 4.6 and its level schedule. The driveway falls 0.10 m to RL 30.90 at the front boundary. Ground-floor fixtures are assumed at or above the slab; the likely sewer fixture is a bin-store wash-down near MH A. The slab-to-MH A invert difference is 1.70 m, not the available pipe fall. The approximately 46 m collector run at 1 in 60 requires 0.77 m of fall. To reach MH A at or above IL 29.30, its upstream invert must be at least RL 30.07, leaving at most 0.93 m below the slab for the upstream invert before allowing for any connection drop. This is a geometric allowance, not verified pipe cover; slab thickness, fixture/trap connections, pipe diameter and cover must fit within it. The preferred route is the 1.5 m east boundary landscape strip, with an under-slab route as the alternative. Detailed design must verify the starting invert, continuous grade, ground profile, cover, service crossings and arrival level at MH A. Any change to the adopted slab or fixture levels requires the internal connection to be rechecked. The external alignment and levels in Table 6 are retained. A detailed hydraulic schematic is not required to describe this RFI concept.

6. CONCEPT ENGINEERING PLAN

Figures 1 and 2 present the off-site gravity concept and its tabulated node levels. Figure 2 has been reconciled to Table 6: MH A to MH C, 62.0 m, is within road reserve; the MH C to MH D reach of 17.6 m comprises about 2.2 m of road reserve, 0.5 m across Council's access restriction strip Lot 4 RP144189 and 14.9 m inside Lot 14 SP127463. Its dashed surface joins are schematic, not a continuous surveyed ground profile. Figure 1 identifies the property connection but does not provide

a coordinated internal sanitary drainage design. Cover, service crossings, internal drainage and legal access remain verification items.



Concept only. Cadastre: DCDB Lite and Council Red-e-Map land layers. Sewer assets: RCC ASSETIC_SEW_MAIN, plan D028884. Levels from Council asset data and Council 0.25 m contours. Not a survey.

Figure 1: Concept gravity sewer connection plan

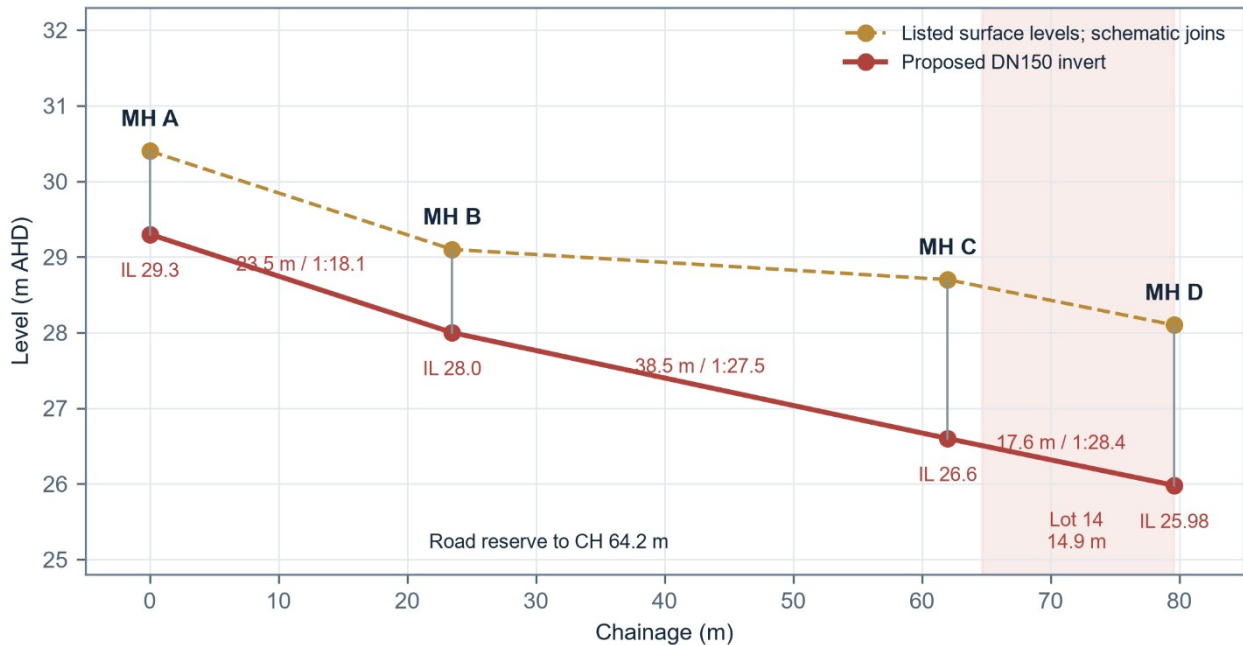


Figure 2: Concept long section, proposed gravity sewer Route 1

7. NETWORK CAPACITY ASSESSMENT

7.1 Assessment basis and method

The supplied Council model provides the existing catchment loads, pipe sizes and levels, pump curves and operating levels needed for an independent static assessment. Those inputs have been extracted and assessed through the receiving gravity network, SPS139, the shared rising-main system, SPS141 and its discharge to the Cleveland treatment-plant inlet.

The source is Council's Cleveland wastewater network model (2023), supplied by Council. Network records use the unaugmented base scenario (alternative 0). The 2026 PWWF load alternative is resolved through 0 > 2 > 12 and the ultimate PWWF alternative through 0 > 8 > 24. The scenario manager's changed-field and deleted-row records are applied, rather than treating the saved active augmented scenario or copied leaf rows as the assessment basis. Load points are traced upstream through enabled links and pumps and counted once per receiving catchment. Model load units are summed as EP; they are not represented as surveyed dwelling counts.

Assigned existing PWWF is the sum of load-point flow × load units in the Council network data. The full development PWWF of 0.4302 L/s is added throughout its actual downstream route, without deducting the model's existing site allocation. Current and ultimate here mean the supplied model scenarios; they do not establish that all subsequent commitments or asset changes have been incorporated. The load factors and source limitations in section 4 remain applicable.

SEQ Design Criteria version 3.0, section 12.2.2, states that static modelling is generally sufficient for smaller developments, with dynamic modelling at the service provider's discretion. The following is a reproducible static assessment of the supplied assets and operating states. It is not a native MIKE dynamic run or a prediction of surcharge duration, overflow frequency or transient pressure. Pump operating policy for Redland is expressly referred to Council by Table 10 D5 and section 13.3.1.

7.2 Receiving gravity network

Route 1 enters model node 1_280 at the upstream end of asset 55349. The downstream path contains 23 gravity links over 1,253.5 m to Sump_139. Each reach is assessed using its recorded internal diameter, length and end inverts, Manning $n = 0.013$ and a limiting normal flow depth of

0.75D, consistent with Table 10 D8. The adopted roughness is slightly more conservative than the code smart-sewer value of 0.0128. Normal flow assumes an unobstructed, freely discharging reach; downstream backwater is addressed separately through the pump assessment.

For a circular pipe, $Q = A R^{2/3} S^{1/2} / n$, where S is the recorded invert fall divided by length. At depth y , $\theta = 2 \arccos(1 - 2y/D)$, $A = D^2(\theta - \sin \theta)/8$ and $R = A/(D \theta/2)$. Table 7 compares assigned flows plus the full development addition with capacity at $y/D = 0.75$. All flows in the table are L/s; utilisation is the larger, ultimate post-development value.

Table 7: Complete receiving gravity path and normal-flow capacity

Asset	DN mm	Grade 1 in	2026 existing	2026 post	Ultimate post	0.75D capacity	Ultimate utilisation
55349	150	16.6	0.10	0.53	0.53	34.11	1.5%
55350	150	14.8	0.92	1.35	1.87	36.16	5.2%
55351	150	161.3	1.05	1.48	2.00	10.94	18.3%
55352	150	19.3	1.15	1.58	2.10	31.59	6.6%
55353	150	19.1	1.84	2.27	2.79	31.75	8.8%
55355	150	31.1	2.00	2.43	2.95	24.89	11.9%
55361	150	16.2	2.36	2.80	3.31	34.54	9.6%
34156	150	37.1	2.40	2.83	3.34	22.80	14.7%
212786	150	35.5	2.46	2.89	3.41	23.31	14.6%
34157	150	34.9	2.66	3.09	3.61	23.49	15.4%
34158	150	151.7	2.66	3.09	3.61	11.27	32.0%
34159	150	149.1	2.66	3.09	3.61	11.37	31.7%
34160	150	153.0	2.66	3.09	3.61	11.23	32.1%
34161	150	158.2	4.30	4.73	5.25	11.04	47.5%
34162	150	154.9	5.32	5.75	6.26	11.16	56.1%
34163	225	252.3	9.13	9.56	10.08	25.78	39.1%
34164	225	205.3	9.13	9.56	10.08	28.58	35.3%
34165	225	287.3	9.13	9.56	10.08	24.16	41.7%
34166	300	343.8	13.80	14.23	14.75	47.56	31.0%
34167	300	370.6	13.80	14.23	14.75	45.80	32.2%
34168	300	419.7	27.38	27.81	28.39	43.04	66.0%
34169	300	21.2	27.38	27.81	28.39	191.65	14.8%
Inlet 139 240023	375	11.1	64.72	65.15	68.39	479.64	14.3%

Source: Council network data (pipe links and inherited load points); gravity capacity check, 2026 and ultimate cases. Last row: Inlet_139_240023. Values rounded for presentation. Colour key: grade, pale to deeper blue = steeper to flatter (1:10 to 1:500, logarithmic scale); utilisation, green 0%, amber 75%, red 100% or above. Colour is visual emphasis, not an additional acceptance criterion.

All 23 reaches pass this normal-flow check. The controlling reach is asset 34168, DN300 at 1:419.7: post-development flow is 27.81 L/s in 2026 and 28.39 L/s ultimate, against 43.04 L/s at 0.75D. Ultimate utilisation is 66.0%, normal depth is about 0.56D and normal-flow headroom is 14.65 L/s.

No gravity-main enlargement is indicated by the assigned-load assessment. This headroom is conditional on downstream hydraulic controls and is not a guarantee against surcharge.

SPS145 discharges into a tributary joining the development route at the final inlet to SPS139. Its supplied curves and DN150 rising main give a two-pump slug of 22.26 L/s. Replacing its assigned catchment peak with that slug gives an ultimate combined flow of 69.01 L/s in Inlet_139_240023, against 412.31 L/s at two-thirds depth. That common reach passes the pumped-slug criterion in SEQ Design Criteria section 13.2. This check covers the common development route, not every gravity tributary in the wider catchment.

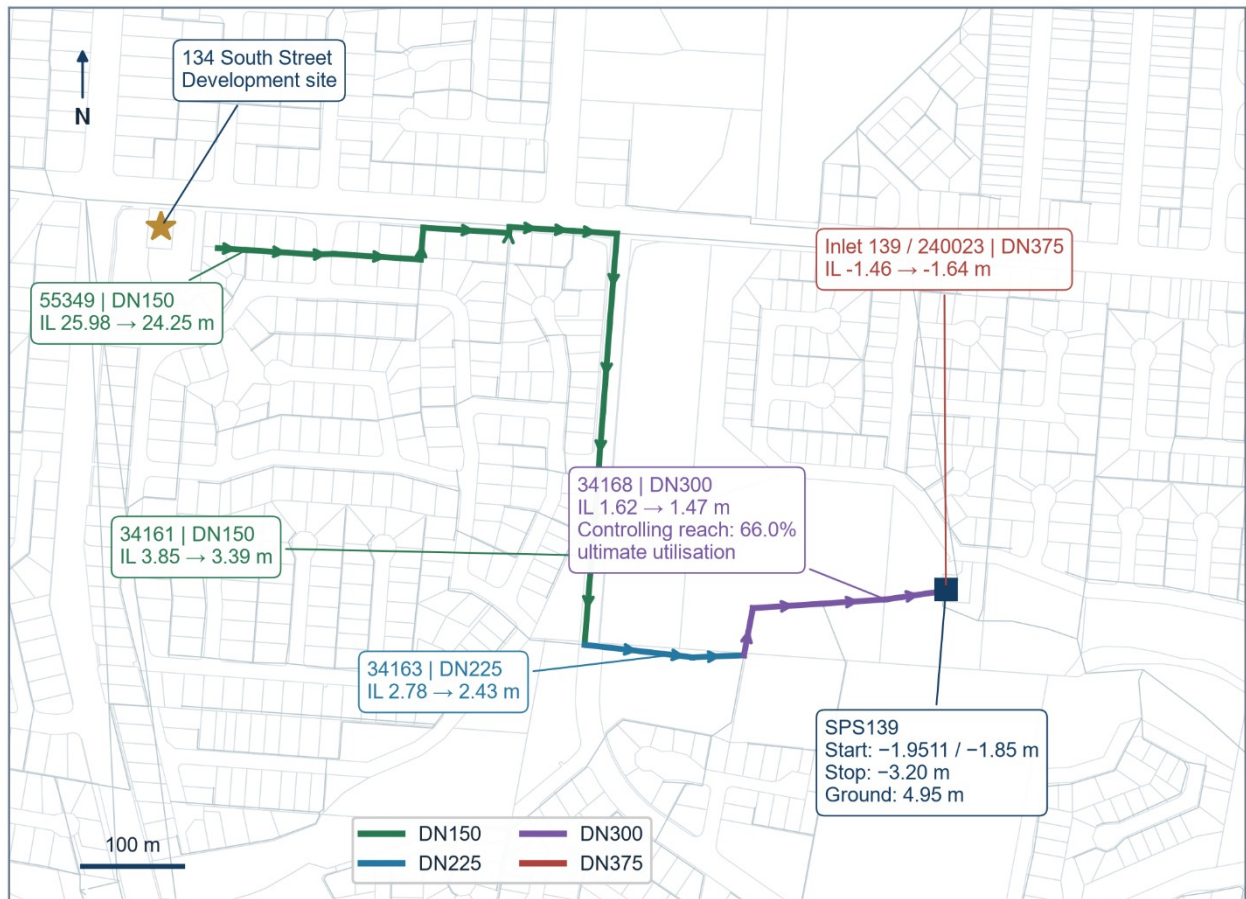


Figure 3: Receiving gravity network and selected model levels

Source: Council Cleveland network data, base scenario (pipe links and nodes); property outlines from Council IDM. Coordinates matched to Council GDA94 MGA Zone 56 assets. IL denotes pipe invert. Levels shown are on the supplied model datum. Table 7 gives every capacity check; Appendix B gives every pipe length and end invert. Pale linework is context only.

7.3 Pump catchments and rising-main calculation

SPS139 pumps through DN300 and DN375 mains to a shared DN375 main receiving SPS011, SPS100 and SPS165, then into SPS141. SPS141 pumps through DN375 and DN450 mains to CWWTP_Inlet. The downstream artificial treatment-plant connector is excluded from pressure-main capacity calculations. SPS147 joins the latter pressure system; its assigned load is zero in both selected scenarios, so it is off in the primary case and tested with both pumps on as a sensitivity. No future augmented pump curve is assumed to be installed.

Table 8: Assigned pump-station catchment loads

Station	2026 existing EP	2026 existing PWWF L/s	2026 post PWWF L/s	Ultimate post PWWF L/s
SPS145	1743.3	21.19	21.19	21.65
SPS139	5325.8	64.72	65.15	68.39
SPS011	1446.0	17.57	17.57	18.28
SPS100	3314.4	40.28	40.28	41.76
SPS165	2729.0	33.17	33.17	44.18
SPS141	12815.5	155.74	156.17	172.61
SPS147	0.0	0.00	0.00	0.00

Source: Council network data load points and upstream network connectivity; pump station load check. SPS145 is included in SPS139 and SPS139/011/100/165 are included in SPS141; these rows must not be added together. The development adds load only to SPS139 and SPS141. The other stations are included for shared-main interference.

Appendix A plots the supplied individual-pump curves for SPS139 and SPS141, tabulates the original head/flow pairs and records the controls for all assessed stations. Appendix B records the physical pipe inputs. These are Council model inputs, not manufacturer test certificates or field-verified performance.

The pressure calculation intersects the supplied Q-head curves in the Council network data with system head. It uses the model material roughness $n = 0.0128$, full-pipe Manning friction, recorded rising-main bores, lengths and inverts, and actual model pump start/stop levels. Shared-main flow is the sum of simultaneously operating pumps, solved iteratively. Required upstream head is the greatest of terminal head plus total friction and each intermediate crown elevation plus upstream friction; no siphon benefit is credited. Terminal head is the discharge crown. The model's duty-point field is not treated as guaranteed capacity where a Q-head curve governs.

The primary calculation includes pipe friction with no separate minor-loss allowance. A deliberately adverse sensitivity uses $n = 0.015$, lumped loss coefficient $K = 5$ at each station discharge, and 2 m additional terminal head. These are assumed sensitivities, not measured asset conditions. Curves are interpolated only within their supplied range; all operating-capacity cases converge within that range. Zero RTC and RTC-rule records are present in the supplied database. Native timing and operational coordination have not been inferred from their absence.

Table 9: Calculated operating capacities and catchment PWWF

Station	Pumps operating	Operating state	Capacity L/s	2026 / ultimate post PWWF L/s
SPS139	One; peers two	Start / stop	69.24 / 67.57	65.15 / 68.39
SPS139	Two; peers two	Start / stop	110.74 / 107.99	65.15 / 68.39
SPS139	Two; peers two	Adverse; stop	94.81	65.15 / 68.39
SPS141	One; SPS147 off	Duty start	125.72	156.17 / 172.61
SPS141	Two; SPS147 off	Start / stop	165.95 / 145.07	156.17 / 172.61
SPS141	Two; SPS147 two	Assist start	160.82	156.17 / 172.61

Source: pump station capacity check, by case. "Peers two" means both pumps operating at each of SPS011, SPS100 and SPS165. Start/stop capacities are calculated at the model's applicable levels, not fixed rated capacities. The adverse SPS139 case uses the higher losses described above. SPS139 start levels are -1.9511 m (duty) and -1.85 m (assist), with stop -3.20 m; SPS141 levels are 23.95 m, 24.10 m and 19.90 m respectively. Levels are on the supplied model datum.

SPS139 has sufficient calculated combined capacity for the post-development peak under both the primary and adverse cases. Its primary single-pump capacity also exceeds the current peak; at ultimate peak a modest rise above the stop level provides the required single-pump throughput. For a Council-approved duty/assist philosophy, Table 10 D5 uses $C1 = 15 EP^{-0.157}$ bounded to 3.5-5 for single-pump sizing, with combined capacity at PWWF. The calculated single-pump requirements are 50.77/52.88 L/s for SPS139 and 109.32/120.83 L/s for SPS141 (2026/ultimate). Primary single-pump start capacities exceed those requirements. Duty/standby would instead require each pump to deliver PWWF and is not demonstrated at SPS141.

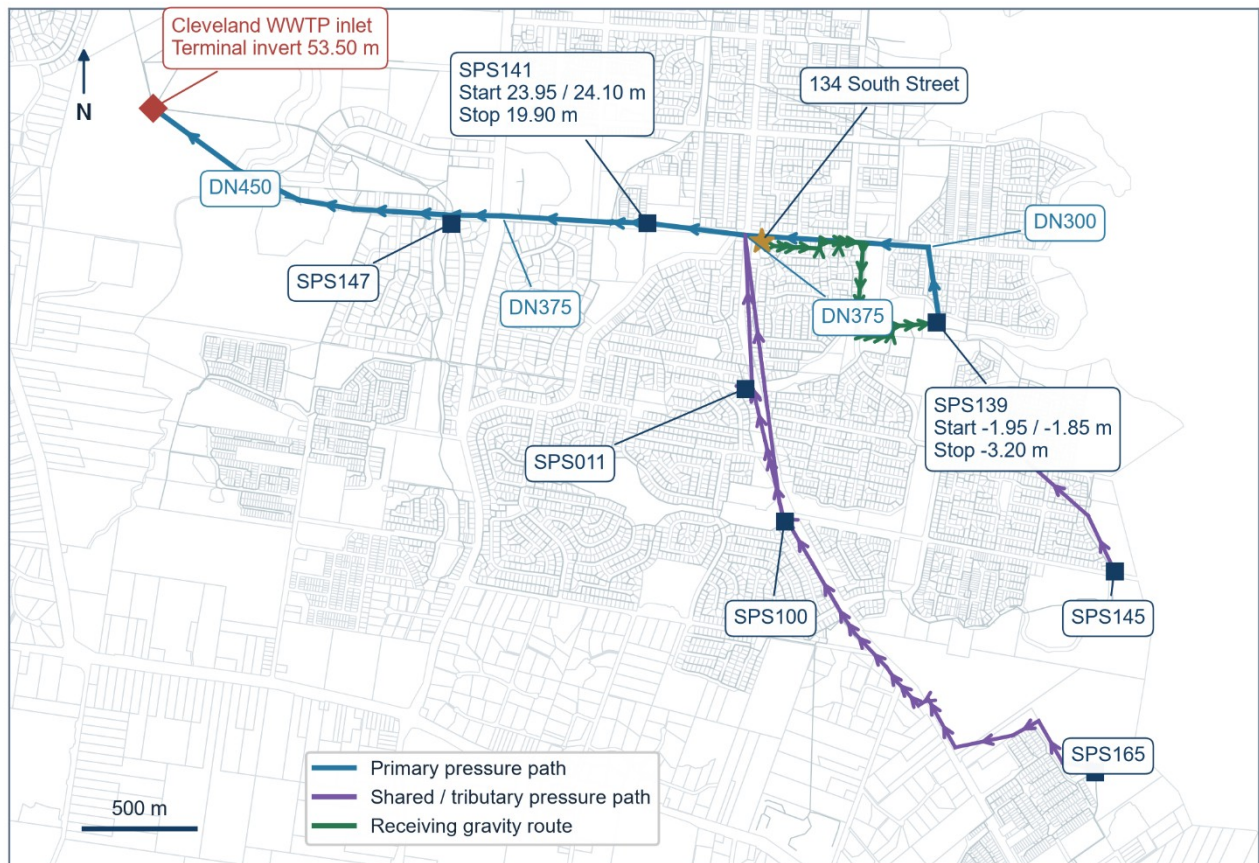


Figure 4: Assessed pumping system and shared rising mains

Source: Council Cleveland network data, base scenario (pipe links, nodes and pumps); Council IDM property outlines. Blue is the development receiving pressure path; purple shows the assessed shared contributors. Arrows show model flow direction. Start labels are pump 1 / pump 2; values are model levels, not verified alarm or overflow levels. Full controls and pipe data are in Appendices A and B.

7.4 Downstream operating constraints

SPS141 is the material downstream constraint. One pump does not pass the assigned catchment PWWF. With both pumps and the primary friction assumptions, the 2026 post-development peak can be conveyed within the model operating range. The ultimate peak requires a wet-well level above the assist start and incoming-main invert. Table 10 gives the constant-inflow equilibrium obtained by prescribing the catchment peak and solving the pump/system-head balance. An equilibrium below ground is not evidence that the level is permitted or that upstream surcharge and overflow criteria are met.

Table 10: SPS141 two-pump equilibrium levels

Case	2026 post level m	Ultimate post level m	Interpretation
Primary; SPS147 off	22.063	25.549	Ultimate exceeds inlet invert
Primary; SPS147 two	23.176	26.556	Higher shared-main head
Adverse; SPS147 off	28.840	33.385	Above recorded ground

Source: pump station equilibrium check. SPS141 incoming-main invert is 24.25 m and recorded ground is 27.60 m; neither is an adopted overflow-control level. Without this development the primary equilibrium is 21.977 m in 2026 and 25.454 m ultimate. The gross development addition raises those levels by 0.086 m and 0.095 m respectively. The ultimate operating constraint therefore exists in the supplied baseline and is marginally increased by this proposal; it is not created by the development.

Simultaneous two-pump operation at SPS139, SPS011, SPS100 and SPS165 gives a combined delivery of 222.31 L/s at their start levels, exceeding the 165.95 L/s SPS141 primary two-pump start capacity. Catchment PWWF and instantaneous pumped delivery are different quantities. Pump cycling and wet-well storage can moderate the latter, but a static snapshot cannot certify its duration or overflow outcome. Council must confirm the approved operating policy, permissible wet-well levels, shared-main coordination and any planned augmentation needed for the current and ultimate cases.

Shared-main interference also warrants checking SPS100. With all peer stations on two pumps, its primary capacity at the model start level is 39.65 L/s against its own assigned current/ultimate peaks of 40.28/41.76 L/s. The ultimate constant-inflow equilibrium is 12.56 m, below recorded ground 14.35 m but above the model start levels; the adverse case exceeds ground. No development load is assigned to SPS100. This is an existing shared-system sensitivity, not a new direct catchment load, and must be included in Council's operating confirmation.

Calculated two-pump velocities on the SPS141 pressure path with SPS147 operating are approximately 0.97-1.46 m/s. Across the SPS139 shared system, the examined simultaneous state ranges from about 0.55 to 2.01 m/s; an existing tributary is below the Table 10 D7 minimum of 0.75 m/s in that state. These state-specific results do not establish daily scouring performance. No new pressure main is proposed and this report does not certify wholesale upgrading of the existing system to new-asset criteria.

7.5 Storage and treatment-plant increment

Using model wet-well diameters and levels, the cylindrical volume between duty stop and duty start is 8.83 m³ at SPS139 and 73.29 m³ at SPS141. These are operating volumes, not emergency storage. Available emergency volume depends on alarm/overflow levels, connected storage and upstream pump-inhibit logic. Ground level and the full wet-well shaft are not substituted for those controls.

SEQ Design Criteria Table 10 D5 specifies four hours at ADWF for Redland emergency storage and an in-catchment basis with upstream pumping inhibited as described in footnote 17. The development's gross additional four-hour allowance is 1.239 m³. At SPS139 this is part of the local gravity catchment; at SPS141 the upstream-pump shutdown and one-cycle allowance must be applied rather than adding four hours of every pumped catchment again. The held input model does not establish the permitted emergency storage or actual inhibit logic, so compliance is reserved for Council's asset confirmation. The development adds 7.434 kL/day average flow at the Cleveland treatment-plant boundary. Treatment-process headroom and discharge-licence compliance are not encoded in the sewer hydraulic model.

7.6 Capacity conclusion and Council confirmation

The supplied-data static assessment demonstrates adequate normal-flow capacity along the development's complete receiving gravity route and adequate combined pumping capacity at SPS139 under the assessed states. It supports the proposed gravity connection. Unconditional acceptance of the whole downstream system is not established: SPS141 requires an accepted duty/assist operating basis, ultimate wet-well levels need approval, and higher-loss/shared-main cases identify existing constraints including SPS100. The small incremental development load does not remove those constraints.

Council is requested to confirm the currency of the selected unaugmented load cases and the conservative site-allocation treatment; the approved duty/assist policy and allowable levels at SPS139/SPS141 and the shared system; the operating/augmentation response to the SPS141 and SPS100 sensitivities; and emergency-storage and treatment-plant acceptance for the stated increment. The calculations and specific operating cases above provide the basis for that decision. Any required augmentation, further dynamic verification or condition of approval must be agreed with Council before an unconditional capacity certification is issued.

8. EASEMENT AND ADJOINING OWNER CONSENT

Council has advised that where sewer extensions are required on adjoining lots, the owner's consent will be required. That advice is accepted and the position is as follows. Approximately 14.9 m of the adopted alignment lies inside Lot 14 SP127463 (126 Morris Circuit), parallel to and about 1 m south of its boundary with Lot 3 SP127463, from the Council strip to the upstream end of asset 55349. A nominal 3 m wide easement in favour of Council is proposed over the private corridor, with final width and terms agreed through detailed design and easement survey. Council's existing sewer lies in the same lot; the easement documentation can address the existing asset as required after title verification. The approximately 0.5 m crossing of Lot 4 RP144189 is on Council land.

No easement has been created and no adjoining owner has been approached or consent obtained, as advised by the applicant's engineer at this revision. The plan shows a proposed corridor, not an existing right to construct or maintain infrastructure on private land. Council's published layer does not show an easement over the proposed corridor; that is a mapping observation, not a title-search conclusion.

The applicant proposes that the easement be secured by a condition of development approval, with survey, owner agreement and registration completed before Operational Works approval. The timing of the approach to the owner of Lot 14 SP127463 is for the applicant to determine. This RFI response records the proposed condition and consent dependency; it does not represent consent as already sought or obtained. Neither approval nor a right of access is assumed.

9. INFRASTRUCTURE WORKS CODE - PERFORMANCE OUTCOMES

Council requires compliance to be demonstrated with performance outcomes PO5, PO6, PO7, PO9 and PO11 of the Infrastructure Works Code. The outcomes below are quoted from Redland City Plan 2018 Version 14, Part 9, Table 9.3.2.3.1.

PO5 *All infrastructure is connected to existing networks in a safe, efficient and functional way, and does not impose loads on those networks that exceed their capacity.*

Response: The DN150 gravity extension and receiving connection are shown in Table 6 and Figures 1 and 2. Section 7 quantifies existing and ultimate assigned flows, the full receiving gravity route and downstream pumping. The gravity route and SPS139 combined capacity support the connection, subject to the specific SPS141/shared-system operating constraints and Council acceptance in section 7.6. PO5 is addressed by that analysis and qualification; unconditional network-capacity compliance is not asserted.

PO6 *All infrastructure is designed and constructed in a manner that minimises whole of lifecycle costs, including short and long term maintenance requirements.*

Response: The adopted alignment keeps approximately 64 m of the 80 m extension within road reserve, and the 15 m on private land runs beside Council's existing sewer inside a single lot, so the asset is accessible for most of its length without entering private property. It is a gravity system with no pump station, no mechanical plant, no power supply and no telemetry, which removes the operating cost, energy cost, standby plant and emergency storage obligations that the withdrawn Option B would have imposed on Council in perpetuity. Pipe material is uPVC with a design life consistent with the surrounding network, and the alignment is straight between maintenance holes.

PO7 *All infrastructure is designed and located to be easily and safely accessed for repair and maintenance purposes.*

Response: Maintenance holes are proposed at direction changes and at the connection to Council's main, with a maximum nominal spacing of 38.5 m. The intended road-reserve access and the private corridor inside Lot 14 SP127463 are shown in Figure 1. Vehicle access, safe working space, structural details, final cover and code spacing require verification. Table 6 lists depths to invert of 1.1 m to 2.1 m, not cover. Legal access to the private corridor must be secured; PO7 remains subject to these matters.

PO9 *A reliable water supply is provided that is sufficient to meet the anticipated use of the premises, including potable and non-potable requirements.*

Response: Water supply is addressed in the separate Water Supply Assessment prepared for this application in response to Item 4 of the Information Request. The site is within Council's reticulated water supply area and the development will be connected to the reticulated water supply system, with reticulation and connections designed and constructed in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code as applicable to Redland City Council, consistent with AO9.1 and AO9.2. No aspect of the sewer strategy in this report affects water supply provision.

PO11 *Wastewater is treated and disposed of in a manner that is sufficient for the volume of wastewater generated on the site and to a level that ensures risks to public health, water quality and the environment are minimised.*

Response: The gravity connection conveys the development's 7.434 kL/day average and 0.4302 L/s peak flow to Council's sewerage system. Section 7 assesses the receiving mains, pumps, pressure system and incremental storage/treatment demand. Acceptance remains subject to Council confirming the identified operating constraints, emergency-storage controls and treatment-plant headroom. The report supports a reticulated servicing solution but does not certify unknown overflow or treatment-process performance.

10. MATTERS FOR OPERATIONAL WORKS

The completed assessment identifies the following specific acceptance and detailed-design matters. The proposed easement condition is stated in section 8. Council's acceptance of the operating constraints in section 7.6 is required for an unconditional capacity conclusion; it is not silently deferred to Operational Works:

- detail survey of the site and the full alignment corridor, including boundaries, surface levels, existing services and the receiving maintenance hole, to confirm the levels and grades in Table 6;
- survey, agreement and registration of the required easement over Lot 14 SP127463, with a title search at that stage;
- Council acceptance of the supplied-model current/ultimate load cases, occupancy basis and gross-addition treatment at load point 28000;

- Council confirmation of duty/assist operation, permissible wet-well levels, shared-main coordination and any augmentation at SPS141/SPS100, plus emergency-storage and treatment-plant acceptance, against the quantified cases in section 7;
- detailed design of the extension and internal reticulation under the applicable SEQ codes, confirming the ground floor slab level and ground floor drainage fixtures assumed in section 5.4;
- decommissioning of the existing on-site wastewater treatment system.

11. CONCLUSIONS

- Option B, the on-site pump station connected to Council's 375 mm rising main, is withdrawn in accordance with Council's Information Request. The development will be serviced by gravity.
- The tabulated concept has positive fall and nominal grades that pass the conservative minimum-grade check. Final gravity feasibility and cover remain subject to verified corridor, connection and internal drainage levels; Figures 1 and 2 are not construction drawings.
- The concept places about 64 m in road reserve, 0.5 m across Council's strip and 14.9 m inside Lot 14 SP127463. One adjoining owner's consent and a nominal 3 m easement are required. No owner has yet been approached; the applicant proposes the easement as a condition before Operational Works approval.
- Sanitary stacks and a gravity collector to MH A form the internal concept, coordinated with the Stormwater Management Plan's RL 31.00 car park slab. Ground-floor fixtures are assumed at or above that level; the internal collector must satisfy the invert, grade and cover checks in section 5.4. A detailed hydraulic schematic is not required to describe this RFI concept.
- The development generates 35.4 EP, an average dry weather flow of 0.0860 L/s and a peak wet weather flow of 0.4302 L/s.
- All 23 receiving gravity links pass the assigned-load normal-flow check; the controlling ultimate utilisation is 66.0%. SPS139 combined capacity is adequate in the assessed states. SPS141 and shared-main operating sensitivities require the specific Council confirmation in section 7.6 before unconditional network acceptance can be stated.
- Section 9 responds to PO5, PO6, PO7, PO9 and PO11 with the stated acceptance and detailed-design conditions. The report is approved for issue. Adjoining-owner consent and Council acceptance remain subject to the requirements stated in this report.

12. PROFESSIONAL RELIANCE AND CERTIFICATION

This development-application assessment relies on Council's supplied hydraulic model and asset data, Council's public mapping including its 0.25 m contours, the Digital Cadastral Database and the Interworks architectural set. The static calculations in section 7 use the supplied pipe, load and pump records, with explicit operating and loss assumptions. No detail survey has been undertaken and no calibrated hydraulic model run has been performed. Where information was not available, assumptions have been adopted and are stated. The alignment presented is a concept alignment for development application purposes and is subject to survey, easement acquisition and detail design.

The calculations, concept drawings and this report were prepared and reviewed by Craig Harris, RPEQ Civil Engineer, registration 13194, RPEQ Consulting. This revision is certified for issue as the sewer servicing and capacity assessment for the development application, in response to Council Information Request Item 5, subject to the assumptions and verification requirements stated in this report. It is not a construction issue. Revision 4 is the public issue of Revision 3: internal working references are removed and the engineering content is unchanged.

Certification

Role	Name	Registration	Revision	Date	Signature
Prepared, reviewed and certified for issue by	Craig Harris, RPEQ Civil Engineer	RPEQ 13194	Revision 4	15 October 2026	

APPENDIX A: PUMP CURVES AND OPERATING INPUTS

The source is Council's Cleveland wastewater network model (2023) (Council network data). Pump records are taken from the base scenario (alternative 0); each pump is linked to its supplied head–flow curve, whose points are listed in order. Head is in metres; flow, supplied in m³/s, is multiplied by 1,000 for L/s below. The source curves describe an individual pump. Combined station capacity depends on the shared system head and is calculated separately in section 7.

Table 11: Pump curve identifiers and model operating levels

Station	Pump 1 / pump 2 curve ID	Start 1 / 2 (m)	Stop 1 / 2 (m)	Sump invert / ground (m)
SPS139	PS 139 / PS 139	-1.9511 / -1.85	-3.2 / -3.2	-3.8 / 4.95
SPS011	PS 011_1 / PS 011_2	6.76 / 6.86111	6.26 / 6.26	5.83 / 11.46
SPS100	PS 100 / PS 100	10 / 10.2511	8.93 / 8.93	7.72 / 14.35
SPS165	PS 165 / PS 165	-1.36 / -1.36	-2.36 / -2.36	-3.16 / 4.5
SPS141	PS 141_1 / PS 141_2	23.95 / 24.1	19.9 / 19.9	18.75 / 27.6
SPS147	PS 147 / PS 147	24.13 / 24.5111	23.43 / 23.43	23 / 30.09
SPS145	PS 145 / PS 145	-1.5 / -1.3	-2.2 / -2.2	-3.059 / 4.605

Source: Council network data: pump start and stop levels and curve references; node invert and ground levels. Levels are on the supplied model datum. Pump 1 / 2 are source identifiers; they do not establish the approved duty rotation, duty/standby policy or inhibit logic. No model alarm or ground level is adopted as an authorised spill level.

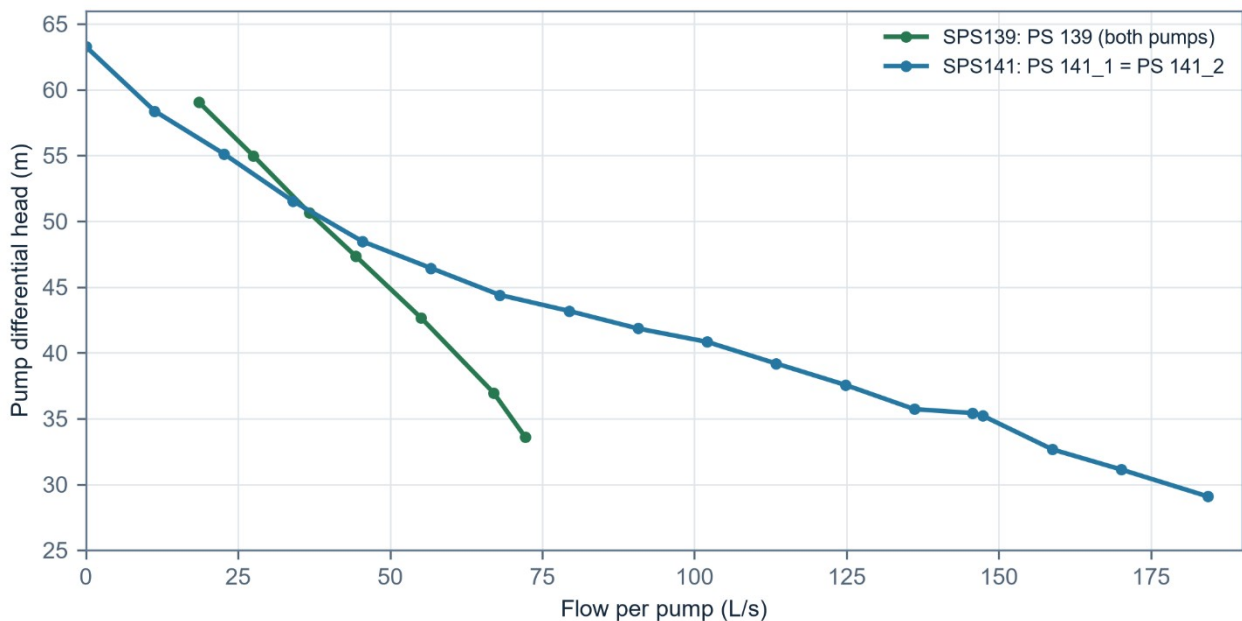


Figure 5: Supplied individual-pump head–flow curves for SPS139 and SPS141

Lines are piecewise-linear joins of supplied points, with no extrapolation. Both SPS139 pumps reference PS 139. PS 141_1 and PS 141_2 contain identical head/flow pairs and therefore share one plotted line. No calculated duty point or combined-pump curve is implied by this source plot.

Table 12: Supplied pump-curve points for SPS139 and SPS141

Point	PS 139 Q (L/s)	PS 139 H (m)	PS 141_1 / PS 141_2 Q (L/s)	PS 141_1 / PS 141_2 H (m)
1	18.6	59.04	0.0	63.28
2	27.5	54.99	11.3	58.38
3	36.7	50.65	22.7	55.12
4	44.3	47.37	34.0	51.54
5	55.1	42.65	45.4	48.48
6	67.0	36.96	56.7	46.44
7	72.2	33.59	68.0	44.40
8	—	—	79.4	43.18
9	—	—	90.7	41.85
10	—	—	102.1	40.83
11	—	—	113.4	39.19
12	—	—	124.8	37.56
13	—	—	136.1	35.72
14	—	—	145.7	35.42
15	—	—	147.4	35.21
16	—	—	158.8	32.66
17	—	—	170.1	31.13
18	—	—	184.3	29.09

Source: Council network data, pump curves PS 139, PS 141_1 and PS 141_2; H in metres; Q = supplied flow (m³/s) × 1,000 (L/s). A dash means no further supplied point for PS 139. Values are reproduced at the supplied precision; no zero-flow point has been invented for that curve.

APPENDIX B: ASSESSED PIPE INPUTS

The following schedules reproduce the unaugmented base-scenario pipe dimensions used in section 7. DN represents model internal diameter $\times 1,000$, rounded to millimetres; length is the model hydraulic length. IL means invert level on the model datum. End inverts are distinct from hydraulic grade, ground and pipe crown. Source: Council network data: link identifier, diameter, length and upstream and downstream inverts.

Table 13: Receiving gravity pipe lengths and end levels

Model link	DN (mm)	Length (m)	Upstream IL (m)	Downstream IL (m)
55349	150	28.67	25.98	24.25
55350	150	68.75	24.20	19.54
55351	150	19.35	18.56	18.44
55352	150	87.33	18.37	13.85
55353	150	32.15	13.80	12.12
55355	150	86.25	12.04	9.27
55361	150	5.98	9.20	8.83
34156	150	50.44	8.77	7.41
212786	150	13.84	7.37	6.98
34157	150	43.68	6.97	5.72
34158	150	89.53	5.63	5.04
34159	150	89.46	5.01	4.41
34160	150	71.92	4.38	3.91
34161	150	72.78	3.85	3.39
34162	150	89.82	3.38	2.80
34163	225	88.31	2.78	2.43
34164	225	20.53	2.42	2.32
34165	225	51.71	2.28	2.10
34166	300	48.13	2.03	1.89
34167	300	70.42	1.85	1.66
34168	300	62.96	1.62	1.47
34169	300	59.49	1.44	-1.37
Inlet_139_240023	375	2.00	-1.46	-1.64

The gravity schedule follows the flow path from the Route 1 receiving pipe end to Sump_139. Table 7 provides the corresponding load and normal-flow capacity calculation. Asset identifiers match Figure 3.

Table 14: Pressure-main lengths and end levels

Model link	DN (mm)	Length (m)	Upstream IL (m)	Downstream IL (m)
RM_139_1_56646	300	496.30	2.50	3.91
RM_139_2_56645	375	246.50	3.91	7.43
RM_139_3_56664	375	457.50	7.43	29.65
Inlet_141_RM_11_100_139	375	450.00	29.65	24.25
RM_011	225	33.00	9.28	9.50
RM_165_018	271	6.60	9.50	9.50
RM_165_019	256	686.00	9.50	29.65
RM_100_1	200	89.00	11.20	11.37
RM_100_2_222773	200	1225.11	11.37	29.65
RM_165_001	271	182.56	3.35	6.38
RM_165_002	271	217.51	6.38	5.29
RM_165_003	271	150.03	5.29	7.01
RM_165_004	271	331.59	7.01	4.03
RM_165_005	271	243.10	4.03	5.47
RM_165_006	271	37.87	5.47	4.97
RM_165_007	228	45.93	4.97	5.40
RM_165_007A	271	102.52	5.40	6.50
RM_165_008A	228	49.56	6.50	5.42
RM_165_008B	271	68.35	5.42	6.70
RM_165_009	228	180.69	6.70	1.95
RM_165_010	228	35.80	1.95	5.85
RM_165_010A	271	102.96	5.85	8.51
RM_165_011	271	7.74	8.51	7.05
RM_165_012	228	45.00	7.05	8.46
RM_165_012A	271	219.00	8.46	14.44
RM_165_013	271	236.89	14.44	11.27
RM_165_014	271	13.34	11.27	10.95
RM_165_015A	271	258.85	10.95	18.79
RM_165_015B	228	38.10	18.79	19.50
RM_165_015C	271	53.35	19.50	19.40
RM_165_016	271	235.64	19.40	8.96
RM_165_017	271	17.20	8.96	9.50
RM_141_245694	375	156.80	25.51	20.35
RM_141_245696	375	4.94	20.35	19.96
RM_141_56649	375	5.80	19.96	20.33
RM_141_56662	375	486.20	20.33	41.57
RM_141_56660	375	239.65	41.57	26.26

Model link	DN (mm)	Length (m)	Upstream IL (m)	Downstream IL (m)
RM_141-147_56657	450	19.86	26.26	26.21
RM_141-147_56655	450	226.50	26.21	32.58
RM_141-147_56654	450	187.84	32.58	27.41
RM_141-147_56653	450	252.75	27.42	38.10
RM_141-147_56652	450	280.10	38.10	19.15
RM_141-147_56650	450	600.95	19.15	53.50
RM_147_226445	150	40.00	28.13	26.26
RM_145_Sec1_232383	150	290.52	2.75	3.27
RM_145_Sec2_232343	150	490.23	3.27	13.53

Each physical model link is listed once even where shared by several pump paths. SPS139, SPS011, SPS100 and SPS165 converge on Inlet_141_RM_11_100_139. SPS147 joins the SPS141 discharge system; SPS145 discharges to a gravity tributary. The artificial connector beyond CWWTP_Inlet is excluded. Figure 4 shows the spatial context.