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19 November 2010

OUR REF: L:\Jobs4\910\Planning Folder\19 November 10, Council(Flooding).docx

Lake Macquarie City Council
Box 1906
Hunter Region Mail Centre
NSW 2310

ATTENTION: MICHELLE BISSON – DEVELOPMENT PLANNER

Dear Michelle,

RE: DA/886/2010 – PROPOSED RETIREMENT VILLAGE "KENDELL PARK ENVIRONMENTAL VILLAGE", LOT's 11 & 12 DP 830292 KNOWN AS NO'S 40-48 BURTON ROAD, MOUNT HUTTON.

Please find enclosed 3 copies of the Flooding Investigation report prepared by Northrop. This report reflects the site specific flood modelling recently undertaken by Cardno. As you will see, the off-site flood impacts have been reduced from that which currently exist, however, have not been totally eradicated. In this regard, the Northrop report confirms that there are options available to totally remove off site flooding impacts should this be required by Council, however, would require further modelling by Cardno. These off-site impacts are minor in nature and within an isolated area to the north of our site which currently floods and is not developed.

In light of the time pressures being put on Council by the JRPP, we propose that the additional modelling (and subsequent amended Civil Drawing prepared by Northrop) could be dealt with as a deferred commencement condition pursuant to Section 80(3) of the Environmental Planning and Assessment Act, 1979.

Notwithstanding the above, further modelling based on the solutions put forward by Northrop is being undertaken by Cardno and we will keep you posted in this regard.

Should you have any further queries, please do not hesitate to contact me on (02) 4942 5441.

Yours sincerely,
de Witt Consulting

MB de Witt

Matthew de Witt
TOWN PLANNER

NORTHROP Bringing people, ideas & engineering together
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NL100073

19/11/2010

EJE Architecture
Mr Peter Johnson
412 King Street
NEWCASTLE NSW 2300

Dear Peter,

Re: Kendall Park Environmental Village – Flooding Investigation

The proposed Kendall Park Environmental Village is located at 40 Burton Road, Mount Hutton and shall be referred to in this letter as 'the site'. The site slopes in a north westerly direction towards Burton Road located along its western boundary. Along the eastern boundary of the site exists a channel which is a tributary of South Creek. This channel discharges through neighbouring properties at Burton Road near the northern boundary to the site. On the 20th July 2010 we were advised by Lake Macquarie City Council that the Engineering and Environmental Consultant 'Cardno' were engaged by Council to undertake the South Creek Flood Study. This study included the channel along the eastern boundary of the site and the expected flooding regime across the site itself. Based on advice from Council we understand that the results of this study showed:

- Results for the 100 year event show that flows are conveyed over a significant proportion of the site. This includes the channel itself (on the eastern side) and overflows across the middle of the property.
- In a Probable Maximum Flood (PMF) event, the majority of the property is inundated by water of a depth above 0.10m.
- For the 100 year Annual Recurrence Interval (ARI) event, high hazard is shown in the channel.
- In the PMF event, high hazard is shown across the majority of the property. Burton Road just to north and Glad Gunson Drive to the west are also shown as high provisional hazard.

As a result of the preliminary advice from Council, Northrop Engineers and Cardno were subsequently engaged to determine the impacts on the development as a result of flooding in a major storm event. The following information outlines the methodology used to determine the impacts and the results found to date.

Methodology

To determine the impact on the flooding regime of South Creek, a Digital Terrain Model (DTM) was compiled for the developed site that reflects the earthworks required for the construction of the proposed dwellings. To provide a simple and conservative modeling approach, the site DTM was developed using to large earth platforms encompassing the extent of the proposed building and access driveways. Figure 1 illustrates the concept behind the developed DTM. Swales were located along either side of the building platforms to convey flows around the dwelling. Flow collected in the swale on the southern side of the site was designed to be conveyed through the site via a central drainage gulley and cross the proposed internal access road through a box culvert. Once on the northern boundary of the site the flow was designed to be spread back into the natural drainage channel and flow path. Figure 1 illustrates the location of the two building platforms and proposed drainage swales.

This DTM was then inserted into the South Creek Flood Model by Cardno and the results reviewed. Based on the review, opportunities to refine the DTM and further mitigate flood impacts were identified. Two such iterations of this process have been completed to date. The results of the latest iteration are contained below.

Results

1 in 100yr ARI Flood Levels

Prior to discussing the results, it is important to note that on all output from the South Creek Flood Model a filtering of the results is used to accurately gain and interpret results. This is due to the fact that the model simulates rainfall in an event using a grid across the entire DTM surface. This process therefore notes all surfaces within the DTM as being covered by flood waters to some depth within a storm event even if it is only 1mm. Further explanation and interpretations on the modeling results is contained below.

Based on the Cardno modeling, Figure 2 shows the extent of the 1 in 100yr ARI flood level greater than 50mm deep. As shown on Figure 2 the raised building platforms proposed for the site are not inundated in the 1 in 100yr ARI flood event. Finished floor levels for individual dwellings will be set such that a 500mm free board will exist to the 1 in 100yr flood extents.

Figure 3 illustrates the peak flood water difference between the developed site and the pre-developed site. The modeling and Figure 3 shows an increase in the depth of flood waters above the building pads. This increase in depth is a result of rain falling on the building platforms and should not be interpreted as an increase in flood levels.

From Figure 3 it can be seen that the peak 1 in 100yr flood level in neighbouring properties is both decreased and increased in certain levels. The decrease in flood water level to the south and northeast of the site is due to the inclusion of swales to collects and convey flows around the building pads. Conversely the increase to the peak flood water level at the main outlet of the site is likely caused by a localised concentration of flows. This is supported by the fact that the increase to flood levels is very small in a spatial sense with levels returning to pre-developed levels relatively quickly. The modeling completed shows that the peak increase in flood water level at this point are predicted to be between 100mm and 200mm.

Information from Cardno and a review of the modeling suggest that this increase in water level and concentration of flow at the outlet point from the site can be better mitigated via balancing flows between the northern and southern swales (i.e directing more flow to the northern swale). We have provided a number of methods on how this may be achieved in the full design of the development in the Recommendation section of this letter.

In comparing Figure 2 and Figure 3 it is quickly found that the increase in 1 in 100yr ARI flood water levels at the outlet of the site will not impact on the overall extent of the flood waters on neighbouring properties. This area is already flood prone in the pre-development scenario with the neighbouring lots part of the existing floodway between the channel, to the east of the site, and the main creek at Burton Road. Therefore the increase to levels within the neighbouring site will not extend the flood extents, nor impact on the development potential of neighbouring properties, or future finished floor levels.

Probable Maximum Flood Hazard

Figure 4 illustrates the hazard categories provided by the modeling for the developed site for the Probable Maximum Flood (PMF) event. Based on the modeling, and comparing it to the advice received from Council, it can be seen that the development of the site will increase the areas of refuge on site. In particular the raising of the building pads has created refuge points on both the eastern and western areas of the site which are not inundated in the PMF event.

Recommendations

The modeling completed by Cardno to depict the impact of development on the site shows that the only negative impact will be a localized rise in 1 in 100yr flood levels on neighbouring properties to the north at the outlet of the site. As previously mentioned this impact will not increase the extent of flooding in the 1 in 100yr event nor impact on the future habital development area. As such we believe the modeling to date has shown that the effect to neighbouring properties due to the development of the site will be insignificant.

While the above is noted, discussions between Northrop and Cardno have identified a number of potential improvements to the modeling of the site which may further mitigate this increase in levels on neighbouring properties. These measures surround the balancing of flows between the northern and southern internal swales as well as a further dispersion of flows at the ends of the swales. Potential minor changes to the modeling identified include:

1. Directing greater flow to the northern swale through regrading of the swales at the south eastern boundary of the site.
2. Providing a piped connection between the southern and northern swales at the mid point of the southern swale. This will allow greater flow to be directed to areas where the flood levels have been reduced on northern properties.
3. Reducing the size of the culvert at the outlet from the southern swale. This will decrease the permissible discharge at the outlet point with flow utilising the depressed area between the building pads for detention of flows.
4. Provision of greater dispersion of flows from the culvert at the northern boundary of the site to decrease the concentration of flow entering the northern properties at the single outlet point.
5. Redirection of the outlet point further to the east along the northern boundary to areas where flood levels have decreased.

While these measures are considered minor in nature and should not affect the overall design of the development or its layout, it is expected that they will provide greater mitigation of peak flood levels at the outlet of the site to further reduce peak flood levels on the northern neighbouring property.

We note that there is a minor increase in flood levels at the outlet from the site, however there is no increase in flood extents. Therefore there is no significant affect on the neighbouring properties. Based on this fact there is no reason that the above modeling improvements can not be conditioned and required as part of the Construction Certificate assessment.

We trust this meets your requirements, however should you require anything further, please do not hesitate to contact the undersigned.

Yours sincerely

Ben Clark
Associate
BE (Civil) MIEAust CPEng NPER (Civil)

FIGURE 1 – Site Plan & Development Layout.

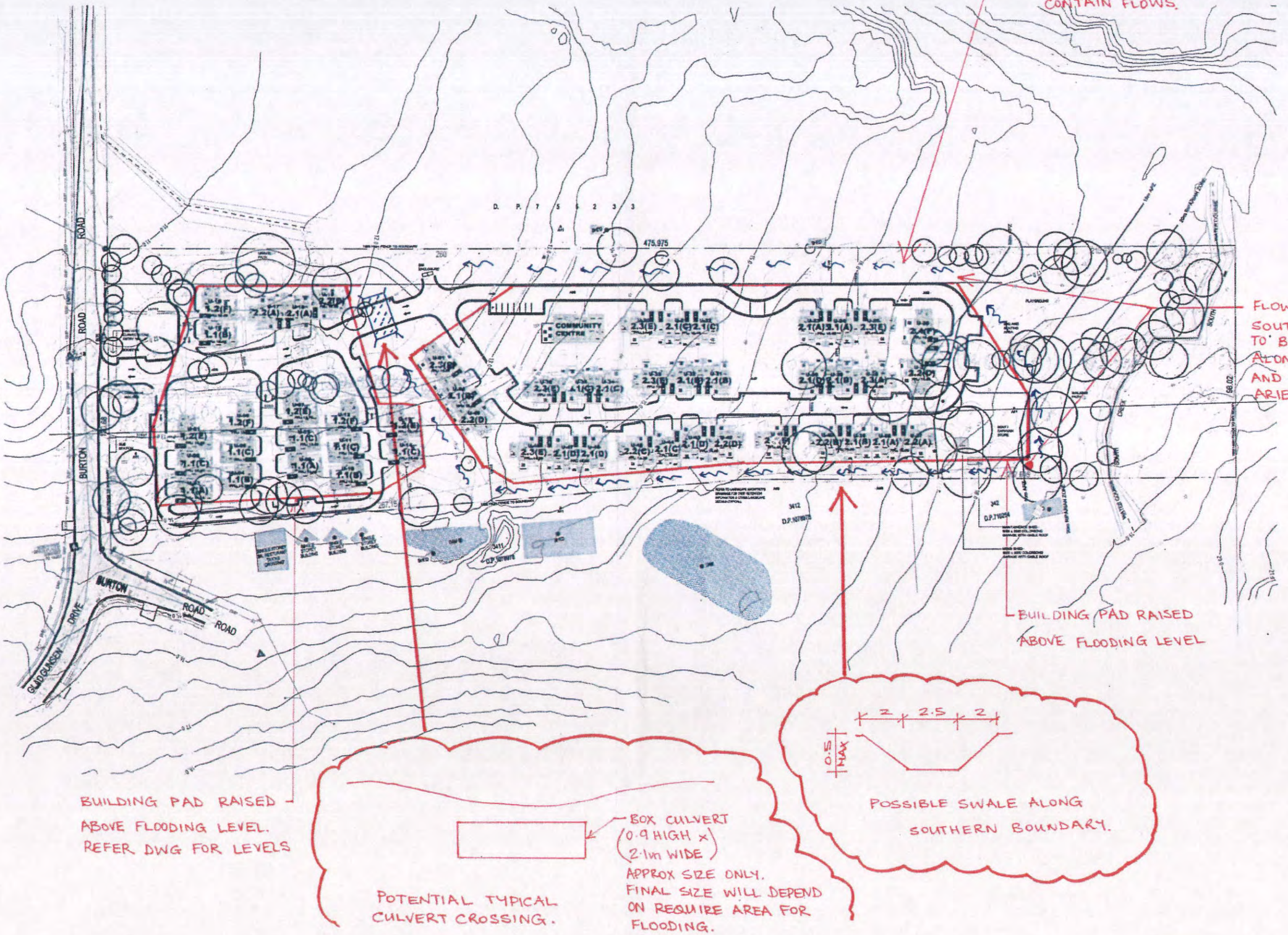

FIGURE 2 - 1 in 100yr Design Flood Extent

CASSON AVE

N
W E
S

BURTON RD

Legend

100yr ARI WL Contours (0.2m Interval)

100yr ARI Flood Extent (0.05m Filter)

0 100.0

meters

Scale: 1:2.522

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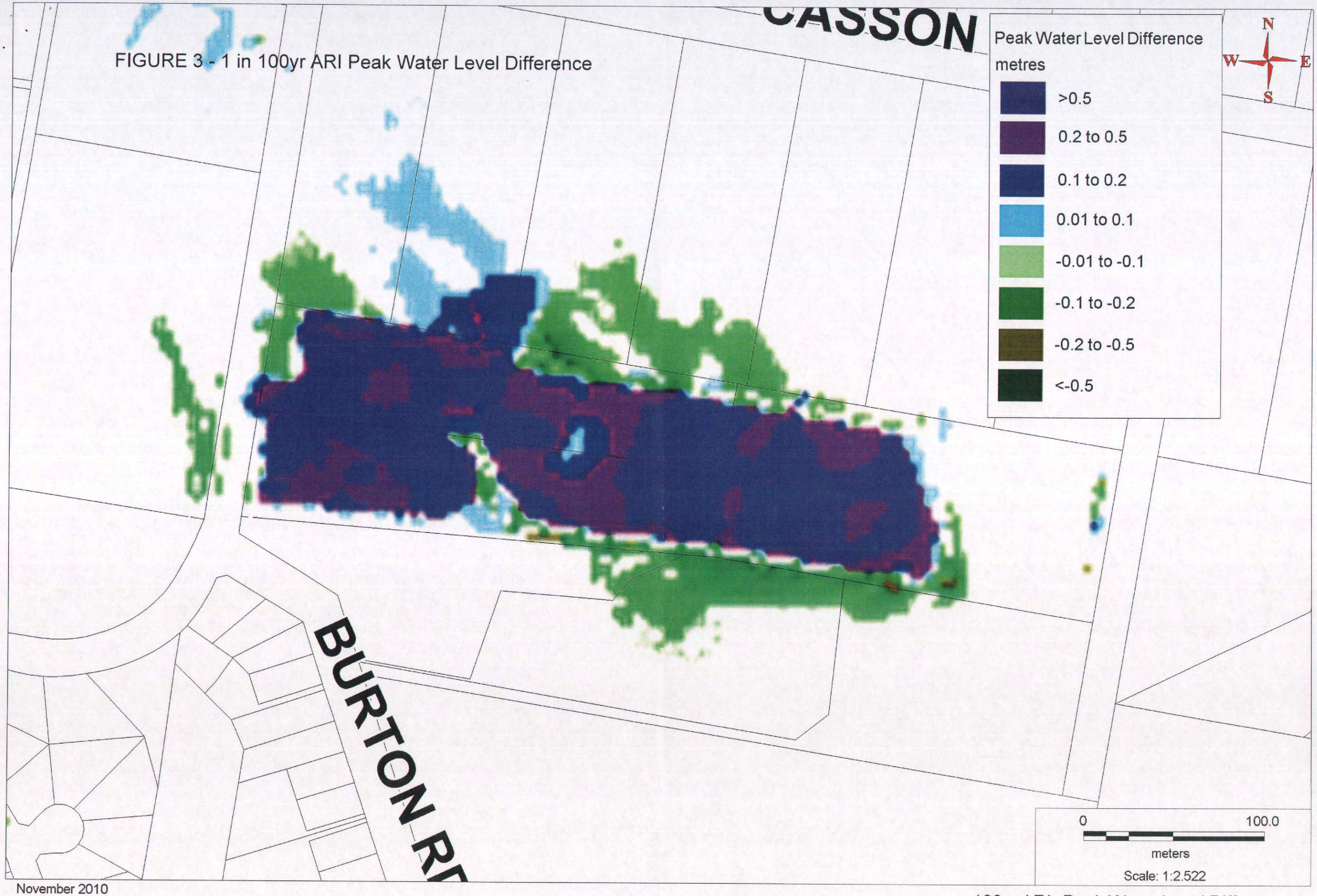
Lots 10-11 Burton Rd MtHutton

100yr ARI - Flood Extent (Revised Design)

FIGURE 3 - 1 in 100yr ARI Peak Water Level Difference



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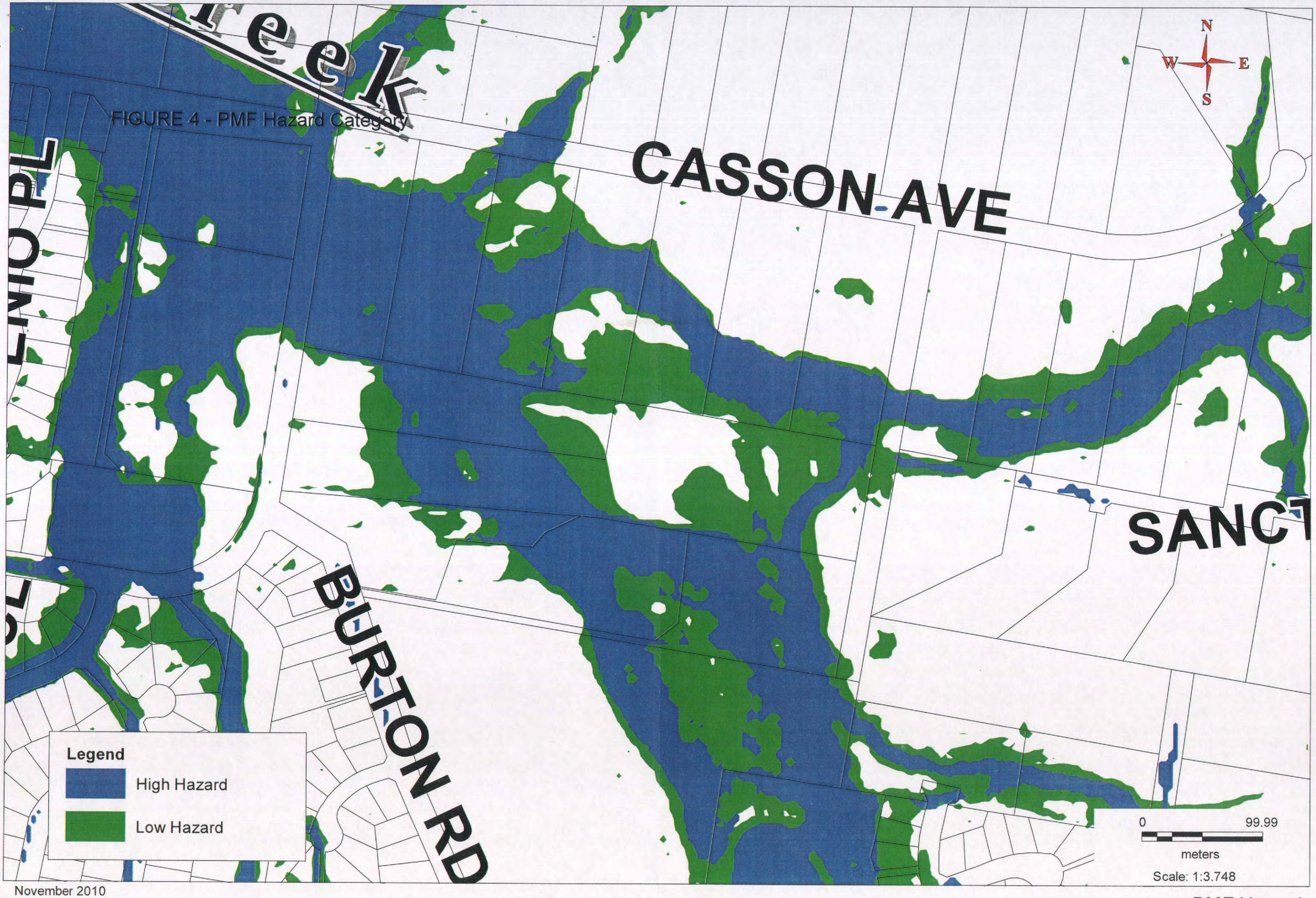
100yr ARI -Peak Water Level Differences
(Revised Design _ Less_Existing)

FIGURE 4 - PMF Hazard Category



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PMF Hazard