

Logan Greyhound Facility

INFRASTRUCTURE SERVICING PLAN AND
SITE BASED STORMWATER MANAGEMENT PLAN

- March 2010



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1. Introduction

This report has been prepared by Sinclair Knight Merz (SKM) on behalf of Greyhounds Queensland Limited (GQL) to support a Development Application for an outdoor greyhound racing facility. The development is referred to in this report as the Logan Greyhound Facility.

1.1. Description of development

The proposed development is to be situated on 10.24 ha of designated public open space known as Cronulla Park in the suburb of Slacks Creek. The park is described as Lot 658 on SL12298, under the jurisdiction of Logan City Council.

The location of the development site with respect to the surrounding suburbs and road network is shown on **Figure A1 – Site Location**.

The proposed development includes the construction of a double storey main facility building with a grassed viewing area, kennel blocks and support buildings serviced by two-way internal roads with access for patron car parks, and dedicated parking area for trainers and employees. An inner and outer greyhound race track will be constructed as the main attraction, with a separate trialling track being formed adjacent to the main tracks.

1.2. Objective of report

The objective of this report is to outline the requirements and provision of infrastructure services and the stormwater management for the site so as to effectively demonstrate that the proposed development can be adequately serviced and support the development application of the proposed facility.

1.3. Scope of report

The scope of this report covers the infrastructure servicing and stormwater management associated with the site to substantiate and support a code compliance submission prepared by the lead consultant, ML Design.

This report considers the bulk earthworks, roadworks and parking layout, stormwater drainage (quantity and quality), sewerage reticulation, water reticulation, electrical and telecommunication services. Further detailed investigation and analysis is required at the Operational Works phase.

2. Site Characteristics

2.1. Location

The proposed development site is in Slacks Creek and is located west of the M1 Motorway, approximately 20km south of Brisbane's CBD and 2.5km north of Logan Central. The intersection of two main arterial roads, Kingston Road and Compton Road define the development's western and northern boundaries. Compton Road bends away from the site to the north approximately halfway along the site's northern boundary.

Industrial lots are located along the proposed development's southern and eastern property boundaries. Additional industrial lots are also located at the north-east corner which is serviced by an industrial access road and turnaround area, known as Cronulla Court. The site is generally fenced along its northern and western boundaries, albeit is open to the public via existing open access points. Additional industrial lots are on the opposite sides of Kingston and Compton Roads.

2.2. Existing topography and drainage patterns

The highest point of the site is approximately RL34.5m Australian Height Datum (AHD) close to Kingston Road, falling to approximately RL22.2m adjacent to the north east corner industrial lots. The average gradients on the site are relatively flat ranging from 0.8% to 2.0% and the main form of drainage is a combination of overland sheet flows and open channel flows. The north east corner is steeper than the majority of the site with grades up to a maximum of 12.5% towards the east.

The site generally grades in a west to east direction, however during site inspections it was noted that several low bunds are present across the predominant gradient of the site (in a north-south configuration), which intercept and divert the overland flow towards the north and south into an existing open channel drain.

An open channel drain to the south and east separates the park from the adjoining industrial lots. The open channel drain conveys surface runoff from Kingston Road, cross-catchment flows from across Kingston Road and from several culverts from the south. The open channel eventually discharges into a large open chamber with its invert level (base) well below the level of the open channel base of RL 20.4m. Twin reinforced concrete pipes have been noted at the bottom of the chamber. The inlet structure is secured behind a fence and appears to be in private land. Logan City Council has advised the RCP sizes as 1200mm and this has been confirmed by the surveyor.

Based on Dial-Before-You-Dig information, the twin pipes appear to be located within a drainage easement which passes through an adjacent bread making factory, in a west-east direction. Review

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of the topographical survey information downstream of the pipes also indicates the presence of an overland flow path from the chamber through the factory's car park, onto Allgas Street to the east and finally into Slacks Creek. Refer to **Appendix D – Open Channel Calculations** for a sketch of the inlet structure.

The site inspections have also identified that parts of the park falls toward the north and north east and it was discovered that these areas do not ultimately discharge into the open channel drain. These areas discharge into an earth drain alongside Compton Road and into existing stormwater gully pits along Cronulla Court.

The existing topography and drainage patterns for Cronulla Park are shown on **Figure A2 – Existing Topography and Drainage Patterns**.

2.3. Existing land use & vegetation

The existing site is currently designated as an open space public park but was previously utilised as a managed landfill between 1970 and 1980. Based on preliminary geotechnical investigations, a low permeable clay capping layer was constructed when the landfill operations were completed to prevent infiltration into the waste material underneath, creating pollution potential beyond the site. Said investigations have indicated that the clay capping cover depths are not consistent, and range from 0.1m at the eastern embankment to 1.0m deep at the west.

It is understood that the landfilling operation was only associated with a proportion of the 10.24ha site. Geotechnical and contamination assessments of the site indicate that the landfill limits ended near the existing trees along Kingston Road to the west. The grass cover in the tree zone has been noted to be poor and sparse. A poorly maintained bituminous road within the tree zone provides vehicular access into the park.

Site inspections have indicated the majority of the area has been grassed at some point but the current condition has been noted as poor with large areas being worn and eroded exposing a compacted bare earth and/or clay layer. The general poor condition of the grass indicates the possibility of minimal depth of topsoil. As such, infiltration opportunities are expected to be limited.

More significant vegetation is limited to periodic clumps of thick grasses and small trees which are observed present in the north east corner of the existing site. The open channel drain running along the south and east boundaries is seen to be heavily vegetated on the park side with predominantly tall grasses and small shrubs. The base and opposite side batter adjacent the industrial lots remains sparsely vegetated and appears to be mostly exposed compacted earth.

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The existing and condition of the vegetation at Cronulla Park can be seen on **Figure A3 – Aerial Photograph**.

2.4. Proposed topography, land use & vegetation

The existing park's previous use as a landfill limits available options for major earthworks and the type of services that can be constructed.

As described in **section 1.1**, the development will consist of a double storey main building, kennel blocks and smaller support buildings, two racing tracks, a trialling track and associated support infrastructure such as roads, footpaths etc. The proposed main access will be from Kingston Road with a dedicated egress onto Compton Road. The proposed location of the access has taken into consideration the existing tree buffer zone along Kingston Road and existing median/opening geometry which is covered in a separate Traffic Impact Assessment report.

The construction of roads and vehicular parking as part of the development will further delineate and modify the site's existing drainage flow patterns. It will also mean removal of the north-south bunds currently present across the site which divert runoff toward the north and south.

The park's past land use as a managed landfill also limits options for standard stormwater conveyance networks incorporating gully pits, field inlets and underground pipes due to the existing clay capping layer protecting the landfill. For which it has been recommended that this capping depth's integrity is maintained throughout. An alternative solution in the form of vegetated trapezoidal swales that do not require excavation as deep as standard conveyance systems is proposed. The swales also provide a Water Sensitive Urban Design solution which provides benefits for water quality treatment. This is described further in **section 5**.

The development therefore creates an impact to the poorly grassed areas of the park, only with the vegetation along the open channel drain flowing north east remaining unaffected. Detailed landscaping proposals will be covered under future submissions by others.

The existing final discharge locations at the outlet headwall to the east, to Compton Road and Cronulla Court to the north will be maintained.

Preliminary discussions with Logan City Council noted that the existing infrastructure in proximity to the development is available and has adequate capacity for use by this development. Information from Dial-Before-You-Dig requests has not indicated locations of existing services being directly affected the development itself. In the event services are found which require diversion as the development progresses within the site boundaries, appropriate measures will be undertaken to protect or relocate the services with input from Logan City Council.

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The proposed layout for the development of the Logan Greyhound Facility is shown on **Figure A4 –Developed Topography & Drainage Patterns.**

2.5. Soils

At the time of writing a detailed geotechnical investigation is being finalised. The final geotechnical report will provide the analysis of existing soil characteristics, the clay capping layer and landfill depths for the site.

The site soil conditions on the site will be detailed in a separate geotechnical report by Sinclair Knight Merz.

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3. Earthworks

3.1. General Compliance

The earthworks to be carried out for the development will be in compliance with the standards for earthworks specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work) 2006*, which will also requires compliance with *AS 3798:1996: Guidelines on earthworks for commercial and residential development*.

3.2. Preliminary activities

Prior to any building works commencing on site the existing grassed vegetation will be stripped within the working zone, grubbed of any remnant stumps and unsuitable material will be removed to a suitable location. Any grub holes will be adequately filled and compacted in accordance with appropriate council standards. Depending on the quality of the existing topsoil, there is the possibility that new topsoil may have to be imported. The areas of the site where minimal operational works will occur will not be cleared of existing grasses until completion of the works to minimise erosion. Care will be taken to ensure the clay capping cover is not penetrated. As a precautionary measure, the existing soils on site and imported material may be tested for fire ant infestation.

Extensive clearing is not anticipated but where necessary, the associated vegetation will be mulched and stockpiled at a nominated location within the site (outside of the work zone) for reuse in the landscaping works. Where possible, any existing trees are to be retained and damage minimised as part of the works. The maximum height of the stockpile will be limited to 1.5m to minimise the potential for combustion. Where areas are not to be developed, appropriate fencing or barriers will be provided before clearing commences. Clearing works will also be limited to within 5m from the boundaries where possible.

As described in **section 2.5**, the final geotechnical report will provide the analysis of existing soil characteristics and sub-strata conditions.

3.3. Bulk earthworks

3.3.1. Landfill clay capping

Based on preliminary geotechnical investigations, additional clay capping material may be imported to increase the clay capping layer depth on the eastern embankment on the site to a

minimum of 0.5m depth. This requirement however is to be confirmed in the final geotechnical report. All reusable topsoil will be maintained and stockpiled as required.

Method statements associated with the earthworks operations will be necessary to highlight the associated risks when working with the clay capping and therefore, should over-excavation occur (beyond the existing clay capping depth into landfill material), appropriate contamination management measures can be implemented.

3.3.2. Buildings, roads and race tracks

Prior to bulk earthworks commencing the existing topsoil will be stripped and stockpiled on the site at a location nominated by the superintendent. The location most suited would be out of the work zone and with minimal impact from external drainage catchments.

Measures will be employed by the civil contractor to minimise the generation of dust from the stockpile throughout the duration of the works. Following the completion of bulk earthworks the stockpile topsoil will be respread over the disturbed areas and stabilised by grassed seeding and/or hydro-mulching. The balance of the topsoil will be tested for potential reuse for landscaping.

An erosion and sedimentation management program will be employed on site to minimise the potential for erosion and the transportation of sediment from the site. A typical program will be described in **section 5.7.10**.

The bulk earthworks operations will include the establishment of a platform for the main building, kennel blocks, internal roads, vehicular parking layouts and for the racing / trialling tracks which will be designed in the Operational Works phase. A cut/fill investigation will be completed to minimise the requirement for importing excessive quantities of fill material. If required, a nominated haul route will be established to minimise the hauling distance and time period with consideration to surrounding land uses.

All fill material used for the development will be suitable fill material free of organic material and unwanted materials and will be sourced from reputable source.

The design of all bulk earthworks will limit developed batters to a maximum slope of 1 in 4, i.e. suitable for maintenance purposes. All batters required as part of the development will be no less than 1.5m from the development's real property boundaries. The appropriate treatment to batters will be grassed or turfed or otherwise in accordance with the batter treatment in Council Work Code, Table 5.3.10A (Batter treatments). The landscape treatment specified will be capable of achieving the required batter treatment within 3 months from completion.

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For typical cross sections of the earthworks required for the track, refer to attached sketch in **Appendix A**.

No retaining walls are anticipated to be included in the proposed development. Should retaining walls be deemed necessary during the Operational Works phase, the walls will not exceed minimum clearances as specified in the Logan Planning Scheme 2006, Chapter 5 – Assessment Criteria for Development of a Stated Purpose or of a Stated Type.

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4. Roadworks and carparks

The roadworks and carparks to be carried out for the assessable development will be in compliance with the standards for earthworks specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work)* 2006.

4.1. Ingress / egress

The proposed site entry and exit to the development is from Kingston Road and egress to Compton Road with a dedicated egress onto Compton Road. Impacts to external roads will be addressed in a separate traffic report, *Logan Greyhound Facility: Traffic Impact Assessment* by Sinclair Knight Merz.

4.2. Internal roads

The internal road network within the development will provide access for the Logan Greyhound Facility patrons, trainers and employees of the facility.

The internal road formation is proposed to be 6.0m kerb to kerb minimum width with a one-way crossfall (typically 3%) and will cater for two-way vehicular movements. The roads are proposed to be flexible granular pavements with an Asphaltic Concrete (AC) surface. The category of road is designated as 'local access' with associated pavement depths kept in accordance with a design to reduce risk of over-excavating beyond the clay capping cover.

It is not anticipated that reinforced concrete hardstand areas will be required but a drop off area is to be provided adjacent to the main facility building and kennel block. Concrete footpaths are to be specified along the roads as required. The roads will be separated from the race tracks by a perimeter fence.

The internal road width and curve radii will be determined with considerations for swept path clearances for design vehicles. The road layout will be reviewed with consideration to a design vehicle specified in a separate Traffic Impact Assessment report referenced above.

The layout of internal roads and carparks are shown on **Figure A4 – Development Topography and Drainage Patterns**.

4.3. Vehicular parking

The development includes 165 number of patron car parks and 50 number of combined employee/greyhound trainer car parks. The car park dimensions will be typically 5.4m long and

2.6m wide and the trailer parks to be 10.0m long by 3.2m wide. Design of the vehicular parks will be in accordance with the off-street parking codes under AS2890. The pavement will be similar to the flexible pavements with AC surface as per the internal roads. Designated concrete footpaths are to be provided to link the car parks to the main facility building and other areas of activities.

The layout of internal roads and car parks are shown on **Figure A4 – Development Topography & Drainage Patterns**.

4.4. Traffic impact study

Consideration to the impact of traffic movements generated by the development are detailed in the traffic report, *Logan Greyhound Facility: Traffic Impact Assessment* by Sinclair Knight Merz.

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5. Site Based Stormwater Management Plan

The proposed development site is located approximately 300m west of Slacks Creek which runs alongside the M1 Pacific Motorway. The stormwater drainage works to be carried out for the assessable development will be in compliance with the standards specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work) 2006*.

5.1. Previous Studies

In discussions held with drainage officers in Logan City Council, it was ascertained that no stormwater management or infrastructure reporting was available for the area.

Logan City Council has also advised that the proposed development is not in a declared flooding zone. Refer to **Appendix G – Logan City Council Correspondence** for further details.

In the absence of previous studies or investigations, the basis for establishing strategies for stormwater conveyance and quality is by reference and compliance with Logan City Council's Policy guidelines.

5.2. Hydrologic Data

The hydrological analysis for the proposed development was completed by establishing a Runoff Routing and Flow Training Simulation (RAFTS) model. RAFTS is a runoff-routing modelling program which simulates flood hydrographs based on rainfall, catchment and channel inputs. It is also used for stormwater detention design. RAFTS is one of the various modelling software packages recommended for use by the *Queensland Urban Drainage Manual (2007)*.

The results from RAFTS were validated against estimated peak discharge from the proposed development using the Rational Method of analysis.

The water quantity modelling is detailed further in **section 5.6**.

5.3. Hydraulic Data

The extent of hydraulic analysis is limited to the preliminary design of proposed detention basin(s) with the RAFTS software. Basin outlet characteristics were estimated using CulvertW. CulvertW was used to calculate the state-discharge curves of a specified low flow culvert and overflow weir for the detention basin(s). The required detention is discussed under **section 5.6.7**. A capacity check of the existing open channel within the site will be completed using Flowmaster which uses Mannings equation.

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The detailed design and hydraulic modelling of the proposed stormwater conveyance system and the final design of the detention basin will be reviewed and completed during the Operational Works phase.

5.4. Water Quality Data

Discussions held with Logan City Council officers did not identify records of water quality data for stormwater runoff from the existing site. As such, pollutant generation and treatment effectiveness was simulated using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software. MUSIC allows the simulation of quality of runoff from catchments and the effect of a wide range of treatment facilities on the quality of runoff downstream.

The water quality modelling is detailed further in **section 5.7**.

5.5. Opportunities and constraints

5.5.1. Increase in discharge / runoff

As described in **section 2.3**, the existing site can be characterised as an undeveloped open space. Based on site inspections and knowledge of its past use as a managed landfill with a clay capping cover, the fraction impervious for the development has been estimated as a weighted average of 0.15 which is conservative. The previous managed landfill's protective clay capping cover also further limits infiltration. Vegetation retardance is expected to be minimal for most of the site due to the poor grass conditions and exposed earth / clay observed on site.

The proposed development with its associated paved roads, roofed area and footpaths will increase the amount of impervious area within the site.

The investigation of the extent of increase in runoff from the developed catchment is detailed in **section 5.6**.

5.5.2. Increase in generated pollutants

The impacts of development to an existing undeveloped catchment has the potential to create an increase in runoff, but also results in the introduction of a wide range of generated pollutants. During rainfall events these pollutants may be washed from the catchment surface and transported within the runoff. These pollutants have the potential to reduce the quality of stormwater discharging to downstream receiving water bodies.

The strategy to manage the levels of water pollutants generated by the proposed development is outlined in **section 5.7**.

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5.5.3. Limited potential for infiltration

Detailed geotechnical testing of the development site soils have not been completed at this time which will accurately identify the infiltration characteristics. Site inspections have indicated that the majority of the site has very poor grass cover. It is expected however, to bring about a minor increase in volume of runoff due to reduced infiltration opportunity and an increased nett peak discharge from the site.

Based on site observations and taking into consideration the site's previous use as a landfill, the potential of infiltration into the subsoil layer has been assessed as limited and restricted. Any infiltration into an ex-landfill site is to be minimised to reduce the risk of undermining the protective clay capping and to avoid contamination of receiving water bodies due to increased leachate.

5.5.4. Limited stormwater quantity and quality options

In addition to reducing infiltration, the presence of the clay capping places constraints on the selection of stormwater conveyance systems and available Water Sensitive Urban Design (WSUD) measures. Initial discussions with Logan City Council have indicated that certain WSUD measures may not be suitable, such as gross pollutant traps which require deep excavations have not been considered at this level of application. The site's ability to support these measures may be reconsidered once the final geotechnical report has been finalised.

Standard stormwater drainage systems utilising pits/chambers and pipes increase the risk of excavating beyond the clay cover into the landfill material underneath. As such, consideration has to be given to alternative options which have smaller depth footprints such as shallow vegetated swales. Alternatively, other options such as slot or grated channel drains may be considered in more detail as part of the Operational Works phase design.

5.5.5. Modification to existing drainage patterns

Inspections of the site have identified approximately half of Kingston Road along the site's western boundary as a contributing upstream catchment with associated runoff discharging as overland flow through the site. This section of Kingston Road is not kerbed and should be anticipated to remain that way during the construction and completion of the Logan Greyhound Facility.

The internal parking areas and roads will modify the existing overland flow path from Kingston Road. The configuration of the internal roads and carparks will be designed to promote the general flow direction is maintained as much as possible. The developed site will be self draining and all areas will be designed using a minimum crossfall of 1 in 100.

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The stormwater infrastructure works to be carried out for the assessable development will be in compliance with the standards for stormwater infrastructure specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work) 2006*.

Refer to **Figure A4 – Developed Topography and Drainage Patterns** for additional information.

5.6. Water Quantity

5.6.1. Proposed strategy

The adopted strategy was to attenuate any increase of development discharge with detention basins up to and including Q100 storm events in accordance with the *Queensland Urban Drainage Manual* (2007). Additional water storage strategies for reuse will be considered in more detail as part of the Operational Works phase.

5.6.2. Proposed Methodology

The methodology adopted to analyse the magnitude of increase in discharge from the existing and developed catchment within RAFTS was by comparing the peak discharge flow rates for each design storm event including Q1, Q2, Q5, Q10, Q20, Q50 and Q100.

The results from RAFTS were then validated against the estimated peak discharge flows from the Rational Method based on the *Queensland Urban Drainage Manual* (2007).

5.6.3. RAFTS modelling

The RAFTS model was set up by dividing the site into sub-catchments based on drainage patterns and areas strategic for comparison. Typical RAFTS model schematic consists of nodes which represent the sub-catchments' outlets and links that connects the nodes to the respective downstream sub-catchment nodes.

As described in **section 2.2**, there are three discharge locations from the site and these have been represented by the following nodes in the RAFTS modelling:

- node 'East Chamber';
- node 'Cronulla Court'; and
- node 'Compton Road'.

5.6.4. Modelling scenarios

Three RAFTS modelling scenarios were investigated:

- **Existing** – for current undeveloped conditions. The results from this model provides the comparison basis for the attenuation strategy;
- **Developed (without detention)** – for the developed Logan Greyhound Facility but without stormwater detention. The results the quantify peak discharge runoff increase against existing conditions;
- **Developed (with detention)** – for the developed Logan Greyhound Facility but incorporating stormwater detention. The results from this model show the improved peak discharge runoff against existing conditions by the use of detention basins, which demonstrates no nett increase of peak discharge as a result of development at the three discharge locations.

The RAFTS schematics for both existing and developed scenarios are shown in **Figure B1 – Existing Catchments & RAFTS Schematic** and **Figure B2 – Developed Catchments & RAFTS Schematic**.

5.6.5. Modelling parameters

5.6.5.1. RAFTS global setup

RAFTS calculates the design storm events using the *Australian Rainfall and Runoff*, 1987 (AR&R) method. For this report, it was therefore necessary to input the applicable temporal pattern zone, geographic location, Average Recurrence Interval (ARI) and duration of the storm events. Standard temporal patterns for Zone 3 apply to the catchment. As such, skew locations, F2 and F50 coefficients required to setup RAFTS were estimated from relevant charts in Volume 2 of the AR&R. These are tabulated below:

Table 5.6.1 – Global RAFTS settings

Description	Value
F2 geographic factor	4.4
F50 geographic factor	17.25
Location skew	0.125
Temporal pattern zone	3

Design flows were calculated for the Q1, Q2, Q5, Q10, Q20, Q50 and Q100 storm events. Storms with rainfall durations of 10, 15, 20, 25, 30, 45, 60, 90 and 120 minutes were generated to establish the critical storm duration.

The distribution of rainfall over the catchment was considered constant due to the relatively small size of the catchment. The rainfall intensities derived from Intensity-Frequency-Duration curves were calculated at the centroid of the catchment, and therefore adopted as being applied across the whole catchment.

The RAFTS model was used to generate theoretical inflow hydrographs for each of the modelling scenarios.

The required Intensity Frequency Duration (IFD) values were calculated with reference recommended coefficients in Table 2.9.1B in Logan City Council's *Planning Scheme Policy no. 5*.

5.6.5.2. Sub-catchment parameters

The following parameters were assigned to represent the properties that effect rainfall excess during storm events for each sub-catchment:

Rainfall losses

An initial and continuing loss rate approach to estimate excess rainfall from the catchment was used. These losses are used to predict the runoff volume generated from the catchment in response to rainfall and include two components:

- Initial loss – a loss (mm) accounting for infiltration effects that is deducted from rainfall prior to the occurrence of surface runoff to pervious areas; and
- Continuing loss – a constant loss rate (mm/h) that is deducted from the rainfall over the duration of the storm to pervious areas.

These values were assigned to the pervious portion of the sub-catchments. Zero losses were applied to the impervious portion of the sub-catchments. The loss rates are shown below:

Table 5.6.2 – Initial & continuing loss rates for pervious areas

Storm Event (years)	Initial Loss (mm)	Continuing Loss (mm)
100	0	2.5
50	3	2.5
20/10	5	2.5
5/2/1	10	2.5

Source: Australian Rainfall & Runoff: A Guide to Flood Estimation Vol. 1
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Percentage impervious

RAFTS allows a split catchment option for sub-catchments with different land use types. These are broadly classified as pervious and impervious surfaces. For this analysis, the first sub-catchment portion was set to represent the impervious area of the catchment and the second, the pervious catchment area. Assigning sub catchment percentages was determined from the Logan Greyhound Facility design layout in **Figure B2 – Developed Catchments & RAFTS Schematic**.

Surface roughness

Surface roughness is an empirical factor based on the average Manning's 'n' of the catchment surface. The weighted average for each sub-catchment for the existing situation was assessed by review of aerial photographs and a ground truth site inspection. Assumed values were assigned for each land use type in both existing and developed models with the typical Manning's values used in the RAFTS model as illustrated in **Table 5.6.3** below.

Table 5.6.3 – Typical land use surface roughness factors

Land Use Description	Manning's 'n' Roughness Factor	
	Impervious Areas	Pervious Areas
Poorly grassed areas	-	0.030
Bare compacted earth	-	0.025
Race Track (compacted sand)	-	0.025
Roof Concourse areas	0.012	-
Concrete / smooth Surface	0.013	-
Asphalt / roadways	0.015	-

Source: Road Drainage Design Manual (2002) Queensland Department of Main Roads, Table 4.5

Vectored slope

The vectored slope for the pervious and impervious areas of each sub-catchment was determined by estimating the average slope across the catchment surface.

The input parameters used in RAFTS for all the modelling scenarios are tabulated in **Appendix B – RAFTS Model Data**.

5.6.6. External catchments

As described in **section 2.2**, several culverts discharge flows from external catchments into the open channel drain flowing north east. As the open channel drain will not be modified by the proposed development, it was assumed that these external catchments have a neutral impact on the development itself for the purposes of RAFTS modelling. They were not included in the result

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comparisons in **section 5.6.9** in this report but are discussed separately under **sections 5.6.11** and **5.6.12**

5.6.7. Detention basin

The adopted attenuation strategy to attenuate post-developed peak discharge flows was by introduction of a detention basin. A dry detention basin does not store water once a rainfall event passes and as such, minimises the risk of infiltration potential into the clay capping layer.

Review of the developed layout has identified the most suitable location for a detention basin is at the south-western part of the site where the clay capping depth is understood to be thickest. The preliminary basin dimensions were estimated to be approximately rectangular in shape with 0.7m storage depth and maximum 1:4 side batters. The estimated required storage volume for a Q100 event was estimated to be 700m³. The exact plan configuration, storage depth and suitable impermeable lining material to further protect the clay capping layer, will be investigated in the Operational Works phase.

The configuration of the basin and outlet levels was modelled to achieve the required storage volume and flow attenuation. The preliminary outlet configuration consists of a low flow pipe modelled as a culvert and a high-level spillway modelled as a broad-crested weir using CulvertW software.

Refer to **Appendix B – RAFTS Model Data** for additional information on the basin storage and outlet characteristics.

5.6.8. Critical storm duration

The RAFTS model results were reviewed for each of the storm durations and storm events to identify the critical storm durations. The critical storm provides the highest peak discharge. The critical storm durations for the site range from 25, 60 to 90 minutes for the existing and developed scenarios. The results in the following section refer to the critical storm durations for particular storm events.

A summary of the critical storm durations are on the cover of **Appendix B – RAFTS Model Data**.

5.6.9. Peak Discharge Comparison

The RAFTS peak discharge results for the critical storm durations at each of the three outlets are shown in the following tables:

Table 5.6.4 – RAFTS Peak Discharge Comparison at node ‘East Chamber’

Return Period ARI (years)	EAST HEADWALL				
	Pre-Developed (m ³ /s)	WITHOUT Basin (m ³ /s)	% Variance	WITH Basin (m ³ /s)	% Variance
1	0.817	0.963	+17.9%	0.749	-8.3%
2	1.215	1.438	+18.4%	1.156	-4.9%
5	1.782	2.021	+13.4%	1.620	-9.1%
10	2.314	2.564	+10.8%	2.074	-10.4%
20	2.791	3.098	+11.0%	2.605	-6.7%
50	3.355	3.713	+10.6%	3.292	-1.9%
100	3.921	4.322	+10.2%	3.921	0.0%

As shown in Table 5.6.4, the peak discharge as a result of development is higher than the existing scenario for all storm events up to and including the Q100 storm event. With a detention basin, the peak discharge has been attenuated to within existing values as demonstrated.

Table 5.6.5 – RAFTS Peak Discharge Comparison at node ‘Cronulla Court’

Return Period ARI (years)	CRONULLA COURT		
	Existing (m ³ /s)	Developed (m ³ /s)	% Variance
1	0.054	0.039	-27.8%
2	0.083	0.058	-30.1%
5	0.132	0.092	-30.3%
10	0.165	0.124	-24.8%
20	0.197	0.145	-26.4%
50	0.218	0.160	-26.6%
100	0.248	0.182	-26.6%

The results in Table 5.6.5 demonstrate that there is no nett increase of peak discharge of the developed scenario against existing conditions for all storm events up to and including a Q100 storm for discharge towards Cronulla Court. The reduction is due to the reconfiguration of the existing catchments in the developed scenario which resulted in a smaller contributing catchment area.

Table 5.6.6 – RAFTS Peak Discharge Comparison at node ‘Compton Road’

Return Period ARI (years)	COMPTON ROAD		
	Existing (m ³ /s)	Developed (m ³ /s)	% Variance
1	0.202	0.190	-5.9%
2	0.297	0.263	-11.4%
5	0.423	0.357	-15.6%
10	0.546	0.440	-19.4%
20	0.666	0.521	-21.8%
50	0.789	0.600	-23.9%
100	0.916	0.708	-22.7%

The results in Table 5.6.6 demonstrate that there is no nett increase of peak discharge of the developed scenario against existing conditions for all storm events up to and including a Q100 storm for discharge towards Compton Road. The reduction is due to the reconfiguration of the existing catchments in the developed scenario which resulted in a smaller contributing catchment area.

5.6.10. RAFTS model validation – against Rational Method

To validate the RAFTS modelling results, peak discharge at the largest subcatchment which discharges into the headwall outlet were estimated using the Rational Method. Several parameters are required to represent each of the properties that effect rainfall excess during a storm event and these are described below.

5.6.10.1. Rational Method Parameters

To simulate the runoff characteristics of the catchment, several parameters are assigned to represent each of the properties that effect rainfall excess during a storm event. These parameters were determined for each sub-catchment and then incorporated into the Rational Method model.

Fraction impervious, f_i

The development site consists of a main facility building with associated support structures and road infrastructure including the race tracks. An average fraction impervious ratio was estimated based on requirements in the *Queensland Urban Drainage Manual* (2007) or QUDM (2007).

Coefficient of Runoff

The coefficient of runoff is determined by application of the estimated Fraction Impervious, 60min duration 10-year ARI rainfall intensity, 10-year ARI Coefficient of Runoff and the Frequency Factor for each respective ARI event as referenced from Section 4, QUDM (2007).

The fraction impervious for the development site was determined from aerial photographs, proposed development plan and site inspections.

Rainfall Intensity

The rainfall intensities adopted for the development has been based on Table 2.9.1B from Logan City Council's *Policy Number 5: Design and Construction of Work*.

Time of Concentration

The time of concentration for the pre-developed sub-catchments has been estimated by reference to Figure 4.07 for sheet flow and Figure 4.09 of QUDM (2007) for stream flows.

The time in concentration for the developed sub-catchments was estimated by application of remaining overland sheet flow, natural channel and vegetated swale flows as per the figures above.

Refer to **Figure C1 – Rational Method Catchment & Flow Path** under **Appendix C – Rational Method Calculations** for the supporting figures and calculations.

5.6.10.2. Results Comparison of existing scenarios

Table 5.6.7 shows comparison at the node 'East Chamber' as this is the main catchment outlet.

Table 5.6.7 – RAFTS & Rational Method validated at node 'East Chamber'

Return Period (Years)	EXISTING		
	RAFTS (m ³ /s)	Rational (m ³ /s)	% Variance (over Rational)
1	0.817	0.859	-4.9%
2	1.215	1.166	+4.2%
5	1.782	1.633	+9.1%
10	2.314	1.934	+19.7%
20	2.791	2.308	+20.9%
50	3.355	2.965	+13.1%
100	3.921	3.431	+14.3%

The comparison results in Table 5.6.7 demonstrate reasonable correlation between results from the RAFTS model and Rational Method. It therefore validates the parameters adopted in the RAFTS model to represent the catchment characteristics under developed conditions.

5.6.11. External catchments

Review of available topographical and Dial-Before-You-Dig information identified two external sub-catchments totalling an approximate size of 14.70 ha which contribute into the open channel. These catchments are well-developed and are composed of mixed use industrial and residential areas.

The external catchment contributes flow into the open channel via the following outlets, as identified from survey and site inspections:

- 2x835mm culvert at the south-west corner (flows from across Kingston Road)
- 1x225mm culvert from industrial lots to the south
- 1x375mm culvert from industrial lots to the south
- 1x1050mm culvert from an industrial lot easement to the south

Refer to **Figure D1** under **Appendix D – Open Channel Calculations** for the catchment extents.

5.6.12. Open channel capacity check

To assess the potential impacts from the Logan Greyhound Facility and to investigate the current discharge characteristic of the existing open channel drain flowing north east along the site, the capacity of the open channel was investigated at three locations:

- Node *PS1*
- Node *PS2*
- Node *PS3*

Estimates of discharge from the external catchments were completed using RAFTS. Additional nodes representing the external catchments were included in the development's RAFTS model and results at critical storm durations obtained for a Q100 storm event. The flows are tabulated in the following page:

Table 5.6.8 – RAFTS Q100 results at PS1, PS2 and PS3

Node	Contributing external catchment size (ha)	RAFTS discharge (External + Development) (m³/s)
PS1	8.860	7.736
PS2	5.840	11.446
PS3	Total of PS1 & PS2	12.869

The cross sections of the open channel at PS1, PS2 and PS3 were determined from survey data and used as inputs for Flowmaster, a software which calculates the flow using Mannings ‘n’ open channel calculations. Appropriate weighted mannings ‘n’ were estimated based on observations during site inspections and aerial photographs for the three locations.

The water elevation and available freeboard are as follows:

Table 5.6.9 – RAFTS results at PS1, PS2 and PS3 for a Q100 storm event

Node	Left channel bank level (m)	Flow water elevation (m)	Right channel bank level (m)	Freeboard to lowest bank (m)
PS1	RL 31.30	RL 30.19	RL 30.80	0.61
PS2	RL 30.00	RL 28.17	RL 29.00	0.83
PS3	RL 28.00	RL 24.62	RL 25.00	0.38

The results above demonstrate that the combined discharge from the development and the external catchments remains within the channel in a Q100 event, with no anticipated overtopping of the open channel banks.

Refer to **Appendix D – Open Channel Calculations** for Flowmaster results and channel section prints.

5.6.13. Inlet chamber at the east

As part of sound engineering practice, a simplified capacity check was carried out at the development’s main final point of discharge at the existing twin 1200mm RCP inlet chamber. The check was completed using CulvertW software. The total Q100 discharge at the chamber was obtained from the RAFTS model used for the open channel.

Table 5.6.8 – RAFTS Q100 results at PS1, PS2 and PS3

Node	RAFTS discharge (External + Development) (m ³ /s)
Chamber	13.278

Due to unavailable detailed drainage information downstream of the twin 1200mm RCPs, conservative estimates were made for the pipes' longitudinal gradients and tailwater levels. A conservative longitudinal gradient of 1 in 500 and a tailwater level at the pipe obvert was selected. Other information such as weir width and levels (at the chamber lip) were estimated from survey data. A sketch of the chamber is included under **Appendix D – Open Channel Calculations**.

The simplified CulvertW analysis indicated the twin 1200mm diameter RCPs convey a part of the estimated Q100 discharge with the balance of flow overtopping the chamber, into the overland flow path easement described in **section 2.2**. The overland flow path easement (identified on Dial-Before-You-Dig information) traverses through the existing factory carpark, which then flows east into Allgas Street before finally discharging into Slacks Creek.

Refer to **Appendix D – Open Channel Calculations** for the RAFTS, Flowmaster results, cross-section results as well as the CulvertW results.

5.6.14. Open channel status

As the open channel conveys flows from external catchments and discharges into stormwater systems which are under Logan City Council jurisdiction, there is opportunity to designate an easement for the existing open channel with access to be provided from the Logan Greyhound Facility internal roads for maintenance by Council.

5.6.15. Downstream information survey

Further to the pre-lodgement discussion with Logan City Council on 12 November 2009, the potential exists for obtaining input from property owners located downstream of this open channel to determine incidences of flooding in the area during the Operational Works phase (such an exercise would however, only provide anecdotal evidence and could not be wholly relied upon).

5.7. Water Quality

5.7.1. Proposed strategy

The adopted strategy to reduce pollutant loadings resulting from the proposed Logan Greyhound Facility was by identifying opportunities for implementation Water Sensitive Urban Design (WSUD) measures within the site.

5.7.2. Proposed methodology

The adopted methodology was to review the development layout and taking into consideration site constraints to identify suitable types of WSUD measures and their locations within the development. The performance of the selected WSUD measures was then analysed in MUSIC v3 utilising a treatment train approach and in accordance with Best Management Practices (BMP). The results were then reviewed against Logan City Council's stormwater quality load reduction objectives, described under **section 5.7.4** below.

5.7.3. Pollutants of concern

There are a range of pollutants that may be generated by a characteristic outdoor recreational development but the key pollutants that were targeted, in line with Logan City Council's stormwater quality load reduction objectives are:

- sediment (coarse and fine suspended solids, TSS);
- nutrients (phosphorus, TP and nitrogen, TN); and
- litter (gross pollutants).

5.7.4. Stormwater quality load reduction objectives

By reference to Logan City Council's *Stormwater Quality Conceptual Design Guidelines*, the Logan Greyhound Facility is classified as a 'high-risk' development due to the estimated impermeable surface area being in excess of 2000 square metres (m²).

The guidelines also specify the stormwater quality load reduction objectives in the table in the following page:

Table 5.7.1 – Stormwater quality load reduction objectives

Pollutant	Target
Total Suspended Sediment (TSS)	80%
Total Phosphorous (TP)	55%
Total Nitrogen (TN)	45%
Litter (5mm or greater)	90%

Source: *Stormwater Quality Conceptual Design Guidelines*, Logan City Council, Section 3

5.7.5. Existing conditions

Site inspections and survey information did not identify existing WSUD measures in place within the site.

5.7.6. Model for Urban Stormwater Improvement Conceptualisation (MUSIC)

To demonstrate the effectiveness of proposed WSUD measures, a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model was set-up to estimate pollutant loadings for the post-developed scenario and to simulate the performance of the proposed best management practices using a treatment train approach. MUSIC version 3 was used in the analysis.

To simulate rainfall, evaporation, land use characteristics, pollutant generation and WSUD measure performance, the MUSIC model was set-up using recommended parameters referenced in Brisbane City Council's *Guidelines for Pollutant Export Modelling in Brisbane Version 7 – Draft* (2003) and Healthy Waterway's *MUSIC Modelling Guidelines for South East Queensland – Draft 01* (Dec 2009).

The following input parameters were assessed and assigned for the specific development and treatment strategy.

5.7.6.1. Meteorological data – rainfall data set

Logan City Council's *Stormwater Quality Conceptual Design Guidelines* specifies that the appropriate meteorological template for MUSIC simulation in Logan City is similar to Brisbane, with continuous rainfall data for 10 years (from 1980 to 1990) at a six-minute time step.

5.7.6.2. Source nodes

Review of the development layout has identified two source nodes types; 'Commercial' and 'Rural Residential'. The source node types were selected after reference to Brisbane City Council's *Guidelines for Pollutant Export Modelling in Brisbane Version 7 – Draft* (2003). 'Commercial' nodes represent catchments with high impervious areas while 'Rural Residential' nodes represent open spaces or existing undeveloped areas.

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Where appropriate, land use within suitable sub-catchments in MUSIC were further sub-divided into roof, road and ground land use types to more accurately represent the development. For these locations, pollutant export parameters were updated in accordance with recommended values in the *MUSIC Modelling Guidelines for South East Queensland – Draft 01* (Dec 2009).

Refer to **Appendix E – MUSIC Model Data** for input details.

5.7.6.3. Soil characteristics

The soil properties of the source nodes were modelled in MUSIC by reference to Table 2.3 in Brisbane City Council's *Guidelines for Pollutant Export Modelling in Brisbane Version 7 – Draft* (2003) based on land use types.

5.7.6.4. Link routing

For the purposes of modelling, link routing was not adopted due to the relatively short distances across the site.

5.7.7. Water Sensitive Urban Design (WSUD) measures

As described in Table 5.7.1, the treatment train approach incorporating Best Management Practices was considered with the following potential WSUD measures.

5.7.7.1. Vegetated / grassed swales

The development layout with consideration to site conditions was assessed to identify suitable locations for swales.

Based on the site's past use as a managed landfill, it was considered that shallow vegetated swales would be the most appropriate system for implementation and will be the primary form of drainage capture and conveyance mechanism for the development. Shallow swales do not require extensive excavation and therefore this associated feature minimises risk of excavating beyond the landfill's protective clay capping. Suitability of proposed swale location however, will require confirmation based on geotechnical findings and advice as part of the Operational Works phase.

Swales also have potential to provide pollutant load reduction benefits. Where swales need to cross a road, cross-drainage culverts will be provided and designed for in the Operational Works phase.

5.7.7.2. Rainwater tanks

The main building in the Logan Greyhound Facility will have a roof rainwater harvesting strategy using rainwater tanks. The tanks are anticipated to be proprietary tanks located above ground and external to the building.

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Roof runoff is considered to be relatively clean water which is suitable for collection, storage and reuse for irrigation or non-potable water purposes. Roofwater harvesting also has the potential to reduce demands on the external potable water supply network and to reduce short duration peak stormwater discharge.

5.7.7.3. Bioretention basins / trenches

Review of the development layout identified several locations where bioretention could be implemented. Bioretention are particularly effective in the removal of nutrients from stormwater runoff. Suitability of the proposed bioretention locations however, will require confirmation based on geotechnical findings and advice as part of the Operational Works phase.

It is expected that the proposed bioretention areas would require an impermeable barrier such as a suitable HDPE liner around the filter media to minimise risk of infiltration beyond the protective clay capping, this is due to extended detention times typical to such WSUD measures.

5.7.7.4. Gross pollutant traps

Gross pollutant traps are particularly effective at pollutant load reduction of coarse and fine sediment, debris and gross litter. Commercially available proprietary devices are often the device of choice. Gross pollutant traps (GPT) however, were not considered in this assessment as these devices often have large depth footprints exceeding 1.0m which may increase risk of excavating beyond the protective clay capping layer.

There is opportunity however, to reassess the suitability of gross pollutant traps if required, during the development's Operational Works phase.

5.7.7.5. Buffer strips

The layout of the site was investigated to identify opportunities where runoff can be maintained as sheet flow and discharged through areas of well-grassed areas to further remove pollutants. Buffer strips are typically grassed areas placed between impervious areas such as car parks and a WSUD stormwater conveyance system such as swales or open channels, sometimes referred to as treatment gardens.

5.7.8. MUSIC treatment node summary

The following is a brief summary of the treatment nodes modelled in MUSIC. The location of these measures are shown in **Figure E1- Waster Sensitive Urban Design Measures (Layout)**, the MUSIC schematic in **Figure E2 – MUSIC Model Schematic** and the MUSIC inputs in **Figure E3 – MUSIC Model Inputs – Screenshots of Input Data**.

5.7.8.1. Vegetated / grassed swales

Swales were modelled in MUSIC as trapezoidal with typical 0.5% longitudinal gradient, 1.2m wide base and 1 in 4 side batters.

The existing open channel along the boundary was modelled as multiple lengths of swale which reflect the various vegetation condition of the open channel along its north east flow path.

5.7.8.2. Detention basins

The detention basin was modelled as a pond without an extended detention volume in MUSIC at the south-western part of the site.

5.7.8.3. Bioretention basins / trenches

Bioretention basins were modelled at three locations, one in the centre of the set-down turnaround area near the main building and the remaining two at the eastern end of both inner and outer tracks.

The finished levels at the eastern ends of the tracks are anticipated to be above existing ground levels on embankments which have potential to encourage ponding of stormwater runoff. As such, there is opportunity to implement a solution which not only discourage ground infiltration through the use of liners but also treat the runoff through bioretention filters at these locations.

A small bioretention trench was modelled at the downstream end of the swale capturing runoff from the main access road from Kingston Road. The trench discharges into the proposed detention basin nearby.

5.7.8.4. Rainwater tanks

A rainwater tank with an estimated storage of 15kL was included in the MUSIC model. No reuse was adopted for the purpose of this analysis. The parameters of the tank including reuse values will be defined with the hydraulic designers of the building as part of the Operational Works phase.

5.7.9. Maintenance of WSUD measures

Where WSUD measures require periodical maintenance, appropriate maintenance plans will be included in the Operational Works phase.

5.7.10. MUSIC model analysis and results

The MUSIC model was set-up by initially subdividing the site into sub-catchments which discharge into WSUD treatment measures using a treatment train approach. Appropriate parameters were then set for each source and treatment node with a total site receiving node added downstream

of the development to represent the combined total site pollutant reduction performance. The site receiving node does not represent the physical site characteristics and is only used for information.

5.7.10.1. MUSIC model results

The MUSIC results are shown in the table below:

Table 5.7.2 – Pollutant reduction performance

Pollutant	Target (%)	MUSIC Results (%)
Total Suspended Sediment (TSS)	80%	90.0%
Total Phosphorous (TP)	55%	74.4%
Total Nitrogen (TN)	45%	46.9%
Litter (5mm or greater)	90%	100.0%

As shown in Table 5.7.2, the strategy of implementing WSUD measures using a treatment train approach and utilising Best Management Practices has reduced the anticipated load of pollutants generated by the Logan Greyhound Facility to within acceptable WSUD standards.

The MUSIC model output results are shown in **Figure E4 – MUSIC Model Results**.

5.7.11. Erosion and Sedimentation Management

The management of erosion and sedimentation primarily throughout the construction phase is an integral component of the pollutant reduction strategy to maintain water quality. It is recognised that the highest load of erosion and hence suspended solids in the runoff occurs during the construction phase.

The proposed detention basin will be partially constructed and utilised as a temporary sediment basin during the construction phase (as part of the early bulk earthworks) for the majority of the vehicular park and internal road works.

The remainder of the construction works such as the tracks, building will be primarily erosion prevention by ground coverage and minimising sediment transportation via strategically placed sediment fences downstream of the works cut off drains.

The typical arrangement and application of erosion and sedimentation management measures proposed for the development site are shown on **Figure E5 – Erosion and Sediment Control** with typical erosion sediment control notes and details under **Figures E6 and E7**.

5.7.11.1. Construction implementation

To mitigate the potential of Water Sensitive Urban Design (WSUD) measures being compromised during construction and to ensure erosion and sediment transport is minimised during construction, the following construction implementation program is proposed:

- Erosion and sedimentation control – to be implemented prior to commencement of bulk earthworks. Continuous monitoring until the development site is established and stabilised are required. Sediment basins are to be provided where proposed detention basins are not present. Sediment fences are to be installed along development site boundaries or at strategic locations;
- Sedimentation basins – all onsite stormwater runoff is to be diverted towards the detention basins as directed via cut-off drains with rock check dams to dissipate energy which reduces velocity and allows enhanced conditions for sediment to settle. These are to be completed prior to commencement of any works upstream;
- Vegetated swales – the proposed vegetated swales are to be completed following completion of the civil construction phase;
- Street sweeping – street sweeping of the road and car park surfaces is to occur following the completion of the building construction phase.

6. Sewerage Reticulation

The sewage reticulation infrastructure works to be carried out for the assessable development will be in compliance with the standards for sewerage reticulation infrastructure specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work) 2006*.

6.1. Demand

The sewage loads expected to be generated by the proposed Logan Greyhound Facility are primarily effluents from bathroom facilities and a kitchen. Also included is the runoff generated by the cleaning of dog holding pens contained within the main facility building.

For the purposes of estimating an approximate discharge, a typical sewage demand rate of 30 equivalent persons per hectare (EP/ha) has been used. The rate was selected after considering Brisbane City Council's typical demand rate for a sporting facility such as a stadium in the Brisbane City Council area. Brisbane City Council's conversion factor table for sewerage is attached under **Appendix F – Services Demand Calculations**.

The sewerage demand has been estimated to be 307.2EP or equivalent to a design flow of 4.44 l/s Peak Wet Weather Flow (PWWF) with Logan City Council's PWWF conversion of 1250L/EP/day.

6.2. Connection

The proposed internal hydraulic sewer connection for the development is the existing 225mm diameter trunk sewerage line located to the north of the proposed main facility building. From discussions held with Logan City Council officers at their offices on 25 October 2009, the existing sewerage system in the area has adequate capacity to accommodate the demand from the development. Reference is also made to an email attached under **Appendix F – Services Demand Calculations** advising general connection locations.

Inspections undertaken at the site have noted the inspection chamber lids of the existing 225mm sewerage line to the north at a lower level than proposed development. As such connection into the existing systems is not anticipated to be an issue. The as-constructed information for sewerage will be sourced from Logan City Council as part of the Operational Works phase.

Where the works do affect any nearby manhole or inspection chambers or other service points which are meant to be accessible, the lid levels of these existing service locations will be raised or lowered as required to match the proposed finished level of works.

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The existing layout and connection locations of the sewerage network are shown on **Figure F1 – Water and Sewerage Reticulation and Services Location Plan.**

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7. Water Reticulation

The water reticulation infrastructure works to be carried out for the assessable development will be in compliance with the standards for water reticulation infrastructure specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work) 2006*.

7.1. Demand

The Logan Greyhound Facility building will require water supply for use of the toilets, kitchens and for washing of the holding pen area. It is however expected that water collected in rainwater tanks generated by roof runoff areas will be treated on site as appropriate and used to supplement non-potable water usage for the toilets and washing of kennels. The rainwater tanks will assist in minimising the demand for potable supply from Council water reticulation mains for building use.

In addition to the building, the development will also require water supply for watering of the racing track. The client, Greyhounds Queensland has advised that the anticipated usage for track watering has been estimate to be on average, 120kL/week for the winter season and up to 150kL/week for the summer season. This demand however, may be offset by alternative water storage and reuse facilities to be described in **section 7.3** below.

The development has been assumed to be classified under the Centres Zone as per Table 2.7.1A in Logan City Council's *Policy No. 5 (Design & Construction of Work)* which specifies a demand peaking factor of 2.6 to be used. As such, the peak demand (Max Second) from the development has been estimated to be 3.33L/s or corresponding to 330 EP.

Table 7.1 – Water demand broken into components

Description	Flow (l/s)
Building – 21WC, 6 urinals, 16 basins, 11 sinks (aerated tap), 1 sink (standard tap) , 2 10mm taps	1.03
Track watering – average 150kL/week per year (summer)	0.25
Total	1.28 L/s

The supply of water from Council's water reticulation network has been assumed to be available at least to a minimum standard of service for fire fighting purposes. However, pressure flow tests may be required to confirm the available pressure during the Operational Works phase. The as-constructed information for the existing water supply reticulation network will be sourced from Logan City Council as part of the Operational Works phase.

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Based on the BCA code, the building is classified as a 'Class 6' structure.

Refer to **Appendix F – Services Demand Calculations** for the water demand estimation calculations and background information.

7.2. Connection point

The proposed connection of the water supply is a metered single connection to the existing 150mm diameter water line located near the intersection of Kingston Road and Compton Road. Dial-Before-You-Dig information has noted the potential need to extend the 150mm water reticulation line from the intersection to the main access of the site from Kingston Road. As such, works along Kingston Road may be a required depending on input from Council.

Preliminary discussions held with Logan City Council at their offices on 25 October 2009 have indicated there is adequate capacity and pressure in the existing water supply system to accommodate the demand from the development. Reference is also made to an email attached under **Appendix F** advising general connection locations. The existing water main size, connection points and service sizes will be confirmed during the operational works phase by submission of a Water Connection application to Logan City Council.

The existing layout and connection locations of the water reticulation network are shown on **Figure F1 – Water and Sewerage Reticulation Plan (Indicative)**.

7.3. Rainwater harvesting

To reduce dependence on Council's water supply system, alternative solutions have been investigated and are outlined below:

7.3.1. Rainwater tank(s)

The main building is proposed to have a roof rainwater harvesting tank which can provide a temporary supply of non-potable water for toilet use or localised landscaping irrigation. Other buildings such as the kennel block could also have a similar arrangement for localised general kennel cleaning and other non-potable use.

7.3.2. Non-potable water supply arrangement

One potential option to reduce use of Council water supply for track watering is to source water from external suppliers. The supplier may come in the form of a neighbouring business which is already generating excess water as a by-product of their daily operations.

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Investigations undertaken found that a similar feasibility study on this option was commissioned by another greyhound racing facility in Victoria, the Meadows Greyhound Racing Club to potentially reuse the excess water generated by a neighbouring Salad Fresh factory. The study's key findings are:

- the source supplier must be able to provide a stable and sufficient amount of excess water to meet demand at the recipient facility in order to provide a beneficial offset against using Council water supply; and
- the water from the source must meet required treatment criteria before it can be used for track watering, which may require additional set up costs for treatment etc.

In addition to potential capital costs for treatment, other associated outlay may include capital cost of piped or conveyance system, storage tanks and cost associated with operation and maintenance of the above system. The Meadows Greyhound/Salad Fresh study concluded with a cost analysis which found the estimated total cost of setting up the system (with treatment included) would initially be much higher than sourcing water from Council supply. Agreements on cost sharing, maintenance, responsibilities will also be required between the relevant parties.

A discussion was held with the Meadows GRC's general manager to canvass their experience on the above study. From the discussion, the option above was received positively but the anticipated high initial capital cost and uncertainty of a long-term water supply resulted in the option not being progressed beyond the study phase.

The purpose of referencing the Meadows Greyhound/Salad Fresh study is that of Greyhound Queensland Limited's intent to investigate similar ventures and the commitment to incorporate a sustainable ethic in their operations in so far as track watering is concerned. Notwithstanding that opportunities are limited, further investigations will continue to the Operational Works phase of the development.

7.3.3. Runoff from racing tracks

There is potential for a system to capture and store stormwater runoff from the surface of the race tracks in the development. The proposed perimeter swales around the inner face of the two tracks could be utilised to convey captured stormwater runoff into collection points, which can either be fed via gravity or pumped into dedicated storage tanks.

The Meadows GRC uses a similar method to capture stormwater runoff and from the discussion with the management, the captured runoff is currently reused directly without treatment. They have

noted however, that the quality of the captured runoff is poor as a result and would have implemented a treatment/filter system if given the opportunity to do so.

There is also possibility of placing storage tanks underneath parts of the race tracks in particular the eastern bends of the tracks where the track surface is situated on fill earthworks. Further investigation will be required to also determine whether percolation through the track surface is a feasible option (which is a compacted sand-like material) in the Operational Works design phase.

7.3.4. Bore / groundwater supply

The option of using water from underground bores could be considered but consideration has to be taken on the site's past use as a managed landfill. Additional studies are likely to be required to determine groundwater characteristics and suitability of the groundwater supply for use however, this option would seem unlikely at this stage.

8. Other Services

The proposed development is located within a relatively well developed area with current availability for utility services. It is proposed that the development site will be serviced from the existing electrical and telecommunications infrastructure with connections directly adjacent. The development is not anticipated to affect any existing services. Where it does, appropriate management measure to protect or divert the affected service will be undertaken with input from Logan City Council.

The infrastructure works to be carried out for the assessable development will be in compliance with the standards for services specified in Logan City Council's *Planning Scheme Policy No. 5 (Design and construction of work)* 2006.

8.1. Electricity

Dial-Before-You-Dig enquiries have indicated the presence of electrical supply cables near the intersection of Kingston and Compton Road. Liaison and a service supply agreement with Energex will be required to determine an appropriate supply connection point and the demand required. An electrical engineering consultant will be engaged to facilitate this process during the Operational Works Phase.

8.2. Telecommunications

Dial-Before-You-Dig enquiries have indicated the presence of Telstra communication lines near the intersection of Kingston and Compton Road and at the south of the site along Kingston Road. Liaison and a service supply agreement with Telstra or other communications providers will be required to determine an appropriate supply connection point and the demand required. An electrical / communications engineering consultant will be engaged to facilitate this process during the Operational Works Phase.

8.3. Gas Supply

Dial-Before-You-Dig enquiries have not indicated the presence of gas supply lines near the development site. If gas is required, a specific gas supply agreement will need to be sourced from a nominated supplier.

9. References

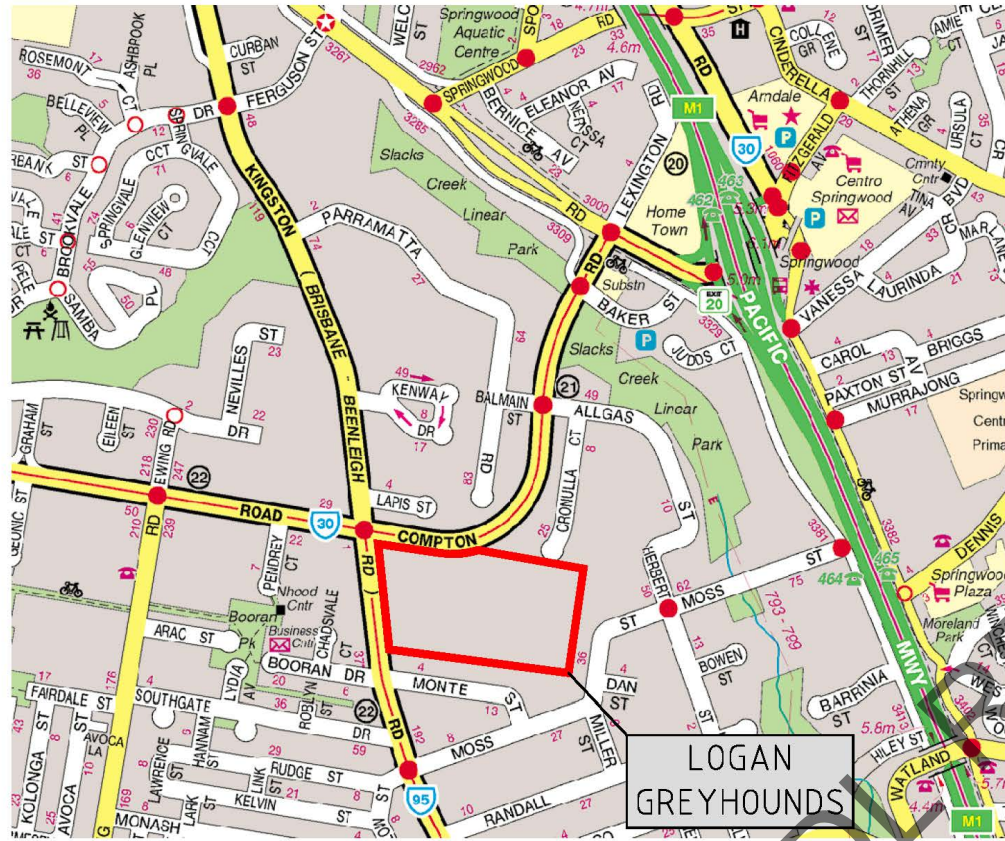
- Logan City Council (2006), Planning Scheme Policies; Policy Number 5 (Design and Construction of Work)
- Logan City Council (2006), Planning Scheme Policies; Policy Number 2 (Development Application for Work)
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- AS2890.1 (2004): Off-Street Parking
- AS3500:1 (2003): Plumbing and Drainage – Water Services
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- Sinclair Knight Merz (July 2009), Cronulla Park Redevelopment (Draft) – Interim Summary Report on Supplementary Site Investigation
- Sinclair Knight Merz (Dec 2009), Logan Greyhound Facility – Traffic Impact Assessment
- Sinclair Knight Merz (Dec 2009), Logan Greyhound Facility – Contaminated Site Investigation

SINCLAIR KNIGHT MERZ

Appendix A Figures

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ



LOGAN GREYHOUNDS
SCALE: NTS

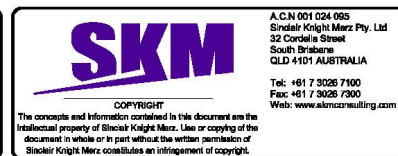
UBD UBD BRISBANE STREET DIRECTORY "MAP
REPRODUCED WITH PERMISSION OF UBD.
COPYRIGHT UNIVERSAL PRESS PTY LTD DG
97/04." MAP - 222 (BRISBANE) GRID - B18



LOGAN GREYHOUNDS
SCALE: NTS

No	DATE	DESIGN REVIEW	REVO P.MGR	APPD P.DIR	AMENDMENT
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REF.	DRAWING NUMBER	REFERENCE DRAWING TITLE



CLIENT: GREYHOUNDS QUEENSLAND			
PROJECT: LOGAN GREYHOUND FACILITY			
DRAWN MA	DRAFTING CHECK HSY	REVIEWED PROJECT MANAGER MH	APPROVED PROJECT DIRECTOR JEE
DESIGNED HSY	DESIGN REVIEW MH		

TITLE: FIGURE A1 SITE LOCATION			
SCALE: SBSMP APPENDIX	PROJECT No: QB10035	DRAWING No: FIGA1	AMDT: A



CRONULLA COURT

COMPTON ROAD

CRONULLA PARK
658
10.24ha
(by title)

ESTIMATED 2 x Ø1200
RCP OUTLET CHAMBER

BREAD
FACTORY

GP
GTP550

31
RPI29974

30
RPI29974

29
RPI29974

28
RPI29974

27
RPI29974

26
RPI29974

INDUSTRIAL LOTS

INDUSTRIAL LOTS

LEGEND

- EXISTING PARK RP BOUNDARY
- OPEN CHANNEL FLOW PATH
- DRAINAGE FLOW DIRECTION
- LANDFILL MONITORING STATION
- THICK TALL GRASSED AREA WITH SMALL TREES
- 2 x Ø825mm RCP HEADWALL CONVEYING FLOWS FROM EXTERNAL CATCHMENT ACROSS KINGSTON ROAD

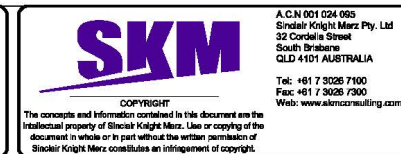
SCALE 1:750 (A1)
10864.2

FIGURE A2
EXISTING TOPOGRAPHY
AND DRAINAGE PATTERNS

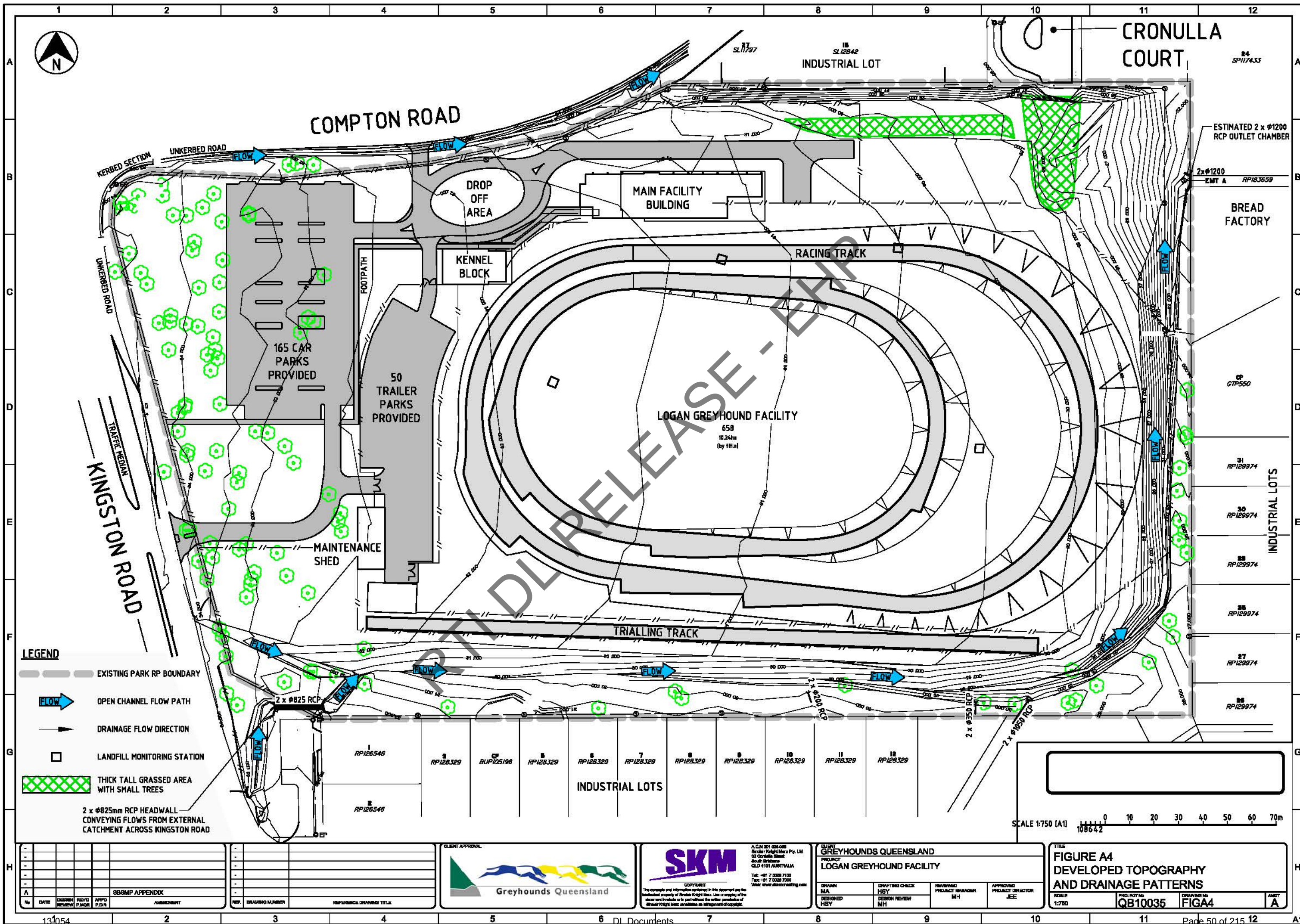
SCALE 1:750 PROJECT No QB10035 DRAWING No FIGA2 AMT A

No	DATE	DESIGN REVIEW	REV'D PMGR	APP'D PDJR	AMENDMENT
A					

REF.	DRAWING NUMBER	REFERENCE DRAWING TITLE
3		



CLIENT: GREYHOUNDS QUEENSLAND			
PROJECT: LOGAN GREYHOUND FACILITY			
DRAWN: MA	DRAFTING CHECK: HSY	REVIEWED: PROJECT MANAGER MH	APPROVED: PROJECT DIRECTOR JEE
DESIGNED: HSY	DESIGN REVIEW: MH		



- LEGEND**
- EXISTING PARK RP BOUNDARY
 - OPEN CHANNEL FLOW PATH
 - DRAINAGE FLOW DIRECTION
 - LANDFILL MONITORING STATION
 - THICK TALL GRASSED AREA WITH SMALL TREES
 - 2 x Ø825mm RCP HEADWALL CONVEYING FLOWS FROM EXTERNAL CATCHMENT ACROSS KINGSTON ROAD

No	DATE	DESIGNER	CHECKED	APPROVED	REVISED	REVISION
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CLIENT APPROVAL

Greyhounds Queensland

SKM

CONSULTANTS

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PROJECT: GREYHOUNDS QUEENSLAND

LOGAN GREYHOUND FACILITY

DESIGNED: HSY

CHECKED: HSY

REVIEWED: HSY

APPROVED: HSY

FIGURE A4
DEVELOPED TOPOGRAPHY
AND DRAINAGE PATTERNS

SCALE: 1:750

PROJECT NO: QB10035

DRAWING NO: FIGA4

ASSET: A

Project No.

File

SHEET No.

OF

PREPARED BY

DATE 18 02 20

CHECKED BY _____

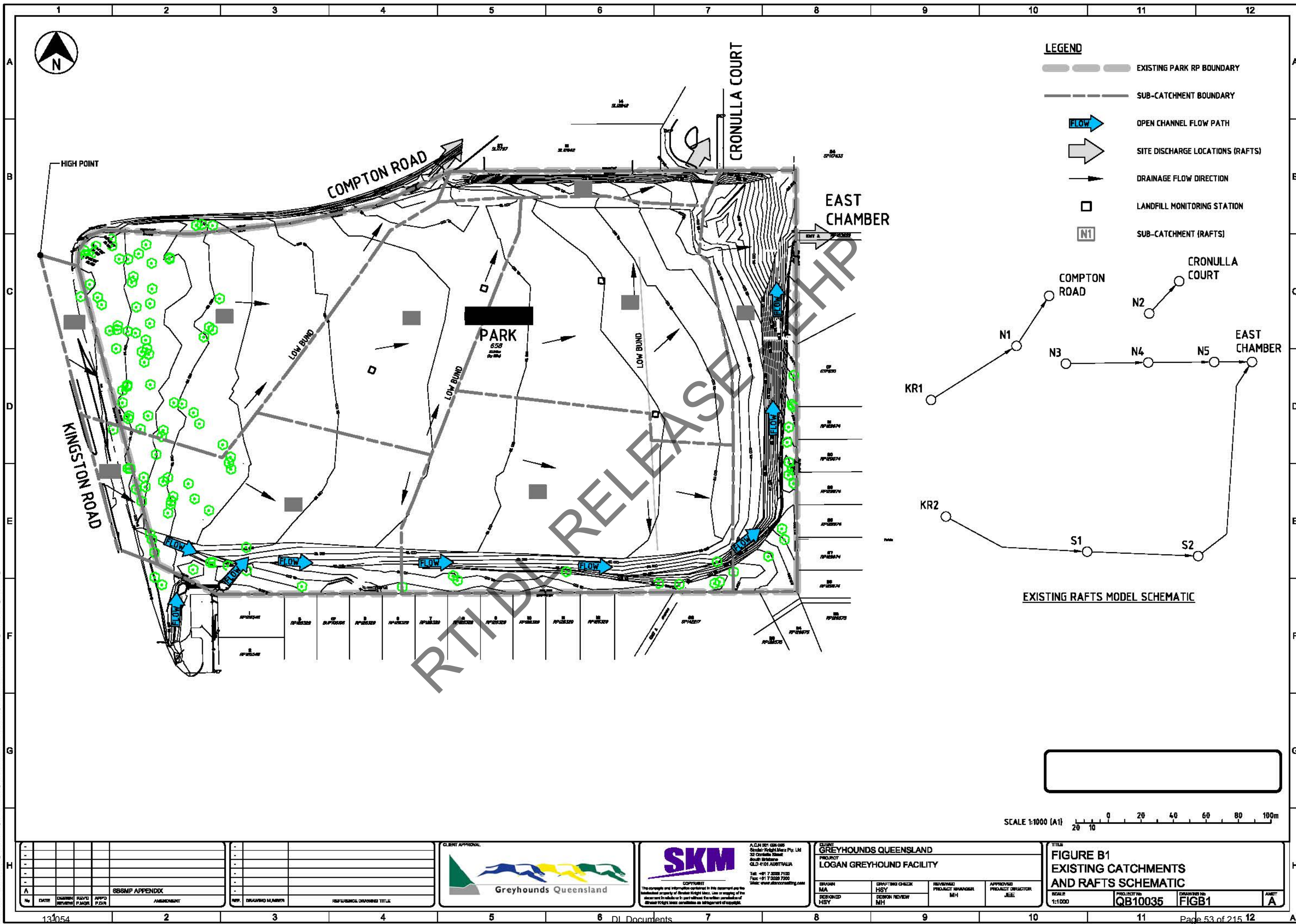
DATE 19 02 2011

[illegible]

Appendix B RAFTS Model Data

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ



[illegible][illegible][illegible]

Sub-Catchment	Area (ha)	% Imp	Imp Area (ha)	Imp Slope (%)	Imp 'n'	Perv Area (ha)	Perv Slope (%)	Perv 'n'	LAG * (mins)
PN1	0.147	0.0%	0.000	0.00%	0.000	0.147	2.30%	0.033	0.0
PN2	0.268	0.0%	0.000	0.00%	0.000	0.268	3.50%	0.033	0.0
PN4	1.082	33.1%	0.358	5.00%	0.013	0.724	1.50%	0.033	0.5
PN5	0.751	0.0%	0.000	0.00%	0.000	0.751	10.10%	0.033	0.0
P1	0.263	0.0%	0.000	0.00%	0.000	0.263	2.00%	0.040	3.0
P2	0.659	78.1%	0.515	2.20%	0.015	0.144	2.00%	0.033	0.0
KR1	0.280	81.5%	0.228	3.00%	0.015	0.052	3.00%	0.033	0.5
P3	0.588	38.6%	0.227	2.00%	0.015	0.361	1.70%	0.040	2.0
KR2	0.124	79.4%	0.098	3.00%	0.015	0.026	3.50%	0.033	2.8
PS1	0.817	0.0%	0.000	3.00%	0.014	0.817	2.00%	0.036	3.0
PS2	1.031	0.0%	0.000	0.00%	0.000	1.031	1.90%	0.033	1.4
T1	1.801	5.0%	0.090	0.50%	0.013	1.711	1.00%	0.033	0.0
T2	1.502	5.0%	0.075	0.50%	0.013	1.427	1.00%	0.033	0.0
PS3	0.474	0.0%	0.000	0.00%	0.000	0.474	5.00%	0.036	1.5
P4	0.885	46.3%	0.410	3.00%	0.015	0.475	1.30%	0.034	0.0
Total	10.672		2.001			8.671			

* - Through downstream catchment

RAFTS RESULTS

EXISTING

'East Chamber'

Existing_Q5.90_Q2.90_Q1.90.txt
Run started at: 3rd December 2009 12:38:10

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1375
ESTIMATED PEAK FLOW (CUMECS) = 0.78E-01
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK S1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.290
ESTIMATED PEAK FLOW (CUMECS) = 0.50
ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK S2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.577
ESTIMATED PEAK FLOW (CUMECS) = 0.94
ESTIMATED TIME TO PEAK (MINS) = 43.00

LINK N3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6338
ESTIMATED PEAK FLOW (CUMECS) = 0.25
ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK N4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.581
ESTIMATED PEAK FLOW (CUMECS) = 0.62
ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK N5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.223
ESTIMATED PEAK FLOW (CUMECS) = 0.91
ESTIMATED TIME TO PEAK (MINS) = 40.00

Existing_Q5.90_Q2.90_Q1.90.txt
LINK East Cmb 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 4.800
ESTIMATED PEAK FLOW (CUMECS) = 1.8
ESTIMATED TIME TO PEAK (MINS) = 44.00

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 5.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.20
TOTAL OF SECOND SUB-AREAS (ha) = 8.25
TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link	
Label	#1 (ha)	#2	#1 (%)	#2	#1	#2	No.
KR2	0.1500	0.0590	3.000	3.500	100.0	0.000	1.000
S1	0.0470	1.980	1.660	2.000	100.0	0.000	1.001
S2	.00001	2.275	.0010	1.500	100.0	0.000	1.002
N3	.00001	1.123	1.660	1.800	100.0	0.000	2.000
N4	.00001	1.674	.0010	2.200	100.0	0.000	2.001
N5	.00001	1.137	.0010	10.10	100.0	0.000	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	1.003

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link			
Label	Intensity	#1	#2	#1	#2	to	Lag			
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins			
KR2	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.0776	32.00	2.800
S1	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.5007	41.00	3.000
S2	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.9376	43.00	2.900
N3	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.2479	41.00	2.900
N4	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.6177	41.00	.5000
N5	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.9109	40.00	0.000
East Cmb	46.434	0.000	0.000	0.000	0.000	69.650	0.000	1.782	44.00	0.000

LINK KR2 2.000

Existing_Q5.90_Q2.90_Q1.90.txt

ESTIMATED VOLUME (CU METRES*10**3) = 0.1045
 ESTIMATED PEAK FLOW (CUMECS) = 0.60E-01
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK S1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9353
 ESTIMATED PEAK FLOW (CUMECS) = 0.34
 ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK S2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.858
 ESTIMATED PEAK FLOW (CUMECS) = 0.63
 ESTIMATED TIME TO PEAK (MINS) = 46.00

LINK N3 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4546
 ESTIMATED PEAK FLOW (CUMECS) = 0.18
 ESTIMATED TIME TO PEAK (MINS) = 43.00

LINK N4 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.136
 ESTIMATED PEAK FLOW (CUMECS) = 0.44
 ESTIMATED TIME TO PEAK (MINS) = 44.00

LINK N5 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.599
 ESTIMATED PEAK FLOW (CUMECS) = 0.65
 ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK East Cmbr 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.457
 ESTIMATED PEAK FLOW (CUMECS) = 1.2
 ESTIMATED TIME TO PEAK (MINS) = 44.00

 #####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 2.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.20
 TOTAL OF SECOND SUB-AREAS (ha) = 8.25
 TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
KR2	0.1500 0.0590	3.000 3.500	100.0 0.000	.015 .031	.0003 .0037	1.000

Existing_Q5.90_Q2.90_Q1.90.txt

S1	0.0470	1.980	1.660	2.000	100.0	0.000	.018	.031	.0003	.0304	1.001
S2	.00001	2.275	.0010	1.500	100.0	0.000	.025	.031	.0002	.0378	1.002
N3	.00001	1.123	1.660	1.800	100.0	0.000	.020	.033	0.000	.0250	2.000
N4	.00001	1.674	.0010	2.200	100.0	0.000	.025	.030	.0002	.0260	2.001
N5	.00001	1.137	.0010	10.10	100.0	0.000	.025	.035	.0002	.0111	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2 (mm)	Cont. #1 (mm/h)	Loss #2 (mm/h)	Excess #1 (mm)	Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
KR2	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.0600	32.00	2.800
S1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.3362	41.00	3.000
S2	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.6271	46.00	2.900
N3	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.1755	43.00	2.900
N4	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.4412	44.00	.5000
N5	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.6467	41.00	0.000
East Cmbr	35.857	0.000	0.000	0.000	0.000	53.785	0.000	1.215	44.00	0.000

LINK KR2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7926E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.46E-01
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK S1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6698
 ESTIMATED PEAK FLOW (CUMECS) = 0.23
 ESTIMATED TIME TO PEAK (MINS) = 43.00

LINK S2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.317
 ESTIMATED PEAK FLOW (CUMECS) = 0.42
 ESTIMATED TIME TO PEAK (MINS) = 51.00

LINK N3 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3228
 ESTIMATED PEAK FLOW (CUMECS) = 0.12
 ESTIMATED TIME TO PEAK (MINS) = 44.00

LINK N4 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8059
 ESTIMATED PEAK FLOW (CUMECS) = 0.30
 ESTIMATED TIME TO PEAK (MINS) = 46.00

LINK N5 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.132
 ESTIMATED PEAK FLOW (CUMECS) = 0.45

Existing_Q5.90_Q2.90_Q1.90.txt
 ESTIMATED TIME TO PEAK (MINS) = 42.00
 LINK East Cmbr 3.000
 ESTIMATED VOLUME (CU METRES*10**3) = 2.449
 ESTIMATED PEAK FLOW (CUMECS) = 0.82
 ESTIMATED TIME TO PEAK (MINS) = 44.00

 #####
 QB10035 LGF - Existing Q100
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 1.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.20
 TOTAL OF SECOND SUB-AREAS (ha) = 8.25
 TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
KR2	0.1500	0.0590	3.000	3.500	100.0	0.000	.015	.031	.0003	.0037	1.000
S1	0.0470	1.980	1.660	2.000	100.0	0.000	.018	.031	.0003	.0304	1.001
S2	.00001	2.275	.0010	1.500	100.0	0.000	.025	.031	.0002	.0378	1.002
N3	.00001	1.123	1.660	1.800	100.0	0.000	.020	.033	0.000	.0250	2.000
N4	.00001	1.674	.0010	2.200	100.0	0.000	.025	.030	.0002	.0260	2.001
N5	.00001	1.137	.0010	10.10	100.0	0.000	.025	.035	.0002	.0111	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
KR2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.0459	35.00	2.800
S1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2281	43.00	3.000
S2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.4175	51.00	2.900
N3	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.1185	44.00	2.900
N4	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.3033	46.00	.5000
N5	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.4469	42.00	0.000
East Cmbr	27.751	0.000	0.000	0.000	0.000	41.627	0.000	0.8168	44.00	0.000

Existing_Q5.90_Q2.90_Q1.90.txt

Run completed at: 3rd December 2009 12:38:33

mik open 0

RTI DL RELEASE - EHP

Existing_Q20.60 and Q10.60.txt
Run started at: 3rd December 2009 12:26:20

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1589
ESTIMATED PEAK FLOW (CUMECS) = 0.12
ESTIMATED TIME TO PEAK (MINS) = 24.00

LINK S1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.608
ESTIMATED PEAK FLOW (CUMECS) = 0.81
ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK S2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.220
ESTIMATED PEAK FLOW (CUMECS) = 1.5
ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK N3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7995
ESTIMATED PEAK FLOW (CUMECS) = 0.39
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK N4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.993
ESTIMATED PEAK FLOW (CUMECS) = 0.99
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK N5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.799
ESTIMATED PEAK FLOW (CUMECS) = 1.4
ESTIMATED TIME TO PEAK (MINS) = 27.00

Existing_Q20.60 and Q10.60.txt
LINK East Cmb 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 6.019
ESTIMATED PEAK FLOW (CUMECS) = 2.8
ESTIMATED TIME TO PEAK (MINS) = 33.00

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 20.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.20
TOTAL OF SECOND SUB-AREAS (ha) = 8.25
TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
KR2	0.1500 0.0590	3.000 3.500	100.0 0.000	.015 .031	.0003 .0037	1.000
S1	0.0470 1.980	1.660 2.000	100.0 0.000	.018 .031	.0003 .0304	1.001
S2	.00001 2.275	.0010 1.500	100.0 0.000	.025 .031	.0002 .0378	1.002
N3	.00001 1.123	1.660 1.800	100.0 0.000	.020 .033	0.000 .0250	2.000
N4	.00001 1.674	.0010 2.200	100.0 0.000	.025 .030	.0002 .0260	2.001
N5	.00001 1.137	.0010 10.10	100.0 0.000	.025 .035	.0002 .0111	2.002
East Cmb	.00001 0.000	.0010 0.000	0.000 0.000	.025 0.00	.0021 0.000	1.003

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1 #2	#1 #2	#1 #2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins
KR2	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.1224	24.00	2.800
S1	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.8120	28.00	3.000
S2	78.203	0.000 5.000	0.000 2.500	78.203 70.953	1.505	31.00	2.900
N3	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.3862	30.00	2.900
N4	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.9929	30.00	.5000
N5	78.203	0.000 5.000	0.000 2.500	78.203 70.953	1.413	27.00	0.000
East Cmb	78.203	0.000 0.000	0.000 0.000	78.203 0.000	2.791	33.00	0.000

LINK KR2 2.000

Existing_Q20.60 and Q10.60.txt

ESTIMATED VOLUME (CU METRES*10**3) = 0.1369
 ESTIMATED PEAK FLOW (CUMECS) = 0.11
 ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK S1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.371
 ESTIMATED PEAK FLOW (CUMECS) = 0.67
 ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK S2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.742
 ESTIMATED PEAK FLOW (CUMECS) = 1.2
 ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK N3 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6781
 ESTIMATED PEAK FLOW (CUMECS) = 0.32
 ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK N4 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.695
 ESTIMATED PEAK FLOW (CUMECS) = 0.81
 ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK N5 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.384
 ESTIMATED PEAK FLOW (CUMECS) = 1.2
 ESTIMATED TIME TO PEAK (MINS) = 29.00

LINK East Cmbr 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 5.126
 ESTIMATED PEAK FLOW (CUMECS) = 2.3
 ESTIMATED TIME TO PEAK (MINS) = 33.00

 #####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 10.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.20
 TOTAL OF SECOND SUB-AREAS (ha) = 8.25
 TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)	(%)	(%)			
KR2	0.1500 0.0590	3.000 3.500	100.0 0.000	.015 .031	.0003 .0037	1.000

Existing_Q20.60 and Q10.60.txt

S1	0.0470	1.980	1.660	2.000	100.0	0.000	.018	.031	.0003	.0304	1.001
S2	.00001	2.275	.0010	1.500	100.0	0.000	.025	.031	.0002	.0378	1.002
N3	.00001	1.123	1.660	1.800	100.0	0.000	.020	.033	0.000	.0250	2.000
N4	.00001	1.674	.0010	2.200	100.0	0.000	.025	.030	.0002	.0260	2.001
N5	.00001	1.137	.0010	10.10	100.0	0.000	.025	.035	.0002	.0111	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2	Cont. #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
KR2	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.1053	22.00	2.800
S1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.6740	28.00	3.000
S2	67.651	0.000	5.000	0.000	2.500	67.651	60.443	1.239	31.00	2.900
N3	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.3198	31.00	2.900
N4	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.8107	31.00	.5000
N5	67.651	0.000	5.000	0.000	2.500	67.651	60.443	1.172	29.00	0.000
East Cmb	67.651	0.000	0.000	0.000	0.000	67.651	0.000	2.314	33.00	0.000

Run completed at: 3rd December 2009 12:26:37

mik open 0

Existing_Q50.60.txt
Run started at: 3rd December 2009 12:22:35

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1894
ESTIMATED PEAK FLOW (CUMECS) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 24.00

LINK S1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.961
ESTIMATED PEAK FLOW (CUMECS) = 0.97
ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK S2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.937
ESTIMATED PEAK FLOW (CUMECS) = 1.8
ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK N3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9803
ESTIMATED PEAK FLOW (CUMECS) = 0.47
ESTIMATED TIME TO PEAK (MINS) = 27.00

LINK N4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.439
ESTIMATED PEAK FLOW (CUMECS) = 1.2
ESTIMATED TIME TO PEAK (MINS) = 29.00

LINK N5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.427
ESTIMATED PEAK FLOW (CUMECS) = 1.7
ESTIMATED TIME TO PEAK (MINS) = 27.00

Existing_Q50.60.txt
LINK East Cmb 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 7.364
ESTIMATED PEAK FLOW (CUMECS) = 3.4
ESTIMATED TIME TO PEAK (MINS) = 31.00

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 50.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.20
TOTAL OF SECOND SUB-AREAS (ha) = 8.25
TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
Label	#1 #2	#1 #2	#1 #2	#1 #2	#1 #2	No.
	(ha)		(%)			
KR2	0.1500 0.0590	3.000 3.500	100.0 0.000	.015 .031	.0003 .0037	1.000
S1	0.0470 1.980	1.660 2.000	100.0 0.000	.018 .031	.0003 .0304	1.001
S2	.00001 2.275	.0010 1.500	100.0 0.000	.025 .031	.0002 .0378	1.002
N3	.00001 1.123	1.660 1.800	100.0 0.000	.020 .033	0.000 .0250	2.000
N4	.00001 1.674	.0010 2.200	100.0 0.000	.025 .030	.0002 .0260	2.001
N5	.00001 1.137	.0010 10.10	100.0 0.000	.025 .035	.0002 .0111	2.002
East Cmb	.00001 0.000	.0010 0.000	0.000 0.000	.025 0.00	.0021 0.000	1.003

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link
Label	Intensity	#1 #2	#1 #2	#1 #2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(m^3/s)	Peak	mins
KR2	92.291	0.000 3.000	0.000 2.500	92.291 86.916	0.1350	24.00	2.800
S1	92.291	0.000 3.000	0.000 2.500	92.291 86.916	0.9655	28.00	3.000
S2	92.291	0.000 3.000	0.000 2.500	92.291 86.916	1.816	31.00	2.900
N3	92.291	0.000 3.000	0.000 2.500	92.291 86.916	0.4711	27.00	2.900
N4	92.291	0.000 3.000	0.000 2.500	92.291 86.916	1.202	29.00	.5000
N5	92.291	0.000 3.000	0.000 2.500	92.291 86.916	1.689	27.00	0.000
East Cmb	92.291	0.000 0.000	0.000 0.000	92.291 0.000	3.355	31.00	0.000

Run completed at: 3rd December 2009 12:22:43
Page 2

Existing_Q50.60.txt

mik open 0

RTI DL RELEASE - EHP

Existing_Q100.60.txt
Run started at: 3rd December 2009 12:11:42

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2139
ESTIMATED PEAK FLOW (CUMECS) = 0.15
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK S1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.259
ESTIMATED PEAK FLOW (CUMECS) = 1.1
ESTIMATED TIME TO PEAK (MINS) = 27.00

LINK S2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 4.556
ESTIMATED PEAK FLOW (CUMECS) = 2.1
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK N3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.131
ESTIMATED PEAK FLOW (CUMECS) = 0.56
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK N4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.818
ESTIMATED PEAK FLOW (CUMECS) = 1.4
ESTIMATED TIME TO PEAK (MINS) = 29.00

LINK N5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.964
ESTIMATED PEAK FLOW (CUMECS) = 2.0
ESTIMATED TIME TO PEAK (MINS) = 27.00

Existing_Q100.60.txt

LINK East Cmb 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 8.521
 ESTIMATED PEAK FLOW (CUMECS) = 3.9
 ESTIMATED TIME TO PEAK (MINS) = 31.00

 #####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 100.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.20
 TOTAL OF SECOND SUB-AREAS (ha) = 8.25
 TOTAL OF ALL SUB-AREAS (ha) = 8.45

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
KR2	0.1500	0.0590	3.000	3.500	100.0	0.000	.015	.031	.0003	.0037	1.000
S1	0.0470	1.980	1.660	2.000	100.0	0.000	.018	.031	.0003	.0304	1.001
S2	.00001	2.275	.0010	1.500	100.0	0.000	.025	.031	.0002	.0378	1.002
N3	.00001	1.123	1.660	1.800	100.0	0.000	.020	.033	0.000	.0250	2.000
N4	.00001	1.674	.0010	2.200	100.0	0.000	.025	.030	.0002	.0260	2.001
N5	.00001	1.137	.0010	10.10	100.0	0.000	.025	.035	.0002	.0111	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
KR2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.1493	22.00	2.800
S1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.123	27.00	3.000
S2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	2.123	30.00	2.900
N3	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.5593	26.00	2.900
N4	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.395	29.00	.5000
N5	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.980	27.00	0.000
East Cmb	103.22	0.000	0.000	0.000	0.000	103.22	0.000	3.921	31.00	0.000

Run completed at: 3rd December 2009 12:11:52

Page 2

Existing_Q100.60.txt

mik open 0

RTI DL RELEASE - EHP

RAFTS RESULTS
DEVELOPED
'East Chamber'

Developed_Q5-90_Q2-90_Q1-90.txt
Run started at: 18th February 2010 13:51:33

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6558
ESTIMATED PEAK FLOW (CUMECS) = 0.32
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK PN5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.080
ESTIMATED PEAK FLOW (CUMECS) = 0.55
ESTIMATED TIME TO PEAK (MINS) = 36.00

LINK T1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.025
ESTIMATED PEAK FLOW (CUMECS) = 0.29
ESTIMATED TIME TO PEAK (MINS) = 50.00

LINK T2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.882
ESTIMATED PEAK FLOW (CUMECS) = 0.54
ESTIMATED TIME TO PEAK (MINS) = 50.00

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8278E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.47E-01
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1879
ESTIMATED PEAK FLOW (CUMECS) = 0.11
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK P3

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5500
 ESTIMATED PEAK FLOW (CUMECS) = 0.26
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK P4 Basin

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.103
 ESTIMATED PEAK FLOW (CUMECS) = 0.50
 ESTIMATED TIME TO PEAK (MINS) = 35.00

iosd llkta 0 8

LINK PS1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.604
 ESTIMATED PEAK FLOW (CUMECS) = 0.46
 ESTIMATED TIME TO PEAK (MINS) = 44.00

LINK PS2

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.186
 ESTIMATED PEAK FLOW (CUMECS) = 0.67
 ESTIMATED TIME TO PEAK (MINS) = 46.00

LINK PS3

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 4.335
 ESTIMATED PEAK FLOW (CUMECS) = 1.3
 ESTIMATED TIME TO PEAK (MINS) = 47.00

LINK East Cmbr

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 5.414
 ESTIMATED PEAK FLOW (CUMECS) = 1.6
 ESTIMATED TIME TO PEAK (MINS) = 41.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 5.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000

Developed_Q5-90_Q2-90_Q1-90.txt

T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2	Cont. #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN4	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.3207	35.00	.5000
PN5	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.5510	36.00	0.000
T1	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.2907	50.00	0.000
T2	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.5431	50.00	0.000
KR2	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.0473	32.00	2.800
KR1	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.1131	32.00	.5000
P3	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.2601	35.00	2.000
P4 Basin	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.4986	35.00	0.000
PS1	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.4577	44.00	3.000
PS2	46.434	0.000	10.00	0.000	2.500	69.650	56.400	0.6701	46.00	1.400
PS3	46.434	0.000	10.00	0.000	2.500	69.650	56.400	1.283	47.00	1.500
East Cmbr	46.434	0.000	0.000	0.000	0.000	69.650	0.000	1.620	41.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	----- Vol. Avail	Basin Vol. Used	----- Stage Used
P4 Basin	35.00	.4986	47.00	.2630	1103.3	0.0000	459.44	31.544

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

LINK PN4 2.000

Develoed_Q5-90_Q2-90_Q1-90.txt

ESTIMATED VOLUME (CU METRES*10**3) = 0.4870
 ESTIMATED PEAK FLOW (CUMECS) = 0.24
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK PN5 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7924
 ESTIMATED PEAK FLOW (CUMECS) = 0.42
 ESTIMATED TIME TO PEAK (MINS) = 36.00

LINK T1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7445
 ESTIMATED PEAK FLOW (CUMECS) = 0.20
 ESTIMATED TIME TO PEAK (MINS) = 53.00

LINK T2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.366
 ESTIMATED PEAK FLOW (CUMECS) = 0.38
 ESTIMATED TIME TO PEAK (MINS) = 51.00

LINK KR2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6318E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.37E-01
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK KR1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1435
 ESTIMATED PEAK FLOW (CUMECS) = 0.85E-01
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK P3 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4129
 ESTIMATED PEAK FLOW (CUMECS) = 0.19
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK P4 Basin 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8255
 ESTIMATED PEAK FLOW (CUMECS) = 0.35
 ESTIMATED TIME TO PEAK (MINS) = 35.00

iosd llkta 0 8
 LINK PS1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.181
 ESTIMATED PEAK FLOW (CUMECS) = 0.26
 ESTIMATED TIME TO PEAK (MINS) = 42.00

LINK PS2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.598
 ESTIMATED PEAK FLOW (CUMECS) = 0.42
 ESTIMATED TIME TO PEAK (MINS) = 44.00

LINK PS3 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.157
 ESTIMATED PEAK FLOW (CUMECS) = 0.86
 ESTIMATED TIME TO PEAK (MINS) = 46.00

LINK East Cmbrr 2.000

Developed_Q5-90_Q2-90_Q1-90.txt
 ESTIMATED VOLUME (CU METRES*10**3) = 3.948
 ESTIMATED PEAK FLOW (CUMECS) = 1.2
 ESTIMATED TIME TO PEAK (MINS) = 41.00

 #####
 QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 2.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000
T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN4	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.2418	35.00	.5000
PN5	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.4169	36.00	0.000
T1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.2033	53.00	0.000
T2	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.3804	51.00	0.000
KR2	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.0367	32.00	2.800

Developed_Q5-90_Q2-90_Q1-90.txt

KR1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.0854	32.00	.5000
P3	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.1882	35.00	2.000
P4 Basin	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.3534	35.00	0.000
PS1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.2607	42.00	3.000
PS2	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.4229	44.00	1.400
PS3	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.8554	46.00	1.500
East Cmbr	35.857	0.000	0.000	0.000	0.000	53.785	0.000	1.156	41.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m ³ /s)	Time to Peak	Peak Outflow (m ³ /s)	Total Inflow (m ³)	Vol. Avail	Basin Vol. Used	Stage Used
P4 Basin	35.00	.3534	67.00	.1227	825.48	0.0000	405.23	31.488

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

LINK PN4 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3564
ESTIMATED PEAK FLOW (CUMECS) = 0.16
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK PN5 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5719
ESTIMATED PEAK FLOW (CUMECS) = 0.30
ESTIMATED TIME TO PEAK (MINS) = 36.00

LINK T1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5226
ESTIMATED PEAK FLOW (CUMECS) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 55.00

LINK T2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9613
ESTIMATED PEAK FLOW (CUMECS) = 0.25
ESTIMATED TIME TO PEAK (MINS) = 54.00

LINK KR2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4818E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.28E-01
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK KR1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1097
ESTIMATED PEAK FLOW (CUMECS) = 0.64E-01

Developed_Q5-90_Q2-90_Q1-90.txt
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK P3 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3080
ESTIMATED PEAK FLOW (CUMECS) = 0.14
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK P4 Basin 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6147
ESTIMATED PEAK FLOW (CUMECS) = 0.25
ESTIMATED TIME TO PEAK (MINS) = 35.00

iosd llkta 0 8
LINK PS1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8601
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 43.00

LINK PS2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.155
ESTIMATED PEAK FLOW (CUMECS) = 0.28
ESTIMATED TIME TO PEAK (MINS) = 45.00

LINK PS3 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.252
ESTIMATED PEAK FLOW (CUMECS) = 0.57
ESTIMATED TIME TO PEAK (MINS) = 47.00

LINK East Cmbr 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.824
ESTIMATED PEAK FLOW (CUMECS) = 0.74
ESTIMATED TIME TO PEAK (MINS) = 42.00

QB10035 Greyhounds - Developed
Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 1.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 1.49
TOTAL OF SECOND SUB-AREAS (ha) = 7.85
TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001

Developed_Q5-90_Q2-90_Q1-90.txt

T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000
T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2 (mm)	Cont. #1 (mm/h)	Loss #2 (mm/h)	Excess #1 (mm)	Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
PN4	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.1626	35.00	.5000
PN5	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2951	36.00	0.000
T1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.1341	55.00	0.000
T2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2484	54.00	0.000
KR2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.0281	32.00	2.800
KR1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.0636	32.00	.5000
P3	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.1369	35.00	2.000
P4 Basin	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2530	35.00	0.000
PS1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.1780	43.00	3.000
PS2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2841	45.00	1.400
PS3	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.5719	47.00	1.500
East Cmbr	27.751	0.000	0.000	0.000	0.000	41.627	0.000	0.7380	42.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m ³ /s)	Time to Peak	Peak Outflow (m ³ /s)	Total Inflow (m ³)	----- Vol. Avail	Basin Vol. Used	----- Stage Used
P4 Basin	35.00	.2530	69.00	.0921	614.75	0.0000	301.31	31.374

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

Developed_Q5-90_Q2-90_Q1-90.txt

Run completed at: 18th February 2010 13:52:20

mik open 0

RTI DL RELEASE - EHP

Developed_Q20-60_Q10-60.txt
Run started at: 18th February 2010 13:55:57

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routng increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7934
ESTIMATED PEAK FLOW (CUMECS) = 0.53
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.327
ESTIMATED PEAK FLOW (CUMECS) = 0.91
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK T1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.284
ESTIMATED PEAK FLOW (CUMECS) = 0.48
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK T2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.354
ESTIMATED PEAK FLOW (CUMECS) = 0.89
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9492E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.75E-01
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2149
ESTIMATED PEAK FLOW (CUMECS) = 0.17
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK P3

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6497
 ESTIMATED PEAK FLOW (CUMECS) = 0.43
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P4 Basin

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.310
 ESTIMATED PEAK FLOW (CUMECS) = 0.81
 ESTIMATED TIME TO PEAK (MINS) = 25.00

iosd llkta 0 8

LINK PS1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.948
 ESTIMATED PEAK FLOW (CUMECS) = 0.81
 ESTIMATED TIME TO PEAK (MINS) = 33.00

LINK PS2

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.680
 ESTIMATED PEAK FLOW (CUMECS) = 1.1
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK PS3

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 5.371
 ESTIMATED PEAK FLOW (CUMECS) = 2.1
 ESTIMATED TIME TO PEAK (MINS) = 36.00

LINK East Cmbr

1.000

ESTIMATED VOLUME (CU METRES*10**3) = 6.698
 ESTIMATED PEAK FLOW (CUMECS) = 2.6
 ESTIMATED TIME TO PEAK (MINS) = 35.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 20.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000

Developed_Q20-60_Q10-60.txt

T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2	Cont. #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN4	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.5285	25.00	.5000
PN5	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.9116	26.00	0.000
T1	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.4806	35.00	0.000
T2	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.8883	35.00	0.000
KR2	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.0753	22.00	2.800
KR1	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.1656	22.00	.5000
P3	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.4309	25.00	2.000
P4 Basin	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.8135	25.00	0.000
PS1	78.203	0.000	5.000	0.000	2.500	78.203	70.953	0.8126	33.00	3.000
PS2	78.203	0.000	5.000	0.000	2.500	78.203	70.953	1.139	35.00	1.400
PS3	78.203	0.000	5.000	0.000	2.500	78.203	70.953	2.143	36.00	1.500
East Cmbr	78.203	0.000	0.000	0.000	0.000	78.203	0.000	2.605	35.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	----- Vol. Avail	Basin Vol. Used	----- Stage Used
P4 Basin	25.00	.8135	34.00	.5035	1309.5	0.0000	526.25	31.612

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

LINK PN4 2.000

Develo ped_Q20-60_Q10-60.txt

ESTIMATED VOLUME (CU METRES*10**3) =	0.6807
ESTIMATED PEAK FLOW (CUMECS) =	0.45
ESTIMATED TIME TO PEAK (MINS) =	25.00
LINK PN5	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	1.135
ESTIMATED PEAK FLOW (CUMECS) =	0.78
ESTIMATED TIME TO PEAK (MINS) =	26.00
LINK T1	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	1.095
ESTIMATED PEAK FLOW (CUMECS) =	0.39
ESTIMATED TIME TO PEAK (MINS) =	36.00
LINK T2	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	2.008
ESTIMATED PEAK FLOW (CUMECS) =	0.72
ESTIMATED TIME TO PEAK (MINS) =	36.00
LINK KR2	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	0.8188E-01
ESTIMATED PEAK FLOW (CUMECS) =	0.65E-01
ESTIMATED TIME TO PEAK (MINS) =	22.00
LINK KR1	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	0.1855
ESTIMATED PEAK FLOW (CUMECS) =	0.15
ESTIMATED TIME TO PEAK (MINS) =	22.00
LINK P3	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	0.5583
ESTIMATED PEAK FLOW (CUMECS) =	0.37
ESTIMATED TIME TO PEAK (MINS) =	25.00
LINK P4 Basin	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	1.123
ESTIMATED PEAK FLOW (CUMECS) =	0.67
ESTIMATED TIME TO PEAK (MINS) =	25.00
iosd llkta	0 8
LINK PS1	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	1.663
ESTIMATED PEAK FLOW (CUMECS) =	0.64
ESTIMATED TIME TO PEAK (MINS) =	35.00
LINK PS2	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	2.286
ESTIMATED PEAK FLOW (CUMECS) =	0.91
ESTIMATED TIME TO PEAK (MINS) =	37.00
LINK PS3	2.000
ESTIMATED VOLUME (CU METRES*10**3) =	4.580
ESTIMATED PEAK FLOW (CUMECS) =	1.7
ESTIMATED TIME TO PEAK (MINS) =	36.00
LINK East Cmbr	2.000

Developed_Q20-60_Q10-60.txt

ESTIMATED VOLUME (CU METRES*10**3) = 5.715
 ESTIMATED PEAK FLOW (CUMECS) = 2.1
 ESTIMATED TIME TO PEAK (MINS) = 37.00

 #####
 QB10035 Greyhounds - Developed
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 10.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000
T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN4	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.4493	25.00	.5000
PN5	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.7759	26.00	0.000
T1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.3857	36.00	0.000
T2	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.7177	36.00	0.000
KR2	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.0653	22.00	2.800

Develoed_Q20-60_Q10-60.txt

KR1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.1452	22.00	.5000
P3	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.3705	25.00	2.000
P4 Basin	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.6728	25.00	0.000
PS1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.6362	35.00	3.000
PS2	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.9061	37.00	1.400
PS3	67.651	0.000	5.000	0.000	2.500	67.651	60.443	1.713	36.00	1.500
East Cmbr	67.651	0.000	0.000	0.000	0.000	67.651	0.000	2.074	37.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m ³ /s)	Time to Peak	Peak Outflow (m ³ /s)	Total Inflow (m ³)	----- Vol. Avail	Basin Vol. Used	----- Stage Used
P4 Basin	25.00	.6728	36.00	.3815	1123.0	0.0000	496.41	31.582

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

Run completed at: 18th February 2010 13:56:28

mik open 0

Developed_Q50-60.txt
Run started at: 18th February 2010 13:57:49

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RUNTIME RESULTS

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Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9589
ESTIMATED PEAK FLOW (CUMECS) = 0.60
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.613
ESTIMATED PEAK FLOW (CUMECS) = 1.0
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK T1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.565
ESTIMATED PEAK FLOW (CUMECS) = 0.59
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK T2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.878
ESTIMATED PEAK FLOW (CUMECS) = 1.1
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1128
ESTIMATED PEAK FLOW (CUMECS) = 0.83E-01
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2552
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7788
 ESTIMATED PEAK FLOW (CUMECS) = 0.49
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P4 Basin 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.570
 ESTIMATED PEAK FLOW (CUMECS) = 0.92
 ESTIMATED TIME TO PEAK (MINS) = 25.00

iosd llkta 0 8
 LINK PS1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.359
 ESTIMATED PEAK FLOW (CUMECS) = 1.0
 ESTIMATED TIME TO PEAK (MINS) = 29.00

LINK PS2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.258
 ESTIMATED PEAK FLOW (CUMECS) = 1.4
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK PS3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 6.548
 ESTIMATED PEAK FLOW (CUMECS) = 2.7
 ESTIMATED TIME TO PEAK (MINS) = 33.00

LINK East Cmbr 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 8.160
 ESTIMATED PEAK FLOW (CUMECS) = 3.3
 ESTIMATED TIME TO PEAK (MINS) = 34.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 50.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000

Developed_Q50-60.txt

T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2	Cont. #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
PN4	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.6012	25.00	.5000
PN5	92.291	0.000	3.000	0.000	2.500	92.291	86.916	1.030	26.00	0.000
T1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.5931	35.00	0.000
T2	92.291	0.000	3.000	0.000	2.500	92.291	86.916	1.100	35.00	0.000
KR2	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.0832	22.00	2.800
KR1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.1829	25.00	.5000
P3	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.4861	25.00	2.000
P4 Basin	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.9196	25.00	0.000
PS1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	1.023	29.00	3.000
PS2	92.291	0.000	3.000	0.000	2.500	92.291	86.916	1.434	32.00	1.400
PS3	92.291	0.000	3.000	0.000	2.500	92.291	86.916	2.689	33.00	1.500
East Cmb	92.291	0.000	0.000	0.000	0.000	92.291	0.000	3.292	34.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m ³ /s)	Time to Peak	Peak Outflow (m ³ /s)	Total Inflow (m ³)	Vol. Avail	Basin Vol. Used	Stage Used
P4 Basin	25.00	.9196	32.00	.6368	1569.9	0.0000	550.81	31.635

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

Run completed at: 18th February 2010 13:58:05
Page 3

Developed_Q50-60.txt

mik open 0

RTI DL RELEASE - EHP

Developed_Q100-60.txt
Run started at: 18th February 2010 13:58:53

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.100
ESTIMATED PEAK FLOW (CUMECS) = 0.68
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.857
ESTIMATED PEAK FLOW (CUMECS) = 1.2
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK T1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.822
ESTIMATED PEAK FLOW (CUMECS) = 0.70
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK T2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.330
ESTIMATED PEAK FLOW (CUMECS) = 1.3
ESTIMATED TIME TO PEAK (MINS) = 34.00

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1271
ESTIMATED PEAK FLOW (CUMECS) = 0.93E-01
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2872
ESTIMATED PEAK FLOW (CUMECS) = 0.20
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK P3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8847
 ESTIMATED PEAK FLOW (CUMECS) = 0.55
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P4 Basin 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.786
 ESTIMATED PEAK FLOW (CUMECS) = 1.0
 ESTIMATED TIME TO PEAK (MINS) = 25.00

iosd llkta 0 8
 LINK PS1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 2.699
 ESTIMATED PEAK FLOW (CUMECS) = 1.3
 ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK PS2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.737
 ESTIMATED PEAK FLOW (CUMECS) = 1.7
 ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK PS3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 7.545
 ESTIMATED PEAK FLOW (CUMECS) = 3.2
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK East Cmbr 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 9.401
 ESTIMATED PEAK FLOW (CUMECS) = 3.9
 ESTIMATED TIME TO PEAK (MINS) = 33.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 100.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 1.49
 TOTAL OF SECOND SUB-AREAS (ha) = 7.85
 TOTAL OF ALL SUB-AREAS (ha) = 9.34

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000

Developed_Q100-60.txt

T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmb	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2	Cont. #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN4	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.6836	25.00	.5000
PN5	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.168	25.00	0.000
T1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.7026	35.00	0.000
T2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.295	34.00	0.000
KR2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.0930	22.00	2.800
KR1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.2045	22.00	.5000
P3	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.5479	25.00	2.000
P4 Basin	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.046	25.00	0.000
PS1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.272	28.00	3.000
PS2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.745	31.00	1.400
PS3	103.22	0.000	0.000	0.000	2.500	103.22	100.72	3.234	32.00	1.500
East Cmb	103.22	0.000	0.000	0.000	0.000	103.22	0.000	3.921	33.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	----- Vol. Avail	Basin Vol. Used	----- Stage Used
P4 Basin	25.00	1.045	29.00	.7893	1786.1	0.0000	578.90	31.663

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

Run completed at: 18th February 2010 13:59:09
Page 3

Developed_Q100-60.txt

mik open 0

RTI DL RELEASE - EHP

RAFTS RESULTS

EXISTING

'Compton Road'

Existing_Q5.60_Q2.90_Q1.90.txt
Run started at: 3rd December 2009 12:33:00

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1252
ESTIMATED PEAK FLOW (CUMECS) = 0.98E-01
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK N1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9236
ESTIMATED PEAK FLOW (CUMECS) = 0.42
ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9236
ESTIMATED PEAK FLOW (CUMECS) = 0.42
ESTIMATED TIME TO PEAK (MINS) = 31.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 5.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26

Page 1

Existing_Q5.60_Q2.90_Q1.90.txt

TOTAL OF SECOND SUB-AREAS (ha) = 1.58
TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link			
Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	No.
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003 .0040 1.000
N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005 .0293 1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021 0.000 1.002

Link	Average	Init. Loss	Cont. Loss	Excess Rain	Peak	Time	Link	
Label	Intensity	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)	(mm/h)	(mm)	(mm)	(m^3/s)	Peak	mins
KR1	60.107	0.000	10.00	0.000	2.500	60.107 48.066	0.0985	22.00 6.000
N1	60.107	0.000	10.00	0.000	2.500	60.107 48.066	0.4234	31.00 0.000
Compton Rd	60.107	0.000	0.000	0.000	0.000	60.107 0.000	0.4234	31.00 0.000

LINK KR1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1107
ESTIMATED PEAK FLOW (CUMECS) = 0.64E-01
ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK N1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7871
ESTIMATED PEAK FLOW (CUMECS) = 0.30
ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK Compton Rd 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7871
ESTIMATED PEAK FLOW (CUMECS) = 0.30
ESTIMATED TIME TO PEAK (MINS) = 41.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 90.
RETURN PERIOD (YRS) = 2.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26
TOTAL OF SECOND SUB-AREAS (ha) = 1.58
TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	CATCH. #1	Area #2	Slope		% Impervious		Pern		B		Link No.
			#1	#2	#1	#2	#1	#2	#1	#2	
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003	.0040	1.000
N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005	.0293	1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss		Cont. Loss		Excess Rain		Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
		#1	#2	#1	#2	#1	#2			
KR1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.0641	32.00	6.000
N1	35.857	0.000	10.00	0.000	2.500	53.785	40.618	0.2970	41.00	0.000
Compton Rd.	35.857	0.000	0.000	0.000	0.000	53.785	0.000	0.2970	41.00	0.000

LINK KR1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8410E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.48E-01
 ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK N1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5638
 ESTIMATED PEAK FLOW (CUMECS) = 0.20
 ESTIMATED TIME TO PEAK (MINS) = 41.00

LINK Compton Rd 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5638
 ESTIMATED PEAK FLOW (CUMECS) = 0.20
 ESTIMATED TIME TO PEAK (MINS) = 41.00

 #####
 QB10035 LGF - Existing Q100
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 1.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.26
 TOTAL OF SECOND SUB-AREAS (ha) = 1.58
 TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	CATCH. #1	Area #2	Slope		% Impervious		Pern		B		Link No.
			#1	#2	#1	#2	#1	#2	#1	#2	
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003	.0040	1.000

Existing_Q5.60_Q2.90_Q1.90.txt

N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005	.0293	1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
KR1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.0483	35.00	6.000
N1	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.2016	41.00	0.000
Compton Rd	27.751	0.000	0.000	0.000	0.000	41.627	0.000	0.2016	41.00	0.000

Run completed at: 3rd December 2009 12:33:09

mik open 0

RTI DL RELEASE - EHP

Existing_Q20.60_Q10.60.txt
Run started at: 3rd December 2009 12:24:39

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1677
ESTIMATED PEAK FLOW (CUMECS) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK N1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.330
ESTIMATED PEAK FLOW (CUMECS) = 0.67
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.330
ESTIMATED PEAK FLOW (CUMECS) = 0.67
ESTIMATED TIME TO PEAK (MINS) = 30.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 20.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26

Page 1

Existing_Q20.60_Q10.60.txt

TOTAL OF SECOND SUB-AREAS (ha) = 1.58
TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 #2	Slope #1 #2	% Impervious #1 #2	Pern #1 #2	B #1 #2	Link No.
	(ha)	(%)	(%)			
KR1	0.1630 0.0570	3.000 3.000	100.0 0.000	.015 .032	.0003 .0040	1.000
N1	0.0990 1.526	1.660 1.800	100.0 0.000	.020 .033	.0005 .0293	1.001
Compton Rd.	0.0001 0.000	.0010 0.000	0.000 0.000	.025 0.00	.0021 0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 #2 (mm)	Cont. Loss #1 #2 (mm/h)	Excess Rain #1 #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
KR1	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.1298	22.00	6.000
N1	78.203	0.000 5.000	0.000 2.500	78.203 70.953	0.6664	30.00	0.000
Compton Rd	78.203	0.000 0.000	0.000 0.000	78.203 0.000	0.6664	30.00	0.000

LINK KR1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1445
ESTIMATED PEAK FLOW (CUMECS) = 0.11
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK N1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.136
ESTIMATED PEAK FLOW (CUMECS) = 0.55
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK Compton Rd 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.136
ESTIMATED PEAK FLOW (CUMECS) = 0.55
ESTIMATED TIME TO PEAK (MINS) = 30.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 10.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26
TOTAL OF SECOND SUB-AREAS (ha) = 1.58
TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. #1 (ha)	Area #2	Existing_Q20.60_Q10.60.txt Slope		% Impervious		Pern		B		Link No.
			#1 (%)	#2 (%)	#1 (%)	#2 (%)	#1	#2	#1	#2	
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003	.0040	1.000
N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005	.0293	1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss		Cont. Loss		Excess Rain		Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
		#1 (mm)	#2	#1 (mm/h)	#2	#1 (mm)	#2			
KR1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.1122	22.00	6.000
N1	67.651	0.000	5.000	0.000	2.500	67.651	60.443	0.5458	30.00	0.000
Compton Rd	67.651	0.000	0.000	0.000	0.000	67.651	0.000	0.5458	30.00	0.000

Run completed at: 3rd December 2009 12:24:50

mik open 0

RTI DL RELEASE - EHP

Existing_Q50.60.txt
Run started at: 3rd December 2009 12:18:26

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1997
ESTIMATED PEAK FLOW (CUMECs) = 0.14
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK N1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.616
ESTIMATED PEAK FLOW (CUMECs) = 0.79
ESTIMATED TIME TO PEAK (MINS) = 30.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.616
ESTIMATED PEAK FLOW (CUMECs) = 0.79
ESTIMATED TIME TO PEAK (MINS) = 30.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 50.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26

Page 1

Existing_Q50.60.txt
TOTAL OF SECOND SUB-AREAS (ha) = 1.58
TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003	.0040	1.000
N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005	.0293	1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link	Average	Init. Loss		Cont. Loss		Excess Rain		Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
KR1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.1423	22.00	6.000
N1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.7895	30.00	0.000
Compton Rd	92.291	0.000	0.000	0.000	0.000	92.291	0.000	0.7895	30.00	0.000

Run completed at: 3rd December 2009 12:18:30

mik open 0

Existing_Q100.60.txt
Run started at: 3rd December 2009 12:13:00

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2253
ESTIMATED PEAK FLOW (CUMECS) = 0.16
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK N1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.869
ESTIMATED PEAK FLOW (CUMECS) = 0.92
ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.869
ESTIMATED PEAK FLOW (CUMECS) = 0.92
ESTIMATED TIME TO PEAK (MINS) = 28.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 100.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.26

Page 1

Existing_Q100.60.txt

TOTAL OF SECOND SUB-AREAS (ha) = 1.58
 TOTAL OF ALL SUB-AREAS (ha) = 1.85

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
KR1	0.1630	0.0570	3.000	3.000	100.0	0.000	.015	.032	.0003	.0040	1.000
N1	0.0990	1.526	1.660	1.800	100.0	0.000	.020	.033	.0005	.0293	1.001
Compton Rd.	0.0001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002

Link	Average	Init. Loss		Cont. Loss		Excess Rain		Peak	Time	Link
Label	Intensity	#1	#2	#1	#2	#1	#2	Inflow	to	Lag
	(mm/h)	(mm)		(mm/h)		(mm)		(m^3/s)	Peak	mins
KR1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.1579	22.00	6.000
N1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.9157	28.00	0.000
Compton Rd.	103.22	0.000	0.000	0.000	0.000	103.22	0.000	0.9157	28.00	0.000

Run completed at: 3rd December 2009 12:13:05

mik open 0

RAFTS RESULTS

DEVELOPED

'Compton Road'

Developed_Q5-25_Q2-25_Q1-25.txt
Run started at: 18th February 2010 14:02:18

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK P1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7672E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.52E-01
ESTIMATED TIME TO PEAK (MINS) = 21.00

LINK P2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3229
ESTIMATED PEAK FLOW (CUMECS) = 0.32
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3660
ESTIMATED PEAK FLOW (CUMECS) = 0.36
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3660
ESTIMATED PEAK FLOW (CUMECS) = 0.36
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 25.
 RETURN PERIOD (YRS) = 5.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.52
 TOTAL OF SECOND SUB-AREAS (ha) = 0.55
 TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. #1	Area #2	Slope #1	% Impervious #2	Pern #1	B #2	Link No.
	(ha)		(%)	(%)			
P1	.00001	0.2630	.0010	2.000	100.0	0.000	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	1.002
Compton Rd	.00001	0.000	.0010	0.000	0.000	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
P1	95.709	0.000	10.00	0.000	2.500	39.879	29.087	0.0517	21.00	3.000
P2	95.709	0.000	10.00	0.000	2.500	39.879	29.087	0.3219	15.00	0.000
PN1	95.709	0.000	10.00	0.000	2.500	39.879	29.087	0.3567	15.00	0.000
Compton Rd	95.709	0.000	0.000	0.000	0.000	39.879	0.000	0.3567	15.00	0.000

LINK P1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5350E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.33E-01
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2428
 ESTIMATED PEAK FLOW (CUMECS) = 0.24
 ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2729
 ESTIMATED PEAK FLOW (CUMECS) = 0.26
 ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2729
 ESTIMATED PEAK FLOW (CUMECS) = 0.26
 ESTIMATED TIME TO PEAK (MINS) = 15.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 2.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.52
TOTAL OF SECOND SUB-AREAS (ha) = 0.55
TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	1.002
Compton Rd	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2	Cont. Loss #1 (mm/h)	Cont. Loss #2	Excess Rain #1 (mm)	Excess Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag
P1	74.909	0.000	10.00	0.000	2.500	31.212	20.462	0.0334	25.00	3.000
P2	74.909	0.000	10.00	0.000	2.500	31.212	20.462	0.2421	15.00	0.000
PN1	74.909	0.000	10.00	0.000	2.500	31.212	20.462	0.2634	15.00	0.000
Compton Rd	74.909	0.000	0.000	0.000	0.000	31.212	0.000	0.2634	15.00	0.000

LINK P1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3605E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.21E-01
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1801
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2002
ESTIMATED PEAK FLOW (CUMECS) = 0.19
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2002
ESTIMATED PEAK FLOW (CUMECS) = 0.19
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 1.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.52
TOTAL OF SECOND SUB-AREAS (ha) = 0.55
TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 #2 (ha)		Slope #1 #2 (%)		% Impervious #1 #2 (%)		Pern #1 #2		B #1 #2		Link No.
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	1.002
Compton Rd.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 #2 (mm)		Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
P1	58.278	0.000	10.00	0.000	2.500	24.283	13.616	0.0213	25.00	3.000
P2	58.278	0.000	10.00	0.000	2.500	24.283	13.616	0.1776	15.00	0.000
PN1	58.278	0.000	10.00	0.000	2.500	24.283	13.616	0.1903	15.00	0.000
Compton Rd.	58.278	0.000	0.000	0.000	0.000	24.283	0.000	0.1903	15.00	0.000

Run completed at: 18th February 2010 14:02:32

mik open 0

Developed_Q20-25_Q10-25.txt
Run started at: 18th February 2010 14:03:59

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routng increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK P1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1197
ESTIMATED PEAK FLOW (CUMECS) = 0.11
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK P2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4480
ESTIMATED PEAK FLOW (CUMECS) = 0.45
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5145
ESTIMATED PEAK FLOW (CUMECS) = 0.52
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5145
ESTIMATED PEAK FLOW (CUMECS) = 0.52
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 25.
 RETURN PERIOD (YRS) = 20.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.52
 TOTAL OF SECOND SUB-AREAS (ha) = 0.55
 TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	1.002
Compton Rd	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
P1	123.45	0.000	5.000	0.000	2.500	51.437	45.479	0.1064	16.00	3.000
P2	123.45	0.000	5.000	0.000	2.500	51.437	45.479	0.4542	15.00	0.000
PN1	123.45	0.000	5.000	0.000	2.500	51.437	45.479	0.5213	15.00	0.000
Compton Rd	123.45	0.000	0.000	0.000	0.000	51.437	0.000	0.5213	15.00	0.000

LINK P1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1022
 ESTIMATED PEAK FLOW (CUMECS) = 0.78E-01
 ESTIMATED TIME TO PEAK (MINS) = 17.00

LINK P2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3865
 ESTIMATED PEAK FLOW (CUMECS) = 0.39
 ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4436
 ESTIMATED PEAK FLOW (CUMECS) = 0.44
 ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4436
 ESTIMATED PEAK FLOW (CUMECS) = 0.44
 ESTIMATED TIME TO PEAK (MINS) = 15.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 10.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.52
TOTAL OF SECOND SUB-AREAS (ha) = 0.55
TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 #2 (ha)	Slope #1 #2 (%)	% Impervious #1 #2 (%)	Pern #1 #2	B #1 #2	Link No.
P1	.00001 0.2630	.0010 2.000	100.0 0.000	.025 .040	.0002 .0129	1.000
P2	0.5150 0.1440	3.000 2.000	100.0 0.000	.015 .033	.0006 .0081	1.001
PN1	.00001 0.1470	.0010 2.100	100.0 0.000	.025 .033	.0002 .0080	1.002
Compton Rd.	.00001 0.000	.0010 0.000	0.000 0.000	.025 0.00	.0021 0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 #2 (mm)	Cont. Loss #1 #2 (mm/h)	Excess Rain #1 #2 (mm)	Peak Inflow (m^3/s)	Time to Peak mins	Link Lag mins
P1	107.22	0.000 5.000	0.000 2.500	44.673 38.756	0.0780	17.00	3.000
P2	107.22	0.000 5.000	0.000 2.500	44.673 38.756	0.3865	15.00	0.000
PN1	107.22	0.000 5.000	0.000 2.500	44.673 38.756	0.4396	15.00	0.000
Compton Rd.	107.22	0.000 0.000	0.000 0.000	44.673 0.000	0.4396	15.00	0.000

Run completed at: 18th February 2010 14:04:08

mik open

Developed_Q50-60.txt
Run started at: 18th February 2010 14:05:46

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK P1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2286
ESTIMATED PEAK FLOW (CUMECS) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK P2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8283
ESTIMATED PEAK FLOW (CUMECS) = 0.52
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9562
ESTIMATED PEAK FLOW (CUMECS) = 0.60
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9562
ESTIMATED PEAK FLOW (CUMECS) = 0.60
ESTIMATED TIME TO PEAK (MINS) = 25.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

Developed_Q50-60.txt

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 50.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.52
 TOTAL OF SECOND SUB-AREAS (ha) = 0.55
 TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	1.002
Compton Rd.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
P1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.1312	26.00	3.000
P2	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.5228	25.00	0.000
PN1	92.291	0.000	3.000	0.000	2.500	92.291	86.916	0.6000	25.00	0.000
Compton Rd.	92.291	0.000	0.000	0.000	0.000	92.291	0.000	0.6000	25.00	0.000

Run completed at: 18th February 2010 14:05:51

mik open 0

Developed_Q100-25.txt
Run started at: 18th February 2010 14:06:32

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK P1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1749
ESTIMATED PEAK FLOW (CUMECS) = 0.15
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK P2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6141
ESTIMATED PEAK FLOW (CUMECS) = 0.61
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK PN1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7115
ESTIMATED PEAK FLOW (CUMECS) = 0.71
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7115
ESTIMATED PEAK FLOW (CUMECS) = 0.71
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

Developed_Q100-25.txt

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 25.
 RETURN PERIOD (YRS) = 100.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.52
 TOTAL OF SECOND SUB-AREAS (ha) = 0.55
 TOTAL OF ALL SUB-AREAS (ha) = 1.07

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area		Slope		% Impervious		Pern		B		Link No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	1.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	1.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	1.002
Compton Rd.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
P1	161.71	0.000	0.000	0.000	2.500	67.381	66.339	0.1502	16.00	3.000
P2	161.71	0.000	0.000	0.000	2.500	67.381	66.339	0.6063	15.00	0.000
PN1	161.71	0.000	0.000	0.000	2.500	67.381	66.339	0.7082	15.00	0.000
Compton Rd.	161.71	0.000	0.000	0.000	0.000	67.381	0.000	0.7082	15.00	0.000

Run completed at: 18th February 2010 14:06:36

mik open 0

RAFTS RESULTS

EXISTING

'Cronulla Court'

Existing_Q5.60_Q2.60_Q1.60.txt
Run started at: 3rd December 2009 12:39:56

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK N2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1840
ESTIMATED PEAK FLOW (CUMecs) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1840
ESTIMATED PEAK FLOW (CUMecs) = 0.13
ESTIMATED TIME TO PEAK (MINS) = 26.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 5.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.38
TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
------	-------------	-------	--------------	------	---	------

Page 1

Existing_Q5.60_Q2.60_Q1.60.txt

Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
N2	60.107	0.000	10.00	0.000	2.500	60.107	48.066	0.1315	26.00	0.000
Cronulla C	60.107	0.000	0.000	0.000	0.000	60.107	0.000	0.1315	26.00	0.000

LINK N2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1327
 ESTIMATED PEAK FLOW (CUMECS) = 0.83E-01
 ESTIMATED TIME TO PEAK (MINS) = 27.00

LINK Cronulla C 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1327
 ESTIMATED PEAK FLOW (CUMECS) = 0.83E-01
 ESTIMATED TIME TO PEAK (MINS) = 27.00

 #####
 QB10035 LGF - Existing Q100
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 2.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.38
 TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Area #2	Slope #1 (%)	% Impervious #2	Pern #1	B #2	Link No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
N2	46.634	0.000	10.00	0.000	2.500	46.634	34.676	0.0830	27.00	0.000
Cronulla C	46.634	0.000	0.000	0.000	0.000	46.634	0.000	0.0830	27.00	0.000

Existing_Q5.60_Q2.60_Q1.60.txt

LINK N2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9296E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.54E-01
 ESTIMATED TIME TO PEAK (MINS) = 32.00

LINK Cronulla C 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9297E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.54E-01
 ESTIMATED TIME TO PEAK (MINS) = 32.00

 #####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 1.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.38
 TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
N2	36.158	0.000	10.00	0.000	2.500	36.158	24.267	0.0540	32.00	0.000
Cronulla C	36.158	0.000	0.000	0.000	0.000	36.158	0.000	0.0540	32.00	0.000

Run completed at: 3rd December 2009 12:40:02

mik open 0

Existing_Q20.25 and Q10.25.txt
Run started at: 3rd December 2009 12:27:52

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK N2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1738
ESTIMATED PEAK FLOW (CUMECS) = 0.20
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1738
ESTIMATED PEAK FLOW (CUMECS) = 0.20
ESTIMATED TIME TO PEAK (MINS) = 16.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 20.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.38
TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
------	-------------	-------	--------------	------	---	------

Page 1

Existing_Q20.25 and Q10.25.txt

Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
N2	123.45	0.000	5.000	0.000	2.500	51.437	45.479	0.1965	16.00	0.000
Cronulla C	123.45	0.000	0.000	0.000	0.000	51.437	0.000	0.1965	16.00	0.000

LINK N2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1475
 ESTIMATED PEAK FLOW (CUMECS) = 0.17
 ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1475
 ESTIMATED PEAK FLOW (CUMECS) = 0.17
 ESTIMATED TIME TO PEAK (MINS) = 16.00

 #####
 QB10035 LGF - Existing Q100
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 25.
 RETURN PERIOD (YRS) = 10.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.38
 TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Area #2	Slope #1 (%)	Slope #2	% Impervious #1 (%)	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
N2	107.22	0.000	5.000	0.000	2.500	44.673	38.756	0.1654	16.00	0.000
Cronulla C	107.22	0.000	0.000	0.000	0.000	44.673	0.000	0.1654	16.00	0.000

Existing_Q20.25 and Q10.25.txt

Run completed at: 3rd December 2009 12:27:58

mik open 0

RTI DL RELEASE - EHP

Existing_Q50.25.txt
Run started at: 3rd December 2009 12:23:33

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK N2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2161
ESTIMATED PEAK FLOW (CUMECS) = 0.22
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2161
ESTIMATED PEAK FLOW (CUMECS) = 0.22
ESTIMATED TIME TO PEAK (MINS) = 16.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 50.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.38
TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
------	-------------	-------	--------------	------	---	------

Page 1

Label	Existing_Q50.25.txt										No.
	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
N2	145.03	0.000	3.000	0.000	2.500	60.430	56.430	0.2183	16.00	0.000
Cronulla C	145.03	0.000	0.000	0.000	0.000	60.430	0.000	0.2183	16.00	0.000

Run completed at: 3rd December 2009 12:23:35

mik open 0

RTI DL RELEASE - EHP

Existing_Q100.25.txt
Run started at: 3rd December 2009 12:15:24

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK N2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2536
ESTIMATED PEAK FLOW (CUMECS) = 0.25
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2536
ESTIMATED PEAK FLOW (CUMECS) = 0.25
ESTIMATED TIME TO PEAK (MINS) = 16.00

#####

QB10035 LGF - Existing Q100

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 100.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.38
TOTAL OF ALL SUB-AREAS (ha) = 0.38

SUMMARY OF CATCHMENT AND RAINFALL DATA
Link Catch. Area Slope % Impervious Pern B Link
Page 1

Existing_Q100.25.txt											
Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
N2	.00001	0.3820	.0010	3.200	100.0	0.000	.025	.032	.0002	.0105	1.000
Cronulla C.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
N2	161.71	0.000	0.000	0.000	2.500	67.381	66.339	0.2485	16.00	0.000
Cronulla C	161.71	0.000	0.000	0.000	0.000	67.381	0.000	0.2485	16.00	0.000

Run completed at: 3rd December 2009 12:15:26

mik open 0

RTI DL RELEASE - EHP

RAFTS RESULTS

DEVELOPED

'Cronulla Court'

Developed Q5-60_Q2-60_Q1-90.txt
Run started at: 18th February 2010 14:07:54

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1292
ESTIMATED PEAK FLOW (CUMECs) = 0.92E-01
ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1292
ESTIMATED PEAK FLOW (CUMECs) = 0.92E-01
ESTIMATED TIME TO PEAK (MINS) = 26.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 5.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.27
TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA
Link Catch. Area Slope % Impervious Pern B Link
Page 1

Developed Q5-60_Q2-60_Q1-90.txt

Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
PN2	60.107	0.000	10.00	0.000	2.500	60.107	48.066	0.0919	26.00	0.000
Cronulla C	60.107	0.000	0.000	0.000	0.000	60.107	0.000	0.0919	26.00	0.000

LINK PN2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9310E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.58E-01
 ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK Cronulla C 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.9311E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.58E-01
 ESTIMATED TIME TO PEAK (MINS) = 28.00

 #####
 QB10035 Greyhounds - Developed
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 2.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.27
 TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Area #2	Slope #1 (%)	% Impervious #2	Pern #1	B #2	Link No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
PN2	46.634	0.000	10.00	0.000	2.500	46.634	34.676	0.0580	28.00	0.000
Cronulla C	46.634	0.000	0.000	0.000	0.000	46.634	0.000	0.0580	28.00	0.000

LINK PN2 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7703E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.39E-01
 ESTIMATED TIME TO PEAK (MINS) = 40.00

LINK Cronulla C 3.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.7703E-01
 ESTIMATED PEAK FLOW (CUMECS) = 0.39E-01
 ESTIMATED TIME TO PEAK (MINS) = 40.00

 #####
 QB10035 Greyhounds - Developed
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 90.
 RETURN PERIOD (YRS) = 1.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.27
 TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN2	27.751	0.000	10.00	0.000	2.500	41.627	28.678	0.0390	40.00	0.000
Cronulla C	27.751	0.000	0.000	0.000	0.000	41.627	0.000	0.0390	40.00	0.000

Run completed at: 18th February 2010 14:08:01

mik open 0

Developed_Q20-25_Q10-25.txt
Run started at: 18th February 2010 14:09:22

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routng increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1210
ESTIMATED PEAK FLOW (CUMECS) = 0.15
ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1210
ESTIMATED PEAK FLOW (CUMECS) = 0.15
ESTIMATED TIME TO PEAK (MINS) = 16.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 20.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.27
TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA
Link Catch. Area Slope % Impervious Pern B Link
Page 1

Developed_Q20-25_Q10-25.txt

Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN2	123.45	0.000	5.000	0.000	2.500	51.437	45.479	0.1450	16.00	0.000
Cronulla C	123.45	0.000	0.000	0.000	0.000	51.437	0.000	0.1450	16.00	0.000

LINK PN2 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1041
 ESTIMATED PEAK FLOW (CUMECS) = 0.12
 ESTIMATED TIME TO PEAK (MINS) = 16.00

LINK Cronulla C 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1041
 ESTIMATED PEAK FLOW (CUMECS) = 0.12
 ESTIMATED TIME TO PEAK (MINS) = 16.00

 #####
 QB10035 Greyhounds - Developed
 Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990
 #####
 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 25.
 RETURN PERIOD (YRS) = 10.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 0.00
 TOTAL OF SECOND SUB-AREAS (ha) = 0.27
 TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Area #2	Slope #1 (%)	% Impervious #2	Pern #1	B #2	Link No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	1.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN2	107.22	0.000	5.000	0.000	2.500	44.673	38.756	0.1238	16.00	0.000
Cronulla C	107.22	0.000	0.000	0.000	0.000	44.673	0.000	0.1238	16.00	0.000

Develoed_Q20-25_Q10-25.txt

Run completed at: 18th February 2010 14:09:26

mik open 0

RTI DL RELEASE - EHP

Developed_Q50-25.txt
Run started at: 18th February 2010 14:10:20

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1511
ESTIMATED PEAK FLOW (CUMECS) = 0.16
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1511
ESTIMATED PEAK FLOW (CUMECS) = 0.16
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 50.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.27
TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
------	-------------	-------	--------------	------	---	------

Page 1

Developed_Q50-25.txt

Label	#1 (ha)	#2	#1 (%)	#2	#1 (%)	#2	#1	#2	#1	#2	No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	1.000
Cronulla C.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN2	145.03	0.000	3.000	0.000	2.500	60.430	56.430	0.1602	15.00	0.000
Cronulla C	145.03	0.000	0.000	0.000	0.000	60.430	0.000	0.1602	15.00	0.000

Run completed at: 18th February 2010 14:10:22

mik open 0

RTI DL RELEASE - EHP

Developed_Q100-25.txt
Run started at: 18th February 2010 14:11:03

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routng increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1781
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1781
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 15.00

#####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990

#####

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 100.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 0.00
TOTAL OF SECOND SUB-AREAS (ha) = 0.27
TOTAL OF ALL SUB-AREAS (ha) = 0.27

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area	Slope	% Impervious	Pern	B	Link
------	-------------	-------	--------------	------	---	------

Page 1

Develped_Q100-25.txt											
Label	#1 (ha)	#2	#1 (%)	#2	#1	#2 (%)	#1	#2	#1	#2	No.
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	1.000
Cronulla C.	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Loss #2	Cont. Loss #1 (mm/h)	Loss #2	Excess Rain #1 (mm)	Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
PN2	161.71	0.000	0.000	0.000	2.500	67.381	66.339	0.1817	15.00	0.000
Cronulla C	161.71	0.000	0.000	0.000	0.000	67.381	0.000	0.1817	15.00	0.000

Run completed at: 18th February 2010 14:11:05

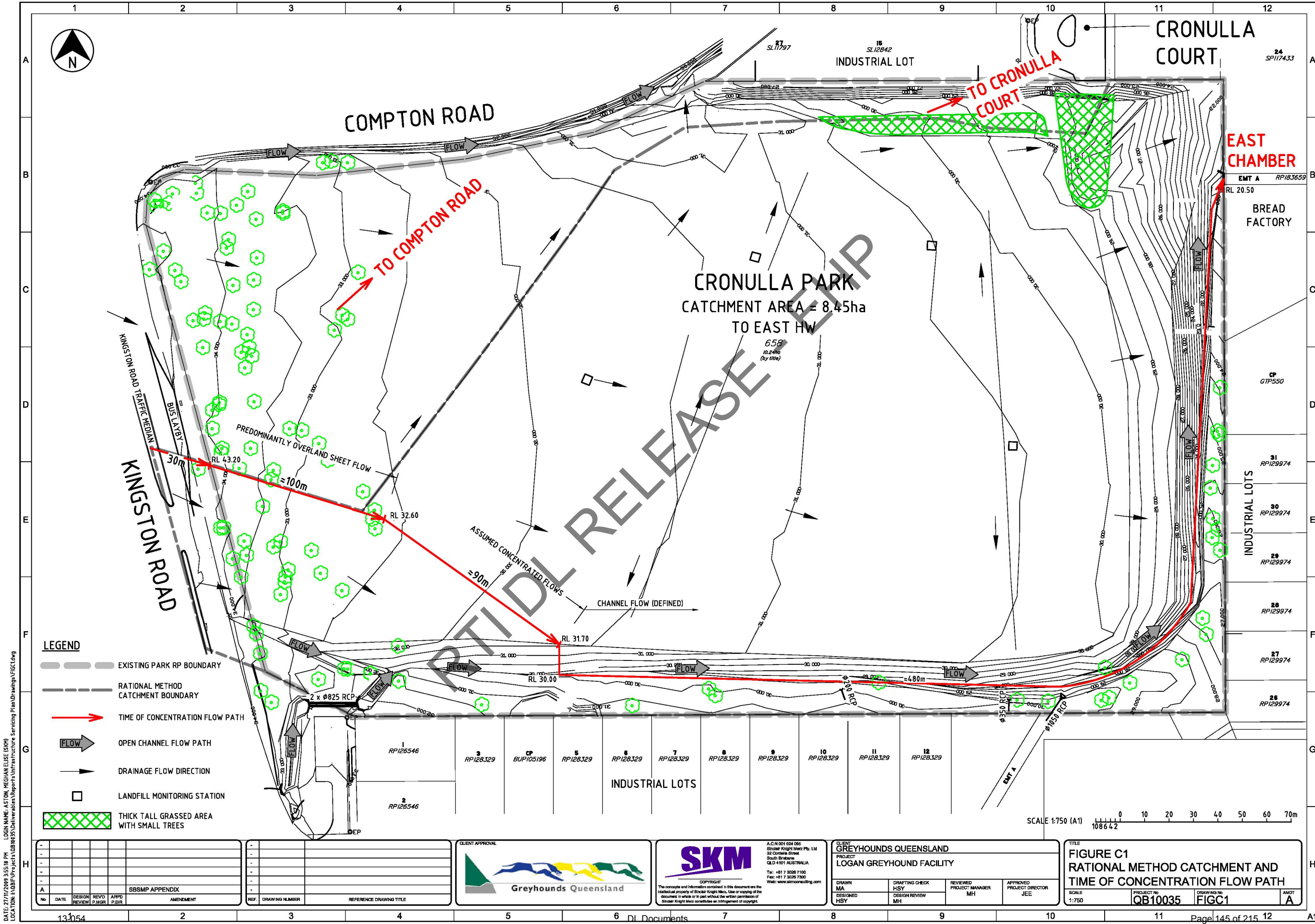
mik open 0

RTI DL RELEASE - EHP

Appendix C Rational Method Data

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ



Project No.

File

SHEET No.

OF

PREPARED BY

DATE

CHECKED BY

DATE

PROJECT	QB10035	LGF	WORK PACKAGE
TASK	RATIONAL M - EXISTING.	ELEMENT	RAPIS CHECK.
<p><u>INFLUENCE FROM EXTERNAL CATCHMENTS</u></p> <ul style="list-style-type: none"> • GROUND TRUTH SITE INSPECTION HAS IDENTIFIED $\frac{1}{2}$ OF KINGSTON ROAD DISCHARGES THROUGH THE WESTERN BOUNDARY OF THE CATCHMENT BEFORE ULTIMATELY ENTERING THE OPEN CHANNEL DRAIN FLOWING NORTH EAST. X- CATCHMENT. • INDUSTRIAL LOTS ON SOUTH, EAST & NORTH-EAST ADJACENT BOUNDARIES DO NOT DIRECTLY AFFECT DEVELOPMENT SITE AS ANY FLOW FROM THESE WOULD DISCHARGE TO THE OPEN CHANNEL. GROUND TRUTH INSPECTION HAS IDENTIFIED THAT MAJORITY OF LOTS DO NOT DISCHARGE INTO CHANNEL. EFFECT IS MINIMAL. — ASSUMED NEUTRAL NEUTRAL • CATCHMENTS FROM WEST OF KINGSTON ROAD ENTERS N.E. OPEN CHANNEL VIA 2x Ø825mm RCP CULVERTS. FLOWS AGAIN DO NOT DIRECTLY AFFECT DEVELOPMENT. NEUTRAL ASSUMED NEUTRAL. • CRONULLA COURT IS BELOW N.E. CORNER OF SITE. NEUTRAL. ASSUMED NEUTRAL • COMPTON ROAD IS BELOW LEVELS ON SITE NEUTRAL. 			
COMMENTS ON CALCULATION RECORD:			Comments by: _____ Date: _____

Project No.

File

SHEET No.

OF

PREPARED BY

DATE

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DATE

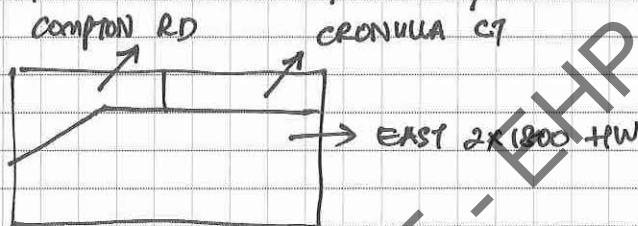
2
1/10

21/10

PROJECT QB 10035 LGF WORK PACKAGE
 TASK RATIONAL M. EXISTING. ELEMENT RAFTS CHECK

CATCHMENT DISTRIBUTION

- DEVELOPMENT SITE IS CURRENTLY CRONULLA PARK, PREDOMINANTLY GRASSED (POOR) W: TREES (POOR GRASS COVER) AT THE WEST, ALONG KINGSDOWN ROAD.
- HAS 3 DISCHARGE LOCATIONS FROM SITE.



- LARGEST SUB-CATCHMENT GOES EAST INTO ~ 2x Ø 1800 RCP HEADWALL (CONCRETE APRON) NEAR BLEND FACTORY.

EAST R/W
MAJOR SUB-C.

EAST HEADWALL CATCHMENT

- SUBJECT OF RAFTS VERIFICATION / VALIDATION
- SUB-CATCHMENT AREA = ~~9.18~~^{8.50} ha (FROM CAD, APPROX.)
- $60 \frac{1}{10}$ (1 HOUR 10 YEAR STORM) = 67 mm/hr
- AREA WAS A PREVIOUS LANDFILL, ∴ CLAY CAPPING LAYER EXISTS BELOW TOPSOIL. INSPECTIONS FOUND > 50% OF SITE IS POORLY GRASSED, WITH EXPOSED HARD, COMPACTED CLAY SURFACE.

~~9.18~~^{8.50} ha.
LCC TABLE
2.9.18.

COMMENTS ON CALCULATION RECORD:

Comments by:

Date:

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21/10

PROJECT QB 10035 - LGF WORK PACKAGE
 TASK RATIONAL M. - EXISTING ELEMENT RATS CHECK

SUB-CATCHMENT CHARACTERISTICS

- FOR PARKS, QUDM (2007) OFTEN SPECIFIES A FRACTION IMPERVIOUS AS 0.0. SINCE KNOWING HISTORY OF SITE & INSPECTION OF EXISTING GROUND CONDITIONS, f_i ESTIMATED TO BE HIGHER, APPROXIMATELY $f_i = 0.15$ QUDM (2007) FIG 4.05
- $f_i = 0.15$ OBTAINED FROM WEIGHTED AVERAGE OF:
 - GREEN AREAS $\Rightarrow f_i = 0.0$
 - POOR GRASS/EARTH $\Rightarrow f_i = 0.15$
 - ROADS $\Rightarrow f_i = 0.90$
- $(0.2 \times 0.90) + (7.2 \times 0.15) + (1.1 \times 0.00) = 0.148$ $f_i = 0.15$ WEIGHTED AVE
~~9.18~~ ~~8.50~~
- C_{10} VALUE APPROXIMATED AS 0.70 QUDM (2007) FIG. 4.05.3(b)
- FREQUENCY FACTORS AS PER QUDM, 2007, CHAPTER 4.

TIME OF CONCENTRATION

- COMPONENTS USUALLY COMPRISED OF:
 - $\Rightarrow$ SHALLOW OVERLAND FLOW
 - $\Rightarrow$ CHANNEL FLOW (RILLS OR DEFINED CHANNEL)
- IN THIS CASE, TOP OF CATCHMENT IS $\frac{1}{2}$ KINGSTON RD, BUT MAJOR TIME COMPONENT WILL BE DETERMINED BY FLOW ACROSS SITE, WHICH WILL BE SHALLOW O/L FLOW. SMALL TOP $\frac{1}{2}$ ROAD CATCHMENT.

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

Project No. _____ File _____
 SHEET No. _____ OF _____
 PREPARED BY HBY DATE _____
 CHECKED BY _____ DATE _____

PROJECT	QB 10035 - LGF	WORK PACKAGE
TASK	RATIONAL M. - EXISTING	ELEMENT RATS CHECK
<p>• OVERLAND SHEET FLOW:</p> <p>⇒ LENGTH ≈ 90 m</p> <p>⇒ SLOPE AVERAGE $\approx 2.0\%$</p> <p>⇒ POORLY GRASSED SURFACE</p> <p>∴ $f \approx 13$ MIN</p> <p style="text-align: right;">QUDM (2007) FIG 4.07</p>		
<p>• OPEN CHANNEL:</p> <p>⇒ LENGTH ≈ 480 m, Drop $\approx 30.5RL - 20.5RL = 10$ m</p> <p>⇒ ASSUME $V = 1.0$ m/s (TYPICAL)</p> <p>⇒ $f = 8$ MIN.</p> <p style="text-align: right;">QUDM (2007) FIG 4.09</p>		
<p>CHECK AGAINST FIG 4.09, QUDM (2007) $f \approx 4.5 \times \Delta 2$</p> <p style="text-align: right;">≈ 9 MIN</p>		
<p>⇒ ASSUMPTION OF $V = 1$ m/s OK, ADOPT $f = 9$ MIN (CONSERVATIVE)</p>		
<p>• TOTAL $f_c = 13 + 9 = 21$ MIN.</p>		
<p>• SEGMENT LONG, BUT ADOPT, SINCE LONGER f_c IS CONSERVATIVE.</p>		
<p><u>RATIONAL METHOD</u></p>		
<p>• FLOW (PEAK) ESTIMATED FROM QUDM, 2007.</p> <p style="text-align: right;">QUDM (2007) SEC. 4.03.1</p>		
$Q = \frac{C \times I \times A}{360}$		
<p>• REFER EXCEL CALCULATION FOR FLOWS.</p>		
COMMENTS ON CALCULATION RECORD:		<p>Comments by: _____ Date: _____</p>

RATIONAL METHOD FLOWRATE ESTIMATION

Logan Greyhound Facility
QB10035

Sub-Catchment	Pre-Dev
FRACTION IMPERVIOUS Fi	0.150
60INT10	67
C10 VALUE	0.700

CATCHMENT AREA (Ha)	8.50
---------------------	------

TIME IN CONCENTRATION Tc (min)	21	From Calc Sheet
--------------------------------	----	-----------------

	F1	F2	F5	F10	F20	F50	F100
	0.8	0.85	0.95	1	1.05	1.15	1.2
	C1	C2	C5	C10	C20	C50	C100
Pre-Dev	0.56	0.60	0.67	0.70	0.74	0.81	0.84
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(mm/hr)	INT1	INT2	INT5	INT10	INT20	INT50	INT100
	65.0	83.0	104.0	117.0	133.0	156.0	173.0
	Q1	Q2	Q5	Q10	Q20	Q50	Q100
Pre-Dev	0.859	1.166	1.633	1.934	2.308	2.965	3.431
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL (m3/s)	0.859	1.166	1.633	1.934	2.308	2.965	3.431

APPROXIMATE VOLUME OF RUNOFF**SIMPLIFIED TRIANGULAR METHOD**

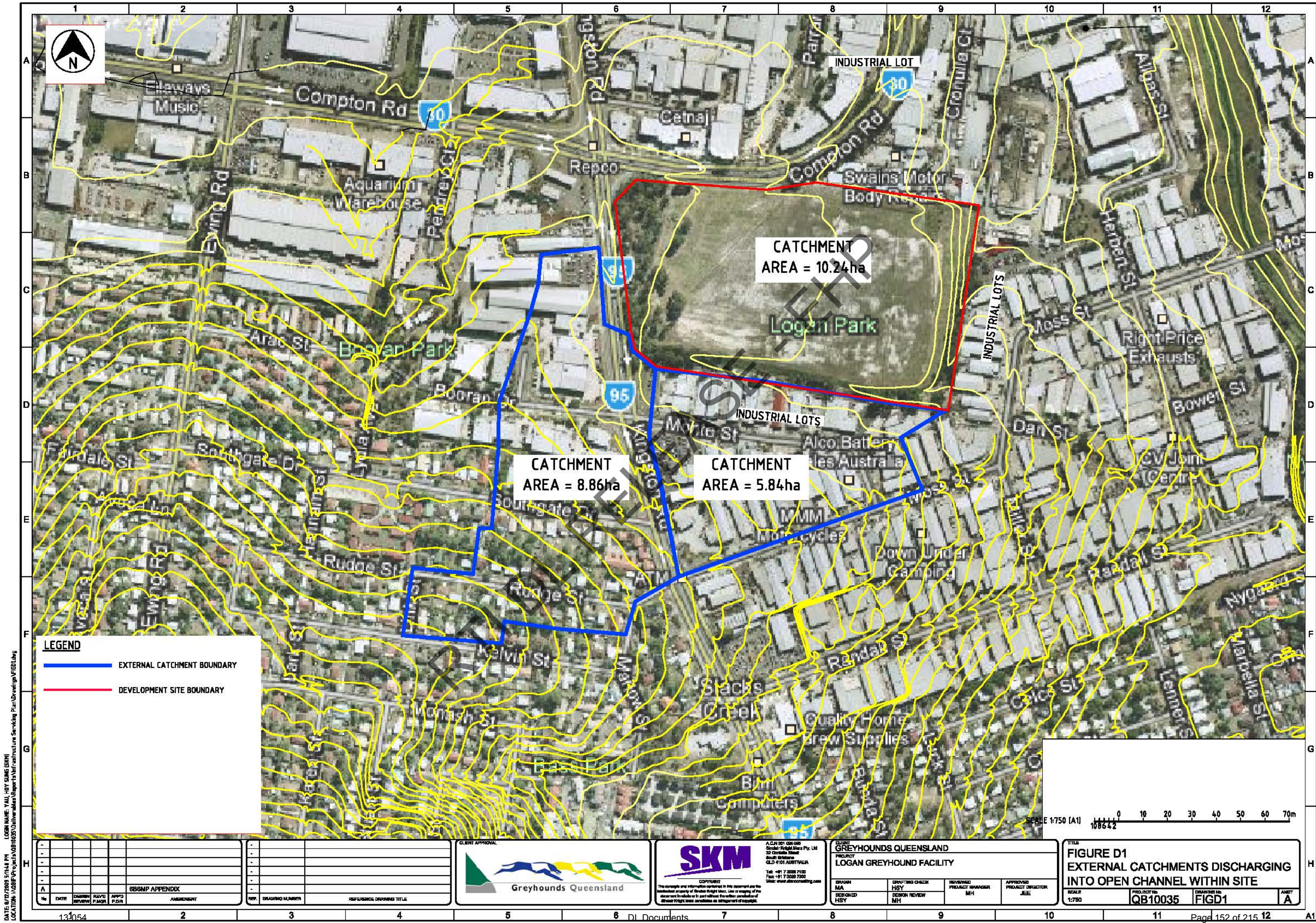
	Q1	Q2	Q5	Q10	Q20	Q50	Q100
VOLUME (m3)	2451.22	3325.65	4657.32	5515.25	6582.94	8456.71	9786.03

CRITICAL STORM DURATION (ASSUMED) 60 (min)

Appendix D Open Channel Calculations

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ



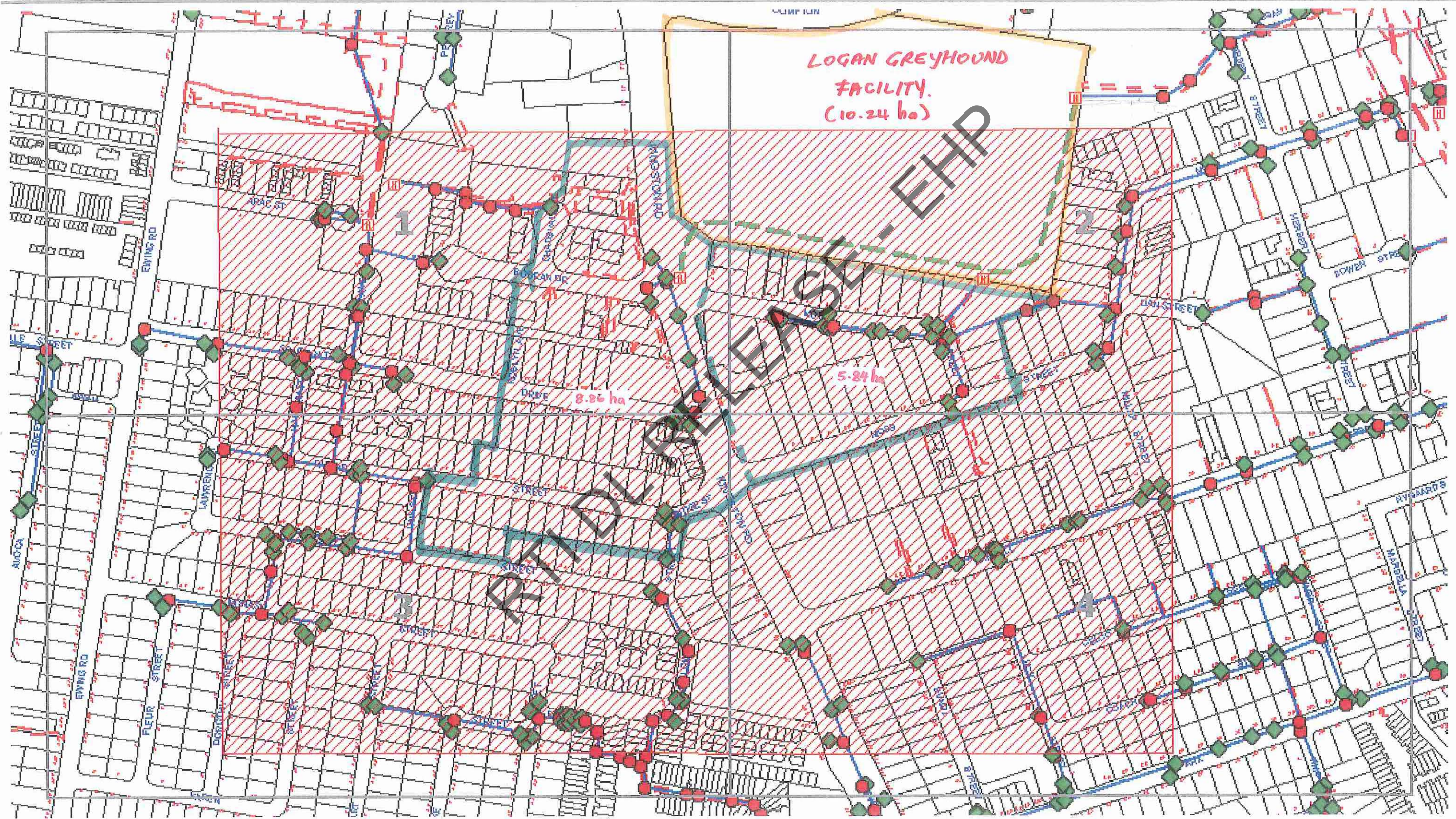
LEGEND

- DEVELOPMENT SITE
- EXTERNAL CATCHMENT
- EXTERNAL SUB-CATCHMENT (REFER CALCS.)



Sequence No: 17222191
Dig Location: monash St Slacks Creek, Qld 4127

Date: 25/11/2009



Project No.

File

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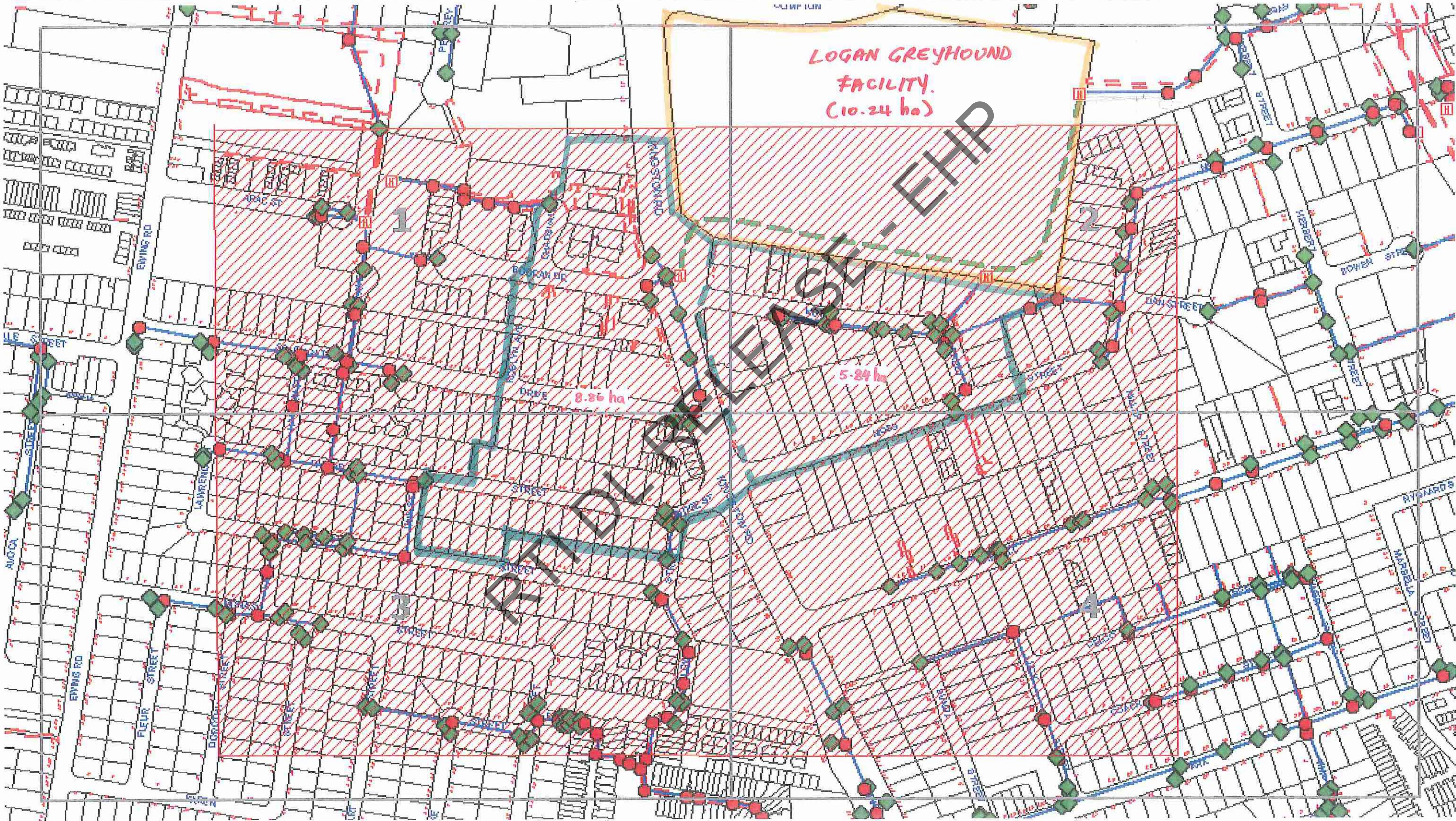
CHECKED BY

DATE

PROJECT	Q/B10035 GREYHOUNDS	WORK PACKAGE	EXTERNAL CATCHMENT
TASK	FLOW ESTIMATION	ELEMENT	
<ul style="list-style-type: none"> EXTERNAL CATCHMENTS DISCHARGE INTO OPEN DRAIN. PART OF THE ANX EXTERNAL CATCHMENT CONTRIBUTES TO PS1 NODE & THE REMAINDER ADDS TO FLOW AT PS2. ESTIMATION OF CATCHMENT AREAS & BOUNDARIES IS BY TOPOGRAPHICAL INFORMATION. SEE ATTACHED DRAWING / FIGURE ESTIMATION OF FLOWS IS BY USE OF RATIONAL METHOD: $Q = \frac{C I A}{360}$ <p>WHERE $C = 0.90$ (DEVELOPED URBAN AREA)</p> <p>A = AREA IN HECTARES</p> <p>I = INTENSITY FOR 100 YEAR STORM BASED ON t_c AT PS1, PS2, PS3 & OUTLET.</p> t_c FOR EX. CATCHMENTS TO PS1 IS: <ul style="list-style-type: none"> → STD INLET TIME = 5 MIN (ROADS, PAVED, URBAN) → UNDERGROUND PIPED SYSTEM ⇒ $L = 640$ m. <ul style="list-style-type: none"> ⇒ DROP = $1L(43-1) - 1L32.50$ (CULVERT OUTLET FROM KINGSTON RD) = 9.5 m ⇒ $t = 6.5$ MIN → KINGSTON RD CULVERT TO PS1 ⇒ $L = 205$ m <ul style="list-style-type: none"> DROP = $1L32.50 - 1L29.50$ = 3.0 m. <p>NOTE: USING MULTIPLIERS IN FIG 4.09 DOES NOT APPEAR RIGHT. EXPECTED ↑ Q, ∴ RELATIVELY ↑ V ON AVERAGE.</p> <p>⇒ V ASSUMED = 1.0 m/s</p> <p>⇒ $t \approx 3$ MIN.</p>			
COMMENTS ON CALCULATION RECORD:			Comments by: _____ Date: _____



- LEGEND
- DEVELOPMENT SITE
 - EXTERNAL CATCHMENT
 - EXTERNAL SUB-CATCHMENT (REFER CALCS.)



Project No.

SHEET No.

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File

OF

DATE

DATE

PROJECT QB10035 LGF

WORK PACKAGE

EXTERNAL CATCHMENT

TASK

FLOW ESTIMATION

ELEMENT

$$\therefore t_c = 5 + 6.5 + 3.0 = 14.5 \text{ MIN, SAY } 15 \text{ MIN.}$$

- INTENSITY FOR $t_c = 15 \text{ MIN}$ & $Q = 100$ IS 200 mm/hr

LCC PS 5
TB 2.9.1B.

$$\begin{aligned} \bullet \text{ } Q \text{ AT PSI} &= \frac{0.9 \times 200 \times 8.86 (\text{EST. AREA})}{360} \\ &= 4.43 \text{ m}^3/\text{s}. \end{aligned}$$

- DISCHARGE FROM LGF SITE AS REPORTED IN RAFTS FOR

$$\text{A } Q100 \text{ STORM IS } 1.489 \text{ m}^3/\text{s}$$

- TOTAL Q EXPECTED TO FLOW FROM PSI IS THEREFORE

$$4.43 + 1.489 = 5.919 \text{ m}^3/\text{s}.$$

- CHECKS OF OPEN CHANNEL CAPACITY TO BE DONE USING FLOWMASTER. REFER FLOWMASTER RESULTS.

- t_c FOR EX. CATCHMENTS TO PS2 IS :

$$\rightarrow \text{PRIOR } t_c \text{ ABOVE} = 15.0 \text{ MIN.}$$

$$\rightarrow \text{ADD FURTHER OPEN CHANNEL} \Rightarrow 3.0 \text{ MIN (FROM RAFTS)} \\ \text{PSI LAG TIME}$$

$$\therefore t_c = 15.0 + 3.0 = 18 \text{ MIN.}$$

$$\bullet I_{100} = 185 \text{ mm/hr}$$

$$\begin{aligned} \bullet \text{ } Q \text{ AT PS2 (FROM EX.)} &= \frac{0.9 \times 185 \times (8.86 + 5.84)}{360} \\ &= 6.79 \text{ m}^3/\text{s}. \end{aligned}$$

ADDITIONAL
AREATB 2.9.1B
LCC P. SCHEME 5

- DISCHARGE FROM RAFTS REPORTED IN RAFTS IS $1.991 \text{ m}^3/\text{s}$ FOR $Q100$ STORM.

COMMENTS ON CALCULATION RECORD:

Comments by:

Date:

Project No.

SHEET No.

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File

OF

DATE

DATE

3

18/11

25/11

PROJECT Q/B 100 35 LGF

WORK PACKAGE

EXTERNAL CATCHMENT.

TASK FLOW ESTIMATION

ELEMENT

- TOTAL Q EXPECTED AT PS2 IS THEREFORE :

$$6.79 + 1.19 = 7.98 \text{ m}^3/\text{s}$$

- CHECKS TO BE DONE FOR OPEN CHANNEL USING FLOWMASTER. REFER FLOWMASTER RESULTS.

- t_c FOR EX. CATCHMENT TO PS3 IS :

$$\rightarrow \text{PRIOR } t_c \text{ ABOVE} = 18.0 \text{ MIN.}$$

$$\rightarrow \text{ADD FURTHER OPEN CHANNEL} \Rightarrow 2.9 \text{ MIN (FROM RAPID LAG TIME)}$$

$$\therefore t_c = 18 + 2.9 = 20.9 \text{ MIN.}$$

$$\bullet 21 I_{100} = 173 \text{ mm/hr}$$

NO ADDITIONAL EX. CATCHMENTS.

TB 2.9.1B
LCL P. SCHEME 5

$$\bullet Q \text{ AT PS3 (EX.)} = 0.9 \times 173 \times 14.7$$

$$= 6.36 \text{ m}^3/\text{s} \quad (\downarrow I, \downarrow Q, = A \therefore \checkmark)$$

- DISCHARGE FROM RAPID A PS3 IS 3.414 m³/s IN A Q100 STORM.

- TOTAL Q EXPECTED AT PS3 IS THEREFORE :

$$6.36 + 3.414 = 9.774 \text{ m}^3/\text{s}$$

COMMENTS ON CALCULATION RECORD:

Comments by:

Date:

Project No.

File

SHEET No.

OF

PREPARED BY

DATE 25/11

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DATE

PROJECT QB10035 GREYHOUNDS

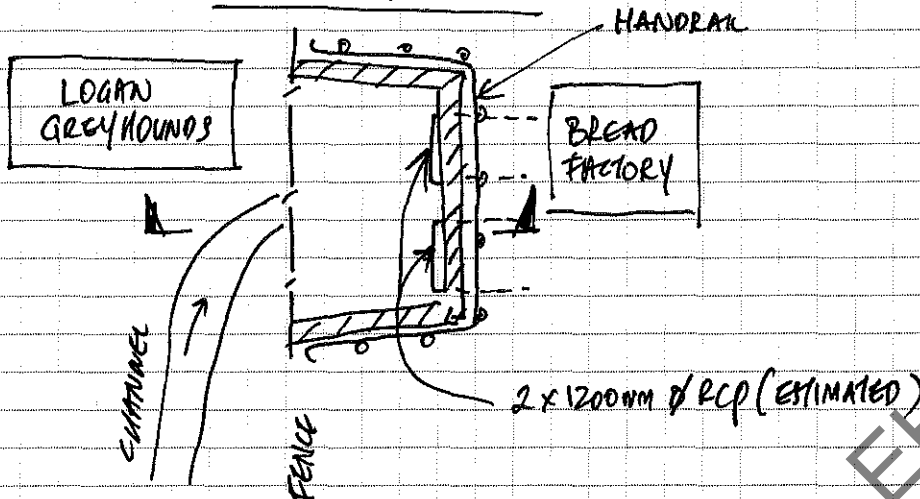
WORK PACKAGE

EXTERNAL CATCHMENT

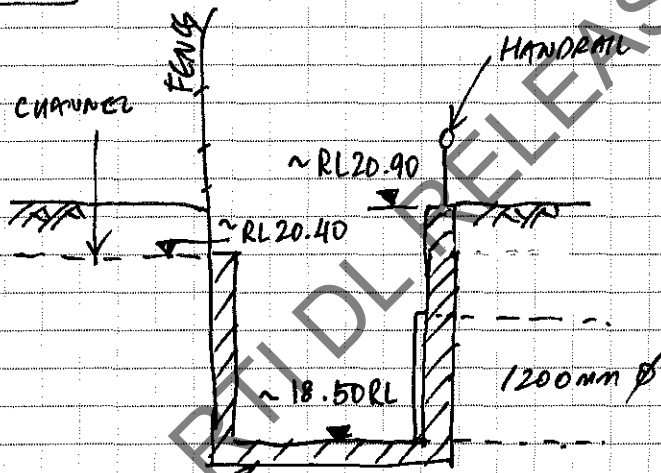
TASK FLOW ESTIMATION

ELEMENT

ESTIMATED INLET HEADWALL INTO



SECTION



HEADWALL IS A BOXED PI/SUMP WITH 2x1200mm Ø RCP (ESTIMATED) AT THE BOTTOM.

WEIR (TOP OF BOX AT RL 20.90) HAS BEEN ESTIMATED AS 5.0 M.

COMMENTS ON CALCULATION RECORD:

Comments by:

Date:

PS1 table
Worksheet for Irregular Channel

Project Description	
Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS1_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

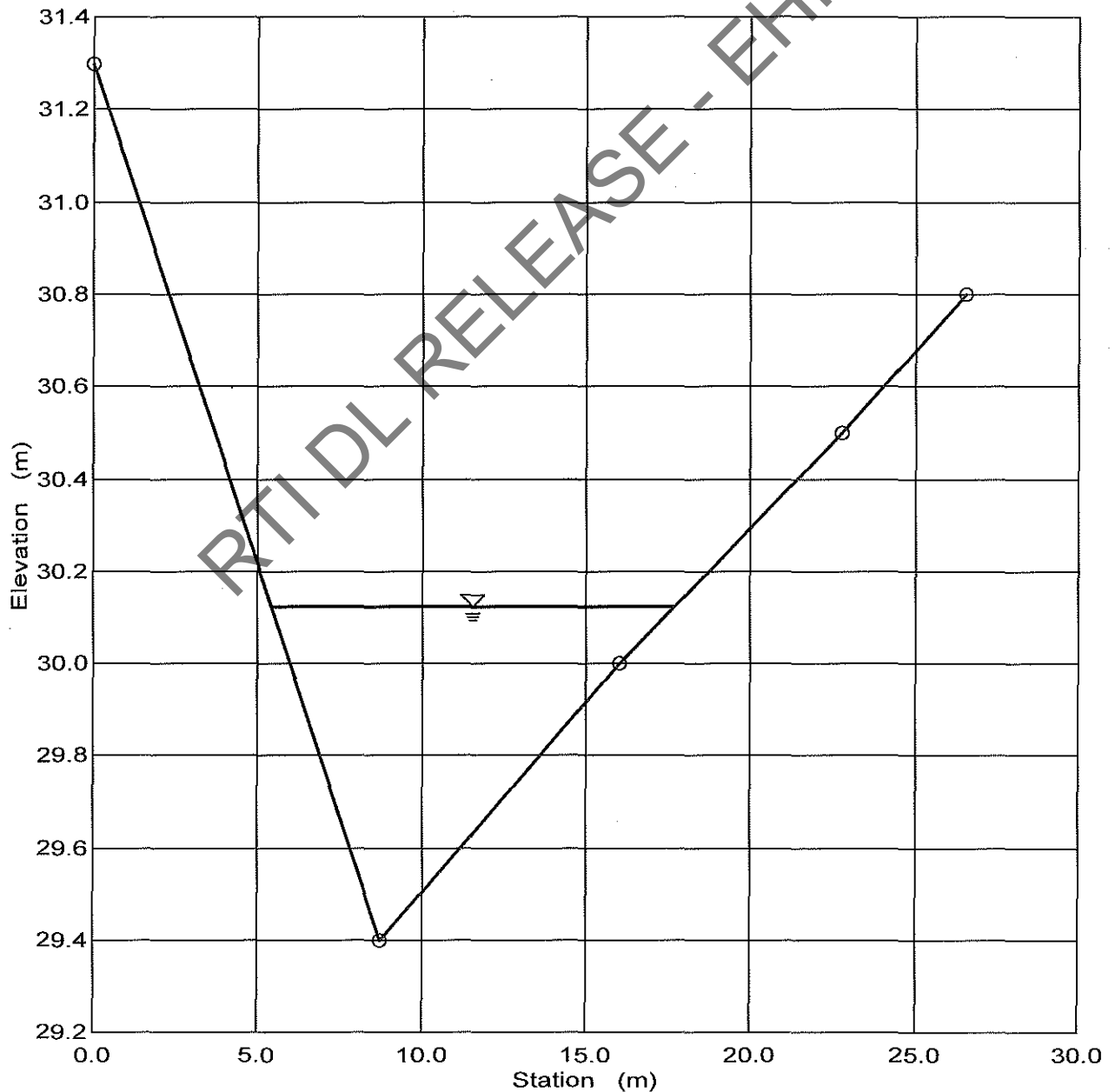
Input Data				
Channel Slope		0.011363 m/m		
Elevation range: 29.40 m to 31.30 m.				
Station (m)	Elevation (m)	Start Station	End Station	Roughness
0.00	31.30	0.00	8.75	0.050
8.75	29.40	8.75	16.00	0.040
16.00	30.00	16.00	22.80	0.030
22.80	30.50	22.80	26.56	0.025
26.56	30.80			
Discharge	5.919	m³/s		

Results		
Wtd. Mannings Coefficient	0.039	
Water Surface Elevation	30.12	m
Flow Area	4.37	m ²
Wetted Perimeter	12.35	m
Top Width	12.24	m
Depth	0.72	m
Critical Water Elev.	30.03	m
Critical Slope	0.024643	m/m
Velocity	1.36	m/s
Velocity Head	0.09	m
Specific Energy	30.22	m
Froude Number	0.72	
Full Flow Capacity	92.40	m ³ /s
Flow is subcritical.		

PS1 cross section
Cross Section for Irregular Channel

Project Description	
Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS1_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.039
Channel Slope	0.011363 m/m
Water Surface Elevation	30.12 m
Discharge	5.919 m ³ /s



PS2 table
Worksheet for Irregular Channel

Project Description	
Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS2_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

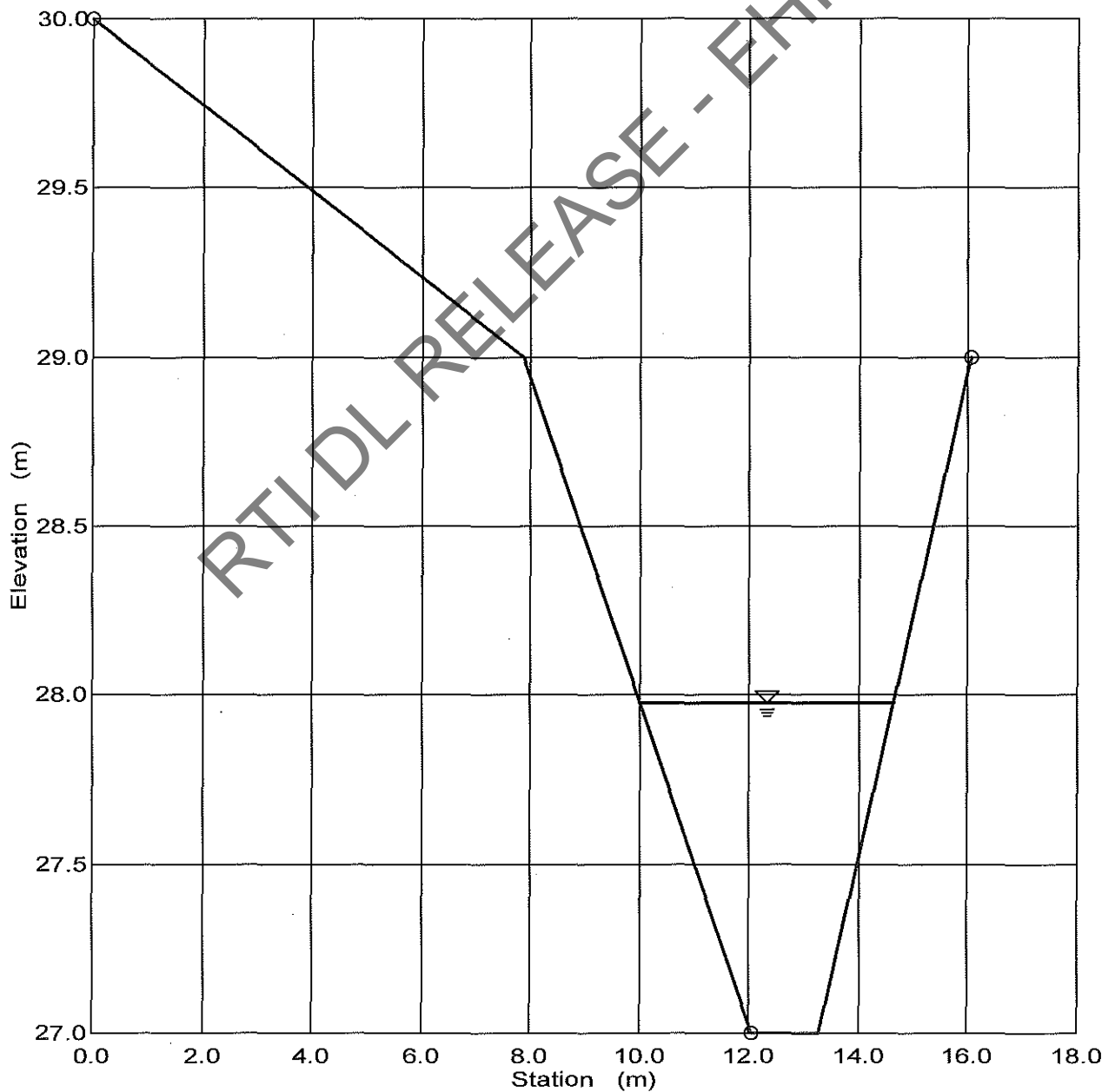
Input Data				
Channel Slope		0.014400 m/m		
Elevation range: 27.00 m to 30.00 m.				
Station (m)	Elevation (m)	Start Station	End Station	Roughness
0.00	30.00	0.00	12.06	0.050
7.88	29.00	12.06	16.06	0.025
12.06	27.00			
13.27	27.00			
16.06	29.00			
Discharge	7.98	m³/s		

Results		
Wtd. Mannings Coefficient	0.029	
Water Surface Elevation	27.98	m
Flow Area	2.85	m ²
Wetted Perimeter	5.15	m
Top Width	4.62	m
Depth	0.98	m
Critical Water Elev.	28.04	m
Critical Slope	0.011073	m/m
Velocity	2.80	m/s
Velocity Head	0.40	m
Specific Energy	28.38	m
Froude Number	1.14	
Full Flow Capacity	90.37	m ³ /s
Flow is supercritical.		

PS2 cross section
Cross Section for Irregular Channel

Project Description	
Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS2_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.029
Channel Slope	0.014400 m/m
Water Surface Elevation	27.98 m
Discharge	7.98 m ³ /s



PS3 table
Worksheet for Irregular Channel

Project Description	
Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS3_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope		0.033000 m/m		
Elevation range: 23.52 m to 28.00 m.				
Station (m)	Elevation (m)	Start Station	End Station	Roughness
0.00	28.00	0.00	8.20	0.040
8.00	24.00	8.20	11.37	0.025
8.20	23.52			
9.20	23.75			
10.50	24.00			
11.37	25.00			
Discharge	9.774	m³/s		

Results			
Wtd. Mannings Coefficient	0.024		
Water Surface Elevation	24.50	m	
Flow Area	2.17	m ²	
Wetted Perimeter	4.64	m	
Top Width	3.92	m	
Depth	0.98	m	
Critical Water Elev.	24.83	m	
Critical Slope	0.008678	m/m	
Velocity	4.51	m/s	
Velocity Head	1.04	m	
Specific Energy	25.53	m	
Froude Number	1.94		
Full Flow Capacity	255.43	m ³ /s	
Flow is supercritical.			

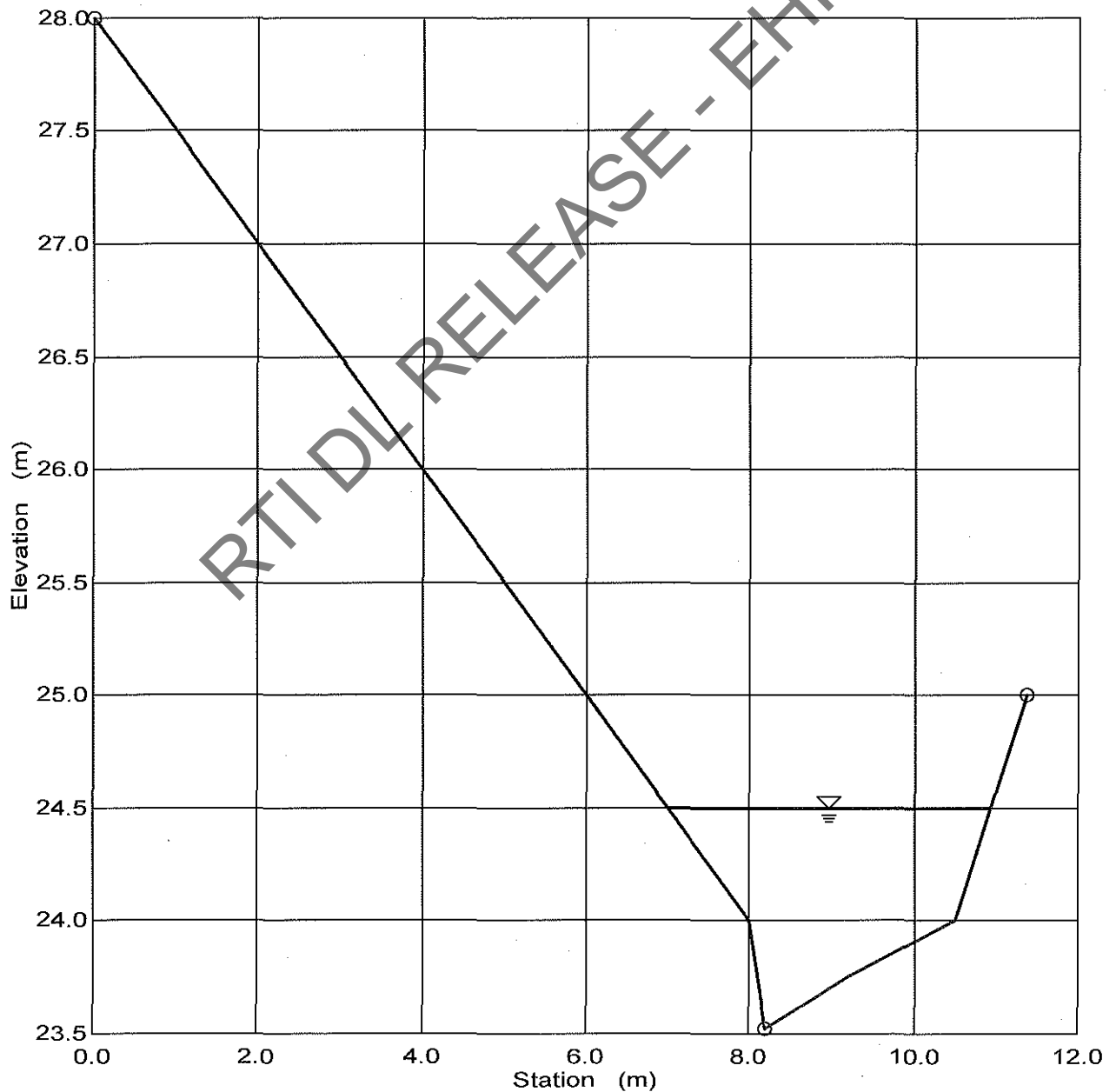
PS3 cross section
Cross Section for Irregular Channel

Project Description

Project File	d:\yau'ss~1\progra~1\flowma~1\qb10035.fm2
Worksheet	PS3_REAL
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

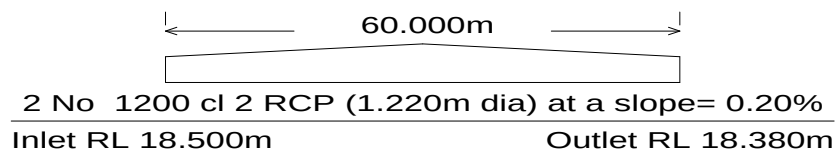
Section Data

Wtd. Mannings Coefficient	0.024
Channel Slope	0.033000 m/m
Water Surface Elevation	24.50 m
Discharge	9.774 m ³ /s



CulvertW - Design Case No 2

(File: QB10035.CUL - Date: 18-2-2010)



Culvert Data

Using Mannings 'n' = 0.013
Entrance Loss Coefficient 'k' = 0.500
Entrance - Sqr end & headwall

Weir Data

Weir Length = 6.000m Weir Coefficient = 0.577
Weir Crest Height = 2.520m (RL 20.900m)

No Channel Data specified to be used

Headwater

Approach Flow = 12.869m³/s
Flow in each Culvert = 4.478m³/s
Flow over weir = 3.913m³/s (depth = 0.527m)
Tailwater depth = 1.200m (RL 19.580m)
Using fixed Tailwater depth
Critical depth at outlet = 1.104m (RL 19.484m)
Effective tailwater depth = 1.200m (RL 19.580m)
Head Loss in Culvert = 1.834m
Depth at outlet adopted to
calculate outlet velocity = 1.200m (RL 19.580m)
Outlet Velocity = 3.831m/s

OUTLET control

Headwater is at RL 21.427m - 0.527m above Weir Crest
Tailwater is at RL 19.580m - 1.200m above outlet invert

Run started at: 18th February 2010 13:06:20

#####

RUNTIME RESULTS

#####

Max. no. of links allowed = 1500

Max. no. of routing increments allowed = 250000

Max. no. of rating curve points = 250000

Max. no. of storm temporal points = 250000

Max. no. of channel subreaches = 25

Max link stack level = 25

Input Version number = 700

LINK PN4 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.100
ESTIMATED PEAK FLOW (CUMECS) = 0.68
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN5 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.857
ESTIMATED PEAK FLOW (CUMECS) = 1.2
ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK T1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.822
ESTIMATED PEAK FLOW (CUMECS) = 0.70
ESTIMATED TIME TO PEAK (MINS) = 35.00

LINK T2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 3.330
ESTIMATED PEAK FLOW (CUMECS) = 1.3
ESTIMATED TIME TO PEAK (MINS) = 34.00

LINK KR2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1271
ESTIMATED PEAK FLOW (CUMECS) = 0.93E-01
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK KR1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2872
ESTIMATED PEAK FLOW (CUMECS) = 0.20
ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK P3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8847
 ESTIMATED PEAK FLOW (CUMECS) = 0.55
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK P4 Basin 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.786
 ESTIMATED PEAK FLOW (CUMECS) = 1.0
 ESTIMATED TIME TO PEAK (MINS) = 25.00

iosd llkta 0 8
 LINK EX1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 9.090
 ESTIMATED PEAK FLOW (CUMECS) = 6.2
 ESTIMATED TIME TO PEAK (MINS) = 22.00

LINK PS1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 11.80
 ESTIMATED PEAK FLOW (CUMECS) = 7.5
 ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK EX2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 6.000
 ESTIMATED PEAK FLOW (CUMECS) = 3.7
 ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK PS2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 18.83
 ESTIMATED PEAK FLOW (CUMECS) = 11.
 ESTIMATED TIME TO PEAK (MINS) = 28.00

LINK PS3 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 22.64
 ESTIMATED PEAK FLOW (CUMECS) = 12.
 ESTIMATED TIME TO PEAK (MINS) = 29.00

LINK East Cmbr 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 24.50
 ESTIMATED PEAK FLOW (CUMECS) = 13.
 ESTIMATED TIME TO PEAK (MINS) = 31.00

LINK PN2 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2700
 ESTIMATED PEAK FLOW (CUMECS) = 0.17
 ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK Cronulla C 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2700
 ESTIMATED PEAK FLOW (CUMECS) = 0.17
 ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK P1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2652
 ESTIMATED PEAK FLOW (CUMECS) = 0.15
 ESTIMATED TIME TO PEAK (MINS) = 26.00

LINK P2 1.000

QB10035_Developed_rev1.out

ESTIMATED VOLUME (CU METRES*10**3) = 0.9408
 ESTIMATED PEAK FLOW (CUMECS) = 0.59
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK PN1 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.089
 ESTIMATED PEAK FLOW (CUMECS) = 0.68
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK Compton Rd 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 1.089
 ESTIMATED PEAK FLOW (CUMECS) = 0.68
 ESTIMATED TIME TO PEAK (MINS) = 25.00

LINK Dummy 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 25.86
 ESTIMATED PEAK FLOW (CUMECS) = 14.
 ESTIMATED TIME TO PEAK (MINS) = 31.00

 #####

QB10035 Greyhounds - Developed

Results for period from 0: 0.0 1/ 1/1990
 to 5: 0.0 1/ 1/1990

 #####

ROUTING INCREMENT (MINS) = 1.00
 STORM DURATION (MINS) = 60.
 RETURN PERIOD (YRS) = 100.
 BX = 1.0000
 TOTAL OF FIRST SUB-AREAS (ha) = 13.76
 TOTAL OF SECOND SUB-AREAS (ha) = 11.61
 TOTAL OF ALL SUB-AREAS (ha) = 25.37

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
PN4	0.3580	0.7240	5.000	3.700	100.0	0.000	.013	.033	.0004	.0139	1.000
PN5	.00001	0.7510	.0010	10.10	100.0	0.000	.025	.033	.0002	.0086	1.001
T1	0.0900	1.711	.5000	1.000	100.0	0.000	.013	.033	.0006	.0417	2.000
T2	0.0750	1.427	.5000	1.000	100.0	0.000	.013	.033	.0005	.0379	2.001
KR2	0.0980	0.0260	3.000	3.500	100.0	0.000	.015	.033	.0003	.0025	3.000
KR1	0.2280	0.0520	3.000	3.000	100.0	0.000	.015	.033	.0004	.0039	4.000
P3	0.2270	0.3610	2.000	1.700	100.0	0.000	.015	.040	.0005	.0164	4.001
P4 Basin	0.4100	0.4750	3.000	1.300	100.0	0.000	.015	.034	.0005	.0192	4.002
EX1	7.088	1.772	3.000	3.000	100.0	0.000	.013	.035	.0022	.0256	5.000
PS1	.00001	0.8170	3.000	2.000	100.0	0.000	.014	.036	0.000	.0214	3.001

QB10035_Developed_rev1.out

EX2	4.672	1.168	3.000	3.000	0.000	0.000	.013	.035	.0154	.0206	6.000
PS2	.00001	1.031	.0010	1.800	100.0	0.000	.025	.033	.0002	.0239	3.002
PS3	.00001	0.4740	.0010	5.000	100.0	0.000	.025	.036	.0002	.0102	2.002
East Cmbr	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	1.002
PN2	.00001	0.2680	.0010	3.200	100.0	0.000	.025	.033	.0002	.0089	7.000
Cronulla C	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	7.001
P1	.00001	0.2630	.0010	2.000	100.0	0.000	.025	.040	.0002	.0129	8.000
P2	0.5150	0.1440	3.000	2.000	100.0	0.000	.015	.033	.0006	.0081	8.001
PN1	.00001	0.1470	.0010	2.100	100.0	0.000	.025	.033	.0002	.0080	8.002
Compton Rd	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0021	0.000	8.003
Dummy	.00001	0.000	.0010	0.000	100.0	0.000	.025	0.00	.0002	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. #1 (mm)	Loss #2 (mm)	Cont. #1 (mm/h)	Loss #2 (mm/h)	Excess #1 (mm)	Rain #2 (mm)	Peak Inflow (m ³ /s)	Time to Peak	Link Lag mins
PN4	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.6836	25.00	.5000
PN5	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.168	25.00	0.000
T1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.7026	35.00	0.000
T2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.295	34.00	0.000
KR2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.0930	22.00	2.800
KR1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.2045	22.00	.5000
P3	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.5479	25.00	2.000
P4 Basin	103.22	0.000	0.000	0.000	2.500	103.22	100.72	1.046	25.00	0.000
EX1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	6.247	22.00	3.000
PS1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	7.497	28.00	3.000
EX2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	3.673	26.00	0.000
PS2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	10.999	28.00	1.400
PS3	103.22	0.000	0.000	0.000	2.500	103.22	100.72	12.489	29.00	1.500
East Cmbr	103.22	0.000	0.000	0.000	0.000	103.22	0.000	13.278	31.00	0.000
PN2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.1652	26.00	0.000
Cronulla C	103.22	0.000	0.000	0.000	0.000	103.22	0.000	0.1652	26.00	0.000
P1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.1485	26.00	3.000
P2	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.5887	25.00	0.000
PN1	103.22	0.000	0.000	0.000	2.500	103.22	100.72	0.6787	25.00	0.000
Compton Rd	103.22	0.000	0.000	0.000	0.000	103.22	0.000	0.6787	25.00	0.000

Dummy 103.22 0.000 0.000 0.000 0.000 103.22 0.000 13.838 31.00 0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m ³ /s)	Time to Peak	Peak Outflow (m ³ /s)	Total Inflow (m ³)	----- Vol. Avail	Basin ----- Vol. Used	Stage Used
P4 Basin	25.00	1.045	29.00	.7893	1786.1	0.0000	578.90	31.663

SUMMARY OF BASIN OUTLET RESULTS

Link Label	No. of	S/D Factor (m)	Dia (m)	Width (m)	Pipe Length (m)	Pipe Slope (%)
P4 Basin	1.0	1.000		0.000	20.000	0.2000

Run completed at: 18th February 2010 13:06:48

mik open 0

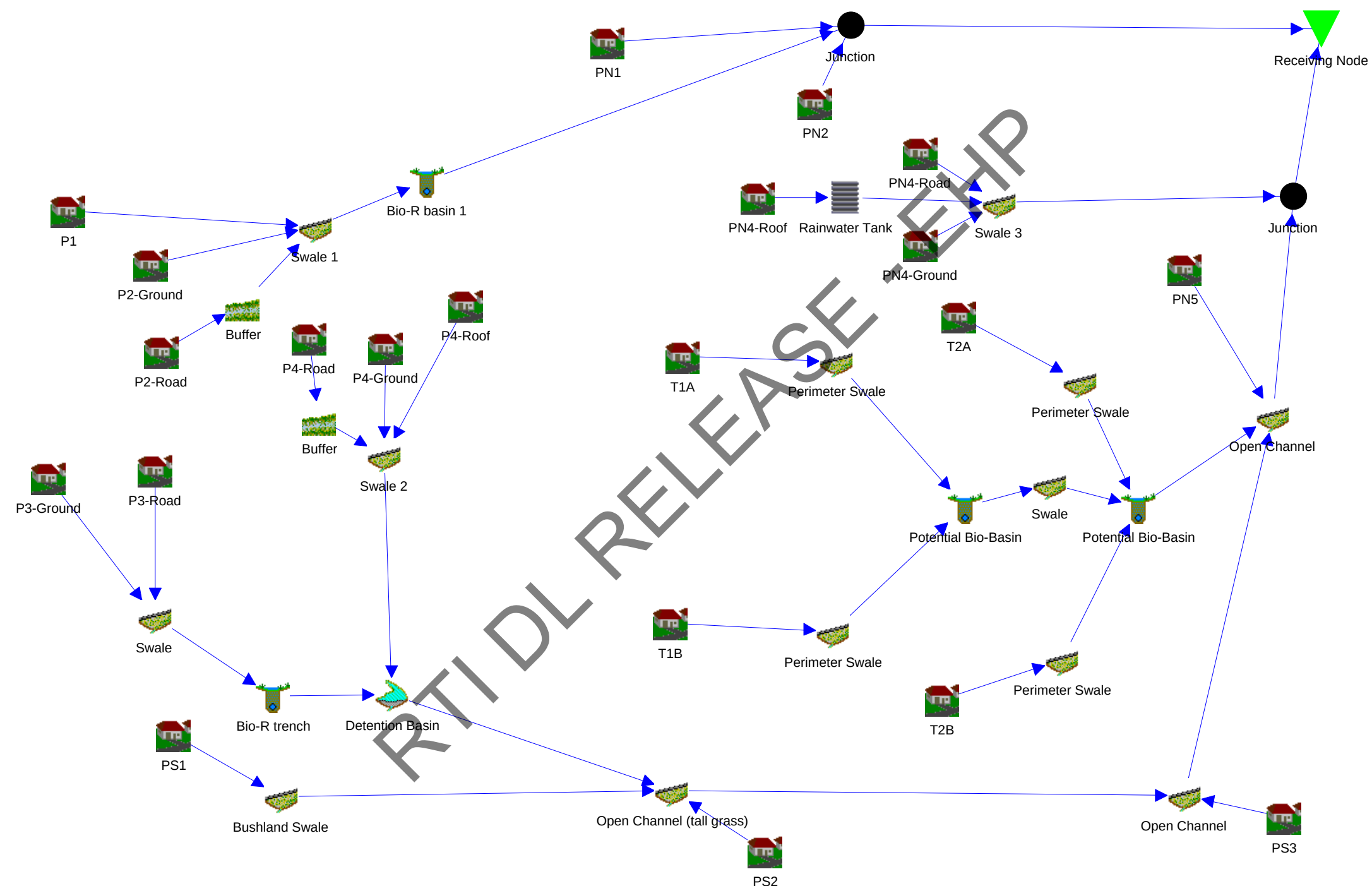
RTI DL RELEASE - EHP

Appendix E MUSIC Model Data

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ

LOGAN GREYHOUND FACILITY - Site Based Stormwater Management Plan
Figure E2 - MUSIC Model Schematic



LOGAN GREYHOUND FACILITY – Site Based Stormwater Management Plan

Figure E3: MUSIC Model Inputs – Printscreens of input data

Detention Basin

Properties of Detention Basin

Location: Detention Basin

Inlet Properties

Low Flow By-pass (cubic metres per sec): 0.000
High Flow By-pass (cubic metres per sec): 100.000

Storage Properties

Surface Area (square metres): 792.0
Extended Detention Depth (metres): 0.01
Permanent Pool Volume (cubic metres): 0.0
Vegetation Cover (% of surface area): 10.0
Seepage Loss (mm/hr): 0.00
Evaporative Loss as % of PET: 100.00

Outlet Properties

Equivalent Pipe Diameter (mm): 450
Overflow Weir Width (metres): 8.0
Notional Detention Time (hrs): 46.6E-3

Re-use... Fluxes... Notes... More

Cancel Back Finish

Bio-Retention Basin (turnaround)

Properties of Bio-R basin 1

Location: Bio-R basin 1

Inlet Properties

Low Flow By-Pass (cubic metres per sec): 0.000
High Flow By-pass (cubic metres per sec): 100.000

Storage Properties

Extended Detention Depth (metres): 0.30
Surface Area (square metres): 540.0
Seepage Loss (mm/hr): 0.00

Infiltration Properties

Filter Area (square metres): 440.0
Filter Depth (metres): 0.6
Filter Median Particle Diameter (mm): 0.45
Saturated Hydraulic Conductivity (mm/hr): 180.00
Depth below underdrain pipe (% of Filter Depth): 0.0

Outlet Properties

Overflow Weir Width (metres): 3.0

Fluxes... Notes... More

Cancel Back Finish

Bio-Retention Basin (tracks – typical)

Properties of Potential Bio-Basin

Location: Potential Bio-Basin

Inlet Properties

Low Flow By-Pass (cubic metres per sec): 0.000
High Flow By-pass (cubic metres per sec): 100.000

Storage Properties

Extended Detention Depth (metres): 0.10
Surface Area (square metres): 150.0
Seepage Loss (mm/hr): 0.00

Infiltration Properties

Filter Area (square metres): 100.0
Filter Depth (metres): 0.6
Filter Median Particle Diameter (mm): 0.45
Saturated Hydraulic Conductivity (mm/hr): 180.00
Depth below underdrain pipe (% of Filter Depth): 0.0

Outlet Properties

Overflow Weir Width (metres): 3.0

Fluxes... Notes... More

Cancel Back Finish

Rainwater Tank

Properties of Rainwater Tank

Location: Rainwater Tank

Inlet Properties

Low Flow By-pass (cubic metres per sec): 0.0000
High Flow By-pass (cubic metres per sec): 100.000

Storage Properties

Volume below overflow pipe (kL): 15.00
Depth above overflow (metres): 0.20
Surface Area (square metres): 21.0

Outlet Properties

Overflow Pipe Diameter (mm): 100

Re-use Properties

☐ Use stored water for irrigation or other purpose

Annual Demand (kL/yr) scaled by daily PET: 0.000
Daily Demand (kL/day): 0.000
Monthly distribution of Annual Demand (kL/yr): 0.000

Fluxes... Notes... More

Cancel Back Finish

Bio-Retention Trench

Properties of Bio-R trench

Location:

Inlet Properties

Low Flow By-Pass (cubic metres per sec):

High Flow By-pass (cubic metres per sec):

Storage Properties

Extended Detention Depth (metres):

Surface Area (square metres):

Seepage Loss (mm/hr):

Infiltration Properties

Filter Area (square metres):

Filter Depth (metres):

Filter Median Particle Diameter (mm):

Saturated Hydraulic Conductivity (mm/hr):

Depth below underdrain pipe (% of Filter Depth):

Outlet Properties

Overflow Weir Width (metres):

Fluxes... Notes... More

Cancel Back Finish

Swales (typical input – length varies)

Properties of Swale 1

Location:

Inlet Properties

Low Flow By-Pass (cubic metres per sec):

Storage Properties

Length (metres):

Bed Slope (%):

Base Width (metres):

Top Width (metres):

Depth (metres):

Vegetation Height (metres):

Seepage Loss (mm/hr):

Fluxes... Notes... More

Cancel Back Finish

Buffer Strips (typical input)

Properties of Buffer

Location:

Treatment Properties

Percentage of upstream area buffered (%):

Buffer Area (% of upstream impervious area):

Seepage Loss (mm/hr):

Fluxes... Notes...

Cancel Back Finish

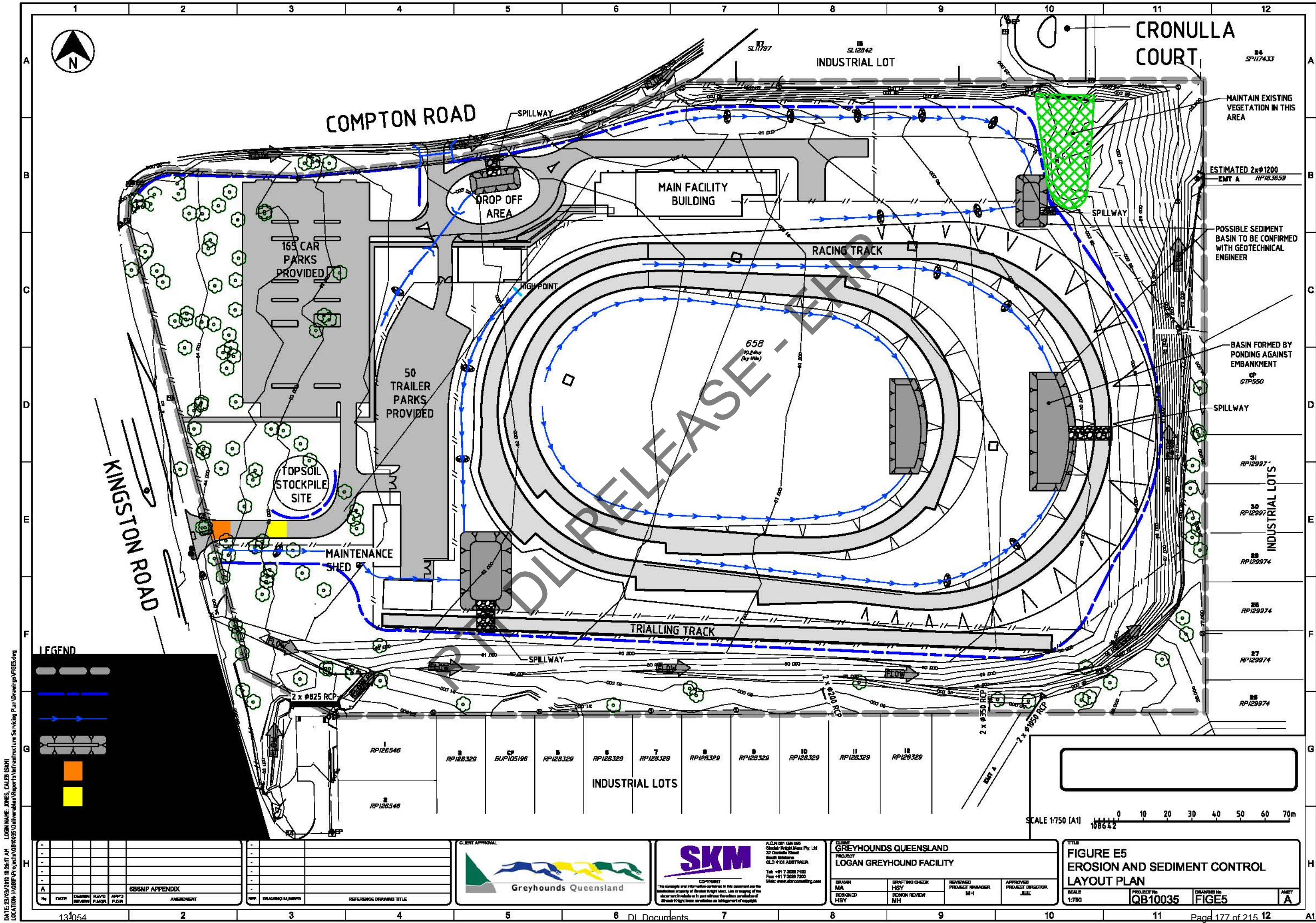
LOGAN GREYHOUND FACILITY – Site Based Stormwater Management Plan

Figure E4: MUSIC Model Inputs – Results

Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	41.4	34.8	16.0
Total Suspended Solids (kg/yr)	12.3E3	1.28E3	89.6
Total Phosphorus (kg/yr)	17.6	4.50	74.4
Total Nitrogen (kg/yr)	111	58.7	46.9
Gross Pollutants (kg/yr)	391	0.00	100.0

RTI DL RELEASE - EHP



3. CLEARING OF VEGETATION IS NOT TO BE UNDERTAKEN UNLESS PRECEDED OR ACCOMPANIED BY INSTALLATION OF ADEQUATE RUNOFF DIVERSION AND SEDIMENT CONTROL MEASURES.
4. AREAS OF VEGETATION THAT IS NOT TO BE DISTURBED AT ANY GIVEN STAGE OF THE WORKS SHOULD BE FENCED OFF TO MINIMISE DISTURBANCE.
5. ALL CLEARED VEGETATION IS TO BE MULCHED WITHIN 2 DAYS AND STOCKPILED AT THE LOCATIONS NOMINATED BY THE SUPERINTENDENT.
6. TOPSOIL SHALL BE STRIPPED IN ACCORDANCE WITH THE SPECIFICATION AND STOCKPILED AT THE LOCATIONS NOMINATED BY THE SUPERINTENDENT.
7. TOPSOIL THAT IS TEMPORARILY STOCKPILED ON SITE MUST BE PROTECTED FROM WIND AND WATER EROSION.
8. A SEDIMENT FENCE IS TO BE INSTALLED IMMEDIATELY DOWNSTREAM OF ANY SOIL/MULCH STOCKPILE.
9. ALL EROSION AND SEDIMENT CONTROL DEVICES ARE TO BE INSPECTED AT INTERVALS SPECIFIED IN L.C.C. ESC STANDARDS, PRIOR TO EXPECTED RAINFALL AND AFTER RAINFALL EVENTS. ANY DAMAGE OR EXCESS EROSION/SEDIMENT IS TO BE REPAIRED/REMOVED AS REQUIRED TO MAINTAIN THE DEVICES EFFECTIVE OPERATION.
10. GRASS SEEDING SHOULD COMMENCE IMMEDIATELY FOLLOWING RESPREADING OF TOPSOIL OVER DISTURBED AREAS, IN ACCORDANCE WITH L.C.C. STANDARDS.

PRE-CONSTRUCTION PHASE

11. **GROUND COVERAGE OF 70% OF ALL SOIL MUST BE PROVIDED WITHIN 30 CALENDAR DAYS FROM COMPLETION OF ANY WORKS ON DISTURBED AREAS. DURING THE INTERIM PERIOD BETWEEN COMPLETION OF WORKS AND THE ESTABLISHMENT OF AT LEAST 70% GROUND COVER, THE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES MUST BE MAINTAINED INCLUDING DIVERSION/CUTOFF DRAINS**
12. **TRENCHES MUST BE BACKFILLED, CAPPED WITH TOPSOIL AND COMPACTED TO A LEVEL AT LEAST 100mm ABOVE ADJOINING GROUND LEVEL.**
13. **THE OPENING TO GULLY PITS ARE TO BE PROTECTED BY INSTALLED PORTABLE GRAVEL KERB SEDIMENT TRAPS.**
14. **THE REQUIREMENT FOR AND PROVISION OF GULLY PIT LITTER BASKETS IS TO BE DIRECTED BY THE SUPERINTENDENT FOLLOWING ASSESSMENT OF POTENTIAL DEBRIS/LITTER LOADINGS WITHIN THE SITE OF WORKS.**
15. **ALL REASONABLE AND PRACTICABLE MEASURES MUST BE TAKEN TO PREVENT ROAD PAVEMENT MATERIALS, CEMENT SLURRY, LOOSE AGGREGATE OR DEPOSITED SEDIMENT FROM ENTERING THE STORMWATER DRAINS.**
16. **SEDIMENT AND DEBRIS REMOVED FROM ROADS OR FROM CONTROLS AT GULLY PITS MUST BE PLACED IN A CONTROLLED AREA FOR READY FOR DISPOSAL.**
17. **ONCE FINAL TRIMMING AND RESPREADING OF TOPSOIL TO VERGES IS COMPLETED, TURF IS TO BE PLACED FOR THE FULL WIDTH FROM PROPERTY BOUNDARY TO BACK OF KERB WHERE NOT FRONTING HOUSE CONSTRUCTION.**
18. **SEDIMENT CONTROL DEVICES THAT ARE REQUIRED TO BE REMOVED TO ALLOW CONSTRUCTION ACCESS, ARE TO BE REINSTATED AT THE COMPLETION OF EACH DAY'S WORK.**
19. **ALL MATERIAL EXCAVATED FROM THE SITE IS TO BE TESTED AND TREATED FOR POTENTIAL ACID SULPHATE CONDITIONS. THE PERMISSIBLE pH LOWER LIMIT IS TO BE NOT LESS THAN 5.5.**
20. **ALL REASONABLE AND PRACTICAL MEASURES MUST BE TAKEN TO PREVENT OR MINIMISE SEDIMENT DISCHARGING ONTO SEALED ROADWAYS (INTERNAL AND EXTERNAL)**

CONSTRUCTION PHASE

1. ALL REASONABLE AND PRACTICABLE EFFORTS MUST BE TAKEN TO MINIMISE THE REMOVAL OR DISTURBANCE OF TREES, SHRUBS AND PARTICULARLY GROUND COVERS ON THE SITE DURING LAND DISTURBING ACTIVITIES.
2. CLEARING OF VEGETATION IS NOT TO BE UNDERTAKEN UNLESS PRECEDED OR ACCOMPANIED BY INSTALLATION OF ADEQUATE RUNOFF DIVERSION AND SEDIMENT CONTROL MEASURES.

ENVIRONMENTAL MANAGEMENT

GENERAL NOTES

1. ATTENTION IS DRAWN TO THE FOLLOWING ACTS OF LEGISLATION RELEVANT TO THE ENVIRONMENTAL MANAGEMENT OF THE WORKS:
 - ENVIRONMENTAL PROTECTION ACT 1994
 - ENVIRONMENTAL PROTECTION (WATER) POLICY 1997
2. THE CONTRACTOR IS TO PREPARE AN ENVIRONMENTAL MANAGEMENT PLAN TO ADDRESS EROSION AND SEDIMENT CONTROL, VEGETATION PROTECTION, NOISE AND DUST CONTROL. THIS MUST BE SUBMITTED TO THE SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORKS. THE NOTES ON THIS PLAN ARE TO BE USED AS A GUIDE FOR THE CONTRACTORS ENVIRONMENTAL MANAGEMENT PLAN.
VEGETATION PROTECTION
3. VEGETATION PROTECTION ORDERS ON THE SITE OR ADJACENT TO THE SITE MUST BE OBSERVED AT ALL TIMES.
4. CAREFUL ATTENTION IS TO BE GIVEN TO VEGETATION THAT IS IDENTIFIED TO REMAIN. THESE AREAS ARE TO BE FENCED OR CLEARLY MARKED.
5. THE PARKING OF MACHINERY AND STORAGE OF MATERIALS NEAR AREAS OF VEGETATION TO BE RETAINED IS PROHIBITED.
NOISE
6. ALL PLANT AND EQUIPMENT SHALL BE CONTROLLED TO MINIMISE NOISE EMISSION IN ACCORDANCE WITH AS2436 (GUIDE TO NOISE CONTROL ON CONSTRUCTION, MAINTENANCE AND DEMOLITION). THE SITE WORKING HOURS TO BE:
 - MONDAY - SATURDAY 7.00am - 6.00pm
 - SUNDAY OR PUBLIC HOLIDAYS - NO WORK PERMITTEDDUST
7. NO VISIBLE DUST EMISSIONS, AND OTHER AIR EMISSIONS INCLUDING ODOURS MUST OCCUR THE BOUNDARIES OF THE SITE DURING EARTHWORKS AND CONSTRUCTION ACTIVITIES ON THE SITE.
8. NO VISIBLE DUST EMISSIONS, AND OTHER AIR EMISSIONS INCLUDING ODOURS MUST OCCUR THE BOUNDARIES OF THE SITE DURING EARTHWORKS AND CONSTRUCTION ACTIVITIES ON THE SITE.
9. THE CONTRACTOR SHALL ENSURE A WATER TRUCK IS AVAILABLE AS REQUIRED TO MITIGATE THE DUST EMISSIONS GENERATED BY CONSTRUCTION TRAFFIC.
LITTER/DEBRIS
10. THE CONTRACTOR IS TO ENSURE THAT ALL LITTER AND DEBRIS INTRODUCED TO THE SITE IS COLLECTED DAILY AND DISPOSED IN A SKIP OR SIMILAR CONTAINER FOR REMOVAL FROM SITE

SEDIMENT BASIN DESIGN CRITERIA

SOIL TESTING AND SAMPLING DETAILS

- DESIGN BASED ON DISTURBED AREAS OF CONSTRUCTION TO BE PREDOMONATELY (SILTY CLAYS - CH)
CONSERVATIVE ASSUMPTION > 33% FINER THAN 0.075mm

BASIN TYPE SELECTION

- ADOPT TYPE 'F' BASIN

BASIN DESIGN FORMULA

SETTLING ZONE VOLUME $V_s = 400 \times C_v \times A$
SEDIMENT STORAGE VOLUME $V_{ss} = 0.5 \times V_s$

SEDIMENT BASIN DESIGN CALCULATIONS

CONTRIBUTING CATCHMENT AREA =
C_y =

SETTLING ZONE VOLUME REQUIRED (V_s) =
SEDIMENT STORAGE VOLUME REQUIRED (V_{ss})
TOTAL STORAGE VOLUME REQUIRED (V_{ss}) =
ACTUAL VOLUMES
SETTLING DEPTH
SEDIMENT STORAGE DEPTH
BASE AREA

SB1	SB2	SB3
TBC	TBC	TBC

EROSION AND SEDIMENT MANAGEMENT PROGRAM

PRE CONSTRUCTION WORKS

- 1 SITE MEETING TO BE HELD WITH SUPERINTENDENT PRIOR TO COMMENCEMENT OF EROSION AND SEDIMENT CONTROL WORKS.
- 2 EMERSON CLASS SOIL TESTS TO BE CARRIED OUT TO DETERMINE IF SITE IS SUBJECT TO DISPERSIVE SOILS. RESULTS TO BE FORWARDED TO THE SUPERINTENDENT AND THE L.C.C.

CLEARING AND STRIPPING PHASE

- 3 IDENTIFY AREAS OF SITE TO BE CLEARED PAYING CAREFUL ATTENTION TO VEGETATION TO BE RETAINED.
- 4 INSPECT SITE WITH SUPERINTENDANT TO DETERMINE ACCESS LOCATION TO SITE
- 5 INSTALL CONSTRUCTION ENTRY/EXIT SHAKEDOWN DEVICE
- 6 CONSTRUCT TEMPORARY SEDIMENT BASINS SB2 AND SB3. BASINS TO BE DEWATERED FOLLOWING STORM EVENTS AS PER BASIN DEWATERING PROCEDURE.
- 7 CONSTRUCT CUT OF DRAINS AND INSTALL ROCK CHECK DAMS AT MAX 20m SPACING.
- 8 INSTALL SEDIMENT FENCE DOWNSTREAM OF CLEARING WORK ZONE.
- 9 UNDERTAKE SELECTIVE CLEARING, MULCH MATERIAL AND STOCKPILE AS DIRECTED.
- 10 UNDERTAKE STRIPPING OF TOPSOIL MATERIAL AND STOCKPILE AS DIRECTED.

BULK EARTHWORKS PHASE

11. EXISTING STOCKPILE ON SITE TO BE REMOVED.
12. COMMENCE FILLING AND EARTHWORKS.
13. INSTALL SEDIMENT FENCES TO TOE OF BATTER FOLLOWING PROGRESSIVE EARTHWORKS COMPLETION.
14. ENSURE RUNOFF FROM PAVEMENT BOX IS DIRECTED TO TEMPORARY SEDIMENT BASINS
15. RESPAAD TOPSOIL TO ALLTMENTS AND COMMENCE GRASS SEEDING OR APPLY HYDROMULCH, IN ACCORDANCE WITH L.C.C. STANDARDS.
16. STABILISATION OF CATCHMENT REQUIRED PRIOR TO TESTING, TREATING, DEWATERING AND FILLING OF BASINS SB1 AND SB3. SUPERINTENDENT TO CONFIRM MINIMUM GROUND COVER HAS BEEN ACHIEVED IN ACCORDANCE WITH L.C.C. STANDARDS PRIOR TO BASIN DECOMMISSIONING.

OPERATIONAL WORKS PHASE

- 17 PROVIDE ADEQUATE PROTECTION TO STORMWATER NETWORK.
- 18 TURF FULL WIDTH OF VERGES.
- 19 INSTALL SEDIMENT FENCE IMMEDIATELY BEHIND BACK OF KERB FRONTING CONSTRUCTION SITES

WATER QUALITY MONITORING

**WATER QUALITY SAMPLES ARE TO BE TAKEN AND TESTED
PRIOR TO RELEASING OF ANY WATER FROM THE BASINS**

WATER QUALITY OBJECTIVES

SUSPENDED SOLIDS (TSS) < 50mg/L
pH BETWEEN 6.5 AND 8.5 AT ALL TIMES

-						
-						
-						
-						
-						
A						SBSMP APPENDIX
Day	DATE	DISSEM	REV'D	APPRO		AMENDMENT

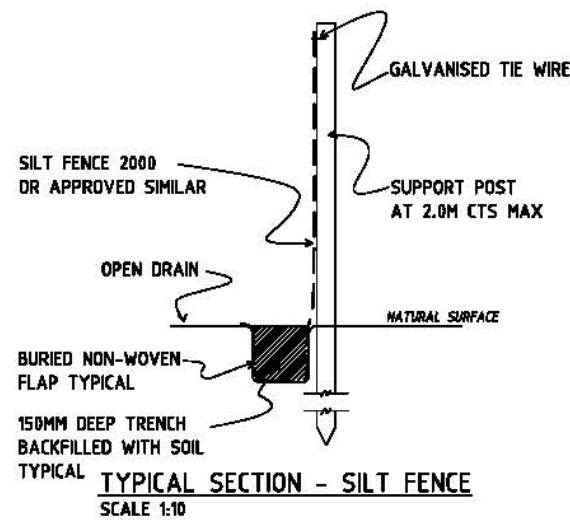
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REF.	DRAWING NUMBER	REFERENCE DRAWING TITLE



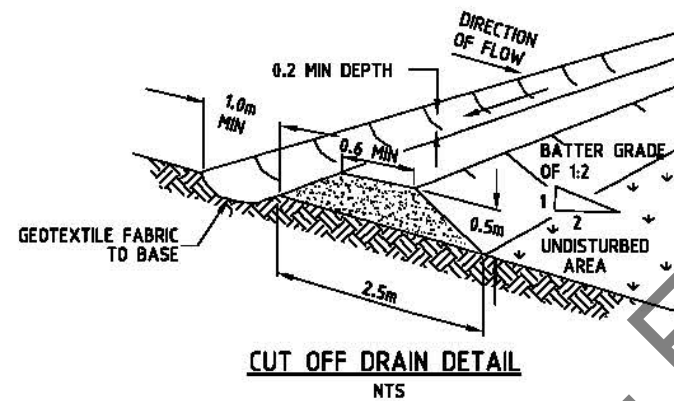
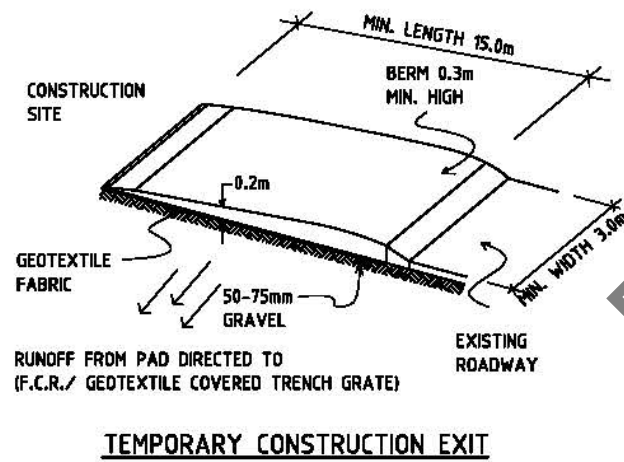
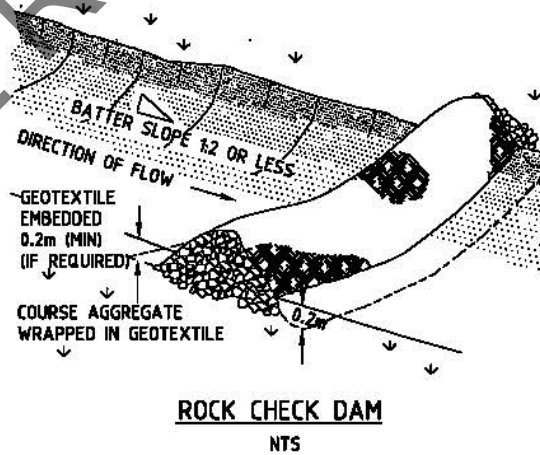
CLIENT GREYHOUNDS QUEENSLAND			
PROJECT LOGAN GREYHOUND FACILITY			
DRAWN MA	DRAFTING CHECK HSY	REVIEWED PROJECT MANAGER MH	APPROVED PROJECT DIRECTOR JEE
DESIGNED HSY	DESIGN REVIEW MH		

FIGURE E6
EROSION AND SEDIMENT CONTROL
TYPICAL NOTES

SCALE 1:750	PROJECT No QB10035	DRAWING No FIGE6	AMT A
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- STEP 1 - DRIVE SUPPORT POSTS INTO GROUND UNTIL SUFFICIENT RESISTANCE IS ACHIEVED, AT A MAXIMUM 3.0m CENTRES AND EXCAVATE 150mm TRENCH ON THE UPSTREAM SIDE OF THE SILT FENCE.
- STEP 2 - POSITION GEOFABRICS AUSTRALASIA P.L SILT FENCE 2000 (OR APPROVED SIMILAR) AGAINST SUPPORT POSTS AND TENSION. ATTACH WITH GALVANISED TIE WIRE SUPPLIED.
- STEP 3 - BURY THE BOTTOM NON-WOVEN FLAP TRENCH AND BACKFILL WITH SOIL AND LIGHTLY STAMP TO ENSURE ANCHORAGE.

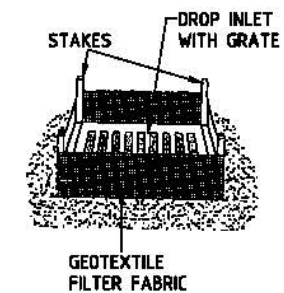


SEDIMENT BASIN NOTES

- ALL SEDIMENT CONTROL DEVICES (SILT FENCES, SPILLWAYS, ROCK CHECK DAMS) TO BE CHECKED AFTER ALL MAJOR RAINFALL EVENTS AND RECTIFIED AS NECESSARY.
- IF SEDIMENT WATER IS SHOWN TO HAVE SUSPENDED SOLIDS > 50mg/L THEN THE USE OF FLOCCULANTS IS TO BE APPLIED AS DIRECTED BY SUPERINTENDENT PRIOR TO THE BASIN BEING DRAINED BY PUMPING OR SIPHONING FOLLOWING THE PASSING OF THE FIELD TEST ON THE RETAINED RUNOFF.

THE FIELD TEST IS:-
FILL A CLEAR 65mm SOFT DRINK BOTTLE WITH BASIN WATER. IF YOU CANNOT SEE CLEARLY THROUGH THE SAMPLE, THEN FLOCCULANTS NEED TO BE APPLIED.

THE pH OF THE WATER MUST BE IN THE RANGE 6.5 TO 8.5 PRIOR TO DISCHARGE. IF THE RESULTS ARE OUTSIDE THESE LIMITS THE SUPERINTENDENT IS TO BE NOTIFIED AND HE WILL ADVISE ON TREATMENT.
- INLET BAFFLE WITH 100mm POSTS AT MAXIMUM 1000mm CENTRES SET 800mm DEEP WITH SEDIMENT FENCE FABRIC WITH 50mm HOLES CUT AT 300mm CENTRES. TO BE CONSTRUCTED DIRECTLY DOWNSTREAM OF INLET STRUCTURE.
- SEDIMENT BASINS TO BE INSPECTED AT LEAST ONCE EVERY WEEK AND DE-SILTED AFTER EACH MAJOR STORM EVENT OR AS DIRECTED BY SUPERINTENDENT.



DRAFT

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

DATE	DESIGN	REVIEW	APPROVED	AMENDMENT
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020
13/05/2020	13/05/2020	13/05/2020	13/05/2020	13/05/2020

I:\QBIF\Projects\QB10035\Technical\Calculations\MUSIC\[QB10035 - MUSIC Input R1_2010-02-19.xls]SOURCE

TABLE E.1 - MUSIC MODEL INPUT DATA
Logan Greyhound Facility
Source Nodes

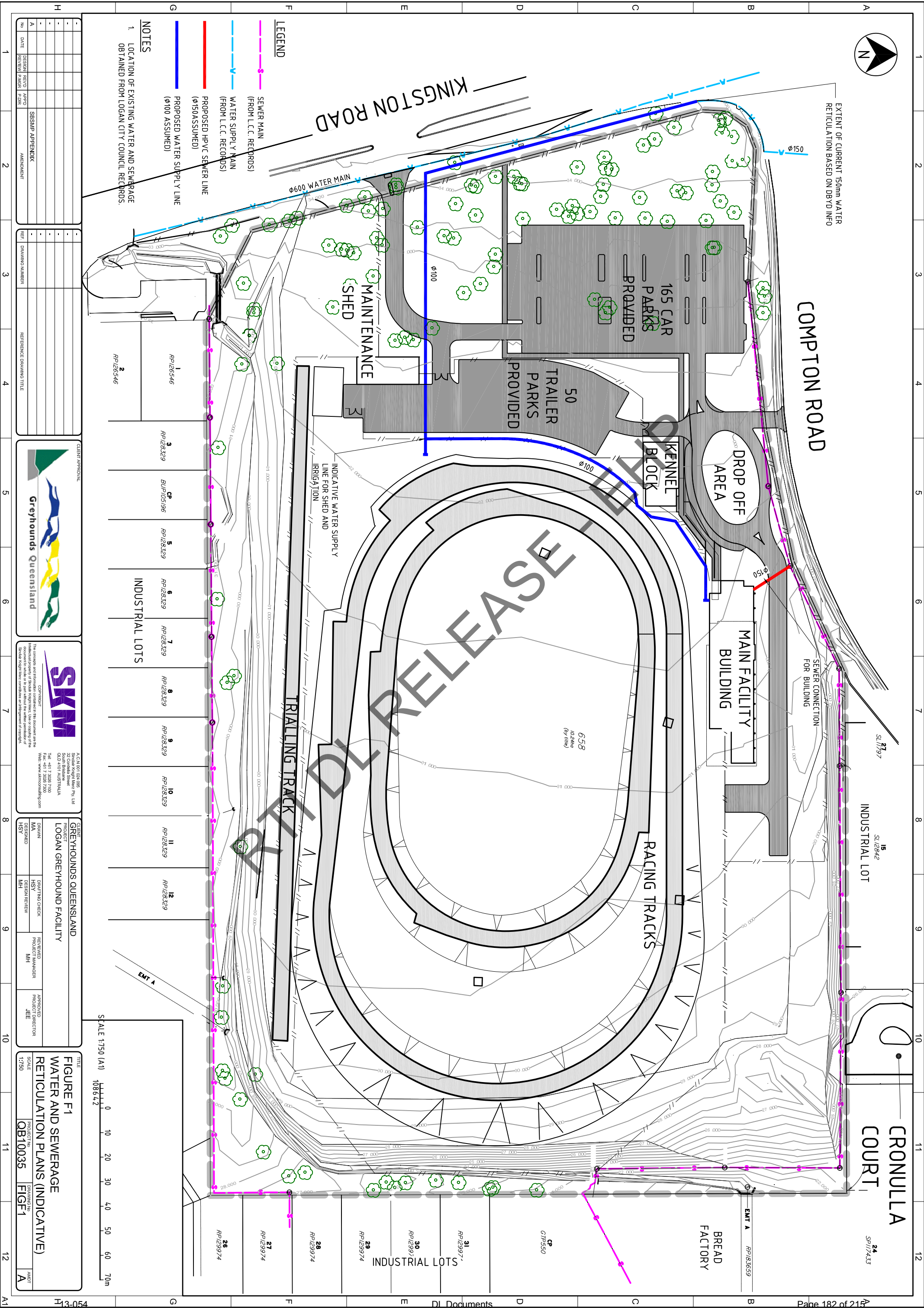
Node Name	Source Node Type	Area (ha)	Actual Imp. (%)	Other Notes
PN1	Rural Residential	0.147	0.0%	
PN2	Rural Residential	0.268	0.0%	
PN4-Roof	Commercial	0.154	100.0%	Split catchment
PN4-Road	"	0.121	100.0%	"
PN4-Ground	"	0.804	0.0%	"
PN5	Rural Residential	0.751	0.0%	
P1	Rural Residential	0.263	0.0%	
P2-Road	Commercial	0.507	100.0%	Split catchment
P2-Ground	"	0.149	0.0%	"
P3-Road	Commercial	0.225	100.0%	Split catchment
P3-Ground	"	0.362	0.0%	"
P4-Roof	Commercial	0.099	100.0%	Split catchment
P4-Road	"	0.304	100.0%	"
P4-Ground	"	0.481	0.0%	"
PS1	Rural Residential	0.817	0.0%	
PS2	Rural Residential	1.031	0.0%	
PS3	Rural Residential	0.474	0.0%	
T1A, T1B	Rural Residential	1.800	0.0%	
T2A, T2B	Rural Residential	1.500	0.0%	
Total		10.257		

Notes:

Appendix F Services Demand Calculations

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ



PROJECT LOGAN GREYHOUND FACILITY WORK PACKAGE

TASK WATER DEMAND ESTIMATE ELEMENT

MAIN BUILDING FACILITY HAS: - 20 WC
- 6 Urinals
- 15 Basins

↳ ASSUME KITCHENS & BARS HAVE 11 x SINKS WITH AERATED TAPS

KENNEL BLOCK HAS - 1 WC
- 1 Basin
- 1 Sink (standard tap)

↳ ASSUME KENNEL BLOCK REQUIRES WASHING USING:

- 2 Internal standard taps (15mm)
- 6 External Washdown Bays - 1 tap each

ASSUME TRIALLING KENNEL REQUIRES: - 4 Washdown Bays
• 1 tap each

- 1 Internal tap for
hosing down

BASED ON AS3500.1 (2003), LOADING UNITS ARE:

- 20 WC	x 2 LU = 40
- 6 Urinals	x 2 LU = 12
- 16 Basins	x 1 LU = 16
- 11 Sinks (Aerated taps)	x 2 LU = 22
- 1 Sink (Standard tap)	x 3 LU = 3
- 13 Taps (15mm)	x 4 LU = 52
	<u>147 LU</u>

PROBABLE SIMULTANEOUS FLOW

TABLE 3.3 AS3500.1 (2003) ONLY UP TO 60 LU

∴ USE TABLE 48 (INSTITUTE OF PLUMBING AUSTRALIA -
SELECTION & SIZING OF COPPER TUBES
FOR WATER PIPING SYSTEMS)

⇒ PROBABLE SIMULTANEOUS FLOW RATE = 1.40 L/s

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

PROJECT LGF

WORK PACKAGE

TASK WATER DEMAND ESTIMATE

ELEMENT

GREYHOUNDS QLD (CLIENT) HAS ADVISED ADDITIONAL WATER USAGE FOR CURRENT ALBION, QLD TRACK AS FOLLOWS:

- 150,000 L/WEEK FOR SUMMER
- 120,000 L/WEEK FOR WINTER

WHICH EQUATES TO:

	SUMMER	WINTER
	21,500 L/day	17,150 L/day
OR	893 L/hr	715 L/hr
OR	0.248 L/s	0.199 L/s

ESTIMATED WATER DEMAND

$$\begin{aligned}
 \rightarrow \text{IN SUMMER (WORST)} &= 1.40 + 0.25 = 1.65 \text{ L/s} \\
 \rightarrow \text{IN WINTER} &= 1.40 + 0.20 = 1.60 \text{ L/s}
 \end{aligned}
 \left. \begin{array}{l} \text{ASSUME} \\ 1.65 \text{ L/s} \\ \text{(CONSERVATIVE)} \end{array} \right\}$$

LOGAN CITY SPECIFIES AVERAGE DAY DEMAND (ADD)
AS 340 L/EP/day

$$\therefore 1.65 \text{ L/s} \text{ EQUIVALENT TO } 142,560 \text{ L/day}$$

$$\Rightarrow 420 \text{ EP FOR THE SITE}$$

COMMENTS ON CALCULATION RECORD:

Comments by: Date:

Project No. **QB10035**
SHEET No. **3**
PREPARED BY **CS**
CHECKED BY

Form ET2 August 96
File
OF
DATE **23/2/10**
DATE

PROJECT	WORK PACKAGE
L&F	
TASK WATER DEMAND ESTIMATE	ELEMENT
<p>DEVELOPMENT SITE IS IN 'CENTRE ZONE' ASSUMED</p> <p>∴ ZONAL RETICULATION IS BY MAX HOUR</p> <p>AND CODES SPECIFY</p> $\frac{MH}{AD} = 2.6 \quad (\text{FACTOR FOR PEAK DEMAND})$ $MH = 2.6 (142,560 / 24) \quad L/hr$ $= 15,444 \quad L/hr$ $\therefore \text{MAX SECOND} = 15,444 / 3600 \quad L/s$ $= 4.3 \quad L/s$	
<p>RTI DL RELEASE - EHP</p>	
<p>COMMENTS ON CALCULATION RECORD:</p>	
<p>Comments by: _____ Date: _____</p>	

Topic No. 4.2		Description PROBABLE SIMULTANEOUS FLOW DATA. — DIVERSITY OF FLOW, LOADING UNITS TO LITRES PER SECOND					
LOADING UNITS	PROBABLE SIMULTA- NEOUS FLOW	LOADING UNITS	PROBABLE SIMULTA- NEOUS FLOW	LOADING UNITS	PROBABLE SIMULTA- NEOUS FLOW	LOADING UNITS	PROBABLE SIMULTA- NEOUS FLOW
	LITRES/ SEC.		LITRES/ SEC.		LITRES/ SEC.		LITRES/ SEC.
1	0.10	170	1.57	1440	5.60	2800	8.78
2	0.12	180	1.65	1480	5.68	2840	8.94
3	0.15	190	1.72	1520	5.76	2880	9.01
4	0.18	200	1.80	1560	5.91	2920	9.09
5	0.21	240	1.97	1600	5.98	2960	9.24
6	0.23	280	2.20	1640	6.06	3000	9.31
7	0.24	320	2.42	1680	6.13	3040	9.39
8	0.25	360	2.57	1720	6.29	3080	9.47
9	0.26	400	2.73	1760	6.36	3120	9.54
10	0.27	440	2.95	1800	6.44	3160	9.69
11	0.28	480	3.10	1840	6.51	3200	9.77
12	0.29	520	3.26	1880	6.66	3240	9.84
13	0.30	560	3.41	1920	6.74	3280	9.92
14	0.31	600	3.48	1960	6.82	3320	10.00
15	0.32	640	3.64	2000	6.89	3360	10.15
16	0.33	680	3.79	2040	7.04	3400	10.22
17	0.34	720	3.86	2080	7.12	3440	10.30
18	0.35	760	4.01	2120	7.19	3480	10.45
19	0.36	800	4.09	2160	7.27	3520	10.53
20	0.38	840	4.17	2200	7.42	3560	10.60
30	0.42	880	4.32	2240	7.50	3600	10.68
40	0.45	920	4.39	2280	7.57	3640	10.83
50	0.52	960	4.47	2320	7.65	3680	10.91
60	0.64	1000	4.54	2360	7.80	3720	10.98
70	0.73	1040	4.70	2400	7.88	3760	11.06
80	0.83	1080	4.77	2440	7.95	3800	11.13
90	0.92	1120	4.85	2480	8.03	3840	11.28
100	1.00	1160	5.00	2520	8.18	3880	11.36
110	1.10	1200	5.07	2560	8.25	3920	11.44
120	1.20	1240	5.15	2600	8.33	3960	11.51
130	1.27	1280	5.23	2640	8.48	4000	11.66
140	1.35	1320	5.38	2680	8.56		
150	1.42	1360	5.45	2720	8.63		
160	1.50	1400	5.53	2760	8.71		

NOTE: When assessing design flows, taps and sanitary fixtures used out of hours, such as cleaner's sinks and hose taps should be ignored. In addition taps and outlets such as air conditioning plant which require full flow should have that flow added to the probable simultaneous flow required for all other taps and sanitary fixtures in the building.

SECTION 3 SIZING OF WATER SERVICES

3.1 SCOPE OF SECTION

This Section specifies the requirements for the sizing of pipes for water service installations.

3.2 FLOW REQUIREMENTS

3.2.1 Flow rates

The flow rates of taps, valves and cisterns shall be not less than the flow rates specified in Table 3.1.

The maximum flow rate from a shower, basin, and kitchen sink or laundry trough outlet shall not exceed 9 L/min.

3.2.2 Loading units

Loading units are factors that take into account the flow rate, length of time in use, and frequency of use of the fixture or appliance. When installed in a domestic situation, loading units for fixtures/appliances shall be as given in Table 3.1.

TABLE 3.1
FLOW RATES AND LOADING UNITS

Fixture/appliance	Flow rate, L/s	Flow rate, L/min	Loading units
Water closet cistern ✓	0.10	6	2 ✓
Bath	0.30	18	8
Basin (standard outlet) ✓	0.10	6	1 ✓
Spray tap	0.03	1.8	0.5
Shower	0.10	6	2
Sink (standard tap)	0.12	7	3
Sink (aerated tap)	0.10	6	2
Laundry tub	0.12	7	3
Washing/machine/dishwasher	0.20	12	3
Mains pressure water heater	0.20	12	8
Hose tap (20 nom. size)	0.30	18	8
Hose tap (15 nom. size)	0.20	12	4

NOTES:

- 1 In the case of valves and appliances where test information indicates that they will function satisfactorily with a flow rate less than that shown in Table 3.1, the tested flow rate may be substituted and the loading units adjusted accordingly.
- 2 Flow rates and loading units given above are taken with cold water flowing at each individual outlet.

PART CLASSIFICATION OF BUILDINGS A3 AND STRUCTURES

A3.1

Principles of classification

The classification of a building or part of a building is determined by the purpose for which it is designed, constructed or adapted to be used.

A3.2

Classifications

Buildings are classified as follows:

Class 1: one or more buildings which in association constitute—

(a) **Class 1a** — a single dwelling being—

- (i) a detached house; or
- (ii) one of a group of two or more attached dwellings, each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house or villa unit; or

(b) **Class 1b** — a boarding house, guest house, hostel or the like—

- (i) with a total area of all floors not exceeding 300 m² measured over the enclosing walls of the Class 1b; and

- (ii) in which not more than 12 persons would ordinarily be resident,

which is not located above or below another dwelling or another Class of building other than a private garage.

Class 2: a building containing 2 or more sole-occupancy units each being a separate dwelling.

Class 3: a residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons, including—

- (a) a boarding-house, guest house, hostel, lodging-house or backpackers accommodation; or
- (b) a residential part of a hotel or motel; or
- (c) a residential part of a school; or
- (d) accommodation for the aged, children or people with disabilities; or
- (e) a residential part of a health-care building which accommodates members of staff; or

- (f) a residential part of a detention centre.
- Class 4: a dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.
- Class 5: an office building used for professional or commercial purposes, excluding buildings of Class 6, 7, 8 or 9.
- Class 6: a shop or other building for the sale of goods by retail or the supply of services direct to the public, including—
- (a) an eating room, cafe, restaurant, milk or soft-drink bar; or
 - (b) a dining room, bar, shop or kiosk part of a hotel or motel; or
 - (c) a hairdresser's or barber's shop, public laundry, or undertaker's establishment; or
 - (d) market or sale room, showroom, or service station.
- Class 7: a building which is—
- (a) **Class 7a** — a carpark; or
 - (b) **Class 7b** — for storage, or display of goods or produce for sale by wholesale.
- Class 8: a laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried on for trade, sale, or gain.
- Class 9: a building of a public nature—
- (a) **Class 9a** — a health-care building, including those parts of the building set aside as a laboratory; or
 - (b) **Class 9b** — an assembly building, including a trade workshop, laboratory or the like in a primary or secondary school, but excluding any other parts of the building that are of another Class; or
 - (c) **Class 9c** — an aged care building.
- Class 10: a non-habitable building or structure—
- (a) **Class 10a** — a non-habitable building being a private garage, carport, shed, or the like; or
 - (b) **Class 10b** — a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool, or the like.

A3.3

Multiple classification

Each part of a building must be classified separately, and—

- (a)
 - (i) where parts have different purposes — if not more than 10% of the floor area of a storey, being the minor use, is used for a purpose which is a different classification, the classification applying to the major use may apply to the whole storey; and
 - (ii) the provisions of (i) do not apply when the minor use is a laboratory or Class 2, 3 or 4 part; and
- (b) Classes 1a, 1b, 7a, 7b, 9a, 9b, 9c, 10a and 10b are separate classifications; and

- (c) a reference to—
 - (i) Class 1 — is to Class 1a and 1b; and
 - (ii) Class 7 — is to Class 7a and 7b; and
 - (iii) Class 9 — is to Class 9a, 9b and 9c; and
 - (iv) Class 10 — is to Class 10a and 10b; and
- (d) A plant room, machinery room, lift motor room, boiler room or the like must have the same classification as the part of the building in which it is situated.

A3.4

Parts with more than one classification

- (a) Notwithstanding A3.3, a building or part of a building may have more than one classification applying to the whole building or to the whole of that part of the building.
- (b) If a building or part of a building has more than one classification applying to the whole building or part in accordance with (a), that building or part must comply with all the relevant provisions of the BCA for each classification.

RTI DL RELEASE - EDP

Supporting Documentation BCC Requirements Sewerage Code - Part 1 (Planning and Design)

Pt 1 – 1.3.3 Design Responsibilities

The design of the works shall be carried out under the direction of and certified by a Registered Professional Engineer of Q'ld. (RPEQ).

The Designer shall obtain the written approval from Council for any variations to the requirements of latest edition of WSA 02-2002 Sewerage Code as amended by this Supplementary Manual prior to the submission of the final design.

Pt 1 – 3.2.1 Design Flow Estimation Method - General

EP Estimation

The dry weather flow (sanitary flow) is calculated from the product of the number of Equivalent Persons (EP) and the flow rate per EP. The EP's are determined by converting the areas of residential, commercial and industrial development to an equivalent residential population on a sewage flow basis. The development areas are based on actual areas excluding roads etc. except where noted otherwise. EP/ha values for various types of development shall be in accordance with Table 3.1.

Table 3.1
Development Area Densities - EP/ha

City Plan Classification	EP/ha	City Plan Classification	EP/ha
Residential		Community Use	
Character and Low Density	36	Community facilities, Education and Emergency Purposes	18
Low-Medium Density	72	Health Care Purposes	60
Medium Density	108	Utility Services	5
High Density	150	Special Purposes Centres	
Emerging Community	36	Major Hospital & Medical facility	60
Industry		Major Educational & Research facility	18
Light	24	Major Sporting Stadium	30
General, Heavy and Future	30	Entertainment Centre	30
Multi-Purpose centres		Port	24
City Centre MP1	100	Major Institution	36
Major Centre MP2	80	Vehicle Sales & Service	18
Suburban Centre MP3	60	Mixed Industry & Business	60
Convenience Centre MP4	20	Office Park	60
		Cottage Industry / Retail	36
		South Bank	18

Where existing or future developments will produce EP's greater than those determined from the above densities, site specific flows shall be used in the analysis. This particularly relates to industrial and commercial type developments. Site specific flow estimates shall utilise sewage flow and / or water consumption data where available. Where this information is not available or in the case of future development where the flow has not been quantified, the rates given in Table 3.2 shall apply.



Appendix G Logan City Council Correspondence

RTI DL RELEASE - EHP

SINCLAIR KNIGHT MERZ

Yau, Hoy Sung (SKM)

From: Osipowicz, Marta [MartaOsipowicz@logan.qld.gov.au]
Sent: Thursday, 8 October 2009 3:29 PM
To: Yau, Hoy Sung (SKM)
Subject: QB10035 Logan Greyhounds: Flood search requirement - POS Corner Kingston Road and Compton Road

Hi Yau,

Please see Nardine's email below. You do not need to consider prospective flooding from Slacks Creek.

In relation to the water supply and sewerage enquiry - I forwarded that to Marco Bonotto. I hope he gets back to you otherwise you may want to phone him and follow up the email I forwarded yesterday.

Take care ... Kind Regards,

Marta Osipowicz
Senior Planning Officer (North East)
Development Assessment Branch
Logan City Council
150 Wembley Rd, Logan Central QLD 4114

☎ +61 7 3412 4931
☎ +61 7 3412 3444
✉ martaosipowicz@logan.qld.gov.au

-----Original Message-----

From: Bird, Nardine
Sent: Thursday, 8 October 2009 2:53 PM
To: Osipowicz, Marta
Subject: RE: QB10035 Logan Greyhounds: Flood search requirement - POS Corner Kingston Road and Compton Road

Hi Marta

If you are enquiring about 146-178 Kingston Road, Slacks Creek, this property does not have a flood overlay. If its not that property just let me know the address.

Kind Regards

Nardine Bird | Flood Plain Management Officer |
Roads Infrastructure Management | **Logan City Council** | 150 Wembley Road, Logan Central, QLD 4114 | P: +61 7 3412 5170 | M: +61 7 3412 3444 | nardinebird@logan.qld.gov.au

<<http://www.logan.qld.gov.au/>>

-----Original Message-----

From: Osipowicz, Marta
Sent: Wednesday, 7 October 2009 4:48 PM
To: Bird, Nardine
Cc: 'HSYau@skm.com.au'
Subject: FW: QB10035 Logan Greyhounds: Flood search requirement - POS Corner Kingston Road and Compton Road

Hello Nardine,

We met with consultants in relation to the development of a Greyhound Racing Facility at the POS reserve on the corner of Kingston Road and Compton Road a couple weeks back. Slacks Creek is a few hundred metres away from the site but one of the consultants would like to know whether there are any flooding concerns in relation to the subject site; do they need to take it into consideration during the planning process?

You can respond to me if you like otherwise the consultant is happy to liaise with you directly. His contact details are below.

Regards,

Marta Osipowicz
Senior Planning Officer (North East)
Development Assessment Branch
Logan City Council
150 Wembley Rd, Logan Central QLD 4114

☎ +61 7 3412 4931
☎ +61 7 3412 3444
✉ martaosipowicz@logan.qld.gov.au

-----Original Message-----

From: Yau, Hoy Sung (SKM) [mailto:HSYau@skm.com.au]
Sent: Wednesday, 7 October 2009 2:00 PM
To: Osipowicz, Marta
Subject: FW: QB10035 Logan Geryhounds: Flood search requirement

Marta

This relates to my query at the meeting itself. Once again, I'll be happy to follow up directly with the respective officer. Thanks.

Kind regards
Yau

From: Yau, Hoy Sung (SKM)
Sent: Thursday, 1 October 2009 4:24 PM
To: 'martaosipowicz@logan.qld.gov.au'
Cc: 'MHolford@skm.com.au'
Subject: QB10035 Logan Geryhounds: Flood search requirement

Dear Marta

We met at the meeting at Council last Friday and I was the stormwater engineer who brought up the issue of whether Council has any requirements to mitigate flooding at the proposed development (I believe it is near to a creek). Have you been able to follow up on the query? I would appreciate your response. Thank you.

Regards,

HS Yau
Civil Engineer
Level 3, 32 Cordelia Street
South Brisbane QLD 4101

(P.O. Box 3848 South Brisbane QLD 4101)

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Yau, Hoy Sung (SKM)

From: Bonotto, Marco [MarcoBonotto@logan.qld.gov.au]
Sent: Wednesday, 21 October 2009 6:37 PM
To: Yau, Hoy Sung (SKM)
Cc: Osipowicz, Marta; Holford, Marcus (SKM); WaterDA
Subject: RE: QB10035 Greyhounds: Water Supply design
Attachments: Connections.pdf

Categories: QB10035

Hi Yau,

Logan Water does not provide the standard package of Brisbane Water as per your email. By the way I'm not sure why you have to provide an internal water supply reticulation for the proposed development: does this development involve any reconfiguration of lots? If not, I believe there is no the requirement of extension of Council's retic water or sewerage infrastructure, as already available for the site.

I've attached snapshot of our GIS showing the existing water and sewer infrastructure and the suggested connection point. For the as constructed drawing you need to request them to Techservices Branch. Please follow the link below: <http://www.logan.qld.gov.au/lcc/residents/buildingdevelopment/yourproperty/asconstructedplans.htm>

Regards,

Marco Bonotto | *Acting Senior Development Response Engineer*
Logan Water Infrastructure

LOGAN CITY COUNCIL

58-60 Manila Street - Beenleigh 4207 QLD

☎: 07-3412 4237 ✉: marcobonotto@logan.qld.gov.au

-----Original Message-----

From: Yau, Hoy Sung (SKM) [mailto:HSYau@skm.com.au]
Sent: Monday, 19 October 2009 3:50 PM
To: Bonotto, Marco
Cc: Osipowicz, Marta; Holford, Marcus (SKM)
Subject: RE: QB10035 Greyhounds: Water Supply design

Hi Marco

How are you? I have some queries. The local authority I often deal with is Brisbane City Council and Council (Brisbane Water) provides a standard package where Council would design and size the internal water supply reticulation pipes for the development and charges the developer a fee for the service. Could you confirm whether Logan City Council provides the same service or do we submit a fully designed water reticulation network for our development at Kingston and Compton Road?

Can Council advise on a designated connection point for the water supply (for example, is there a valve we can connect to along the water reticulation pipe along Kingston Road?) and a designated connection manhole for sewerage? Is it possible to obtain copies of as-constructed information for these services near our development site?

I'll be happy to give you a call to discuss if you wish. Much obliged if I could hear back from you. Thank you.

Regards

Yau

07 3026 7348

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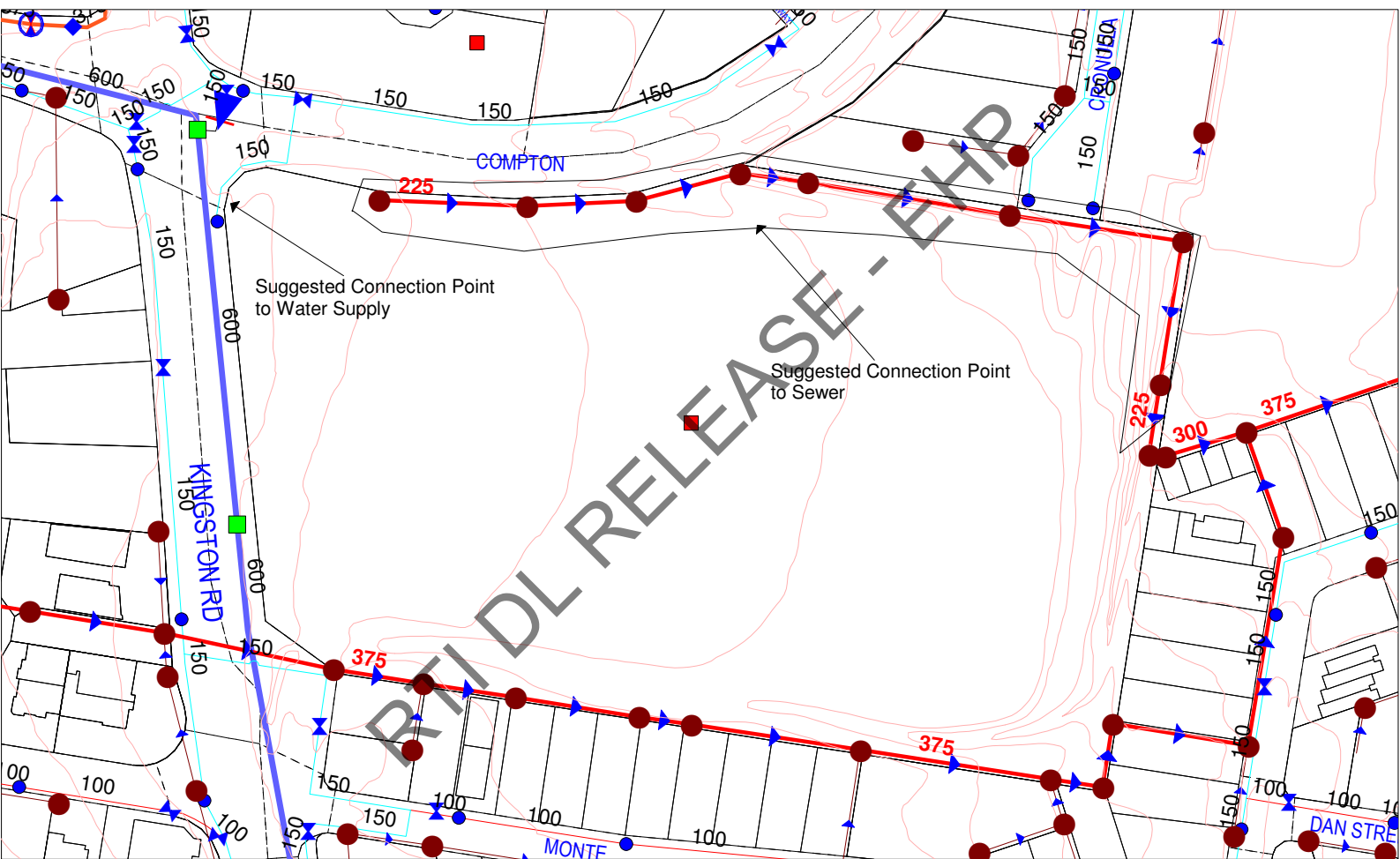
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Appendix H Code Compliance Assessment

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SINCLAIR KNIGHT MERZ

1. Earthworks

Specific outcomes and prescribed solutions for earthworks being operational work

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
Protection from natural physical processes		
O1 Development provides for earthworks that protect development and is protected from natural physical processes.	<p>S1.1 Development being assessable development in respect of which earthworks are carried out complies with the standards for earthworks specified in <i>Planning Scheme Policy No. 5 (Design and construction of work) 2006</i>.</p> <p>S1.2 Development provides that earthworks complies with—</p> <ul style="list-style-type: none"> (a) AS 3798:1996: <i>Guidelines on earthworks for commercial and residential development</i> except to the extent that the Earthworks code specifies otherwise; and (b) the <i>Soil Erosion and Sediment Control Guidelines</i> except to the extent that the Earthworks code specifies otherwise. 	<p>S1.1 The earthworks to be carried out for the assessable development will be in compliance with the standards for earthworks specified in <i>Planning Scheme Policy No. 5 (Design and construction of work) 2006</i>. Refer to section 3 in 'Infrastructure Servicing Plan and Site Based Stormwater Management Plan' report (hereafter known as the 'Infrastructure Report' attached with this submission for additional details</p> <p>S1.2</p> <ul style="list-style-type: none"> (a) Compliance with S1.1 will comply with AS3798. (b) Refer to section 5.7.10 of the Infrastructure Report for additional details on erosion and sediment control measures.
Protection and enhancement of existing and planned infrastructure		

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O2 Development does not have an adverse impact on infrastructure including any service.	S2.1 Development provides that a survey mark remains accurate and is not disturbed.	S1.1 Survey of the existing site did not identify any survey marks within the development. Any recorded survey marks which are used as reference for future surveys are to be retained and protected during the development.
	S2.2 Development provides for the rectification of any damage caused by the development.	S2.2 In the event of damage to any existing infrastructure or services, appropriate rectification measures will be undertaken to restore it to existing condition(s).
	S2.3 Development does not interfere with infrastructure.	S2.3 The existing site surveys and dial-before-you-dig requests have not identified any major infrastructure over the site. In the event of any damage however, appropriate rectification measures will be undertaken.
	S2.4 Development provides for the raising of the level of a manhole, an inspection hole or access, valve and hydrant surround and cover and water meter box and lid for a service on the premises to the ground level of the premises after it has been filled and paved.	S2.4 Where the works do affect any nearby manhole or inspection chambers or other service points which are meant to be accessible, the lid levels of these existing service locations will be raised or lowered as required to match the proposed finished level of works.
Protection and enhancement of ecosystems and protection and enhancement of nature conservation values		
<i>Site clearing</i>		

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O3 Development provides that— (a) the extent of clearing of the premises is minimised so that interference to plants is minimised; and (b) cleared plants other than environmental weeds are mulched and reused on the premises as far as possible; and (c) mulched plants are not stockpiled so as to constitute a fire hazard.	S3.1 Development limits the clearing on the premises to the full width of the ground to be occupied by the completed earthworks, plus a maximum of 1 metre on either side and an area for the installation of a service.	S3.1 Refer to section 3 of the 'Infrastructure Report' attached with this submission for additional details.
	S3.2 Development is carried out to prevent damage to plants by clearing— (a) overhanging trees or boughs; or (b) trees that are hung-up as a result of clearing; or (c) any dead or dying tree or part of a tree that is otherwise dangerous.	S3.2 Where possible, any existing trees are to be retained and damage minimised as part of the works. Additional clearing information is provided in section 3 of the 'Infrastructure Report' attached with this submission.
	S3.3 Development is carried out so that an area, including an existing or future park that is not to be cleared, is fenced off or otherwise delineated before clearing commences.	S3.1 Where areas are not to be developed, appropriate fencing or barriers will be provided before clearing commences.
	S3.4 Development provides for— (a) the grubbing of the cleared land to a minimum depth of 300mm below the surface of the ground level; and (b) all grub holes to be adequately filled and compacted.	S3.4 Grubbing of cleared land to be minimised as much as possible due to site's past use as a managed landfill. Any grub holes will be adequately filled and compacted to standards.
O4 Development provides for— (a) cleared premises to be maintained in a clean state; and (b) cleared plants and waste not to be	S4.1 Development provides that all cleared plants are mulched and retained on the site or cleared plants and waste are removed from the site to be disposed of elsewhere.	S4.1 Refer to section 3 of the 'Infrastructure Report' for clearing and removal measures.

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
incinerated.		
<i>Stripping and stockpiling of topsoil and spoil</i>		
O5 Development provides an area on the premises to stockpile topsoil and spoil that does not cause adverse impacts on other property.	S5.1 Development provides that an area used to stockpile topsoil and soil is located a minimum of 5 metres from the boundary of the premises.	S5.1 Refer to section 3 of the 'Infrastructure Report' for stockpile measures.
<i>Filling and excavation</i>		
O6 Development provides that— (a) fill material is solid clean earth free of organic and putrescible waste, rubbish and refuse material; and (b) filling and excavation does not remove or expose actual acid sulfate soils or potential acid sulfate soils.	S6.1 None applicable.	S6.1 (a) Fill material will be of suitable fill material free of organic and unwanted materials and will be sourced from reputable providers. (b) The risk of acid sulphate soils will be addressed by a geotechnical site investigation report. This report determined whether an acid sulphate soil management plan is required. Measures to mitigate the risk posed by acid sulphate soils will be outlined in a separate acid sulphate soil management plan if required.
Protection and enhancement of personal health and safety and property and protection and enhancement of amenity and character		
<i>Surface water drainage</i>		
O7 Development provides for the drainage of the	S7.1 Development provides for the premises to—	S7.1

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
premises so as not to cause— (a) the ponding of stormwater on the premises; or (b) a hazard to personal health and safety or property.	(a) be self draining; and (b) have a minimum crossfall of 1 in 100.	(a) Minimum crossfalls of 1 in 100 will be designed for. (b) Minimum crossfalls of 1 in 100 will be designed for.
<i>Natural flow of surface water</i>		
O8 Development provides that the natural flow of surface water from the premises or adjoining premises is not altered so as to cause a risk to personal health and safety or property.	S8.1 Development provides that the natural flow of surface waters from the premises or adjoining premises is not concentrated onto other premises.	S8.1 Refer to details under section 5.6 of the 'Infrastructure Report' which demonstrates no post-development nett increase of peak discharge.
<i>Erosion and sediment control</i>		
O9 Development protects and enhances nature conservation values from the adverse impacts of sediment and erosion.	S9.1 Development being assessable development complies with the standards for earthworks specified in <i>Planning Scheme Policy No. 5 (Design and construction of work) 2006</i> .	S8.1 Refer to answer provided in S1.2 for Outcome O1.
<i>Batter</i>		
O10 Development provides a batter that is safe and stable.	S10.1 Development provides that a batter is contained wholly within the premises so that the toe of the batter is not within 1.5 metres of the boundary of the premises.	S10.1 All batters required as part of the development will be no less than 1.5m from the development's RP boundaries.
	S10.2 Development provides that a batter does not extend into an existing or proposed park or a conservation area.	S10.2 No batters will extend into adjacent parks or beyond the development's RP boundaries.

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
	S10.3 Development provides that a batter is limited to a maximum slope of— (a) 1 in 4; or (b) 1 in 10, in a park.	S10.3 Any designed batters will have a maximum slope of 1:4 to allow for ease of maintenance. Alternatively, batter slopes steeper than 1:4 will be assessed by an experienced geotechnical engineering professional.
	S10.4 Development provides that a batter is landscaped in accordance with the batter treatment in Table 5.3.10A (Batter treatments) and complies with the slope treatment in Table 5.3.10B (Slope treatments).	S10.3 Batter treatment to batters no steeper than 1:4 will be grassed or turfed or otherwise in accordance with Table 5.3.10A of the Council Work Code.
	S10.5 Development provides that 80% of the landscape treatment of the batter is achieved within 3 months of the completion of the development.	S10.3 The landscape treatment specified will be capable of achieving the require batter treatment within 3 months from completion.
<i>Retaining wall</i>		
O11 Development provides that a retaining wall is— (a) in a location— (i) that avoids conflict with adjoining lots; and (ii) where infrastructure is not affected; and (b) landscaped so that the retaining wall does not have an adverse impact on the visual amenity of adjacent premises or a public place.	S11.1 Development provides that a retaining wall— (a) which has a height which does not exceed 1.5 metres has a clearance from the boundary of minimum of half the height of the retaining wall; and (b) which has a height that exceeds 1.5 metres— (i) has a clearance from the boundary of the premises which is a minimum distance equal to the height of the retaining wall; and	S11.1 Retaining walls are not expected for the development. However where it is deemed necessary during the Operational Works phase, the walls will meet or exceed the minimum clearance requirements as well as other additional requirements as specified under O11.

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
	<p>(ii) is stepped a minimum of .75 metres for every 1.5 metres in height; and</p> <p>(iii) is terraced and landscaped; and</p> <p>(c) does not exceed an angle of repose of 45 degrees to adjoining buildings.</p>	
	S11.2 Development provides for the relocation of services or the relocation of the retaining wall if the services are contained within the area of influence of the loads of the retaining wall.	S11.2 As mentioned in the response to S11.1, where retaining walls are required and if it was found existing services are within the wall's zone of influence, the affected services will be assessed and relocation provided on a case by case basis. Agreement will be sought with Council regarding such findings.
<i>Filling of a dam</i>		
O12 Development involving the filling of an existing dam – (a) does not adversely affect drainage; and (b) provides for the compacting of the fill.	<p>S12.1 Development involving the filling of an existing dam, provides for the dam to be dewatered and all unsuitable material to be removed from the premises.</p> <p>S12.2 Development provides for the backfilling of a dam using selected fill compacted in layers not exceeding 300mm depth to a level 2 certification as set out in AS 3798:1996: <i>Guidelines on earthworks for commercial and residential development.</i></p>	<p>S12.1 No dams are present in the development site</p> <p>S12.2 No dams are present in the development site</p>
<i>Hazards</i>		
O13 Development protects and enhances personal	S13.1 Development is not located on premises which	S13.1 Development is located on an existing

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
health and safety and property of the community from a hazard.	is contaminated land.	designated public park which was previously a managed landfill. Refer to separate Contaminated Site Investigation report for details on contamination management.

Specific outcomes and prescribed solutions for earthworks being building work

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
Protection from natural physical processes		
O1 Development provides for earthworks that protect development and is protected from natural physical processes.	<p>S1.1 Development being assessable development in respect of which earthworks are carried out complies with the standards for earthworks specified in <i>Planning Scheme Policy No. 5 (Design and construction of work) 2006</i>.</p> <p>S1.2 Development provides that earthworks complies with—</p> <ul style="list-style-type: none"> (a) AS3798:1996: <i>Guidelines on earthworks for commercial and residential development</i> except to the extent that the Earthworks code specifies otherwise; and (b) the <i>Soil Erosion and Sediment Control Guidelines</i> except to the extent that the Earthworks code specifies otherwise. 	<p>S1.1 The earthworks to be carried out for the building works will be in compliance with the standards for earthworks specified in <i>Planning Scheme Policy No. 5 (Design and construction of work) 2006</i>. Refer to section 3.2.2 of the ‘Infrastructure Report’ attached with this submission for additional details.</p> <p>S1.2</p> <ul style="list-style-type: none"> (a) Compliance with S1.1 will comply with AS3798. (b) Refer to section 5.7.10 of the Infrastructure Report for additional details on erosion and sediment control measures.

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
Protection and enhancement of personal health and safety and property		
<i>Natural flow of surface water</i>		
O2 Development provides that the natural flow of surface water from the premises or adjoining premises is not altered so as to cause a risk to personal health and safety or property.	S2.1 Development provides that the natural flow of surface waters from the premises or adjoining premises is not concentrated onto other premises.	S1.1 Concentration of flow onto adjacent premises are not anticipated. The majority of the flows enter an existing open channel drain within the current RP boundary of the development.
<i>Batter</i>		
O3 Development provides a batter that is safe and stable.	S3.1 None applicable.	S1.1 Batter slopes steeper than 1:4 will be assessed by an experience geotechnical engineering professional.
<i>Retaining wall</i>		

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O4 Development provides that a retaining wall is— (a) in a location— (i) that avoids conflict with adjoining lots; and (ii) where infrastructure is not affected; and (b) landscaped so that the retaining wall does not have an adverse impact on the visual amenity of adjacent premises or a public place.	S4.1 Development provides that a retaining wall— (a) which has a height which does not exceed 1.5 metres is set back a minimum of half the height of the retaining wall from the boundary of the premises; and (b) which has a height that exceeds 1.5 metres is— (i) set back from the boundary of the premises a minimum distance equal to the height of the retaining wall; and (ii) stepped a minimum of 0.75 metres for every 1.5 metres in height; and (c) does not exceed an angle of repose of 45 degrees to adjoining buildings.	S4.1 Retaining walls are not expected for the development. However where it is deemed necessary during the Operational Works phase, the walls will meet or exceed the minimum clearance requirements as well as other additional requirements as specified under O4.
	S4.2 Development provides for the relocation of services or the relocation of the retaining wall if the services are contained within the area of influence of the loads of the retaining wall.	S4.1 Retaining walls are not expected for the development. If required, proposed measures will be as per general earthworks S11.1 under Outcome O1.
<i>Stripping and stockpiling of topsoil and spoil</i>		
O5 Development provides an area on the premises to stockpile topsoil and soil that does not cause adverse impacts on other property.	S5.1 Development provides that an area used to stockpile topsoil and soil is located a minimum of 5 metres from the boundary of the premises.	S5.1 Refer to section 3 of the 'Infrastructure Report' for proposed stockpile measures.
<i>Hazards</i>		

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O6 Development protects and enhances personal health and safety and property of the community from a hazard.	S6.1 Development is not located on premises which is contaminated land.	S5.1 Refer to S13.1 above.

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2. Infrastructure

Specific outcomes and prescribed solutions for the planning of infrastructure

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
Provision of infrastructure to service the development		
<i>Provision of infrastructure</i>		
O1 Development provides infrastructure to service the development where— (a) the existing infrastructure provided by an infrastructure provider that is necessary to service the development is not adequate; or (b) the infrastructure to be provided by an infrastructure provider to service the development is necessary but is not yet available; or (c) the development is not consistent with the assumptions upon which infrastructure has been provided or is planned to be provided by an infrastructure provider.	S1.1 None applicable.	S5.1 Refer to the ‘Infrastructure Report’ for infrastructure servicing details.
O2 Development provides land (including an easement), works or a monetary sum or a combination of land, works or a monetary sum in respect of infrastructure determined by the local government in accordance with <i>Planning Scheme Policy No. 7 (Infrastructure contributions) 2006</i> .	S2.1 None applicable.	S5.1 Refer to ‘Town Planning Assessment Report’ for further detail

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O3 An easement is provided to— (a) an infrastructure provider which contains all the infrastructure under the control of the infrastructure provider which traverses the premises; and (b) the local government which contains all land required to accommodate the flow or detention of stormwater on the premises.	S3.1 None applicable.	S5.1 The existing open channel drain flowing northeast connects piped stormwater networks currently maintained by Logan City Council at both ends. As such, the open channel is proposed to be made an easement which will be maintained by Council.
<i>Design and construction of infrastructure</i>		
O4 Development provides infrastructure which— (a) meets the standards at the least whole of life cost, including avoiding unnecessary duplication; and (b) is robust and fit for the purpose and intended period of operation; and (c) is easily maintained without unnecessarily requiring specialist expertise or equipment; and (d) is comprised of components and materials that are as readily accessible and available as practicable; and (e) is readily integrated with the existing infrastructure networks and facilitates the orderly provision of future infrastructure networks.	S4.1 Development provides infrastructure to the standards specified for infrastructure in <i>Planning Scheme Policy No 5 (Design and Construction of Work) 2006</i> .	S5.1 Infrastructure will be designed to the standards and specifications outlined in Logan City Council's <i>Planning Scheme Police No. 5 (Design and Construction of Work) 2006</i> .
Protection and enhancement of existing and planned infrastructure		

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
O5 Development does not adversely impact on existing or planned infrastructure.	S5.1 None applicable.	S5.1 Preliminary discussions held with Logan City Council indicated existing infrastructure is available and has adequate capacity for the said development
O6 Development protects existing and planned infrastructure from natural physical processes.	S6.1 None applicable.	S5.1 Development is not anticipated to affect any existing services. Where it does, appropriate management measure to protect or divert the affected service will be undertaken with input from Logan City Council.
O7 Development does not— (a) interfere with or adversely impact on the prescribed infrastructure; and (b) place an adverse loading on the prescribed infrastructure.	S7.1 Development provides that— (a) there is an unobstructed horizontal clearance of a minimum width of— (i) 15 metres from the prescribed infrastructure, if the building work and operational work involves pile driving; and (ii) 2 metres from the prescribed infrastructure, if the building work and operational work does not involve pile driving; and (b) there is an unobstructed vertical clearance of a minimum depth of 2.5 metres from the ground level above the prescribed infrastructure to any part of the prescribed infrastructure work; and (c) filling is limited to a maximum of 3 metres of material over the prescribed infrastructure; and	S5.1 General adherence to the requirement will be included as part of detailed design during the Operational Works phase. Any potential non-compliance will be brought to the attention of Logan City Council.

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
	<p>(d) excavation is limited to a residual cover over the prescribed infrastructure of a minimum of 600mm; and</p> <p>(e) fill, plants or a paved surface are not placed over an access cover to the prescribed infrastructure; and</p> <p>(f) there is a clearance of a minimum of 2.5 metres between buildings or structures where the prescribed infrastructure is located between buildings or structures; and</p> <p>(g) there is a clearance of a minimum of 2.5 metres between a building or a structure and the boundary of the premises where the prescribed infrastructure is located behind a building or a structure; and</p> <p>(h) there is a clearance of a minimum of 1.5 metres through the premises where it is necessary to access through the premises to access the prescribed infrastructure on adjacent premises.</p> <p>In this prescribed solution and specific outcome prescribed infrastructure means infrastructure which is part of—</p> <p>(a) the sewerage system; and</p> <p>(b) the water supply system; and</p> <p>(c) the local government’s stormwater drainage.</p>	

Column 1 Specific outcomes	Column 2 Acceptable solutions—if self-assessable Probable solutions—if code assessable	Column 3
Protection against development of an inconsistent scale, form and intensity		
Pattern of development		
O8 Development provides for the orderly and efficient provision of planned infrastructure as shown on a structure plan map.	S8.1 None applicable.	S5.1 Not relevant to the development application
O9 Development is consistent with the assumptions upon which infrastructure has been provided or planned by the local government or other infrastructure provider.	S9.1 None applicable.	S5.1 The redevelopment of the site is minor in scale and generally in accordance with the land for land zoned 'Sport and Recreation'.