



BMT WBM
PLANS AND DOCUMENTS
 referred to in the ULDA
APPROVAL dated 16/9/11

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Our Ref: L.B17507.002.00.doc

12 May 2011

Stockland Sunshine Coast
 Mark Stephens
 Level 1 Innovation House,
 8 Innovation Parkway, Kawana Business Village
 QLD 4575

Attention: Mark Stephens

Dear Mark

RE: Haul Road Bridge Design Conformation

As part of the Bell Vista II development Brown Consulting on behalf of Stocklands has designed a Haul Road Bridge over Lamerough Creek in Caloundra South. BMT WBM undertook an investigation into the impact of the proposed bridge on flood levels and flow velocities based on preliminary bridge design. The methodology and findings of this investigation were presented in the letter to Stocklands, dated 4 March 2011 (Ref: L.B17507.001.00.doc).

We are writing to confirm that the details of Haul Road Bridge supplied by Brown Consulting are consistent with the details in the hydraulic model used for the preliminary flood impact assessment and hence if the flood impact assessment is valid.

For convenience the results of the preliminary flood impact assessment of the Haul Road Bridge are presented here.

Design Conformation

The bridge structure modelled in the preliminary hydraulic investigation had dimensions of:

- 20m clear span bridge length,
- soffit level of 3.1 m AHD and,
- a deck thickness of 900mm.

The dimensions of the bridge design provided by Brown Consulting (drawings; B11056-S10-1 to B11056-S12-1) show dimensions of:

- 20m clear span bridge length,
- soffit level at the lowest point of 3.12 m AHD and,
- a deck thickness of 880mm (850mm D PSC Deck Units and 30mm Deck Wearing Surface).

These details indicate a difference of 0.02 m AHD in soffit level and a difference of 20mm in the deck thickness.

These differences would have negligible impacts on the flooding behaviour. The modelled soffit level is lower than the minimum design soffit level the results of the investigation can be considered slightly conservative.

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The maximum flood level at the bridge during 100 year events is approximately 3.4 m AHD which compares to a bridge deck level of 4.0 m AHD in the preliminary assessment and a designed top of kerb level of 4.0 m AHD. These levels are identical.

Findings

Given the minor differences between the modelled Haul Road Bridge and the Haul Road Design there will be no significant impact on flood levels or flow velocities. The results of the preliminary flood mapping are therefore valid and presented below.

The flood impacts are presented for the 10 year and 100 year events in Figures 1 and 2. In these figures, colours indicate the flood extent and the change in flood level in accordance with the magnitude indicated in the legend. The grey colour indicates areas where there is no change within a ± 0.01 m modelling tolerance, the red/yellow shades indicate increases in flood level and the blue shades indicate decreases. The brown colour indicates areas that were once wet and would now be dry and the solid purple indicates areas that were dry and would now be wet with the bridge in place.

Across all flood events the maximum cumulative change in flood level is within the ± 0.02 m to 0.03 m range. The extent of the impact decreases in smaller events. The zone of impact is generally to the west and northwest of the bridge, that is, upstream as expected. As would be expected decreases in flood level are shown on the downstream side of the bridge. The results for the 3 month and 50 year events follow those of the 10 year and 100 year events having small increases in flood levels upstream of the proposed bridge and small decreases downstream of the bridge. The 3 month impacts are smaller than the 10 year impacts and the 50 year impacts fall between the 10 year and 100 year impacts.

The changes in flow velocities are presented for the 10 year and 100 year events in Figures 3 and 4. In these figures, colours indicate the flood extent and the change in flow velocity in accordance with the magnitude indicated in the legend. The grey colour indicates areas where there is no change within a ± 0.01 m/s modelling tolerance, the red/yellow shades indicate increases in flood level and the blue shades indicate decreases. The brown colour indicates areas that were once wet and would now be dry and the solid purple indicates areas that were dry and would now be wet with the bridge in place.

Across all flood events the maximum cumulative increase in flood velocity is generally within the ± 0.2 m/s range with the exception of the bridge opening and immediately adjacent to abutments. The zone of impact is in the vicinity of the bridge with increase in velocity in the bridge opening and decreases adjacent to the abutments as expected. Within the bridge opening there were localised velocity increases up to 0.5m/s and immediately adjacent to abutments there were decreases of up to 1m/s. The extent of the impact decreases in smaller events. There is also an area of increased velocity the north east of the proposed bridge. The results for the 3 month and 50 year events follow those of the 10 year and 100 year events. The 3 month impacts are smaller than the 10 year impacts and the 50 year impacts fall between the 10 year and 100 year impacts.

The modelling indicates that the haul road bridge does not lead to any significant flood level or velocity impacts across a range of ARI events from the 3 month to the 100 year.

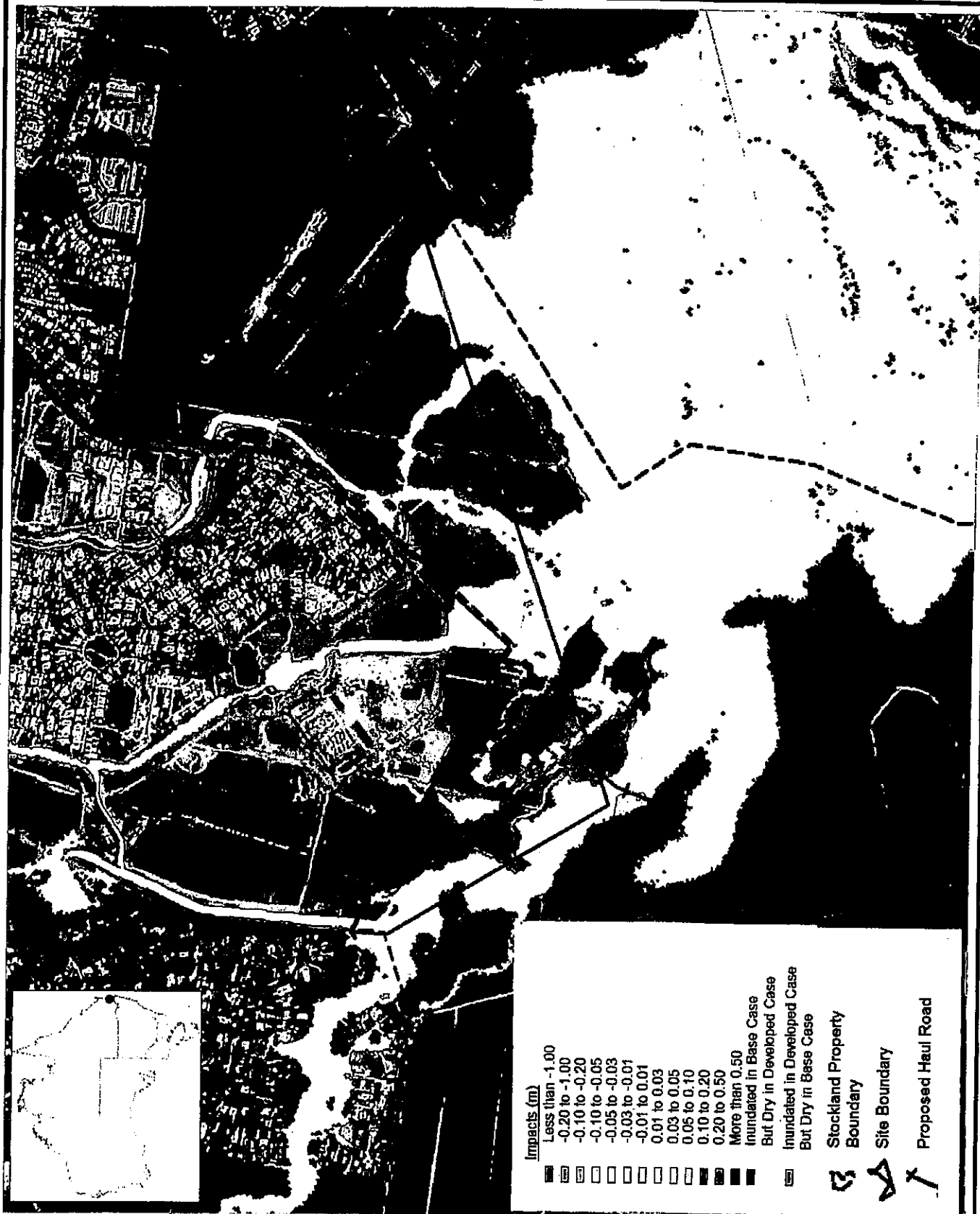
I trust that this satisfies your requirements. Please do not hesitate to contact the undersigned should you require further information or assistance.

Yours faithfully
BMT WBM Pty Ltd



Philip Pedruco
Senior Engineer
Flooding and Hydraulics (Victoria)

cc Brent Thomas Brown Consulting



Title:
100 year ARI Peak Flood Level Impacts

Figure:
1

Rev:
A

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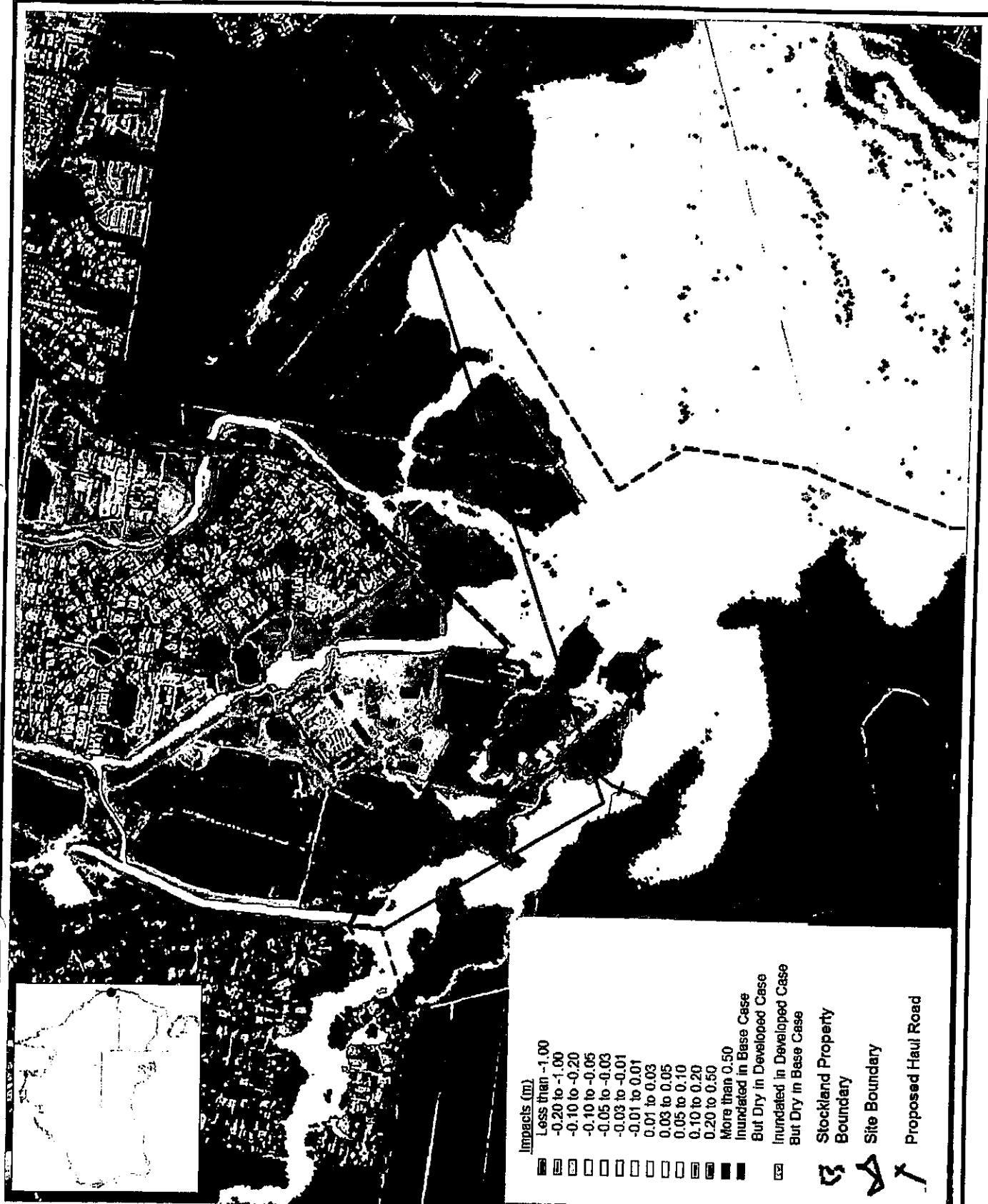
0 250 500m
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Title:
10 year ARI Peak Flood Level Impacts

Figure:
2

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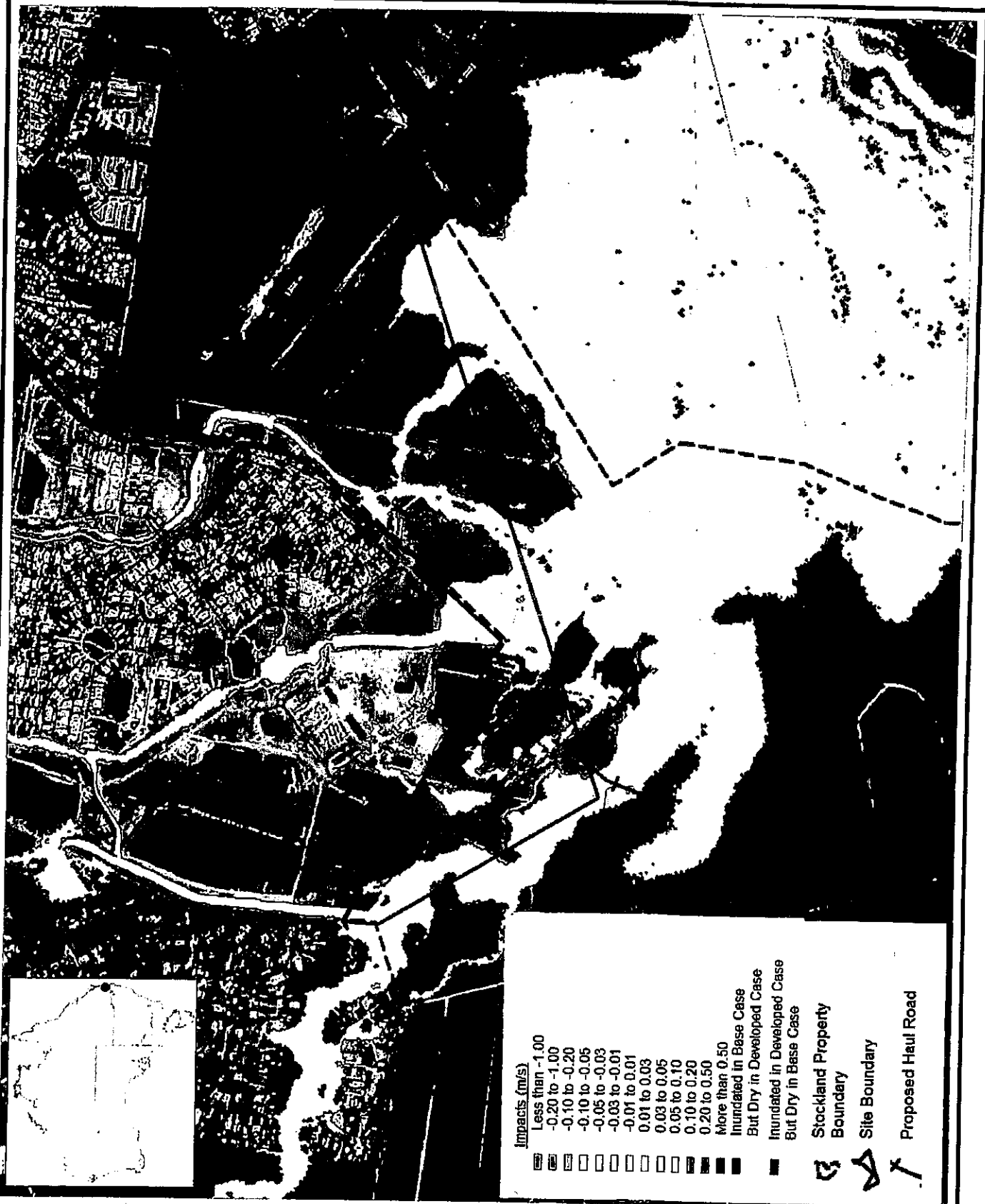
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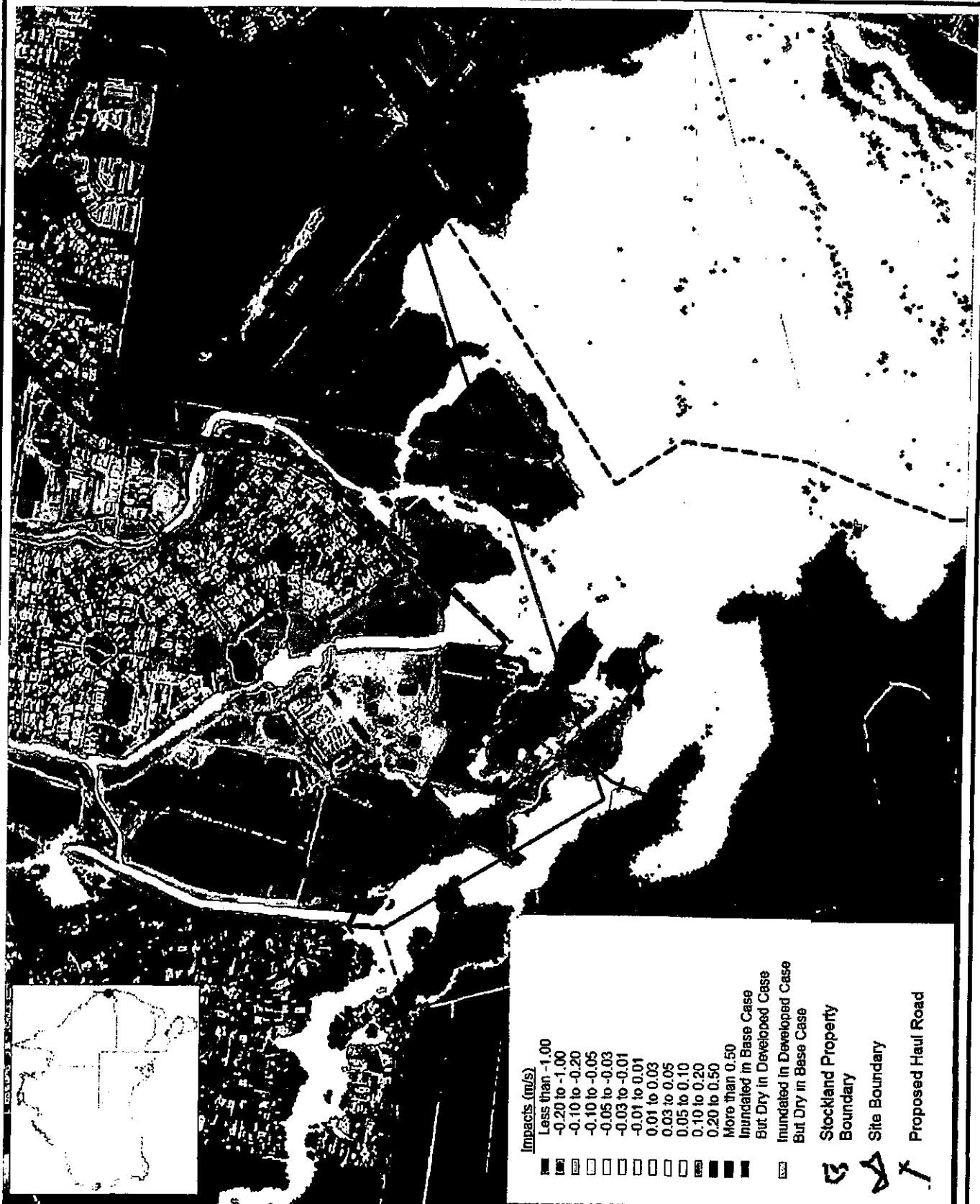
Title:
100 year ARI Peak Flood Velocity Impacts

Figure:
3

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Title:
10 year ARI Peak Flood Velocity Impacts

Figure:
4

Rev:
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0 250 500m
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Photos



Photo 1: Gap in remnant vegetation along Lamerough Creek for proposed bridge location as viewed from the southern side of the waterway



Photo 2: Existing unformed crossing of Lamerough Creek

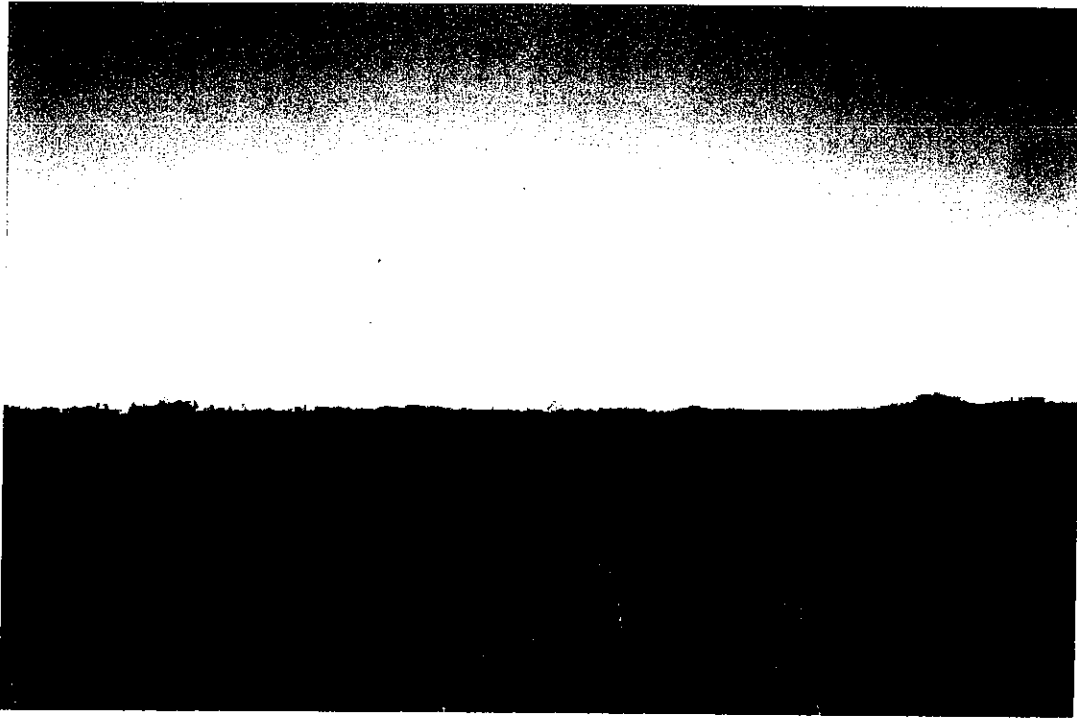


Photo 3: Vegetation community within and adjacent to haul road, looking west



Photo 4: Proposed bridge crossing viewed from the top of the southern bank



Photo 5: Proposed bridge crossing viewed from the top of the northern bank.