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Mr Blake O'Mullane
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Re : Moloney Subdivision South of Goondiwindi with reference to Moree Plains Growth Management Strategy

Thank you for your letter dated 12-5-2009. The following addresses the issues raised by the Department in relation to the proposed subdivision.

Issues raised by the Dept of Planning ;

1. An appropriate staging plan for the release of the proposed land rezoning:

The attached Plan 1 shows the proposed Staging of the development. The first stage is to build the road from the old Goondiwindi Town Bridge along the riverbank and across the local drainage gully and as far as Lot 46 and Lot 28. The roadway through the local gully will be elevated with drainage culverts for local runoff. Stage 2 will see the road extended to the north as far as lot 63 and to the south as far as Lot 14 and Lot 34. The third stage will see the northern road extended as far as Lot 72 & 90 and the road to the south extended to Lots 5 & 8. The final stage will see the northern road extended to Lot 81 and the southern road completed through to the Goondiwindi to Boomi road. The proposed stages will be dependant on market demand. It is the developers desire not to deflate the value of land in the Goondiwindi area but to release each stage as demand dictates.

2. Flooding Issues :

- *Hazard mapping is required to be undertaken to identify critical areas within the proposed development.*

Moree Plains Shire Council in 2008 produced the Moree and Environs Floodplain Risk Management Plan dated the 17th of July 2008. The purposes of this document are as follows:

- *Provide a local expression of the principles contained in the Gazetted NSW Floodplain Development Manual dated April 2005 as are relevant to the Moree and Environs area.*
- *Provide a framework for the management of flood risk in the Moree Plains Local Government Area*
- *Be the vehicle for the current flood risk management plan for the Moree and Environs area within the Moree and Environs Area.*

- *Support the technical application of the Flood Risk Management of Development chapter of the Moree Plains DCP 2008.*
- *Provide the underlying principles for the assessment of development applications where the DCP does not specifically apply. In other words, this document is to provide guidance in the assessment of all development applications.*

This document applied the NSW Floodplain Development Manual 2005 to the Moree and Environs area specifically and provided the underlying principals for assessment of development applications elsewhere in the shire. The Risk Management Plan was developed in consultation with all interested government departments and the local and state emergency services.

Section 4 of the Moree and Environs Floodplain Risk Management Plan 2008 details the method of assessment of proposed developments for Property Hazard Categories and Frequency (Life) Hazard Categories. The methods adopted in this chapter 4 are in agreement with the principals set forth in Appendix L of the NSW Floodplain Development Manual April 2005.

Frequency Hazard (Life)

As Boggabilla lies in the catchment of the McIntyre River system and on the floodplain the response time for flooding is in the order of a few days. Therefore it is considered that there is generally sufficient time to mobilise evacuation plans, led by the SES or those under their authority.

The Moree and Environs Floodplain Risk Management Plan considers it appropriate to categorise land according to Frequency Hazards on the basis of whether or not land is likely to be inundated by particular events.

The outcome is an indication of whether or not land is suitable for occupation. Land that is inundated regularly will afford the occupiers an unacceptable exposure to the impacts of flooding. A range of frequency hazard categories is required thus:"

F3: *(high frequency hazard) Land that is likely to be inundated by very frequent events (say 10% AEP + 500mm). This is the probability level where it is unacceptable for residents to have to deal with the impacts due to flooding (evacuation, clean up and relocation) on an average frequency basis of more often than one in ten years on average.*

F2: *(moderate frequency hazard) Land that is likely to be inundated, or have its access cut off between the F3 event and less common, but standard events (say 1% AEP + 500mm).*

F1: *(low frequency hazard): The remainder of flood liable land not in an F3 or F2 category.*

Note that the Frequency Hazard categories do not rely on hydraulic hazards, just probability of inundation.

Attached is Plan 2, which shows the Frequency Hazard over the proposed development area based on the Moree and Environs Flood Plain Risk Management Plan 2008. Estimation of the 10% AEP flood level for the Boggabilla Gauge was obtained from calculation of the Flood Frequency by two methods, gauge height and peak discharge.

Table 1 attached ranks the gauge heights according to frequency of occurrence for the Boggabilla Gauge No.416002 over the period from 1890 to 2004. The method used is in accordance with Australian Rainfall & Runoff Section 10 Flood Frequency Analysis. The table shows the 10% AEP flood event is about 1.0m lower in water level when compared to the 1976 flood event (higher than 1%AEP). The Flood Frequency Table for the Boggabilla Gauge indicates the closest flood in ranking to the 10%AEP event was the Dec, 1916 flood with a gauge reading of 11.8m. The difference between the 1916 flood and the 1976 flood is 1.0m.

Estimation of the 10% AEP flood level for the Boggabilla Gauge can also be determined using peak discharge. Lawson and Treloar Flood Frequency Chart (private correspondence or Appendix A Lawson & Treloar Report 2007) for peak discharge for the Boggabilla gauge was used to estimate the 10% flood level. According to this chart the 10%AEP flood has a peak discharge of about 1700cumecs (146,880ML/day). The 1983 flood has a similar discharge being 148,500ML/day, which resulted in a gauge reading of 11.85m at Boggabilla. This indicates a height difference between the 1% AEP flood and the 10%AEP flood would be 0.95m.

Plans 5 and 6 show the 10% flood level in relation to the proposed road centreline and in both cases the proposed road and subdivision lots will be above the 10% AEP flood level.

Figure 6.2 of the Lawson & Treloar Report 2007 shows a high riverbank and high highway centreline extending from the old Goondiwindi Bridge back to Boggabilla. This high ridgeline will not allow a 10% AEP flood to flow through the proposed subdivision. The Lawson and Treloar Figure 6.2 shows water depths for the 1%AEP flood along this ridgeline of between 0 and 0.5m deep. The 10%AEP flood level is between 0.95 and 1.0m below the 1%AEP flood and therefore would not inundate the proposed subdivision.

Plan 9 shows a survey of the centreline of the road from the old Goondiwindi Bridge to a point on the Newell Highway opposite the Boggabilla River Gauge, which is at the 50km/hr speed limit sign for the Township of Boggabilla. This longsection of the road is presented in attached Plans 8 & 9. Plan 9 shows the 10%AEP flood event does not breach the road centreline. This confirms the proposed development is not affected by a 10%AEP flood event.

An existing gully between A and G on Plan 6 could receive between 0.8m of backup water. It is proposed to raise the road through this gully as part of the road construction, making the access road 0.7m above the 10%AEP flood. The gully between K and L receives only backup water from the river and the proposed road level will be above the 10%AEP flood level.

In practical terms land that is subject to a flood more frequently than 1 in 10 years is not acceptable for development due to the social cost of repair of individual properties and public infrastructure.

Plan 2 shows the proposed subdivision categorised for Frequency Hazard (Life). All of the area can be classified as L2 (moderate) as it is not covered by a 10%AEP flood but is covered by a 1%AEP flood. Figure 4.3 of the Lawson & Treloar Report 2007 shows the maximum water velocity over the area is less than 0.7m/sec with most of the area below 0.5m/sec.

Two areas of the proposed development have depths of floodwater greater than 1.5 metres in a 1%AEP flood. The first is near the gully on the entrance road near lots 19 to 21. The entrance road will be raised above the gully such that only about 0.5metres of water will cover it in a 1% AEP flood and culverts will be used to convey local drainage water under the road back to the river. Lots 19 to 21 will be combined into one lot if it is not possible to obtain sufficient land at less than 1.5m of floodwater on which to situate a house. The second area is near lots 77 and 85 and again the road is to be built up through this low area such that it is covered with only about 0.9m of floodwater. Lots 77, 84 and 85 will be combined with adjoining land if insufficient area cannot be obtained on each lot on which to place a dwelling where L2 can be achieved. It is intended to construct on each lot a house mound of sufficient size to accommodate a dwelling and vehicles. This mound is to be 600mm above the 1%AEP flood level. This extra height should afford each allotment the security against threat to life as considered under Frequency (Life) Hazard section of the Moree & Environs Floodplain Risk Management Plan 2008 and NSW Floodplain Development Manual 2005.

Property Hazard

Property hazard is defined as the depth and velocity combination that would cause structural instability of buildings. The Moree & Environs Floodplain Risk Management Plan 2008 in

compliance with the NSW Floodplain Development Manual 2005 defines property hazard as follows;

In broad terms, the application of high and low hazard categories based on structural stability is appropriate. The following property hazard categories are suggested, based on three basic types of construction.

P3:(high property hazard) *Light framed buildings are unstable. Structural certification of buildings is required.*

P2:(moderate property hazard): *Light framed, fixed buildings are stable and structural certification is not required, however manufactured homes and shipping containers are unstable,*

P1:(low property hazard): *Manufactured homes, caravans and shipping containers are stable.*

Figure 4.1 and table 4.1 of the Moree & Environs Floodplain Risk Management Plan 2008 shows how the Property hazard is to be assessed for the Moree Shire. Figure 4.1 has been derived from Table 4.1.

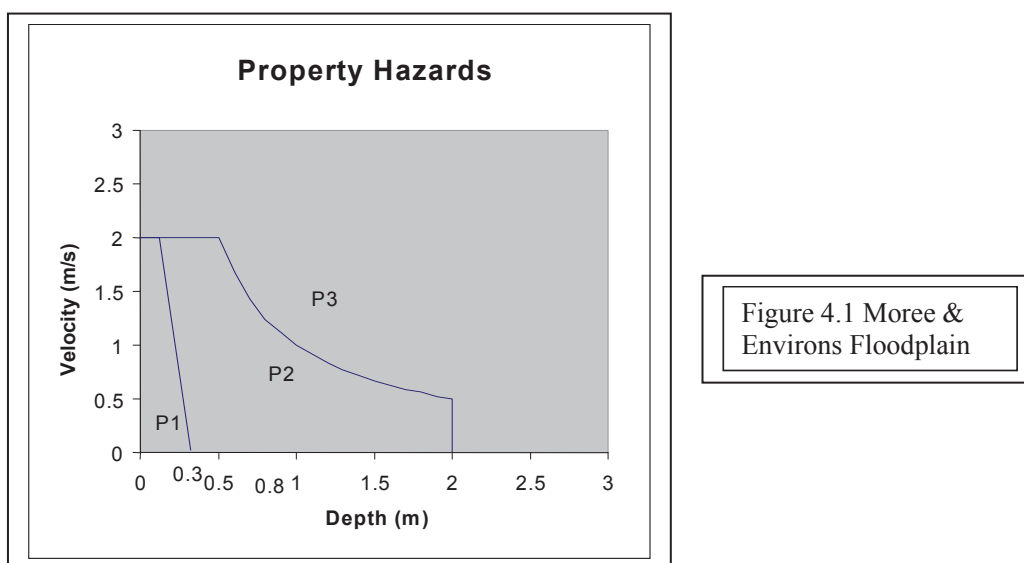


Figure 4.1 Moree & Environs Floodplain

Property Hazards	Velocity Depth Relationship
P1	$V < (6 - 20d) \text{ m/s}, v < 2 \text{ m/s}$
P2	$V < 2 \text{ m/s}, d < 2 \text{ m}, v \cdot d < 1 \text{ m}^2/\text{s}$
P3	$V > 2 \text{ m/s}, d > 2, \text{m } v \cdot d > 1 \text{ m}^2/\text{s}$

Table 4.1 Hydraulic behaviour threshold velocity - depth relationships

The above requirements were used to examine Figures 6.2 and Figure 4.3 of the Lawson & Treloar Flood Report 2007. Figure 4.3 refers to the velocity of floodwater in a 1% AEP flood event with the proposed subdivision fully developed with house mounds. All velocities are less than 0.75metres/sec and the majority of the site is less than 0.5m/sec. If the majority of the site experiences a velocity of less than 0.5m/sec then in accordance with the above criteria a depth of water of 2m is needed before the site could be classified as P3 (high property hazard). The only location where this occurs is at the western end of the development near lots 84 to 86 where the depth is between 1.5 and 2 metres but the velocity is less than 0.5m/sec and therefore it would be

classed as P2. The area of higher velocity of 0.7m/sec is over an area where the depth of floodwater is less than 0.7 metres and therefore would be classed as P2.

Plan 3 shows the site classified for Property Hazard. Most of the site is category P1 or P2 except for a low area near lots 19-21 and lots 88-92 which is P3.

The proposed development complies with the Moree & Environs Floodplain Risk Management Plan 2008 with respect to the Property Hazard requirement. The proposal to create on each allotment a flood proof mound 600mm above the 1 in 100 year flood event would ensure the preservation of property from damage as proposed by the NSW Floodplain Development Manual 2005. The height of this **mound being at or above the PMF** will ensure minimal property damage as all houses will be above flood level. Therefore all lots in the proposal could be classified P1.

3. Flooding Issues :

The proposed subdivision layout along the river lies in the path of a main flood water “breakout” from the Macintyre River. If developed, a significant proportion of the ‘breakout’ will be obstructed by dwellings and ancillary structures. This obstruction is likely to result in an increase in flood levels of up to 50mm along the Goondiwindi levee which may have significant implications for the town. Consideration needs to be given to having less dense development in this area to provide less obstruction to ‘breakout’ flows and also reduce the afflux impinging into the freeboard of the Goondiwindi levee;

As stated in the Lawson and Treloar report the impact of each of these house mounds has been considered and found to increase flood levels by less than 50mm. This increase is in the river adjacent to lots 36 to 63 (4000 sq m lots). Lawson and Treloar state in their conclusions this maximum afflux of less than 50mm is “well below the statutory authority acceptable impacts.”

Also in the Lawson & Treloar Report the afflux that is acceptable to Waggamba Shire Council and the DNR (NSW) is stated in section 7.1 as following and it is noted that no overtopping of the existing Goondiwindi Town Levee will be caused by the proposed development:

Flooding criteria set by Waggamba Shire Council:

- **Maximum allowable impact – less than 200 mm;**
- **No overtopping of the existing and accurately surveyed Goondiwindi Levee System occurs during the 1% AEP event due to the proposed development.**

Flooding criteria set by DNR (NSW)

- **Maximum allowable impact – less than 200 mm;**
- **Preferred afflux – less than 100mm;**
- **Afflux on affected existing properties – less than 20mm, depending on habitable floor levels;**
- **Maximum change in flow distribution – less than 2 to 5%;**
- **Maximum increase in velocities outside scour prone areas – less than 50%.**

Also Waggambba

Plans 7 shows the high ground surface levels adjacent to or on the riverbank from the Old Goondiwindi Bridge to the west to a point on the riverbank near Lot 63. In the vicinity of Lots 36 to 63 the riverbank is as high or higher than the 1% AEP flood level. The suggestion that this bend in the river is a “main floodwater breakout” is **false**. The riverbank ground surface height prevents water breaking from the river at this point. Even if a low flow of up to a couple of centimeters was to occur across these lots long grass would certainly impede the flow. Allotment size, house

mound creation and ancillary structures will not adversely affect the freeboard of the Goondiwindi levee bank in the area in question.

If this afflux was considered significant at the development application stage then increased lot sizes may be considered in this area.

4. Flooding Issues :

There is insufficient detail about evacuation of the area in times of inundation. The report identifies that there could be up to 2.0m of water over the existing access road. The proponents need to address this issue in consultation with the SES (both NSW and QLD units responsible for this area) including investigation of the need for an alternative access route;

The proposed subdivision is on land that is above the 10%AEP flood but is subject to flooding in a 1%AEP flood event. Two access routes are proposed for the subdivision (see plans 4,5 and 6). The first is along the riverbank from point 'A' near the old Goondiwindi Bridge to a point 'L' at the western end of the development. The second route is to the south from point 'A' along the Goondiwindi – Boomi road to a point 'C' where the route enters the subject property and travels north to join with the other river road at point 'G'. The two routes provide an alternative escape route for each other. The first route between points 'A' to 'G' and 'K' to 'L' cross low ways, which will be raised to provide access to the subdivision. These roads will not be covered in water in a 1 in 10 year flood event. The maximum depth of water over the road will occur between 'K' and 'L' with a depth of 0.9 metre in the 100year event.

5. Flooding Issues :

There is insufficient discussion or assessment on evacuation frequency or the trigger point when the area will require evacuation. How often will evacuations occur, for how long will evacuation be needed, and how long will it take to evacuate the area? An Evacuation Plan is needed that considers the above issues and supported by those responsible for emergency services;

The subdivision is not affected by a 1 in 10 year flood event. A 1 in 40 year flood level at the Boggabilla gauge may cause minor overland flows capable of breaking the riverbank upstream and entering the subdivision. While water may enter the subdivision, evacuation would only be considered when predicted gauge readings were above this level. Section 2.2 of the Lawson & Treloar Report 2007 states that it could be considered that the level of 600mm above the 1%AEP flood would be at a level above the Probable Maximum Flood (PMF). Because the house mounds will be 600mm above the 1 in 100 year flood level it could be considered that the house mounds would be safe even for the PMF flood. Therefore evacuation would only be required as a result of injury, illness, food or drinking water. To circumvent this problem it is probably prudent to evacuate if the Boggabilla predicted gauge reading was to be above the 1 in 50 year event, as access would remain open below this level with limited inundation (below 300mm).

The flood warning time for Boggabilla is about 40 to 45 hours from floods originating in the middle part of the catchment and 10 days for floods from the upper catchment area near Inverell. Evacuation would be required before the peak of the flood arrived. In a 100-year event isolation times at the peak are about 1.5 to 2.5 days. Therefore the total evacuation time would be about 3.5 days, which includes the evacuation time before the flood and the time for the flood to recede. The subdivision is between 300m and 3.2klms from the old Goondiwindi Bridge and because all property could be above the PMF flood level residents do not need to remain to protect property. Because property does not need to be evacuated the evacuation of only residents and animals greatly simplifies the process. This evacuation could be accomplished in several hours.

A flood evacuation plan has been prepared and is attached. Please note the following;

A discussion with the Mr. Steve Basham of the Moree Regional SES Office has resulted in the following advice.

- The State of NSW has a **State Disaster Plan 2003 (DISPLAN)** from which Regional Disaster Plans are created. The Regional Disaster Plan for this area is the **PEEL DISTRICT DISASTER PLAN (DISPLAN) 2006**. The Regional Disaster Plan allows for the creation of Local Disaster Plans and the Local plan for this area is the Moree Plains Local Disaster Plan July,2001.
- The State SES and Local SES is not an Approval Authority and do not have the power to approve or disapprove Flood Evacuation Plans. They will not offer any comment on any private evacuation plans as it may be construed that they have given approval to a document which may or may not contradict any State, Regional or Local Evacuation Plan.
- The SES sees the already created State, Regional and Local Evacuation Plans as being those Plans **approved for use** and the addition of private evacuation plans will only cause confusion in a flood disaster.

6. Flooding Issues :

Further information is needed as to who will be responsible for provision of emergency services and their capacity to assist;

The NSW State Disaster Plan 2001 states that for floods and tempest the NSW State Emergency Services are responsible. The Moree SES has indicated that Queensland SES **would not** be involved unless formally requested. The provision of emergency services to the proposed site will be by the NSW SES. The nearest SES crew is at Boggabilla a distance of 7klms. If a flood were immanent for Boggabilla Queensland SES would be mobilized to deal with their side of the river and as such would be available to assist evacuees arriving from NSW.

7. Flooding Issues :

Information on flood warning times is required; and

The Moree & Environs Floodplain Risk Management Plan 2008 states that warning times need to be of the order of about 24hrs if evacuation is to be considered as part of a flood plain management plan. The SES considers 24hrs sufficient to evacuate if required. Typical warning times have been extracted from the gauge readings for the following significant floods in the McIntyre River System.

<u>Flood Year</u>	<u>Time Taken for Flood to flow from Inglewood to Boggabilla or Roseneath to Boggabilla.</u>
1956	42hrs
1971	43hrs
1976	40hrs

Floods originating in the upper part of the catchment near Inverell take typically 10days to arrive at Boggabilla. Moree has a warning time of about 24hrs and is considered satisfactory by MPSC and the SES. Therefore 40 to 43hrs warning for Boggabilla is acceptable.

8. Flooding Issues :

Further information is required as to how this proposal complies with the NSW Flood Prone Land Policy and Floodplain Development Manual 2005. The primary objective of the policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property and to reduce private and public losses resulting from floods. Details on how this development achieves this will be required, along with an assessment of the social and indirect costs of this development (evacuation, accommodation, disruption, cleaning up after a flood) and who meets these costs.

Section 1.3 of the Moree & Environs Flood Plain Risk Management Plan 2008 states the objectives of this Plan are:

- To facilitate the application of the NSW Government Flood Policy in the specific context of Moree and Environs; and
- By application of the Policy, to reduce future and existing flood risk for the benefit of all community members in the Moree and Environs area.

The Flood Prone Land Policy Direction No.15 Jan, 2007 requires the preparation of a Floodplain Risk Management Plan before the preparation of any LEP. It also states that the Floodplain Risk Management Plans preparation is to be in accordance with the Floodplain Development Manual 2005.

The Moree and Environs Floodplain Risk Management Plan has been prepared in accordance with the requirements of the Flood Prone Land Policy Direction No.15 Jan, 2007 and the Floodplain Development Manual 2005.

The proposed development has been assessed for Flood Impact Categories under section 3 of the Moree & Environs Floodplain Risk Management Plan 2008 Section 3.

- Floodways. There are no recognized or designated major floodways across the subject land.
- Flood Storage. The establishment of house mounds will only alter flood storage insignificantly. House mounds including batters will occupy approximately 5% of the site. This reduction in flood storage is considered negligible. The Risk management plan identifies a reduction in rural residential areas of 20% acceptable. (Section 3.3)
- Flood Fringe. Lots 36 to 63 could be classed as a flood fringe areas where development of the site will cause no significant impact on surrounding lands.

The proposed development has been assessed for Frequency (Life) Hazard Categories and Property Hazard Categories and found to comply with those requirements set forth in the Moree & Environs Floodplain Risk Management Plan 2008 Section 4. The access to each allotment is classified as Life Hazard Category L2 but the house mounds could be seen as L1 as they are above the 1%AEP flood. Most of the properties on the site are classified Property Hazard P2 with a small area of P1. Where lots are classed as P3 then these lots will be combined with adjacent lands so that sufficient area is available for the construction of an earthen mound and the access is P2 or less. The use of flood proof mounds 600mm above the 1% AEP flood will see each house site classified P1.

The proposed development has been assessed for Flood Planning Levels and found to comply with those requirements set forth in the Moree & Environs Floodplain Risk Management Plan 2008 Section 5. The Risk Management Plan has adopted the 1% AEP flood level as the Flood Planning Level plus a freeboard of 500mm. All of the proposed allotments will have a flood proof mound 600mm above the 1%AEP flood level and as such all lots will comply with the Flood Planning Level.

The proposed development has been assessed for Extreme Flood Events and found to comply with those requirements set forth in the Moree & Environs Floodplain Risk Management Plan 2008 Section 6. The Risk Management Plan and the Floodplain Development Manual 2005 both recognize:

“More explicit recognition of the need to consider the full range of flood sizes, up to and including the ...PMF, but recognising that such rare floods should not preclude or unnecessarily hamper development”. (Section A5 of the Manual)

The proposed development has addressed this issue in the provision of flood proof mounds as high as the Probable Maximum Flood. The flood evacuation plan attached suggests evacuation in these extreme events is the preferred option to minimize risk to residents and SES personnel.

Flood Damage, Private and Public Losses

The proposal has endeavored to achieve a development that would suffer minimal loss in any flood event. The proposal is for rural residential use and as such the placement of all dwelling houses above the 1 in 100 year flood level will ensure minimal damage to private property. The use of plain or barbed wire fences not netting fences on all property boundaries will ensure the passage of floodwater with minimal damage. All plain wire fences suffer little or no damage even when fully inundated. All electric components associated with Septic tanks and Bores are required by law to be above the 1% AEP flood level. The land will not be zoned to allow commercial or industrial pursuits and therefore no loss is expected from the closure or damage to such premises. The access roads to and through the site are above the 1 in 10 year flood event and possibly above the 1 in 40 year event. A small flood flow between points ‘A’ and ‘B’ will cross the road at about the 1 in 17year level but this flow rejoins the river 300m down stream. It is prevented from spreading south through the subdivision site by a high ridge on the southern side of the gully.

All roads will be covered by floodwater in a 1% AEP flood event but if roads remain closed until all floodwater has receded little or no damage will occur.

Evacuation costs are borne by individuals with accommodation and meals within evacuation centers borne by DOCS and hence the community. It is envisaged that evacuation may be necessary once in every 50 years with some residents staying on site, some evacuating to relatives and friends within the town of Goondiwindi or elsewhere and some to the official evacuation centre. Not all residents will need to be accommodated.



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