Brisbane Stormwater Management Pty Ltd BSM

CABOOLTURE SHIRE COUNCIL

MATHEW CRESCENT, BURPENGARY

FLOOD MITIGATION SCENARIOS

04 DECEMBER 2007

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BRISBANE STORMWATER MANAGEMENT PTY LT

[redacted]

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1.0 EXECUTIVE SUMMARY

The Caboolture Shire Council has commissioned Brisbane Stormwater Management Pty Ltd to assess the extent to which the construction of a drain across the Burpengary Creek floodplain has affected the flood immunity of properties in the Mathew Crescent area, and to investigate and recommend measures to mitigate those impacts. The location of the subject drain, which is described hereafter as the "upstream drain, is shown in Figure 2 of this report.

The assessment, which is based on an Extran computer model of the floodway system, has found that the increased overflow from the creek to the Mathew Crescent area, via the upstream drain, has had the following impacts on the 100 year flood profile:

- The 100 year flood levels along the overflow path through the Mathew Crescent properties have risen by as much as 0.35 metre.

- The 100 year flood level in the creek at the drain junction has dropped by 0.33 metre. Further down the creek channel, the flood profile returns to its pre-existing level just downstream of the Young Creek junction and then rises fractionally (0.01 metre) above the pre-existing profile from the Rowley Road crossing down to the Bruce Highway crossing.

- Whereas two house floors (at [redacted] Annette Court and [redacted] Mathew Crescent) could have been inundated by a 100 year flood prior to the upstream drain's construction, three further house floors (at 27-29, 33 and [redacted] Mathew Crescent) could be inundated by the same event following the drain's construction.

- The 100 year inundation widths through the Mathew Crescent area have increased, as seen by the difference between the pre-existing and existing scenarios in Figure 9 of this report. In some areas the increase is quite substantial - for example, at [redacted] Mathew Crescent, where the widening of the inundation could affect almost half of the lot.

A range of possible mitigation measures has been tested in the Extran model, including flapgating of the subject upstream drain and a downstream drain, excavation of the creek's floodway, topping-up of low spots in the creek banks, levees and a decanting basin.

After considering costs and effectiveness, the most favourable strategy is recommended to be the installation of three 1500 mm diameter flapgates in the upstream drain, together with any topping-up of the banks and minor drainage redirection that might be required alongside the Hideaway Close and River Oak Way properties to prevent any consequent adverse impacts in this area. That strategy, which is expected to cost $ 107000, is shown in Figure 11 of this report. Although this strategy could be expected to return the situation to the pre-existing situation, the Extran model predicts that there could still be affluxes of 0.01 metre to 0.02 metre at a few nodes along the Mathew Crescent overflow path. Significantly, though, the three house floors that could have been affected by the increased flood levels could regain their pre-existing flood-free status in a 100 year flood.

Additionally installing two 1050 mm diameter flapgates in the downstream drain, thereby taking the total cost to about $ 140000, could ensure that the 100 year flood levels through the Mathew Crescent properties are depressed below their pre-existing levels and only one house floor (at 136 Mathew Crescent) might then remain susceptible to a 100 year flood. However, adding this component to the strategy could result in affluxes of 0.01 metre to 0.02 metre on the pre-existing 100 year flood profile along the creek channel, between the nodes BP50.4 and BP52.6 identified in Figures 3 and 9 of this report.

Alternative strategies involving a decanting basin could go close to achieving 100 year flood immunity for the remaining flood-prone house floor in the Mathew Crescent area, but at considerable extra cost ($480000 extra). More significantly, a decanting basin could achieve a notable reduction in flood levels along the creek channel downstream of the basin and it could therefore have some future potential as a regional detention facility to offset further catchment development.

A recent development application (IMP-84) for [redacted] Delaney Road included a proposal to excavate the overbank area along the creek frontage of that property. That excavation could have a substantial beneficial impact on flood profiles through the area and could, for example, enable the achievement of the mitigation objective without the additional installation of the flapgates on the downstream drain. Although that application is now in limbo, any similar future proposals for this property could offer the opportunity for similar benefits.

2.0 INTRODUCTION

The Caboolture Shire Council has commissioned Brisbane Stormwater Management Pty Ltd to assess the extent to which the construction of a drain across the Burpengary Creek floodplain has affected the flood immunity of properties in the Mathew Crescent area, and to investigate and recommend measures to mitigate those impacts.

The locality of Mathew Crescent, in relation to the Burpengary Creek catchment and the town of Burpengary, is shown in Figure 1 of this report. The location of the subject drain, which is described hereafter as the "upstream" drain, is shown in Figure 2.

The subject area is shown in more detail on a topographic base in Figure 3. The channel of Burpengary Creek is quite deeply incised into the floodplain, such that natural overflows from the northern bank, to the Mathew Crescent properties, between the nodes marked BP54 and BP50 on Figure 3, are quite infrequent - typically in the order of 50 to 100 years. However, more frequent intrusions of flooding from the creek to Mathew Crescent can occur at two constructed drains: - the subject "upstream" drain, which was constructed in the 1990's, and a "downstream" drain (Figure 3) which is believed to have been constructed in the early 1980's. Flood overflows to Mathew Crescent from these drains could occur as often as about 20 years, although only the December 1991 flood is likely to have approached this level since the construction of the downstream drain.

Council's design flood levels in the area are based on a 1990 study of flood profiles along the creek by Scott & Furphy Pty Ltd. That study, which was undertaken after the construction of the downstream drain but before the construction of the upstream drain, did not identify any overflow from the creek to the Mathew Crescent properties.

The downstream drain, which is believed to have been constructed as part of the original subdivision of the Mathew Crescent area, is essentially part of the base-case, or "pre-existing" scenario, as far as the present study is concerned. The upstream drain, which has further increased the flood-susceptibility of the Mathew Crescent properties, forms the "existing" scenario, for the purposes of this study.

This present study is based on numerical (computer based) catchment and floodway models, both of which are refinements of models used by Australian Water Engineering Pty Ltd and Brisbane Stormwater Management Pty Ltd for earlier investigations of downstream floodway developments - notably, the Norfolk Lakes development, the expansion of St Eugene College and the widening of the Bruce Highway crossing. The catchment modelling is described in Section 3 of this report, while the refinement of the floodway model is described in Section 4. The subsequent use of the floodway model to assess a range of mitigation scenarios is described in Section 5, leading to a recommended mitigation strategy in Section 6.

3.0 CATCHMENT MODEL

A catchment model is used to generate numerical hydrographs of stormwater runoff from a catchment to a floodplain. Figure 1 shows the subarea network that has been used, in this instance, to model the Burpengary Creek catchment using the URBS software (Version 3.5g). The subarea network shown in Figure 1 provides significantly more detail than earlier versions of this model, in the vicinity of Mathew Crescent.

Earlier versions of this model were broadly calibrated to statistical flow targets that were abstracted, on an exponential area basis, from gauged flood frequencies in the nearby Caboolture River and South Pine River catchments. The calibration has been improved in this study by applying an URBS model directly to the Caboolture River itself (proximity to the Burpengary Creek catchment as shown in Figure 1) and then adjusting that model's parameters so as to match a statistical flow rate (the 5 year flow) just above the limit of the Caboolture River's confirmed gauge rating. Those calibrated parameters were then transposed directly to the Burpengary Creek model. The calibrated storage parameter from the Caboolture River model (alpha, 0.77) is consistent with values reported from models on other morphologically similar catchments in south-east Queensland, particularly Moggill Creek (alpha, 0.80) and Bulimba Creek (alpha, 0.83).

The mainstream flow rates predicted by this model, at Oakey Flat Road and at the Youngs Creek confluence, are 5 to 10 percent less than the flow rates predicted by the earlier versions of the model.

4.0 FLOODWAY MODEL

4.1 Model Set-Up

The extent of the Extran floodway model, in relation to the catchment extent, is shown in Figure 1. A more detailed view of the overall model is shown in Figure 2, while an even more detailed view of the model layout in the Mathew Crescent area can be seen in Figure 3.

Earlier versions of this model had only the main-channel nodes prefixed BP in Figure 2. The refinement of the model to suit this study included the addition of intermediate main-channel nodes around the Mathew Crescent area (for example, the addition of nodes BP51.4 and BP51.6 between the original nodes BP51 and BP52) and the addition of an overflow network through the Mathew Crescent area itself (nodes prefixed MC in Figure 2 and Figure 3). Additional channel cross-sections were surveyed and the overflow area through the Mathew Crescent area was mapped by Council at a narrow contour interval (as seen in Figure 3), for this purpose.

Two variants of the model were compiled: - a "pre-existing" variant which did not have the connection of the upstream drain to the creek and therefore did not include nodes MC34, MC35, MC37 and MC37.1, and an "existing" variant which included the drain connection. Other developments that have occurred in the floodplain, between the construction of the two drains (for example, Pitt Road / Northshore and part of Norfolk Lakes, were treated identically in the two variants, so as to allow the two model variants to identify the impact of just the subject upstream drain. Both versions were run in Engine Version 9.28 of the Extran software.

4.2 Model Calibration

The "pre-existing" variant of the model was calibrated to the surveyed flood levels along the creek by bracketing the 20, 50 and 100 year flood profiles around the recorded April 1989, February 1972 and December 1991 flood levels at the Rowley Road and Oakey Flat Road crossings.

The 1989 flood is believed, from previous studies by Australian Water Engineering Pty Ltd, to have been about a 10 year event, while the 1991 flood is the second highest in the 37 year history of recordings since 1970 and is considered to have been close to a 20 year event at the Oakey Flat Road crossing. The 1972 flood is the highest flood recorded in Burpengary Creek since 1970, and, on the basis of records from the adjoining Caboolture River catchment, would almost certainly not have been exceeded by any flood between 1931 and 1970, making it the highest flood in the past 76 years.

The calibration, which involved Manning's n values as high as 0.15 in the main channel and as low as 0.05 in the open paddocks such as at the Equestrian Centre, predicted a 100 year flood profile which exceeded the 1972 levels by 0.28 metre at Oakey Flat Road and by 0.58 metre at Rowley Road.

4.3 Impact Of The Upstream Drain

Running the "existing" variant of the model with the calibrated Manning's n values from the "pre-existing" variant, confirmed that overflows from the creek to the Mathew Crescent area, via the upstream drain, could commence just below the 20 year level.

The impacts of the upstream drain on the 100 year flood levels at each of the model nodes can be seen a the difference (afflux) between the pre-existing and existing levels as tabulated in Appendix B hereto. Th diversion of flow from the creek to the drain has dropped the 100 year flood level in the creek (at th drain junction, node BP54) by 0.33 metre, while the overflow profile through the Mathew Crescen properties has risen by as much as 0.35 metre (at node MC14). Further down the floodway, the profile i the creek returns to its pre-existing level at node BP48.3 and then rises fractionally (0.01 metre) above that profile from the Rowley Road crossing down to the Bruce Highway crossing. Whereas two house floors (at [redacted] Annette Court and [redacted] Mathew Crescent) could have been inundated by a 100 year flooc prior to the upstream drain's construction, three further house floor (at 27-29, 33 and 41 Mathew Crescent) could be inundated by the same event following the drain's construction.

The differences in the 100 year inundation widths through the Mathew Crescent area, between the pre-existing and existing scenarios, can be seen in Figure 9. In some areas, the inundation width is substantially increased - for example, at [redacted] Mathew Crescent, where the widened inundation could affect almost half of the lot.

5.0 MITIGATION SCENARIOS

5.1 Objective And Opportunities

The objective of the mitigation strategy is to restore the flood immunity of the Mathew Cresce[nt] properties to its pre-existing level, without depreciating the pre-existing flood immunity of oth[er] properties elsewhere along the floodplain.

Since it is not practical to enlarge the flowpath and the existing drainage easement through the Mathe[w] Crescent properties to carry the increased overflow at its pre-existing levels, the available opportunities are reduced to restrictions on the drains' overflow capacities, lowering the flood level in the creek at th[e] drain junctions, and substantially increasing the floodway storage elsewhere. Any restrictions of th[e] drains' overflow capacities, which would divert flow back to the creek, may have to be accompanied by floodway excavation or bank raising along the creek, so as to maintain the existing flood profile along th[e] creek or to prevent its overflow to other properties. A range of opportunities that could address the objective are shown in Figure 4 and summarised as follows:

- Excavating the creek bank, upstream of the Equestrian Centre, could increase the overflow capacity across Council land at this point, and could thereby lower the flood levels in the creek fo[r] some distance upstream of this point. The excavation is shown in Figure 5.

- A recent development application (IMP-84) involved excavating the southern overbank of th[e] creek through 60 - 106 Delaney Road. Although this proposal has recently been put in limbo, similar proposal for this property in the future could lower the flood profile in the creek for some distance upstream.

- Overflows to the upstream drain could be partially restricted by pipes just large enough to discharge the local runoff, or could be completely restricted by fitting flapgates to those pipes, a[s] shown in Figure 6.

- The downstream drain could be flapgated, as shown in Figure 6, to reduce the overflows at thi[s] point. This could require an enlargement of the existing easement at this location, to cover the proposed works.

- A levee could be placed along the downstream side of the upstream drain, as shown in Figure 7, to prevent overflows from the drain. However, this would require part of Mathew Crescent to b[e] raised, as part of the levee, and there would inevitably be a substantial adverse impact on the floo[d] immunity of the Rowley Road / Mathew Crescent intersection and the nearby school.

- The creek bank near the Extran nodes BP55 and BP53.7 could be topped-up or leveed, as shown in Figure 7, to prevent minor overflows at these points in a 100 year storm. However, the levee near node BP53.7 would involve works in private property.

- A decanting basin could be built on the upstream Council land adjoining the Caboolture Regional Environmental Education Centre, as shown in Figure 8, to increase the floodway's upstream flood storage and thereby reduce the downstream flow rates and flood levels.

- Any low sections of the southern bank of the creek at Hideaway Close and River Oak Way, opposite the upstream drain junction, could be topped-up as in Figure 8 to counter an afflux from the drain restriction. An existing minor drain that has been cut through the creek bank from the rear of the Hideaway Close properties should, in any case, be blocked off and redirected instead to the creek bank further downstream.

Although some of the above opportunities are mutually exclusive (for example, the decanting basin and the blocking of the overflow at BP55), it would nevertheless be possible to compile a very wide range of combinations of those opportunities. In practice, some instinctive selection has been applied to the process, to arrive at just 14 scenarios for testing in the Extran model. The make-up of each of those scenarios is summarised in Table 1. The 14 scenarios are labelled A to N in broad order of their increasing effectiveness in reducing the overflows through Mathew Crescent.

5.2 Effectiveness Of The Various Scenarios

The impacts of the 14 scenarios on the 100 year flood profiles, as assessed in the Extran model, are fully detailed in Appendix B hereto, and are summarised in Table 2. The upper half of that table lists the impacts relative to the pre-existing flood levels, while the lower half lists the impacts relative to the existing flood levels. The costs of the scenarios are also listed in Table 2, to provide a perspective on benefit/cost ratios.

The effects of three of these scenarios (G, H and N) on the 100 year inundation widths through the Mathew Crescent properties, are marked on Figure 9. The inundation widths for a fourth scenario (E) are practically identical to the widths indicated in Figure 9 for the pre-existing scenario,

The impacts of the various scenarios at each of the five flood-affected houses are also tabulated alongside those house locations on Figure 9.

The assessment can be summarised as follows:

- Scenarios A to D do not achieve the objective of at least returning the Mathew Crescent flood profile to its pre-existing levels, and two of those scenarios (A and D) are particularly expensive.

- Scenario E, flapgating of the upstream drain, which could have been expected to return the Mathew Crescent flood profile to its pre-existing levels, is predicted by the Extran model to mostly meet that objective, apart from affluxes of 0.01 metre and 0.02 metre at just a few nodes. Significantly, the three "extra" flooded house floors at [redacted] Mathew Crescent, could regain their pre-existing flood-free status in the 100 year event. Any minor impacts of this scenario on the existing external developments could be counteracted by the topping-up of the banks at Hideaway Close and River Oak Way.

- Scenario F, which is basically Scenario E (flapgating of the upstream drain) plus the recently proposed floodway excavation at [redacted] Delaney Road, is the first scenario to meet the objective of returning the Mathew Crescent flood profile to or below its pre-existing levels. Significantly, only one house floor [redacted] Mathew Crescent) would still be flood-affected by the 100 year flood, which would be an improvement on the pre-existing scenario. Also significantly, at $107000 th is one of the least costly scenarios. However, the viability of this scenario is dependent on a future developer of [redacted] Delaney Road wanting to excavate that property in a similar manner to that which was proposed under IMP-84, which is not something that can be ensured by Counci Accordingly, the viability of this scenario is somewhat opportunistic.

- Scenario G, which adds flapgating of the downstream drain to Scenario E, is slightly better tha Scenarios E and F for some of the Mathew Crescent properties, but at 30 percent more cost. Importantly, unlike Scenario F, this scenario would not be dependent on a future developer of 60 106 Delaney Road. However, this scenario could raise the pre-existing flood levels along the mai channel of the creek, between nodes BP50.4 and BP52.6, by 0.01 metre to 0.02 metre.

- Scenario H, which is Scenario G plus the proposed floodway excavation at Delaney Road, offers slightly more benefit than Scenario G to the Mathew Crescent properties, without further increasing the cost, and could remove Scenario G's slight affluxes along the creek between node BP50.4 and BP52.6. However, like Scenario F, this scenario is dependent on a future developer of [redacted] Delaney Road wanting to excavate that property in a similar manner to that which was proposed under IMP-84, and the viability of this scenario is somewhat opportunistic.

- Scenarios I and J, which add the decanting basin to the respective scenarios F and G, could furthe improve the profiles through Mathew Crescent and could remove Scenario G's affluxes along th creek, but at about five times the cost of those other scenarios. Since Scenario G would depress the Mathew Crescent flood profile to just below its pre-existing level, and Scenario F woul achieve close to the same result, the additional costs of scenarios I and J seem difficult to justify.

- Scenarios K to N offer little or no further benefit to the Mathew Crescent properties. This is because Options F to J could already reduce the creek overflows to less than the local stormwater runoff that would flow through the Mathew Crescent properties, earlier in the storm. This effect i illustrated in Figure 10, which shows the impact of Scenario M on the 100 year flood hydrograph at node MC 20. Since scenarios K to N are all more expensive than Scenarios F to H, they are less attractive.

- Notwithstanding the above comments, the scenarios involving the decanting basin (I, J and L) could have a notable impact on flood levels along the creek channel everywhere downstream of th basin (except along the Mathew Crescent overflow). They could also come close (within 0.02 metre) to achieving flood immunity for the last of the flood affected houses, at [redacted] Mathe Crescent, which fronts the creek rather than the overflow path. While these scenarios offer limite value with respect to the Mathew Crescent problem, and are fairly costly, they could have some future potential as a regional detention facility to offset further catchment development.

6.0 CONCLUSIONS

The construction of the upstream drain has significantly impacted on the flood behaviour, causing the 100 year flood profile in the creek to drop by as much 0.33 metre, while the flood profile through Mathew Creek has risen by as much 0.35 metre. Three house floors could be affected by the increased flood levels (in addition to the two other house floors that could already have been affected by the 100 year flood in the pre-existing scenario) and the inundation boundaries through Mathew Crescent have been substantially widened.

The recommended mitigation strategy comprises the installation of three 1500 mm diameter flapgates in the upstream drain, together with some minor works alongside the Hideaway Close and River Oak Way properties to top-up any low spots in the banks and to redirect some local drainage, as in Scenario E, at an expected cost of $107000. This strategy should return the situation to practically the pre-existing scenario, although the Extran model predicts that there would still be affluxes of 0.01 metre to 0.02 metre at a few nodes along the Mathew Crescent overflow path. Significantly, though, the three house floors that could have been affected by the increased flood levels could regain their pre-existing flood-free status in a 100 year flood.

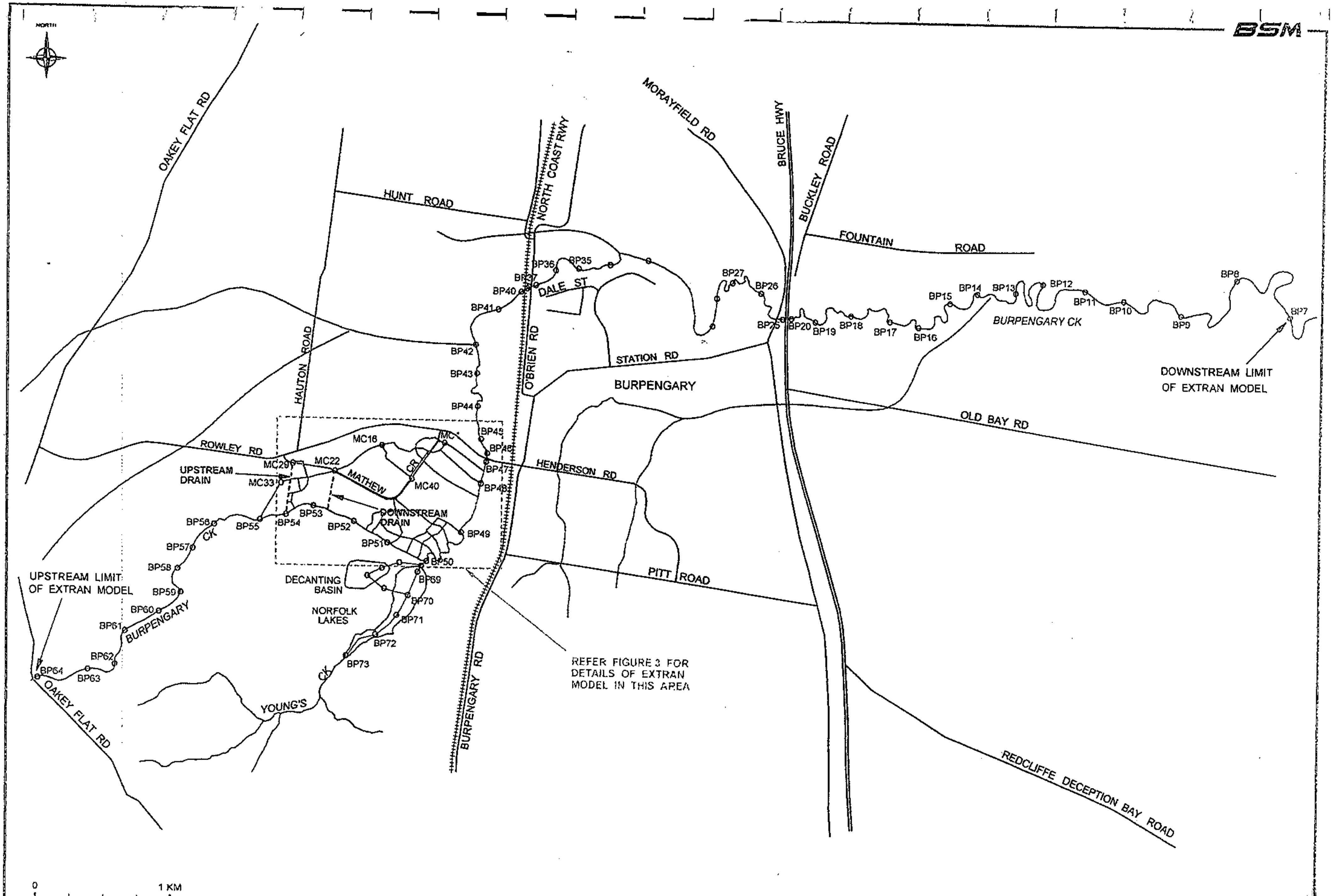
Additionally installing two 1050 mm diameter flapgates in the downstream drain, taking the total cost to about $ 140000, would ensure that the 100 year flood levels through the Mathew Crescent properties are depressed below their pre-existing levels and only one house floor (at [redacted] Mathew Crescent) could then remain susceptible to a 100 year flood. However, this could result in affluxes of 0.01 metre to 0.02 metre on the pre-existing 100 year flood profile along the creek channel, between nodes BP50.4 and BP52.6.

Alternative strategies involving a decanting basin could go close to achieving 100 year flood immunity for the remaining flood-prone house floor, but at considerable extra cost ($480000 extra). More significantly, a decanting basin could achieve a notable reduction in flood levels along the creek channel downstream of the basin and it could therefore have some future potential as a regional detention facility to offset further catchment development.

A recent development application (IMP-84) for [redacted] Delaney Road included a proposal to excavate the overbank area along the creek frontage of that property. That excavation could have had a substantial beneficial impact on flood profiles through the area and could, for example, have ensured that Scenario E would completely achieve the mitigation objective without the need for the additional flapgates on the downstream drain.

TABLE 1: SCOPE OF EACH MITIGATION SCENARIO

SCENARIO	Excavate Bank At Equestrian Centre	IMP-84 Excavation 60-106 Delaney Rd	Extra Excavation 60-106 Delaney Rd	3 x 1500 Pipes Upstream Drain	Add Flapgates Upstream Drain	2 x 1050 Pipes And Flapgates At Downstream Drain	Top-Up Bank And Redirect Drain At Hideaway / RiverOak	Top-Up Bank At Extran BP55	Levee Overflow Extran BP53.7	Levee Alongside Upstream Drain	Decanting Basin
A	Y										
B		Y									
C			Y								
D				Y		Y					
E				Y	Y		Y				
F		Y		Y	Y		Y				
G				Y	Y	Y	Y				
H		Y		Y	Y	Y	Y				
I				Y	Y		Y				Y
J				Y	Y	Y	Y				Y
K		Y				Y	Y			Y	
L		Y		Y	Y	Y	Y		Y		Y
M		Y		Y	Y	Y	Y	Y	Y		
N		Y				Y	Y		Y	Y	



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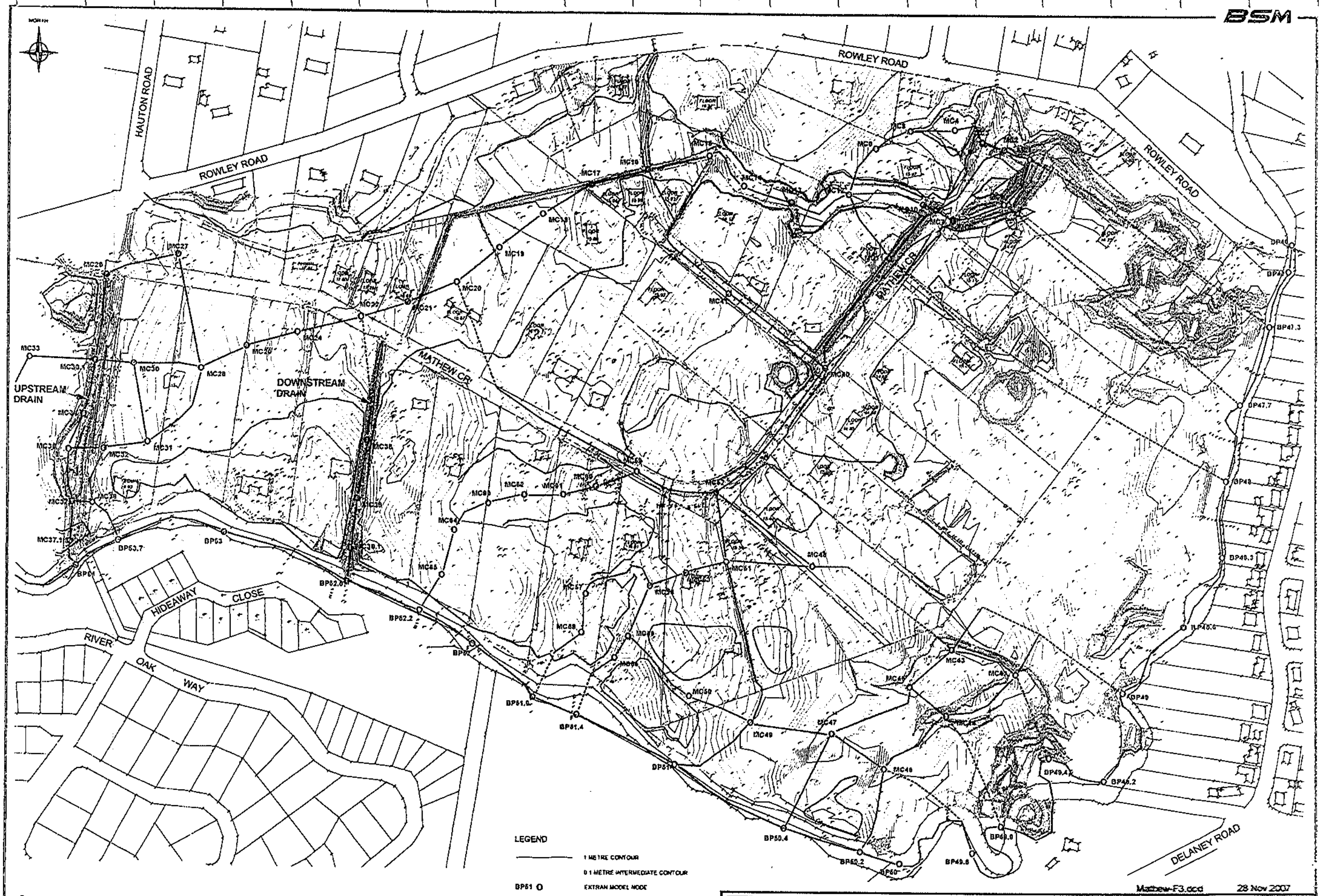
FLOOD MITIGATION SCENARIOS FOR MATHEW [illegible]

[illegible]



FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

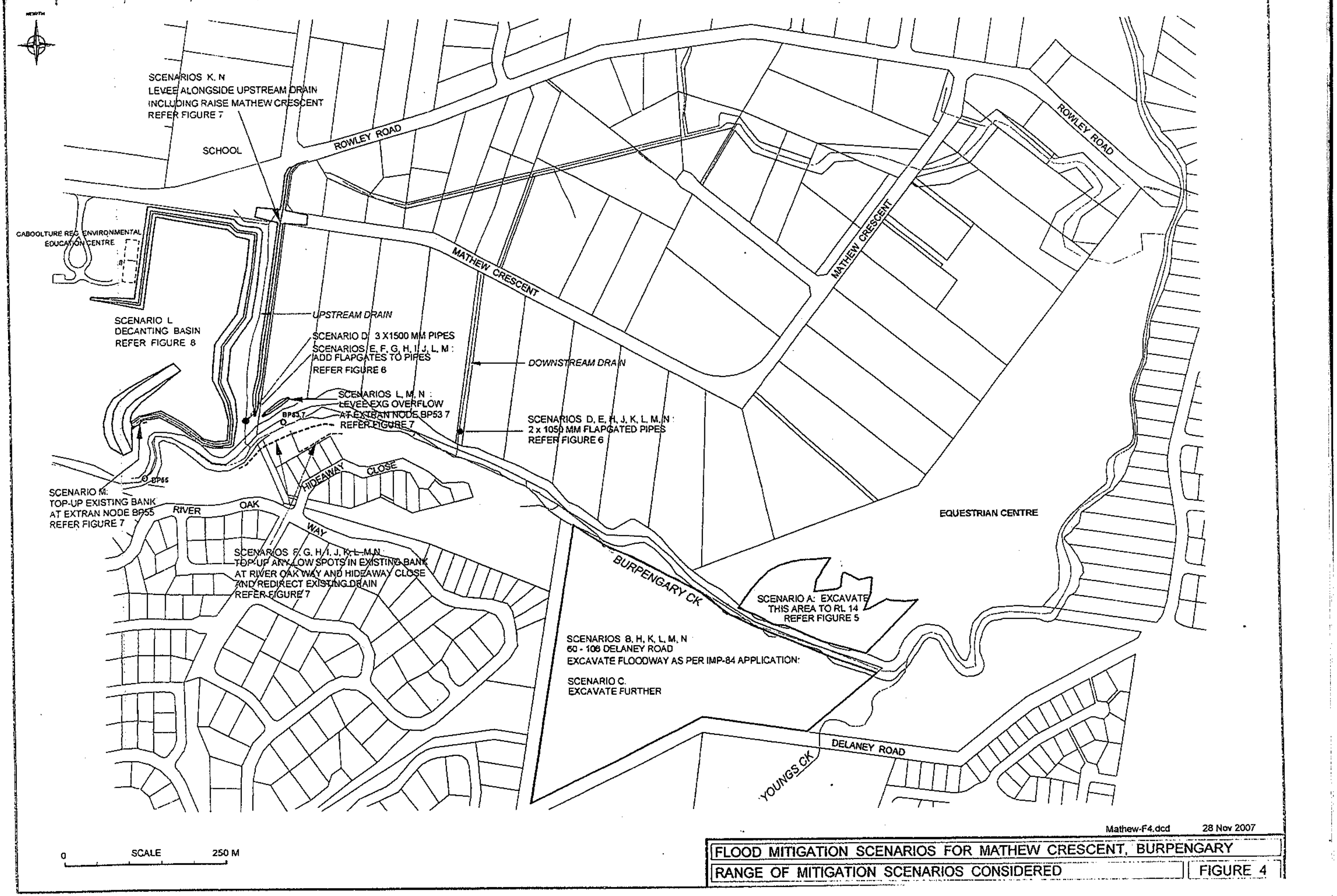
TABLE 2: COST/BENEFIT COMPARISON

IMPACTS (M) ON **PRE-EXISTING** 100 YR FLOOD LEVELS AT EXTRAN NODES / LOCATIONS

SCENARIO	COST ($)	BP58	BP56	BP54	BP51.4	Mathew Cr MC24	Mathew Cr MC20	Annette Ct MC18/MC17	Mathew Cr MC51	Mathew Cr BP47.3	Dale St BP36	Fountain Rd BP14
A	1,150,000	-0.01	-0.05	-0.33	-0.1	0.14	0.32	0.17	-0.01	0	0	-0.04
B	N/A	-0.01	-0.06	-0.35	-0.25	0.14	0.31	0.15	-0.01	0	0	-0.04
C	1,389,000	-0.01	-0.06	-0.38	-0.79	0.13	0.29	0.13	-0.01	0.01	0	-0.04
D	99,000	-0.01	-0.03	-0.12	-0.03	0	0.23	0.06	-0.01	0	0	-0.04
E	107,000	0	0	-0.02	-0.01	-0.11	0	0.01	-0.01	0	0	-0.04
F	107,000	0	-0.01	-0.04	-0.16	-0.12	-0.01	-0.03	-0.01	0	0	-0.04
G	140,000	0	0	-0.02	0.01	-0.11	-0.03	-0.05	-0.01	0	0	-0.04
H	140,000	0	-0.01	-0.03	-0.14	-0.12	-0.06	-0.06	-0.01	0	0	-0.04
I	580,000	-0.02	-0.09	0	-0.06	-0.17	-0.11	-0.06	-0.01	-0.06	-0.04	-0.06
J	610,000	-0.02	-0.09	-0.17	-0.04	-0.17	-0.2	-0.06	-0.01	-0.06	-0.04	-0.06
K	210,000	0	-0.01	-0.01	-0.13	-0.17	-0.2	-0.06	-0.01	-0.01	-0.01	-0.05
L	620,000	-0.02	-0.09	-0.18	-0.19	-0.17	-0.2	-0.06	-0.01	-0.06	-0.04	-0.06
M	150,000	0	0	0.02	-0.12	-0.17	-0.2	-0.06	0	0	0	-0.04
N	220,000	0	-0.01	0.01	-0.12	-0.17	-0.2	-0.06	0	-0.01	-0.01	-0.05

IMPACTS (M) ON **EXISTING** 100 YR FLOOD LEVELS AT EXTRAN NODES / LOCATIONS

SCENARIO	COST ($)	BP58	BP56	BP54	BP51.4	Mathew Cr MC24	Mathew Cr MC20	Annette Ct MC18/MC17	Mathew Cr MC51	Mathew Cr BP47.3	Dale St BP36	Fountain Rd BP14
A	1,150,000	0	0	0	-0.01	0	0	0	0	-0.01	-0.01	0
B	N/A	0	0	-0.02	-0.16	0	-0.01	-0.02	0	-0.01	-0.01	-0.01
C	1,389,000	0	0	-0.05	-0.7	-0.02	-0.02	-0.04	0	0	0	0
D	99,000	0	0.02	0.21	0.07	-0.15	-0.08	-0.11	0	-0.01	-0.01	-0.01
E	107,000	0.01	0.05	0.31	0.09	-0.25	-0.31	-0.18	0	-0.01	-0.01	-0.01
F	107,000	0.01	0.04	0.3	-0.06	-0.27	-0.33	-0.2	0	-0.01	-0.01	0
G	140,000	0.01	0.05	0.31	0.11	-0.25	-0.35	-0.22	0	-0.01	-0.01	-0.01
H	140,000	0.01	0.05	0.3	-0.05	-0.26	-0.37	-0.23	0	-0.01	-0.01	0
I	580,000	-0.01	-0.03	0.16	0.03	-0.31	-0.43	-0.23	0	-0.07	-0.05	-0.02
J	610,000	-0.01	-0.03	0.16	0.05	-0.31	-0.52	-0.23	0	-0.07	-0.05	-0.02
K	210,000	0.01	0.04	0.32	-0.04	-0.31	-0.52	-0.23	0	-0.02	-0.02	-0.01
L	620,000	-0.01	-0.03	0.15	-0.1	-0.31	-0.52	-0.23	0	-0.07	-0.04	-0.02
M	150,000	0.01	0.06	0.36	-0.02	-0.31	-0.52	-0.23	0	-0.01	-0.01	0
N	220,000	0.01	0.05	0.34	-0.02	-0.31	-0.52	-0.23	0.01	-0.02	-0.01	-0.01

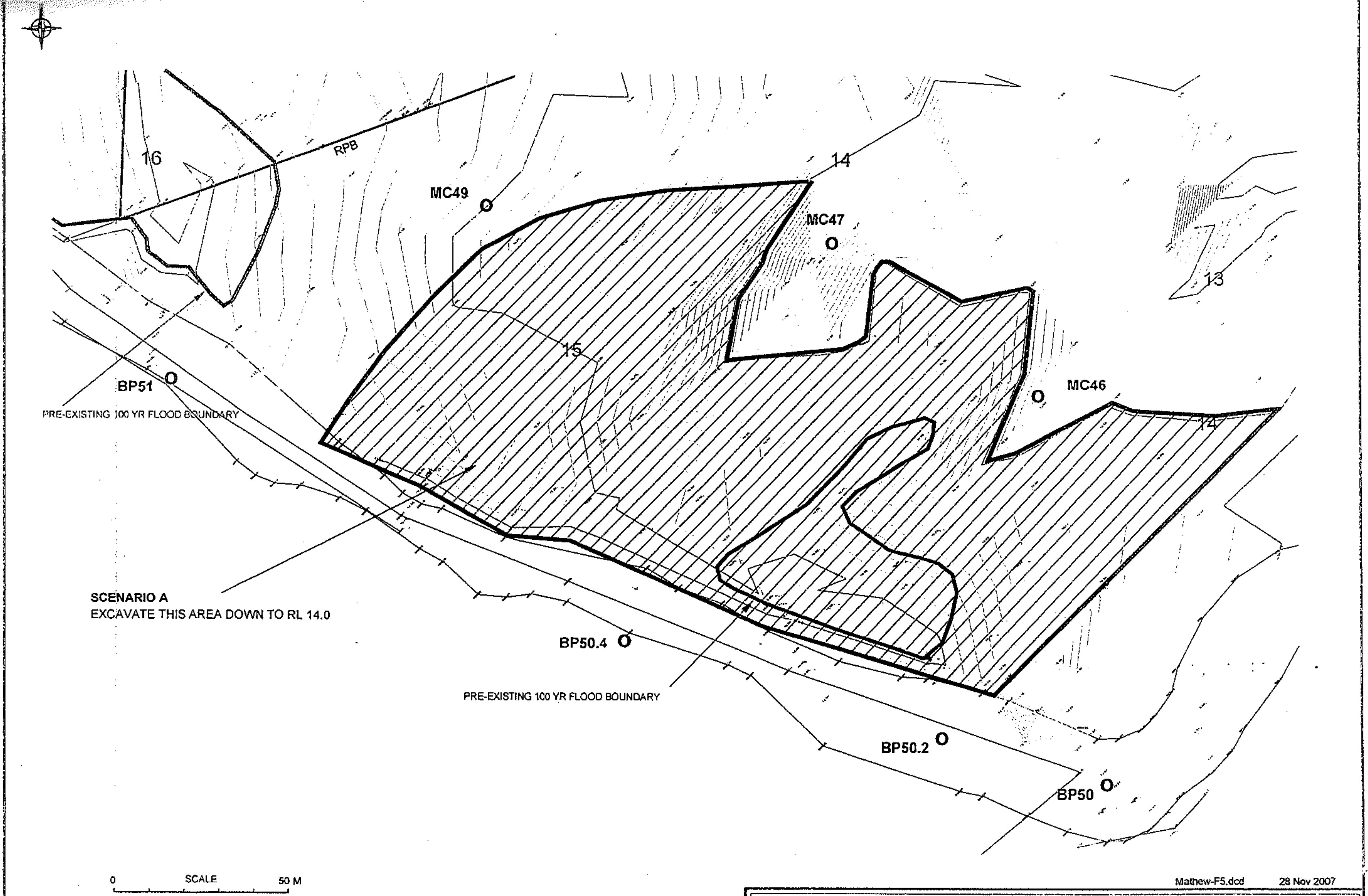


Mathew-F4.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

RANGE OF MITIGATION SCENARIOS CONSIDERED

FIGURE 4

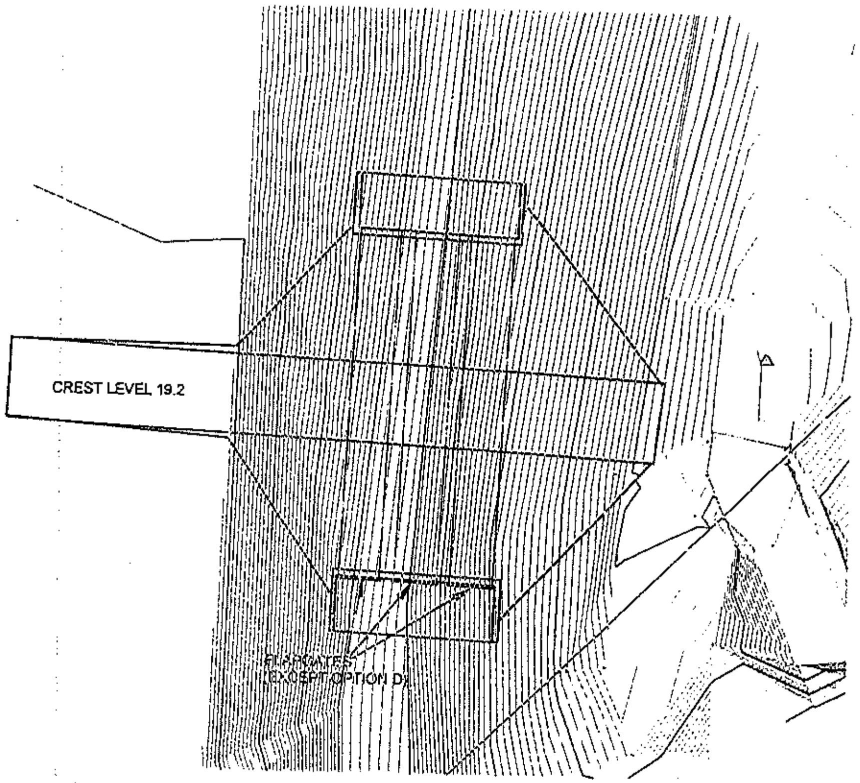


Mathew-F5.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

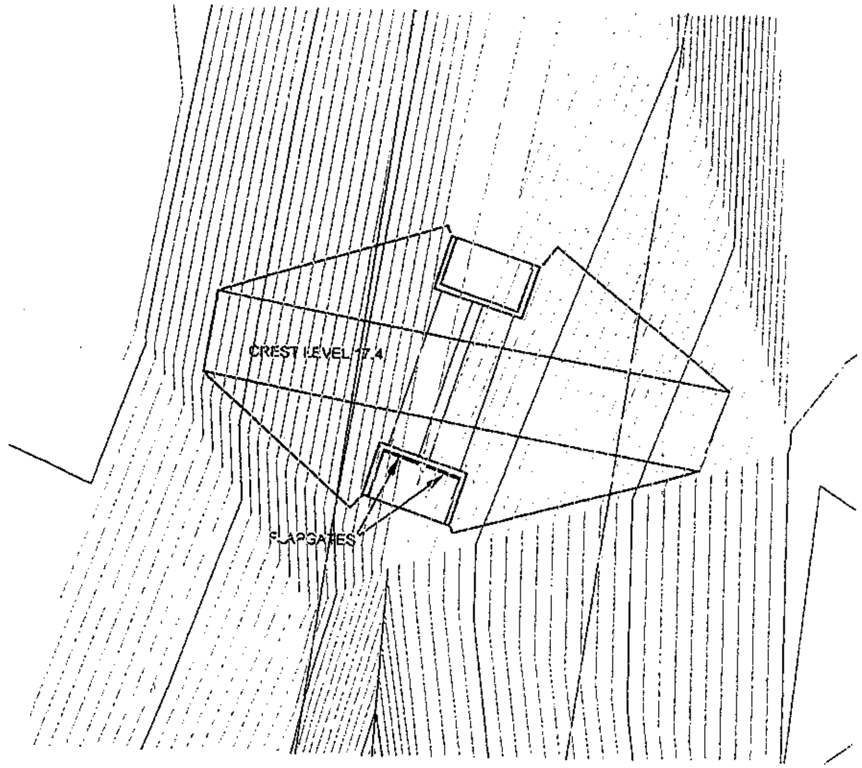
BANK EXCAVATION UPSTREAM OF EQUESTRIAN CENTRE

FIGURE 5



UPSTREAM DRAIN - 3 x 1500 MM PIPES

(SCENARIOS D, E, F, G, H, I, J, L, M)



DOWNSTREAM DRAIN - 2 x 1050 MM PIPES

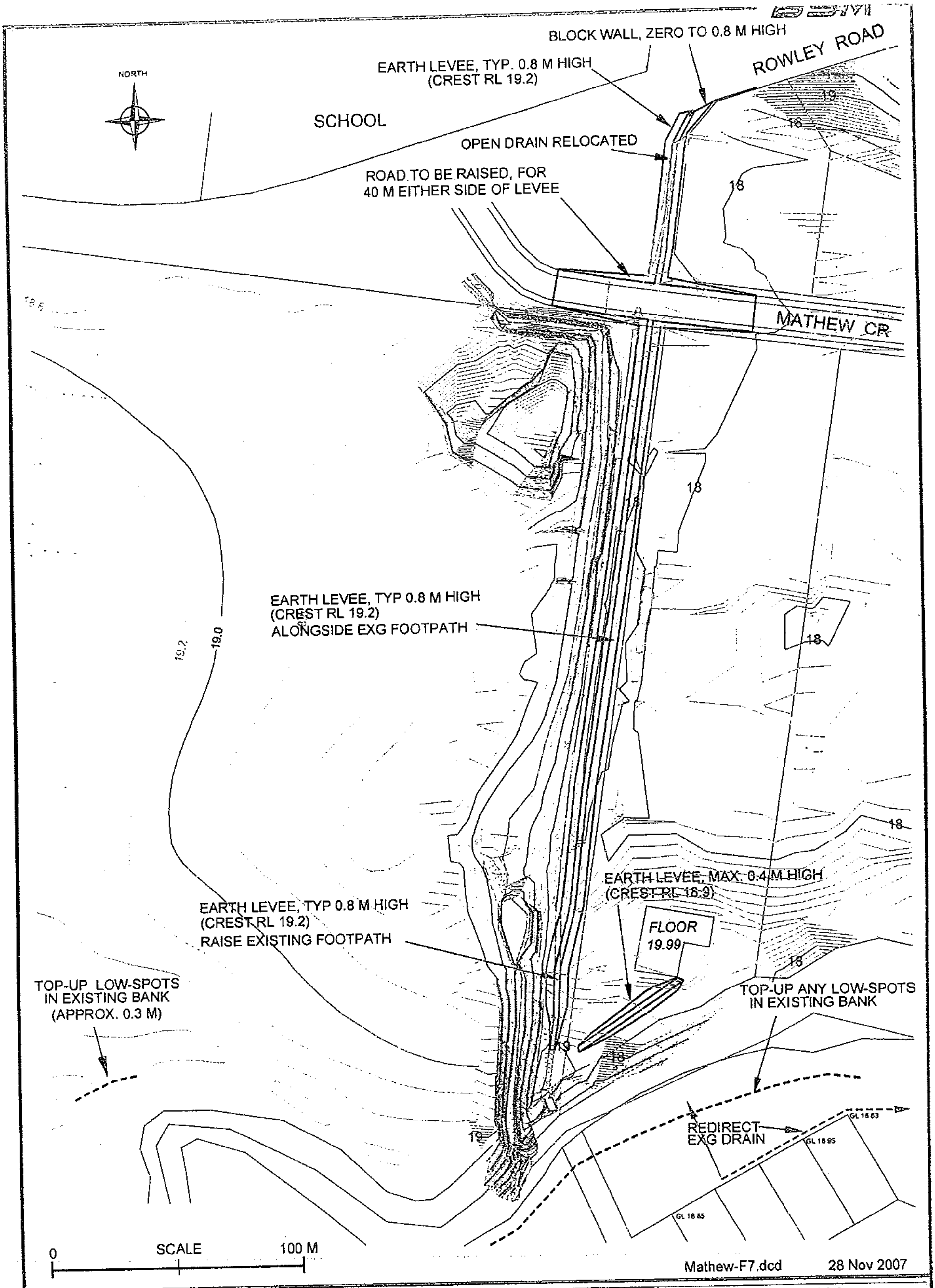
(SCENARIOS D, E, H, J, K, L, M, N)

0 SCALE 10 M

Mathew-F6.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

FIGURE 6

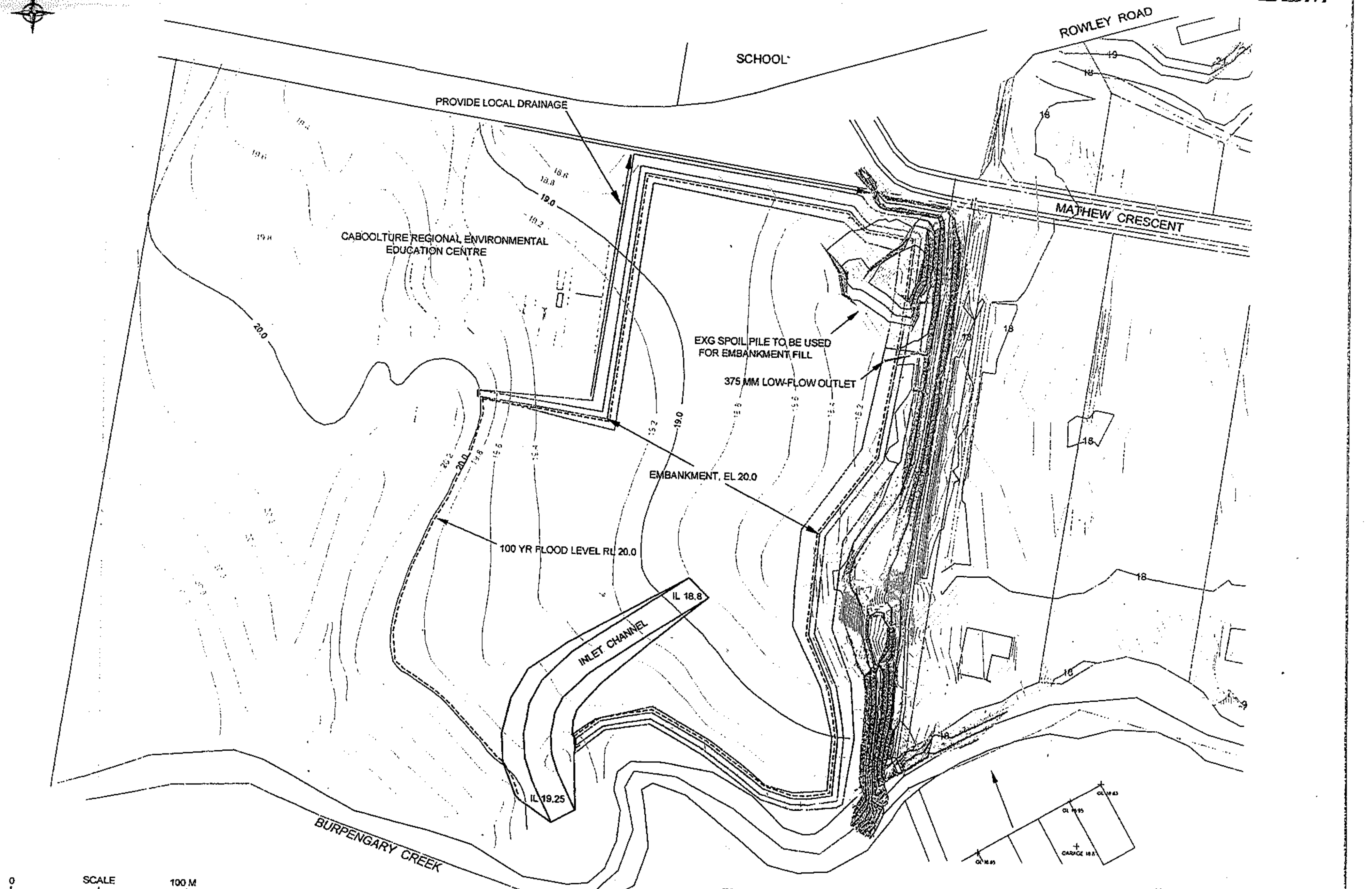


Mathew-F7.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

LEVEES AND BANK TOP-UPS

FIGURE 7

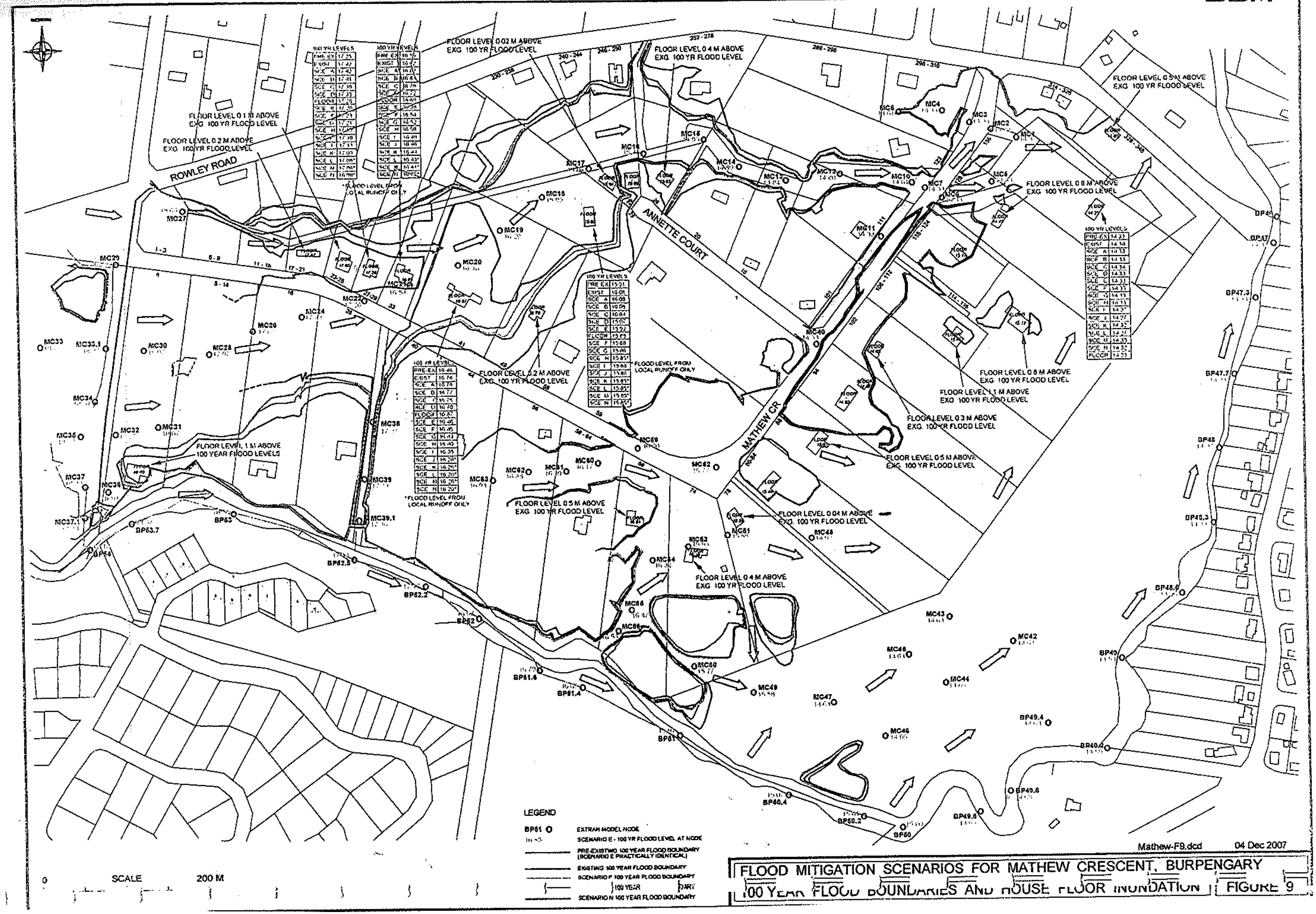


Mathew-F8.dcd 28 Nov 2007

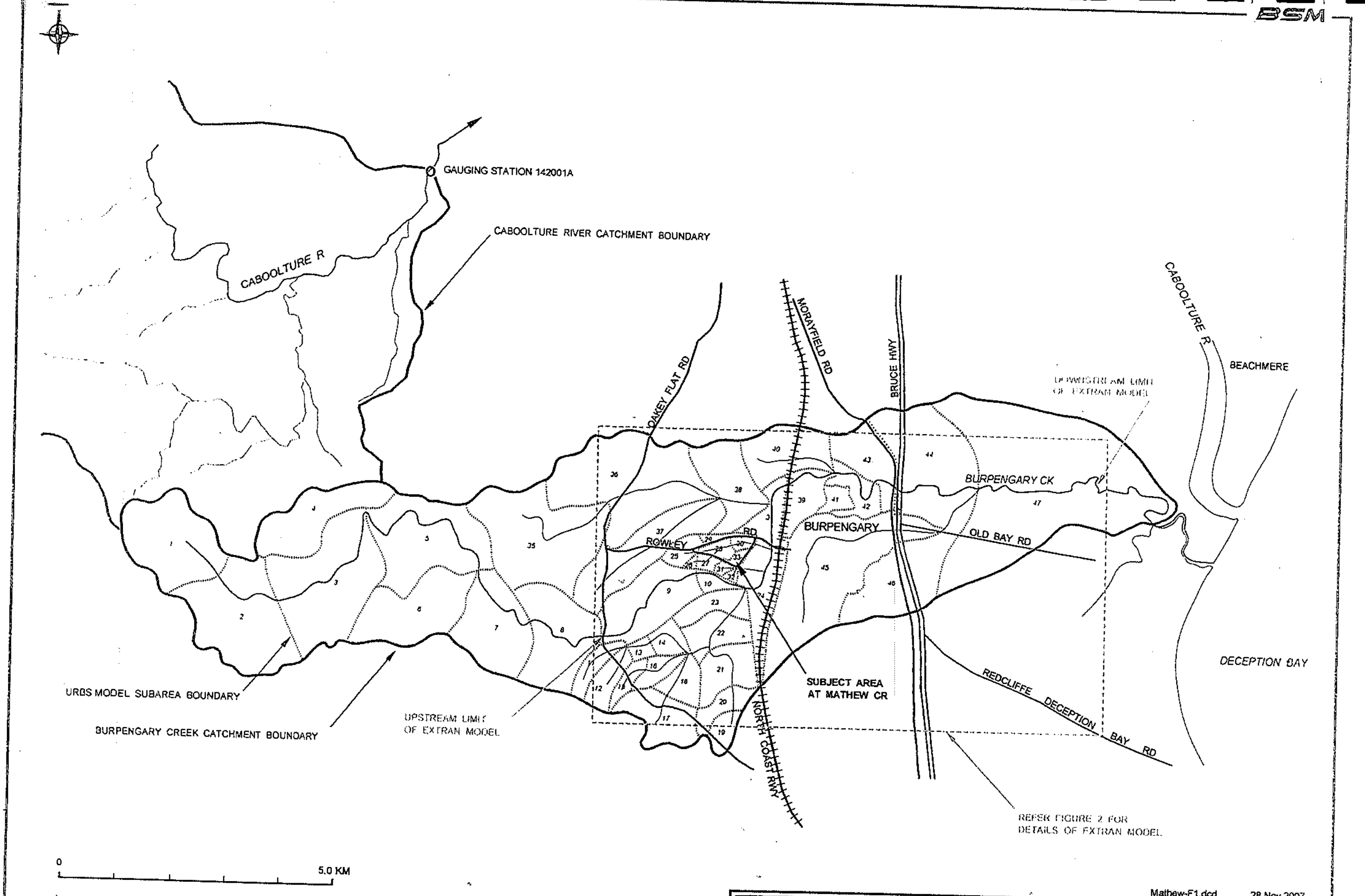
FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

UPSTREAM DECANTING BASIN

FIGURE 8



ROWLEY ROAD
ANNETTE COURT
MATHEW CR
FLOOR LEVEL 0.02 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.4 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.5 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.8 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 1.1 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.3 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.04 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 0.2 M ABOVE EXG 100 YR FLOOD LEVEL
FLOOR LEVEL 1.1 M ABOVE 100 YEAR FLOOD LEVELS
*FLOOD LEVEL FROM LOCAL RUNOFF ONLY
LEGEND
EXTRAN MODEL NODE
SCENARIO E - 100 YR FLOOD LEVEL AT NODE
PRE-EXISTING 100 YEAR FLOOD BOUNDARY (SCENARIO E PRACTICALLY IDENTICAL)
EXISTING 100 YEAR FLOOD BOUNDARY
SCENARIO F 100 YEAR FLOOD BOUNDARY
SCENARIO N 100 YEAR FLOOD BOUNDARY
SCALE
0
200 M
Mathew-F9.dcd
04 Dec 2007
FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY
100 YEAR FLOOD BOUNDARIES AND HOUSE FLOOR INUNDATION
FIGURE 9

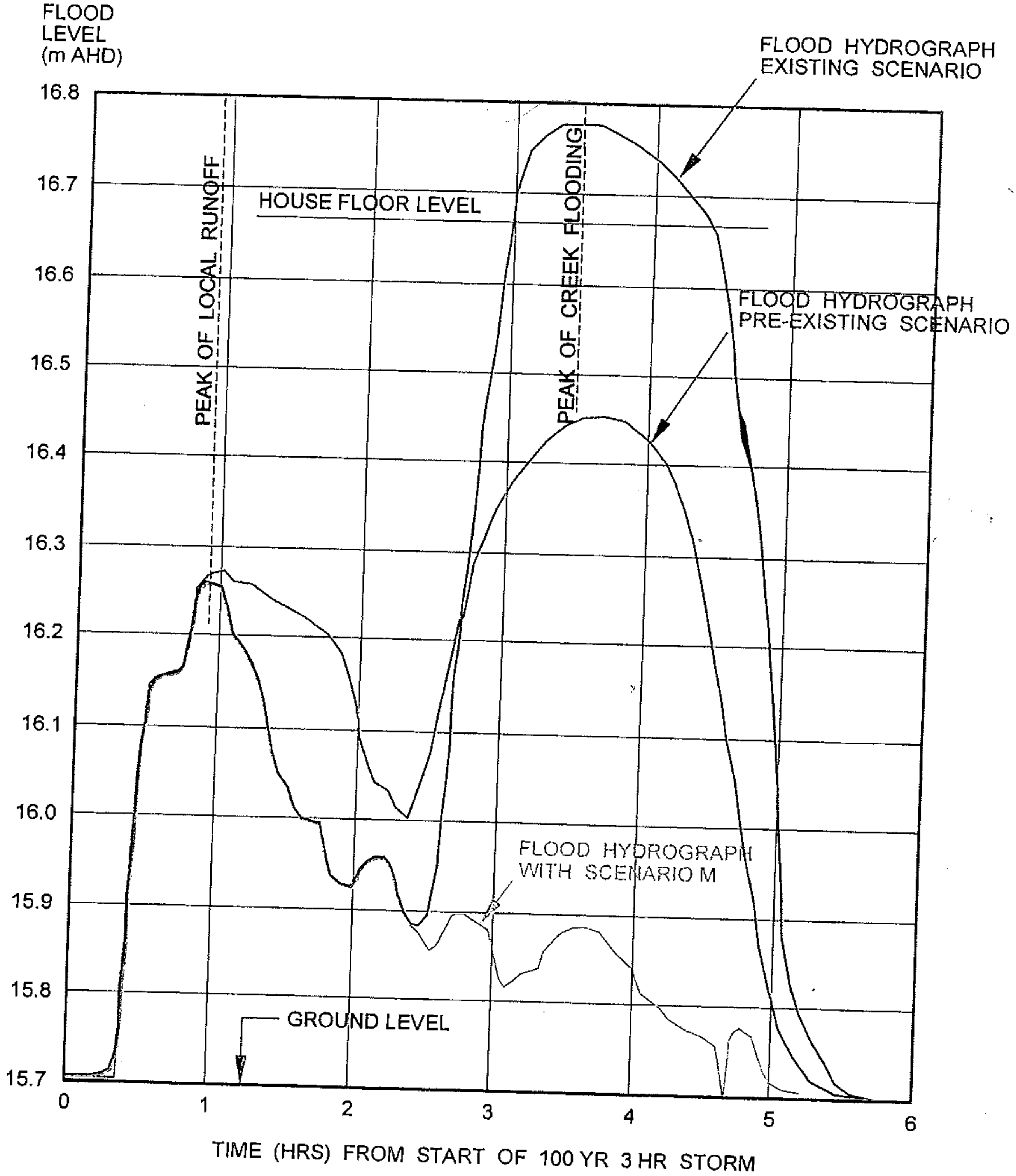


Mathew-F1.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

LOCALITY AND CATCHMENT PLAN

FIGURE 1



Mathew-F11.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

IMPACT OF SCENARIO M AT [redacted] MATHEW CRESCENT (NODE MC20) FIGURE 10

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO A

Excavate Creek Bank Near Equestrian Centre

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and grubbing	3	days	4000	12000
Strip existing surface, 0.1 m deep	2100	m3	8	16800
Excavate to spoil	14140	m3	11	155540
Cart spoil to nearest landfill (15 km)	1410	m3	10	141400
Landfill dump fees	21210	t	15	318150
Topdress disturbed area	21000	m2	4.5	94500
Turfing to disturbed area	21000	m2	4.5	94500
Silt and sediment control	1	Item	10000	10000
Sub-total				842890
Council survey, design and admin costs (19%)				160149
Sub-total				1003039
Estimate Factor (-5%)				-50152
Sub-total				952887
Contingencies (20%, rounded up)				197113
TOTAL				1150000 (ex. GST)

APPENDIX A

Cost Estimates

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO C

Additional Excavation At [redacted] Delaney Road

Preliminary Cost Estimate By D Ogle, BSM P/L

Additional Excavation	28000	m3	11	308000
Cart spoil to nearest landfill (15 km)	28000	m3	10	280000
Landfill dump fees	42000	t	15	630000
Sub-total				1218000
Estimate Factor (-5%)				-60900
Sub-total				1157100
Contingencies (20%, rounded up)				231900
TOTAL				1389000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO D

Choke Upstream Drain; Flapgate Downstream Drain

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Install flapgates	2	Item	700	1400
Sub-total				65937
Council survey, design and admin costs (19%)				12528
Sub-total				78465
Estimate Factor (+5%)				3923
Sub-total				82388
Contingencies (20%, rounded up)				16662
TOTAL				99000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO E

Flapgate Upstream Drain
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	1	day	4000	4000
Excavate for aprons	25.5	m3	12	306
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	6	m3	700	4200
Concrete wingwalls & headwalls	3.8	m3	1200	4560
Fill over pipes	123	m3	23	2829
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	3	Item	700	2100
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				71653
Council survey, design and admin costs (19%)				13614
Sub-total				86267
Estimate Factor (+4%)				3411
Sub-total				88678
Contingencies (20%, rounded up)				18322
TOTAL				107000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO F

Floodway Excavation At [redacted] Delaney Rd As Per IMP-84
Flapgate Upstream Drain
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	1	day	4000	4000
Excavate for aprons	25.5	m3	12	306
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	6	m3	700	4200
Concrete wingwalls & headwalls	3.8	m3	1200	4560
Fill over pipes	123	m3	23	2829
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	3	Item	700	2100
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				71653
Council survey, design and admin costs (19%)				13614
Sub-total				86267
Estimate Factor (+4%)				3411
Sub-total				88678
Contingencies (20%, rounded up)				18322
TOTAL				107000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO G

Flapgate Both Drains
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	5	Item	700	3500
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				94693
Council survey, design and admin costs (19%)				17992
Sub-total				112685
Estimate Factor (zero)				0
Sub-total				112685
Contingencies (20%, rounded up)				27315
TOTAL				140000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO H

Floodway Excavation At[redacted] Delaney Rd As Per IMP-84
Flapgate Both Drains
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	5	Item	700	3500
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				94693
Council survey, design and admin costs (19%)				17992
Sub-total				112685
Estimate Factor (zero)				0
Sub-total				112685
Contingencies (20%, rounded up)				27315
TOTAL				140000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO I

Flapgate Upstream Drain
Decanting Basin At CREEC
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	1	day	4000	4000
Excavate for aprons	25.5	m3	12	306
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	6	m3	700	4200
Concrete wingwalls & headwalls	3.8	m3	1200	4560
Fill over	123	m3	23	2829
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	3	Item	700	2100
Clearing and grubbing in decanting area	7	days	4000	28000
Strip surface for decanting embankment	1572	m3	8	12576
Excavate inlet channel	1257	m3	11	13827
Excavate exg spoil pile	2240	m3	11	24640
Import nett fill requirement	2800	m3	18	50400
Place and compact embankment fill	6300	m3	12	75600
Topdress disturbed areas	15720	m2	4.5	70740
Turfing to disturbed areas	15720	m2	4.6	70740
Supply & deliver 375 mm outlet pipe	10	m	25.66	257
Lay 375 mm outlet pipe	10	m	115	1150
Concrete headwalls & wingwalls, with dissipator	2.5	m3	1200	3000
Concrete aprons	0.75	m3	700	525
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				423108
Council survey, design and admin costs (19%)				80391
Sub-total				503499
Estimate Factor (-5%)				-25175
Sub-total				478324
Contingencies (20%, rounded up)				101676
TOTAL				580000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO J

Flapgate Both Drains
Decanting Basin At CREEC
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	5	Item	700	3500
Clearing and grubbing in decanting area	7	days	4000	28000
Strip surface for decanting embankment	1572	m3	8	12576
Excavate inlet channel	1257	m3	11	13827
Excavate exg spoil pile	2240	m3	11	24640
Import nett fill requirement	2800	m3	18	50400
Place and compact embankment fill	6300	m3	12	75600
Topdress disturbed areas	15720	m2	4.5	70740
Turfing to disturbed areas	15720	m2	4.6	70740
Supply & deliver 375 mm outlet pipe	10	m	25.66	257
Lay 375 mm outlet pipe	10	m	115	1150
Concrete headwalls & wingwalls, with dissipator	2.5	m3	1200	3000
Concrete aprons	0.75	m3	700	525
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				446148
Council survey, design and admin costs (19%)				84768
Sub-total				530916
Estimate Factor (-5%)				-26545
Sub-total				504370
Contingencies (20%, rounded up)				105360
TOTAL				610000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO K

Floodway Excavatiuon At [redacted] Delaney Rd As Per IMP-64
Levee Upstream Drain
Flapgate Downstream Drain
Top-Up Banks At Hideaway Close And River Oak Way

Preliminary Cost Estimate By D Ogle, BSM P/L

Strip surface for levee	331	m3	8	2648
Remove part of existing footpath	14	m3	150	2100
Cart concrete rubble to recycle	14	m3	15	210
Dispose of concrete rubble to recycle	30	t	5	150
Earthfill for levee	1814	m3	23	41722
Topdress levee surface	3456	m2	4.5	15552
Turf levee surface	3456	m2	4.5	15552
Reinstate footpath	110	m2	40	4400
Blockwork levee at Rowley Rd	12	m2	140	1680
Footing for blockwork	3	m3	700	2100
Realign open drain, Rowley Rd to Mathew Cr	60	m3	12	720
Scarify exg bitumen in Mathew Cr	640	m2	2	1280
Strip existing verges	32	m3	8	256
Supply road base	840	t	9	7560
Spread and compact road base	840	t	19	15960
Two-coat bitumen seal	640	m2	10	6400
Clearing and Grubbing	1	day	4000	4000
Excavate for aprons	2.7	m3	12	32
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Concrete aprons	3.4	m3	700	2380
Concrete wingwalls & headwalls	2.9	m3	1200	3480
Fill over pipes	52	m3	23	1196
Supply 1050 mm flapgates	2	Item	2965	5930
Install flapgates	2	Item	700	1400
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Sub-total				146386
Council survey, design and admin costs (19%)				27813
Sub-total				174199
Estimate Factor (zero)				0
Sub-total				174199
Contingencies (20%, rounded up)				35801
TOTAL				210000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO L

Floodway Excavation At [redacted] Delaney Rd As Per IMP-84
Flapgate Both Drains
Decanting Basin At CREEC
Top-Up Banks At Hideaway Close And River Oak Way
Levee Overflow At Node BP53.7

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	5	Item	700	3500
Clearing and grubbing in decanting area	7	days	4000	28000
Strip surface for decanting embankment	1572	m3	8	12576
Excavate inlet channel	1257	m3	11	13827
Excavate exg spoil pile	2240	m3	11	24640
Import nett fill requirement	2800	m3	18	50400
Place and compact embankment fill	6300	m3	12	75600
Topdress disturbed areas	15720	m2	4.5	70740
Turfing to disturbed areas	15720	m2	4.6	70740
Supply & deliver 375 mm outlet pipe	10	m	25.66	257
Lay 375 mm outlet pipe	10	m	115	1150
Concrete headwalls & wingwalls, with dissipator	2.5	m3	1200	3000
Concrete aprons	0.75	m3	700	525
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Strip surface for levee	34	m3	8	272
Earthfill for levee	64	m3	23	1472
Topdress levee surface	340	m2	4.5	1530
Turf levee surface	340	m2	4.5	1530
Sub-total				450952
Council survey, design and admin costs (19%)				85681
Sub-total				536633

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO M

Floodway Excavation At [redacted] Delaney Rd As Per IMP-84
Flapgate Both Drains
Top-Up Banks At Hideaway Close And River Oak Way
Levee Overflow At Node BP53.7
Top-Up Bank At Node BP55

Preliminary Cost Estimate By D Ogle, BSM P/L

Clearing and Grubbing	2	days	4000	8000
Excavate for aprons	28.2	m3	12	338
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Supply & deliver 1500 Class 2 FJ pipe	36	m	304.05	10946
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Excavate, lay & backfill 1500 pipe	36	m	446	16056
Concrete aprons	9.4	m3	700	6580
Concrete wingwalls & headwalls	6.7	m3	1200	8040
Fill over	175	m3	23	4025
Supply 1050 mm flapgates	2	Item	2965	5930
Supply 1500 mm flapgates	3	Item	7200	21600
Install flapgates	5	Item	700	3500
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Strip surface for levee	34	m3	8	272
Earthfill for levee	64	m3	23	1472
Topdress levee surface	340	m2	4.5	1530
Turf levee surface	340	m2	4.5	1530
Clearing & grubbing at node BP55	0.5	day	2000	1000
Top-up creek banks	11	m3	23	253
Turfing	80	m2	4.5	360
Sub-total				101110
Council survey, design and admin costs (19%)				19211
Sub-total				120321
Estimate Factor (zero)				0
Sub-total				120321
Contingencies (20%, rounded up)				29679
TOTAL				150000 (ex. GST)

Estimate Factor (-5%)	-26832
Sub-total	509801
Contingencies (20%, rounded up)	110199
TOTAL	620000 (ex. GST)

Estimate Factor (zero)	0
Sub-total	179916
Contingencies (20%, rounded up)	40084
TOTAL	220000 (ex. GST)

CABOOLTURE SHIRE COUNCIL
MATHEW CRESCENT FLOOD MITIGATION, BURPENGARY

SCENARIO N

Floodway Excavation At [redacted] Delaney Rd as per IMP-84
Levee Upstream Drain
Flapgate Downstream Drain
Top-Up Banks At Hideaway Close And River Oak Way
Levee Overflow At Node BP53.7

Preliminary Cost Estimate By D Ogle, BSM P/L

Strip surface for levee	331	m3	8	2648
Remove part of existing footpath	14	m3	150	2100
Cart concrete rubble to recycle	14	m3	15	210
Dispose of concrete rubble to recycle	30	t	5	150
Earthfill for levee	1814	m3	23	41722
Topdress levee surface	3456	m2	4.5	15552
Turf levee surface	3456	m2	4.5	15552
Reinstate footpath	110	m2	40	4400
Blockwork levee at Rowley Rd	12	m2	140	1680
Footing for blockwork	3	m3	700	2100
Realign open drain, Rowley Rd to Mathew Cr	60	m3	12	720
Scarify exg bitumen in Mathew Cr	640	m2	2	1280
Strip existing verges	32	m3	8	256
Supply road base	840	t	9	7560
Spread and compact road base	840	t	19	15960
Two-coat bitumen seal	640	m2	10	6400
Clearing and Grubbing	1	day	4000	4000
Excavate for aprons	2.7	m3	12	32
Supply & deliver 1050 Class 2 FJ pipe	12	m	160.18	1922
Excavate, lay & backfill 1050 pipe	12	m	225	2700
Concrete aprons	3.4	m3	700	2380
Concrete wingwalls & headwalls	2.9	m3	1200	3480
Fill over pipes	52	m3	23	1196
Supply 1050 mm flapgates	2	Item	2965	5930
Install flapgates	2	Item	700	1400
Remove & reinstate creekbank landscaping	240	m2	15	3600
Top-up creek banks	32	m3	23	736
Redirect spoon drain (excavate)	60	m3	12	720
Strip surface for levee at BP53.7	34	m3	8	272
Earthfill for levee	64	m3	23	1472
Topdress levee surface	340	m2	4.5	1530
Turf levee surface	340	m2	4.5	1530
Sub-total				151190
Council survey, design and admin costs (19%)				28726
Sub-total				179916

Estimate Factor (zero)	0
Sub-total	179916
Contingencies (20%, rounded up)	40084
TOTAL	220000 (ex. GST)

APPENDIX B

Extran Model Results

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.14	[illegible]	0.14	[illegible]	0.14	...04	0.[illegible]	7.97	[illegible]	17.96	[illegible]	17[illegible]	[illegible]1	[illegible]	).01	[illegible]	-0.06	)2	-0.(	7.91	-	17.90	[illegible]	17.[illegible]	3	1	.20
[illegible]	[illegible]	18.12	0.02	18.12	0.01	18.12	0.01	18.11	0.01	18.07	-0.04	18.06	-0.05	18.05	-0.05	18.06	-0.05	18.05	-0.05	18.03	-0.08	18.03	-0.08	17.91	-0.19	18.04	-0.07	18.03	-0.08	17.81	-0.30
MC26	17.69	17.82	0.13	17.82	0.13	17.81	0.13	17.80	0.12	17.71	0.03	17.63	-0.06	17.62	-0.07	17.63	-0.06	17.62	-0.07	17.57	-0.12	17.57	-0.12	17.56	-0.12	17.56	-0.12	17.56	-0.12	17.56	-0.12
MC24	17.53	17.68	0.15	17.68	0.14	17.68	0.14	17.66	0.13	17.53	0.00	17.43	-0.11	17.41	-0.12	17.43	-0.11	17.42	-0.12	17.37	-0.17	17.37	-0.17	17.37	-0.17	17.37	-0.17	17.37	-0.17	17.37	-0.17
MC22	17.25	17.42	0.17	17.42	0.17	17.41	0.16	17.39	0.15	17.33	0.08	17.26	0.02	17.23	-0.02	17.21	-0.04	17.19	-0.06	17.19	-0.05	17.11	-0.13	17.09	-0.16	17.08	-0.17	17.06	-0.18	16.98	-0.27
MC39.1	17.38	17.29	-0.09	17.28	-0.09	17.21	-0.16	17.08	-0.30	17.34	-0.03	17.36	-0.01	17.28	-0.10	17.22	-0.16	17.20	-0.17	17.28	-0.09	17.12	-0.25	17.10	-0.28	17.08	-0.29	17.07	-0.30	16.98	-0.39
MC39	17.34	17.33	0.00	17.33	0.00	17.29	-0.05	17.21	-0.13	17.33	0.00	17.33	0.00	17.26	-0.07	17.21	-0.13	17.20	-0.14	17.26	-0.08	17.12	-0.22	17.09	-0.24	17.08	-0.26	17.07	-0.27	16.98	-0.36
MC38	17.25	17.42	0.17	17.42	0.17	17.41	0.16	17.39	0.14	17.33	0.08	17.27	0.02	17.23	-0.02	17.21	-0.04	17.19	-0.06	17.20	-0.05	17.11	-0.14	17.09	-0.16	17.08	-0.17	17.07	-0.19	16.98	-0.27
MC21	16.56	16.82	0.26	18.82	0.26	16.81	0.25	16.79	0.23	16.72	0.16	16.58	0.02	16.54	-0.02	16.52	-0.04	16.50	-0.06	16.49	-0.07	16.46	-0.10	16.44	-0.12	16.43	-0.13	16.41	-0.15	16.26	-0.30
MC20	16.46	16.78	0.32	16.78	0.32	16.77	0.31	16.75	0.29	16.70	0.23	16.46	0.00	16.45	-0.01	16.43	-0.03	16.40	-0.06	16.35	-0.11	16.26	-0.20	16.26	-0.20	16.26	-0.20	16.26	-0.20	16.26	-0.20
MC19	16.28	16.49	0.21	16.49	0.21	16.48	0.20	16.46	0.18	16.33	0.04	16.29	0.00	16.27	-0.01	16.26	-0.02	16.26	-0.02	16.26	-0.02	16.26	-0.02	16.26	-0.02	16.26	-0.02	16.26	-0.02	16.26	-0.02
MC18	15.99	16.14	0.15	16.14	0.15	16.13	0.14	16.11	0.12	16.04	0.05	15.99	0.00	15.96	-0.03	15.95	-0.04	15.95	-0.04	15.95	-0.04	15.95	-0.04	15.95	-0.04	15.95	-0.04	15.95	-0.04	15.95	-0.04
MC17	15.83	16.01	0.18	16.01	0.18	15.99	0.16	15.97	0.14	15.90	0.06	15.85	0.02	15.80	-0.03	15.77	-0.06	15.76	-0.07	15.76	-0.07	15.76	-0.07	15.76	-0.07	15.76	-0.07	15.76	-0.07	15.76	-0.07
MC16	15.46	15.54	0.08	15.53	0.08	15.52	0.07	15.51	0.05	15.47	0.01	15.45	0.00	15.44	-0.01	15.44	-0.02	15.44	-0.01	15.45	-0.01	15.45	-0.01	15.44	-0.01	15.44	-0.01	15.44	-0.01	15.44	-0.01
MC15	14.98	15.33	0.34	15.32	0.34	15.30	0.31	15.25	0.27	15.09	0.11	14.95	-0.03	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06	14.92	-0.06
MC14	14.94	15.28	0.35	15.28	0.34	15.25	0.32	15.21	0.27	15.04	0.10	14.89	-0.04	14.87	-0.07	14.67	-0.07	14.87	-0.07	14.87	-0.07	14.87	-0.07	14.87	-0.07	14.87	-0.07	14.87	-0.07	14.67	-0.07
MC13	14.89	15.22	0.32	15.21	0.32	15.19	0.30	15.15	0.25	14.98	0.09	14.84	-0.05	14.82	-0.07	14.82	-0.07	14.62	-0.07	14.82	-0.07	14.82	-0.07	14.82	-0.07	14.82	-0.07	14.82	-0.07	14.82	-0.07
MC12	14.85	15.16	0.31	15.15	0.30	15.13	0.28	15.10	0.24	14.94	0.09	14.80	-0.05	14.79	-0.06	14.79	-0.06	14.79	-0.06	14.79	-0.07	14.79	-0.07	14.79	-0.06	14.79	-0.06	14.79	-0.06	14.79	-0.06
MC11	14.33	14.37	0.04	14.37	0.03	14.36	0.03	14.35	0.02	14.34	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.28	-0.05	14.28	-0.06	14.32	-0.01	14.28	-0.06	14.33	0.00	14.32	-0.01
MC10	14.67	14.96	0.29	14.96	0.29	14.95	0.28	14.93	0.26	14.80	0.12	14.64	-0.04	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06	14.61	-0.06
MC9	15.01	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00
MC8	14.61	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.81	0.00	14.61	0.00
MC7	14.33	14.37	0.04	14.37	0.03	14.36	0.03	14.35	0.02	14.34	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.28	-0.05	14.28	-0.05	14.33	-0.01	14.28	-0.05	14.33	0.00	14.33	-0.01
MC6	14.33	14.34	0.01	14.34	0.00	14.33	0.00	14.34	0.01	14.33	0.00	14.33	0.00	14.33	0.00	14.34	0.01	14.33	0.00	14.28	-0.05	14.28	-0.05	14.33	0.00	14.28	-0.05	14.33	0.00	14.33	0.00
MC5	14.33	14.34	0.01	14.33	0.00	14.33	0.00	14.34	0.01	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.28	-0.05	14.28	-0.05	14.33	-0.01	14.28	-0.05	14.33	0.00	14.33	-0.01
MC4	14.34	14.34	0.01	14.33	-0.01	14.34	0.00	14.34	0.00	14.34	0.00	14.33	0.00	14.33	-0.01	14.33	0.00	14.33	-0.01	14.28	-0.06	14.28	-0.06	14.33	-0.01	14.28	-0.06	14.33	0.00	14.33	-0.01
MC3	14.34	14.34	0.01	14.33	0.00	14.34	0.00	14.34	0.00	14.34	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	-0.01	14.28	-0.06	14.28	-0.06	14.32	-0.01	14.28	-0.06	14.33	-0.01	14.33	-0.01
MC2	14.33	14.34	0.01	14.33	0.00	14.33	0.00	14.34	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.28	-0.06	14.28	-0.06	14.32	-0.01	14.28	-0.06	14.33	0.00	14.33	-0.01
MC1	14.33	14.34	0.01	14.33	0.00	14.33	0.00	14.34	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.28	-0.06	14.28	-0.06	14.32	-0.01	14.28	-0.06	14.33	0.00	14.33	-0.01
MC63	17.01	16.98	-0.02	16.98	-0.02	18.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02	16.98	-0.02
MC62	16.92	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.86	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04	16.88	-0.04
MC61	16.51	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03	16.49	-0.03
MC60	16.21	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04	16.17	-0.04
MC59	16.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03	16.00	-0.03
MC56	16.54	16.46	-0.08	16.45	-0.06	16.33	-0.21	16.23	-0.31	16.52	-0.02	16.53	-0.01	16.41	-0.13	18.55	0.01	16.42	-0.12	16.49	-0.05	16.51	-0.03	16.43	-0.11	16.39	-0.15	16.44	-0.10	16.44	-0.10
MC55	16.47	16.43	-0.04	16.43	-0.05	16.33	-0.14	16.23	-0.25	16.46	-0.01	16.47	0.00	16.40	-0.07	16.46	0.01	16.40	-0.07	16.44	-0.03	16.45	-0.02	16.41	-0.06	16.38	-0.09	16.42	-0.05	16.42	-0.05
MC54	16.30	16.28	-0.02	16.28	-0.02	16.22	-0.08	16.22	-0.08	16.30	0.00	16.30	0.00	16.27	-0.03	16.30	0.00	16.27	-0.03	16.29	-0.01	16.29	-0.01	16.27	-0.03	16.26	-0.04	16.28	-0.02	16.28	-0.02
MC53	15.95	15.94	-0.01	15.94	-0.01	15.89	-0.06	15.89	-0.08	15.95	0.00	15.95	0.00	15.93	-0.03	15.95	0.00	15.93	-0.02	15.95	-0.01	15.95	-0.01	15.94	-0.02	15.92	-0.04	15.94	-0.02	15.94	-0.02
MC52	15.78	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01	15.77	-0.01
MC51	15.56	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	-0.01	15.55	0.00	15.55	0.00
MC50	15.78	15.74	-0.04	15.74	-0.04	15.67	-0.11	15.87	-0.11	15.76	-0.01	15.77	0.00	15.72	-0.05	15.78	0.00	15.73	-0.05	15.75	-0.02	15.76	-0.02	15.73	-0.05	15.71	-0.07	15.73	-0.04	15.73	-0.04
MC49	15.59	15.35	-0.24	15.42	-0.17	15.59	0.00	15.03	-0.56	15.43	-0.16	15.58	-0.01	15.64	0.05	15.59	0.00	15.64	0.05	15.39	-0.20	15.42	-0.18	15.64	0.05	15.63	0.04	15.65	0.06	15.66	0.06
MC48	14.93	14.92	0.00	14.92	-0.01	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00
MC47	14.64	14.62	-0.03	14.66	0.01	14.61	-0.03	14.62	-0.02	14.63	-0.01	14.64	0.00	14.65	0.00	14.64	0.00	14.65	0.01	14.60	-0.04	14.61	-0.03	14.65	0.01	14.62	-0.03	14.66	0.02	14.66	0.02
MC46	14.65	14.62	-0.03	14.69	0.03	14.61	-0.04	14.63	-0.02	14.64	-0.01	14.65	0.00	14.85	0.00	14.65	0.00	14.65	0.00	14.61	-0.04	14.62	-0.03	14.66	0.01	14.62	-0.03	14.66	0.01	14.66	0.01
MC45	14.64	14.62	-0.03	14.62	-0.02	14.61	-0.03	14.62	-0.02	14.63	-0.01	14.64	0.00	14.64	0.00	14.84	0.00	14.65	0.00	14.60	-0.04	14.61	-0.03	14.65	0.01	14.61	-0.03	14.66	0.01	14.66	0.01
MC44	14.65	14.62	-0.03	14.62	-0.03	14.62	-0.03	14.63	-0.02	14.64	-0.01	14.65	0.00	14.65	0.00	14.65	0.00	14.65	0.00	14.61	-0.04	14.62	-0.03	14.66	0.01	14.62	-0.03	14.66	0.01	14.66	0.01
MC43	14.63	14.61	-0.03	14.61	-0.03	14.60	-0.03	14.61	-0.02	14.62	-0.01	14.63	0.00	14.63	0.00	14.63	0.00	14.64	0.00	14.60	-0.04	14.60	-0.03	14.64	0.01	14.60	-0.03	14.65	0.01	14.65	0.01
MC42	14.63	14.61	-0.03	14.60	-0.03	14.60	-0.03	14.61	-0.02	14.62	-0.01	14.63	0.00	14.63	0.00	14.63	0.00	14.64	0.00	14.60	-0.04	14.60	-0.03	14.64	0.01	14.60	-0.03	14.65	0.01	14.64	0.01
MC41	15.81	15.81	0.00	15.81	0.00	15.61	0.00	15.61	0.00	15.81	0.00	15.61	0.00	15.81	0.00	15.61	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.61	0.00	15.81	0.00	15.81	0.00
MC40	14.35	14.37	0.03	14.37	0.02	14.36	0.02	14.35	0.01	14.34	-0.01	14.33	-0.01	14.33	-0.02	14.33	-0.01	14.33	-0.02	14.28	-0.06	14.28	-0.06	14.32	-0.02	14.28	-0.06	14.33	-0.02	14.32	-0.02

MATHEW CRECENT, BURPENGARY - FLOOD MITIGATION SCENARIOS

100 YEAR FLOOD LEVELS, WITH AFFLUXES RELATIVE TO PRE-EXISTING SCENARIO

Node	Pre-Exist	Existing	Aff	Sce.A	Aff	Sce.B	Aff	Sce.C	Aff	Sce.D	Aff	Sce.E	Aff	Sce.F	Aff	Sce.G	Aff	Sce.H	Aff	Sce.I	Aff	Sce.J	Aff	Sce.K	Aff	Sce.L	Aff	Sce.M	Aff	Sce.N	Aff
BP64	28.28	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00
BP63	27.04	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00
BP62	25.95	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00
BP61	24.47	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00
BP60	23.66	23.66	0.00	23.66	0.00	23.66	0.00	23.68	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.65	0.00	23.65	0.00	23.66	0.00	23.65	0.00	23.66	0.00	23.66	0.00
BP59	22.69	22.68	-0.01	22.68	-0.01	22.68	-0.01	22.68	-0.01	22.88	0.00	22.68	0.00	22.68	0.00	22.69	0.00	22.66	0.00	22.67	-0.01	22.67	-0.01	22.68	0.00	22.67	-0.01	22.69	0.00	22.68	0.00
BP58	22.23	22.22	-0.01	22.22	-0.01	22.22	-0.01	22.22	-0.01	22.23	-0.01	22.23	0.00	22.23	0.00	22.23	0.00	22.23	0.00	22.21	-0.02	22.21	-0.02	22.23	0.00	22.21	-0.02	22.24	0.00	22.23	0.00
BP57	21.88	21.86	-0.02	21.86	-0.02	21.86	-0.02	21.85	-0.02	21.86	-0.01	21.88	0.00	21.87	0.00	21.88	0.00	21.87	0.00	21.84	-0.04	21.84	-0.04	21.87	-0.01	21.84	-0.04	21.88	0.00	21.87	-0.01
BP56	21.27	21.21	-0.05	21.21	-0.05	21.21	-0.06	21.21	-0.06	21.24	-0.03	21.26	0.00	21.26	-0.01	21.26	0.00	21.26	-0.01	21.18	-0.09	21.18	-0.08	21.26	-0.01	21.18	-0.09	21.27	0.00	21.26	-0.01
BP55	20.31	20.12	-0.19	20.12	-0.19	20.12	-0.19	20.11	-0.19	20.21	-0.10	20.29	-0.02	20.28	-0.03	20.30	-0.01	20.28	-0.03	20.04	-0.27	20.04	-0.27	20.29	-0.02	20.03	-0.28	20.33	0.03	20.30	-0.01
BP54	19.20	18.86	-0.33	18.86	-0.33	18.85	-0.35	18.82	-0.38	19.07	-0.12	19.18	-0.02	19.16	-0.04	19.18	-0.02	19.17	-0.03	19.02	-0.17	19.03	-0.17	19.19	-0.01	19.02	-0.18	19.22	0.02	19.21	0.01
BP53.7	18.97	18.66	-0.31	18.66	-0.31	18.64	-0.33	18.59	-0.37	18.85	-0.12	18.94	-0.02	18.92	-0.04	18.95	-0.02	18.93	-0.04	18.80	-0.17	18.81	-0.16	18.95	-0.01	18.80	-0.17	18.99	0.02	18.98	0.01
.BP53	18.35	18.08	-0.26	18.08	-0.27	18.04	-0.30	17.96	-0.39	18.25	-0.10	18.32	-0.02	18.29	-0.06	18.34	-0.01	18.30	-0.05	18.20	-0.15	18.21	-0.14	18.32	-0.03	18.17	-0.17	18.35	0.01	18.34	0.00
BP52.5	17.40	17.26	-0.14	17.25	-0.14	17.16	-0.23	16.95	-0.44	17.35	-0.04	17.38	-0.01	17.29	-0.11	17.42	0.02	17.31	-0.08	17.30	-0.10	17.33	-0.07	17.33	-0.07	17.23	-0.17	17.35	-0.04	17.35	-0.05
BP52.2	17.18	17.05	-0.13	17.05	-0.13	18.93	-0.25	16.65	-0.53	17.14	-0.04	17.17	-0.01	17.04	-0.14	17.20	0.02	17.07	-0.11	17.09	-0.09	17.12	-0.06	17.08	-0.10	16.99	-0.19	17.10	-0.08	17.10	-0.08
BP52	16.98	16.86	-0.12	16.85	-0.12	16.70	-0.27	16.33	-0.65	16.94	-0.04	16.97	-0.01	16.81	-0.17	17.00	0.02	16.83	-0.15	16.90	-0.08	16.92	-0.06	16.84	-0.14	16.77	-0.21	16.86	-0.12	16.86	-0.12
BP51.6	16.80	16.70	-0.10	16.69	-0.11	16.51	-0.29	15.97	-0.83	16.77	-0.03	16.79	-0.01	16.60	-0.20	16.81	0.01	16.62	-0.18	16.73	-0.06	16.75	-0.04	16.63	-0.17	16.57	-0.23	16.64	-0.15	16.64	-0.16
BP51.4	16.86	16.56	-0.09	16.56	-0.10	16.41	-0.25	15.86	-0.79	16.63	-0.03	16.65	-0.01	16.50	-0.18	16.67	0.01	16.52	-0.14	16.60	-0.06	16.62	-0.04	16.53	-0.13	16.47	-0.19	16.54	-0.12	16.54	-0.12
BP51	15.91	15.84	-0.08	15.81	-0.11	15.91	0.00	15.26	-0.65	15.88	-0.03	15.91	-0.01	16.01	0.09	15.92	0.01	16.02	0.10	15.86	-0.05	15.88	-0.03	16.03	0.12	15.98	0.07	16.03	0.12	16.04	0.12
BP50.4	15.07	15.03	-0.04	14.79	-0.29	14.99	-0.08	15.03	-0.04	15.06	-0.01	15.07	0.00	15.03	-0.04	15.08	0.01	15.04	-0.03	15.04	-0.03	15.05	-0.02	15.04	-0.03	15.02	-0.05	15.05	-0.02	15.05	-0.02
BP50.2	15.02	14.98	-0.04	14.76	-0.26	14.96	-0.06	15.00	-0.02	15.00	-0.01	15.01	0.00	15.01	-0.01	15.02	0.00	15.01	-0.01	14.99	-0.03	15.00	-0.02	15.01	0.00	14.99	-0.03	15.02	0.00	15.02	0.00
BP50	15.01	14.97	-0.04	14.75	-0.25	14.95	-0.05	14.99	-0.02	14.99	-0.01	15.00	0.00	15.00	-0.01	15.01	0.00	15.00	-0.01	14.98	-0.03	14.99	-0.02	15.00	0.00	14.98	-0.03	15.01	0.00	15.01	0.00
BP49.8	14.96	14.93	-0.03	14.74	-0.22	14.91	-0.05	14.95	-0.01	14.95	-0.01	14.96	0.00	14.95	-0.01	14.96	0.00	14.95	-0.01	14.93	-0.03	14.94	-0.02	14.96	0.00	14.93	-0.03	14.96	0.00	14.96	0.00
BP49.6	14.68	14.66	-0.03	14.62	-0.06	14.65	-0.03	14.66	-0.02	14.67	-0.01	14.68	0.00	14.68	0.00	14.66	0.00	14.68	0.00	14.65	-0.04	14.65	-0.03	14.69	0.01	14.65	-0.03	14.69	0.01	14.69	0.01
BP49.4	14.63	14.61	-0.02	14.60	-0.03	14.60	-0.03	14.61	-0.02	14.62	-0.01	14.63	0.00	14.63	0.00	14.63	0.00	14.64	0.00	14.60	-0.04	14.60	-0.03	14.64	0.01	14.60	-0.03	14.65	0.01	14.64	0.01
BP49.2	14.60	14.56	-0.02	14.57	-0.03	14.57	-0.03	14.58	-0.02	14.59	-0.01	14.59	0.00	14.60	0.00	14.60	0.00	14.60	0.00	14.56	-0.04	14.56	-0.04	14.60	0.01	14.57	-0.03	14.61	0.01	14.61	0.01
BP49	14.55	14.53	-0.02	14.52	-0.02	14.52	-0.02	14.53	-0.01	14.54	-0.01	14.54	0.00	14.55	0.00	14.54	0.00	14.55	0.00	14.50	-0.04	14.51	-0.04	14.55	0.00	14.51	-0.04	14.56	0.01	14.55	0.01
BP48.6	14.46	14.45	-0.01	14.45	-0.01	14.45	-0.01	14.45	-0.01	14.45	-0.01	14.46	0.00	14.46	0.00	14.48	0.00	14.46	0.00	14.41	-0.05	14.42	-0.04	14.46	0.00	14.42	-0.04	14.47	0.01	14.46	0.00
BP48.3	14.38	14.39	0.00	14.38	-0.01	14.38	-0.01	14.38	0.00	14.38	0.00	14.38	0.00	14.38	0.00	14.38	0.00	14.36	0.00	14.33	-0.05	14.33	-0.05	14.38	0.00	14.33	-0.05	14.39	0.00	14.38	0.00
BP48	14.37	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.37	0.00	14.32	-0.05	14.32	-0.05	14.36	-0.01	14.32	-0.05	14.37	0.00	14.37	0.00
BP47.7	14.34	14.35	0.01	14.34	0.00	14.34	0.00	14.34	0.00	14.34	0.00	14.34	0.00	14.34	0.00	14.33	-0.01	14.34	0.00	14.28	-0.05	14.28	-0.06	14.33	-0.01	14.28	-0.05	14.34	0.00	14.33	-0.01
BP47.3	14.33	14.34	0.01	14.33	0.00	14.33	0.00	14.34	0.01	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.33	0.00	14.27	-0.06	14.27	-0.06	14.32	-0.01	14.27	-0.06	14.33	0.00	14.32	-0.01
BP47	14.31	14.32	0.01	14.32	0.00	14.32	0.00	14.32	0.01	14.31	0.00	14.31	0.00	14.31	0.00	14.31	0.00	14.31	0.00	14.26	-0.06	14.26	-0.06	14.31	-0.01	14.26	-0.06	14.31	0.00	14.31	-0.01
BP36	11.38	11.38	0.01	11.38	0.00	11.37	0.00	11.38	0.00	11.37	0.00	11.37	0.00	11.37	0.00	11.37	0.00	11.37	0.00	11.34	-0.04	11.34	-0.04	11.37	-0.01	11.34	-0.04	11.37	0.00	11.37	-0.01
BP30	9.01	9.01	0.00	9.01	0.00	9.00	0.00	9.01	0.00	9.00	0.00	9.00	0.00	9.00	0.00	9.00	0.00	9.00	0.00	8.98	-0.02	8.98	-0.02	9.00	-0.01	8.99	-0.02	9.00	0.00	9.00	0.00
BP25.1	7.67	7.68	0.01	7.67	0.00	7.67	0.00	7.68	0.00	7.67	-0.01	7.67	-0.01	7.67	0.00	7.67	-0.01	7.67	0.00	7.84	-0.04	7.63	-0.04	7.66	-0.01	7.64	-0.04	7.67	0.00	7.66	-0.01
BP14	4.64	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.60	-0.04	4.58	-0.06	4.58	-0.06	4.59	-0.05	4.56	-0.06	4.60	-0.04	4.60	-0.05
			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
MC37.1		18.83	18.83	18.83	18.83	18.81	18.81	18.78	18.78	18.52	18.52	18.38	18.38	18.38	18.38	18.39	18.39	18.38	18.38	18.35	18.35	18.35	18.35	19.20	19.20	18.35	18.35	18.34	18.34	19.22	19.22
MC37		18.68	18.68	18.68	18.68	18.67	18.67	18.65	18.65	18.50	18.50	18.38	18.38	18.38	18.38	18.39	18.39	18.36	18.38	18.35	18.35	18.35	18.35	19.20	19.20	18.35	18.35	18.33	18.33	19.22	19.22
MC36	18.95	18.68	-0.29	18.66	-0.29	18.65	-0.30	18.84	-0.31	18.70	-0.25	18.80	-0.15	18.78	-0.17	18.81	-0.14	18.79	-0.16	18.68	-0.27	18.68	-0.27	18.94	-0.01	18.41	-0.54	18.41	-0.54	18.41	-0.54
MC35		18.63	18.63	18.63	18.63	18.62	18.62	18.61	18.61	18.48	18.48	18.37	18.37	18.38	18.38	18.39	18.39	18.38	18.38	18.34	18.34	18.35	18.35	19.20	19.20	18.35	18.35	18.33	18.33	19.22	19.22
MC34		18.62	18.62	18.62	18.62	18.61	18.61	18.60	18.60	18.48	18.48	18.37	18.37	18.38	18.38	18.39	18.39	18.38	18.38	18.35	18.35	18.35	18.35	19.20	19.20	18.35	18.35	18.33	18.33	19.22	19.22
MC33	18.79	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	18.77	-0.01	20.02	1.23	20.02	1.23	19.21	0.42	20.01	1.22	18.77	-0.01	19.24	0.45
MC33.1	18.46	18.51	0.05	18.51	0.05	18.50	0.04	18.50	0.04	18.44	-0.02	18.37	-0.09	18.38	-0.08	18.38	-0.08	18.38	-0.08	18.34	-0.12	18.35	-0.11	19.20	0.74	18.35	-0.11	18.33	-0.13	19.22	0.76
MC32	18.29	18.49	0.20	18.49	0.20	18.48	0.19	18.46	0.17	18.31	0.03	18.25	-0.04	18.24	-0.04	18.26	-0.03	18.25	-0.04	18.20	-0.09	18.20	-0.09	18.28	-0.01	18.16	-0.13	18.14	-0.14	18.11	-0.18
MC31	18.06	18.34	0.27	18.34	0.27	18.33	0.27	18.32	0.25	18.19	0.13	18.07	0.01	18.05	-0.01	18.08	0.02	18.06	0.00	17.99	-0.08	17.99	-0.07	18.05	-0.01	17.92	-0.14	17.90	-0.16	17.80	-0.27
MC30	18.08	18.34	0.25	18.34	0.25	18.33	0.25	18.32	0.23	18.20	0.11	18.07	-0.01	18.06	-0.03	18.08	0.00	18.06	-0.02	17.99	-0.10	17.99	-0.09	18.04	-0.04	17.93	-0.15	17.91	-0.17	17.86	-0.22
MC29	18.47	18.46	0.00	18.46	0.00	18.46	0.00	18.46	-0.01	18.42	-0.05	18.36	-0.10	18.37	-0.09	18.38	-0.09	18.38	-0.09	18.34	-0.12	18.34	-0.12	19.20	0.73	18.34	-0.13	18.33	-0.14	19.22	0.75

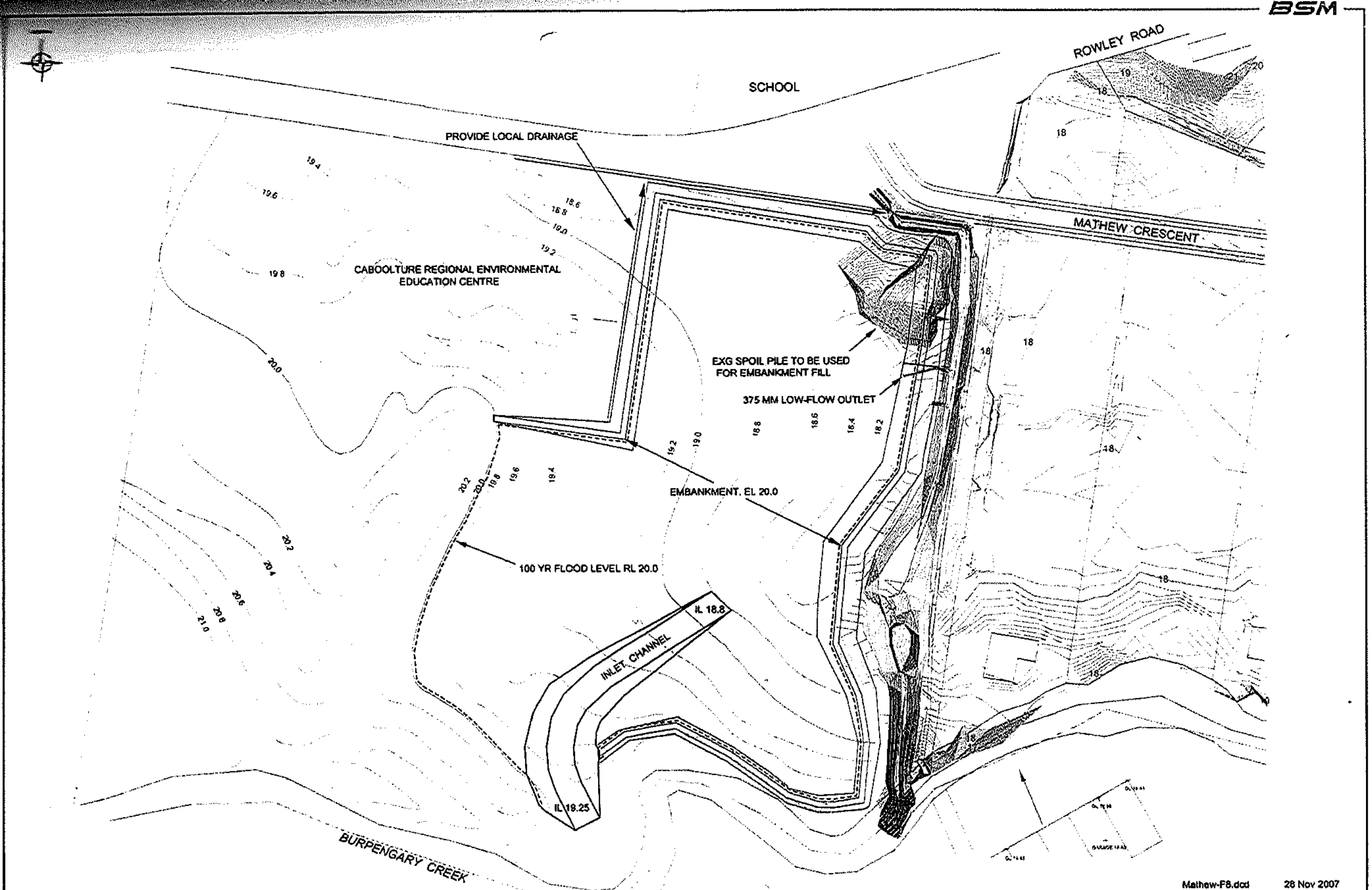
MATHEW CRESCENT, BURPENGARY - FLOOD MITIGATION SCENARIOS

100 YEAR FLOOD LEVELS, WITH AFFLUXES RELATIVE TO EXISTING SCENARIO

Node	Pre-Exist	Aff	Existing	Sce.A	Aff	Sce.B	Aff	Sce.C	Aff	Sce.D	Aff	Sce.E	Aff	Sce.F	Aff	Sce.G	Aff	Sce.H	Aff	Sce.I	Aff	Sce.J	Aff	Sce.K	Aff	Sce.L	Aff	Sce.M	Aff	Sce.N	Aff
BP64	28.28	0.00	28.28	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.278	0.00	28.278	0.00	28.28	0.00	28.28	0.00	28.28	0.00	28.28	0.00
BP63	27.04	0.00	27.04	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.044	0.00	27.044	0.00	27.04	0.00	27.04	0.00	27.04	0.00	27.04	0.00
BP62	25.95	0.00	25.95	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.951	0.00	25.951	0.00	25.95	0.00	25.95	0.00	25.95	0.00	25.95	0.00
BP61	24.47	0.00	24.47	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00	24.47	0.00
BP60	23.66	0.00	23.66	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.66	0.00	23.654	0.00	23.654	0.00	23.66	0.00	23.65	0.00	23.66	0.00	23.66	0.00
BP59	22.69	0.01	22.68	22.68	0.00	22.68	0.00	22.68	0.00	22.68	0.00	22.68	0.01	22.68	0.00	22.69	0.01	22.68	0.00	22.673	-0.01	22.673	-0.01	22.68	0.00	22.67	-0.01	22.69	0.01	22.68	0.00
BP58	22.23	0.01	22.22	22.22	0.00	22.22	0.00	22.22	0.00	22.23	0.00	22.23	0.01	22.23	0.01	22.23	0.01	22.23	0.01	22.213	-0.01	22.213	-0.01	22.23	0.01	22.21	-0.01	22.24	0.01	22.23	0.01
BP57	21.88	0.02	21.86	21.86	0.00	21.86	0.00	21.85	0.00	21.86	0.01	21.88	0.02	21.87	0.02	21.88	0.02	21.87	0.02	21.841	-0.02	21.841	-0.02	21.87	0.02	21.84	-0.02	21.88	0.02	21.87	0.02
BP56	21.27	0.05	21.21	21.21	0.00	21.21	0.00	21.21	0.00	21.24	0.02	21.26	0.05	21.26	0.04	21.26	0.05	21.26	0.05	21.183	-0.03	21.184	-0.03	21.26	0.04	21.18	-0.03	21.27	0.06	21.26	0.05
BP55	20.31	0.19	20.12	20.12	0.00	20.12	0.00	20.11	-0.01	20.21	0.09	20.29	0.17	20.28	0.16	20.30	0.18	20.28	0.16	20.036	-0.09	20.038	-0.08	20.29	0.16	20.03	-0.09	20.33	0.21	20.30	0.18
BP54	19.20	0.33	18.86	18.86	0.00	18.85	-0.02	18.82	-0.05	19.07	0.21	19.18	0.31	19.18	0.30	19.18	0.31	19.17	0.30	19.023	0.16	19.028	0.16	19.19	0.32	19.02	0.15	19.22	0.36	19.21	0.34
BP53.7	18.97	0.31	18.86	18.66	0.00	18.64	-0.02	18.59	-0.06	18.85	0.20	18.94	0.29	18.92	0.27	18.95	0.29	18.93	0.27	18.801	0.15	18.808	0.15	18.95	0.30	18.80	0.14	18.99	0.34	18.98	0.32
.BP53	18.35	0.26	18.08	18.08	0.00	18.04	-0.04	17.96	-0.13	18.25	0.17	18.32	0.24	18.29	0.20	18.34	0.26	18.30	0.21	18.197	0.12	18.21	0.13	18.32	0.24	18.17	0.09	18.35	0.27	18.34	0.26
BP52.5	17.40	0.14	17.26	17.25	0.00	17.16	-0.09	16.95	-0.31	17.35	0.10	17.38	0.13	17.29	0.03	17.42	0.16	17.31	0.06	17.296	0.04	17.326	0.07	17.33	0.07	17.23	-0.03	17.35	0.10	17.35	0.09
BP52.2	17.18	0.13	17.05	17.05	0.00	16.93	-0.12	16.65	-0.40	17.14	0.09	17.17	0.12	17.04	-0.01	17.20	0.15	17.07	0.02	17.089	0.04	17.117	0.07	17.08	0.03	16.99	-0.06	17.10	0.05	17.10	0.05
BP52	16.98	0.12	16.86	16.85	-0.01	16.70	-0.16	16.33	-0.53	16.94	0.08	16.97	0.11	16.81	-0.05	17.00	0.14	16.83	-0.03	16.897	0.04	16.923	0.06	16.84	-0.02	16.77	-0.09	16.86	0.00	16.86	0.00
BP51.6	16.80	0.10	16.70	16.69	-0.01	16.51	-0.19	15.97	-0.73	16.77	0.07	16.79	0.09	16.60	-0.10	16.81	0.11	16.62	-0.08	16.732	0.03	16.754	0.06	16.63	-0.07	16.57	-0.13	16.64	-0.05	16.64	-0.06
BP51.4	16.66	0.09	16.56	16.56	-0.01	16.41	-0.16	15.86	-0.70	16.63	0.07	16.65	0.09	16.50	-0.06	16.67	0.11	16.52	-0.05	16.597	0.03	16.619	0.05	16.53	-0.04	16.47	-0.10	16.54	-0.02	16.54	-0.02
BP51	15.91	0.08	15.84	15.81	-0.03	15.91	0.08	15.26	-0.57	15.88	0.05	15.91	0.07	16.01	0.17	15.92	0.08	16.02	0.18	15.864	0.03	15.88	0.04	16.03	0.19	15.98	0.14	16.03	0.20	16.04	0.20
BP50.4	15.07	0.04	15.03	14.79	-0.24	14.99	-0.04	15.03	0.00	15.06	0.03	15.07	0.04	15.03	0.00	15.08	0.05	15.04	0.01	15.042	0.01	15.05	0.02	15.04	0.01	15.02	-0.01	15.05	0.02	15.05	0.02
BP50.2	15.02	0.04	14.98	14.76	-0.23	14.96	-0.02	15.00	0.02	15.00	0.02	15.01	0.03	15.01	0.02	15.02	0.04	15.01	0.03	14.991	0.01	14.998	0.02	15.01	0.03	14.99	0.01	15.02	0.04	15.02	0.04
BP50	15.01	0.04	14.97	14.75	-0.22	14.95	-0.02	14.99	0.02	14.99	0.02	15.00	0.03	15.00	0.02	15.01	0.04	15.00	0.03	14.98	0.01	14.986	0.02	15.00	0.03	14.98	0.01	15.01	0.04	15.01	0.04
BP49.8	14.96	0.03	14.93	14.74	-0.19	14.91	-0.02	14.95	0.02	14.95	0.02	14.96	0.03	14.95	0.02	14.98	0.03	14.95	0.03	14.934	0.01	14.94	0.01	14.96	0.03	14.93	0.01	14.96	0.03	14.96	0.03
BP49.6	14.68	0.03	14.66	14.62	-0.03	14.65	-0.01	14.66	0.01	14.67	0.01	14.68	0.02	14.68	0.03	14.68	0.02	14.68	0.03	14.646	-0.01	14.652	0.00	14.69	0.03	14.65	0.00	14.69	0.04	14.69	0.04
BP49.4	14.63	0.02	14.61	14.60	-0.01	14.60	0.00	14.61	0.00	14.62	0.01	14.63	0.02	14.63	0.03	14.63	0.02	14.64	0.03	14.595	-0.01	14.6	-0.01	14.64	0.03	14.60	0.00	14.65	0.04	14.64	0.04
BP49.2	14.60	0.02	14.58	14.57	-0.01	14.57	0.00	14.58	0.00	14.59	0.01	14.59	0.02	14.60	0.02	14.60	0.02	14.60	0.02	14.557	-0.02	14.562	-0.01	14.60	0.03	14.57	-0.01	14.61	0.03	14.61	0.03
BP49	14.55	0.02	14.53	14.52	-0.01	14.52	0.00	14.53	0.00	14.54	0.01	14.54	0.01	14.55	0.02	14.54	0.01	14.55	0.02	14.503	-0.03	14.507	-0.02	14.55	0.02	14.51	-0.02	14.56	0.03	14.55	0.03
BP48.6	14.46	0.01	14.45	14.45	-0.01	14.45	-0.01	14.45	0.00	14.45	0.00	14.46	0.00	14.46	0.01	14.46	0.00	14.46	0.01	14.413	-0.04	14.416	-0.04	14.46	0.01	14.42	-0.03	14.47	0.01	14.46	0.01
BP48.3	14.38	0.00	14.39	14.38	-0.01	14.38	-0.01	14.38	0.00	14.38	-0.01	14.38	-0.01	14.38	0.00	14.38	-0.01	14.38	0.00	14.331	-0.06	14.331	-0.06	14.38	-0.01	14.33	-0.05	14.39	0.00	14.38	0.00
BP48	14.37	0.00	14.37	14.37	-0.01	14.37	-0.01	14.37	0.00	14.37	-0.01	14.37	-0.01	14.37	-0.01	14.37	-0.01	14.37	-0.01	14.316	-0.06	14.315	-0.06	14.36	-0.01	14.32	-0.06	14.37	0.00	14.37	-0.01
BP47.7	14.34	-0.01	14.35	14.34	-0.01	14.34	-0.01	14.34	0.00	14.34	-0.01	14.34	-0.01	14.34	-0.01	14.33	-0.02	14.34	-0.01	14.284	-0.06	14.282	-0.07	14.33	-0.02	14.28	-0.06	14.34	-0.01	14.33	-0.01
BP47.3	14.33	-0.01	14.34	14.33	-0.01	14.33	-0.01	14.34	0.00	14.33	-0.01	14.33	-0.01	14.33	-0.01	14.33	-0.01	14.33	-0.01	14.274	-0.07	14.273	-0.07	14.32	-0.02	14.27	-0.07	14.33	-0.01	14.32	-0.02
BP47	14.31	-0.01	14.32	14.32	-0.01	14.32	-0.01	14.32	0.00	14.31	-0.01	14.31	-0.01	14.31	-0.01	14.31	-0.01	14.31	-0.01	14.258	-0.07	14.258	-0.07	14.31	-0.02	14.26	-0.07	14.31	-0.01	14.31	-0.02
BP36	11.38	-0.01	11.38	11.38	-0.01	11.37	-0.01	11.38	0.00	11.37	-0.01	11.37	-0.01	11.37	-0.01	11.37	-0.01	11.37	-0.01	11.338	-0.05	11.337	-0.05	11.37	-0.02	11.34	-0.04	11.37	-0.01	11.37	-0.01
BP30	9.01	0.00	9.01	9.01	0.00	9.00	-0.01	9.01	0.00	9.00	-0.01	9.00	-0.01	9.00	-0.01	9.00	-0.01	9.00	-0.01	8.984	-0.03	8.984	-0.03	9.00	-0.01	8.99	-0.03	9.00	-0.01	-9.00	-0.01
BP25.1	7.67	-0.01	7.68	7.67	-0.01	7.67	-0.01	7.68	0.00	7.67	-0.01	7.67	-0.01	7.67	-0.01	7.67	-0.01	7.67	-0.01	7.635	-0.05	7.634	-0.05	7.66	-0.02	7.64	-0.04	7.67	-0.01	7.66	-0.02
BP14	4.64	0.04	4.60	4.60	0.00	4.60	-0.01	4.60	0.00	4.60	-0.01	4.60	-0.01	4.60	0.00	4.60	-0.01	4.60	0.00	4.583	-0.02	4.583	-0.02	4.59	-0.01	4.58	-0.02	4.60	0.00	4.60	-0.01
		0.00			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
MC37.1		####	18.83	18.83	0.00	18.81	-0.01	18.78	-0.04	18.52	-0.30	18.38	-0.45	18.38	-0.44	18.39	-0.44	18.38	-0.44	18.35	-0.48	18.351	-0.48	19.20	0.37	18.35	-0.47	18.34	-0.49	19.22	0.40
MC37		####	18.68	18.68	0.00	18.67	-0.01	18.65	-0.03	18.50	-0.18	18.38	-0.30	18.38	-0.30	18.39	-0.29	18.38	-0.30	18.346	-0.33	18.349	-0.33	19.20	0.52	18.35	-0.33	18.33	-0.35	19.22	0.54
MC36	18.95	0.29	18.66	18.66	0.00	18.65	-0.01	18.64	-0.02	18.70	0.04	18.80	0.14	18.76	0.12	18.81	0.15	18.79	0.13	18.675	0.01	18.68	0.02	18.94	0.28	18.41	-0.25	18.41	-0.25	18.41	-0.25
MC35		####	18.63	18.63	0.00	18.62	-0.01	18.61	-0.02	18.48	-0.15	18.37	-0.25	18.38	-0.25	18.39	-0.24	18.38	-0.25	18.335	-0.29	18.345	-0.28	19.20	0.57	18.35	-0.28	18.33	-0.30	19.22	0.60
MC34		####	18.62	18.62	0.00	18.61	-0.01	18.60	-0.02	18.48	-0.14	18.37	-0.24	18.38	-0.24	18.39	-0.23	18.38	-0.23	18.346	-0.27	18.348	-0.27	19.20	0.58	18.35	-0.27	18.33	-0.28	19.22	0.61
MC33	18.79	0.01	18.77	18.77	0.00	18.77	0.00	18.77	0.00	18.77	0.00	18.77	0.00	18.77	0.00	18.77	0.00	18.77	0.00	20.016	1.24	20.02	1.25	19.21	0.44	20.01	1.24	18.77	0.00	19.24	0.46
MC33.1	18.46	-0.05	18.51	18.51	0.00	18.50	0.00	18.50	-0.01	18.44	-0.07	18.37	-0.14	18.38	-0.13	18.38	-0.13	18.36	-0.13	18.343	-0.16	18.345	-0.16	19.20	0.69	18.35	-0.16	18.33	-0.18	19.22	0.71
MC32	18.29	-0.20	18.49	18.49	0.00	18.48	-0.01	18.46	-0.03	18.31	-0.17	18.25	-0.23	18.24	-0.24	18.26	-0.23	18.25	-0.24	18.2	-0.29	18.202	-0.28	18.28	-0.21	18.16	-0.33	18.14	-0.34	18.11	-0.38
MC31	18.06	-0.27	18.34	18.34	0.00	18.33	-0.01	18.32	-0.02	18.19	-0.14	18.07	-0.27	18.05	-0.28	18.08	-0.26	18.06	-0.28	17.987	-0.35	17.99	-0.35	18.05	-0.29	17.92	-0.41	17.90	-0.43	17.80	-0.54
MC30	18.08	-0.25	18.34	18.34	0.00	18.33	-0.01	18.32	-0.02	18.20	-0.14	18.07	-0.26.	18.08	-0.28	18.08	-0.26	18.06	-0.28	17.987	-0.35	17.99	-0.35	18.04	-0.30	17.93	-0.41	17.91	-0.43	17.86	-0.48
MC29	18.47	0.00	18.48	18.46	0.00	18.46	0.00	18.46	-0.01	18.42	-0.04	18.36	-0.10	18.37	-0.09	18.38	-0.08	18.38	-0.09	18.342	-0.12	18.343	-0.12	19.20	0.73	18.34	-0.12	18.33	-0.14	19.22	0.76

MC28	17.98	-0.14	18.12	18.12	0.00	18.11	-0.01	18.11	-0.01	18.04	-0.08	17.97	-0.15	17.96	-0.16
MC27	18.11	-0.02	18.12	18.12	0.00	18.12	0.00	18.11	-0.01	18.07	-0.05	18.06	-0.06	18.05	-0.07
MC26	17.69	-0.13	17.82	17.82	0.00	17.81	0.00	17.80	-0.01	17.71	-0.10	17.63	-0.19	17.62	-0.20
MC24	17.53	-0.15	17.68	17.68	0.00	17.68	0.00	17.66	-0.02	17.53	-0.15	17.43	-0.25	17.41	-0.27
MC22	17.25	-0.17	17.42	17.42	0.00	17.41	-0.01	17.39	-0.03	17.33	-0.09	17.26	-0.16	17.23	-0.19
MC39.1	17.38	0.09	17.29	17.28	0.00	17.21	-0.07	17.08	-0.21	17.34	0.05	17.36	0.08	17.28	-0.01
MC39	17.34	0.00	17.33	17.33	0.00	17.29	-0.05	17.21	-0.13	17.33	0.00	17.33	0.00	17.26	-0.07
MC38	17.25	-0.17	17.42	17.42	0.00	17.41	-0.01	17.39	-0.03	17.33	-0.09	17.27	-0.15	17.23	-0.19
MC21	16.56	-0.26	16.82	16.82	0.00	16.81	-0.01	16.79	-0.03	16.72	-0.10	16.58	-0.24	16.54	-0.29
MC20	16.46	-0.32	16.78	16.78	0.00	16.77	-0.01	16.75	-0.02	16.70	-0.08	16.46	-0.31	16.45	-0.33
MC19	16.28	-0.21	16.49	16.49	0.00	16.48	-0.01	16.46	-0.04	16.33	-0.17	18.29	-0.21	16.27	-0.22
MC18	15.99	-0.15	16.14	16.14	0.00	16.13	-0.02	16.11	-0.04	16.04	-0.10	15.99	-0.15	15.96	-0.18
MC17	15.83	-0.18	16.01	16.01	0.00	15.99	-0.02	15.97	-0.04	15.90	-0.12	15.85	-0.16	15.80	-0.21
MC16	15.46	-0.08	15.54	15.53	0.00	15.52	-0.01	15.51	-0.03	15.47	-0.07	15.45	-0.08	15.44	-0.09
MC15	14.98	-0.34	15.33	15.32	0.00	15.30	-0.03	15.25	-0.07	15.09	-0.24	14.95	-0.37	14.92	-0.41
MC14	14.94	-0.35	15.28	15.28	0.00	15.25	-0.03	15.21	-0.07	15.04	-0.25	14.89	-0.39	14.87	-0.41
MC13	14.89	-0.32	15.22	15.21	0.00	15.19	-0.03	15.15	-0.07	14.98	-0.23	14.84	-0.37	14.82	-0.39
MC12	14.85	-0.31	15.16	15.15	0.00	15.13	-0.03	15.10	-0.06	14.94	-0.21	14.80	-0.35	14.79	-0.37
MC11	14.33	-0.04	14.37	14.37	0.00	14.36	-0.01	14.35	-0.02	14.34	-0.03	14.33	-0.04	14.33	-0.04
MC10	14.67	-0.29	14.96	14.96	0.00	14.95	-0.01	14.93	-0.04	14.80	-0.17	14.64	-0.33	14.61	-0.35
MC9	15.01	0.00	15.01	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00
MC8	14.61	0.00	14.61	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00
MC7	14.33	-0.04	14.37	14.37	0.00	14.36	-0.01	14.35	-0.02	14.34	-0.03	14.33	-0.04	14.33	-0.04
MC6	14.33	-0.01	14.34	14.34	-0.01	14.33	-0.01	14.34	-0.01	14.33	-0.01	14.33	-0.02	14.33	-0.01
MC5	14.33	-0.01	14.34	14.33	-0.01	14.33	-0.01	14.34	0.00	14.33	-0.01	14.33	-0.01	14.33	-0.01
MC4	14.34	-0.01	14.34	14.33	-0.01	14.34	-0.01	14.34	0.00	14.34	-0.01	14.33	-0.01	14.33	-0.01
MC3	14.34	-0.01	14.34	14.33	-0.01	14.34	-0.01	14.34	0.00	14.34	-0.01	14.33	-0.01	14.33	-0.01
MC2	14.33	-0.01	14.34	14.33	-0.01	14.33	-0.01	14.34	0.00	14.33	-0.01	14.33	-0.01	14.33	-0.01
MC1	14.33	-0.01	14.34	14.33	-0.01	14.33	-0.01	14.34	0.00	14.33	-0.01	14.33	-0.01	14.33	-0.01
MC63	17.01	0.02	16.98	16.98	0.00	16.98	0.00	16.98	0.00	16.98	0.00	16.98	0.00	16.98	0.00
MC62	16.92	0.04	16.88	16.88	0.00	16.88	0.00	16.88	0.00	16.88	0.00	16.88	0.00	16.88	0.00
MC61	16.51	0.03	16.49	16.49	0.00	16.49	0.00	16.49	0.00	16.49	0.00	16.49	0.00	16.49	0.00
MC60	16.21	0.04	16.17	16.17	0.00	16.17	0.00	16.17	0.00	16.17	0.00	16.17	0.00	16.17	0.00
MC59	16.03	0.03	16.00	16.00	0.00	16.00	0.00	16.00	0.00	16.00	0.00	16.00	0.00	16.00	0.00
MC56	16.54	0.08	16.46	16.45	-0.01	16.33	-0.13	16.23	-0.23	16.52	0.06	16.53	0.07	16.41	-0.05
MC55	18.47	0.04	16.43	16.43	0.00	16.33	-0.10	16.23	-0.20	16.46	0.03	16.47	0.04	16.40	-0.03
MC54	16.30	0.02	16.28	16.28	0.00	16.22	-0.06	16.22	-0.06	16.30	0.02	16.30	0.02	16.27	-0.01
MC53	15.95	0.01	15.94	15.94	0.00	15.89	-0.05	15.89	-0.05	15.95	0.01	15.95	0.01	15.93	-0.01
MC52	15.78	0.01	15.77	15.77	0.00	15.77	0.00	15.77	0.00	15.77	0.00	15.77	0.00	15.77	0.00
MC51	15.56	0.01	15.55	15.55	0.00	15.55	0.00	15.55	0.00	15.55	0.00	15.55	0.00	15.55	0.00
MC50	15.78	0.04	15.74	15.74	0.00	15.67	-0.07	15.67	-0.07	15.76	0.03	15.77	0.03	15.72	-0.02
MC49	15.59	0.24	15.35	15.42	0.07	15.59	0.24	15.03	-0.33	15.43	0.07	15.58	0.22	15.64	0.28
MC48	14.93	0.00	14.92	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00
MC47	14.64	0.03	14.62	14.66	0.04	14.81	0.00	14.62	0.00	14.63	0.01	14.64	0.02	14.65	0.03
MC46	14.65	0.03	14.62	14.69	0.07	14.61	0.00	14.63	0.01	14.64	0.02	14.65	0.03	14.65	0.03
MC45	14.84	0.03	14.62	14.62	0.01	14.61	0.00	14.62	0.00	14.63	0.01	14.64	0.02	14.64	0.03
MC44	14.65	0.03	14.62	14.62	0.00	14.62	0.00	14.63	0.00	14.64	0.01	14.65	0.02	14.65	0.03
MC43	14.63	0.03	14.61	14.61	0.00	14.60	0.00	14.61	0.00	14.62	0.01	14.63	0.02	14.63	0.03
MC42	14.63	0.03	14.61	14.60	-0.01	14.60	0.00	14.61	0.00	14.62	0.01	14.63	0.02	14.63	0.03
MC41	15.81	0.00	15.81	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.61	0.00	15.81	0.00
MC40	14.35	-0.03	14.37	14.37	0.00	14.36	-0.01	14.35	-0.02	14.34	-0.04	14.33	-0.04	14.33	-0.04

MC28	17.97	-0.15	17.97	-0.15	17.918	-0.20	17.92	-0.20	17.91	-0.21	17.90	-0.22	17.90	-0.22	17.78	-0.34
MC27	18.06	-0.06	18.05	-0.07	18.026	-0.09	18.026	-0.09	17.91	-0.21	18.04	-0.08	18.03	-0.09	17.81	-0.31
MC26	17.63	-0.19	17.62	-0.20	17.586	-0.25	17.568	-0.25	17.56	-0.25	17.56	-0.25	17.56	-0.25	17.56	-0.25
MC24	17.43	-0.25	17.42	-0.26	17.367	-0.31	17.367	-0.31	17.37	-0.31	17.37	-0.31	17.37	-0.31	17.37	-0.31
MC22	17.21	-0.21	17.19	-0.23	17.191	-0.23	17.112	-0.31	17.09	-0.33	17.08	-0.34	17.06	-0.35	16.98	-0.44
MC39.1	17.22	-0.07	17.20	-0.08	17.282	-0.01	17.122	-0.17	17.10	-0.19	17.08	-0.20	17.07	-0.21	16.98	-0.31
MC39	17.21	-0.12	17.20	-0.14	17.258	-0.08	17.117	-0.22	17.09	-0.24	17.08	-0.25	17.07	-0.27	16.98	-0.36
MC38	17.21	-0.21	17.19	-0.23	17.196	-0.22	17.113	-0.31	17.09	-0.33	17.08	-0.34	17.07	-0.35	16.98	-0.44
MC21	16.52	-0.30	16.50	-0.32	16.491	-0.33	16.455	-0.37	16.44	-0.39	16.43	-0.39	16.41	-0.41	16.26	-0.56
MC20	16.43	-0.35	16.40	-0.37	16.35	-0.43	16.259	-0.52	16.28	-0.52	16.26	-0.52	16.26	-0.52	16.26	-0.52
MC19	16.26	-0.23	16.28	-0.24	16.259	-0.24	16.259	-0.24	16.26	-0.24	16.26	-0.24	16.26	-0.24	16.26	-0.24
MC18	15.95	-0.19	15.95	-0.20	15.948	-0.20	15.948	-0.20	15.95	-0.20	15.95	-0.20	15.95	-0.20	15.95	-0.20
MC17	15.77	-0.24	15.76	-0.25	15.761	-0.25	15.781	-0.25	15.76	-0.25	15.76	-0.25	15.76	-0.25	15.76	-0.25
MC16	15.44	-0.10	15.44	-0.09	15.445	-0.09	15.445	-0.09	15.44	-0.09	15.44	-0.09	15.44	-0.09	15.44	-0.09
MC15	14.92	-0.41	14.92	-0.41	14.922	-0.41	14.922	-0.41	14.92	-0.41	14.92	-0.41	14.92	-0.41	14.92	-0.41
MC14	14.87	-0.41	14.87	-0.41	14.868	-0.41	14.868	-0.41	14.87	-0.41	14.87	-0.41	14.87	-0.41	14.87	-0.41
MC13	14.82	-0.40	14.82	-0.39	14.824	-0.39	14.824	-0.39	14.82	-0.39	14.82	-0.39	14.82	-0.39	14.82	-0.39
MC12	14.79	-0.37	14.79	-0.37	14.788	-0.37	14.786	-0.37	14.79	-0.37	14.79	-0.37	14.79	-0.37	14.79	-0.37
MC11	14.33	-0.04	14.33	-0.04	14.277	-0.09	14.275	-0.10	14.32	-0.05	14.28	-0.09	14.33	-0.04	14.32	-0.05
MC10	14.61	-0.35	14.61	-0.35	14.611	-0.35	14.611	-0.35	14.61	-0.35	14.61	-0.35	14.61	-0.35	14.61	-0.35
MC9	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00	15.01	0.00
MC8	14.61	0.00	14.61	0.00	14.612	0.00	14.612	0.00	14.61	0.00	14.61	0.00	14.61	0.00	14.61	0.00
MC7	14.33	-0.04	14.33	-0.04	14.279	-0.09	14.277	-0.09	14.33	-0.05	14.28	-0.09	14.33	-0.04	14.33	-0.05
MC6	14.34	0.00	14.33	-0.01	14.283	-0.08	14.284	-0.08	14.33	-0.01	14.28	-0.06	14.33	-0.01	14.33	-0.02
MC5	14.33	-0.01	14.33	-0.01	14.28	-0.06	14.28	-0.06	14.33	-0.02	14.28	-0.06	14.33	-0.01	14.33	-0.01
MC4	14.33	-0.01	14.33	-0.01	14.281	-0.06	14.282	-0.06	14.33	-0.02	14.28	-0.06	14.33	-0.01	14.33	-0.02
MC3	14.33	-0.01	14.33	-0.01	14.279	-0.07	14.279	-0.07	14.32	-0.02	14.28	-0.07	14.33	-0.01	14.33	-0.02
MC2	14.33	-0.01	14.33	-0.01	14.278	-0.06	14.278	-0.06	14.32	-0.02	14.28	-0.06	14.33	-0.01	14.33	-0.02
MC1	14.33	-0.01	14.33	-0.01	14.277	-0.07	14.277	-0.07	14.32	-0.02	14.28	-0.06	14.33	-0.01	14.33	-0.02
MC63	16.98	0.00	16.98	0.00	16.983	0.00	16.983	0.00	16.98	0.00	16.98	0.00	16.98	0.00	16.98	0.00
MC62	16.88	0.00	16.88	0.00	16.879	0.00	16.879	0.00	16.88	0.00	16.88	0.00	16.88	0.00	16.88	0.00
MC61	16.49	0.00	16.49	0.00	16.487	0.00	16.487	0.00	16.49	0.00	16.49	0.00	16.49	0.00	16.49	0.00
MC60	16.17	0.00	16.17	0.00	16.168	0.00	16.168	0.00	16.17	0.00	16.17	0.00	16.17	0.00	16.17	0.00
MC59	16.00	0.00	16.00	0.00	16.001	0.00	16.001	0.00	16.00	0.00	16.00	0.00	16.00	0.00	16.00	0.00
MC56	16.55	0.09	16.42	-0.04	16.489	0.03	16.507	0.05	16.43	-0.03	16.39	-0.07	16.44	-0.02	16.44	-0.02
MC55	16.48	0.05	16.40	-0.02	16.444	0.02	16.454	0.03	16.41	-0.02	16.38	-0.05	16.42	-0.01	16.42	-0.01
MC54	16.30	0.02	16.27	-0.01	16.289	0.01	16.294	0.01	16.27	-0.01	16.26	-0.02	16.28	0.00	16.28	-0.01
MC53	15.95	0.01	15.93	-0.01	15.945	0.00	15.948	0.01	15.94	0.00	15.92	-0.02	15.94	0.00	15.94	0.00
MC52	15.77	0.00	15.77	0.00	15.767	0.00	15.767	0.00	15.77	0.00	15.77	0.00	15.77	0.00	15.77	0.00
MC51	15.55	0.00	15.55	0.00	15.549	0.00	15.549	0.00	15.55	0.00	15.55	0.00	15.55	0.00	15.55	0.01
MC50	15.78	0.04	15.73	-0.01	15.752	0.01	15.76	0.02	15.73	-0.01	15.71	-0.03	15.73	-0.01	15.73	-0.01
MC49	15.59	0.24	15.64	0.29	15.394	0.04	15.415	0.06	15.64	0.29	15.63	0.28	15.65	0.30	15.66	0.30
MC48	14.92	0.00	14.92	0.00	14.923	0.00	14.923	0.00	14.92	0.00	14.92	0.00	14.92	0.00	14.92	0.00
MC47	14.64	0.02	14.65	0.03	14.604	-0.01	14.61	-0.01	14.65	0.04	14.62	0.00	14.66	0.04	14.66	0.04
MC46	14.65	0.03	14.65	0.03	14.614	0.00	14.621	0.00	14.66	0.04	14.62	0.00	14.66	0.04	14.66	0.04
MC45	14.64	0.02	14.65	0.03	14.604	-0.01	14.61	-0.01	14.65	0.04	14.61	0.00	14.66	0.04	14.66	0.04
MC44	14.65	0.02	14.65	0.03	14.611	-0.01	14.617	-0.01	14.66	0.03	14.62	0.00	14.66	0.04	14.66	0.04
MC43	14.63	0.02	14.64	0.03	14.596	-0.01	14.601	-0.01	14.64	0.03	14.60	0.00	14.65	0.04	14.65	0.04
MC42	14.63	0.02	14.64	0.03	14.595	-0.01	14.6	-0.01	14.64	0.03	14.60	0.00	14.65	0.04	14.64	0.04
MC41	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00	15.81	0.00
MC40	14.33	-0.04	14.33	-0.04	14.282	-0.09	14.282	-0.09	14.32	-0.05	14.28	-0.09	14.33	-0.04	14.32	-0.05

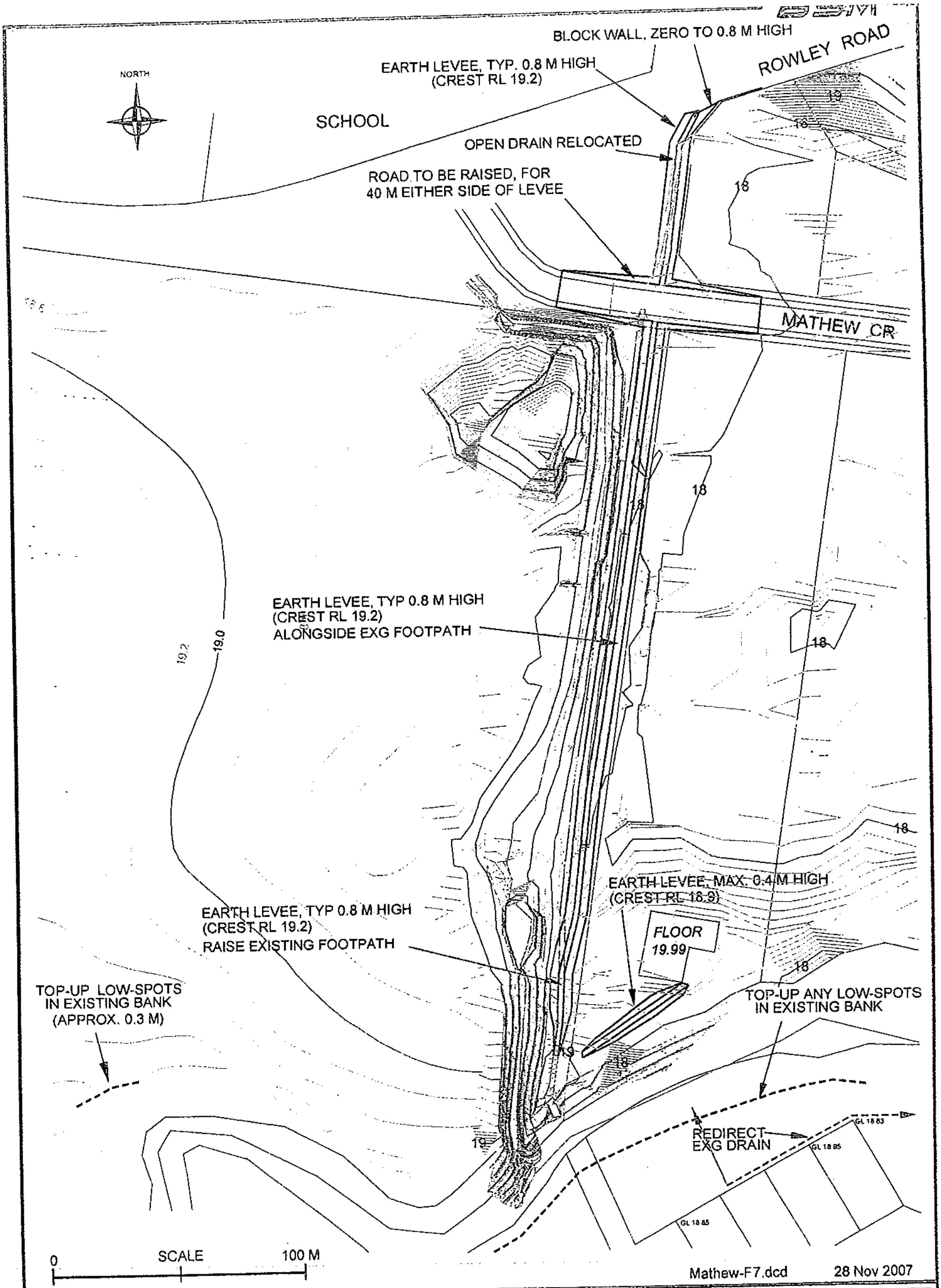


Mathew-F8.dcd 28 Nov 2007

FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

UPSTREAM DECANTING BASIN

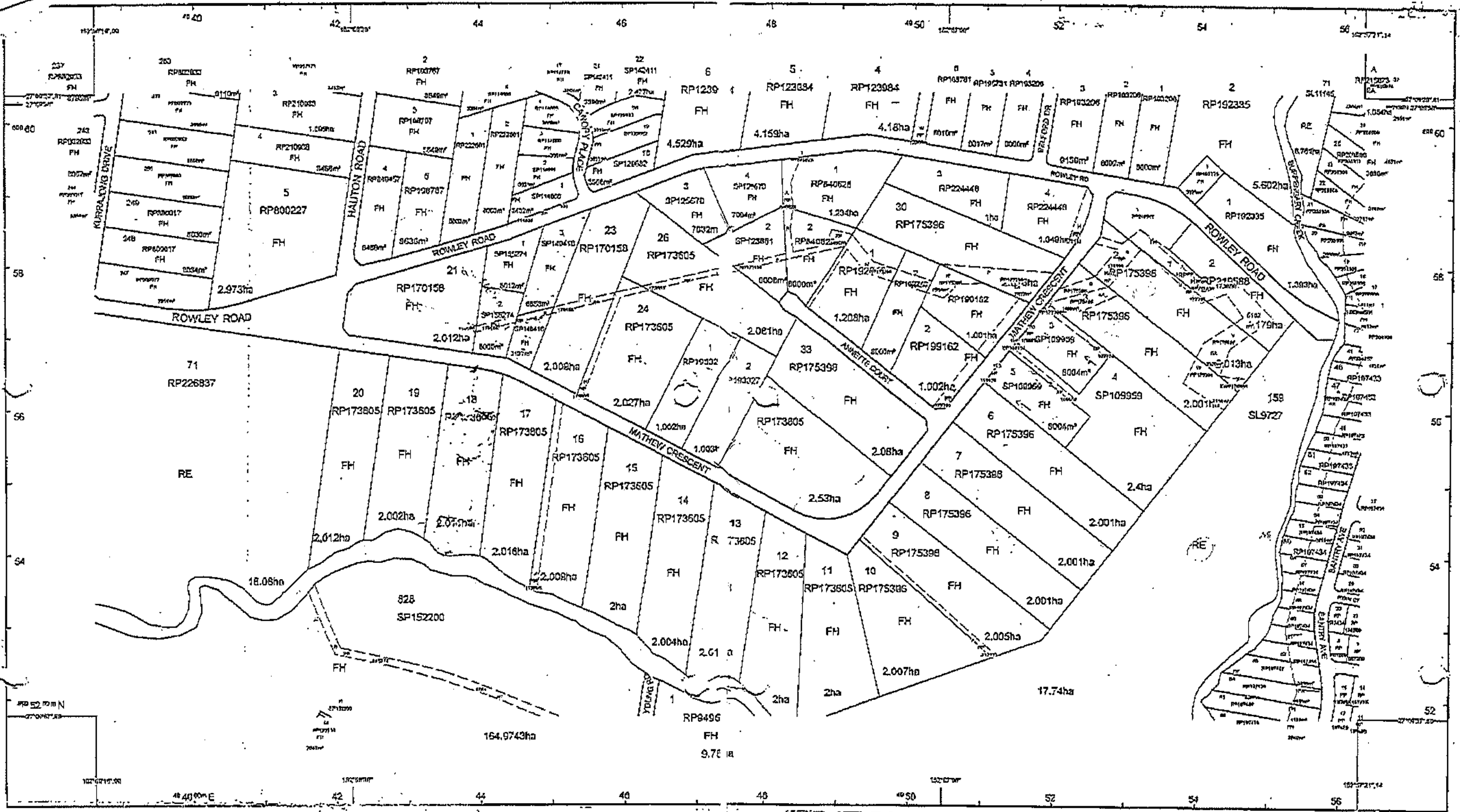
FIGURE 8



FLOOD MITIGATION SCENARIOS FOR MATHEW CRESCENT, BURPENGARY

LEVEES AND BANK TOP-UPS

FIGURE 7



STANDARD MAP NUMBER
6443-12134

Attachment 1.

HORIZONTAL DATUM - GDA94 SCALE 1 : 3000

GDA

SUBJECT PARCEL DESCRIPTION

DCDB	
Lot/Plan	[illegible]
Area/Volume	[illegible]
Tenure	FREEHOLD
Local Government	CABOOLTURE SHIRE
Locality	BURPENGARY
Parish	BURPENGARY
County	STANLEY
Parcel/Segment	[illegible]

CLIENT SERVICE STANDARDS

[illegible]

LEGEND

SmartMap

An External Product of the Basic Land Information Network

Based upon an extraction from the Digital Cadastral Data Base

Queensland Government

Natural Resources and Mines

4 STRUCTURES IMPAIRING FLOWS OR INCREASING FLOWS

4.1

Executive Summary of

Main Drainage Problems

Executive summary of main drainage problems

Contrary to the stance of the council that we live in a flood plain, we submit that our properties do not lay in a flood plain. The estate area is no plain, the drop over of the Burpengary creek in our estate is 5 meter. We submit that the problem of flooding in our area is caused by:
1) Drainage problems blocking the natural flow (Rowley Road Mahers bride, weir, footbridge) and
2) Extensive new housing developments which increased flows.

Thirty years ago this area was a cattle farm within a forestry area. At the time of the building development of our estate houses were built at the ground levels congruent with that setting. Council now claims that according new models our area has a flood problem, however these models reflect the current situation after 30 years council approved building development with thousands more houses which increased fast drainage flows into the catchments combined with several man made obstacles restricting the maximum flow of the creek.
The council did not fulfill its duty of care of ensuring that existing estates would not be negatively impacted by the new developments. Though the council clearly knew about the risks for our estate (see the whole range of flood studies done in time), new developments were approved without executing mitigating work that would prevent exacerbating potential flooding risks for us.
Apparently even funds for mitigation work that were collected from developers were not used for the required flood mitigation work. Even as we write this document, across the creek new development takes place, further restricting the natural retention capacity of the creek and increasing max flows towards Mahers Bridge, and increasing flood risk for us. Again the mitigation work that was assessed as being needed has not been done. Amazingly however flood levies are built to protect those new developments.
The new models have in time increased the Q100 level placing some properties in our estate now under Q100. Furthermore a lot more land is now deemed as being under Q100 reducing its value as it cannot be developed by their owners. Again we submit that the decrease of the value of our properties and recent flooding of some properties is caused by council approved developments and a lack of flood mitigating works.

We submit that we don't have a flood problem but a drainage problem and the council should immediately:

1. Increase the max flow are under Mahers bridge, by clearing the vegetation that now restricts the flow and remove soil to increase the max volume. Re-asses the bridge itself as its design and especially the access ramps severely limits the flow to only a fraction (20%) of the natural flow. The bridge only spans a fraction of the original wider flow area when at high creek level.
2. Clean and reposition the culverts under the access road of the Equestrian Centre.
3. Remove the illegal weir blocking the storm water easement across property at Mathew Crescent 128 (note that this weir was placed by a previous owner and the current owner only inherited it and bears no responsibility)
4. Increase the height of the new footbridge so as it does not block the flow and forces the creek to break its banks and flow into the storm water easement.
5. Halt developments upstream until flood mitigation work has been done. The council should stop increasing the flood risk of existing properties.

The solutions mentioned above might even help to mitigate the Dale Street estate flooding, which was built in a known flood prone area. It is interesting to note that contrary to our estate, developers at Dale Street were required to build high set properties and forbidden to place electricity outlets below 1.5m. The fact that these requirements did not exist for our estate indicates too that our estate at the time was not deemed to be flood prone at the time.

Further, we submit that for the medium term an independent flood mitigation study should been done with the goal to find mitigation works that reduces the Q100 back to the value which existed when the area was developed thirty years ago. At the start of the study the state or council should commit that they will execute the advice of the study.

We point out that from local knowledge we think that small but expensive mitigation work like flood gates etc. likely will not work. The solution for local rain events likely lies in removing blockages to increase max flow. The solution for rain events further upstream in the Mt. Mee area lies likely in a large retention dam/basin upstream that restricts flow and decreases the peak flow.

Explanation of issues considered of impact

1. Mahers bridge at Rowley Road (behind railway station).

When our estate was developed 30 years ago the setting was a cattle farm in a forestry area. There was only a cattle bridge across the creek and no entrance road of the equestrian centre. The houses were built with the flood level at that time and assessing the situation at that time. The houses were built with the expectation that they should not flood with any rain event according to memory at that time.
When Rowley road was build to further develop outer areas later the road was placed higher than the surrounding area effectively blocking the potential high rain event flow that previously existed through the forestry area, across what is now Rowley Road at the place where now a school is built and at the bridge. All flow is now forced into the storm water easement behind Annette court and has to go into the Burpengary Creek just before the bridge. The Rowley Road acts as a dam forcing the water to pass under the bridge.

The soil heightened access ramps severely block high flow levels. If the road there would have been at the original levels, water would more easily flow over the road and water would back up less high. At the original height of the road before the bridge the properties 124 and would not flood.
The situation at the bridge is hard to explain or capture in a photo. Basically the bridge is just across part of the original creek bed. The bridge spans only the deepest channel. There where historically the water would flow when at high creek levels, the access ramps and the bridge form a weir preventing high water levels to pass. The bridge acts as a dam when the water is at a high level and the Burpengary Creek water will back-up flooding the properties upstream and the Equestrian Centre. Without the bridge the Q100 upstream would drop drastically, as the water would not back-up.
The flow under the bridge might have sufficed thirty years ago in a forestry surrounding setting. However several suburbs have been developed with thousands of houses. One only has to compare old maps with new maps, or even look at only the last decade at Google historic maps to see that the hard area (roofs, roads) upstream has increased considerably.

We submit that flooding and flood risk in our estate would have been considerably less without all new developments and man made obstacles that block drainage.
The max flow coming towards the bridge has increased considerably over the past thirty years. It should therefore not be surprising that new flood models in time showed progressively higher Q100 numbers.

It should be noted that the council had not executed any mitigation work to decrease max flow towards the bridge. It also is clear that the progressively higher flood risk considerably lowered the value and development potential of the properties on our estate.
Apparently the council knew about the risk for the estate (considering the flood studies done in the past) and apparently developers have been forced to provide funds for flood mitigation work, but to our knowledge those funds have not been used for these mitigation works that were deemed necessary for the development to be approved. We consider council's lack of use of these funds to carry out the work, a clear act of negligence.
Even at the moment still houses are built across the creeks that further exacerbate the flood risk for our estate. Over the last two years huge amounts of rubble and banks have been placed across the creek in what historically has been a flood retention area. Again this increased the max flow just in front of Mahers Bridge, increasing the backflow flooding to several properties. To our knowledge again no mitigation work was done or is currently awaiting construction.

The second issue is that the max flow under the bridge is restricted considerably at the moment by the abundant vegetation and debris under the bridge. When the bridge was built the banks were clear (cattle paddock). It is unlikely that the designers of the bridge anticipated that the flow area would be reduced by such overgrow.
The big problem of water backing up at Mahers bridge would be reduced greatly by increasing the max flow back to historic levels.
This could be easily done by excavating some soil in front of and under the bridge and clearing vegetation to a normal level. There appears to be plenty of scope to do this without impacting the structure of the bridge. Impact on wildlife habitat can be managed to the extent where no harm has to be caused.
It should also be noted that the concrete under the bridge which should hold the soil has been washed away in several places.

2. Access road of the BEC and culverts

Under the access road of the BEC culverts were placed to drain the storm water towards the creek just before the bridge. It should be noted that historically this easement was dry when it was not raining. However when the council built the access road to the BEC some ridiculously small culverts (compared to the size of the easement) were placed under the access road.

The culverts were placed quite high and now act as a dam. The storm water easement before the culverts is a mosquito and weed infected swamp area. Also the culverts and the area in front of them have not been cleaned in decades, the culverts (on council land) are also party blocked.
It also should be noted that because of the backing up of water from at the Bridge, water from the creek backflows through the culvert (and at high flood level over the access road) backwards into the easement. At high flood levels the water comes rushing down from the easement from behind Annette court and meets water backing up from Mahers bridge.
As mentioned above the first thing needed is increasing the max flow under the bridge.

3. Illegal dam in storm water easement

Across the road from Mathew Crescent 128 the storm water easement is dammed.

Sometime over the last thirty years a weir was built in the storm water easement (without council approval) by the then owner, that created a lake. The lake is clearly visible on Google maps and needed constant treatment for weed infestation over the last years. This weir was in place when the current owner bought the property.
Obviously the dam greatly reduces the retention capacity of the storm water easement.
We submit that this weir should be removed ASAP, restoring the easement to function as an easement.

4. Foot bridge and surrounding area

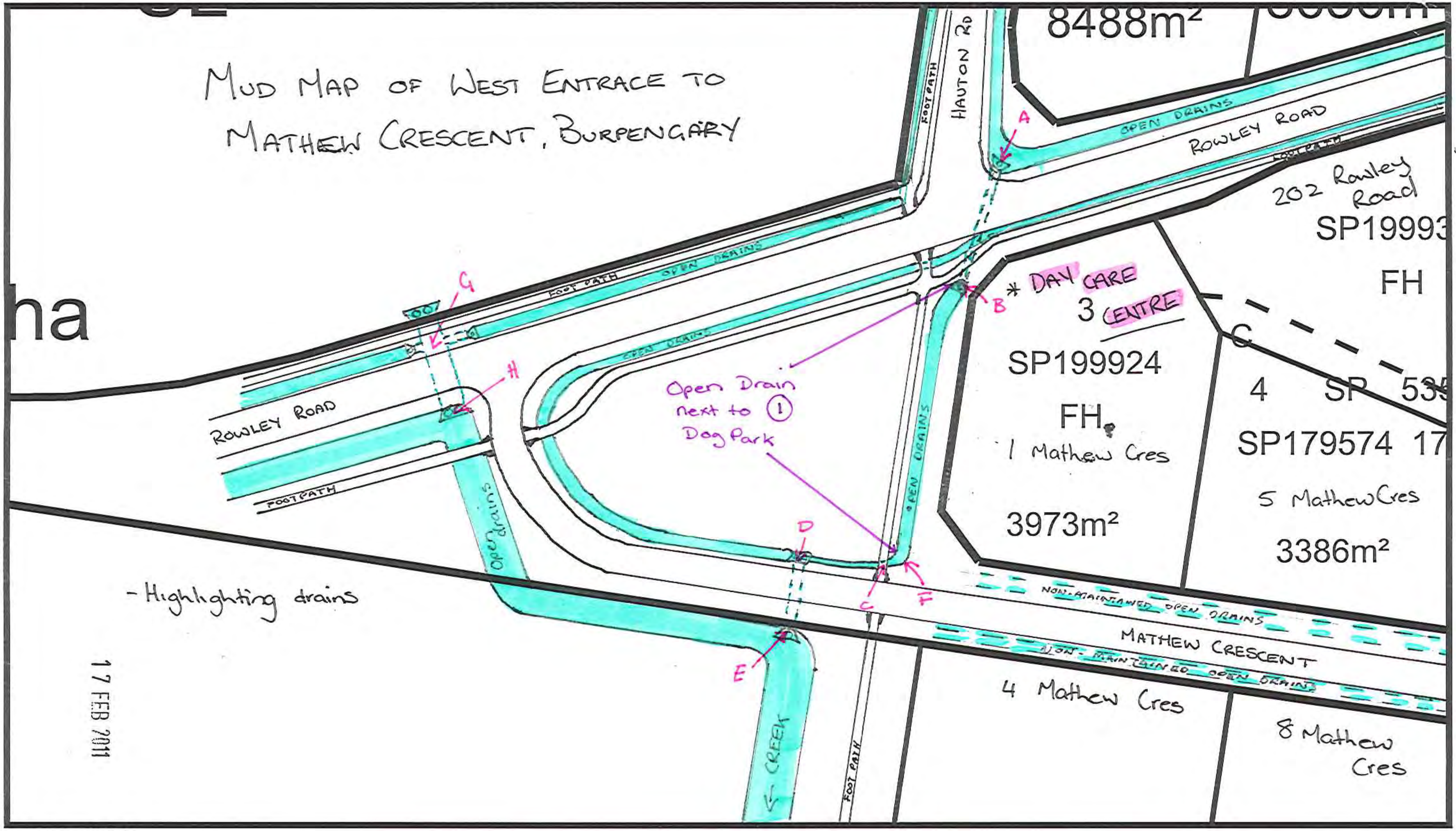
In 2010 the council built a foot bridge over the Burpengary Creek. Before building the council was already warned by residents that the planned bridge was too low based on their experience. Unfortunately the council ignored the advice.

The deck of the bridge is now built at Q100 level but the girders under the bridge are not. During the last high rainfall event the Creek rose so high that the girders under the bridge started to act as a blockage and flow was redirected over the Creek banks and ended up in the storm water easement behind Annette Court. This redirection of Creek water combined with water coming over the road from higher laying new developments caused considerably flooding of several houses.
Obviously the foot bridge contributed to the flooding of several houses. The council should increase the height of the bridge.

4.2

Drainage Submission

2.1.2



Mud Map of West Entrace to
Mathew Crescent, Burpengary
8488m²
Hauton Rd
Foot path
Open drains
Rowley Road
202 Rowley Road
SP19999
FH
A
B
* Day Care
3 Centre
SP199924
FH
1 Mathew Cres
3973m²
C
4
SP 535
SP179574 17
5 Mathew Cres
3386m²
G
H
Rowley Road
Footpath
ha
Open Drain next to ① Dog Park
Open drains
D
E
F
Creek
Non-maintained open drains
Mathew Crescent
4 Mathew Cres
8 Mathew Cres
- Highlighting drains
17 FEB 2011

S.A 10-2-11

10th February 2011

To whom it may concern,

Re: Flood water and Drainage issues on Mathew Crescent, Burpengary

Following the flash flooding in January, I would like to take this opportunity to highlight what I believe are stormwater drainage problems at the west end of Mathew Crescent, Burpengary.

Since we purchased our property[redacted] Mathew Crescent, Burpengary) and commenced building in March 2007, our shed / block has been flooded 4 times. Although we live close to the Burpengary Creek, on all occasions but the last (Jan 2011) the majority of properties that back onto the creek (south side) have not flooded, while the north side residents have been inundated, often with water entering homes and causing damage. On these occasions the source of flooding has not come from the creek itself, but from poor storm water drainage near the west entrance of Mathew Crescent, which is fed from both Rowley Road and Hauton Road, as well as little to no street front drainage and no management of the water easement which runs through many properties on the north side of Mathew Crescent.

I provide the following images with comments and references to the mud map attached, to support my opinion.

__Open Drains at the Dog Park, west entrance of Mathew Crescent__

9th February 2011 -North facing image of the Dog Park drain (1) running parallel with Dog Park foot path.

This drain is fed stormwater from the eastern side of Hauton Road and the north side of Rowley Road, east of the intersection, via a 450mm pipe passing under Rowley Road (A to B). It runs parallel with the Dog Park footpath until it reaches Mathew Crescent, where it turns west passing under the footpath via a 300mm pipe (C). It continues west until it empties into a 1200mm deep grated pit (D) with a 400mm pipe connected to carry it under Mathew Crescent and join up with the large stormwater gully (E) on route to Burpengary Creek.

ISSUES:

1) The feeding pipe is 450mm but the pipe passing under the foot path is only 300mm and restricts the flow. During most rains, the drain quickly becomes congested and spills over the south bank (F) of the drain as it turns west to pass under the footpath. Over time, I believe this has eroded the bank and now the drain predominately flows out onto Mathew Crescent, with very little passing under the footpath.

2) The pipe passing under Mathew Crescent from the pit is only 400mm. While larger than the 300mm pipe that passes under the footpath, this pit is also feed from the west drain which circles around the west end of the Dog Park and collects run off and storm water from the south side of Rowley Road (east of Mathew Crescent).

SUPPORTING IMAGES:

10:39am 11th January 2011 – South bend of open drain (F) and footpath at Dog Park, west entrance of Mathew Crescent.

- Shows water flowing out of open drain onto Mathew Crescent.

10:39am 11th January 2011 – West entrance of Mathew Crescent.

- The grated pit drain (D) flooding, unable to cope with the quantity of water, while the large deep drains on the opposite side of the road (closest to the creek) were doing their job, even during these unusual storms.
- Note that the water was only flowing over the road at the area closest to the west bend (F) in the drain before the footpath.

OBSERVATIONS:

During my investigations into the depths and capacity of the drains around the west entrance of Mathew Crescent and Rowley Road / Hauton Road intersection, I noticed that the west side of Hauton Road, Burpengary Meadows State School oval and the north side of Rowley Road in front of the school, feed into open drains on the C.R.E.E.K side of Mathew Crescent via two 450mm+ drains under Rowley Road (G to H). This open drain is significantly deeper than those on the opposite side of the road, and as noted above did not overflow during the January flooding.

Street front drainage.

The stormwater drainage along both sides of Mathew Crescent is poor. In many places it has become so shallow it's almost non-existent. In my opinion, this causes storm water which should be travelling down Mathew Crescent to spill out over the front of properties.

9:54am 11th January 2011 – Initial flooding at front of 5 Mathew Crescent.

This photo shows flood water flowing down the sides of Mathew Crescent (centre of road not covered) and overflowing onto properties. Note that the driveway of [redacted] Mathew Crescent (creek side) is not flooded, while the driveway of [redacted] Mathew Crescent is inundated. I use this photo as further support for my opinion that the Dog Park drain (1) plays a significant role in our flood events, and by addressing the problems with it, the frequency of flooding would reduce to almost nothing, excluding 100yr flood events.

Natural water easements / causeways.

When we purchased our block we were alerted to the fact that a natural water easement runs through many properties on the north side of Mathew Crescent and Annette Court. I was quite surprised to note that the official easement started suddenly on Lot 2 SP179574 ([redacted] Rowley Road) and there was no corresponding easement on Lot 3 [redacted] Mathew Crescent), even though water often courses over the back corner of that block.

Since we purchased our block (which does not have a water easement), [redacted] Mathew Crescent has also been developed and swimming pools installed at [redacted] and [redacted] Mathew Crescent, very close to the easements. This has led to natural shallowing on the water way and hence exacerbated localised flooding on these properties as the water spreads out much further.

11:45am 11th January 2011 – Natural water way easement on 11 Mathew Crescent.

I use this photo to emphasise the water spreads out over the land when the water way becomes shallower, but note at the time of this photo the creek had broken its bank and we were at the peak of a 1/100 or 1/1000 year flood.

In my opinion, re-establishing this waterway to its original depth would help reduce the frequency of flood events, especially if combined with changes to the street front drainage and improvements to the Dog Park drain (1).

Conclusion

As one of the newer residents of Mathew Crescent, my battles with storm water have only just begun, while I believe other residents have been raising concerns regarding these and other storm water problems for nearly 30 years. As a rural-residential community, Mathew Crescent and Annette Court have been left behind while new residential developments have taken priority. Stormwater drainage in these new developments have been directed toward Burpengary Creek, often via drains which run near and through our properties with little regard to how it impacts on us. Embankments on the Narangba side of Burpengary Creek have been established to reduce flood risks to the new developments without consultation or even information regarding the risks and consequences to pre-established properties this side of the creek.

In light of the events on the 11th of January this year, I believe an Independent Hydrologist should be consulted, at the council's expense, to address issues of drainage and flood minimisation and make recommendations that benefit all parties.

Suzanne Alexander

[redacted] Mathew Crescent

Burpengary, QLD

Mud Map of west entrance to Mathew Crescent highlighting drainage – attached (Page 6)

4.3

Drainage Submission

2.3.1

Queensland State Government

To whom it may concern

BURPENGARY

STORM WATER INUNDATION CAUSING BUILDING & CONTENTS DAMAGE

This document has been prepared to highlight the effects of stormwater inundation to the property at 28 Annette Crt Burpengary during major storm events, in particular the event of January 2011.

Following the event of 2009 we were asked along with other residents to participate in the Moreton Bay Regional Councils ***"Regional Floodplain Database Project "****prepared* by GHD Pty Ltd, without hesitation we volunteered our time, photo's, information and provided unrestricted access to the property for further investigation and data collection of the 2009 event, in the belief that Moreton Bay Regional Council and GHD Pty Ltd would follow through and achieve the objectives of the project.

Unfortunately to date I believe the project remains incomplete therefore Moreton Bay regional Council is unable to achieve its mitigation objectives. Had the project been completed and results published and actioned by Council within the time frame given, the event of 2011 may not have had such a catastrophic impact on our properties buildings and contents.

Whilst this is the first major stormwater inundation experience at this address for us, (fortunately covered by insurance) it has become apparent that other residents in the Mathew Cres, Annette Crt and Rowley Rd area have endured similar and in some cases worse experiences several times in recent years as sub division approvals and subsequent development surrounding this area continue to increase greatly impacting on existing stormwater easements and drains tracking through our properties and on into and greatly impacting the Burpengary Creek. Water inundation to our home was and remains a traumatic experience as we commence the re building process however, the surge of stormwater eventually entering our home had tracked across properties bringing with it raw sewage from impacted residential treatment plants and septic tanks as well as animal faeces and debris collected by the rapidly moving water causing potentially serious health concerns.

Consultation with Moreton Bay Regional Council representatives prior to and immediately following the 2011 event have also ended with council providing only very poor excuses without reason sighting "little or no record or data collection by previous council" and "this was a one in one thousand year event "when in fact the community has recorded property and contents damage 3 times in 9 years, leaving residents concerns unanswered and very little if any results moving forward.

Also contained in this document are copies of emails and replies sent to our council representative Adrian Raedel following the 11/1/11 event which express our concerns regarding, 1) the lack of response and communication by Moreton Bay Regional Council during and immediately following the event, because, they said "we were unaware this area had been impacted by the event" just two of the issues contained in the ***"Regional Floodplain Database Project"*** to be reviewed and, 3) my request to council for ongoing inspections and maintenance of the stormwater easements and drains. At a recent council / residents meeting held 17/3/11 councillor Raedel advised that Moreton Bay Regional Council had assigned $150,ooo.oo to, investigate, modify, rectify ....what? How far does $150,ooo.oo stretch? again this consultation with residents concluded without positive result.

It is clear Moreton Bay Regional Council remain non-committed on this issue whilst residents continue to receive increased land valuations along with increased rates to match, how is this justified given that these events have surely rendered our properties worthless while the ***"Regional Floodplain Database Project"*** is not and remains incomplete without mention of conclusive mitigation objectives by Council moving forward for rectification to the stormwater issue in this area.

I together with other residents request assistance from the State Government of Queensland for intervention for improved consultation with positive results on behalf of the Burpengary community towards a resolution between Moreton Bay Regional Council and the residents affected by stormwater and stormwater surges during severe storm events in our area.

Your earliest attention to this is appreciated.

Thank you,

Peter & Elizabeth Odlum

[redacted] Annette Crt

Burpengary

Ph: [redacted]

Google maps Australia

Address **Rowley Rd**
Brisbane QLD 4505

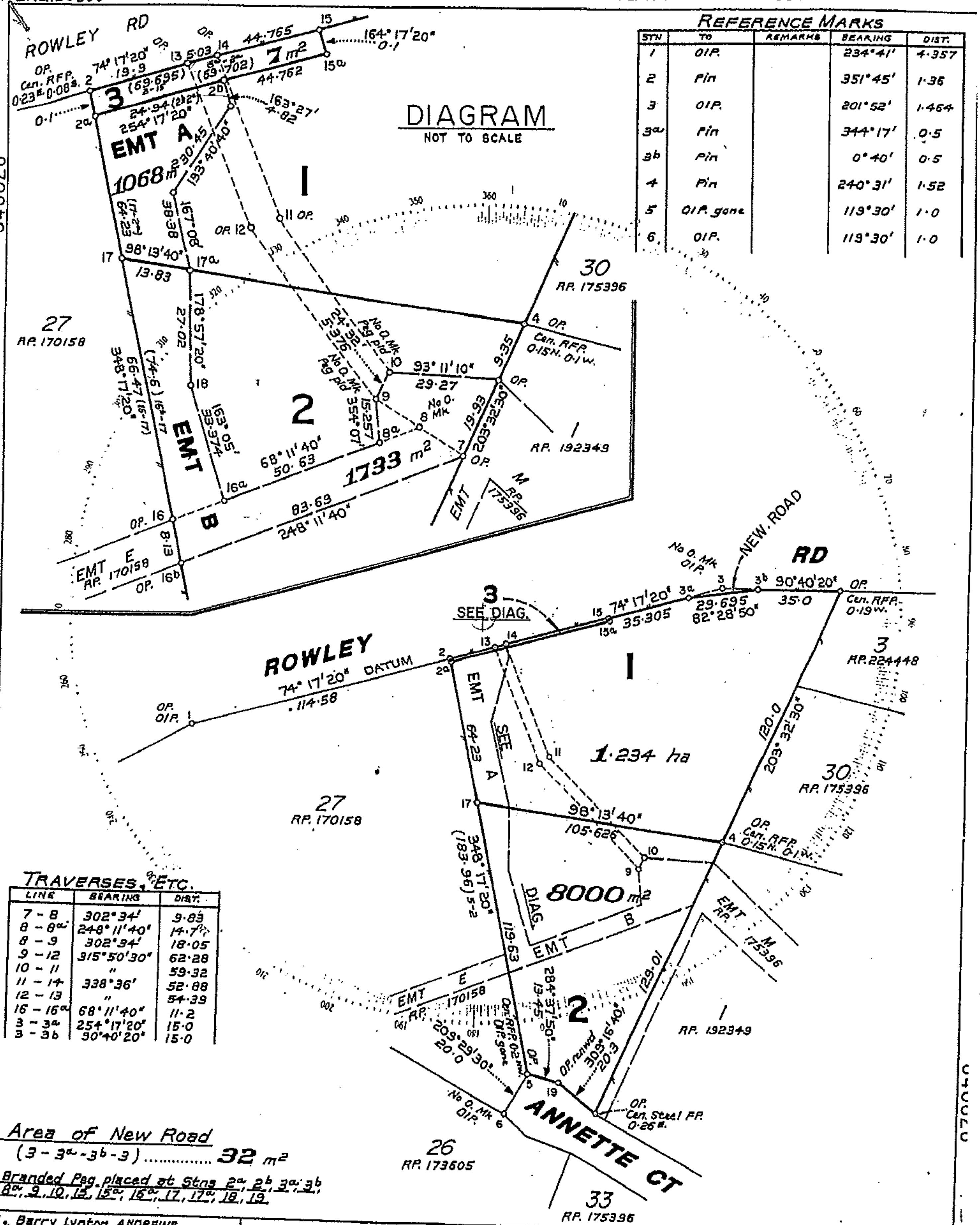
KEY:

EASEMENTS & DRAINS.

[redacted] ANNETTE CRT BURPENGARY

MAJOR EVENT STORMWATER SURGE.

WARNING — PLAN MAY BE ROLLED — A FOLDED OR MUTILATED PLAN WILL NOT BE ACCEPTED



REFERENCE MARKS

STN	TO	REMARKS	BEARING	DIST.
1	O.I.P.		234° 41'	4·357
2	Pin		351° 45'	1·36
3	O.I.P.		201° 52'	1·464
3a	Pin		344° 17'	0·5
3b	Pin		0° 40'	0·5
4	Pin		240° 31'	1·52
5	O.I.P. gone		119° 30'	1·0
6	O.I.P.		119° 30'	1·0

TRAVERSES, ETC.

LINE	BEARING	DIST.
7 – 8	302° 34'	9·83
8 – 8a	248° 11' 40"	14·7
8 – 9	302° 34'	18·05
9 – 12	315° 50' 30"	62·28
10 – 11	"	59·32
11 – 14	338° 36'	52·88
12 – 13	"	54·39
16 – 16a	68° 11' 40"	11·2
3 – 3a	254° 17' 20"	15·0
3 – 3b	90° 40' 20"	15·0

Area of New Road
(3 - 3a - 3b - 3) .... 32 m²

Branded Peg placed at Stns 2a, 2b, 3a, 3b, 8a, 9, 10, 15, 15a, 16a, 17, 17a, 18, 19.

I, Barry Lynton ANDREWS hereby certify that ~~I/we Company~~ have surveyed the land comprised in this plan ~~(either personally or~~ by Vicki Alma HALDER, Licensed Surveyor for whose work ~~I/we Company~~ accept responsibility), that the plan is accurate, that the said survey was performed in accordance with the Surveyors Act and the Surveyors Regulations and that the said survey was completed on 26.8.1992.

(signed) Licensed Surveyor/~~Director~~

Date 15.9.92

PLAN OF [redacted]

Proposed Easement A in Lot 1 and
Proposed Easement B in Lot 2

Cancelling Lot 28 on RP. 170158

ORIGINAL POR. 86

PARISH BURPENGARY
COUNTY Stanley
~~TOWN~~/LOCALITY BURPENGARY
LOCAL AUTHORITY CABOOLTURE S.C.
LAND AGENTS/MINING DISTRICT
MINING FIELD

MERIDIAN	MAP REF	SCALE	FILE REF	No. SURVEY RECORDS DEPOSITED ENDORSED	REGISTERING DIST
of RP 170158	9443-12134	1 : 1500		(signed) 6-10-1992	DT(S) [redacted]

0 1 2 3 4 5 6 7 8 9 10 cm

NOTES :

FOR DETAILS OF STEEL GARAGE REFER TO ATTACHED MANUFACTURERS DRAWING & SPECIFICATION.

NOTE : FOR ADDITIONAL SITE INFORMATION REFER TO SITE PLAN ENLARGEMENT : SHEET 2.

SI

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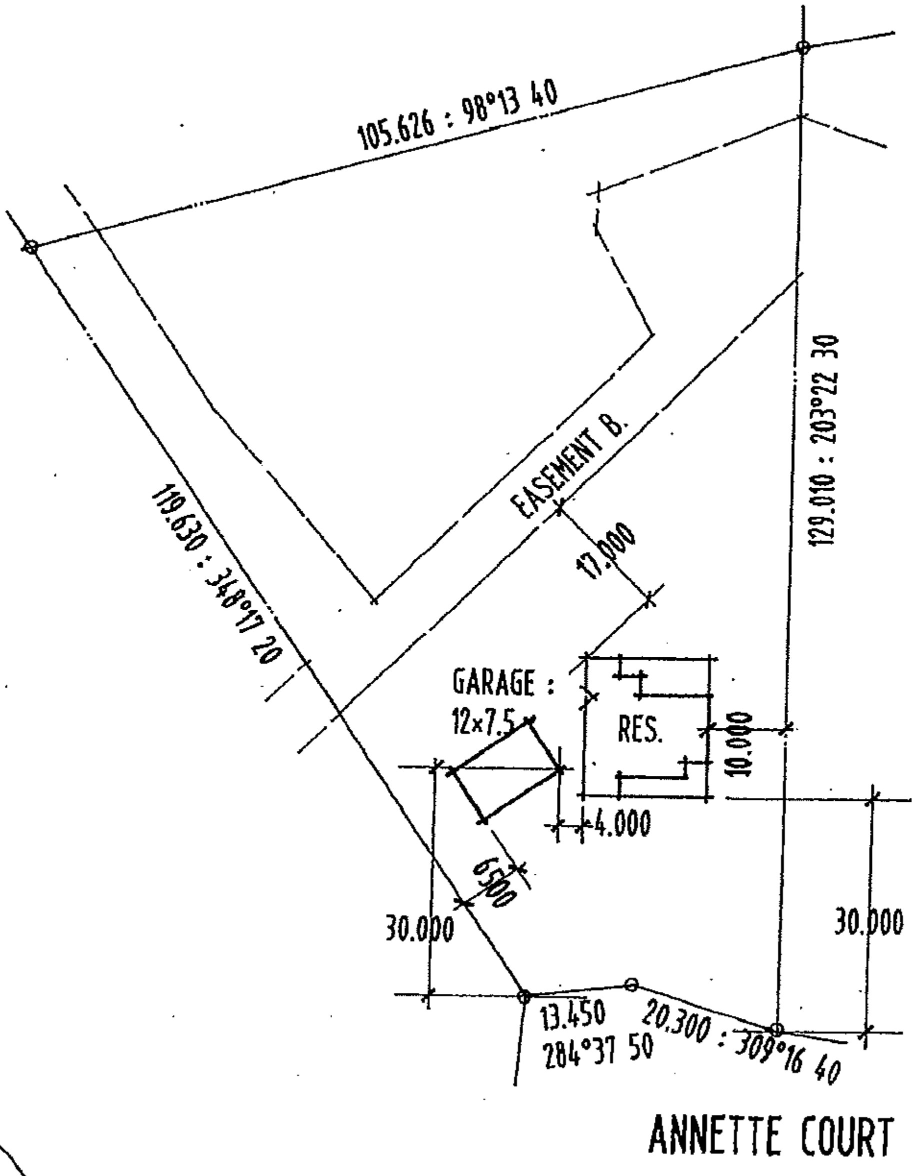

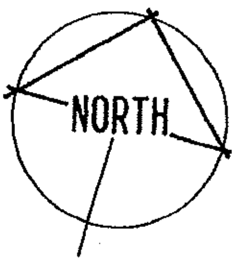

SITE PLAN.
1:1000.

REAL PROPERTY DESC. :

[redacted] PARISH : BURPEN

AREA OF LOT : 8000 SQ.M.

OWNER\BUILDER :

PETER ODLUM

4. GIBBONS COURT. BURPENGARY. Q. 4505.
PHONE : (07) 3888 0646.

PROJECT :

PROPOSED NEW RESIDENCE AT [redacted] ANNETTE COURT. BURPENGARY.

26.7.97.