

PLANS AND DOCUMENTS
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AGENCY RESPONSE



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Engineering Report Incl. Stormwater Management

1028 Lytton Road,
Murarrie, QLD, 4172

Arcos Project: 2500103

Attention: Brisbane City Council

C/- N/A

By Email

2 March 2026

Arcos Project: 2500103**Rev 2****AG-2500103-RPT-C-01****Engineering Report Incl. Stormwater Management****1028 Lytton Road,****Murarrie, QLD, 4172****Document Control**

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Building pad earthwork levels have been designed above the 1% AEP flood level with the majority of overland flow directed toward the Queensland State rail corridor.

All cutting and filling are to be carried out in accordance with AS3798:2007 Guidelines on Earthworks for Commercial and Residential Developments. Any site filling will be from site spoil (subject to Geotechnical Investigation), provided it meets the requirements of AS3798 and is placed with controlled compaction.

Impacts of proposed earthworks on overland flow conditions will not adversely affect adjacent or downstream properties. Proposed earthworks will not encroach on adjacent properties or affect the function of stormwater catchments external to the site.

All construction activities, including Erosion and Sediment Control (ESC) methods, would be managed under the control measures of a Construction Environmental Management Plan (CEMP) for the development site. The CEMP and ESC plans would be prepared for submission with the future application for Operational Works Approval.

5 Stormwater Management

5.1 General

The minor storm event is the 39% Annual Exceedance Probability (AEP) event in accordance with Table 7.2.2.3.B of the BCC Planning Scheme and QUDM for the 'industrial' development category.

The minor drainage system is anticipated to consist of the following:

- Field inlet pits and piped drainage;
- Piped roof water connections;
- Surface grading and/or swales (as required); and
- On-site quality treatment.

The combined minor/major drainage system shall be designed to cater for the 2% AEP flows in accordance with Table 7.2.2.3.B of the BCC Planning Scheme.

5.2 Drainage/ Lawful Point of Discharge

Runoff from upstream of the subject site is currently captured via twin 375mm diameter RCP and discharges west to the Queensland Rail State Corridor, as shown in **Figure 3**. Based on the existing topography, overland flow during major storm events also conveys to this location. This existing lawful Point of Discharge (LPD) is going to be maintained for the proposed development with reconstruction of the existing pipes with a singular box culvert and is compliant with Section 3.9.1 requirements of QUDM. Re-alignment of the existing stormwater pipe network is proposed to reduce conflicts with the building footprint and allow for easier access for maintenance.

A secondary overland flow channel is to be maintained at the basement level and go to an existing swale along the northern side of the development in the case of blockage and for other minor flows directed towards the building.

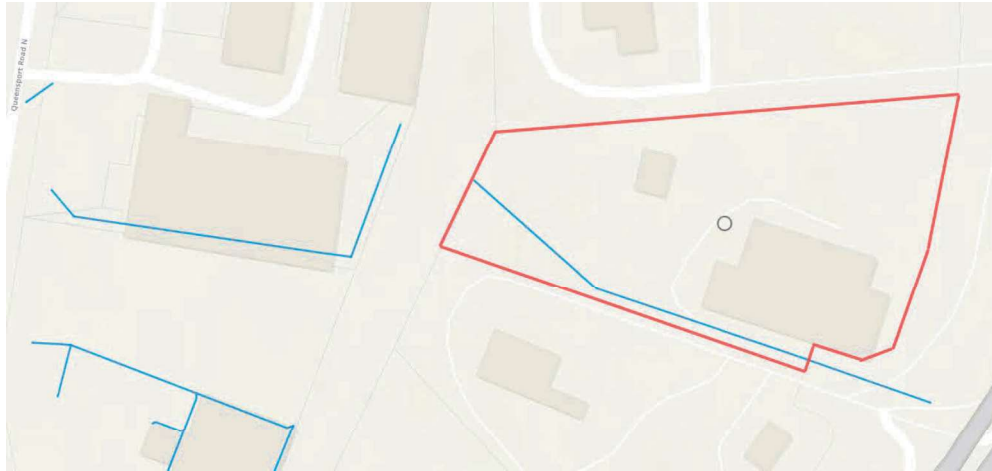


FIGURE 3: EXISTING STORMWATER NETWORK (SOURCE: BCC)

5.3 External Catchments

There is an external catchment located to the east of the site that drains through the property and ultimately discharges into the Queensland Rail State Corridor. This catchment includes a portion of Lytton Road and its western verge.

It is proposed to convey this flow to the same location it is currently being captured in existing stormwater pipes, via a new 900 mm diameter pipe beneath the basement pavement. The pipe has been sized to accommodate runoff from both the subject site and the contributing external catchment for the 1% AEP event.

In the event this pipe becomes blocked, an overland flow path is available with discharge into a proposed concrete channel to the east of the building, flow northwards toward a landscaped swale, and then be directed west to the rail corridor.

5.4 Flooding

The site is not identified as being impacted by flooding as per BCC Flooding Overview Mapping.

5.5 Stormwater Quality Management

The State Planning Policy states that stormwater management design objectives do not apply for premises smaller than 2500m². However, as the development is larger than this stormwater quality management is required.

5.5.1 Construction Phase

The site's management is important in ensuring water quality standards are achieved during the construction phase. Implementing best practice Erosion and Sediment Control techniques is imperative to managing the runoff quality affected by construction works.

Best practice measures shall be utilised during the construction phase to minimise the potential impacts of the pollutants mentioned above. Detailed Erosion and Sediment Control Management Plans should be developed in conjunction with the Operational Works design prior to construction works commencing in accordance with the International Erosion Control Association (IECA) - "Best Practice Erosion and Sediment Control (BPESC) document" and overseen by a Certified Professional in Erosion and Sediment Control (CPESC) or Registered Professional Engineer Queensland (RPEQ).

Through their principal contractor, the developer shall be responsible for ensuring that temporary sediment and erosion controls are installed and maintained correctly.

5.5.1.1 Pollutants

The pollutants that would typically be generated during the construction of the proposed development are outlined in **Table 2**.

TABLE 2: TYPICAL CONSTRUCTION PHASE POLLUTANTS

Pollutant	Source
Litter	Paper, construction packaging, food packaging, cement bags, offcuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters e.g. from tile works)
Ph Altering Substances	Acid sulphate soils, cement slurry

5.5.1.2 Potential Impacts

Construction activities can have a potential impact on water quality. Removal of vegetation, earthworks and changes to drainage patterns can result in erosion and sediment being washed into waterways. This can impact the physical-chemical parameters of the receiving water, the decline in the health of aquatic ecosystems, and overall aesthetics. The potential impacts on the development site's surrounding receiving waters will be minimised during the construction phase with typical measures outlined below. These measures should be adequately detailed on erosion and sediment control plans as part of the development's Operational Works application.

5.5.1.3 Performance Objectives

The amount of runoff traversing and discharging from the site while under construction should be kept to a minimum. This will restrict soil erosion and mobilisation of sediments and pollutants through and off the site. During the construction phase, stormwater runoff at discharge points shall comply with the objectives detailed in QLD SPP (July 2017).

5.5.1.4 Control Measures

The following are typical treatment measures that should be implemented before the commencement of any construction works. Detailed erosion and sediment control procedures shall be based on the erosion and sediment control plans lodged at the Operational Works phase.

5.5.1.5 Maintenance

Maintenance of erosion and control treatment measures (such as sediment fences) will be undertaken if it is observed that they have not been properly installed or the capacity of the measure falls below 75%.

5.5.1.6 Minimise Disturbance Area

Clearing of land is to be minimised to areas planned to be actively under construction in the near term (e.g. within the next 3-6 months).

5.5.1.7 Stabilise Disturbed Areas

Provide temporary stabilisation of disturbed soils whenever active construction is not occurring on a portion of the site. Provide permanent stabilisation during finish grade and landscape the site.

5.5.1.8 Protect Slopes and Channels

Safely convey runoff from the top of the slope and stabilise temporary and permanent channel crossings as quickly as possible and ensure that increases in runoff velocity caused by the project do not erode the channel.

5.5.1.9 Diversions of Upslope Runoff

Upslope runoff should be diverted away from areas of exposed soil to prevent the contamination of clean runoff. This may be achieved by installing tightly abutting sandbags, creating a 'sandbag perimeter bank' to divert flow.

5.5.1.10 Sediment Fences and Inlet Protection

Delineate site perimeter to prevent disturbing areas outside the project limits. Sediment fences should be installed around the perimeter of works to ensure contaminated runoff is filtered and sediment is trapped before leaving the site. Sandbags or geofabric should also be placed around/over existing stormwater inlets/grates throughout the site to filter any contaminated runoff before entering the existing piped stormwater network.

5.5.1.11 Retain Sediment

Retain sediment-laden waters from disturbed, active areas within the site.

5.5.1.12 Stabilised Vehicle Entry/Exit Point

A stabilised entry/exit point should be constructed to minimise the transport of sediment off-site. All vehicles entering and leaving the site must use this designated entry/exit point.

5.5.1.13 Stockpiles

Stockpile locations should be identified before the commencement of works. Ideally, they should be located in a flat area at least 15m from any water body or stormwater inlet. Sediment fences should be installed downslope of all erodible stockpiles, and upslope protection measures should be used (i.e. sandbags or sediment fence) to divert runoff in the event of rain. At the end of each working day, stockpiles should be covered with geofabric if rain or high winds are forecast.

5.5.1.14 Street Sweeping

Ensure that local roads are swept as required. This will minimise the potential for sediment tracked onto the road to be washed into the stormwater system. If there is a large quantity of sediment being tracked onto the surrounding streets, the stabilised entry/exit point may need to be raked or reinforced with rock treatment to provide more effective sediment removal for vehicles.

5.5.1.15 Erosion Control Matting and Permanent Stabilisation

Exposed areas onsite should be permanently stabilised (i.e. with turf) as the construction works progress. Erosion control matting or mulching should be used as a temporary measure to stabilise exposed areas before permanent stabilisation can be undertaken.

5.5.1.16 Monitoring

Monitoring and recording of the performance of the drainage control devices are to be undertaken in accordance with local government requirements. It is further recommended that the proposed construction works be undertaken during periods of dry weather to reduce the potential for sediment to be transported off-site during construction.

5.5.2 Operational Phase

5.5.2.1 MUSIC Modelling

MUSIC (MUSICX by eWater), a pollutant export modelling program, has been used to model the expected pollutant loads generated by the development and the effectiveness of WSUD treatment options selected.

5.5.2.2 Split Catchment Approach

The MUSIC model is based on a split catchment approach, modelled as various catchments representing the different surface types in accordance with the guidelines and available site information. Split catchment surface information is shown in **Table 3** in accordance with HLW guidelines.

TABLE 3: ADOPTED AREA & PERCENT IMPERVIOUS – COMMERCIAL

Surface Type	Area (ha)	Percent of Site (%)	Percent Impervious (%)
Roof	0.214	59	100
Road	0.140	39	100
Landscape	0.006	2	0
	Total: 0.36		

5.5.2.3 MUSIC Meteorological Data

The Kalinga Bowls Club (Station 40222) meteorological data was selected for the MUSIC analysis. The 10-year climate period was selected in accordance with HLW guidelines. The rainfall and evapotranspiration data for the period of 01/01/1980 to 31/12/1989, with a 6-minute time step, was used in the model.

Input parameters for the rainfall-runoff, source nodes and treatment devices were also obtained from the guidelines. The following parameters were selected based on commercial and industrial development.

5.5.2.4 Rainfall-Runoff Parameters

The rainfall-runoff parameters listed in Table 3.7 of MUSIC guidelines were used in the model. The parameters recommended by the guideline are as shown in **Table 4**.

TABLE 4: RECOMMENDED RAINFALL-RUNOFF PARAMETERS

Parameter	Commercial and Industrial
Rainfall threshold (mm)	1
Soil storage capacity (mm)	18
Initial storage (% capacity)	10
Field capacity (mm)	80
Infiltration capacity - Coefficient a	243
Infiltration capacity - Exponent b	0.6
Initial depth (mm)	50
Daily recharge rate (%)	0
Daily baseflow rate (%)	31
Daily deep seepage rate (%)	0

5.5.2.5 Pollutant Export Parameters

The pollutant export parameters for split catchment land use were adopted for MUSIC modelling and are shown in **Table 5**.

TABLE 5: POLLUTANT EXPORT PARAMETERS – SPLIT CATCHMENT INDUSTRIAL LAND USE

Flow Type	Surface Type	Total Suspended Solids (TSS) (Log ₁₀ mg/L)		Total Phosphorous (TP) (Log ₁₀ mg/L)		Total Nitrogen (TN) (Log ₁₀ mg/L)	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Road Reserve	0.78	0.45	-1.11	0.48	0.14	0.20

Flow Type	Surface Type	Total Suspended Solids (TSS) (Log ₁₀ mg/L)		Total Phosphorous (TP) (Log ₁₀ mg/L)		Total Nitrogen (TN) (Log ₁₀ mg/L)	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Baseflow concentration parameters	Ground	0.78	0.45	-1.11	0.48	0.14	0.20
Storm flow concentration parameters	Roof	1.30	0.44	-0.89	0.36	0.25	0.32
	Road Reserve	2.43	0.44	-0.30	0.36	0.25	0.32
	Ground	1.92	0.44	-0.59	0.36	0.25	0.32

5.5.2.6 MUSIC Model Layout

The model node arrangement shown in **Figure 4** has been adopted and is representative of the proposed development.

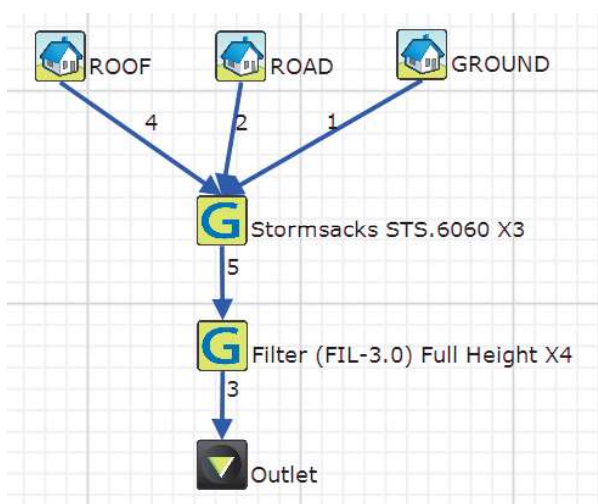


FIGURE 4: MUSIC MODEL LAYOUT

5.5.2.7 MUSIC Model Results

The model's minimum load-based pollutant reduction efficiencies are achieved, shown in **Table 6**, and in accordance with the QLD SPP (July 2017), Table B: Post Construction Phase - stormwater management design objectives.

Refer to **Appendix C** for Atlan product information.

TABLE 6: MUSIC MODEL RESULTS

Parameter	Required Load Reduction	Music Results	Result
Total Suspended Solids (TSS)	80%	81.3%	Compliant
Total Phosphorous (TP)	60%	77.5%	Compliant
Total Nitrogen (TN)	45%	59.8%	Compliant
Gross Pollutants >5mm	90%	99.7%	Compliant

5.6 Stormwater Quality Asset Maintenance

5.6.1 Maintenance Schedule

Outlined below in **Table 7** are the recommended maintenance schedules for the treatment types.

TABLE 7: STORMWATER QUALITY ASSETS MAINTENANCE SCHEDULE

Stormwater Asset	Maintenance Frequency	Tasks
Media Filtration (General Guidance – advice should be sought from the proprietary provider of technology)	Four-monthly inspections 10-years	General cleaning (remove the build-up of debris/pollutants >150mm) Every 10 years, the filter media cartridges are to be replaced.

5.7 Stormwater Quantity Management

5.7.1 General

Due to the increase in impervious area for the development, the stormwater runoff peak flow will minorly increase. However, with consideration of the site location, the wider catchment and the current site conditions, it has been determined that no onsite detention is required.

Clause 7.5.2 of BCC's Schedule 6 IDPP notes that the majority of infill development should not require stormwater detention, except under 3 specific conditions as follows:

- Downstream drainage network cannot cater for the additional capacity;
- No practical way to increase downstream capacity; and
- The increase in stormwater flows would cause adverse flooding impacts to adjacent or downstream properties.

It also goes on to note that stormwater detention requirements can be waived where the site location is located in the bottom one-third of the catchment which generally does not require detention, discussed in clause 7.5.2 of BCC's Schedule 6 IDPP and QUDM.

The subject site, located in Murarrie, is within the bottom third of the Brisbane River catchment which outlets east to the ocean.

Using the Rational Method, it has been determined that the site runoff will increase by 40l/s and 91l/s in the minor and major storms respectively. The proposed stormwater outlet for the site, the lawful point of discharge, is the Queensland Rail Corridor. This is a wide corridor with sufficient capacity for the minor increase in runoff. The corridor outlets to an existing 1350mm diameter stormwater pipe which flows to the Brisbane River. Therefore, the downstream drainage network can cater for the minor increase in flows.

It is also noted that the portion of the site subject to development is currently covered with gravel hardstand, which functions as a relatively impervious surface for vehicle parking. Further showing that the net increase in runoff will not be significant. Additionally, the proposed stormwater quality treatment tank will act as 'informal' detention in smaller rainfall events.

6 Build Over Assets

6.1 Stormwater

Two existing stormwater pipes currently traverse the proposed development footprint on a diagonal alignment. It is proposed to realign these pipes along the southern boundary of the site to avoid conflict with the new building. The structural columns for the proposed building have been designed in accordance with the requirements of MP1.4 to ensure no structural loading is imposed on the new stormwater infrastructure.

6.2 Sewer

An existing vitrified clay (VC) sewer runs north–south through the site. The proposed development will be constructed over this alignment; however, the sewer main will be reconstructed as a polyethylene (PE) pipe along the same alignment. This approach will improve durability and reduce long-term maintenance requirements. Building columns and piles are to be located a minimum of 1.2 m from the pipe centreline in accordance with MP1.4.

7 Service Provisions

7.1 Water

The site is currently serviced by a 100mm diameter connection stub connected to a 300mm diameter ductile iron reticulation main located adjacent to the site access on Lytton Road. It is proposed that this existing connection be maintained to service the development.

7.2 Sewer

The existing development on the eastern portion of the site is serviced via a sewer stub connected to an existing maintenance hole located to the northwest of the site. It is proposed that this stub be extended and split to provide a second line servicing the proposed development to the west.

7.3 Waste Collection

A bin enclosure is proposed at the front of the building. The loading bay has been designed to provide sufficient space for a rear-loading Waste Collection Vehicle (WCV) to access the bin area, collect waste, and exit the site in a forward direction.

7.4 Communications & Electrical

Details of electrical supply and communication infrastructure and services proposed for the development site are outside the scope of this report. However, we understand that supply to the development can be provided via an extension of the existing electricity network.

8 Code Assessment

The relevant code assessment tables for BCC and SARA have been shown in **Appendix D**.

9 Conclusion

This Engineering Services Report has been prepared to provide a review and information on the Engineering requirements to support the application for MCU on the proposed development at **1028 Lytton Road, Murarrie, QLD**.

The following requirements have been reviewed as part of this report:

- Suitable access can be provided off Lytton Road to access the development via the existing crossover;
- The proposed floor levels are above the flood level requirements of the site;
- Stormwater quality and quantity requirements for drainage discharge can be provided for the site;
- Sewerage reticulation can be provided to the site via the existing property connection to the Urban Utilities network; and
- Water reticulation can be provided to the site via the existing property connection to the Urban Utilities network.

In summary, this report shows that the development site can be adequately serviced and provision made as currently shown and in further detailed design for this development to be in accordance with Council's code requirements.