

Evidence E.

IN THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

of Plan Change 026 to the Waimakariri District
Plan requested by Westpark Rangiora Ltd

EVIDENCE OF REGAN SMITH

27-29 JULY 2015

1 STATEMENT OF PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

- 1.1 My full name is Regan Neville Smith. I am a Chartered Professional Engineer and a Professional Member of the Institute of Professional Engineers of New Zealand. I am employed as a Civil Engineer by Aurecon New Zealand Ltd.
- 1.2 I have 18 years experience in Civil Engineering. For the past 12 years I have been involved in the engineering and project management aspects of urban and rural land development projects throughout the Canterbury Region. I have also been involved in earthquake recovery and infrastructure rebuild works with the Waimakariri District Council in Kaiapoi and SCIRT in Christchurch and more recently the CCC Mayoral Flooding Taskforce in Christchurch and the Waimakariri District Council Flood Team.
- 1.3 I am familiar with the ground conditions, and land drainage and servicing issues affecting development in Rangiora having been extensively involved in many local developments, including the "Arlington Park" plan change and subdivisional development north of the site, "The Oaks" subdivisional development east of the site and plan change P018 east of the site.
- 1.4 I have read the Environment Court's Code of Conduct for Expert Witnesses and agree to comply with it. I confirm that the issues addressed in this statement of evidence are within my area of expertise.

2 SCOPE OF EVIDENCE

- 2.1 I have been asked to present evidence relating to provision of infrastructure to service future residential development of the site subject of the Plan Change request. I am familiar with the subject site and the Infrastructure Assessment Report that was submitted as part of the Plan Change Request. I have read the Officers Report prepared by Mr Blay, including the supporting evidence prepared by Mr Simpson, Mr Boot and Mr Mudliar.
- 2.2 My evidence focuses on the servicing and flood risk issues associated with the proposal, including a brief description of the site, proposed methods for servicing future residential development and flooding risk. More detail regarding these matters is included in the plan change documentation. As there is a high level of consensus between the Applicant and the Council Officers in relations to servicing, I will focus more on the aspects where there are still minor differences of opinion.

3 THE SITE

- 3.1 The site is described in detail in the plan change application and Officers Report. The key points relating to servicing are:
 - The site is bounded to the west by Lehmans Road and rural land, to the east by rural-residential and residential zoned land, to the south by Oxford Road

and rural land, and to the north by residential land recently developed as part of the "Arlington Park" subdivision.

- The site is relatively flat with a gentle fall in a SSE direction
- The soil profile consists of topsoil overlying sandy silt, overlying gravel. Based on the limited number of test pits excavated over the site, the gravel starts at between 1.6 - 3.1 metres below ground. The geotechnical report refers to a number of test pits dug across the site with two of the pits encountering ground water at depths of 7.1m.
- An overland flow path runs across the site from west to east approximately 150 m from the southern boundary of the site but only flows in significant storm events.
- There is a stock water race that flows eastwards through the site from Lehmans Road, passing through neighbouring rural residential properties before draining along Oxford Road into the head of the North Brook.
- The Ashley River is located approximately 1.6 kilometres north of the site and flows from west to east. The site lies within an area that could be affected by a breakout of the Ashley River from one of four locations modelled by ECan. The ECan flood modelling indicates that the site could be inundated to depths less than 0.25m during the 0.2% AEP Ashley River breakout event. This is classified as Low Hazard.

4 WATER SUPPLY

- 4.1 The only feasible option for connection to the Rangiora urban water supply is to extend the existing water main along Oxford Road from Acacia Drive to the proposed north south road within the site.
- 4.2 The extension is anticipated in and consistent with the West Rangiora Structure Plan (WRSP).
- 4.3 Council's Water Asset Manager, Mr Suresh Mudliar, has confirmed that the scheme has sufficient capacity to service the proposed development for domestic supply and fire-fighting purposes.
- 4.4 The development will have to rely on a single point of supply until residential zoned land east of the site is developed and the network extended to provide additional connection(s). Although the additional connections are desirable from a network resilience perspective, the single connect is adequate to service the development.
- 4.5 On this basis I do not see any impediment to the Plan Change being approved from a water supply perspective.

5 WASTEWATER

- 5.1 As with water supply, the most practical option to provide wastewater reticulation to service development of the site is to extend the existing gravity reticulation along Oxford Road from Acacia Drive. The entire site can be serviced by a gravity system from this point.
- 5.2 The Council's Project Delivery Manager, Mr Gary Boot, has confirmed in his evidence that capacity upgrades required to service development in west Rangiora, including the P026 Site, are either planned or underway. Specifically, Mr Boot has confirmed that "there is or shortly will be adequate capacity within the wastewater reticulation system to service the development that could occur as a result of P026, without adversely affecting other users or compromising the Council's levels of service".
- 5.3 On this basis I do not see any impediment to the Plan Change being approved from a wastewater servicing perspective.

6 LAND DRAINAGE

6.1 Stormwater Management

- 6.1.1 The ground conditions on the site are relatively well suited to incorporating soakage disposal into the stormwater system. Gravels were recorded between 1.6m and 3.1m below existing ground level, being deepest at the southern end of the site. The groundwater level is estimated to be in the order of 7.1m below ground level.
- 6.1.2 Soakage based systems have been deployed successfully in the adjacent "Arlington Park", "The Oaks" and "Belmont Ave" subdivisions where the ground conditions are similar to the Plan Change site.
- 6.1.3 The proposed stormwater management system includes:
- Runoff from hardstand and roading will need to be treated prior to discharge to ground. It is proposed that this be achieved by provision of a stormwater management area located in the southeast corner of the site. The stormwater management area will include a first flush infiltration basin to provide necessary treatment.
 - The stormwater management area will also provide storage and soakage areas designed to capture and dispose of all runoff from the site up to a 2% AEP (1 in 50 year average recurrence interval) event.
 - Runoff from roof areas within the developed site will be discharged directly to ground through individual on-site soakpits.
 - Secondary flow paths will be provided along road and reserve corridors to direct any overland flow from within and upstream of the site, that exceeds the capacity

of the stormwater system, through to Oxford Road and the existing flow path east of the site.

- 6.1.4 A discharge consent has been obtained from Environment Canterbury for the proposed development and a copy is included in the Infrastructure Report submitted as part of the plan change request documentation.
- 6.1.5 Mr Simpson notes in his evidence that "it is preferable that secondary flow from both Basin A and Basin B occur into Oxford Road then into the North Brook, rather than through private property. This route for the secondary flows better aligns with the proposed secondary flow route to the south, shown on the stormwater plan in the West Rangiora Structure Plan..."
- 6.1.6 I agree with Mr Simpson that this option is preferable to trying to maintain the existing flow path through private property east of the site. Removing this flow path will offer significant benefit to properties to the east. This modification to the proposed stormwater management system has also been included in the updated flood modelling discussed later in my evidence.
- 6.1.7 This proposed stormwater management system, including blocking of the existing west to east overland flow path is consistent with the system anticipated in the WRSP.
- 6.1.8 It is my opinion that the proposed stormwater management system is appropriate for the site and will provide some benefit to existing properties to the east by eliminating flow from the site for all events up to the 2% AEP level.

6.2 Other Drainage Features

- 6.2.1 The existing water race at the south end of the site will need to be considered when the site is developed. It is accepted by the applicant that it not desirable to have a water race located within residential properties and as such they have applied to Council formally requesting its closure. It is noted Mr Simpson confirms in his evidence that Council are supportive of the closure.
- 6.2.2 If the water race closure did not proceed for any reason, the race could be diverted or piped through the development to maintain existing supply to properties east of the site.
- 6.2.3 Either way, both outcomes can be accommodated within any future development of the site and the specific requirements can be dealt with at the subdivision stage.
- 6.2.4 On that basis I do not consider the future treatment of the water race as an issue that needs to be resolved as part of the plan change process.

6.3 Flood Risk

- 6.3.1 The Plan Change site has the potential to be flooded from internal stormwater runoff, rural overland flow from the west of the site or flows resulting from a breakout of the

Ashley River if it were to occur at one of the potential locations modelled by ECan west of the site.

- 6.3.2 The potential flooding from internal stormwater runoff has effectively been addressed with the proposed stormwater managements system. The proposed roads will also act as overland flow paths for events exceeding the capacity of stormwater system.
- 6.3.3 Flood modelling was undertaken by Aurecon stormwater modellers utilising existing 2D Flood Models from ECan (Ashley River Breakout) and WDC (Localised Flooding). A 0.5% AEP (1 in 200 year average recurrence interval) event was modelled for both scenarios. The results of the modelling are summarised in the Ashley River Breakout Flood Modelling Report dated 21 November 2014, that was submitted as part of this Plan Change application.
- 6.3.4 The outputs of the modelling confirmed that The Ashley River Breakout was the critical scenario with flow crossing the site at depths up to 0.25m. Mitigation options considered in the report focussed on addressing the Ashley River Breakout event.
- 6.3.5 Flow paths through and around the site will be altered by land reshaping required for future development of the site for residential purposes. For the purposes of modelling the developed scenario, the building platforms were raised above expected flood levels and roads were graded as anticipated by the proposed stormwater management plan for the site. The existing west to east flow path through the site was also maintained.
- 6.3.6 The results of the modelling identified a potential increase in flooding to the north, west and south of the site, and a potential decrease in flood levels to east and southeast of the site.
- 6.3.7 To mitigate some of the increased flooding effects, further mitigation measures were considered including:
- Bunding along the boundary between Arlington and the future bypass road to prevent flow into the residential area north of the site. This was proposed and is needed to prevent flooding of residential areas in the Arlington subdivision, regardless of the Westpark development.
 - A box culvert under Oxford Road and a drain on the east side of Lehmans Road to reduce the water level northwest of the intersection (Rangiora Vet Site).
 - Maintaining the existing west to east overland flow path through the site
- 6.3.8 The modelling predicted that the development including the mitigation measures would reduce flooding to the north and east of the site but result in an increase of typically up to 50mm but up to 100mm in some localised areas south and west of the site. The predicted increase at the vet clinic site was 60mm.

6.4 Updated Flood Modelling

6.4.1 Since completing the initial modelling and report, and after reviewing the evidence prepared by Councils 3 Waters Manager, Mr Kalley Simpson, further mitigation options have been investigated and modelled by Aurecon. The earth bund constructed around the vet clinic to provide protection against flooding of the building that occurred in the June 2014 flood event has also been included in the model.

6.4.2 Mr Simpson's evidence recommends additional mitigation measures be assessed including:

- A green space link from the north south road to the reserve at the northwest corner of the site
- Diversion of the west to east overland flow path into the stormwater management area and limiting secondary flow to Oxford Road only.
- Extension of a swale south of the previously proposed box culvert under Oxford Road.

6.4.3 Mr Simpson also recommends the flood risk assessment specifically address the effects of increased flooding risk to the habitable floor levels of the houses at 201 Lehmans Road or 161 Lehmans Road and the development impact on the Residential 4A land at 260 Lehmans Road.

6.4.4 Additional model runs have now been completed to include:

- The vet clinic bund (for both existing and developed scenarios)
- Green space link at north of the site (with and without previously proposed bunding)
- Preventing flow to the existing overland flow path east of the site
- Box culvert under Oxford Road (with and without swale drain south along Lehmans Road)
- Swale south along east side of Lehmans Road (with and without box culvert under Oxford Road)

6.4.5 Now that the vet clinic bund has been constructed, including it in the model is considered to be a more appropriate representation of the existing situation against which the effects of the Westpark development are considered. Updated maps showing predicted flood depths for the existing and developed scenarios, and a difference map illustrating the predicted increase or decrease in flood depth resulting from development, are attached and discussed in more detail below.

6.4.6 Including the greenspace link and bunding to the north of the site provides benefit in reducing the flood levels in residential areas north and east of the site. By allowing flow into the development at this location, backing up of floodwater upstream of the

bund is also limited to the bypass road corridor. The previous modelled potential impact on the Residential 4A land at 260 Lehmans Road is eliminated by this option.

- 6.4.7 There is a potential increase in flood levels (up to 50mm increase) affecting the north of 67 Oxford Road due to flow entering the site from the northernmost road link. The remainder of the site benefits from the diverting effect of the development. This site is zoned for residential use and future development would provide an extension of the northern road which would provide an appropriate flow path to accommodate this flow. Alternatively, the road could be further graded into the Westpark site to divert a greater volume of flow south through the development.
- 6.4.8 As with the previous modelling, flood levels are still increased west of the site due to diverting effect created by raising the building platforms above the predicted flood level. However, allowing flow through the greenspace link at the north of the site does reduce the level of the impact on all properties, including virtually eliminating the impact on 255 Lehmans Road.
- 6.4.9 There is a predicted increase in flood level of up to 90mm at the south of 201 Lehmans Road. The dwelling is however located on higher ground that is shown to be free of inundation in both the existing and developed scenario (refer to attached flood modelling maps). Based on this evidence, I conclude that the habitable floor level at this site is unlikely to be inundated in the 0.5% AEP Ashley River Breakout scenario as a result of the proposed development.
- 6.4.10 As discussed previously, an earth bund has been constructed around the Rangiora Vet Centre to mitigate flooding of the site from rural overland flow. Although the modelling indicates an increase in flood levels around the outside of the bund (up to 90mm east of the clinic), the level is not predicted to exceed the height of the bund and the clinic building within should remain free of inundation in the 0.5% AEP Ashley River Breakout scenario. It is noted that the previously proposed box culvert under Oxford Road offers little value in terms of mitigating flood levels at the Vet Clinic site now that the bund has been constructed.
- 6.4.11 A post development flood depth of up to 250 mm is predicted in the vicinity of the northern dwelling at 161 Lehmans Road. This is a 25mm, or 10% increase from the existing scenario.
- 6.4.12 Measurements undertaken on site indicate that the building is in the order of 160mm above the surrounding ground level. Accepting the limitations of the flood model, it is reasonable to conclude that the floor level could be inundated in the 0.5% AEP Ashley River Breakout event for both the existing and developed scenarios.
- 6.4.13 The south building at 161 Lehmans Road is approximately 280mm above the ground level with a predicted flood depth of 45mm and 50mm in the existing and developed scenarios respectively. I therefore consider it unlikely that the floor level will be inundated in either scenario.

- 6.4.14 The diversion of flow through the site and limiting overflow to Oxford Road only results in an increase in flood depths of up to 80mm on 83 Oxford Road. However, the dwelling is sited on an area of land where there is no predicted increase in flood depth in the developed scenario. I therefore conclude that there is unlikely to be an increased flooding risk to the dwelling at 83 Oxford Road in the 0.5% AEP Ashley River Breakout event as a result of the proposed development.
- 6.4.15 Providing the box culvert under Oxford Road and a swale drain south along the east side of Lehmans Road also did not provide any mitigation to the predicted flood levels at 161 Lehmans Road. As there is no significant predicted benefit in terms of flood mitigation to 161 Lehmans Road or the vet clinic, I conclude that there is little merit in constructing the box culvert and swale for this purpose.
- 6.4.16 Development of the site with the proposed mitigation measures can provide benefit to large areas of residential land east and south east of the site.
- 6.4.17 There are some areas west and south of the site that could be affected by an increase in flood level as a result of the development. However, the areas affected are largely rural land or land identified for future development. There is no increase in the number of habitable floor levels that are predicted to be flooded as a result of the proposed development in the 0.5% AEP Ashley River Breakout event.
- 6.4.18 Where the land is identified for future residential development, opportunity exists to further mitigate the potential effects of overland flow resulting from a breakout of the Ashley River on residential areas of Rangiora.
- 6.4.19 The diversion of overland flow around and through the development is largely consistent or compatible with Council's long term strategies for managing stormwater and overland flow in west Rangiora.
- 6.4.20 I therefore conclude that the site can therefore be developed for residential purposes in a way that adequately mitigates the flood risk to surrounding land and to future residential dwellings constructed on the site.
- 6.4.21 The Applicant has proposed a modification to Rule 27.1.1.24 to make this development site subject to the requirement to set the floor levels a minimum of 350 mm above the 200 year flood event (0.5% AEP flood event). This is considered to be an appropriate measure to mitigate against flood risk within the development site.
- 6.4.22 In addition Council has requested an additional rule as part of their submission that requires residential allotments to have a finished ground level that avoids inundation in the 0.5% AEP flood event.
- 6.4.23 Although I understand the intent of this rule, it is my view that this additional rule will unnecessarily constrain design of the development. It is not uncommon in modern subdivision design for there to be a steeper batter from the road boundary up to the main building platform of the allotment. The recommended rule would prevent this

front part of an allotment being utilised to convey secondary flow, even if the main building platform on the allotment free of inundation.

- 6.4.24 It is my view that the rule proposed by the applicant is sufficient to ensure that future dwellings are sufficiently protected from flooding. However, if it is considered necessary to add the additional rule, it should be amended to require a suitable building platform to be free from inundation rather than the entire allotment.

7 SUBMITTERS

- 7.1 Submission #90 - Richard Brittan (161 Lehmans Road) - Supports stormwater secondary flow along Oxford Road and retaining of the existing west to east flow path through the site. Requests requirement be imposed that there will not be overflow south of Oxford Road.

- 7.1.1 Stormwater from the site resulting from events up to 2% AEP will be managed on-site through soakage and storage. The west to east flow path through the site will be maintained to the stormwater management area, but it is proposed that this will be prevented from flowing east of the site along its existing channel. Secondary flow for the site and the flow path will be from the stormwater management area to Oxford Road east of Lehmans Road. This is consistent with Council's expectations and the stormwater strategy anticipated in the WRSP.

- 7.2 Submission #102 - Kippenberger Holdings Ltd (Rangiora Vet Centre site) – Seek adequate infrastructure to be put in place to prevent flooding to surrounding area from the extra surface water that this change would create. Further request that the recommendations of the Council report into flooding in Rangiora be considered as a minimum starting point.

- 7.2.1 The proposed stormwater management system will store and dispose of all runoff from the site in up to a 2% AEP event. This is beyond the requirement of the WDC Engineering Code of Practice which requires runoff from the developments not to exceed pre-development levels for up to the 2% AEP event. This appears to address the first point raised in the submission.

- 7.2.2 The second request relates to options being considered by Council to intercept rural runoff from west of Lehmans Road and convey it south along Lehmans Road from Oxford Road to the South Brook. Those options include increasing culvert capacity under Oxford Road and providing additional conveyance capacity through existing or new drains south of Oxford Road. It is noted that the site is east of and drains away from the vet clinic site. The west to east flow path which crosses Lehmans Road just north of the vet clinic will also be maintained into the site. The site does not contribute to the local rural overland flow potentially affecting the vet clinic and the upgrade options being considered by Council.

7.2.3 The effectiveness of providing additional culvert and drain capacity across Oxford Road was tested in relation to the more significant Ashley River Breakout event. As discussed in Section 6 above, little benefit was provided by these measures and the recently constructed bund around the vet clinic is effective in managing that risk.

7.3 Submission #109 - Ryman Healthcare – Object to the plan change if the development cannot be adequately serviced or if servicing of the development limits the ability of existing zoned land to connect to necessary services. The submitter also requests consideration of the effect closing of water race may have on supply of water to other parties who utilise or propose to utilise this water race.

7.3.1 It has been demonstrated that the development can be serviced and Council have confirmed that there is adequate capacity within the reticulated water and wastewater systems to cater for the additional development anticipated by this plan change.

7.3.2 As already discussed, the process for closing the water race is separate to the plan change process and the outcome will not affect potential development of the site.

7.3.3 The purpose of the water race is for stock water so I fail to see how the submitter could legitimately propose to utilise the race for the residential development that they have subdivision consent for. The Council and other land owners between the submitter's site and the Westpark site are agreeable to closure of the race.

7.3.4 I also note that the subdivision consent that has been granted for their site includes conditions relating to piping and protecting the water race through the development. The closure of the water race would therefore appear to me to offer significant benefit to the submitter in terms of reducing the cost of development and avoiding any unnecessary encumbrances on the land where the race is located.

7.4 Ruth and Bruno Zahner 70 Oxford Road - Concerned at any potential effect of development on flooding of their property associated with the west to east flow path.

7.4.1 It is proposed that the west to east flow path will now be diverted to the stormwater management area within the plan change site. This will offer significant benefit to the submitters by diverting flow from the rural catchment west of Lehman's Road away from their site, thereby reducing the flood risk. The flow path will still intercept runoff from land between the plan change site and the submitter's property, so any development east of their land will still need to allow for this flow path.

7.5 Submission #115 – Waimakariri District Council – seek addition of a rule requiring residential allotments to have finished ground level to avoid inundation in a 0.5% AEP flood event.

7.5.1 I agree with the intent of the rule but believe it will unnecessarily constrain design of the future subdivision development. It is my recommendation that this rule be amended to require the main building platform on any allotment to be free from

inundation. Alternatively, that inundation be allowed within the 5m of the road boundary.

8 CONCLUSIONS

8.1 Wastewater and Water Supply

- 8.1.1 The site can be serviced by logical extension of the Rangiora water and wastewater systems.

8.2 Stormwater Management

- 8.2.1 Stormwater from the site can effectively be managed by a combination of on-site for up to a 2% AEP event by direct soakage of roof water and centralised treatment, storage and soakage of other runoff. A discharge consent has been obtained from Environment Canterbury for the proposed system.
- 8.2.2 Secondary flow paths can be provided through the site to convey overland flow from within and outside the site. The flow paths would convey runoff to Oxford Road which is consistent with the WRSP.

8.3 Flood Risk – Ashley River Breakout

- 8.3.1 Development of the site with the proposed mitigation measures can provide benefit to large areas of residential land east and south east of the site.
- 8.3.2 There are some areas west and south of the site that could be affected by an increase in flood level as a result of the development. However, the areas affected are largely rural land or land identified for future development. There is no increase in the number of habitable floor levels that are predicted to be flooded as a result of the proposed development in the 0.5% AEP Ashley River Breakout event.
- 8.3.3 Where the land is identified for future residential development, opportunity exists to further mitigate the potential effects of overland flow resulting from a breakout of the Ashley River on residential areas of Rangiora.
- 8.3.4 The diversion of overland flow around and through the development is largely consistent or compatible with Council's long term strategies for managing stormwater and overland flow in west Rangiora.

Regan Smith

Figure 1: West Rangiora Structure Plan – Stormwater and Reserves

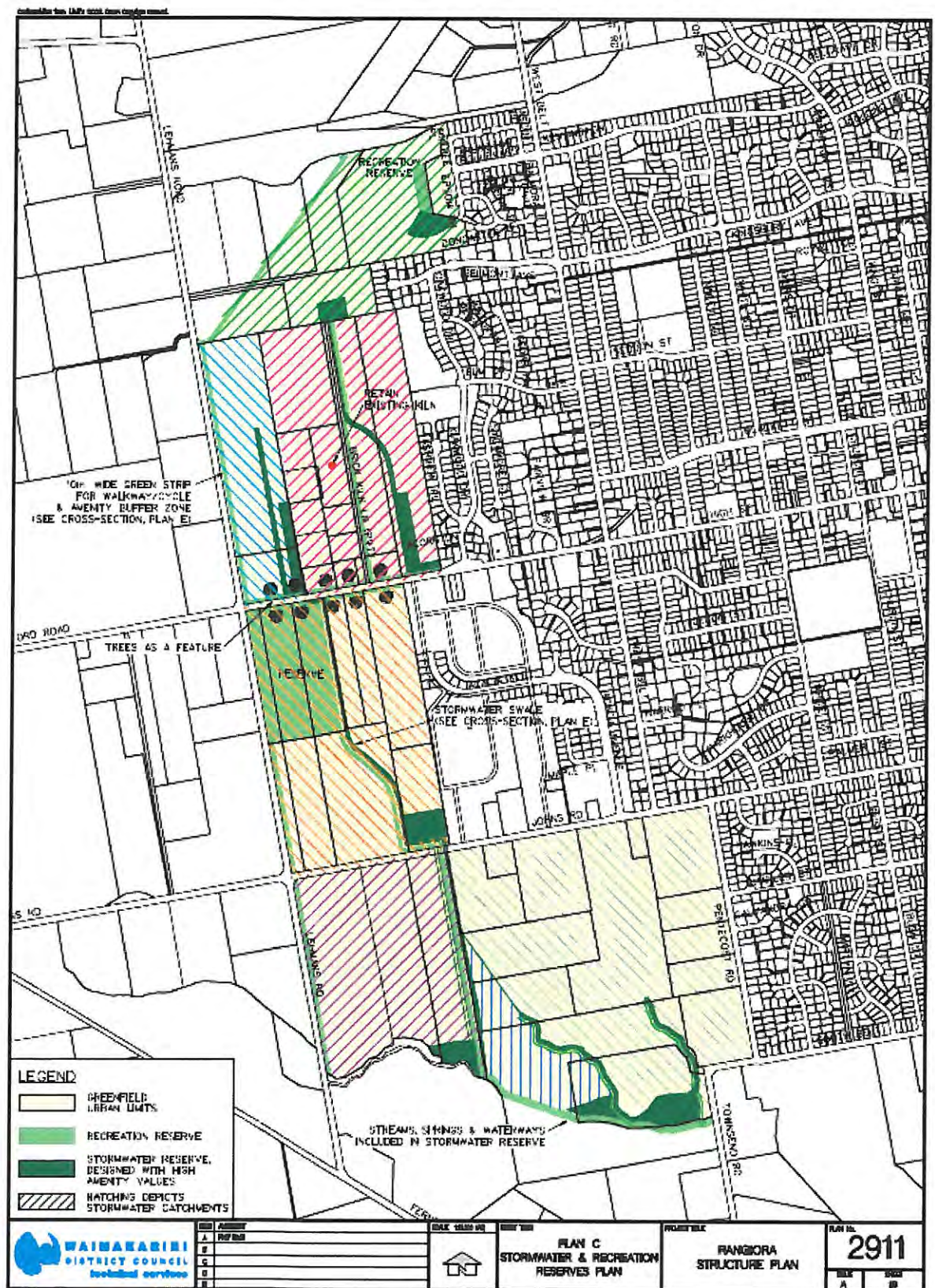


Figure 2: Flood Depth Map for Existing Scenario (including vet clinic bund)

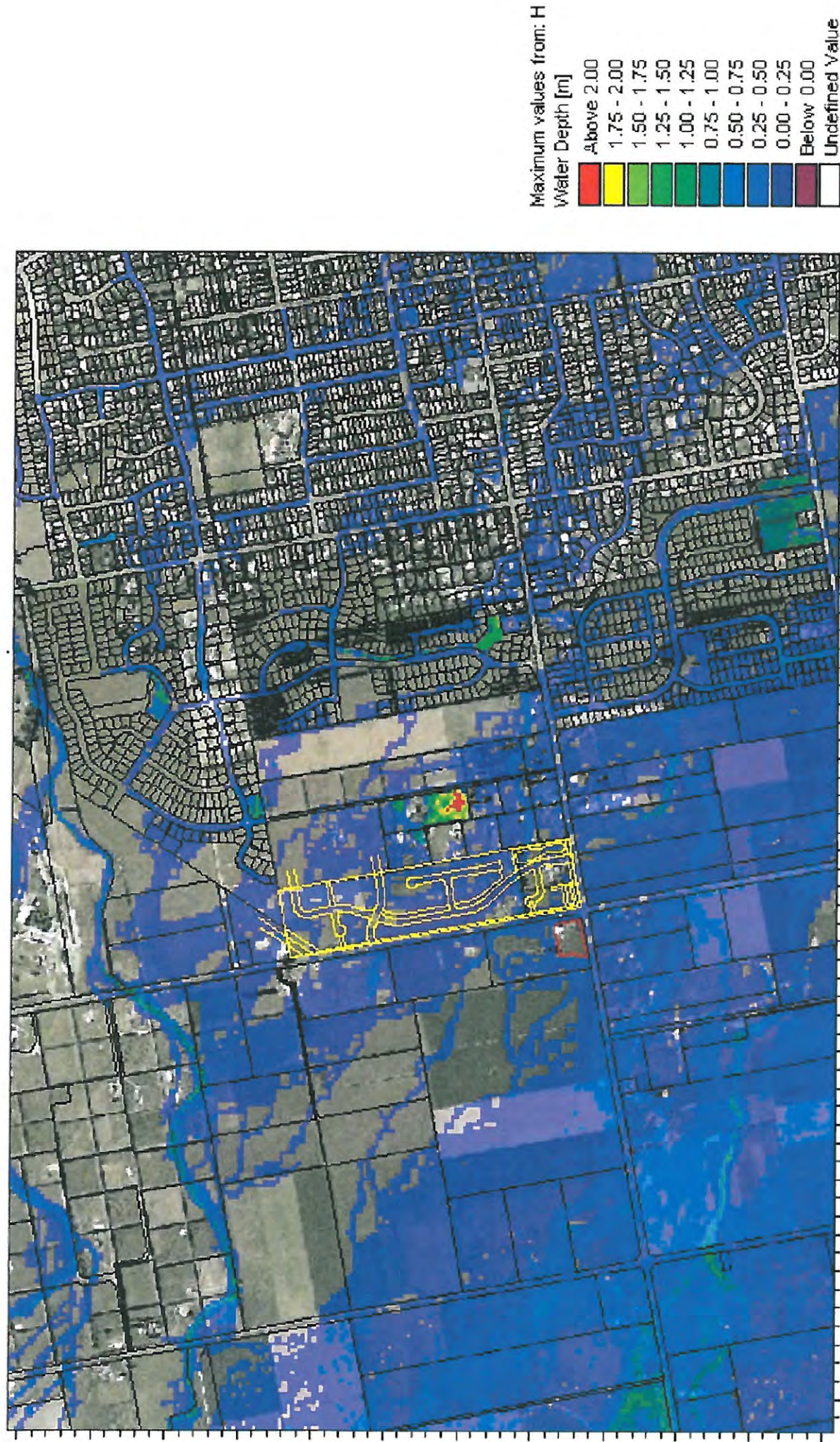


Figure 3: Flood Depth Map for Developed Scenario (including mitigation measures)

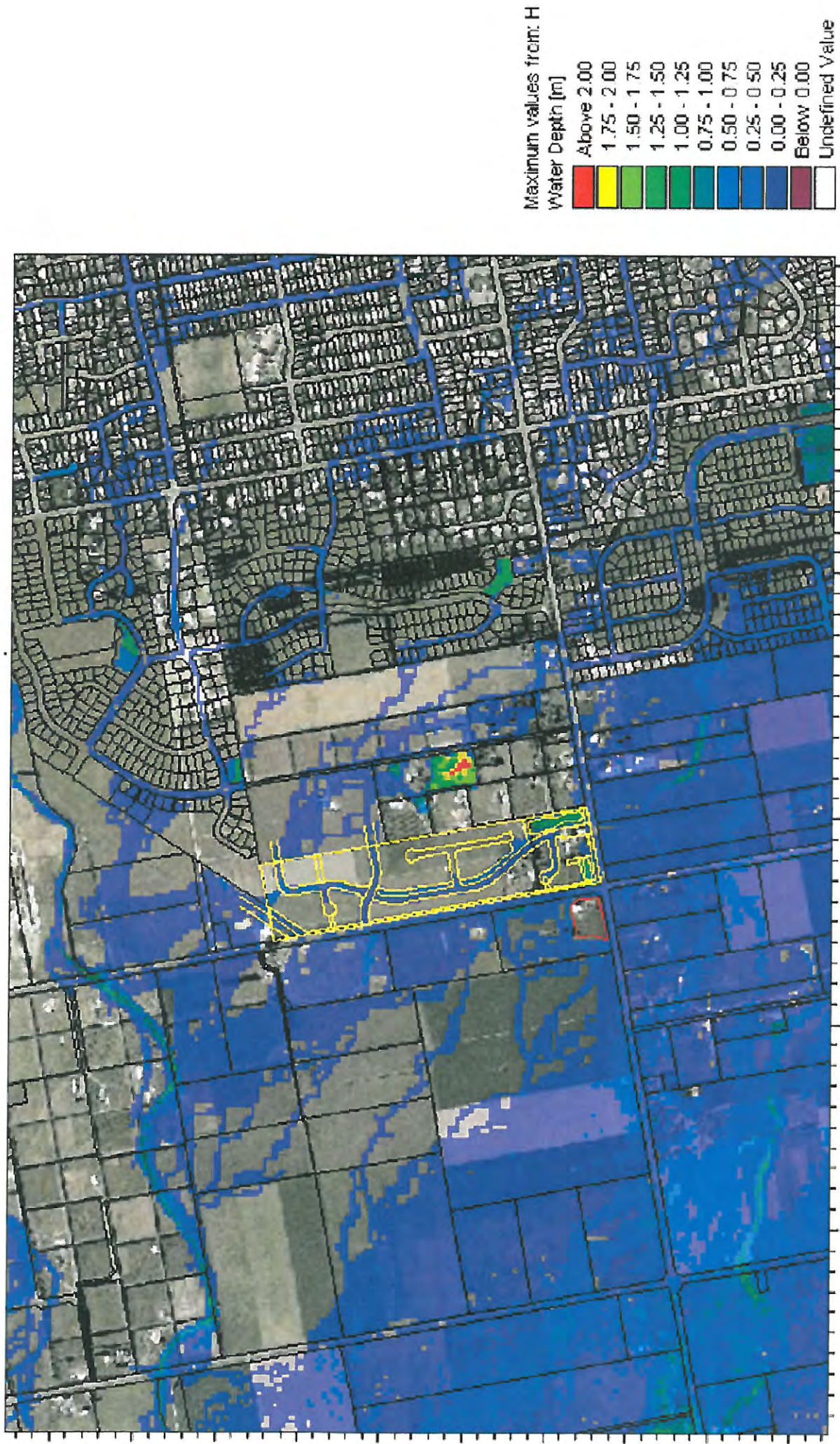


Figure 4: Flood Depth Difference Map (Existing vs Developed Scenarios)

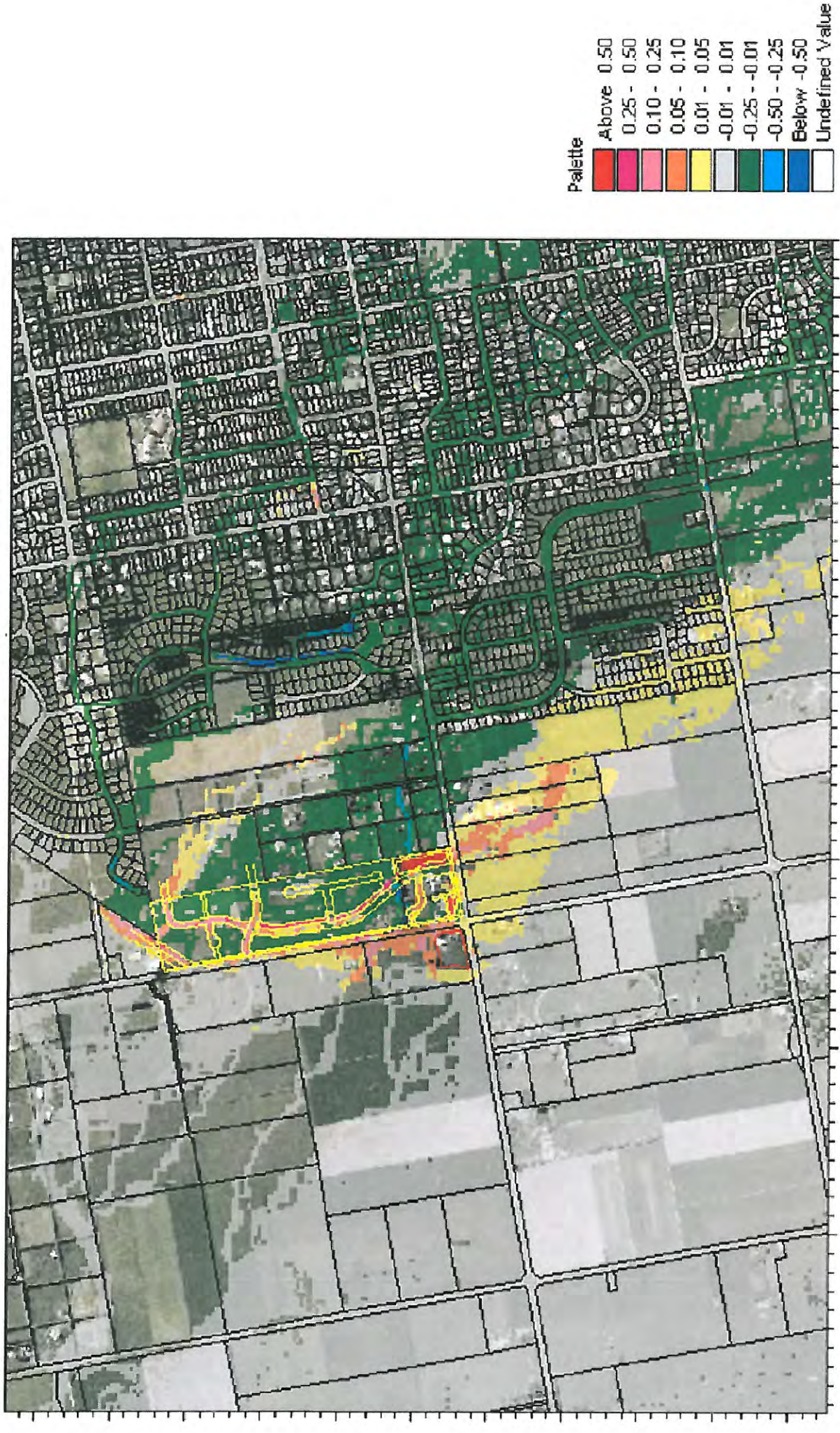


Figure 5: Flood Difference Map – Potentially Affected Dwellings

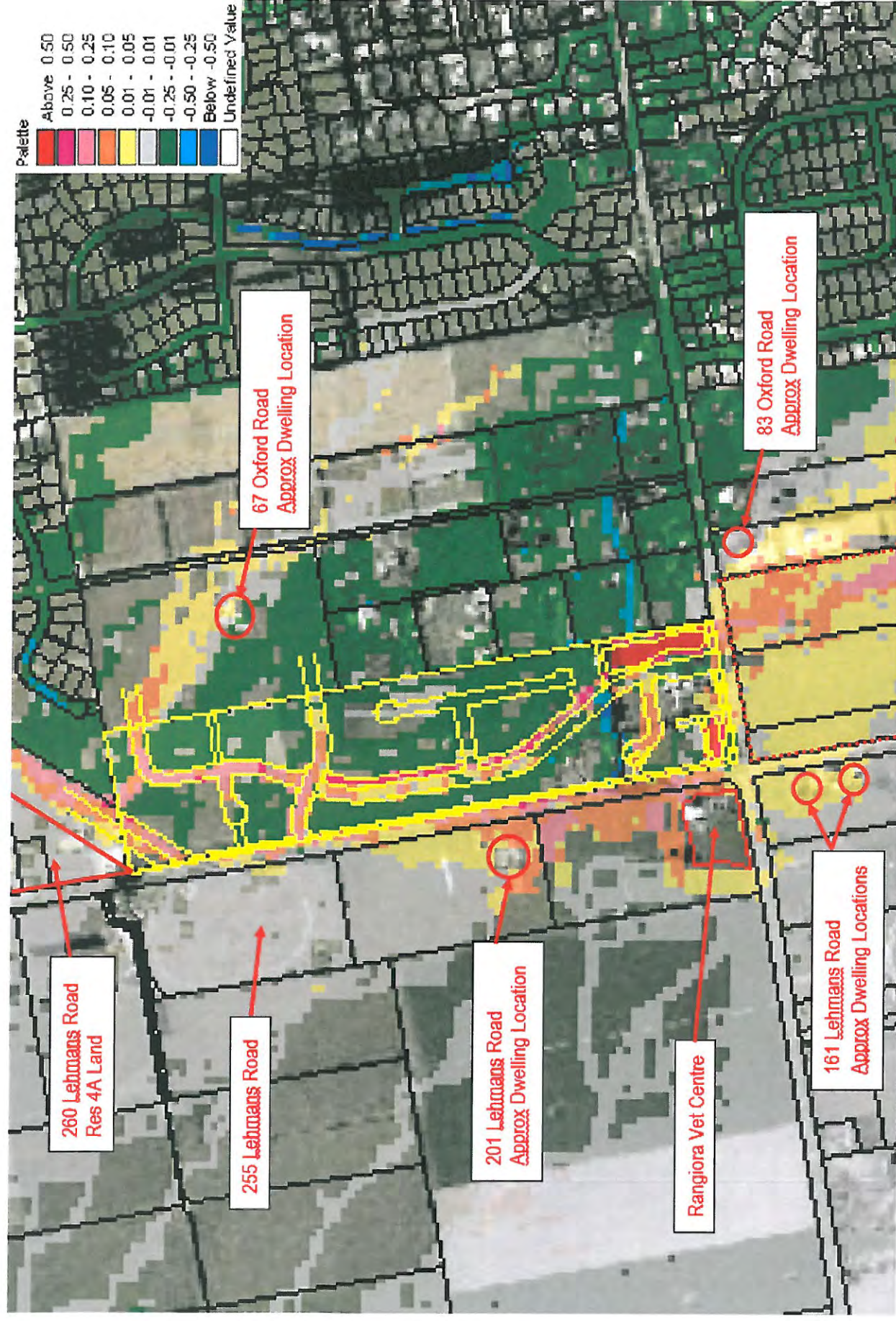


Figure 2: Flood Depth Map for Existing Scenario (including vet clinic bund)

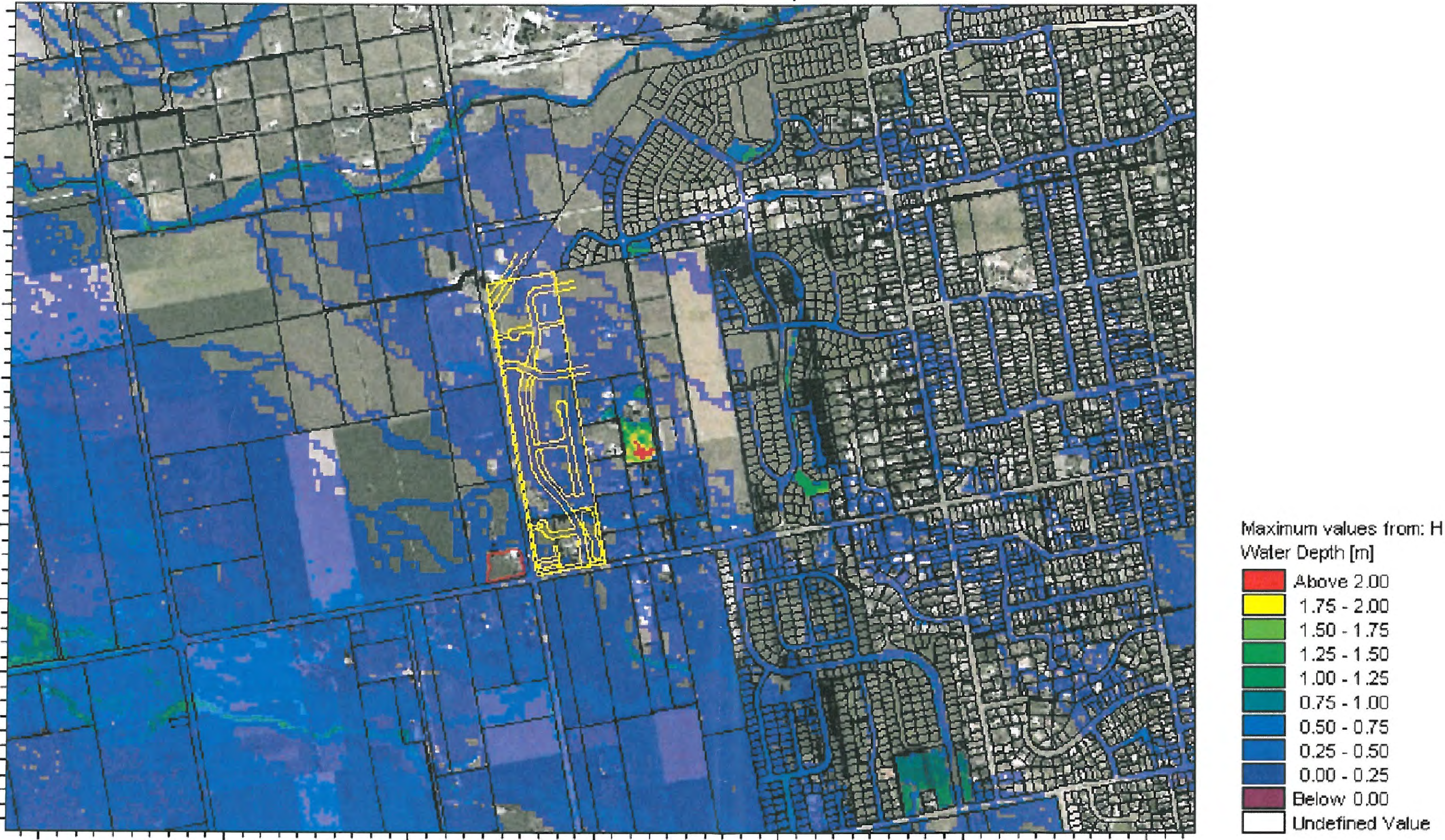


Figure 3: Flood Depth Map for Developed Scenario (including mitigation measures)

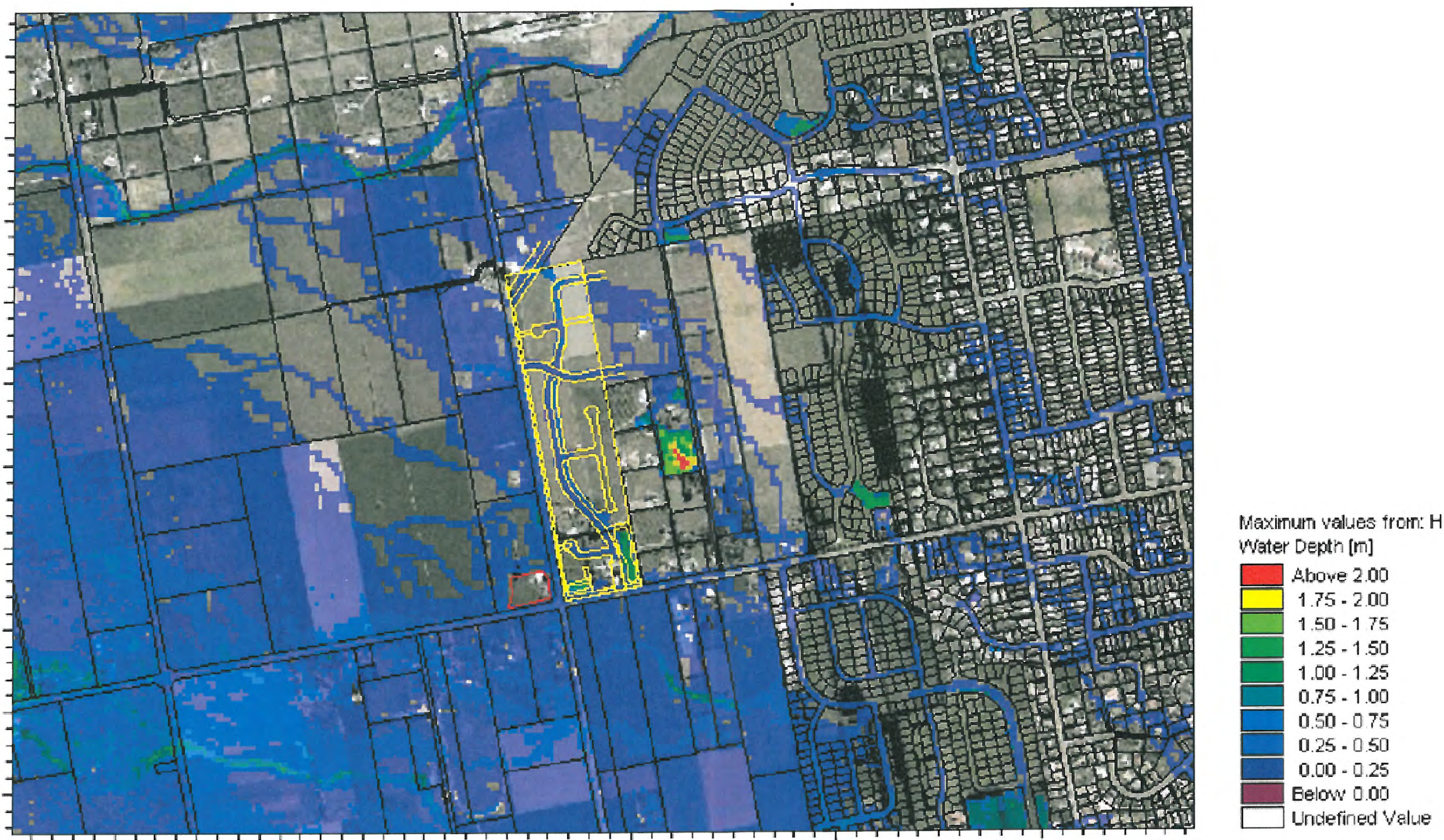


Figure 4: Flood Depth Difference Map (Existing vs Developed Scenarios)

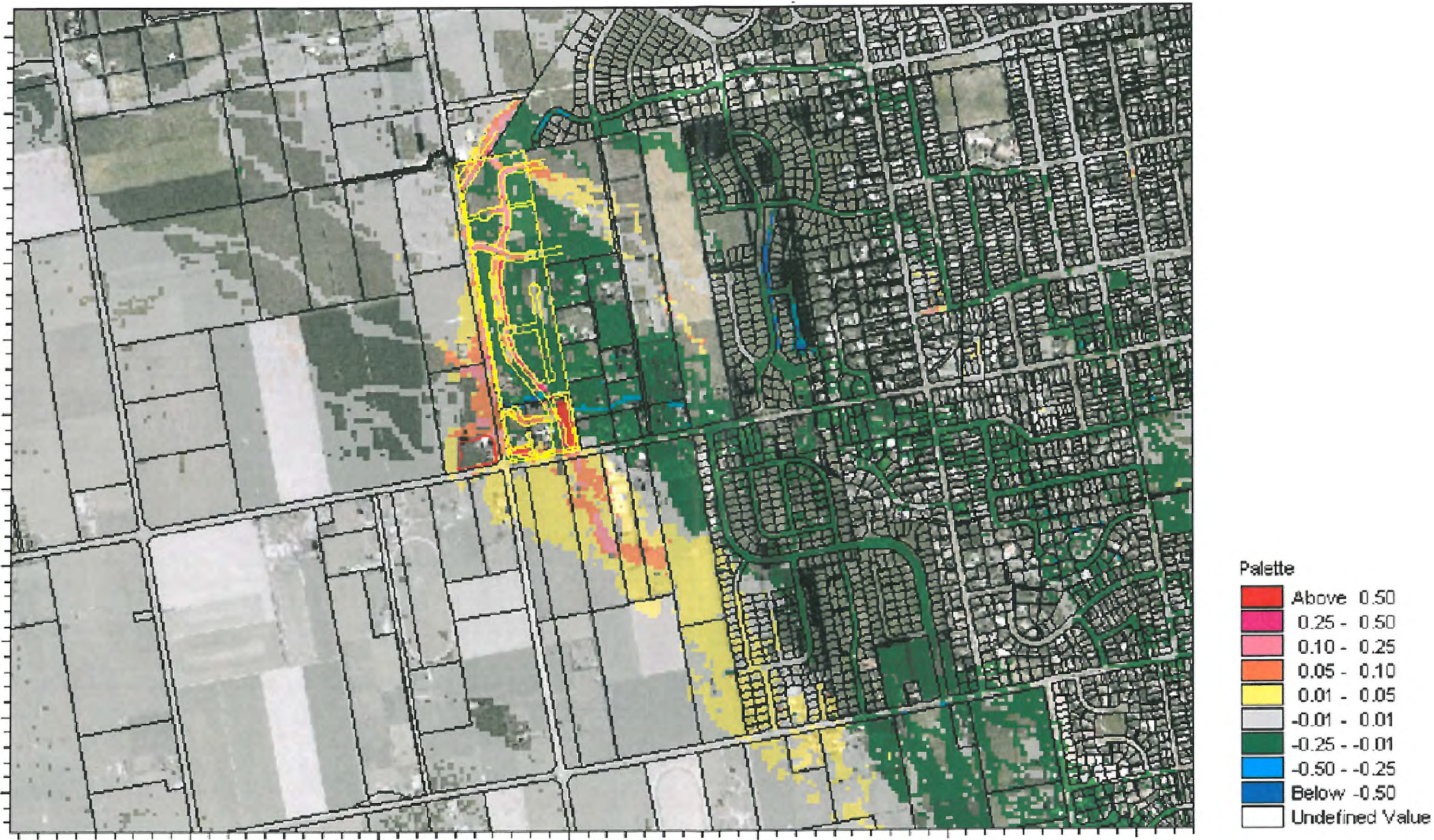


Figure 5: Flood Difference Map – Potentially Affected Dwellings

