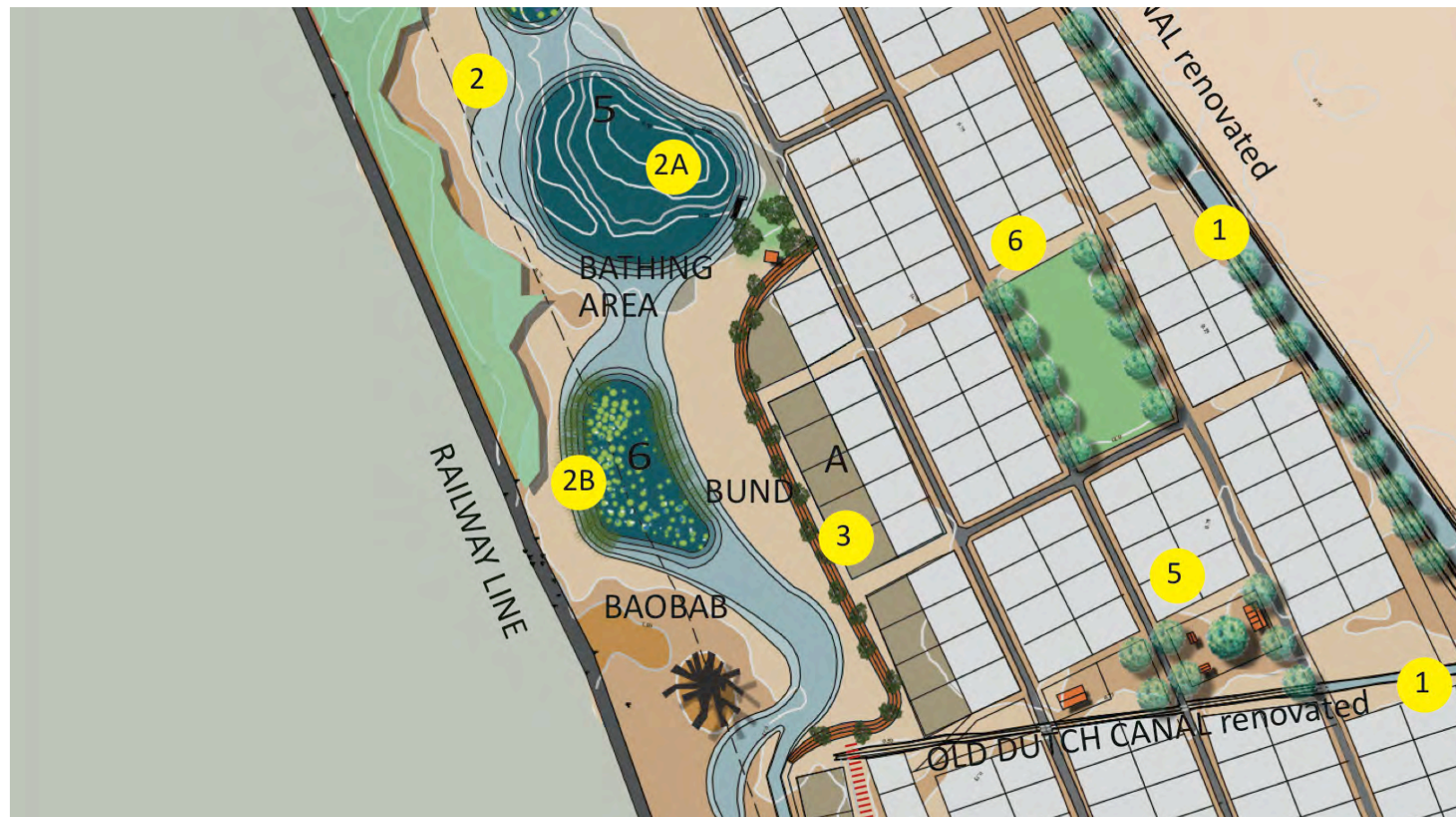


# Santhipuram: From Hardship to Heroes

## A Drainage, Housing and Village Improvement

July 2014



This project has been developed on the request of the Divisional Secretary Mannar Town (DS), Mr Srisanthakumar in June 2014 to Bridging Lanka regarding the Santhipuram GSN Area. The present DS Mr Vasanthakuma also supports this project and its outcomes. The primary reason for requesting improvements within Santhipuram is that up to 150 families have to relocate during the rainy season due to flooding. This has been discussed with the Government Agent Mr Desaphria, who has approved Bridging Lanka to work with the DS Mannar and Disaster Management Officer.

Santhipuram translates to “Village of Peace” and true to its name, community consultation results show a strong sense of appreciation for the peace and unity felt by those living here. This consultation demonstrated the village’s overwhelming interest in being involved in creating the future, welcoming the ongoing consultation with identification of primary concerns and a range of suggestions.

While current conditions require rectification, there is also opportunity here with new infrastructure being planned and designed through various channels. Santhipuram maintains an impressive system of social infrastructure to manage local issues and continues to improve, at times with the help of government and NGO programs.

Background data and current consultation with stakeholders and the Santhipuram community aligned the primary issues, with a view to concurrent works being conducted in the area.

This report aims to document the findings of this research into Santhipuram’s current condition and propose potential solutions to the main issues, with a view to aligning development of infrastructure with the village’s aspirations for further social, environmental and economic opportunities.



## EXECUTIVE SUMMARY

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The 450 families of Santhipuram demonstrate resilience, resourcefulness and a strong sense of community. They live in difficult circumstances because their neighbourhood floods each year and they live with flood water in their streets and homes. They have developed techniques to survive in these wet and uncertain conditions and have built a friendly and peaceful community. Their vision is to be the best example of a thriving village in Mannar, to lead the way to the future.

Bridging Lanka was invited by the former Divisional Secretary of Mannar Town, Mr. Sriskanthakumar, to provide advice on the planning for Santhipuram and brought a team of 5 Australian professionals (engineers, landscape architect and town planners) to analyse the drainage, housing and village issues. Planning for Santhipuram is one of the key projects for the Mannar Marumalarchi 2022 - Town Planning Committee. This report provides the recommendations of the Australian team, and the report and outcomes are also supported by the present DS Mr Vasanthakuma. The team has undertaken significant consultation with the Santhipuram community and discussions with the Government Agent's Office, Divisional Secretary's office, the Urban Council, Disaster Management Centre, UNOPS, UN Habitat and additional relevant government agencies; as well as undertaking their own studies to develop the recommendations in this report.

The area where Santhipuram has developed over the past three decades is close to the sea and low lying, it is susceptible to both monsoonal rains and tidal sea inundation. The original houses and early housing projects of 1995 and 1999 have been expanded by ongoing encroachment. Many houses are located in areas unsuitable for housing because they are flooded for up to two months each wet season (Oct-Jan). However, the communities are well established and it is not possible for them to be easily relocated. Of greater concern are the anticipated effects of climate change on sea level rise for Mannar Island and Santhipuram in particular. UN Habitat anticipate that sea level rise will have a significant impact on Mannar Island within the next 10 years.

Flooding during the wet season creates both health and safety concerns for the people of Santhipuram and puts many families in crisis. The community has in place an Announcements Committee to alert people to leave during flood and a Life Saving Committee to assist people in life threatening circumstances during flood. It is estimated that up to 150 families need to leave their homes and relocate to higher ground (at St Xavier's School, Santhipuram School and Santhipuram Church) each year during flood times and will need food, medication and sanitation support during these times. Those families who remain in their homes during flood experience difficulties by not being able to cook, limited road access and disruption to school because space is used to house families.

Improvements at Santhipuram are necessary for the safety of the local community and to mitigate against natural disaster. Flooding in the area can be life threatening and creates costs in human health, livelihood and in supporting families during flood times. The village is currently in drought, with fresh water being supplied. These costs could be reduced and the level of health and safety improved if the recommended works are undertaken.

Key actions recommended in this report (detailed in the Recommended Projects and Implementation Plan) are based on:

- To reduce the time families spend away from their homes during flood, the plan is to increase flood water storage by constructing three additional kulams (detention basins). To increase the flow of water away from the village during flood the plan is to integrate with the UNOPS proposal to rehabilitate the main drains (using the Old Dutch Canal as a main drain) to improve run off. This will improve human health and safety during extreme flood events
- The report includes a detailed drainage strategy showing how drainage will function after installation of the additional kulams and the drains are rehabilitated. This includes cross-sections, cut and fill volume estimates and schematic plans of the kulams during flood and dry season.

- The fill material taken from construction of the additional kulams to be placed on areas where there is existing housing encroachment to make this safer and on the school grounds to provide a safe place during flood and to allow school expansion. Approval for additional housing (fill areas A and B) should be subject to increasing the ground height above mean sea level to 1.0 metre. A bund wall between the drainage line and this housing area will improve flood protection.
- To increase the flow of water out of Santhipuram during flood, additional storm water storage is proposed south of Station Road, within the northern part of the existing saltern.
- For safety during flood – ensuring there is a high level access road in place and increasing the height of the land around the primary school.
- To address social issues raised by the Santhipuram community several projects are suggested including:
  - Improvements to the Santhipuram Park by adding an audience grandstand and shade trees.
  - Providing land for the future expansion of the primary school to accommodate secondary classes and allowing the community to plant shade trees for the students
  - Re-opening of the market and creating shops for Santhipuram residents near the new Railway Station to provide economic opportunities.
  - Community action projects such as planting and watering street trees and installing additional street lighting.

For action to occur, even if a funding source is not apparent, a plan is needed. This means that resources can be accurately directed when a funding source does become available and can be used to inform funding proposals and requests. Bridging Lanka considers that action will follow a thoughtful plan as funding opportunities become available.

The plan developed by the Australian team is based on their work over a four week period and is based on existing information and input from local residents and government bodies. It provides a set

of actions (drainage, infrastructure, social and housing) to address the identified problems. The implementation plan allocates each action to an agency or organisation within a realistic timeframe.

Some of the actions and projects in this report can be undertaken by the Santhipuram community with little or no funding – such as shade tree planting, small building projects and requesting street lighting.

Some projects are large and will need support from other funding sources. Importantly, achievement of the outcomes require effective partnerships and support from other agencies and donor bodies. Key partners in implementing the recommendations are:

- Government Agent
- Divisional Secretary
- Urban Development Authority
- Mannar Urban Council
- Bridging Lanka – MM22 Town Planning, Business, Environment Committees
- Disaster Management Centre
- United Nations Operations (UNOPS)
- UN Habitat
- Santhipuram – Rural Development Society and Women’s Rural Development Society

For the professional team from Australia, working with the community of Santhipuram has been a privilege and a pleasure. We wish to thank the Santhipuram community for their assistance and enthusiasm to see improvements in their lives and the future of their village. We would also like to thank the Government Agent, Divisional Secretary and Chairman of the Urban Council for their ongoing support and the cooperation of their senior staff.



GN of Santhipuram addressing the community consultation.



One of the stakeholder meetings undertaken.



Members of the WDRS of Santhipuram discussing the differing options presented



Volleyball, along with football and cricket are popular sports.



Locals utilising the shading provided by overhanging trees.



School students of Santhipuram.



## PROJECT VISION

Santhipuram village's vision for the future includes being free of flooding and to become an example village; free of social problems and with education, economic and industrial opportunities. Santhipuram maintains a strong identity and many residents comment on the peace and unity of the village.

This Bridging Lanka project aims to build on the strengths of Santhipuram and provide relief from flooding while improving additional issues including access, economic opportunities, public amenity and local capacity to make improvements. Due to time constraints, the project scope has included:

- Scoping study and background research into Santhipuram (observations, community consultation, stakeholder engagement)
- Concept proposals for comment for drainage as well as social infrastructure.
- Final proposal, including opportunities for implementation of projects across a range of scales.

## OBJECTIVES

- To determine the community vision for the development of Santhipuram Village.
- To engage with the Santhipuram community to gain an appreciation of their issues and to provide a community voice that is available to the Government to inform policy.
- To engage with the major stakeholders to understand their constraints, opportunities and current projects for the village.
- To provide outcomes that align or better inform current planning and construction works for the village – these can be included in the Mannar Urban Development Plan under preparation by UDA.
- To provide project proposals that can be funded by other parties as funding becomes available.
- To document our observations, research and stakeholder inputs of Santhipuram village to guide future projects in this community.

Santhipuram Park from the south east corner, RDS building shown.



Santhipuram: From Hardship to Heroes,



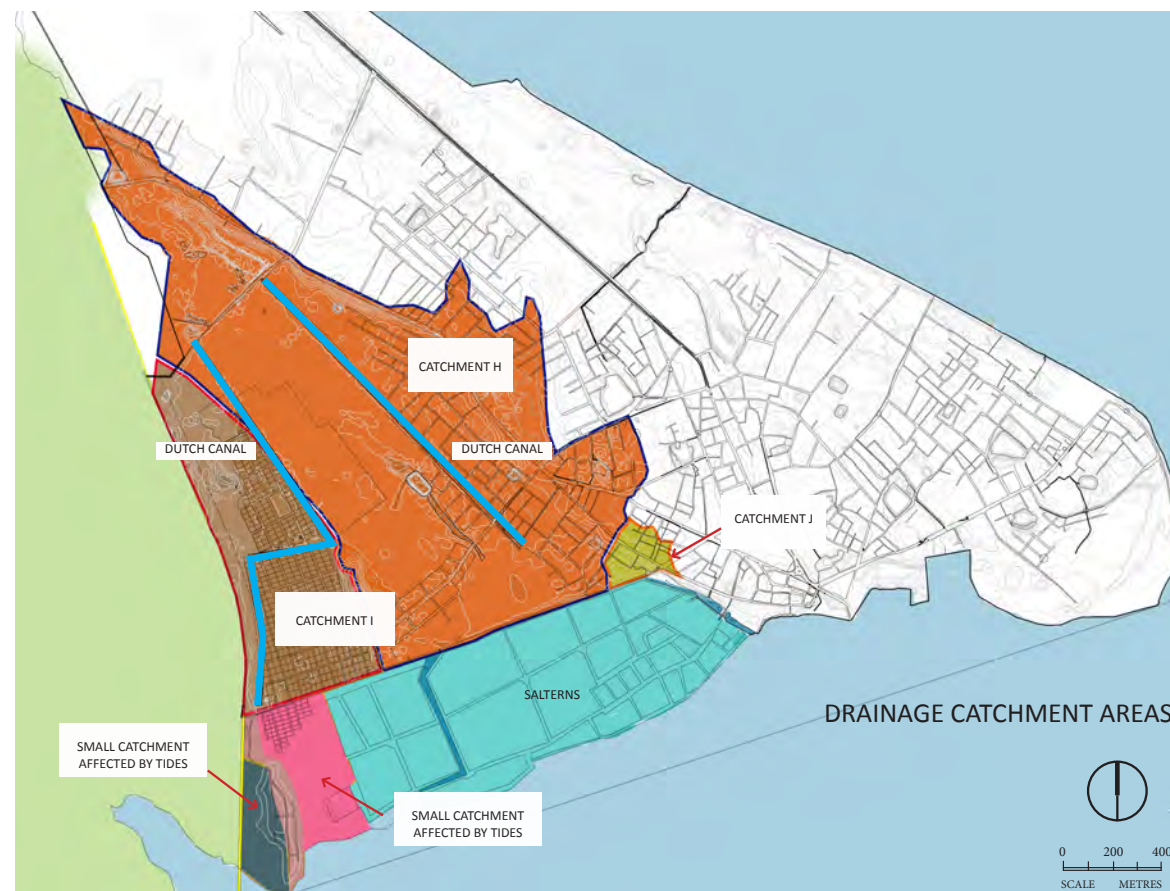
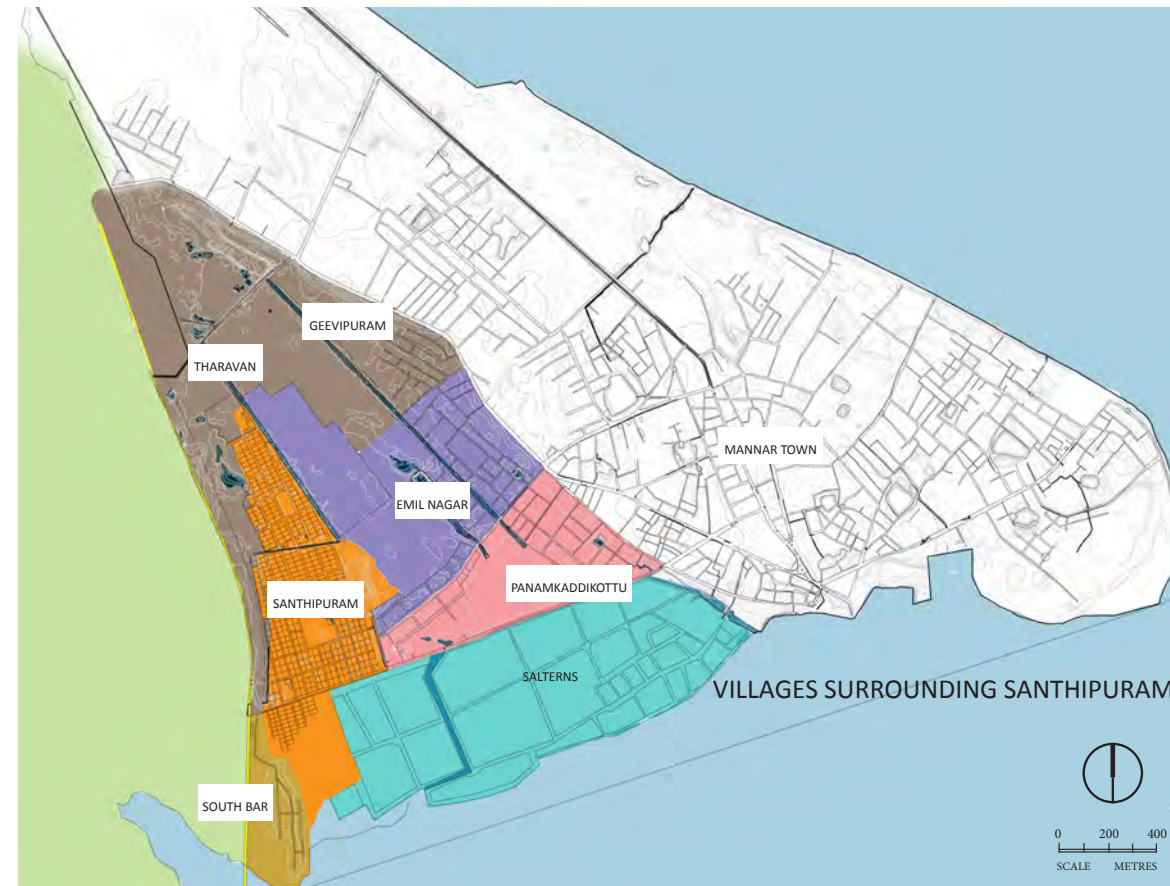
## PROJECT BACKGROUND

With the end of three decades of conflict in Sri Lanka, Mannar District is now undergoing development, especially in terms of infrastructure and housing. The communities affected by the conflict are now returning to their places of origin and are beginning to rebuild their lives. Housing in the area of Santhipuram is in response to this, as well as offering housing to those from other areas who are in need of land.

Santhipuram is located two kilometres from Mannar Town and is the most westerly suburb sitting next to the reconstructed railway line. It is a low-lying area that is prone to flooding in the wet season, particularly between November and January, with significant rainfall from October to February.

It is estimated that up to 150 Santhipuram families relocate during the floods for a duration from one week to several months. The affected residents relocate to St Xavier's School, the Santhipuram School and the Churches. Some families also move to stay with family in other areas of the town during this time.

The initial phase of this project was to determine the extent of the study. It involved a rapid assessment of the villages that flood east of the town. These villages broadly sit within separate catchment zones that have been defined in an earlier study by UNOPS. Santhipuram village sits within catchment I. Time constraints and government requests resulted in the project being limited to Santhipuram village, although the UNOPS project will include Catchments H and I together. There are opportunities for future studies to be undertaken for the surrounding villages. This Scoping Study, which provides an overview of the flooding issues in the area, is provided as an Appendix to this report.





## SOCIAL CONTEXT

### Employment

It is difficult for many people in the area to find employment. Even with an education, many adults in the area do not have a permanent source of income or rely on seasonal work. The main jobs available are working in the fishing industry or as a labourer. The majority of families in the area rely on fishing as the main source of income and 20% of families own their own boat whilst others work as crewmembers. The women of the area are also involved in the fishing industry onshore through cleaning and maintaining the nets.

### Education

Education is of very high importance for most families in Santhipuram. Most children not only attend school during the day but also night and weekend tutoring classes. There is a primary school (grade 1 to 5) and pre-school located within Santhipuram. The primary school grounds are 5ha in size and therefore has the ability to expand and allow growth into secondary schooling.



Local family in Santhipuram



Santhipuram Pre-School class



Santhipuram School (Grade 1 to 5)

### Relocation during wet season

When families are temporarily relocated during flood times, support is provided by the Disaster Management Centre (DMC) in the form of temporary accommodation, food, medication and sanitation.

### Community

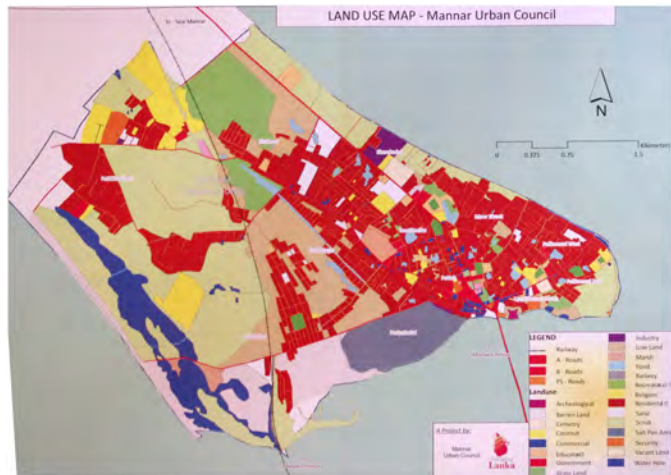
There is a strong and active community framework found in Santhipuram. This is primarily through the community groups of the Rural Development Society (RDS) and Women's RDS (WRDS). Other community committees include the Announcements Committee, the Lifesaving Committee and the Food and Accommodation Committee.

The community also works together on numerous projects through Shraimanadan events. These 'working bee' style activities are held every two months.



## LAND USE AND COMMUNITY FACILITIES

The Land Use Study undertaken in 2013 for Mannar Town (map below) provides a good insight into the surrounding land uses of Santhipuram. To the west of the village the land is described as scrub. This area has a large salt and fresh water lake. To the north of the village (in the upper catchments of H and I) the area is described as grasslands. This area has the start of new houses and buildings including a new school.



Within Santhipuram the majority of the area is permanent housing. There is also some infill semi-permanent housing, however most of the semi-permanent (or recent encroachment) housing occurs at the edges of the village with the exception of the large semi-permanent housing area to the south of Station Road (in South Bar).

The village has a Roman Catholic Church, a Philadelphia Church and a Buddhist Temple. The Temple is located on the highest and biggest land parcel in the village despite there being few Buddhists in the town. There is one school located in the northern most area of the village for children from Grade 1 to Grade 5. This school is located on a large fenced area of low lying land. It is anticipated that the school will expand in the future to accommodate older grades.

There are two recreational spaces within the village. These are used predominately by the boys and men in the town for playing cricket, football and volleyball. Adjoining one of these fields is a children's play area, the GN's office, the community hall and the

preschool are located at the edge of the larger playing field (Santhipuram Park).

There are several small shops scattered throughout the village. A market building and a food relief building (that distributes food to the poorer people of the village) is also part of the community facilities.

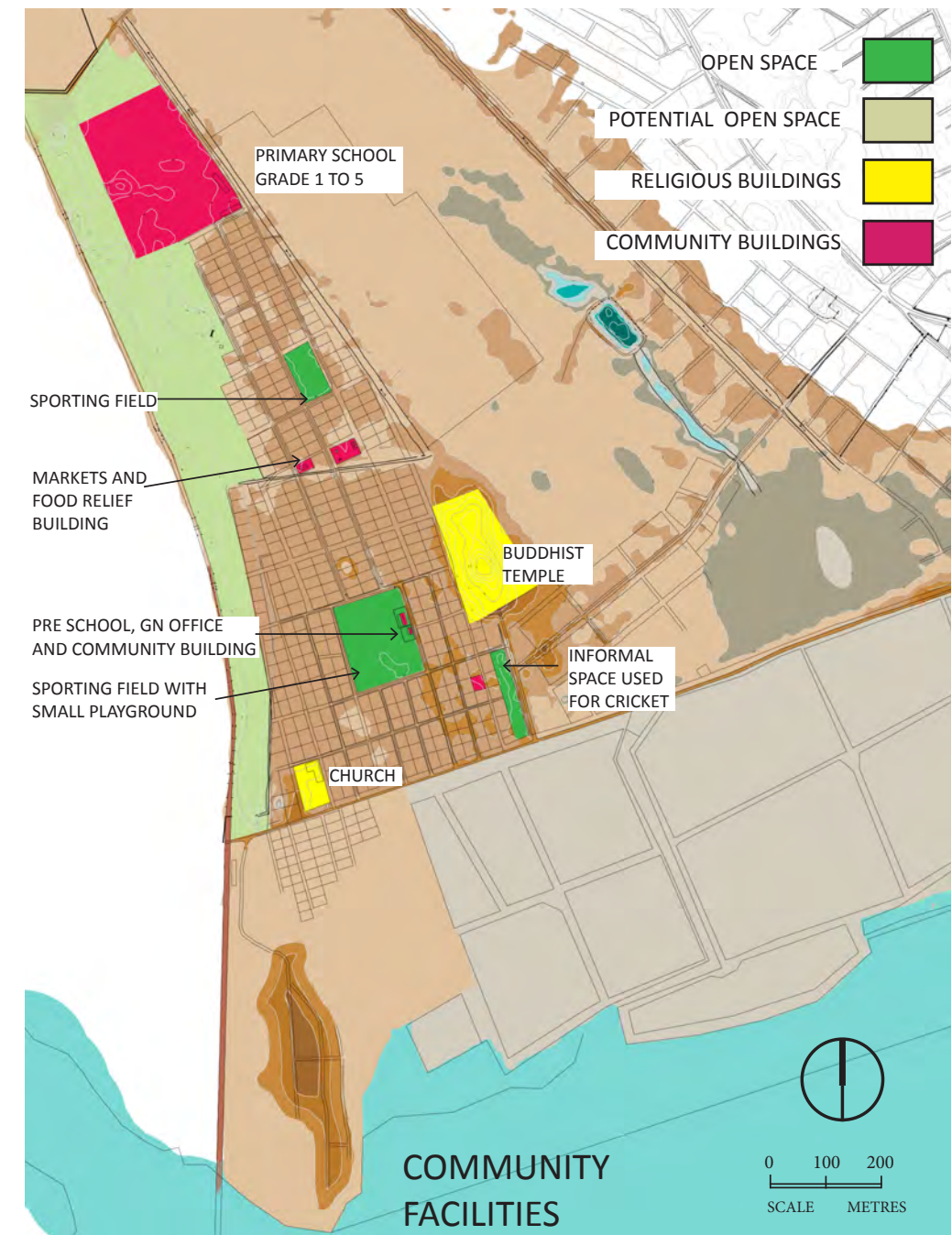
A large part of the land occupied by the village is low lying drainage areas to the west and east of the village and the tidal flood plain to the south. It is clear from looking at the land use that there is little existing available government land for future development or housing above the flood level unless the land is extensively modified (filled). There are opportunities to create more recreation space within the drainage areas.



Santhipuram RDS Building



Santhipuram Pre-School (play area in foreground) and GN Office. Opposite: Santhipuram Primary School (Grade 1 to 5).





## LAND OWNERSHIP

Rights to land in the Mannar District is an issue due to multiple parties having rights over the same land and outstanding land claims. This can occur when a person owned land prior to leaving the District and has found on returning that someone else has been given ownership rights to the same land; resulting in a land dispute. People who have encroached onto land (such as flood prone land) are able to gain ownership to the land after waiting a specified period and being granted ownership by the Urban Council. To resolve land disputes and to accommodate those making land claims, the government has needed to provide additional land to cater for these people.

Additionally, many families that have returned to Mannar after the conclusion of the war have grown in size, meaning that more land is needed for growing families. The population of the area is expected to continue to grow as more people return to Mannar District after the war.

These two factors have meant that more of the flood prone land at Santhipuram is being used for housing purposes.

The Land Development Officer states that in relation to Mannar Island:

- 65% is private land;
- 13% is LRC (Land Reform Commission); and
- The balance is State Land, which includes water bodies. There are already encroachments within this land.

These statistics support the general view that very little land or government owned land is available for housing on Mannar Island, meaning that the land at this location, even though flooding is an issue, has become a necessary option.

Many people choose to stay and live in Santhipuram, even though there are many flooding and drainage issues that cause annual displacement. Reasons for people staying in Santhipuram despite the regular flood conditions and the need to relocate from their houses each year include:

- The land (and often the house) has been given to the family by the government as a place to live.
- People do not wish to move away from other family members already residing in Santhipuram.
- Displaced people are returning to Mannar District and it is one of very few places where they can live.
- They cannot afford to move and live somewhere else where there is less flooding and displacement.
- Whilst there are major flooding issues, the site is strategically located in relation to employment and facilities such as schools.

The lack of land available to people on Mannar Island and the reasons people choose to remain in Santhipuram mean that many families will continue to live in the area and will continue to need services and support. Both permanent housing, attained through a range of housing schemes, and semi-permanent housing, attained through the encroachment process, are found in Santhipuram and are shown on the map adjacent.

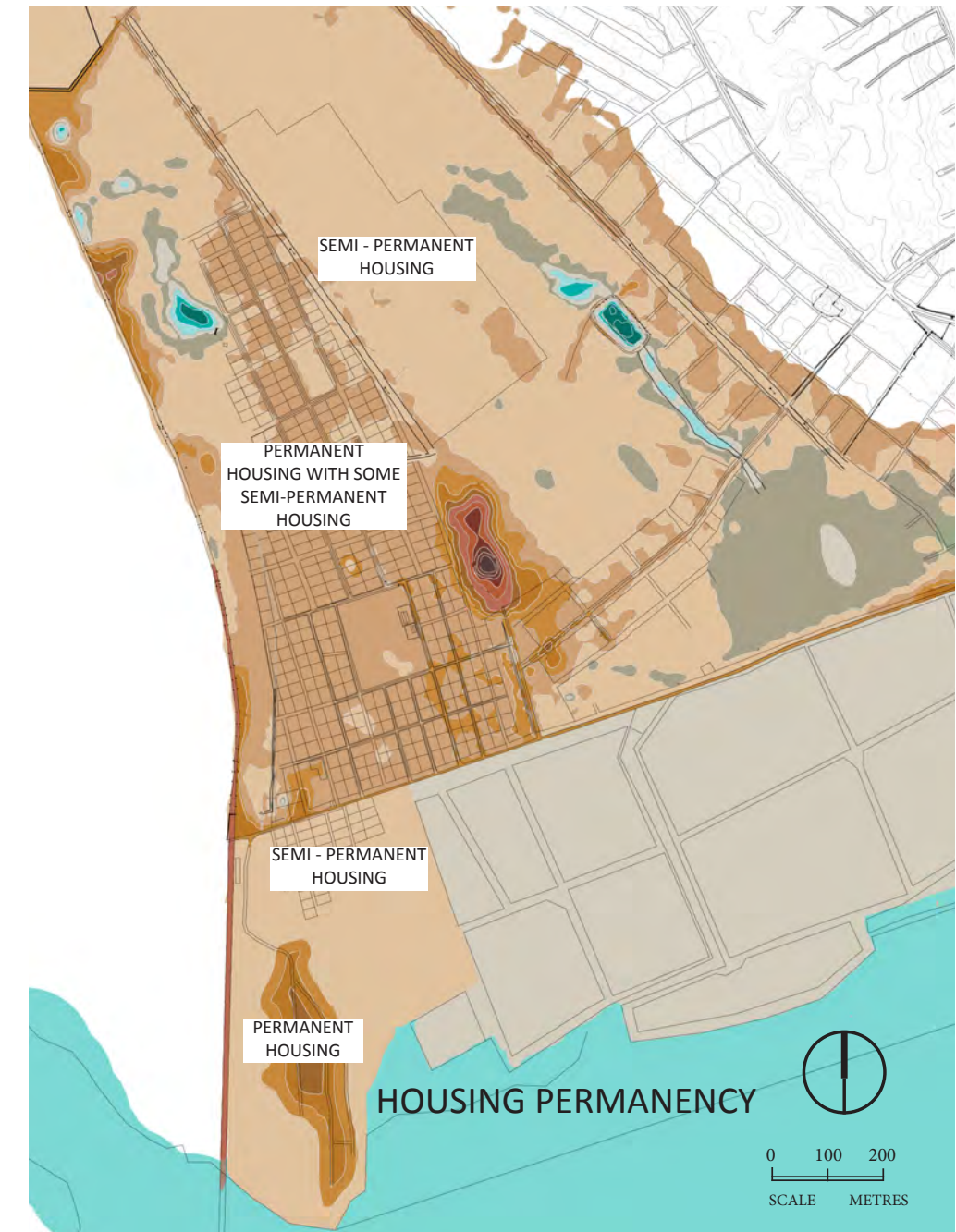
### Shanthipuram Housing Schemes

The following table outlines the history of settlement in Santhipuram village. Houses were present prior to the first housing scheme including houses to the south of Station Road and the houses directly north of Station Road.

Name	Year	No. Lots	Lot Size**	Comments
1 <sup>st</sup> Scheme or 50 Housing Scheme	1995	50		Presumed to be higher elevation and considered suitable for residential use.
2 <sup>nd</sup> Scheme or 100 Housing Scheme	1999	100	20 perch	Presumed to be higher elevation and considered suitable for residential use.
Encroachment reported		125*	10-15 perch	Currently under assessment.

\* 125 applications received for Santhipuram for the upcoming Land Kacheri, expected to be completed by the end of this year.

\*\*160 perch = 1 acre, 20 perches = 505m<sup>2</sup>





## Encroachment

The encroachment of people into areas not presented in the housing schemes is a major issue in the area. Many people have encroached into unsuitable areas, such as into major drainage routes.

Broad areas of encroachment include to the south of Station Road and the fringe areas near the major Old Dutch Canal and alongside the Railway. The area to the northeast is a recent encroachment area, which has occurred, in the past year (as shown on the map above).

Encroachment is dealt with through the Land Development Ordinance (LDO) Process. This process includes:

- Apply to the Land Development Officer for a title for land ownership for the site. Each case is analysed and considered individually:
  - o Land Officer meets with applicants to verify ownership.
  - o Survey is carried out for each property to determine suitability of land.
  - o Survey Department is working through the current applications, hoping to complete by the end of 2014.
- If the application is successful, temporary LDO is granted, then after one year, permanent LDO is granted (see photos). This land cannot be sold, but can be passed down through the family e.g. mother to daughter.
- If unsuccessful, family would need to relocate. However, government will do all they can to ensure that the family gets what they want. Therefore, the LDO is usually granted.
- There are currently 2,500 LDO applications throughout Mannar Urban Area.

This process allows people to stay in the area, while they wait a period of time for their claim to be processed. Although this is good for the residents to be able to stay in the meantime, it also means current properties encroached in inappropriate locations can be given permanent status. This can make it difficult to solve some of the complex drainage problems once permanent status has been given.

This system also does not give an incentive to move from the flood prone locations, as there is the understanding that if people stay long enough, permanent status will be given. This means that there is no ability to prevent the encroachment once this process has taken place.

This encroachment issue means that whilst certain sections of the Santhipuram area have been planned for, large sections of encroachment have occurred into inappropriate locations. This especially relates to the drainage issues of the area, which has further exacerbated the flooding issues at the site.



Temporary and Permanent titles



Encroachment of fence property into the drainage



Encroachment of fence and housing into the drainage reserve area.



Encroachment of property into the Old Dutch Canal (and opposite)



**BUILT FORM AND HOUSING**

There are predominately two types of housing within the village permanent and semi-permanent.

The permanent housing is generally made of rendered or un-rendered concrete blocks. The houses sit on plinths elevated between 300-500mm above the ground to prevent flood waters entering the house. A separate elevated septic toilet is located within the plot. The roof material is predominately tiles however there is some corrugated iron. Surrounding the permanent houses and their gardens are high concrete walls or palmyra fences built on a low earth bund in some cases to keep the flood waters out of the resident's plot.

The permanent houses have been mostly built by the resident. We were advised that many of resident's septic toilets were funded and built by World Vision. Residents can apply to get a toilet from World Vision and this is built only when funding is available. It appears from site observations that houses are expanded as money is available as the older houses in the village have porches and are larger than the more simple two or three room permanent houses.

The semi-permanent houses are generally on the encroachment lands where residents have an application waiting for land to be granted. These houses are made of thatched Palmyra some with corrugated iron roofs. Residents say the iron roofing makes the home to hot to stay in the dry season. The fencing surrounding the plots is Palmyra and the gardens are newly established.



Permanent housing located in the central area



Semi-permanent housing located in the northern area



Temporary housing located in the northern area



Permanent housing located in the southern area



Permanent housing located in the central area



Permanent housing located in the central area



Permanent housing located in the eastern area



Permanent fencing located in the central area



Permanent fencing located in the central area

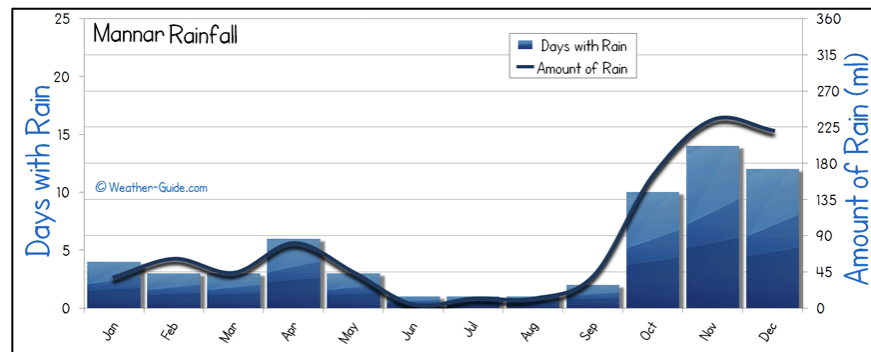


Temporary fencing made from Palmyra, a local product



## RAINFALL PATTERNS, CLIMATE AND TIDAL EFFECTS

The flooding during the rainy season and from seawater ingress is variable (see graph below). Tide measurements indicate the average high tide height of 0.75m and average low tide of 0.05m. Anecdotal advice suggests that since the Tsunami in 2004, rainy seasons have been inconsistent in duration and severity.



## FLOODING & DRAINAGE

Inadequate drainage appears to be the main issue during the wet season, with rainwater inundating housing in the low-lying areas, and remaining throughout the season. Considerable damage to property is evident, and consequently the affected families are compelled to move out of their homes to safer location during the peak of the flooding.

In addition, during high tide there is sea water intrusion along the road side drains and overflowing to housing lots. This is evident from the damage to brickwork by the seawater.

The existing Dutch Canals were constructed hundreds of years ago (taking seawater inland and used for transport purposes) but are currently in poor condition. However, settlement in the area has only occurred since the initial housing scheme of 1995. Observations of the Dutch Canal includes heavy silting and blockages in many places, and it appears to obstruct the free flow of runoff water during floods.

The existing sea outfall canal through the salterns has an anicut (weir) constructed across the canal with provision for stop planks to prevent sea water intrusion. Also, upstream of the anicut is an offtake culvert 450mm diameter to divert flows to the adjacent

saltern. There are pipes from one saltern to another to fill subsequent salterns as the sea water flows inward through the system.



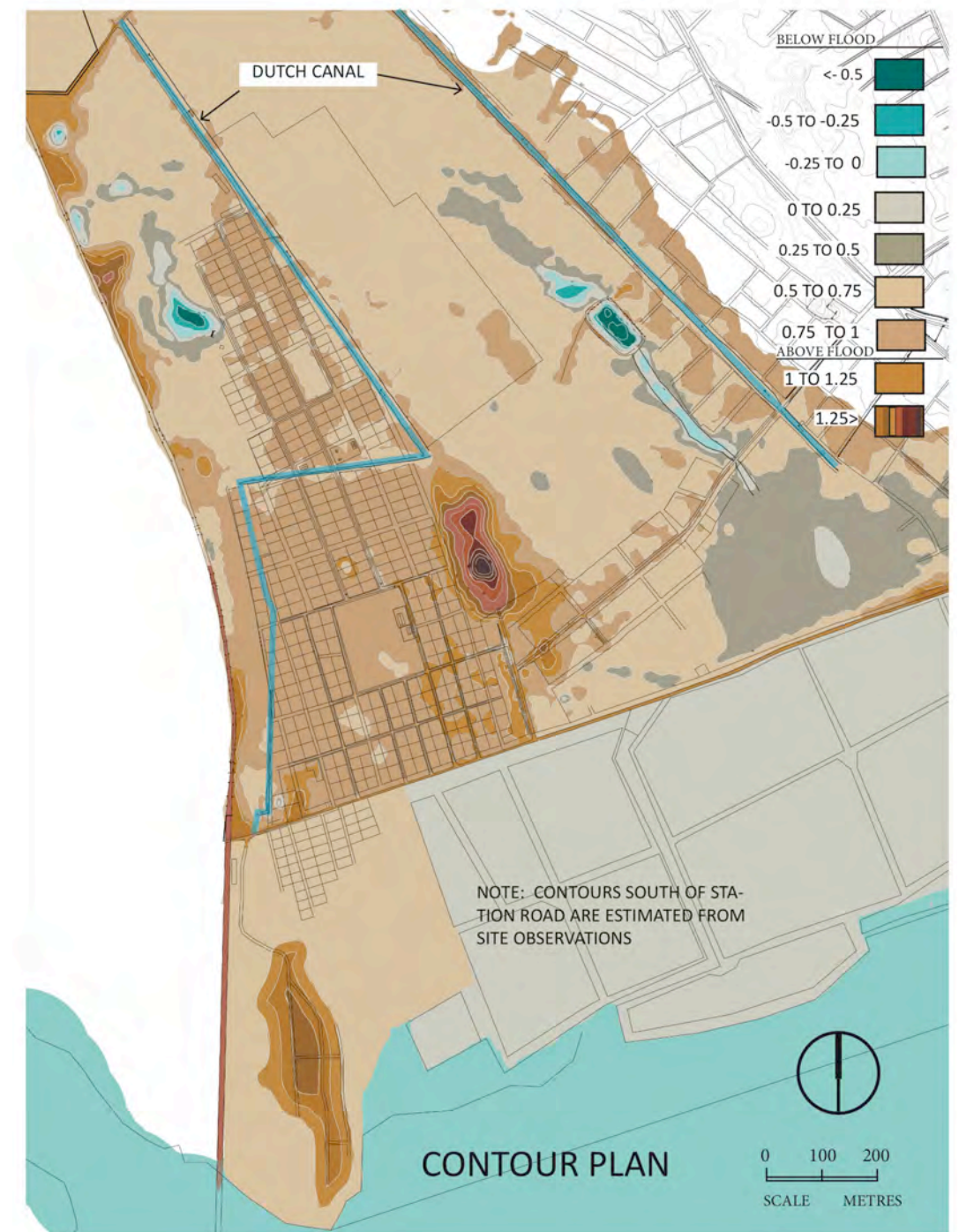
Dutch Canal running north south (southern section)



Dutch Canal running east west



Old Dutch Canal running north south (northern section)



Waterline on side of houses illustrates the height of the flood during the rainy season (opposite)



## SERVICES

Water to the village is through a reticulated water supply with each allotment with potable water having a meter. The present water supply is not available to all houses but is satisfactory where connected.

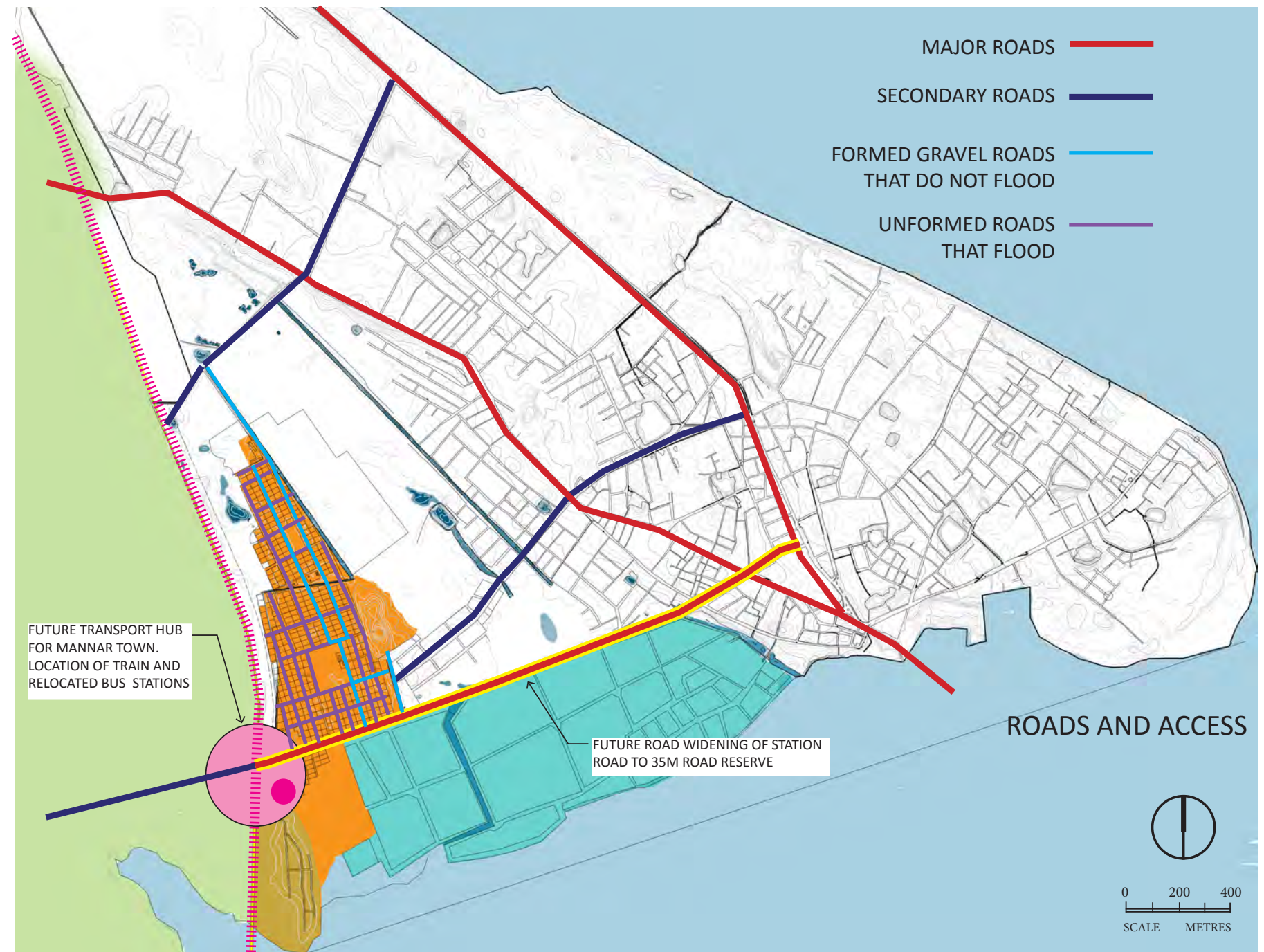
Sewage disposal is by means of septic tanks. The toilet blocks are elevated in order to function satisfactorily in the event of floods. At times of high floods the septic tank can be completely submerged and cause a potential health hazard from floodwater contamination with sewage. Not all homes have toilet facilities and connections.

Power supply is not yet available to all housing, and where there is connection, some families cannot afford bulbs and electricity costs.

## ACCESS IN THE WET AND DRY SEASON

There is an established road network to Santhipuram from three main roads. Two of these roads are sealed with only Hospital Road being a formed gravel road. These three roads are above the flood level. Within the village there are several elevated, formed gravel roads that connect to the surrounding road network, these appear to be well maintained. During the community consultation process, it was established that these were the only roads that did not flood during the wet season. The other internal roads are formed (with side drains) but below flood level or are tracks between new encroachments (with no side drains) (See photos below).

During the wet season, dry access from a majority of houses to facilities such as schools is cut off and the children walk to school through water or are not able to attend.





## FUTURE DEVELOPMENT OF THE TRAIN STATION

The reconnection of the Railway from Colombo to Mannar Island will see the development of the Railway Station area. The train will provide cheap transport and it is expected that this will become a major entranceway to Mannar. It is understood that the Bus Stand will move from the centre of town close to the Rail Station.

Furthermore, the future endeavour to have a ferry service from Thalaimannar (northernmost point of Mannar Island) to India will mean that Mannar Town would be located on an international transport route. Opportunity for stopping in Mannar Town could provide a significant boost to the local economy through tourism and trade.

The Railway and Bus Stand development will affect the surrounding road network. The widening of Station Road by the Roads Development Authority is planned, making this a 35 metre wide, Class B road to transport goods and people from the central town to the Station.

Santhipuram will become one of the first villages seen on entering the Town and will offer commercial opportunities for the Santhipuram residents. Through the community consultation, the people of Santhipuram saw this as an economic opportunity they can take advantage of.

## CONCURRENT INFRASTRUCTURE PROJECTS

UNOPS are currently delivering a large scale Drainage Project for Mannar Township. Santhipuram forms the majority of Catchment I within this scheme, with consideration to Catchment H (primarily Emil Naga and Pannankattukottu East and West GSN Areas). UNOPS design solutions are currently in development for main drains within this area.

Other concurrent infrastructure works with potential impact to Santhipuram's drainage include the upgrade of Station Road by the Roads Development Authority (RDA). This would service vehicle traffic between Mannar Town and the new Railway Station once open. It is understood that designs currently in progress will include increasing the height and width of Station Road, along with provision for bridges and culverts for drainage of the area.

Therefore, proposals contained in this report should be reviewed once designs from RDA and UNOPS works are available. Proposals presented are based on preliminary discussions and assumptions for potential main drain locations for Catchments H and I (UNOPS), as well as bridge and culvert locations along Station Road (RDA). It is the intention that proposals from this report provide flexibility to adapt to the final approved design solutions from UNOPS and RDA.





## ECOLOGY AND THE ENVIRONMENT

The Santhipuram land is a highly modified landscape. The changes to the hydrology of the low lying areas has created a barren treeless salt plain. It is conceivable that this area may once have been a combination of samphire flats fringed by mangroves in the tidal zones with low scrub land and the occasional Baobab tree on the higher elevations. Freshwater kulams (seasonal and permanent) could have been present providing habitat for birds and water plants alike.

The coastal landscape of mangroves and tidal flats is valuable to the health of the oceans and provides breeding habitat for fish. Proposals should look to protect the existing tidal flat plant communities and look for opportunities to re-establish this ecological system where tidal areas are to be retained or recreated. This could be particularly relevant to the land south of Station Road.

The scrub vegetation that is typified by the land to the west of the Railway line appears to be a hardy community that can establish in the sandy, hot and wet conditions of Mannar Island. We would expect that this type of plant community would be important habitat for small birds and animals. This community would not be appropriate around the township due to its dense cover however trees species which grow in this community. There could be considered for planting in open space areas and could provide a green link between the scrub vegetation to the west and the Mannar Township.

In Santhipuram village there are three trees identified that are significant and should be protected in development plans. The first is the Baobab tree located on an isolated island next to the Railway Station. The Baobab trees are a significant Mannar Island tree purportedly brought here by the Moor's. The second significant tree is the Bodhi tree located within the Buddhist temple. The third is a line of Palmyra palms located along the entry to the Buddhist temple within a small drainage area. These trees have the potential to feature in an entry to the village from Hospital Road.

The most abundant vegetation in Santhipuram is the productive and shady gardens in people's homes. These gardens spill out over the top of fences and walls and contribute significantly to the local character. The most noticeable trees from these gardens is the coconut palm and it is clear when walking around the village when sections of the village where built by the height of the palms.



Baobab Tree



Vegetation from gardens overhanging into the street.



## CLIMATE CHANGE AND ADAPTABILITY

The District Disaster Preparedness and Response Plan for the area indicates that the site will at risk of of tsunami, flooding and cyclone hazards. The consequence of sea level rise from climate change will also impact this area in future years as flooding already affects the village on high tides. Future plans should consider the impacts of sea level rise on development in this area.



## CONSULTATION PLAN

The consultation plan included:

- Initial community consultation to understand current situation and future aspirations. Session in Santhipuram and follow up surveys.
- Stakeholder meetings to understand government and private context.
- Development of concept plans, presentation to community and government representatives for comment.
- Individual stakeholder meetings for relevant inputs and site walk with community representatives.
- Refine plan/designs and present results to stakeholders.
- We also took many trips to visit Santhipuram at different times of day to observe day to day life.

## COMMUNITY CONSULTATION FINDINGS

From the initial consultation and follow up survey analysis, we learned that:

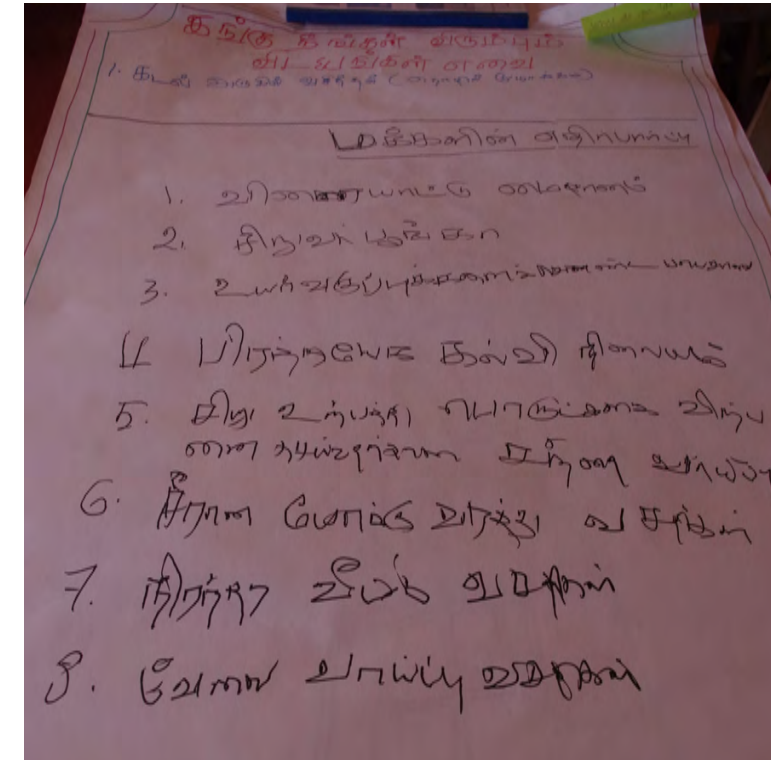
- Roads, drainage and streetlights were the top priorities for improvement.
- Social issues identified included employment, youth, poverty.
- People stay in Santhipuram for the land availability (52%), and also to appreciate the unity and peace (32%).
- Top response for how it could be changed was NGO's (24%), but then "we can do it" and "capacity building" (each 21%).
- The future vision is for a modern, better developed village, educated and respectful society without temporary housing. Also for a vision of peace and being the number one, example village.
- Of those surveyed, it was almost even responses to staying at home or relocating during flood times.

## CONSULTATION SESSION 1

This session was held on 19th June, with the aim to represent the community in planning – to understand the current situation, the issues that are important and ideas for the future.

It was impressive that with an expectation of 20-30 community members and despite only short notice, 76 people attended.

The first exercise was for people to mark their home on the map, some also commented on flood conditions. We then asked questions about what the issues are, and discussed the current situation and future aspirations.



Examples of comments recorded and preferences from visual options.





## CONSULTATION RESULTS

Discussions from the session are summarised below:

### What you don't like about living in Santhipuram?

- During the rainy season, many houses are flooded.
- No proper by-roads & need streetlights.
- Many living in temporary houses for a long time – also some are too hot to stay during the hot season (tin roof).
- No proper drainage system.
- Lack of jobs in Mannar – even with education.
- Only primary school up to Grade 5, 2km to high school – bus service, but if you can't afford it, have to walk.
- No electricity for street lights.
- Sewerage problem during the rainy season, and not all homes have toilets.
- No drinking water in some areas (find out where) at encroachments along the railway line.
- 20% have nets and boats, rest do not – they work with other fisherman.
- Women want income generating activities for the ladies.
- There are small industries at home - candles, grinding chili, but they cannot get it to market.

### What is it like during flood times?

- Dengue fever.
- Even by bicycle, children cannot get to school.
- Families relocate while house floods.
- No transport.
- Unable to cook – firewood is wet.
- Water is stagnant – no drinking water.
- Cannot use toilets (septic tanks overflow during flood).
- There are 9 sub roads available – only one is used (#3) other 8 roads are unusable.
- Daily business is disrupted.

There were also comments that Santhipuram has done community consultation twice before, and look forward to the results from this session.

### What you would like to see in Santhipuram in the future?

- Playground (during rainy season).
- Children's Park.
- High school.
- Private tuition centre.
- Market to sell our local products and good shops.
- Proper transportation system.
- Permanent houses.
- Employment.
- Library for the students.
- No fence around the primary school.
- 25 years living in a temporary home – want a permanent home.
- Enough fishing for the future.
- Get shops in early before the railway opens and many more shops open.



Images taken in the community consultation session

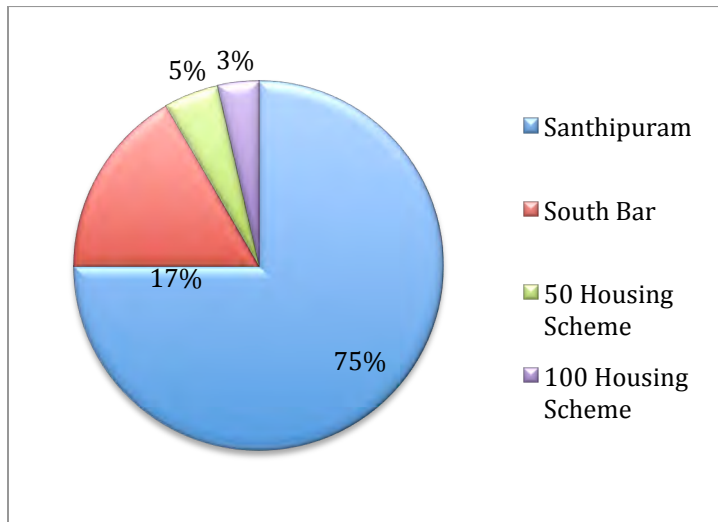


**FOLLOW UP SURVEY**

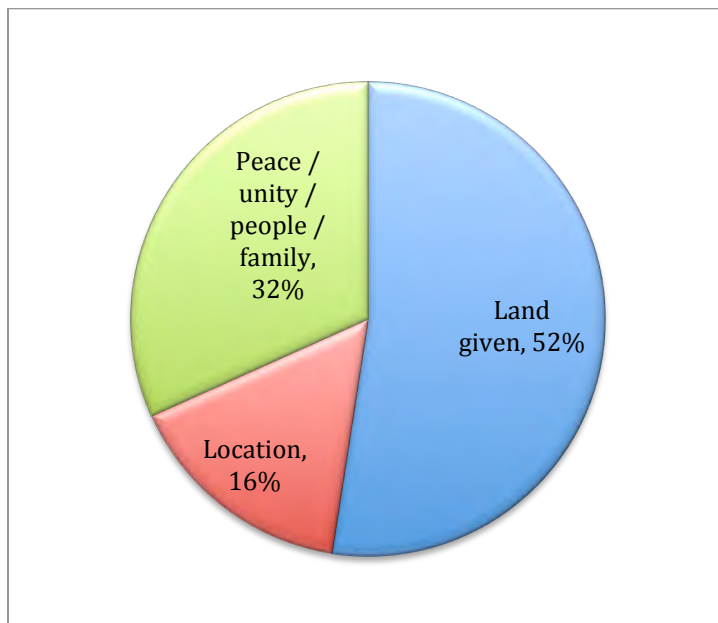
We offered surveys to provide comments – there was not a chance for everyone to speak in the consultation – and also for people to take home to their neighbours as well.

87 surveys were returned:

**Address:**



**1. Why do you come to / stay in Santhipuram?**



While it was mostly due to land being available, reasons also show a strong community sentiment:

“Free of religious, caste, ethnic problems - internal harmony”

“People are very cooperative, that's why I stay here”

“Because it's a multi-religious, multi-ethnic group living peacefully.”

“I have land, my children are here, I am interested in this village.”



**Question 2: What changes would you like to see in Santhipuram?**

Changes we want	No.	%
Roads	29	34%
Drainage / Culverts	28	33%
Street Lighting	20	23%
Permanent Housing	15	17%
Drinking Water	15	17%
Work Together / Discuss to Achieve	11	13%
Electricity	10	12%
Free of Liquor Addiction / Drugs	10	12%
Education	8	9%
Other	6	7%
Youth Issues	6	7%
Disciplined Society	4	5%
Underage marriage should not take place	4	5%
Free of Child and Women's Abuse	4	5%
Jobs	4	5%
Free of Poverty	4	5%
Better Developed Village	4	5%
Garbage Disposal / Environment / Greenery	3	3%
Implementation	3	3%
Free of Conflict / Dispute	3	3%
Free of Suicide	2	2%
Transport systems	2	2%
Park / Children's Park / Playing Field	2	2%
Hygeine	2	2%
Free of Malpractise	2	2%



**Question 3: Who can help with this / how could it be changed?**

Who / How?	No.	%
NGO	21	24%
We Can Do It	18	21%
Capacity Build / Awareness	18	21%
Improve Infrastructure	16	19%
Speak to Village Head / RDS (Rural Development Society)	12	14%
Other	7	8%
Government / State	14	16%
Discuss together, make plans	2	2%
Youth Employ / Industry	2	2%

Note: for questions 2 to 5, each survey could have multiple responses for various items. E.g. "Drinking water, streetlights, proper drainages and temporary houses should be permanent."



**Question 4. In future, how do you want to see Santhipuram?**

Future	No.	%
Better development, modern village	25	29%
Education	17	20%
Discipline / honourable / respect	14	16%
No temporary houses	10	11%
Peaceful	8	9%
#1 village / example	8	9%
Economic	7	8%
Industry	5	6%
Roads/ access	4	5%
Greenery	4	5%
Flood	3	3%
Equality	3	3%
Employment	3	3%
Good hygiene	2	2%
Drought	1	1%
Stop sand removal by others	1	1%
Hear & rectify all public grievances	1	1%
Basic requirements fulfilled	1	1%
Environmental pollution free	1	1%
Free of disputes	1	1%
Drinking water	1	1%
Market and library	1	1%
Multistorey / apartment buildings	1	1%

It's clear that the community is keen to see Santhipuram developed – this is the top response for the future. Being an educated, disciplined society is after that – social values are held strongly.

The results for the future vision of Santhipuram focus on the community social aspects as well as infrastructure.

**5. During flood time, where do you go, what do you do?**

During Flood	No.	%
Stay	33	38%
Of those who stay, some flooding at home.	6	7%
Move	29	34%
Church / temple	20	23%
School	20	23%
Relative	5	6%
Drainage solutions*	11	7%
Other response (included 1 for tsunami housing)	6	38%

\*Solutions suggested include: more, deeper drains & culverts, sandbags, sluice gates, prevention of sea water ingress, raising the land (earthworks).

**SITE WALK**

The Santhipuram RDS and WDRS members, along with the GN Ms P.J Resha Sinthiya offered to walk us around the site to confirm specific areas of encroachment and context of the extent of flood waters. This was also an opportunity to discuss and improve the proposed concepts; for example with the kulam expansion, and a request to include steps to allow bathing and washing.

The ideas and opinions of the community are illustrated in the site plan following.





FROM SCHOOL PRINCIPAL  
 LIKE THE IDEA OF A SPORTS GROUND ON SCHOOL LAND BEING SLIGHTLY LOWER – CAN FLOOD DURING THE RAINY SEASON AND WILL RETAIN WATER LONGER TO PROVIDE GRASSED PLAYING FIELD. COMMUNITY DID NOT WANT THE SCHOOL LAND TO BE REDUCED IN SIZE AS THEY HOPE THE SCHOOL WILL BE EXPANDED INTO SECONDARY IN THE FUTURE.

BATHING POND: RESIDENTS, ESPECIALLY WOMEN, WOULD LIKE THE POND TO BE ABLE TO BE USED AS A BATHING AREA. THIS WOULD INCLUDE STEPS INTO THE POND TO ALLOW PEOPLE TO BATHE AND WASH CLOTHES.

THIS LAND NEAR THE BAOBAB TREE IS CLAIMED. AS IT IS WITHIN THE RAILWAY STATION HOWEVER, IT HAS NOT BEEN GRANTED PERMANENCY AS YET.

ALONG WEST DRAIN: THERE ARE HOUSES ENCROACHING INTO THE DRAINAGE SYSTEM. THERE ARE HOUSES ON THE WEST SIDE OF THE DRAIN WHICH HAVE NOT BEEN GRANTED LAND AS THEY ARE TOO CLOSE TO THE OLD DUTCH CANAL. THE RESIDENTS OF THIS LAND SAID THEY WOULD MOVE WHEN THE DRAINAGE WORKS WERE RESOLVED.

WOULD LIKE TO RETAIN MAIN CENTRAL SPORTS GROUND (VERY IMPORTANT TO THE COMMUNITY). DO NOT WANT ADDITIONAL DEVELOPMENT HERE. WOULD LIKE FACILITIES SUCH AS GRANDSTAND AND SPORTS CLUB.

RETAIL ALONG STATION ROAD: LIKED THE IDEA OF RETAIL ALONG STATION ROAD TO CAPTURE TRAIN STATION MOVEMENT.

THE HOUSES THAT ARE VACANT HAVE OWNERS WHO EITHER ARE LIVING ELSEWHERE (INDIA) OR THEIR LAND FLOODS AND WILL RETURN WHEN DRAINAGE IS FIXED.



TANK OVERFLOWS INTO SANTHIPURAM

ALONG EAST DRAIN: THE HOUSES ENCROACH

OPEN TO THE IDEA OF RELOCATED THE SPORTS GROUND AND CREATING A TOWN CENTRE.

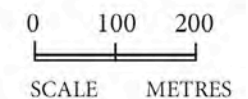
WOULD LIKE THE TUTORING CENTRE TO BE RE-OPENED AND REVIVAL OF THE MARKET AREA. THIS IS GEOGRAPHICALLY CENTRAL TO ALL IN THE VILLAGE. MOST PEOPLE GO INTO MANNAR TOWN FOR SHOPPING AND TUTORING.

EAST-WEST DRAIN: THERE ARE FENCES THAT ENCROACH INTO THE OLD DUTCH CANAL.

INFORMAL SPACE USED FOR CRICKET: COMMUNITY SEE THIS AREA AS A POTENTIAL COMMERCIAL AREA/STRIP.

SOUTH BAR: THROUGH CONSULTATION IT WAS NOTED THAT THE AREA OF SOUTH BAR HAD BEEN MISREPRESENTED AS IT WAS UNKNOWN THAT THIS AREA WAS NOT ALSO REFERRED TO AS SANTHIPURAM. THIS HAS BEEN UNDERSTOOD AND THIS AREA IS INCLUDED IN THE STUDY.

## SANTHIPURAM COMMUNITY COMMENT ON CONCEPT PROPOSALS





## STAKEHOLDER MEETINGS

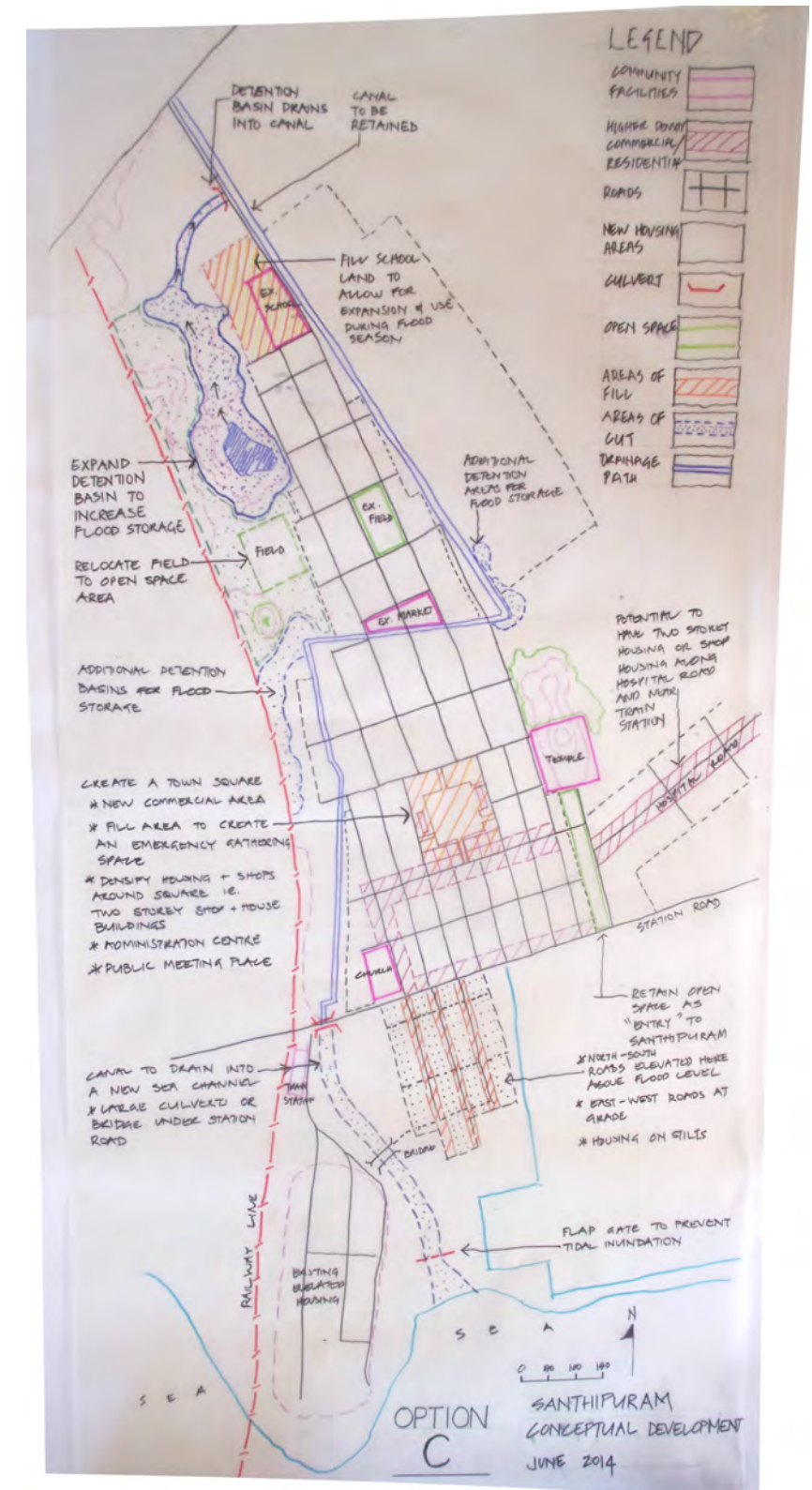
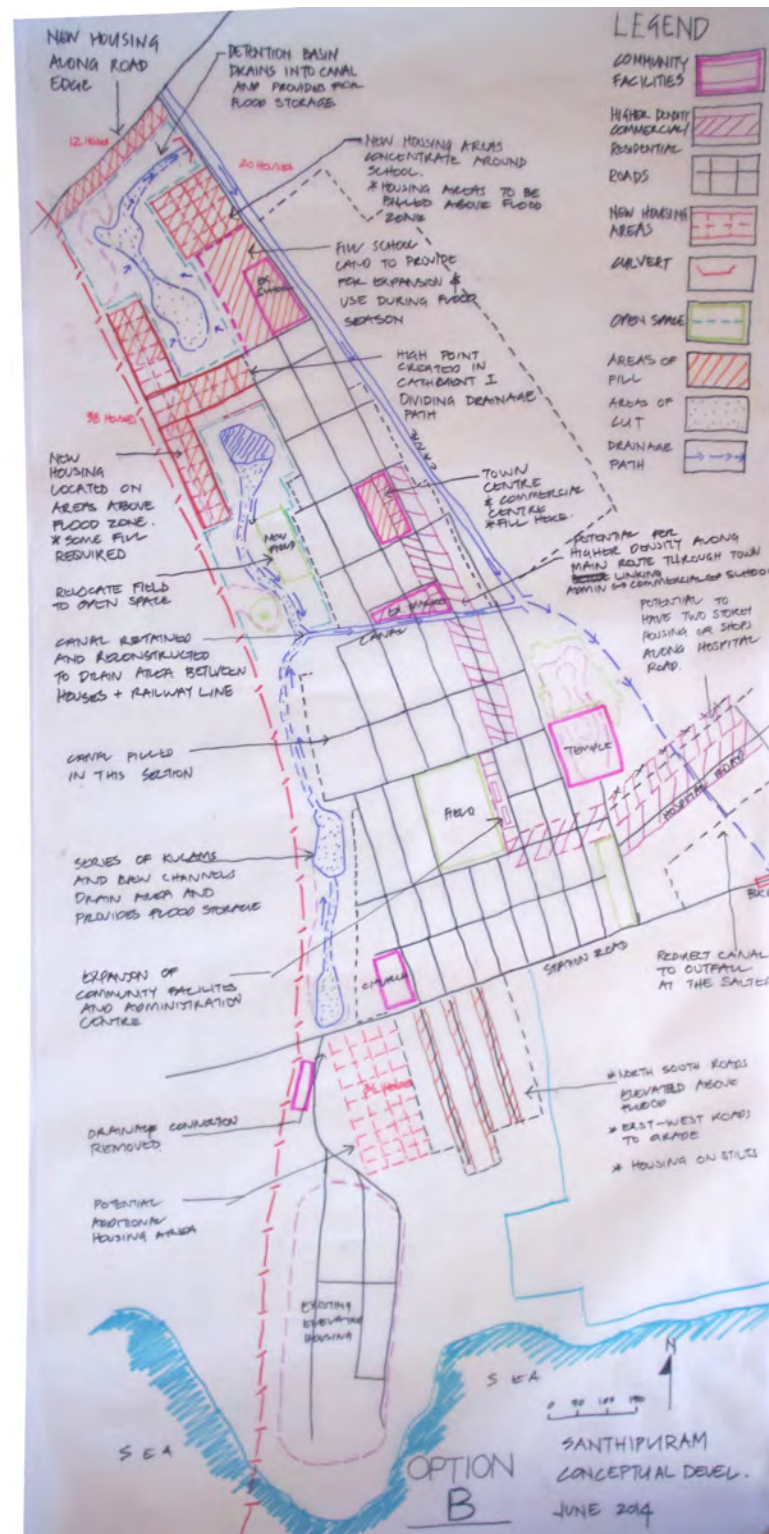
Three options were developed from the information gathered in the scoping study.

These were based on drainage solutions but also incorporated housing and social projects within the concepts

The options allow for potential UNOPS drainage outcomes – either using the Old Dutch Canal or sending the outflow to the existing channel through the salters.

Each includes themes of drainage including kulams and

water detention, access, use of fill for housing/school/commercial opportunities and creation of a town administrative centre. These are proposed for discussion of what might be feasible or acceptable.





## Urban Council

30<sup>th</sup> June at 4pm, S. James Jesuthasan, S. Selvam, X. L. Reynold

Comments on drainage in the area:

- 75% of rainwater drains to sea via culvert – on many occasions, have pumped the water across Station Rd to the sea via two electric pumps.
- Size of this current drainage pipe is inadequate.
- Salterns have only been there for past 2 years.

Preference for Option A, with the following comments:

- Keep the sports ground where it is.
- Determine the extents of the Buddhist land.
- Subdivision of land can occur to increase housing.
- Potential for multistory flats in public land.
- Want shops along main street.
- Like the expansion of the kulam, but concerned regarding depth.
- Recommend keeping school land and railway reserve (50m either side of track), and need to consider interference from proposal of kulam and detention area in north west area.
- Option C; – allows concepts for use of existing Old Dutch Canal and avoid complications for UNOPS to put new drain through existing area east of Santhipuram.

Services provided by Urban Council:

- Streetlights (main line by CEB) and electricity.
- Garbage clearing – once a week, 3-4 tractor loads.
- Internal roads.
- Pond construction.
- Water supply, sewer and sub drainage.
- Parks and maintenance.

## Saltern Management

1<sup>st</sup> July at 9am, A Kishotharan, S J Nixon Croos

Salterns include 190 acres of property, with permanent management staff plus 32 permanent labourers and 70-80 seasonal workers (approximately 50 from Santhipuram). Production is approximately 2,800 metric tonnes per year.

Sea water enters the north east corner of the salterns, and over three months flows to the production pans. Saltern walls are 1m high, so that the channel for urban drainage flows underneath the pipes that run between each saltern.

The Saltern Management will clean out the drainage channel before the rainy season. The radial gate – to prevent seawater ingress – is also operated by Saltern Management. Since construction in 2011, the seawater has not come in over this gate.

At the end of the rainy season, water collected in the salterns is pumped over the 5' bund to the sea (two pump locations in the easterly end).

There was discussion regarding whether the salterns could provide rainy season run off detention – with raised bund walls and an overflow / spillway to the sea. At the end of the rainy season, the water left in the salterns would be pumped out. Use of gypsum prevents storage of fresh water.

However, the production relies on air flow across the surface of the salterns for evaporation and therefore would be interrupted by higher bund walls.

Earlier, they used to pump from the Pannankattukottu low point across to the salterns to drain – but since, there are encroachments and now cannot.

RDA require 15m from centerline reserve to be available – salterns have encroached on this. Discussion regarding possibility of proposal to the Saltern Board of Management to

request an additional section of the land south of Station Rd to be available for drainage solutions, for example 10m.

## Ceylon Electricity Board

1<sup>st</sup> July at 10am, M M M Mishrack

- CEB is providing lines for all street lighting in Mannar Island (rehabilitation project), including Santhipuram – then after connection, UC can provide streetlights. Project expected to be complete within the year.
- Street light set is 750R for single bulb, 1000R for double. 100 lights would be enough for all of Santhipuram.
- Individual streetlamps would cost more. 1 light with switch, maybe 3000R, and private owner would pay the electricity consumption.
- Other project also going on in Mannar District is Utruwasandae to provide electrification to 100% of the Mannar District. All new lines & individual house connection (provided free for displaced people). If displaced before war, then resettle, then it is free (from CEB).
- Where there are new encroachment/semi permanent houses, CEB can provide electricity supply. Need safety wiring to be available and electricity available in the street.
- In 2009-2011, government paid for first 6months of electricity bill. An average bill is 800-1000 rupees per month for a small home.
- 15m offset either side of high tension lines, no buildings but parks could be ok, 15m ground clearance (no tall trees within 15m height of lines).
- Primary station near the Navy Camp (sunni village). Substation is in the south east corner of Santhipuram near the church.



## Disaster Management Centre (DMC)

1<sup>st</sup> July at 11am, L A Premraj,

Santhipuram is currently in a state of drought, with drought relief water distribution. DMC provides the tank and monitoring, while UC responsible to fill the tanks with water. New drinking water supply through ADP (Asian Development Fund) provided for bulk tank & then gravity feed for distribution.

### Encroachments and Hazards

- DMC have run numerous community awareness programs regarding the risks of encroachment in low land, but still people encroach.
- Land department for encroachments – for evacuate people living in the Old Dutch Canal, then also went to community for awareness of the risks.
- No safety location, no safety route within Santhipuram.
- Cannot create safety area within 3km from sea (for tsunami, storm surge, cyclone). Could provide for the flood times though.

### Funding for Disaster Management

- Funding through ministers, also from NGO's (e.g Oxfam).
- Funding has been mostly for emergency response (not for mitigation). Some mitigation plans have been developed, but cannot be implemented due to encroachment properties.
- Tsunami housing, there has been no funding in this area for tsunami housing because the tsunami did not hit here. Recovery funding was directed to tsunami rebuilding.
- Building 5 sample tsunami houses in Mannar, locations are identified by DS. DMC Colombo with UNDP provide Mason's Training on how to build tsunami housing.

### Approvals Process

- For Santhipuram, if we had a design/proposal, DMC could assess for disaster risk (e.g. multistorey).
- If housing scheme for South Bar is proposed, DMC cannot approve but can advise.

- Much funding has been allocated to drainage – now difficult to get approval for more drainage.
- Increased kulam – mitigation for drought (and flood). DMC would support this idea for mitigation. SP could make proposal to GA and DS, then to DMC. Also consider reduction of dengue from stagnant water.
- Approvals go through 13th Amendment for Sri Lankan Law, from GN to National level.



Images from the stakeholder meetings undertaken.

## Santhipuram Rural Development Society (RDS and Women's Rural Development Society (WRDS)

1<sup>st</sup> July at 12pm, I Soosaidasan (RDS Member), I Mary Janet (WRDS Member), T B Amaladi (RDS Member), T M A Denina (Jenny) (WRDS Secretary), N X S Jebanesan (RDS Secretary), T Anuran (RDS President), S M C Jodini (WRDS Treasurer), M Vesani (WRDS President), T S Leelavathy (WRDS Member)

Comments on the concept plans included:

- Want a tutoring centre and revival of the market area – this is geographically central to all in the village. Most people go into Mannar Town for shopping and tutoring.
- Retain main central sports ground (very important to the community). Do not want additional development here. Consider sports club.
- Clarification of school perimeter. Set aside land for expansion of school. Like the idea of a sports ground on school land being slightly lower – can flood during the rainy season and will retain water longer to provide grassed playing field.
- Much of this was also gained during the site walk.

### UNOPS

2<sup>nd</sup> July at 9am, P Anutharshan

- Catchments H and I combined for their project
- All works suspended in Mannar at the moment.
- Confirmed that history of the Dutch Canals was for transport from sea (originally flowed inland).
- Considered proposals, but need more data and detailed design to comment on options for drainage strategy.



# IMPLEMENTATION PLAN

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Thank you to those people in Santhipuram who have helped the team and added their ideas and comments.

The plan that is shown below are ideas for the future which are yet to have agreement or funds, but they are an important beginning for future change.

Some ideas are big and will be expensive (such as drainage). Some ideas are smaller and can be achieved by the community working together (such as tree planting and safety).

The ideas on this plan are:

## **Flooding**

- Make a larger kulam alongside the Railway to store more water during flood – this will also provide rainwater for bathing and washing.
- Restore the Old Dutch Canal to drain more water during flood.
- Higher ground at the Santhipuram School for safety.

## **Santhipuram School**

- Protect land for future expansion of the school for secondary students.
- Enough space for playing field.
- Water to drain from the Kulam will flow past the school.
- Provide shade trees for students.

## **Roads**

- A high road for access during flood times.

## **Santhipuram Park**

- Future audience grandstand.
- Community tree planting for shade and comfort.
- Place for community celebrations and a women's and girls' garden.

## **Market**

- RDS, WRDS and UC work together to make the market work again as a place for selling food, vegetables and household goods. Private tuition space is also available here.

## **Safety**

- RDS and UC work together for future street lighting at locations where people most need it (playing field, school, church, shrine, tuition building).

## **Economic**

- Shops on Station Road near Railway Station where Santhipuram people can sell food to travellers, parking for three wheelers.

## **Community**

- Community tree planting and watering project at the school, RDS/WRDS building, around the playing field, tuition building and market.



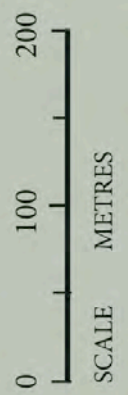


**PROJECTS**

- 1 DRAINAGE IMPROVEMENTS
- 2 KULAM EXPANSION
- 2A BATHING AREA AT KULAM
- 2B NATURAL AREA AT KULAM
- 3 HIGHER GROUND FOR HOUSING
- 4 SCHOOL
- 5 MARKET REVIVAL
- 6 CENTRAL FIELD
- 7 SANTHIPURAM PARK
- 8 RAILWAY PRECINCT (SHOPS)
- 9 STREET TREE PLANTING ON STATION ROAD
- 10 STREETLIGHTING
- 11 SOUTH BAR HOUSING
- 12 SUBDIVISION OF LAND FOR TWO HOUSES

**SANTHIPURAM VILLAGE**  
**DRAINAGE, HOUSING AND VILLAGE**  
**IMPROVEMENT PLAN**

- LEGEND**
- HOUSING AREA SANTHIPURAM
  - SHOPS
  - OLD DUTCH CANAL
  - HIGHER GROUND FOR HOUSING AND SCHOOL
  - BUND TO PROTECT HOUSES
  - KULAMS
  - TREE PLANTING
  - SHRUBS
  - OLD DUTCH CANAL REALIGNED



SALTURNS

RAILWAY STATION

AUDIENCE STAND

CHURCH

TEMPLE

OLD DUTCH CANAL renovated

OLD DUTCH CANAL renovated

OLD DUTCH CANAL renovated

SCHOOL

BATHING AREA

RAILWAY LINE

BAOBAB

BUND A

BUND B

CHURCH

CHURCH

HOSPITAL ROAD

STATION ROAD



# Project 1: Drain Improvements

## Description

### Hydrology

Hydrological data has been obtained from an existing reports including from Disaster Management, Department of Meteorology, UNOPS along with visual inspections of the catchment basin, flood level, invert levels of pipe outlets and local knowledge of the people of Santhipuram.

Data of the Mannar district including rainfall and tide variation frequency, flood duration and flooding has been assessed with available data.

However, flood runoff from the catchment has been assessed with reference to 'Development of Village Irrigation Works'.

### Drainage

The drainage of flood water from Santhipuram village would closely follow the Old Dutch Canal system but with some improvements to facilitate and direct the flows through a series of ponds (kulams), interconnected in between.

Furthermore, the adequacy of the existing subsidiary drain is insufficient for rapid runoff of flood water. Additional outlets and pipe culverts at road intersections needs to be provided.

Bearing in mind the mean sea level is 0.00m and the outfall invert level to the sea is only 0.542m, the flood water will spread up to the 0.54m contour. The high tide level may prevent the sea outfall canal from discharging the flood water that builds up in the inland area during heavy rain.

The flood waters will tend to build up in the Pannankattukottu South basin before discharging to the sea outfall via the existing four, 600 diameter pipe outlets.

The sufficiency in size and opening of bridges, culverts at road crossings need more detailed study.





### Recommendations for Improvement

The Old Dutch Canal (A), East of the Railway track must be upgraded and the flow of water directed to a series of kulam ponds. The overflow from the kulams is connected at the head of the Old Dutch Canal (C), running north south and upgraded in size to handle additional flows.

The Old Dutch Canal east west (B) will have a section via concrete channel and the existing road culvert comprising of two 850 diameter pipe must be demolished and the channel constructed to go straight across the road. The concrete section will terminate after the road culvert and proceed as a double sided embankment canal meeting the Old Dutch Canal, running north south. The combined flows from the canal will fall into the Pannamkaddikoddu South basin.

There are two pipe culverts from the housing area crossing the Station Road (1), one 600 diameter pipe at invert level 0.542 and (2) four, 600 diameter pipe at invert level 0.542. Both culverts must have flap valves discharging into the outfall canal. The other culvert with one 600 diameter pipe at invert 0.593 discharging into the proposed basin in the Saltern.

Provide a flap valve at the pipes 4/No 600 diameter leading to the existing sea outfall while checking for the adequacy of the pipe size for capacity.

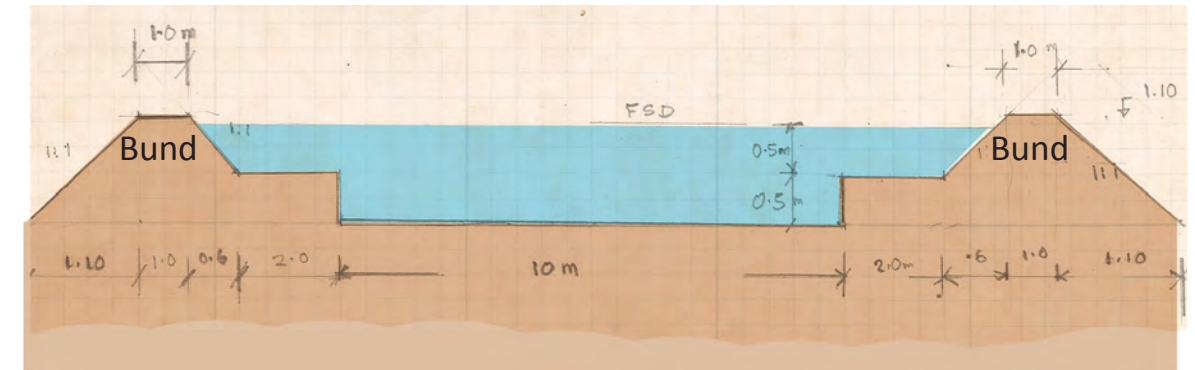
It is suggested to acquire a 15m wide strip of the Saltern alongside Station Road for flood retention. This would assist to divert a part of the flood water inflow from Santhipuram village into the acquired basin. The outfall canal would perform better hydraulically if constructed to go straight into the sea, rather than through a right angle bend as existing.

Furthermore, periodic maintenance must be done before the onset of the rainy season. The sand bar at the sea outfall must be breached and the outfall canal desilted. Side drains along roads and canals at Kulam to be desilted and all debris cleared for smooth flow of water.

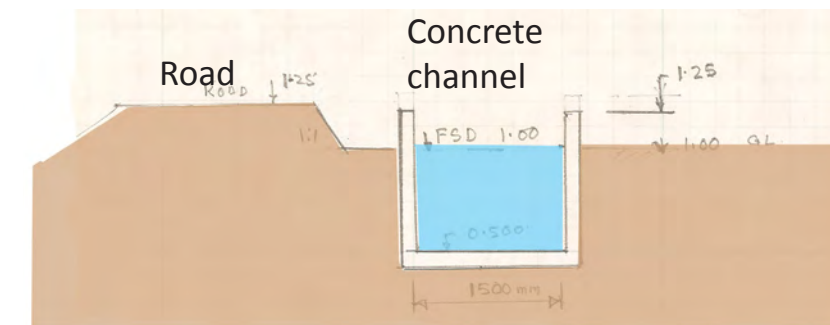
It is suggested that a series of bore holes to be opened in proposed kulam area and flood retention open spaces to monitor ground water levels and ascertain the depth required before exavacating the proposed kulams and to obtain subsoil data.

### Implementation Steps

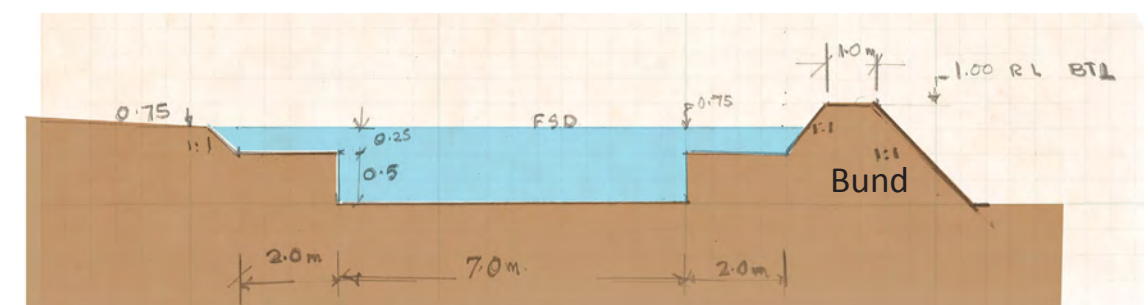
1. Marking extent of flooding in the next flood period.
2. Larger Kulam. Proposal to DMC, with construction to follow if funding available.
3. Improve North-South Drains and East-West Drain (Old Dutch Canal). Can be completed separately to construction of larger Kulam. Part of UN Operations project.



**Cross Section A Old Dutch Canal N-S hor 1:1**



**Cross section B Concrete Channel proposal of Old Dutch Ca (180M length)**



**Cross section C Old Dutch Canal S to N hor 1:1 ver 2:1**





Channel leading into sea



Outfall Channel between the saltern



Existing bend in outfall channel



Measuring Anicut (dam)



Box culvert to salterns

SALTERNS DRAINAGE PROPOSAL ALONG STATION ROAD



# Project 2: Kulam Expansion

## Description

Make a larger kulam along the north-west edge of Santhipuram to store more water during flood and provide drought mitigation in the dry season. The new Kulam will be desilted and widened but leaving sufficient land for the school and create additional land for housing. Any deepening of the kulam must be designed with caution to prevent the salt water would not rise into the fresh water.

This will reduce the amount of land that is flooded, slow the flood water and improve safety. It will also provide more water storage that can be used by the community for bathing and washing.

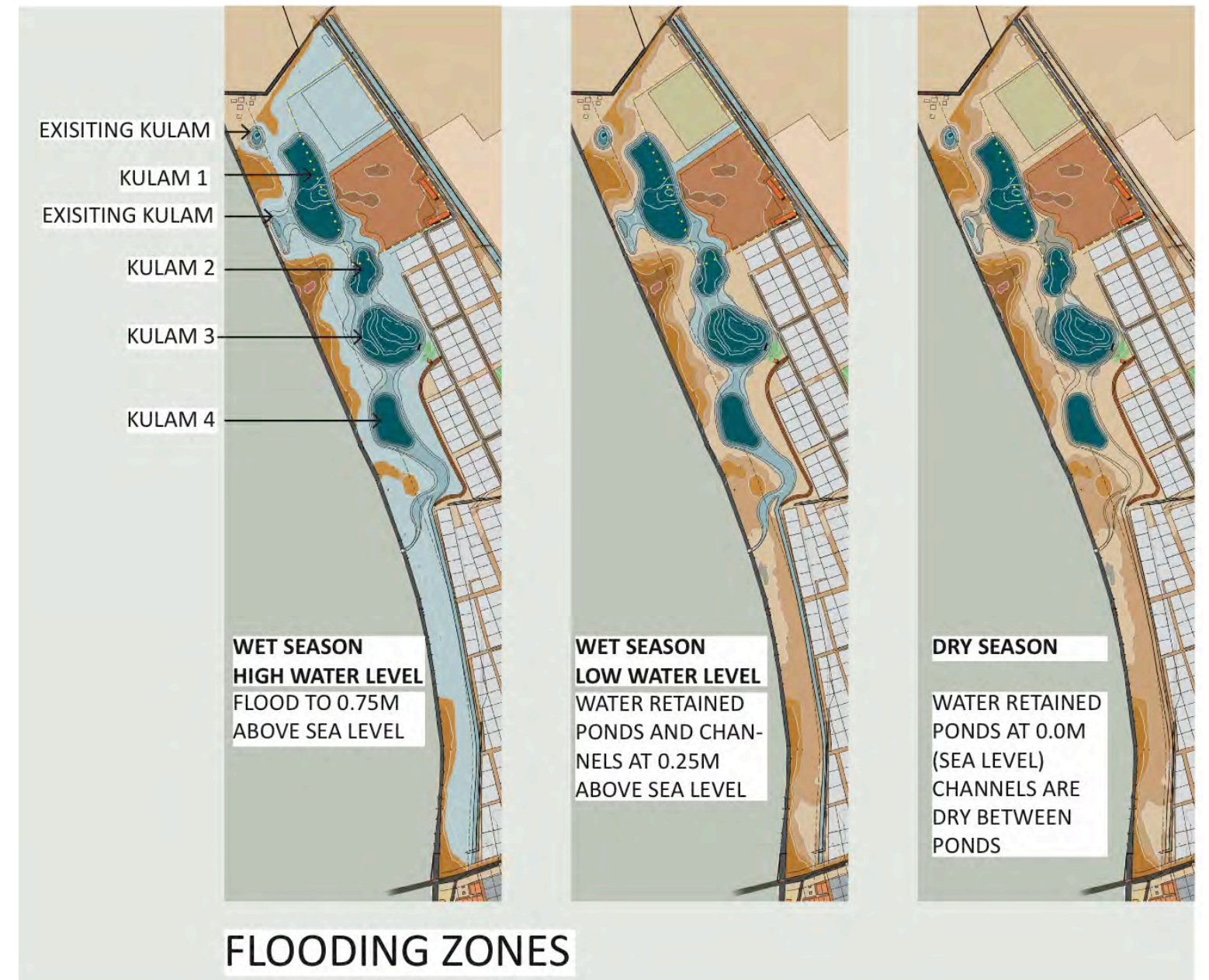
The proposal includes three additional kulams as shown on the map adjacent. Also shown is the planting and amenity including bathing and washing facilities.

## Implementation steps

1. Proposal to DMC for drainage and drought mitigation for approval for funding.
2. The construction could be a community project organised by the RDS and WRDS.
3. Consider coordination with UNOPS drainage implementation.



Current Kulam can be expanded to hold more water





# Project 2: Kulam Expansion

## Bathing Pool and Natural Pond

### Bathing Pool

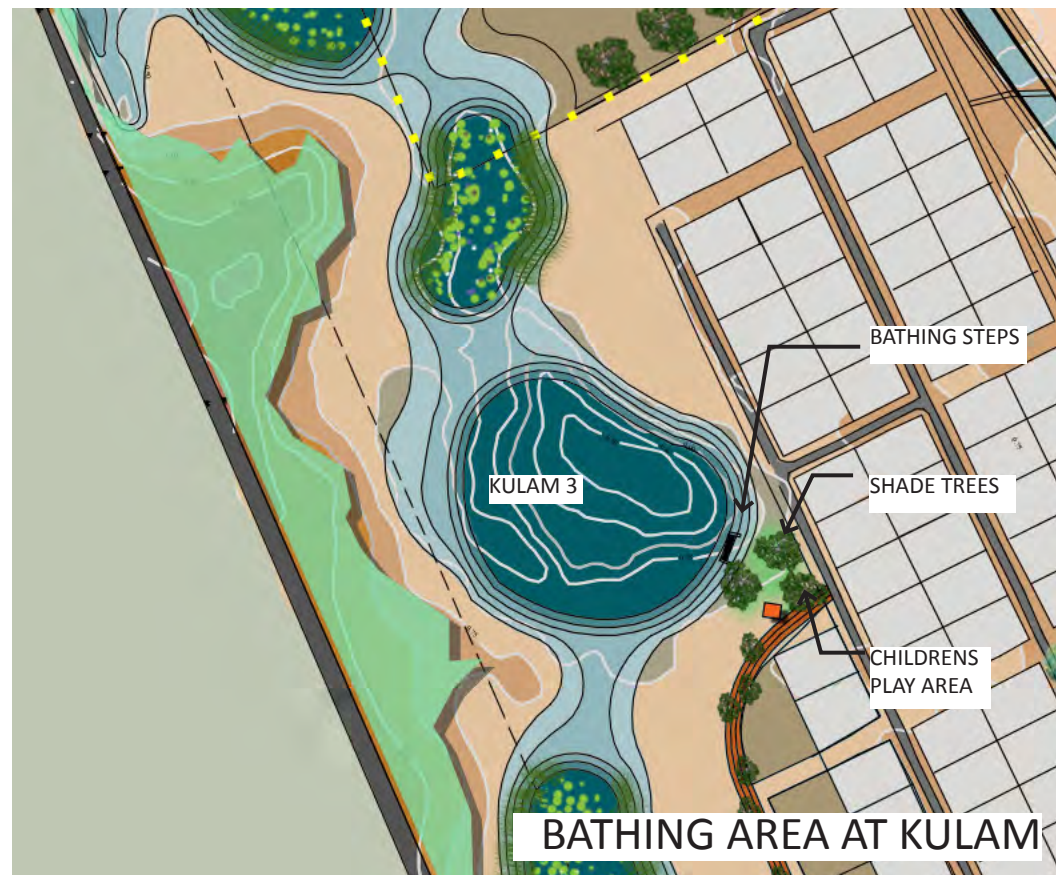
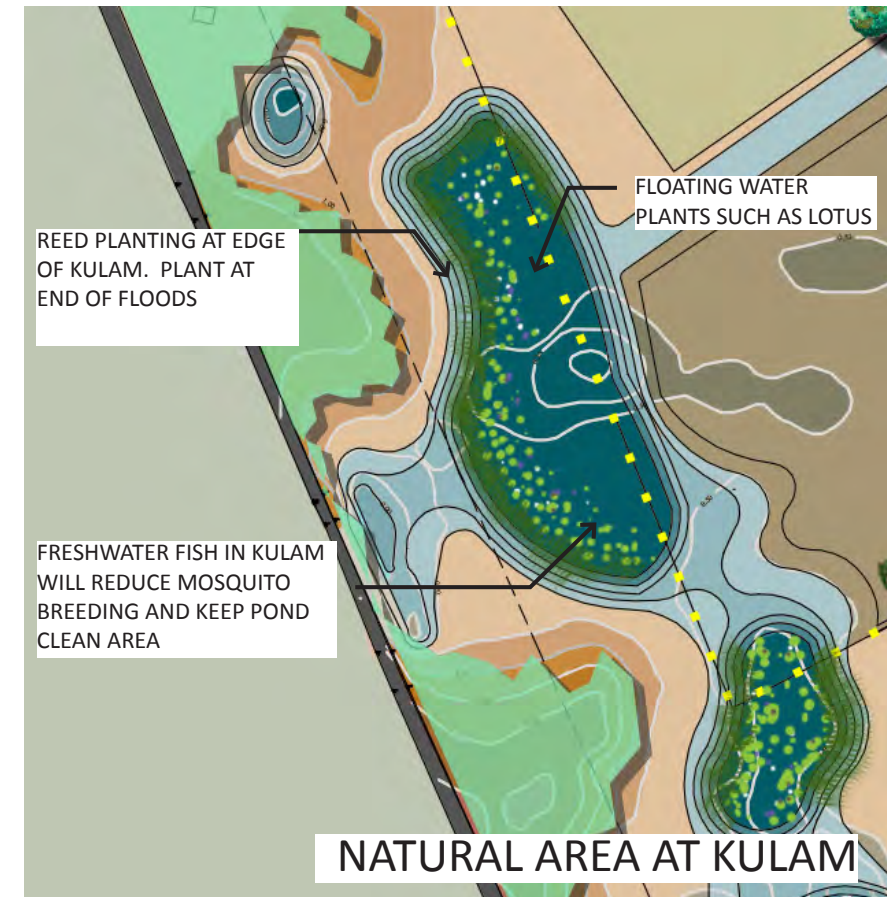
Places for bathing and washing in clean rain water are limited in Santhipuram. The larger kulam proposed for Santhipuram will provide a larger area of rain water during the year which can be used for bathing and washing.

Construction of concrete bathing steps on the edge of the larger kulam will make it easier and safer for people to use this water, with plantings for additional shade and seating.

There is also opportunity to provide a Children's Playground.

### Natural Pond

The natural pond would be planted just after the coming wet season and will provide passive recreation space and improved environmental values in the area.s



Natural Pond



Bathing steps can allow people to wash clothes



# Project 3: Higher Ground for Housing

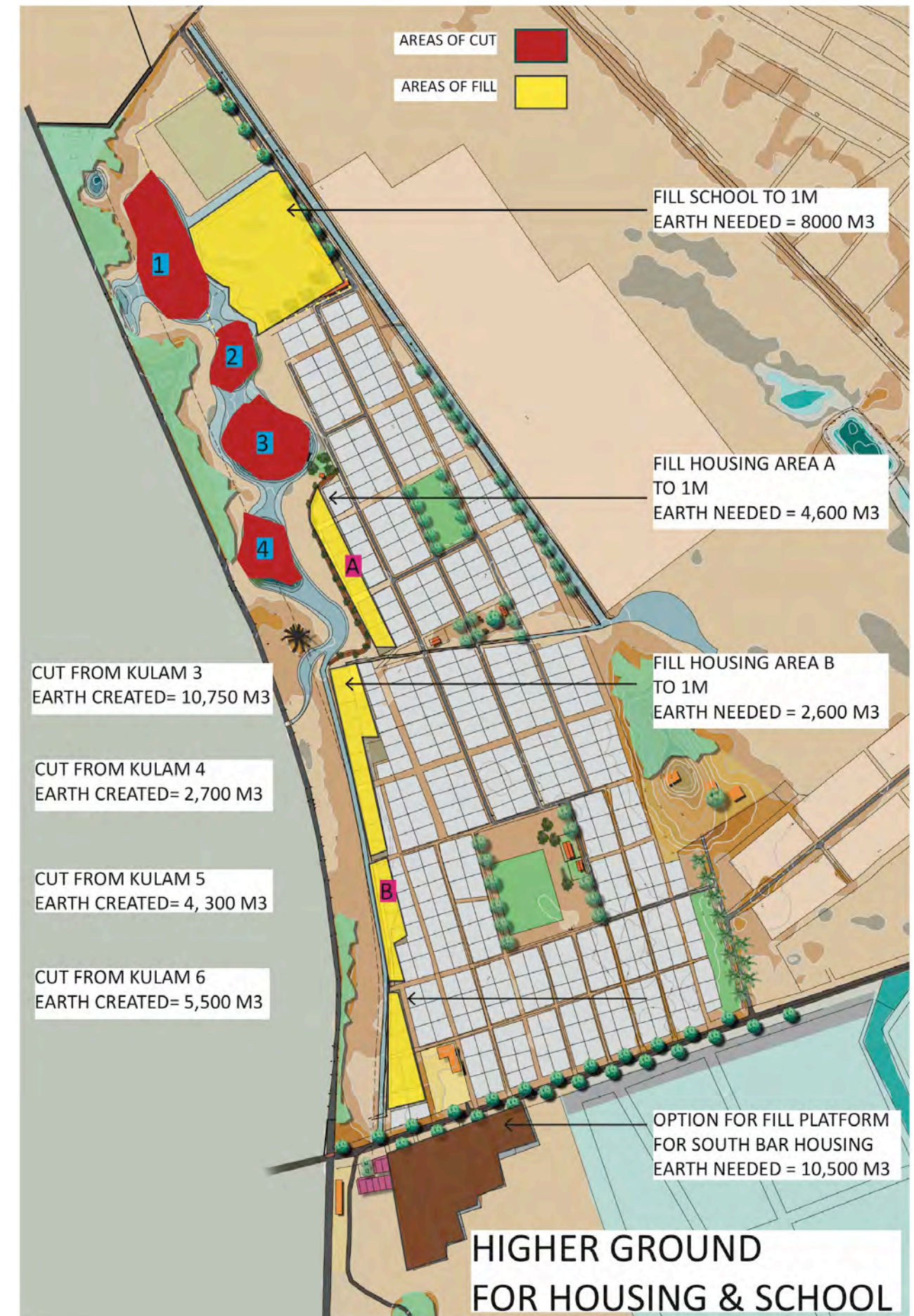
## Description

Earth taken from the larger Kulam can be transported to increase the height of land elsewhere – around the school and to improve housing in the south-west precinct. Increasing the height of the land around and within the Santhipuram School will provide safe land to live on during flood and provide an area of higher land for future school buildings.

For vacant properties or those with temporary houses, the owners would remove soil from the proposed kulam area and build up the level on their own property. This is a cost effective way for residents to develop their property themselves and will assist the kulam construction. These properties would still need to meet the UC requirements of living on higher ground. Varies from 0.2m to 0.045m.

## Implementation Steps

1. The Urban Council confirms the exact location of the kulams and uses pegs to mark these locations.
2. People owning sites that want be raised higher then remove this soil (providing their own labour) from the kulam areas and use at their own property.
3. The work must meet standards of the UC such as being built up a minimum of 0.5m and compacted as it is built.
4. Once this work has been completed, approval for building on the site can occur.





# Project 4: School

## Description

As a critical part of the community's infrastructure, development for the existing school has a number of aspects.

Sufficient land is to be protected for additional school buildings to allow the school to include secondary classes when needed. Soil taken from the expansion of the Kulam can be used to increase the ground level to accommodate future school buildings and provide better access for the existing school buildings during flood.

Sufficient land is to be protected for playing field for school students. A drainage channel from the expanded kulam will need to flow through the school grounds to allow flood waters to escape during time of flood.

Tree planting to provide shade for school students is needed in the school grounds.

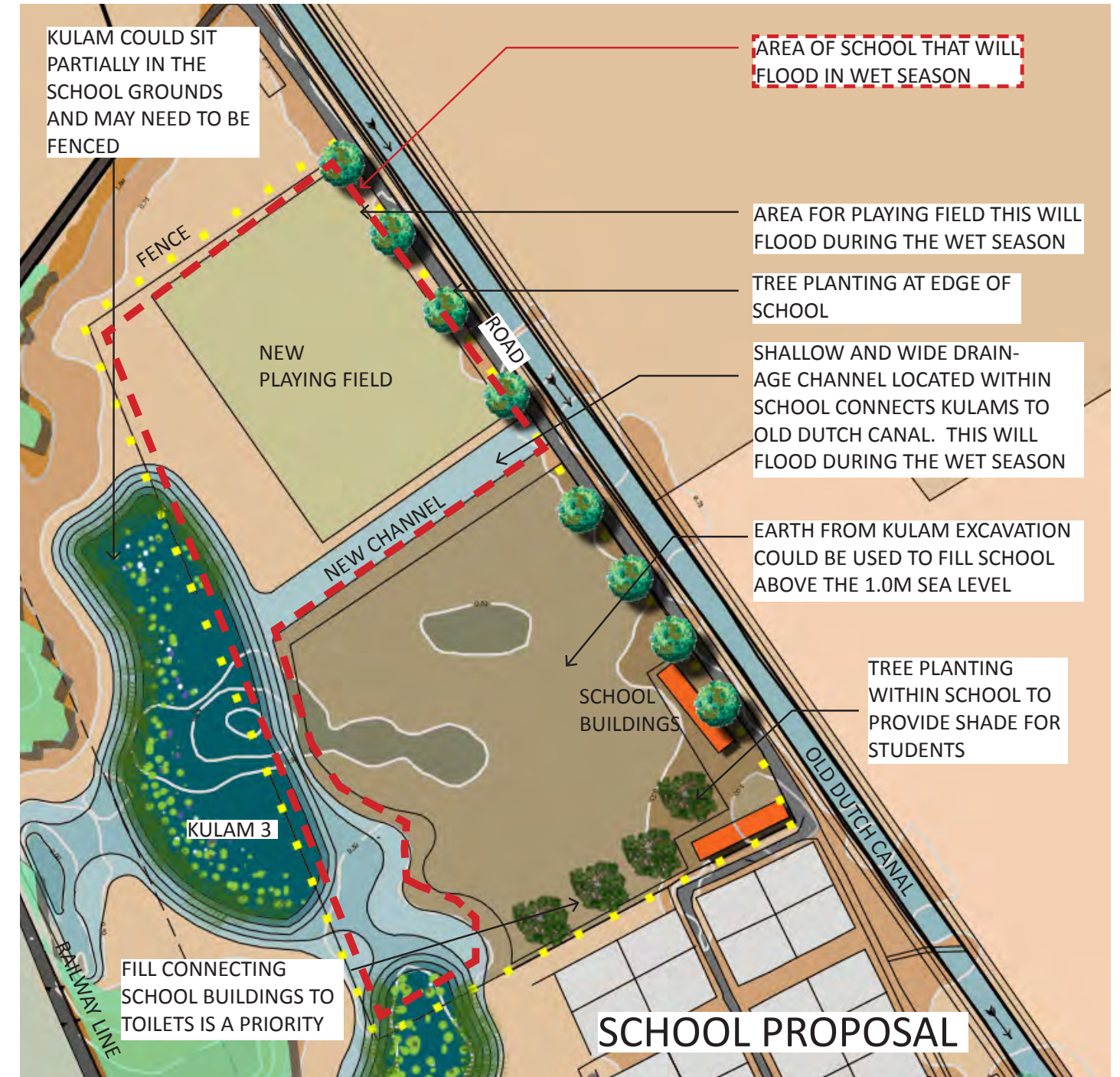
## Project implementation Steps

Higher ground and kulam expansion

1. Confirm plans and extents for kulam expansion – stakeholders including Government Departments and School Principal, and design within UNOPS plans.
2. Priority areas for raising levels would be the path to the toilets, and access between buildings and to the entrance.
3. Channel to be constructed and maintained. Include fencing options for safety of school children if the kulam is within the school boundary.
4. Ensure works carried out with adequate compaction for different future use of land.

Tree planting

1. Shade trees have previously been planted, but have failed due to damage from animals (Palmyra) and people (Neem trees having bark taken). Includes fencing around trees for protection while they are being established.
2. The School Principal has agreed to maintain the trees if they are planted.
3. Priority is to provide shade within the school grounds, including spectators at the sports ground.
4. Project could be community based for labour.



School grounds can be raised; this will allow people to access the bathrooms during the rainy season



Increased vegetation is needed at the school to provide shade



# Project 5 - 6: Market Revival - Central Field

## Description

The market is currently closed, but the buildings (including a private tuition centre) are existing. When working it provides a place for people to buy food, vegetables and household items they need every day – the community support the reopening.

## Implementation Steps

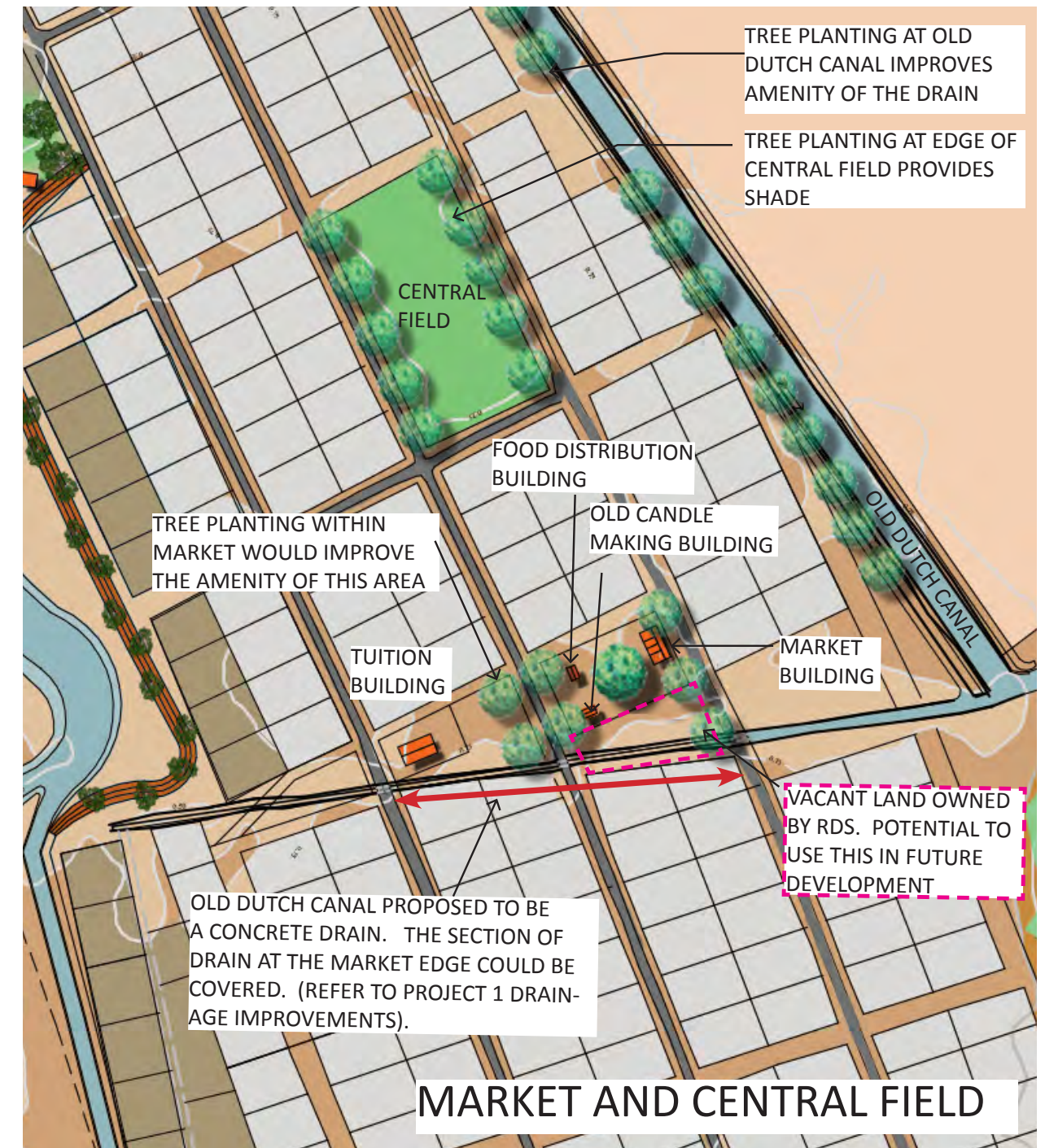
1. Undertake a study to understand why the market is now closed (possibly rental cost, lack of customers).
2. Mitigation strategy based on findings could include subsidised rent, tree planting, street lighting and the painting of buildings.



Current buildings at the market are not being utilised



The market could be activated through fresh fruit stalls





# Project 7: Santhipuram Park

## Description

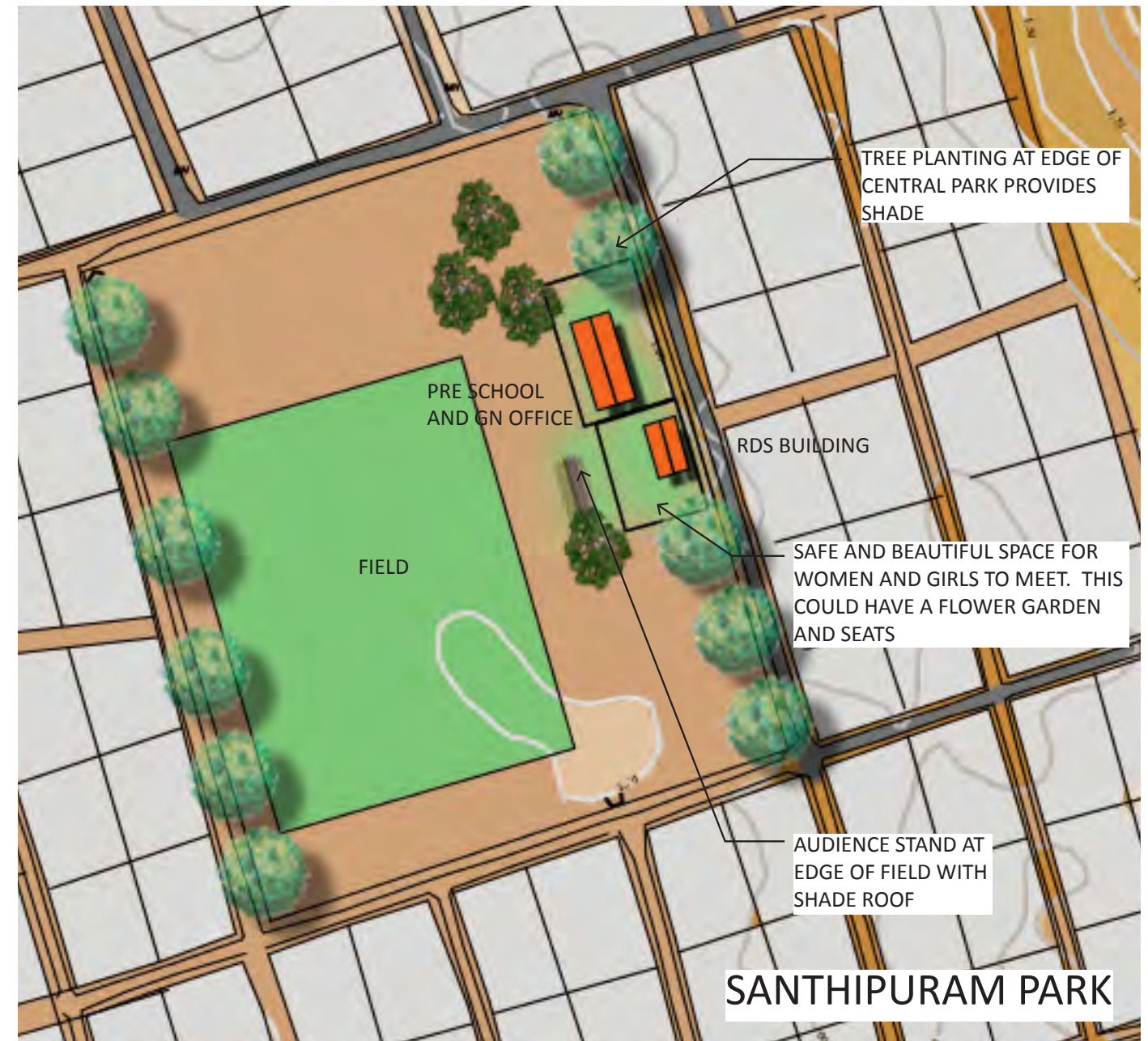
Santhipuram Park is highly valued and used by the community and should be protected. Some future community buildings could be located along the eastern boundary of the Park alongside the RDS/ WRDS building and pre-school building.

Suggested improvements are:

- Perimeter tree planting to provide shaded walkways and to beautify the Park, and encourage pedestrian access around the boundary to protect the playing grounds.
- Audience grandstand building so that patrons can watch football and cricket matches under cover, as well other community events.
- The audience shelter structure is extended to the rear to provide a frame for vines and trees. This laneway would be shaded with additional gates to access from existing buildings.
- A safe and beautiful place for women and girls to meet – this could be close to the south side of the RDS/WRDS building and include a garden and seating.
- Additional tree planting at public places will provide shelter and improve the appearance of these places for the benefit of the community.

## Implementation Steps

1. Confirm location of proposals, with possibility of community involvement for construction. Include planting scheme and maintenance responsibility.
2. Consider a community awareness program to open the park and to explain the intention for the new shaded areas being available for all the community.
3. Include secure gates in the rear walls of the buildings to open up this space during events.
4. Consider future sports club building location and details.



Audience grandstand to watch football in the shade



Shading by using vines



Garden and seating for women and girls to meet

Santhipuram: From Hardship to Heroes,



# Project 8: Railway Precinct (Shops)

## Description

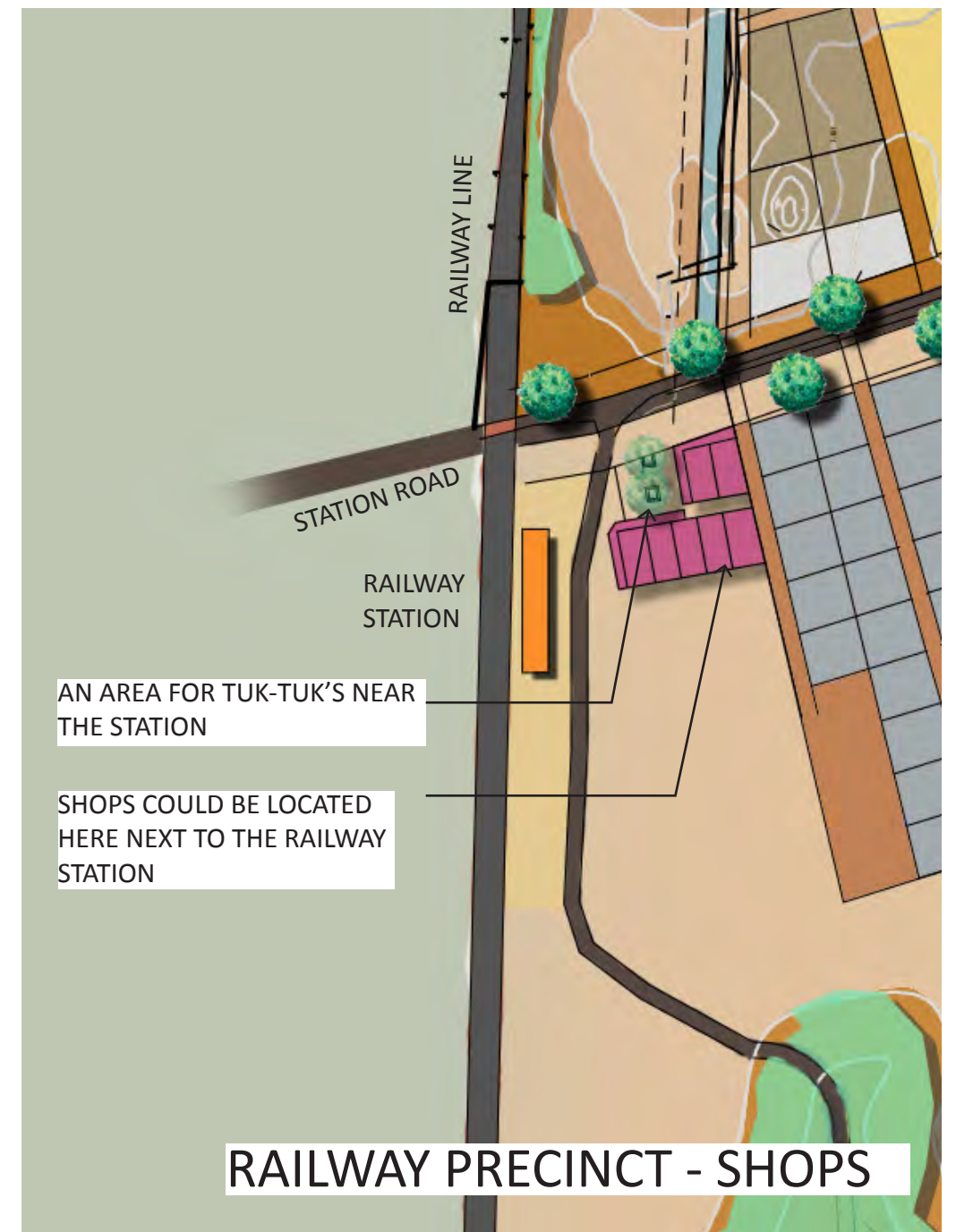
The opening of the new railway presents an economic opportunity for residents of Santhipuram, as suggested in consultation results. This could be to provide transport as drivers of three wheelers and to sell food and other goods to travellers.

Land alongside the Railway on the south side of Station Road in Santhipuram is a good potential location for some shops and parking space for three wheelers. A plan showing how this land could be used for shop buildings and parking is shown, including allocation of an area for parking of three-wheelers close to the Rail Station.

By forming a retail area, along with parking for waiting three-wheelers, there is the opportunity for employment and economic development for the area. The area would also include a shaded seating area for travellers and locals and encourage stopping at the shops.

## Implementation steps

1. Determine land use close to the new Rail Station for retail, industrial and commercial activities and the location of the bus stand and parking area for three-wheelers. Allocation of space for shops in Santhipuram on Station Road near the Railway Station.
2. Establishment of the new businesses. Initial phase could include temporary stalls to begin (mobile food stands and market stalls).



Parking area for three-wheelers



Moveable stores



Retail activities



## Project 9: Street Tree Planting - Station Road

### Description

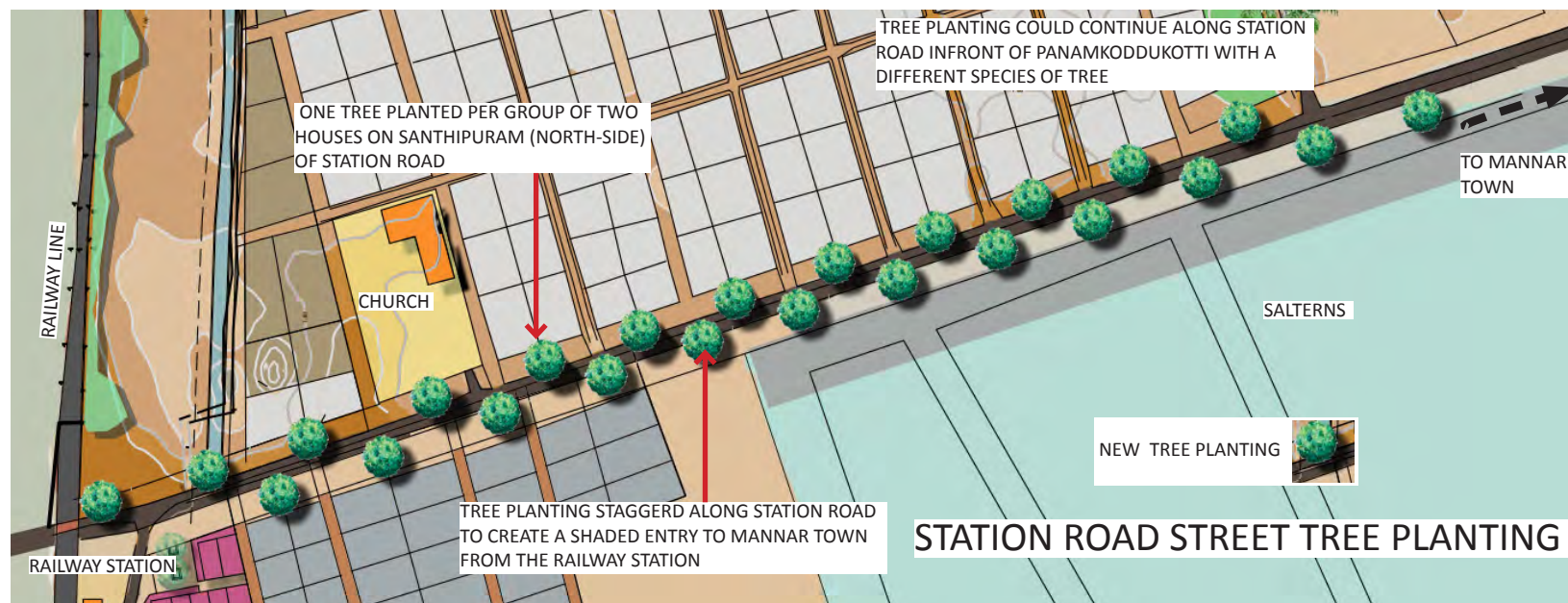
Street planting is not needed on all roads as shade is often provided from overhanging trees from private gardens.

However, Station Road would benefit from street planting as there is current no shading providing in this area, and could be part of the planned improvements. RDA plans to widen and raise Station Road are in development.

Adding street trees would provide a sense of a gateway to welcome visitors to Mannar Island.

### Implementation Steps

1. Station Road upgrade to be completed.
2. Confirm planting details and tree selection, along with maintenance responsibility.
3. Community, RDS and UC could be involved in planting these trees as an investment in Santhipuram and Mannar Town.



## Project 10: Street Lighting

### Description

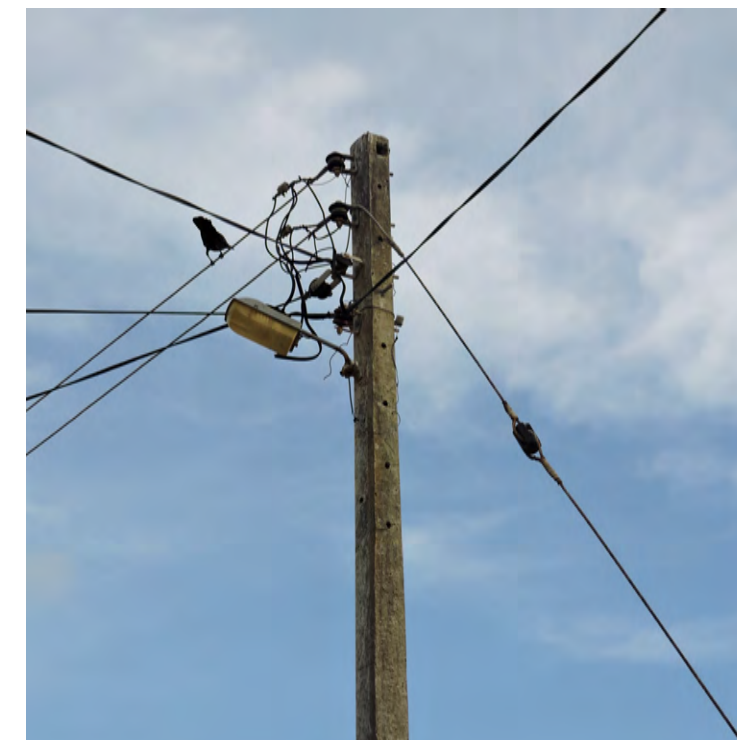
Streetlighting was a high priority from the community consultation, and highlighted are streets which have lights installed, need repair/replacement or are priority for further installation. Once the new line is installed by CEB, UC can then connect a new street lamp set.

Priority areas are:

- Sports ground and RDS / GN Office and Pre-School area.
- Streets leading into Santhipuram and to the Church.
- 2<sup>nd</sup> Street as one of the main access routes.
- Main road into South Bar.

### Implementation Steps

1. Apply to the UC for additional street lights, with map of priority areas and quantity of street lamp sets.
2. Repair existing lamp sets where required and install new lamp sets, beginning with priority areas, and where there are existing lines.
3. Once CEB has installed new lines, street lamps to be installed across Santhipuram as part of the rehabilitation works for Mannar Urban Area.





# Project 11: South Bar Housing Options

## Description

The area south of Station Road is known as South Bar. There is an area of permanent housing along the railway side, which is on higher ground and safe from flood during the usual rainy season.

There is also an area of semi-permanent housing (shown in grey on map adjacent), which has tidal flood as well as the rainy season flood waters, making it a priority for improvement. Any raised east west roads block drainage and worsen flooding.

Finally, there has also been a stakeholder suggestion of future plans to include an industrial area near the rail connection

In initial investigation, three options are available for this housing, and were presented at consultation:

- Relocate the existing South Bar residents to another location. The South Bar land can then be used for industrial or commercial purposes to create new employment given proximity to the Rail Station.
- Tsunami style housing (built above the ground on stilts). This allows flood water to enter the housing area and to recede afterwards. North-south roads would be raised to provide safe access during flood times (with walkways to the homes) and east-west roads would remain low so not to impede flood waters. (See sketch)
- Place fill across the South Bar housing area to raise the ground level and reduce the effects of flooding. The fill could come from the excavation of the larger Kulam proposed. (See sketch)

## Implementation Steps

Note that these options require further consultation, design and proposal, with integration into existing planning frameworks.

Relocation:

1. Semi-permanent housing not to become permanent until land use is resolved.
2. Confirm integration of UDA Mannar Urban Development Plan and authorities regarding:
  - a. Alternative housing area identification
  - b. Industrial and commercial land at use opportunities.

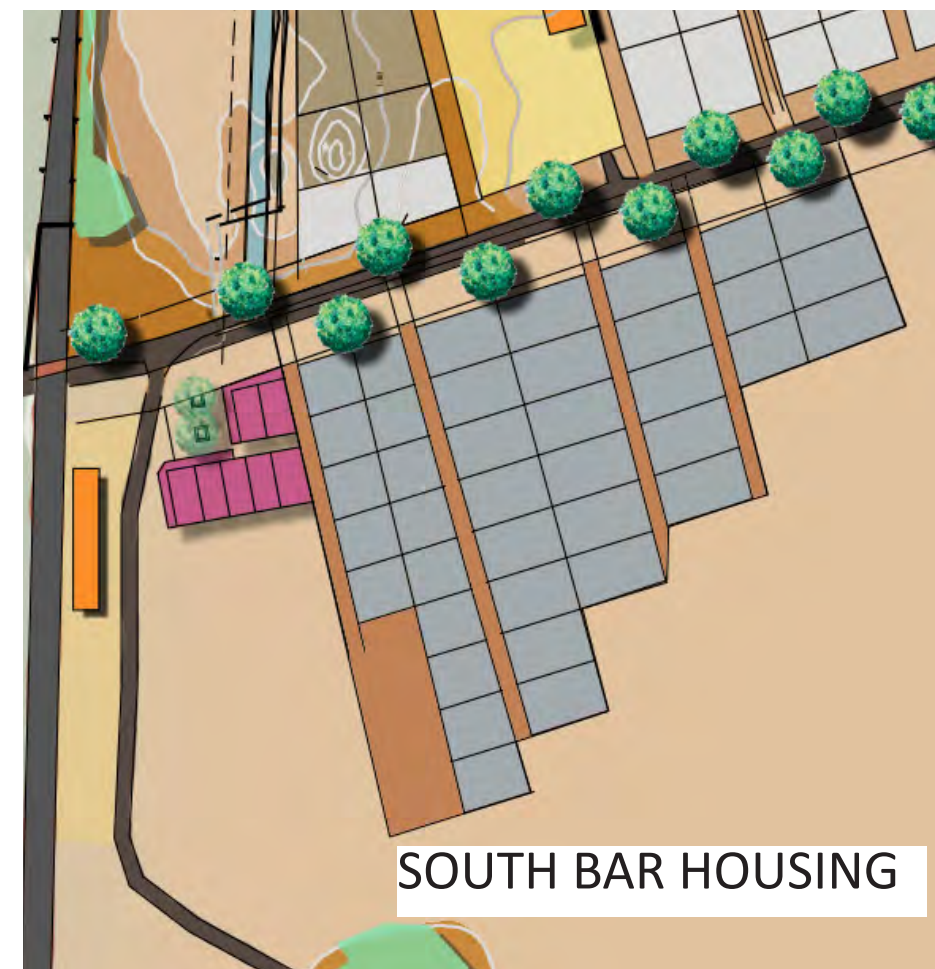
Tsunami Housing:

1. Seek guidelines for tsunami house design and construction relevant to South Bar.
2. Confirm plans with existing or proposed projects from DMC and other stakeholders.

Santhipuram: From Hardship to Heroes,

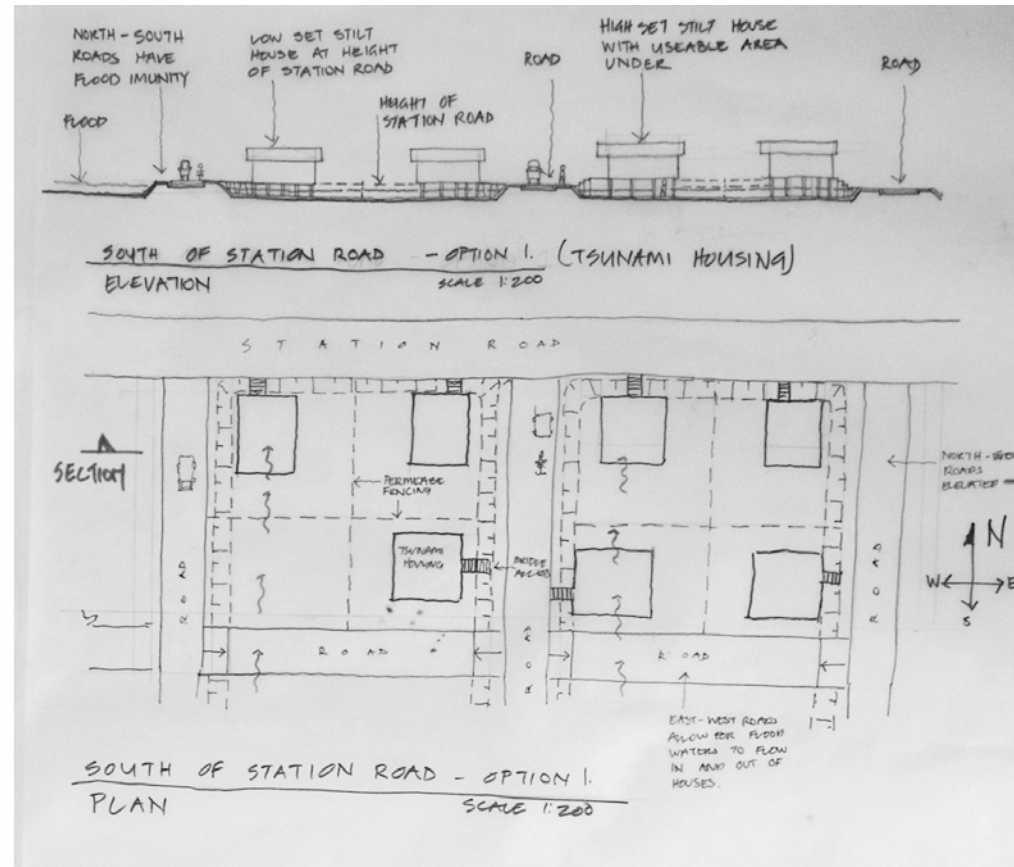
Higher Ground for Housing

1. Integrate with Project 3 for priorities in using fill from kulam expansion.
2. Determine opportunities for new housing scheme.

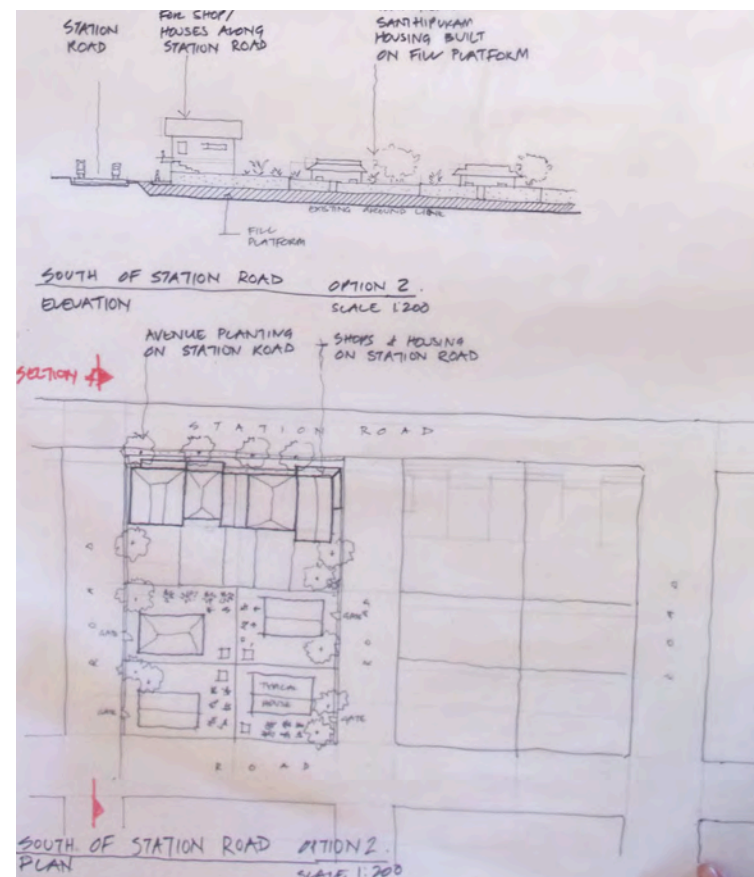




Option 2: Tsunami Housing



Option 3: Place fill across South Bar housing area



# Project 12: Housing Subdivision

## Description

People living in Santhipuram sometimes want to provide land for their family members to live nearby, but land is limited and not usually available.

One solution is to allow a family to add an extra house within their land for other family members. This land would not be subdivided, but would be occupied by two houses instead of one. This will allow a family to expand without having to buy, or encroach, on surrounding areas. Shared facilities would include sewerage, garden and kitchen.

## Implementation steps

1. Provide guidelines on adjoining or additional house plan on blocks of 10, 15 or 20 perch properties.
2. Allow planning requirements to include an option for an additional dwelling to be on the existing title.
3. Ensure that sufficient land is available to accommodate a septic tank for toilets. An additional water supply connection should be allowed for the second house and family.



House with the potential of adding an additional house to the lot



## IMPLEMENTATION PLAN

Strategies	Proposals	Actions	Who
<b>Drainage Strategy</b>	<p><b>Kulam Expansion</b> Construct a larger Kulam along the north-west edge of Santhipuram to store more water during flood. The new Kulam will be deepened and widened but leaving sufficient land for the school and create additional land for housing. This could include 3 basins – a bathing and washing pond (with steps), natural pond (with plantings) and a pond that becomes grass lined during the dry season.</p> <p>This will reduce the amount of land that is flooded, slow the flood water and improve safety. It will also provide more water storage which can be used by the community for bathing and washing.</p> <p>Earth taken from the larger Kulam can be transported to increase the height of land elsewhere – around the school and to improve housing in the south-west precinct. Increasing the height of the land around the Santhipuram School will provide safe land to live on during flood and provide an area of higher land for future school buildings.</p>	<p>The Regional Land Office (RLO) can make a proposal to the Disaster Management Centre (through the District Secretary) for funds for these earthworks because it will reduce the impact of flooding and improve safety. There is an annual opportunity to make funding requests to the Disaster Management Centre.</p> <p>MM22 Town Planning subcommittee and Bridging Lanka will assist the RLO to prepare this proposal.</p> <p>Another alternative could be to provide details of the larger Kulam proposal and a request to UN Habitat for funding as part of its Disaster planning program in Mannar.</p>	<p>RLO, DS MM22-TPC, BL</p> <p>UN Habitat</p>
	<p><b>Drainage Improvements</b> <b>Improve North-South Drains</b></p> <p>1. A new drain alongside the Rail reserve will improve north-south drainage and connect to the larger Kulam, taking flood water north to connect to the Old Dutch Canal.</p> <p>2. The Dutch Canal should also be restored and deepened to drain more rain water toward the sea during flood.</p> <p><b>Improve East-West Drains</b> The central east-west drain (part of the Old Dutch Canal) will collect rain water internally from Santhipuram and take it eastward to the Old Dutch Canal. This drain also needs to be deepened and restored.</p>	<p>The main section of the Dutch Canal could be restored by UN OPS as part of the drainage program for Mannar.</p> <p>The Urban Council should negotiate with UN Operations to include restoration of the Dutch Canal in Catchment I to improve drainage and flood mitigation in Santhipuram.</p>	<p>UNOPS</p> <p>UC</p>

Strategies	Proposals	Actions	Who
	<p><b>Detention Basin within Saltern</b> Provide additional storm water detention capacity during flooding it is proposed to create a 10 metre wide detention basin just south of Station Road within the area now occupied by the Saltern. This will collect coming to the sea from north-south drains in Santhipuram and improve drainage during flooding, allowing more water to discharge from the housing areas.</p>	<p>These construction works would be included within the proposal to be made to the Disaster management Centre.</p>	<p>RLO,DS MM22-TPC, Saltern Company</p>
	<p><b>Marking Extent of Flooding</b> Use concrete markers (dragon's teeth) to show the extent of flood waters. This will show the community which areas are flooded when water is high and where houses should not encroach.</p>	<p>The can be included within the proposal to the Disaster Management Centre, to pay for the cost of constructing concrete markers because this will improve safety and readiness for floods. The RDS and WRDS could be shown how to identify the correct place to put the markers during flood times, under RLO supervision. This should be done as early as possible because it will provide important information about the extent of flooding in deciding about the location of new houses. It should be checked again in subsequent years.</p>	<p>RLO, DMC, RDS, WRDS, MM22-TPC</p>
<b>Infrastructure Strategy</b>	<p><b>Santhipuram School</b> Sufficient land to be protected for additional school buildings to allow the school to include secondary classes when needed. Soil taken from the expansion of the Kulam can be used to increase the ground level to accommodate future school buildings. Sufficient land protected for playing field for school students.</p> <p>Tree planting to provide shade for school students is needed in the school grounds – this could be done as a community project with support from RDS and WRDS.</p>	<p>By agreement between the Regional Land Office (through the Divisional Secretary) and Santhipuram School.</p> <p>Community project organised by RDS and WRDS, tree stock provided by the Urban Council or a donor.</p>	<p>RLO, DS, SS, MM22-TPC</p> <p>RDS, WRDS, SS, UC or Donor RLO, SS</p>



Strategies	Proposals	Actions	Who
	A drainage channel from the expanded Kulam will need to flow through the school grounds to allow flood waters to escape during time of flood – this channel must be constructed and maintained.	By agreement between the Regional Land Office and Santhipuram School. This is part of the Larger Kulam project.	
	<p><b>Lighting</b></p> <p>Street lighting was identified by the Santhipuram community as a priority to improve safety. The first priority, once street light cabling is installed in Santhipuram, should be to connect lamps at the locations most used by the community.</p> <p>Additional street lighting can be installed in the future by the Urban Council when funding is available.</p> <p>Lighting at Santhipuram Park (near the RDS/WRDS buildings) and the Tuition building will extend the hours during which these facilities can be used by the community and improve safety, particularly for women and girls.</p> <p>Street lighting along the high level roads will also improve safety during high flood times.</p>	<p>Bridging Lanka understands from the Ceylon Electricity Board that cables for street lighting will be installed across Mannar within 12 months. The next step is for the Urban Council to provide the lamps and connect these to electricity poles (usually at 800m intervals).</p> <p>Street lamps currently cost 750 Rupees for single globe and 1150 Rupees for double globe.</p> <p>The first batch of 10 lamps could be located at the locations mostly needed by the community such as – along key roads, playing field, school, church, shrine, tuition building and some street corners.</p>	<p>CEB</p> <p>UC, RDS, WRDS MM22-TPC</p>
	<p><b>Playing Field</b></p> <p>Protection of the sports playing fields at Santhipuram Park and the Volley Ball field is important for community health and wellbeing.</p> <p>The community has also identified the need for audience shelter for patrons so they can watch football and cricket matches under cover.</p>	<p>A plan in this report shows a proposed future grandstand building. If materials can be made available, potentially funded by a Donor then construction of the audience grandstand could be done by the community under the guidance of the RDS/WRDS. The Donor will need to seek approval from the Regional Land Office.</p> <p>Bridging Lanka will provide a more detailed construction design of the audience shelter.</p>	<p>RDS, WRDS, Donor, RLO</p> <p>BL, MM22-TPC</p>

Strategies	Proposals	Actions	Who
		The Urban Council will be in the best position to estimate the cost of materials and to approve the design.	UC
	<p><b>Central Field</b></p> <p>The Central field will benefit from shade tree planting.</p>	The RDS and WRDS can undertake shade tree planting at the Central field as a community project. The RDS/WRDS will need approval from the Regional Land Office (through the DS) and donor support for the tree stock.	RDS, WRDS, DS.
	<p><b>Roads</b></p> <p>A continuous dry road connection during times of flood is important for community safety – this connection is shown on the Plan for Santhipuram.</p>	The Disaster Management Centre and the Urban Council should ensure that a high level road is maintained for safe exit from Santhipuram in time of flood.	DMC, UC, MM22-TPC



Strategies	Proposals	Actions	Who
<b>Social Strategy</b>	<p><b>Santhipuram Park</b> Santhipuram Park is highly valued by the community and should be protected. Some future community buildings could be located along the eastern boundary of the Park alongside the RDS/ WRDS building and pre-school building.</p> <p>Suggested improvements are:</p> <ul style="list-style-type: none"> <li>Perimeter tree planting to provide shaded walkways and to beautify the Park.</li> <li>Audience grandstand building so that patrons can watch football and cricket matches under cover.</li> <li>A women and girls garden near to the RDS/WRDS building that is safe and attractive.</li> </ul>	<p>By agreement between the Regional Land Office and the RDS/WRDS</p> <p>Community project organised by RDS and WRDS, tree stock provided by Urban Council or Donor. The Donor will need to seek approval from the RLO (through the DS). If materials can be made available, potentially funded by a Donor, then construction of the audience shelter could be done by the community under the guidance of the RDS/WRDS. The Donor will need to seek approval from the RLO (through the DS).</p> <p>Community project organised by RDS and WRDS, tree stock and seating provided by Urban Council or donor.</p>	<p>RLO UC, RDS, WRDS</p> <p>RDS, WRDS, RLO, DS.  RDS, WRDS, RLO, DS MM22-TPC</p> <p>RDS, WRDS, RLO, DS, MM22-TPC</p>
	<b>Market</b> If the market is working it provides a place for people to buy food, vegetables and household items they need every day. The building is in place but is not functioning.	The RDS, WRDS and District Secretary will work together to make the market work again as a place for selling food, vegetables and household goods. If the Market does not work because it is poorly located, then an alternative location can be investigate.	DS, RDS, WRDS MM22-BC
	<b>Tree Planting and Seating</b> People living in Santhipuram already grow trees and plants and maintain them during drought and flood. These provide food and shelter as well as making Santhipuram look green and attractive. They are good for the environment.	Tree planting is a good community development project where the community can put in their labor to plant and water the trees with the support of the Urban Council.	RDS, WRDS, UC MM22-EC

Strategies	Proposals	Actions	Who
	<p>Additional tree planting at public places will provide shelter and improve the appearance of these places for the benefit of the community.</p> <p>Park seating can provide a place for people to sit and talk and to watch children playing.</p> <p>Tree planting along Station Road to provide a gateway to Mannar and Santhipuram</p>	<p>This can be a series of Community projects organised by RDS and WRDS, with tree stock provided by the Urban Council.</p> <p>Installing park seating can be a community project organised by RDS and WRDS with the park seating provided by a donor or UC RDS. The Donor will need to seek approval from the RLO.</p>	RDS, WRDS, RLO, DS MM22-TPC
	<p><b>Railway Precinct (shops)</b> The opening of the new Railway presents an economic opportunity for some residents of Santhipuram. This could be to provide transport as drivers of three wheelers and to sell food and other goods to travelers.</p> <p>Land alongside the Railway on the south side of Station Road in Santhipuram is a good location for some shops and parking space for three wheelers. A plan showing how this land could be used for shop buildings and parking is included in this report. The UDA and Urban Council should allocate an area for parking of three-wheelers close to the Rail Station.</p>	<p>MM22 – Business Committee can seek approval from the Urban Council to allocate space for shops in Santhipuram on Station Road near the Railway Station to residents of Santhipuram to establish several small businesses.</p> <p>The Mannar Urban Development Plan being prepared by the Urban Development Authority should determine land use close to the new Rail Station for retail, industrial and commercial activities and the location of the bus stand and parking area for three-wheelers.</p>	UC MM22-BC  UDA
	<p><b>Bathing Area at Kulam</b> Places for bathing and washing in clean rain water are limited in Santhipuram.</p> <p>The larger Kulam proposed for Santhipuram will provide a larger area of rain water during the year which can be used for bating and washing.</p> <p>Construction of concrete bathing steps on the edge of the larger Kulam will make it easier for people to use this water.</p>	<p>If the larger Kulam is constructed then the additional space for bathing and washing can be provided. Approval is needed from the District Secretary if the larger Kulam is built. Construction of bathing steps can be a community project managed by the RDS, materials from a</p>	DS, RDS, Donor MM22-TPC



Strategies	Proposals	Actions	Who
		donor.	
<b>Housing Strategy</b>	<p><b>Higher Ground for Housing</b> Additional housing options in Santhipuram include:</p> <ol style="list-style-type: none"> <li>Excavation of ground to create the larger kulams provides fill material (soil) which can be moved onto low lying land to provide some higher land for housing. The proposal is for the fill to be placed on fill areas A and B on the western side of Santhipuram near the Railway line. There is already encroachment in this area, but only semi-permanent housing exists. The UC could approve these housing requests subject to the additional fill being taken from the larger kulams and placed on this land. Residents wanting to build a house in these areas could remove the soil and fill it onto their land using their own labor, under the supervision of the UC. This will also accelerate the construction of the larger Kulam.</li> <li>People living in Santhipuram sometimes want to provide land for their family members to live nearby, but land is limited and not usually available. One solution is to allow a family to add an extra house within their land for other family members. This land would not be subdivided, but would be occupied by two houses instead of one. The UC will need to make sure that sufficient land is available to accommodate a septic tank for toilets. An additional water supply connection should be allowed for the second house and family.</li> </ol>	<p>If the plan for the kulams expansion is approved by the UC, then the Regional Land Office can mark out where residents can remove soil to be used as fill onto their land. This would be a condition of approving land title in fill areas A and B. We estimate that the amount of fill to be placed on these blocks prior to building a house ( to bring them up to 1.0 meter above mean sea level) varies from 0.2 up to 0.45 metre (shown on the fill plan). The RLO could check the amount of fill and its compaction prior to building commencing.</p> <p>The Regional Land Office should allow a second house to be built on land to accommodate other family members on the same land. This should occur on areas where the extra fill has been placed to bring the block up to 1.0 metre above mean sea level – fill areas A and B.</p>	<p>DS, LRO Residents, MM22-TPC</p> <p>RLO, MM22-TPC</p>
	<p><b>South Bar Housing</b> The South Bar housing area is different from Santhipuram housing on the north side of Station Road because it is affected by tidal flooding from the sea, in addition to flood from heavy rain during the wet season.</p>	<ol style="list-style-type: none"> <li>The Mannar Urban Development Plan being prepared by the Urban Development Authority should identify the future of South Bar and the</li> </ol>	<p>UDA, MM22-TPC</p>

Strategies	Proposals	Actions	Who
	<p>If a rail line is built to transport salt from the saltern production area to the Railway then will create an additional dam holding water and worsening the flooding in South Bar. Careful investigation is needed of the South Bar housing areas before any rail line is built between the Salterns and the Railway. There are three options for the South Bar Housing area:</p> <ol style="list-style-type: none"> <li>Relocate the existing South Bar housing to another location – such as the new housing are west of the Rail line. The South Bar land can then be used for industrial or commercial purposes to create new employment. This could include industry related to salt production and transport or fish processing. Its proximity to the Rail Station makes this land attractive for industrial and commercial purposes.</li> <li>Use South Bar for Tsunami style housing (built above the ground on stilts). This has potential to be supported by an international NGO as a new housing project. This style of housing is supported by the Disaster Management Centre because it allows flood water to enter the housing area and to recede afterwards. North-south roads would need to be raised to provide safe access during flood times and east-west roads would remain low so not to impede flood waters.</li> <li>A third option is to place fill across the South Bar housing area to raise the ground level and reduce the effects of flooding. The fill could come from the excavation of the larger Kulam proposed.</li> </ol>	<p>need for industrial and commercial land. This should be done before permanent houses are constructed there. The UDA will need to identify an alternative housing area for relocation of the South Bar residents. The UDA should consult with the Saltern Company and others about the need for industrial and commercial land at South Bar and close to the Rail Station.</p> <ol style="list-style-type: none"> <li>If the Mannar Urban Development Plan determines that South Bar is suitable for housing then it should also determine if the area is to be occupied by Tsunami housing and the form of development. The UDA should seek advice from the Disaster management Centre about the use of Tsunami housing in South Bar.</li> <li>If the Mannar Urban Development Plan does not endorse the use of Tsunami housing at South Bar then it should consider the placement of fill to increase the ground level and which agency is responsible for increasing the ground level.</li> </ol>	<p>UDA, DMC, Donor</p> <p>UDA</p>



## IMPLEMENTATION AND SEQUENCING

Short – by end 2015 Medium – by end 2016 Long – beyond 2016

No.	Strategies	Proposal	Sequence	Who	Timing
1	<b>Drainage Strategy</b>	Kulam Expansion	Proposal to DMC in next 6 months; response by mid-2015. If proposal is successful then construction during 2016.	RLO, DS MM22-TPC, BL UN Habitat	Medium
2		Improve North-South Drains (Old Dutch Canal)	Can be completed separately to construction of larger Kulam. Part of UN Operations project during 2014 – 2015.	UNOPS	Medium
3		Improve East-West Drain (part of Old Dutch Canal)	Can be completed separately to construction of larger Kulam. Part of UN Operations project during 2014 – 2015.	UNOPS	Medium
4		Detention Basin within Saltern	Can be completed separately to construction of larger Kulam. Part of UN Operations project during 2014 – 2015.	UNOPS	Medium
5		Marking extent of Flooding	During floods late 2014, early 2015	RLO, DMC, RDS, WRDS, MM22-TPC	Short
6	<b>Infrastructure Strategy</b>	Santhipuram School  Protection of school land  Tree planting to provide shade for school students	By agreement between the Urban Council and Santhipuram School. 2014. Community project in 2014 and 2015.	RLO, DS, SS, MM22-TPC RDS, WRDS, Donor	Short  Medium
7		Lighting	CEB will install street light cabling into Mannar by mid-2015.  RDS/WRDS and the Urban Council could negotiate to jointly fund the first batch of street lamps when the cabling is installed at the locations mostly needed by the community – in 2015.	CEB  RDS, WRDS, UC MM22-TPC	Short  Medium

No.	Strategies	Proposal	Sequence	Who	Timing
8		Playing Field	Construction of grandstand. Design in 2014 Secure materials 2015 Construction 2015	DS, RLO, RDS,WRDS , BL, Donor MM22-TPC	Medium
9		Roads	Ensure that a high level road is maintained for safe exit from Santhipuram in time of flood. Proposal to DMC in next 6 months; response by mid-2015. If proposal is successful then construction during 2016.	DMC, RDA MM22-TPC	Medium
10	<b>Social Strategy</b>	Santhipuram Park	Perimeter tree planting to provide shaded walkways and to beautify the Park as a community project by RDS and WRDS in 2014 and 2015. Tree stock provided by UC.  A safe and beautiful place for women and girls to meet as a community project by RDS and WRDS, tree stock and seating provided by UC, during 2015.	DS, RLO RDS, WRDS, MM22-TPC  RDS, WRDS, UC	Short  Short to Medium
11		Market	The RDS, WRDS and UC will work together to make the market work again as a place for selling food, vegetables and household goods – resolve by 2015.	DS, RDS, WRDS MM22-BC	Short



No.	Strategies	Proposal	Sequence	Who	Timing
12		Tree Planting and Seating	A series of community tree planting projects including: <ul style="list-style-type: none"> <li>Perimeter trees at Santhipuram Park</li> <li>Creating a women's and children's garden outside the RDS/WRDS building</li> <li>Shade trees at the market</li> <li>Tree planting along the Kulam and near the Shrine</li> </ul> <p>These can start immediately in 2014, to be supported by the UC and organised by the RDS and WRDS.</p>	RLO, DS RDS, WRDS, MM22-TPC	Short to Medium
			Installing park seating can be a community project organised by RDS and WRDS with the park seating provided by the Urban Council in 2015 and 2016	RDS, WRDS, UC, MM22-TPC	Medium
13		Railway Precinct (shops)	Urban Council could allocate space for shops in Santhipuram on Station Road near the Railway Station in 2014.	UC	Short
			The Business Committee from Bridging Lanka can assist with this process and the establishment of the new businesses in 2014.	MM22-BC	Medium
14		Bathing and Washing	If the larger Kulam is constructed then the additional space for bathing and washing can be approved by the UC in 2016.  The construction could be a community project organised by the RDS and WRDS in 2016.	UC, RDS, MM22-TPC	Medium

No.	Strategies	Proposal	Sequence	Who	Timing
15	Housing Strategy	Higher ground for Housing and an additional house for family members	The Regional Land Office (through the District Secretary) could approve housing requests in fill areas A and B subject to the additional fill being taken from the Kulam expansion area and placed on the housing land. Residents wanting to build a house in these areas could remove the soil and fill it onto their land using their own labor. An additional house on land that has been filled could be allowed in areas A and B. The DS could do this in 2014 or 2015.	DS, RLO Residents, MM22-TPC	Short
16		South Bar Housing	Urban Development Plan for Mannar – completion in 2014 by the UDA	UDA	Short
			Investigation of Tsunami housing for South Bar by DMC.	DMC, Donor	Medium
			If the Mannar Urban Development Plan does not endorse the use of Tsunami housing at Southbar then it should consider the placement of fill to increase the ground level and which agency is responsible for increasing the ground level.	UC	Long



## REFERENCES

Ref	Title	Subtitle	Description	Date	Author	District
1	Metro Colombo Urban Development Project	Environmental Screening Report for Establishment of Beddagana and Kotte Ramparts Parks			Uni-Consultancy Services - University of Moratuwa	Colombo
2	Mannarin Marumalarchi 2022 - Annexure 3	Complete notes from village workshops and community forum				Mannar
3	Diaspora Lanka Report, 28 Sept to 31 Dec 2013			1/12/13	Diaspora Lanka	
4	Information for Australian Planners Workshop	Shantipuram, Pannankattukottu East & West		30/05/14	Sinclair, Peter	Mannar
5	Drainage Project in Mannar Township			9/05/14	UNOPS	Mannar
6	Blocking Out Diagram for a Housing Scheme	Divisional Secretary Mannar, Requisition for Survey No. MND/SR/SP/37 of 1999-05-17	Survey plan for 2nd scheme Santhipuram land allocation	28/05/99	Department of Survey	Mannar
7	Blocking Out Diagram Showing Block C at Railway Station	GA Mannar's Requisition for Survey No. 1/PTF/MN/STR/VE of 1995-03-22	Survey plan for 1st scheme Santhipuram land allocation	22/03/95	Department of Survey	Mannar
8	Handbook on Design and Construction of Housing for Flood-Prone Rural Areas of Bangladesh			1/01/05	Asian Disaster Preparedness Centre (in partnership with: Bangladesh Disaster Preparedness Centre, CARE-Bangladesh, Bangladesh Ministry of Food and Disaster / Comprehensive Disaster Management Programme, BRAC University	Bangladesh
9	Briefing: Houses for Flood-prone Areas			18/06/11	Cement Concrete & Aggregates Australia	Australia
10	A Field Guide to the Common Trees and Shrubs of Sri Lanka	(including an introduction to the flora, plant uses, and index)		1997	Ashton, Mark S.; Gunatilleke, Savitri; de Zoysa, Neela; Dassanayake, M.D.; Gunatilleke, Nimal and Wijesundera, Siril.	



## APPENDIX 1: STAKEHOLDERS

State and Government Departments that have been consulted and involved in this project:

- Government Agent Mannar (GA)
- Divisional Secretary Mannar (DS)
- Survey Department Mannar (Contour Maps, Encroachments)
- Disaster Management Centre, Mannar (Flood, Drought, Tsunami)
- District Land Officer (DS Office)
- Urban Council Mannar (Environmental, Garbage Clearing, Clean Water, Sewerage, House Taxes, Electricity, Water, Telecom) (UC)
- Environmental Officer Mannar (Pollution; Land, Wind and Sea)
- Water and Drainage Board
- Sri Lanka Telecom
- Ceylon Electricity Board (CEB)
- Coastal Conservation Department
- Railway Department
- Road Development Authority (RDA)
- Assistant Commissioner of Agricultural Department

Additional Stakeholders (non-governmental)

- UNOPS Mannar (Drainage Engineers, Planners)
- UN Habitat
- Saltern Manager

Organisations within Santhipuram

- Grama Niladari (GN) Local Authority for Santhipuram and South Bar.
- Santhipuram RDS (Rural Development Society)
- Santhipuram WRDS (Women's Rural Development Society)
- Food & Accommodation Committee
- Announcements Group
- Lifesaving Group
- Religious dignitaries of this area (Roman Catholic, Muslim, Hindu, Buddhist)
- Fishermen's Organisation

Santhipuram: From Hardship to Heroes,

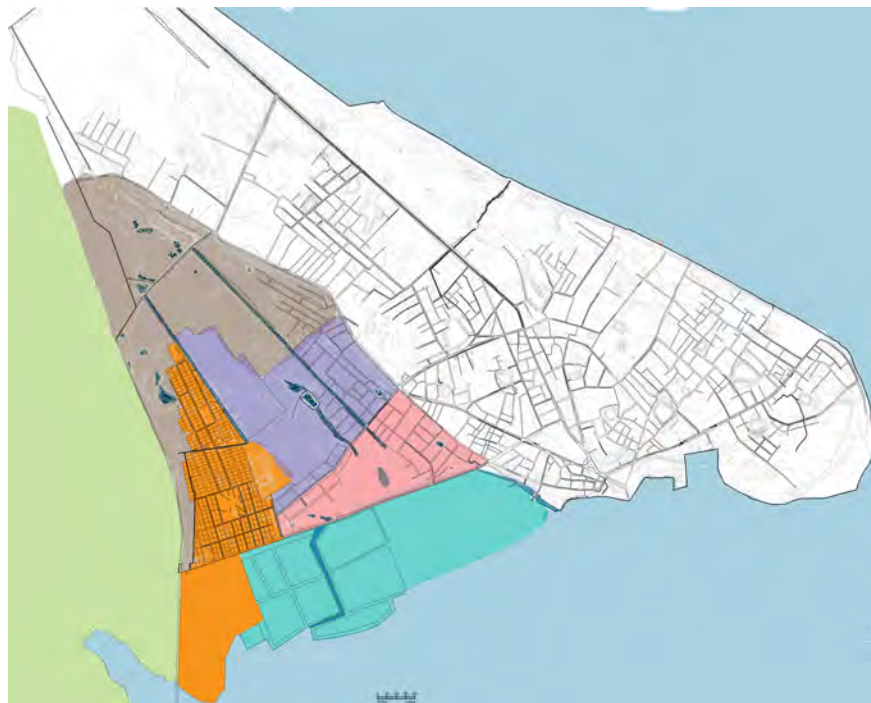


## APPENDIX 2: SCOPING STUDY AND PROJECT DEFINITION

The initial phase of this project was to determine the extent of the study. It involved a rapid assessment of the villages that flood east of the town. Time constraints and government requests resulted in the project being limited to Santhipuram. There are opportunities for future studies to be undertaken for the surrounding villages. This section provides an overview of the flood issues in this area and suggests opportunities for townscape improvements.

The area considered in the initial scoping study lies to the east of the old part of Mannar town and is bounded in the west by the reconstructed railway line, the north by Tharavan Koddai Road and Station Road in the south. The area is low lying and forms two large drainage basins that prior to the development of the town may have drained the lands to the north west of the township and been subject to tidal inundation. The construction of dutch canals (probably used for transport of spices and goods), a railway line, roads, the saltern and most recently housing have dramatically changed the natural drainage system by creating a series of dams and channels.

This drainage basin contains the suburbs of Tharavai, Emir Nagar, Panamkaddikoddu and Santhipuram.



Village location

### Emir Nagar (East and South)

Emir Nagar is located to the north of the Santhipuram Road. A series of kulams (ponds/tanks) and an old Dutch canal provide the main drainage route for flood waters. The canal and the kulams both outfall through a series of culverts under Santhipuram Road into the drainage basin in Panamkaddikoddu South. The housing in Emir Nagar is located in three distinct areas:

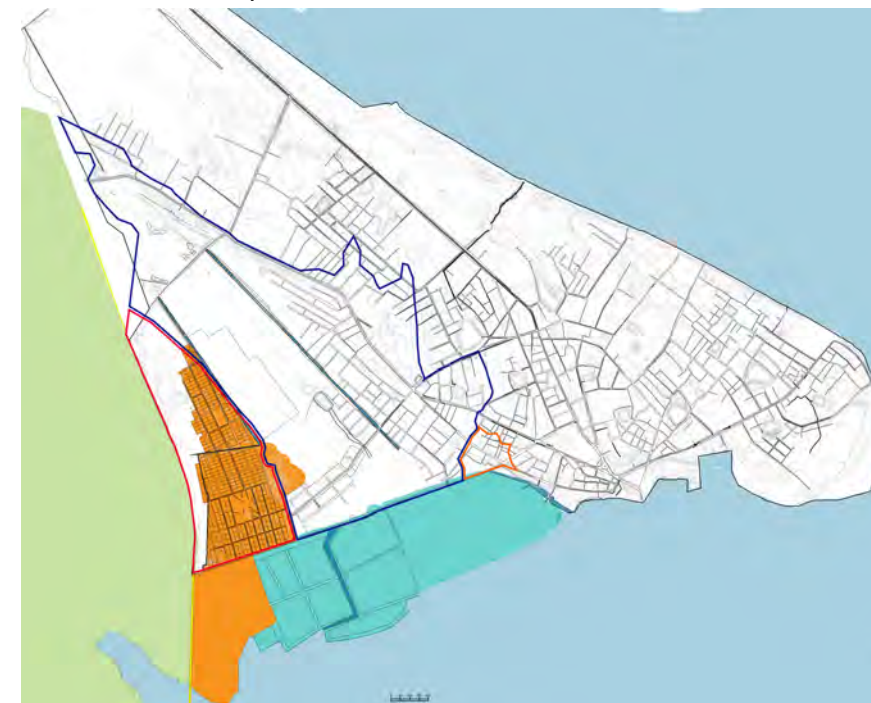
Santhipuram: From Hardship to Heroes,

- Along Santhipuram Road the houses are elevated and “permanent” and create a dam between Emir Nagar and Panamkaddikoddu.
- In the west adjoining the Santhipuram village the houses are “semi-permanent” and built in low lying areas (RL 0.75 or below). From site observations it would appear the roads and houses would flood during the rainy season.
- To the east Emir Nagar connects directly with Mannar town.

Townscape improvements to this village could include drainage mitigation measures as well as the creation of a large useable open space area for use by the surrounding suburbs and Mannar township.

Opportunities could include:

- Deeping and widening the existing kulams
- Clearing the old canal of debris and fill
- Increasing the size of the culverts under Santhipuram Road
- Redirecting the storm water to the north into a large tank. This water could be used to increase the Mannar Towns water supply in the dry period.
- Creating a series of wetlands that provide habitat for water birds and filter polluted water
- Paths and parkland facilities beside cool water bodies



Catchment Areas

### Panamkaddikoddu (South and East)

Panamkaddikoddu is located between Santhipuram Road and Station Road. There are two distinct areas in this village.

Panamkaddikoddu east is an established suburb that is located on the edge of Mannar township. The houses are predominately permanent. The area is drained through road side drains and culverts into kulams within the built up housing area. An open major drain corridor connects the kulams and outlets under Station Road into a wide channel connecting to the sea at the east edge of the salterns.



This village has some of the lowest areas in Catchment H with housing sitting below RL0.5. From site observations it appears to flood during the rainy season and we anticipate that there would be tidal inundation also given its low elevation. The drainage of this area appears to be compromised with encroachment and dumping of rubbish around the kulams and blocked of culverts and drains.

Opportunities for townscape improvements could include;

- Deeping and widening the existing kulams.
- Detailed assessment of the existing culvert network to determine the necessity for additional pipes and culverts.
- Increasing the size of the culverts under Station Road.
- Redirecting stormwater flood waters from Panamkaddikoddu South to reduce Panamkaddikoddu sub-catchment area.
- Elevated paths and road network that allows access to the town in the rainy season.

Panamkaddikottu south is located along Station Road and the south side of Santhipuram Road includes the large low drainage basin that is feed from the Emil Nagar catchment. This drainage basin is drained by a culvert to the west of the catchment that outfalls under Station Road and into a large drainage channel within the Salterns. The houses along Santhipuram Road are predominately permanent and elevated. The houses along Station Road are mostly semi-permanent (however there are a few substantial properties that have filled within the drainage basin to the height of Station Road. Near the culvert inlet on Station Road the houses are all semi-permanent and at the time of the site investigations (June during the site visit) water was seen to be lying around some of the properties. Any drainage works in Panamkaddikottu would need to be done with consideration of the drainage works in Emir Nagar. Opportunities for townscape improvement could include;

- Creation of a kulam within the centre of the drainage areas to increase stormwater storage and reduce the duration of the flood.
- A bund protection embankment around the housing to create an elevated water body and protect the existing low lying houses.
- To redirect all the stormwater from Emir Nagar to the north and fill the whole area to create more flood free housing land.
- Elevated paths and roads to connect the communities to Station of Santhipuram Road during the rainy season.



Blocked drainage under Station Road



Old Dutch Canal



Block drainage under Station Road