

PRE-FEASIBILITY

**SWEDEN NAGAR
PIMPRI CHINCHWAD
SMART CITY**



SWEDEN NAGAR SUSTAINABLE URBAN REGENERATION FOR THE FUTURE

Pre-Feasibility Study
Pimpri Chinchwad Smart City
March 2018

This pre-feasibility study is written to report our findings, recommendations and to form a basis for conducting a detailed feasibility of the proposed Sweden Nagar project in Pimpri Chinchwad, as a potential Smart City in India developed with Swedish co-operation. This study is based on a field visit conducted by members of Teknikföretagen, SIBC, IVL and Sweco between February 26th - March 1st 2018.



Teknikföretagen



EXECUTIVE SUMMARY

Sustainable cities and infrastructure is crucial to tackling the three central challenges facing the global community: reigniting growth, delivering on the Global Goals, and reducing climate change risk in line with the Paris Agreement.

Transformative change is needed now in how we build our city spaces, use energy, transport people and goods, and manage our landscapes. The need for a new sustainable infrastructure in India offers a fantastic opportunity to “leapfrog” the inefficient, sprawling and polluting systems of the past.

Sweden Nagar offers an historic opportunity for Swedish industry to showcase solutions and technologies that can deliver inclusive economic growth, eliminate poverty and reduce the risk of climate change. With Pimpri Chinchwad we have a municipality that is pro-Sweden and have already committed 15 million Euros for the initial budget. Thus, we have a strong business case to demonstrate the Swedish model of integrated development and this could, with us be an example of sustainable infrastructure for other cities throughout India and worldwide.



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BACKGROUND

In 2014 India launched its Smart City Mission and selected 100 cities with the aim to lead an urban development across the nation and setting an example. Focus is on increasing ICT services, waste management, energy efficiency actions, clean transport and mobility management.

Each smart city area is an average of 4.9 sq km. The smart city mission created a framework that helped focus the direction needed for urban development. The mission, and areas selected within the Smart Cities should not be seen as a limiting factor for areas of engagement, but rather as a first step for India's fast growing municipalities to understand the scope of smart city development.

Sweden has a strong history of positive experience in the Smart City/ SymbioCity arena, with a focus on planning as a mean to deliver effective solutions. This has been recognized most recently with the development of Smart City Sweden 2016, as a national centre of excellence, funded by the Swedish government and Swedish Energy Agency, and managed by IVL. A Memorandum of Understanding (MoU) on Smart Cities was signed between the Confederation of Indian Industries (CII) and Teknikföretagen, on October 5th 2016 in the presence of Energy Minister Baylan and Energy Agency Director General.

Sweden has recognised the value of engaging with India. From a business perspective, this is reflected in the Government to Government Memorandums of Understanding that have been signed in the areas of Energy, Urban Development and Micro, Medium and Small Enterprises. Smart Cities are further reflected in the India Sweden Business Leaders Roundtable (ISBLRT), a business to business network with the objective to provide strong frameworks for cooperation in the areas of smart cities, defence, digitization, development and entrepreneurship.

In October 2017 during the Make in India conference in Stockholm, a roundtable was held with interested companies and the Consul General Ulrika Sundberg, where the suggestion of developing a success story for Smart City Sweden in India was put forward including Pimpri Chinchwad (Pimpri) as a potential opportunity, due to existing solid ties with Sweden.

In November 2017, Pimpri's Commissioner Shravan Hardikar visited Stockholm and Gothenburg with a view to understand the Swedish best practice in the area of smart cities. He requested that Sweden investigate opportunities in a specifically selected area of Pimpri, to showcase Swedish solutions, but also take the first step to creating viable sustainable business models.

WHY PIMPRI

Pimpri is situated in the greater Pune area in state of Maharashtra, India. The area is predominantly an industrial hub and has been the location of choice for automotive and heavy industry since the Indian independence.

Swedish presence in Pimpri began with Sandvik's establishment in 1960, shortly followed by Alfa Laval and Atlas Copco, all three are adjacent to each other, so much so that the area was named Svea Nagar (Sweden Town). Pimpri Chinchwad Municipal Corporation has recently accepted that the road where all the above mentioned companies are located be named Swedish Avenue. Slightly north of Svea Nagar is SKF's large manufacturing campus.

It can be said that Pimpri Chinchwad and Pune greater region have the highest concentration of Swedish companies in India. This has made the local population aware of Sweden. There is political support for Swedish brands and as such making it an attractive location for the demonstration of Swedish technology and knowhow. Sweden Nagar has the potential to be the first success story for a coordinated Swedish offer in India which can be replicated nationwide.

SWEDEN NAGAR

Together with Pimpri's Commissioner an area surrounding Svea Nagar and Swedish Avenue has been outlined to be officially recognised as Sweden Nagar.

Sweden Nagar has a population of ca. 20 000 and provides employment to another 20 000, and occupies an area of slightly over 1 sq. km. There is a highway (old Mumbai-Pune) passing through the centre, a surrounding river, industrial units, residential areas, commercial establishments, informal housing, BRT stops, a planned Pune Metro station, heavy traffic, a planned regional transport node at one end and is connecting to Pune via bridge.

Sweden Nagar offers all the challenges that rapid urbanisation has created in multiple cities across the globe. It also offers all the environmental issues regarding air, land and water contamination. Thus, a successful demonstration of a systematic solution based approach to solve the issues within Sweden Nagar can easily be replicated and exported to multiple cities and countries.

Swedish Avenue and Sweden Nagar are at the border of the main connecting road to Pune, which is located along Old Mumbai Road to the south of Wakar - Bhosari BRTS Road.

BASIS OF STUDY

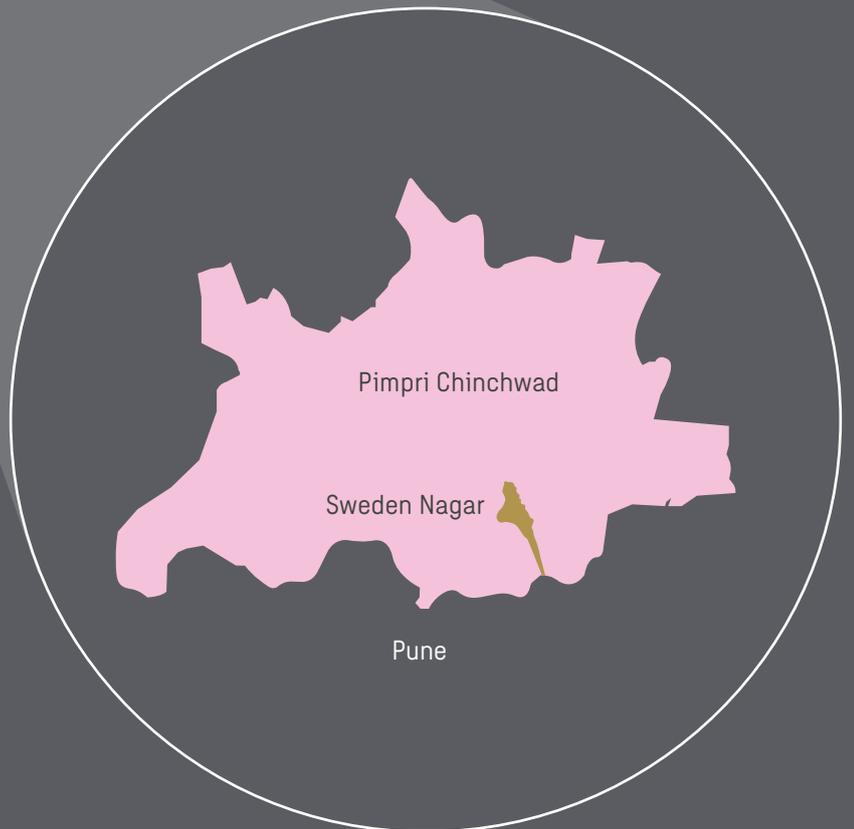
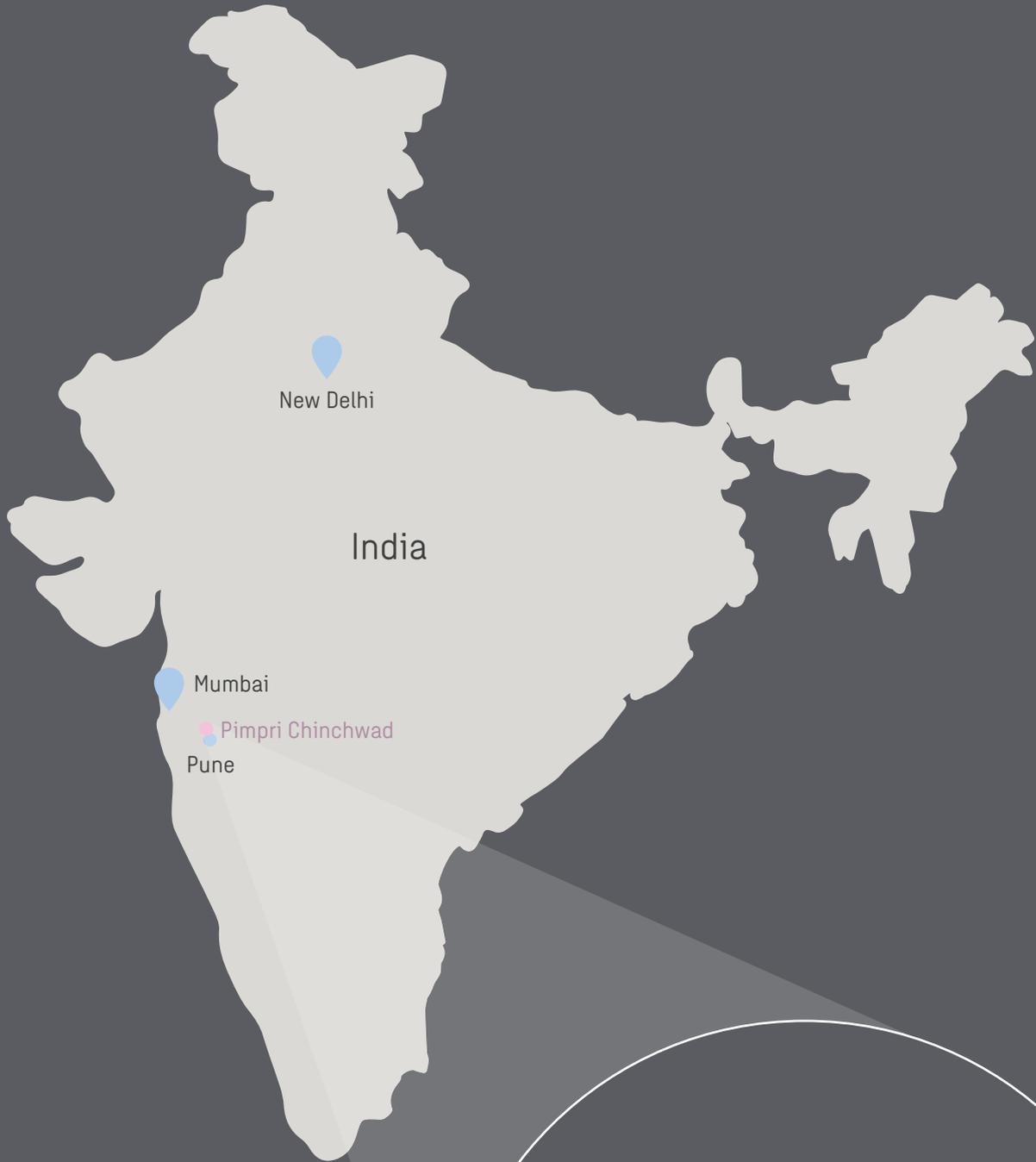
This pre-feasibility study is based on our findings and understanding during our study visit to Pimpri, between February 26th - March 1st 2018. A pre-feasibility team from Teknikföretagen, SIBC, IVL and Sweco in assistance from the Pimpri Chinchwad Municipal Corporation participated in multiple meetings and conducted various field visits.

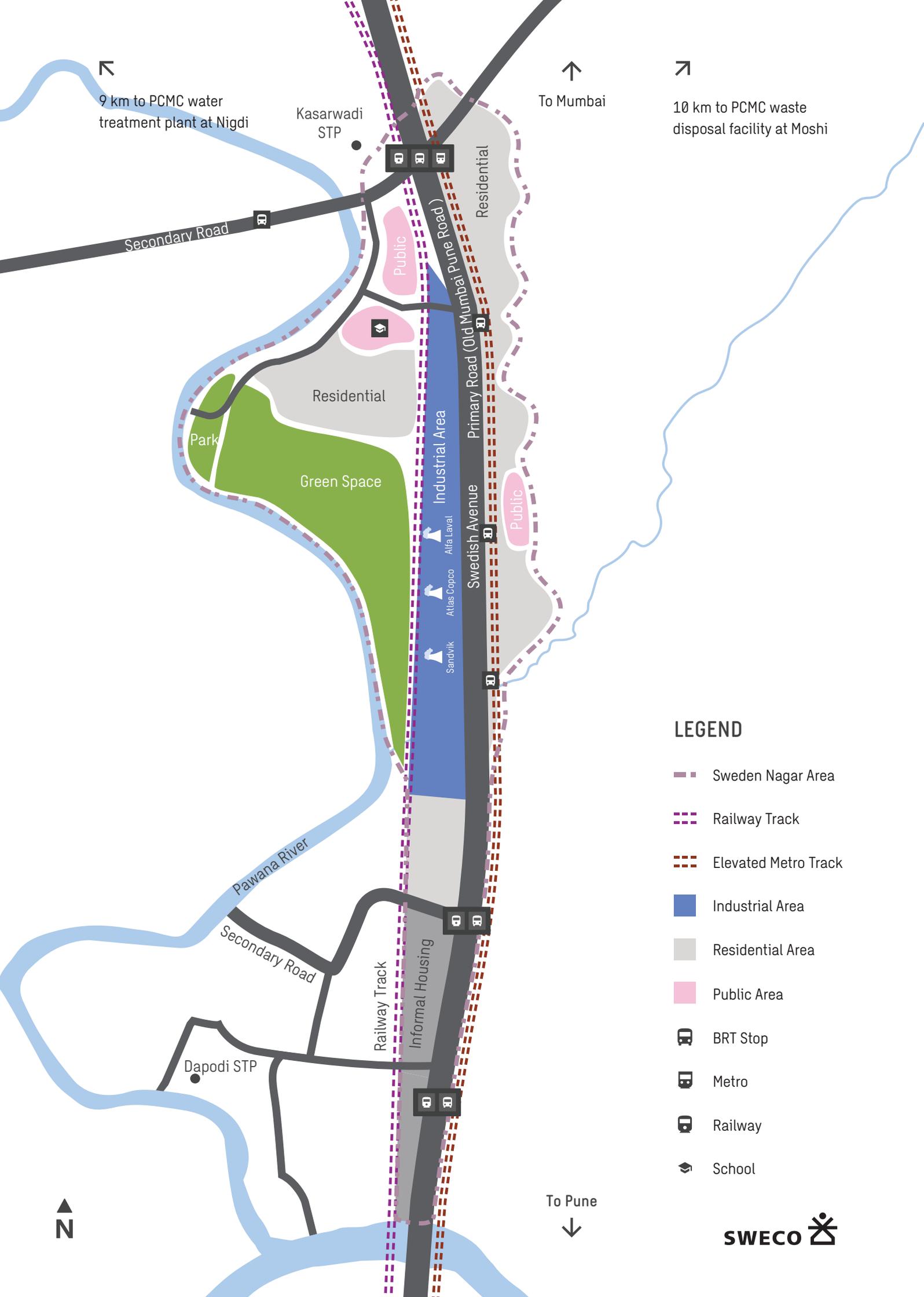
Prominent meetings were with:

- Mayor
- Municipal Commissioner
- Standing Committee Chairman
- City Planners
- City Engineers
- Project Managers for Existing Smart City projects - E&Y and KPMG
- City Transformation Office - Palladium

Field visits focused on understanding current situation on:

- Wastewater treatment
- Water demand and supply
- Waste Management
- Slum development
- Transport
- Urban Sprawl





9 km to PCMC water treatment plant at Nigdi

Kasarwadi STP

To Mumbai

10 km to PCMC waste disposal facility at Moshi

Secondary Road

Public
Residential
Industrial Area
Swedish Avenue
Primary Road (Old Mumbai Pune Road)

Park

Green Space

Sandvik
Atlas Copco
Alfa Laval

Public

Pawana River

Secondary Road

Railway Track
Informal Housing

Dapodi STP

To Pune

LEGEND

- Sweden Nagar Area
- Railway Track
- Elevated Metro Track
- Industrial Area
- Residential Area
- Public Area
- BRT Stop
- Metro
- Railway
- School

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EXISTING SITUATION

The project area is situated in Pimpri Chinchwad, three hours from Mumbai and 30 minutes from its twin city, Pune. It is located along Old Mumbai Road to the south of Wakar - Bhosari BRTS Road and is approximately 1 sq. km large where three Swedish companies (Alfa Laval, Atlas Copco and Sandvik) are situated locally known as Svea Nagar, which translates to Sweden Town.

TRANSPORT AND MOBILITY ACCESSIBILITY AND TRAFFIC SAFETY

India has a Vision Zero program as a part of the Agenda 2030. India Vision Zero is aimed to facilitate the exchange of ideas and experiences for improving road safety, and to promote a shared vision towards zero road accident deaths in the country.

Road safety India 2017:

- 64 674 crashes
- 1 48 707 fatalities
- 82 389 injuries
- 16 killed an hour every day!

In Agenda 2030, target 3.6 “Reduce Road Injuries and Deaths” aims to halve the number of global deaths and injuries from road traffic accidents by 2020. Pimpri has the potential of contributing to this goal. The area does not have an accessible and safe infrastructure today.

India has also signed the Convention on the Rights of Persons with Disabilities (CRPD) from the UN. The Convention follows decades of work by the United Nations to change attitudes and approaches to persons with disabilities. It facilitates a change from viewing persons with disabilities as “objects” of charity, medical treatment and social protection towards viewing persons with disabilities as “subjects” with rights, who can claim those rights and making decisions for their lives based on their free and informed consent as well as being active members of society.

The Convention is intended as a human rights instrument with an explicit, social development dimension. It adopts a broad categorization of persons with disabilities and reaffirms that all persons with all types of disabilities must enjoy all human rights and fundamental freedoms. It clarifies and qualifies how all categories of rights apply to persons with disabilities and identifies areas where adaptations should be made for persons with disabilities to effectively exercise their rights and areas where their rights have been violated, and where protection of rights must be reinforced.

These initiatives have all been put in place to tackle the traffic safety and accessibility issues that the Pimpri area is facing today. Upon site visit it was evident that Pimpri does not have accessible and safe infrastructure and that there is potential for contributing to this convention with some small-scale mitigations.





Connections across the transport corridor in the area (including Swedish Avenue) are only possible at a few points none of which are safe and accessible. There are only two possible places to cross the river and the train tracks meaning that the need to cross the road at these sites is higher.

The large intersection at the beginning of the Swedish Avenue has some facilities for crossing, but it only works well for cars. The signal does not provide enough time for pedestrians to cross and the path is blocked for pedestrians and cyclists. These crossings are not safe or accessible. Large vehicles have issues passing through the intersection due to congestion cars, pedestrians and motorcycles that stop and often park illegally in these locations.

The platforms at the bus stops are in the middle of the road and have only one entry and exit point at one end. For good access, there should be one at each end and there should be an option to cross the median. At present there is only one option, there is a signal for pedestrians but the signal phase for not functioning. There is a table-topped crossing that lowers speeds, but the traffic is highly congested making it difficult to get across.

North view of Swedish Avenue from the highway



The infrastructure for pedestrians is very poor, vehicle infrastructure is prioritised over pedestrian infrastructure, and the roads are compared to the pavements. Resultantly pedestrians are forced to walk in the road putting themselves at risk. This is not only traffic safety issue but it also makes the car lanes less efficient.



There are many people travelling by bicycle even where there are no cycle lanes, thus there is a clear need for better cycle infrastructure.



PUBLIC TRANSPORT

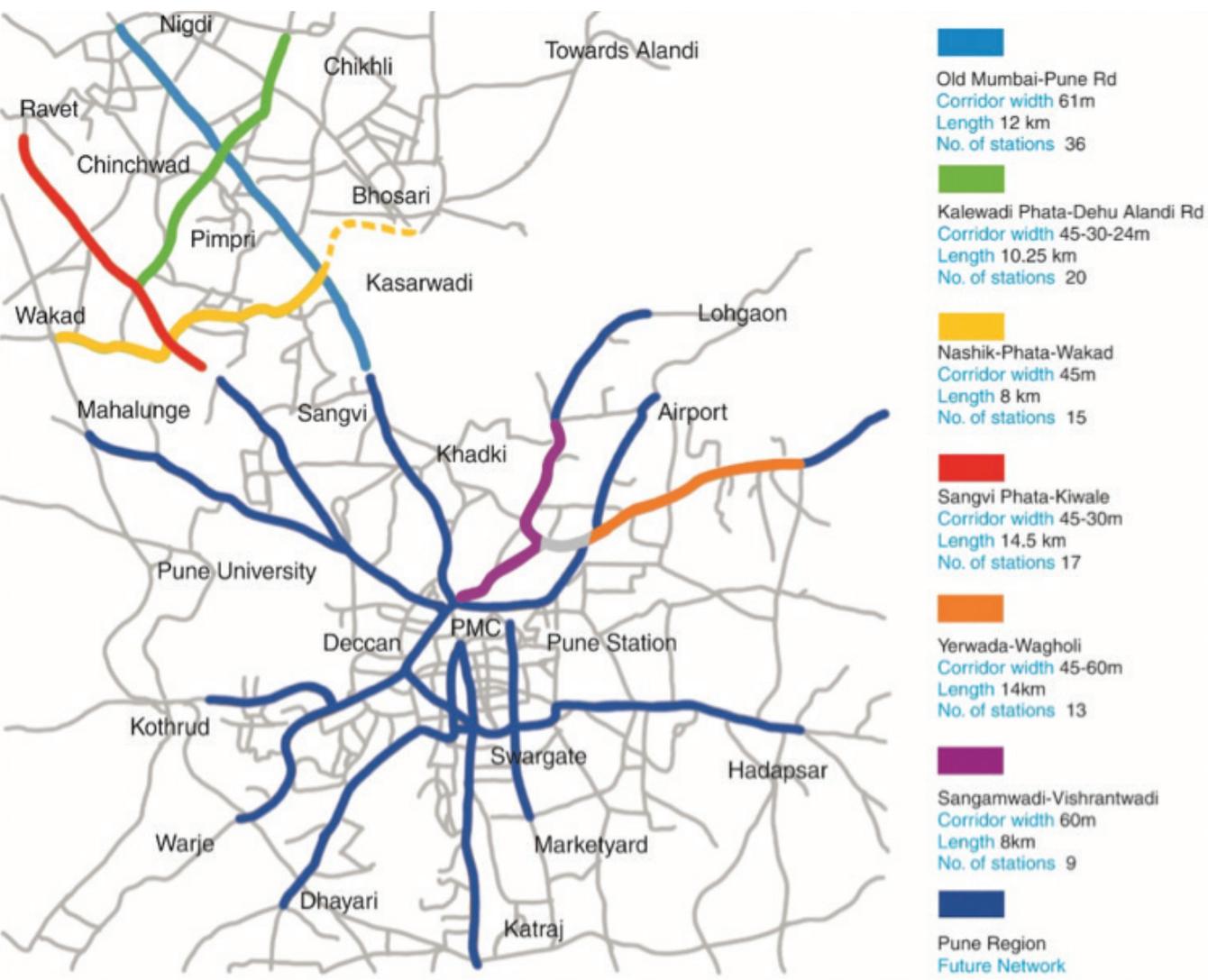
METRO UNDER CONSTRUCTION

Currently there is a new metro being constructed with two stations along the Swedish Avenue. More details on this metro need to be obtained to understand how the surrounding area can benefit in the best way possible from the metro.

BUS AND BRT INFRASTRUCTURE

Currently one of the city's four Bus Rapid Transit (BRT) lines goes along the Swedish Avenue with departures every 10 minutes in each direction. For cost saving purposes the bus stops, originally designed with entrances at both ends, have been built with entrances only at one end. Because of this, the average walking distance and likelihood that someone will jaywalk is higher than it would have been had the stop been built with two entrances. This, coupled with only a handful of pedestrian connections between the bus stops and sidewalks on either side of the 3.6 km long segment, makes the access to the bus infrastructure difficult and unsafe.

PROPOSED NETWORK, WHEN COMPLETE, WILL BE THE LARGEST BRT SYSTEM IN INDIA



TICKETING SYSTEM

Bus fares are charged on the vehicles, and with the current ticketing system, each bus requires a different fare. This means that if you have two connections you are required to buy three different tickets. Weekly and monthly passes are also available.

BUS FLEET

Both the BRT buses and other public buses appear in poor bad condition. This has implications on the emissions, reliability and accessibility.



Pimpri Chinchwad
BRT Buses



URBAN ENVIRONMENT



PARKING

Parking is often unregulated, unorganized and rules are frequently unenforced. Cars park on the side of the street and on the pavements. This makes it sometimes difficult for pedestrians but it also reduces capacity of car lanes. There are some private parking facilities in the area that are used by people that live and work in the area. There are no dedicated loading areas and thus loading is mainly carried out from the street or the pavements.

MAINTENANCE

While the road is to some degree maintained, the pavement is in such poor condition that it is rendered useless along many passages. Unfinished groundworks have left a dangerous and deep ditch in long segments of the pavement, and ongoing construction projects completely occupy the pavement without offering any alternative routes for pedestrians, and parking, vendors and stalls. Several dwellings also encroach onto the pavement forcing the pedestrians into the roadway. Damaged street furniture is not adequately replaced, also street lighting and signs require more maintenance.



INFORMAL HOUSING

Adjacent to the main street is a 400 ha informal housing area, also known as a slum. It consists of about 1000 dwellings as well as stalls for commercial activity and religious buildings.

Pune Slum Rehabilitation Authority works to improve the standard of living in slums in and around Pimpri Chinchwad and has arranged amenities and street lighting for Sidhartha Nagar Slum located in the project area.

Sidhartha Nagar Slum, in the project area.



ENVIRONMENT

WASTE

All municipal solid waste (MSW) produced in Pimpri Chinchwad is sorted and managed at a waste disposal facility located in Moshi, Pimpri Chinchwad. The site is 30 0000 sqm and has 4 landfills, two capped landfills, one active landfill and one newly constructed landfill.

Schematic of Waste Disposal Facility at Moshi, Pimpri Chinchwad



Capped landfill at Moshi waste disposal site (Closure 1)



Active landfill at Moshi waste disposal site (Existing SFL I)

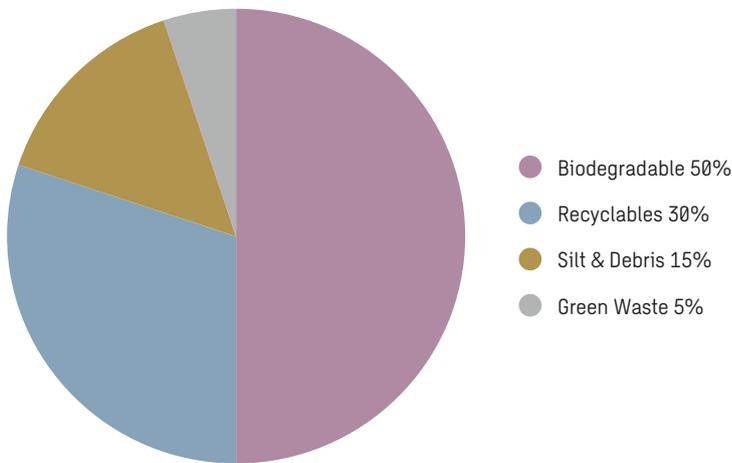


Sorting facility and newly constructed modern landfill at Moshi waste disposal site (Proposed SFL II)



The two capped landfills (Closure 1 and 2) have a landfill gas (LFG) collection system installed, but release untreated LFG directly into the atmosphere. There is no flaring system or gas treatment system currently installed at both Closure 1 and 2. The environmental impact of LFG being released unflared and untreated is extremely high, methane (CH₄) the main proponent of LFG is approximately 30 times more potent as a heat-trapping gas than carbon dioxide. It is estimated to have a global warming potential (GWP) of 28 - 36 over 100 years, 120 kg of methane is generated from every tonne of MSW.

The active landfill is 90% full and will soon be closed. The new landfill was constructed with modern landfill engineered methods including impermeable linings, a drainage system and a leachate collection system. At the sorting facility Trommel machines are used to separate the waste.



Composition of Municipal Solid Waste

The facility receives approximately 800 tonnes/day of municipal solid waste (MSW) and 450 tonnes/day of refuse-derived fuel (RDF). The biodegradable waste is mechanically converted into compost for agricultural use.



Trommel and composting machines at Moshi waste disposal site

WASTEWATER

There are thirteen sewage treatment plants (STP) in Pimpri Chinchwad, four STP have an Activated Sludge Process (ATP), six STP have Sequencing Batch Reactors (SBR) technology, two have Combitreat technology - an improved version of SBR, and one STP has biogas recovery and hydropower technology. In the 'Sweden Nagar' area there are two STP facilities servicing the area, a large STP located in Kasarwadi, and a smaller facility in Dapodi.

Particle filtration at Kasarwadi STP



ATP phase at Kasarwadi STP



Outlet and inlet water from phase 3 at Kasarwadi STP



The STP at Kasarwadi processes sewage from the Bhosari, Pimple Saudagar and Kasarwadi areas. The total capacity of Kasarwadi STP is 120 Million Litres/Day (MLD) the capacity of each phase at Kasarwadi:

- Phase 1 is 40 MLD with ATP technology
- Phase 2 is 40 MLD with ATP technology
- Phase 3 is 40 MLD with SBR technology
- also includes post chlorination process for all phases

The treated wastewater is disposed of by the following methods: 10 - 2 MLD treated effluent goes to the rowing channel, 5-6 MLD to dairy farms, 1-2 MLD for site cleaning and rest is disposed of the in Pawana river.

The general water quality from the inlet and outlet of all 3 phases is measured and documented on a daily basis at Kasarwadi STP.

WATER

Nigdi, Pimpri Chinchwad. The water treatment plant (WTP) at Nigdi receives 480 MLD of water from the Pawana dam in Lonawala through an open channel. Pimpri has plans to upgrade the system and convert the system to a closed channel to minimise contamination. The capacity is 428 MLD and can accommodate at least 20% more volume.



Water treatment plant (WTP) at Nigdi

The distribution of the water supply in Pimpri Chinchwad is monitored by SCADA, an online real-time monitoring system. The system can be accessed through an online program and a mobile application, as a result all the PCMC water engineers can monitor the ESR stations remotely. There are 85 ESR stations in the city and water flow and pressure meters connected to the SCADA system are installed on the inlet of each ESR. Water supply levels are set for the quantity of water distribution to all areas in PCMC and the main water line from the WTP is monitored to determine the volume of water each area is receiving.

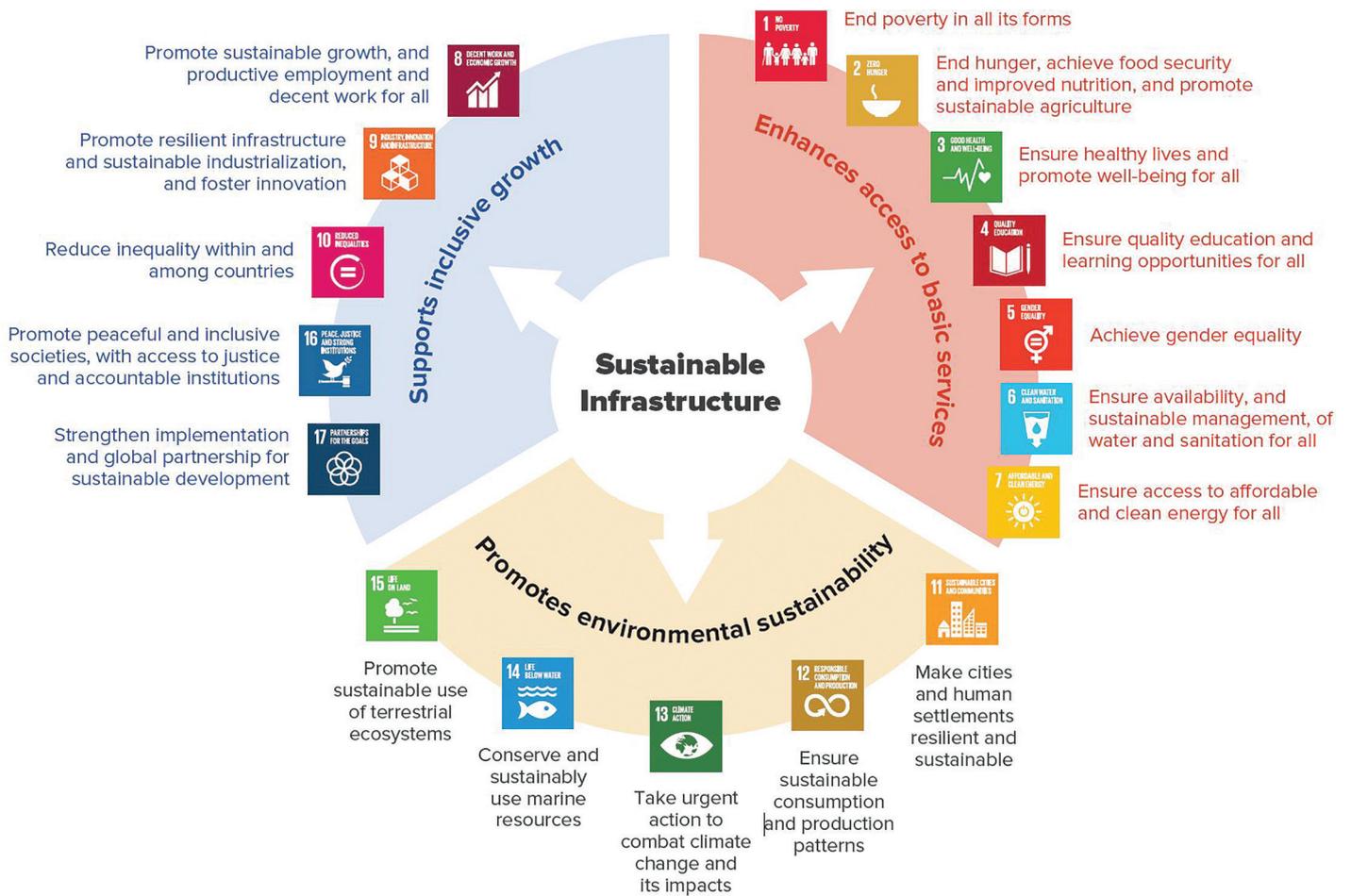
Conventional treatment (screening, aeration, coagulation, flocculation, and filtration) with pre- and post-chlorination is utilised at Nigdi water treatment plant. The general water quality for the inlet and outlet flow is monitored hourly, samples are tested 150 times per month from various locations throughout the city. At present there is sufficient water supply for the city, however due to the rate of growth in Pimpri Chinchwad, PCMC will have to increase water supply by importing water from Andra Dam (100 MLD) and Bhaha Askhed (167 MLD) to meet the future water demand.

Water treatment plant (WTP) at Nigdi, showing Phase 1



POSSIBILITIES AND OPPORTUNITIES

India has the youngest population in the world with just over 30% of its population under the age of 14. Some say that achieving the Global Goals is not possible unless India leads the way. After committing to the Global Goals in 2015 India's government are building plans towards their "Vision 2030" agenda, a plan designed to involve all aspects of government in working across departments to achieve the goals. Pimpri has the potential to take lead in this work and become a testbed for sustainable solutions, a truly smart city. A city providing a good life for all its residents and workers.



TRANSPORT AND MOBILITY

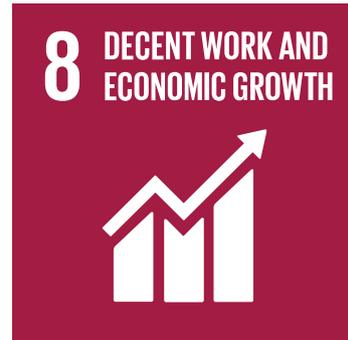
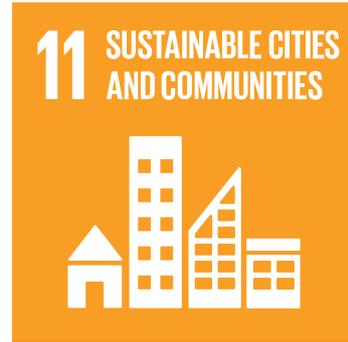
There is a possibility to work towards a non-motorized transportation strategy for Pimpri with the objective of preserving non-motorized transport, improving non-motorized transport infrastructure and moving towards a zero-tolerance policy for pedestrian injuries and. This will lead to a more sustainable, liveable and efficient city environment. This represents a key component for reaching the Global Goals.

An accessible and safe transport system gives people the access work opportunities and resultantly improve their quality of life and economic growth. At present there are many health issues such as high pollution levels and high fatalities on the roads. Improved infrastructure for pedestrians and bicycles will encourage more people to cycle or walk, creating a better environment and healthier people.

There is enormous potential to reduce carbon emissions by utilising a variety of urban transport modes including bus rapid transit (BRT), auto-rickshaws, metro, cycling, and walking - all of which help to reduce the use of private vehicles and shift trips to more efficient modes of transport, which in turn improves the efficiency of existing systems. By enabling cities to implement sustainable infrastructure, this improves air quality and reduces global climate change.

We can save lives by reducing traffic accidents and making cities safer by design. By focusing on the needs of people instead of vehicles, we able to transform cities and transport choices to protect pedestrians, cyclists and drivers alike. Our work goes beyond traffic safety ad we aim to improve personal health and activity, while reducing air pollution.

Travel and commuting time will be improved by encouraging to commuters to switch to more efficient, high-capacity modes of transport helping to reduce time spent traveling, giving urban residents more free time. Transport modes like BRT offer financially and environmentally sustainable alternatives to traditional systems, enhancing urban mobility and improving quality of life in cities. Efficient intersections with better signalling is another possibility to improve travel speeds and safety without encroaching on land allocated for streets.



TARGET 11-2



AFFORDABLE AND SUSTAINABLE TRANSPORT SYSTEMS

ACCESSIBILITY

An improved transportation system would provide access to safe, affordable and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situation - women, children, persons with disabilities and older persons. This will help to achieve The Global Goals, specifically Target 11.2 Affordable and Sustainable Transport Systems.

The Pimpri Chinchwad Municipal Corporation is responsible for planning, designing and maintaining the transportation system. The system should first be accessible, this goal goes beyond accessibility for the disabled and elderly but includes pavements, curbs that one can climb, and legible signs. In addition, a well-designed system and accurate information contributes to the overall experience of comfort reducing the perceived travel time.

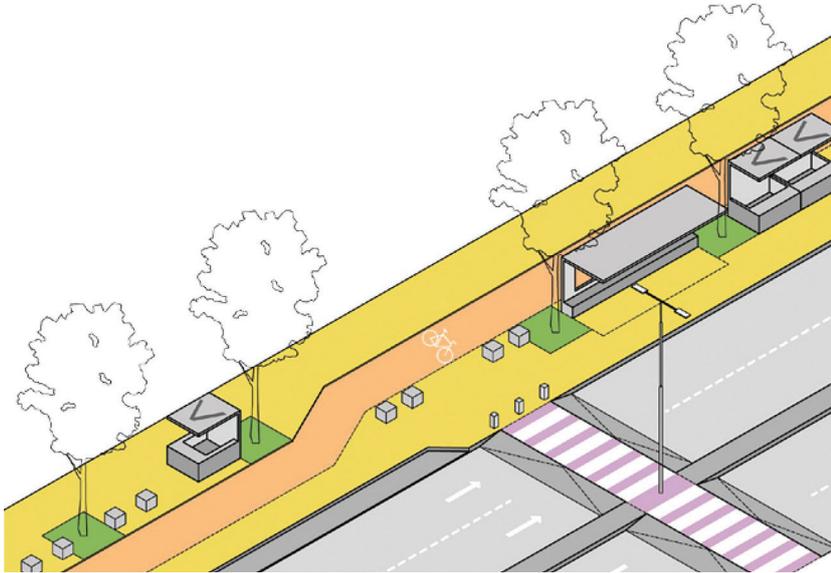
Bus stops are a focus area that requires improvement. The Nantes Busway located in Nantes, France represents a good example for the arrangement of stations. The road behind the stations is elevated which is an efficient way to reduce the speed of motor vehicles where they come in conflict with pedestrians.

Nantes Busway located in Nantes, France

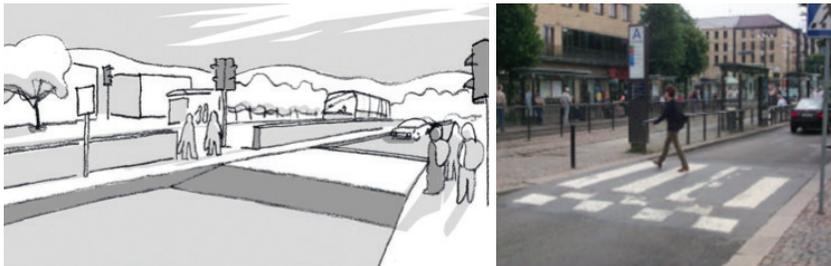


TRAFFIC SAFETY

A well-designed public space needs to be safe so that people feel secure, a practical solution for this would be a slow zone in every street where pedestrians have priority. In smaller streets with a shared space format, the entire street acts as a slow zone for all users (i.e. pedestrians, cycles and cars).



All bus stops must be organised to minimise accidents. Firstly, pedestrian approaches such as street crossings must be suitably organised, bus stop bays should be located to cater for provision of safe pedestrian crossings depending on the various conditions of the street or road in question. Elevated pedestrian crossings, in which pedestrians remain at the same level as the footpath (+150 mm) and vehicles pass over ramps, represent safe design for pedestrian crossings. Refuge islands that allow the pedestrians to cross one direction of traffic at a time further improve safety.



TARGET	3-6
	
REDUCE ROAD INJURIES AND DEATHS	

TARGET 11-7



PROVIDE ACCESS TO SAFE AND INCLUSIVE GREEN AND PUBLIC SPACES



URBAN ENVIRONMENT

Providing universal access to safe, green and public spaces helps to achieve the Global Goals; specifically, Target 11.7 Build Safe and Inclusive Green Public Spaces. Improving the public spaces by upgrading and providing more street lighting offers many significant benefits, including promoting safety and security in urban areas and to increase the quality of life by artificially extending ‘daylight’ hours during which activity can continue. Street lighting also improves safety for drivers, riders, and pedestrians.

Smart, efficient street lighting powered by solar power can be connected to a management system so the lighting can be easily monitored. With longer life, more efficient and smart technology the municipality can make enormous savings on operation and maintenance costs.

GREEN PUBLIC SPACE

There is a green area along the waterfront around the Pimpri Gurav road (between the road and the river) with a park, a playground and a school on the other side. This location has enormous potential for a recreational area. The road is wide, with a low level of traffic, the speed of traffic is generally high, however, following several straightforward changes this can be reduced. At present there are no pavements; an improvement would entail a narrowing of the traffic lanes and an addition of a pavement along on the river, which would not encroach onto the green area. This area would act as a testbed for sustainable solutions for the rest of the waterfronts in Pimpri Chinchwad.

MAINTENANCE

Infrastructure requires maintenance, this should be conducted in a regular and planned fashion with a focus on the users. While maintenance is important for the street (e.g. pedestrian safety) its elements to function as intended, it also improves the appearance and public appreciation of an area. Improving maintenance would contribute towards the aim of bringing Swedish attributes to the Sweden Nagar area.

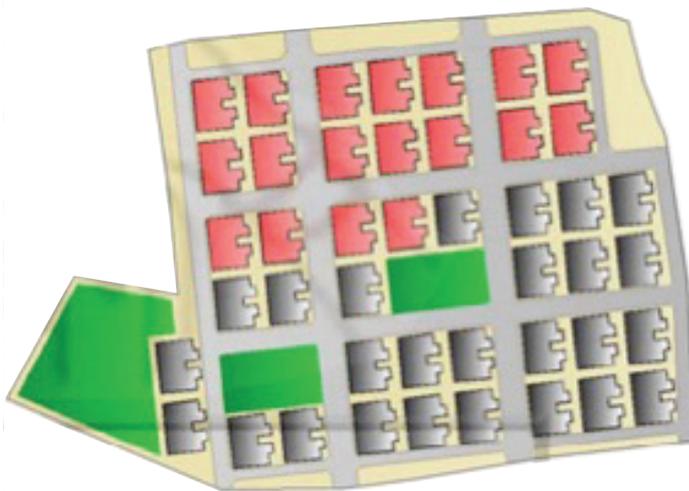
The responsibility for planning, designing and maintaining the transportation system falls under PCMC. The observed lack of maintenance is thought to stem from two sources; one is that most resources are allocated to investments leaving little for maintenance. The other is that PCMC lacks procedures to ensure the required functions of the streets are maintained and that destruction or encroachment on the street made by private companies or other departments of the city (e.g. ditches for cables or annexation from private properties) are regulated.

INFORMAL HOUSING

Pune Slum Rehabilitation Authority work with redeveloping the areas from the ground up in which case the current residents are offered a subsidised price for stakes and dwelling (or commercial) rights to the social housing properties being built. The slum improvement programme would help to achieve the Global Goals; specifically, Target 11.1 Safe and Affordable Housing.



The used method for redevelopment of slums is to demolish existing buildings and build 5 storey buildings interspersed with green areas in an orthogonal street network, such as that shown in the plan below.



Schematics like this were common in Sweden in the 1960s and 1970s and often lead to further social issues down the line.

Most of the slum area does not have access to modern energy services. The requirement for improvements to the slum areas offers a rare opportunity for these areas to “leapfrog” the inefficient, sprawling and polluting systems of the past. By introducing innovative technology, for instance solar panels to roofs which would help the urban poor skip fossil fuels supplied electricity, would provide good roofs for dwellings. This would help to achieve the Global Goals, specifically Target 7.1 Universal Access to Modern Energy.

In addition, most of the slum area does not have access to safe and affordable drinking water. Communal drinking water stations that dispense drinking water powered by solar energy would provide for the slum areas. This would help to achieve the Global Goals, specifically Target 6.1 Safe and Affordable Drinking Water.

TARGET 11.1

SAFE AND AFFORDABLE HOUSING

TARGET 7.1

UNIVERSAL ACCESS TO MODERN ENERGY

TARGET 6.1

SAFE AND AFFORDABLE DRINKING WATER

TARGET 11.6



REDUCE THE ENVIRONMENTAL IMPACT OF CITIES

ENVIRONMENT

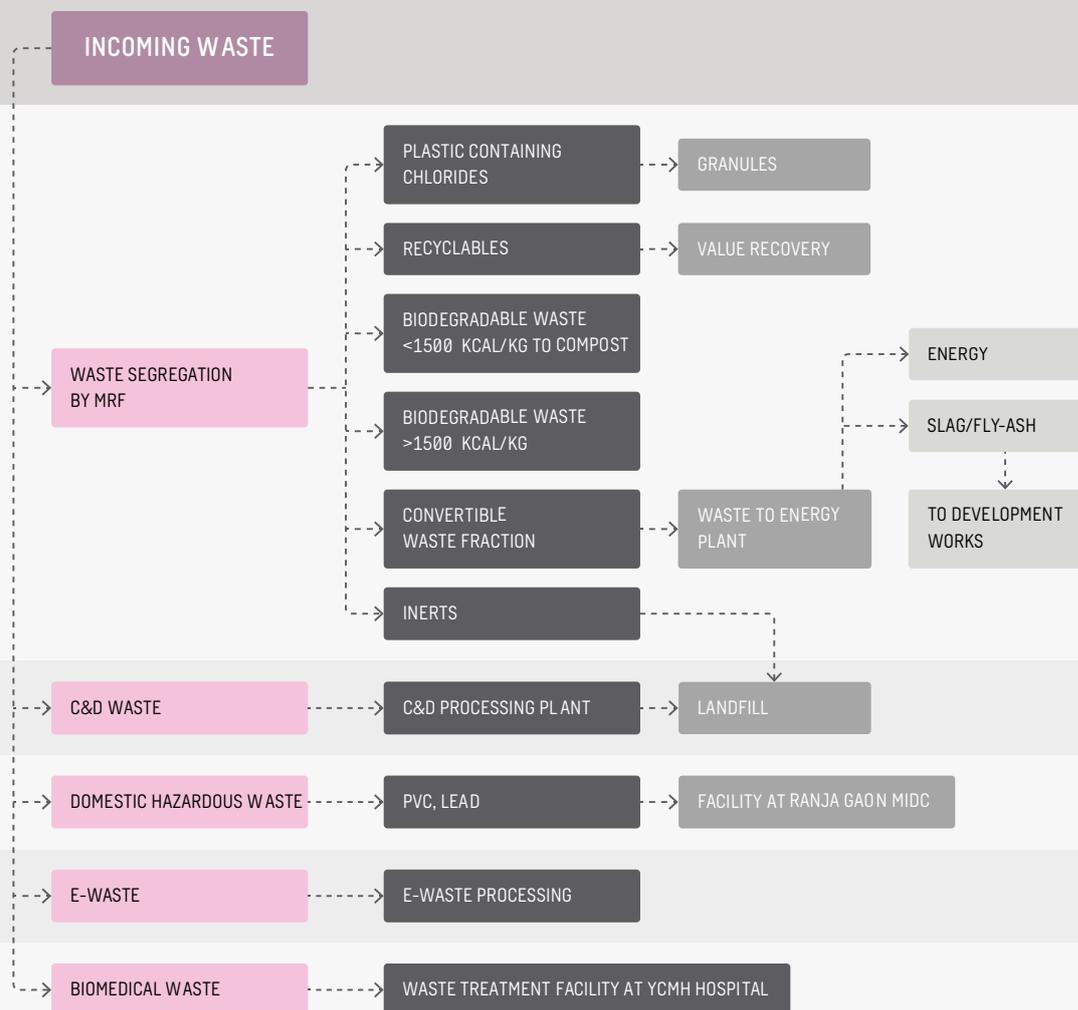
WASTE

Pimpri Chinchwad Municipal Corporation have plans to build a new waste to energy plant at the site with the capacity to process 1000 tons/day. A contract was signed at the end of 2017 with Antony Waste Handling Cell Pvt Ltd in partnership with Hitachi. PCMC intend to use the waste temporarily stored in the active landfills for energy and the refuse-derived fuel (RDF) will be supplied onsite.

For the existing landfills there is potential to reduce greenhouse gas emissions through installing a flaring system or gas treatment facility on the capped landfills. PCMC showed interest trialling a smart bins system contacted to their smart city network.

The planned waste to energy plant and proposed measures would reduce the adverse per capita environmental impact of the city and its landfills, particularly by improving the air quality and municipal and other waste management. This would help to achieve the Global Goals; specifically, Target 11.6 Minimize the Environmental Impact of Cities.

PROPOSED INTEGRATED SOLID-WASTE MANAGEMENT FOR PCMC



WASTEWATER

Improving the water quality by reducing pollution, eliminating dumping, minimising the release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling would help to achieve the Global Goals; specifically, Target 6.3 Improve Water Quality, Wastewater Treatment and Safe Reuse.

Pimpri Chinchwad has one STP located in Akurdi with Combitreat technology, biogas recovery and hydro power generation. The Akurdi STP generates and powers 60-80% of its own energy. There is opportunity to replicate and improve on the existing technology currently employed at the Akurdi STP. There is potential to upgrade sewage treatment plants servicing the Sweden Nagar area by reusing and recycling the wastewater more effectively. PCMC were interested in shown interest in upgrading both STP's to include tertiary treatment and energy recovery and generation.

ENERGY

The vision of Sweden Nagar is a to develop the Old Mumbai Road (60) and surrounding areas into a more liveable and sustainable city area for residents, industries, businesses and other organisations in the local area, as well as workers and customers who visit the area. The energy system is a crucial part of an attractive, smart and sustainable city district. By examining the energy demands, a more flexible energy system can be implemented that can evolve and interact with its users. The goal is to assist in the development of a resilient and sustainable urban environment for all parts of the community by analysing the energy flows in the development.

A sustainable and resilient energy system that makes use of local resources is a crucial part of an attractive, smart and sustainable city district. If the area could be designed to become a net power producer during peak demand. Implementation of the proposed solutions for the Sweden Nagar will show how the area can best utilise its resources and contribute to a sustainable city. Possibilities from smart meters, demand response, etc will also be included. Energy resources for the area may include solar energy as well as biogas recovery from wastewater production. The proposed solutions for the Sweden Nagar entail a palette of technologies and concepts including smart solar powered lighting, public access to smart phone and vehicle charging, smart waste management and energy recovery. This would help to achieve The Global Goals; specifically, Target 6.3 Double the Improvement in Energy Efficiency.

A local energy 'know-how' and energy system understanding also increases the innovation of the community in this very important area by giving residents and businesses opportunities to contribute. A smart city is the sum of its parts and these parts need to be considered together at an early stage and in close dialogue with stakeholders.

TARGET 6-3



IMPROVE WATER QUALITY, WASTEWATER TREATMENT AND SAFE REUSE

TARGET 7-3



DOUBLE THE IMPROVEMENT IN ENERGY EFFICIENCY

NEXT STEPS

TRANSPORT AND MOBILITY

Sweden Nagar, should have strategies and guidelines that aim to promote public transport and non-motorized modal shares by providing sufficient, safe, comfortable and convenient non-motorized traffic infrastructure.

A street hierarchy should be suggested based on the transport function. It includes arterial, sub-arterial, major collector, minor collector and local streets. Next steps include making strategies and guidelines for long term improvements in the transport system.

The need and possibilities of using smart technology is part of this work. Technology such as smart signs including travel information, WIFI hotspots, smart signals including bus priority, CCTV, that has its place in the urban environment. The aging bus fleet is also in need of improvement.



ACCESSIBILITY

Bikeshare

There is a transport hub in the northern part of the Swedish Avenue with BRT station and a proposed metro station. The distance is ideal for cycling and a bikeshare program could be introduced to enable quicker travel time from the transport hub to the businesses along the Swedish Avenue. For safety reasons the bicycle system should only be introduced once the bicycle infrastructure is in place.

PUBLIC TRANSPORT

Ticketing system

“Automated fare collection” AFC could be introduced at the BRT stations to improve boarding times and the overall speed of the BRT system. An integrated ticketing system should be introduced for all bus transportation and the new metro.

Bus fleet

A modern bus fleet is more sustainable and reliable. The overall Life Cycle Cost of a modern bus is lower when long term planning is carried out. An overview of the bus fleets as well as their operation and maintenance should be made to understand what can be done to improve the sustainability of the bus system. Electric buses have progressed significantly and could be a viable option for this area.

Volvo 7900 Electric Bus



TRAFFIC SAFETY

For the transport corridor we suggest making a RSA (Road safety audit) according to international standards. This can also be done for other parts of the area. From the RSA specific mitigation measures will be recommended.

TRAFFIC CIRCULATION

Transport modes including BRT offer financially and environmentally sustainable alternatives to traditional systems, which can enhance urban mobility and improve quality of life in cities. If public transport and bike lanes are prioritised increased numbers of people will likely utilise these forms of transport instead of private cars. Efficient intersections with better signalling systems can improve travel speed and prioritise public transport, bicycles and pedestrians. Next steps include analyses of traffic flow and capacity for the main transport corridor and formulating recommendations on how improve the existing street space through Intelligent Transport Systems (ITS).



CAR SHARE

On average a car is parked and stationary 95% of the time – a car should ideally be in motion as much as possible during its life cycle to maximise the material and energy costs. The Sweden Nagar area represents a prime locality for a sustainable car share scheme. Local businesses could make use of such a scheme for work related trips and local residents gain for private use.



URBAN ENVIRONMENT

CITY MASTERPLAN

A smart city comprises of various well-functioning components including transportation, energy, waste and infrastructure. It is only once these components work together and are coordinated that synergies are aligned and a city can truly be a smart city. A city masterplan could be made to ensure that all the smart city components work together to make a sustainable city.

Sweco Architects
Visualization Studio



SWEDISH AVENUE UPGRADE

At present, the Swedish avenue is a wide road acting as a barrier physically and economically, the transportation along the road is unorganised. The Swedish Avenue could be upgraded to improve the traffic situation as well as to make it a more pleasant environment. A conceptual design of the Swedish Avenue could be carried out to demonstrate future plans for the road.

Sweco Architects
Visualization Studio



GREEN PUBLIC SPACES

The waterfront area around the Pimpri Gurav road has the potential to act as a testbed for sustainable solutions. The area could be transformed into a recreational and green space, representing an oasis from the hustle and bustle of the busy surroundings. Part of the next step should be to study on how Pimpri Gurav road can be transformed to lower speeds and make the green surroundings more accessible for the residents and workers in the area. The area already has a cricket pitch, so an outdoor gym nearby would complement this and seating in shaded areas could be provided.

Sweco Architects
Visualization Studio



MAINTENANCE

In the long term rigorous maintenance will increase the lifespan of infrastructure and hence decrease the overall life costs. In Sweden there are systems on how maintenance is organised so that, simple issues are checked and changed on time. Next steps will include a study in how maintenance work is planned and executed and how this can be improved. The municipality requires a maintenance plan and a dedicated department to carry out maintenance on infrastructure before it fails. For instance, smart efficient lighting connected to a management system that notifies the maintenance department when and where a light requires attention. With more efficient and smart technology the municipality has the potential to make enormous savings on operation and maintenance costs. To highlight the financial benefits of incorporating such technology Life Cycle Cost analysis can be undertaken.

PARKING

Next steps to improve parking will include devising a parking strategy and designating parking areas for private vehicles and logistics. This will work towards implementing the city's new parking strategy into this area. The next steps will include guidelines on enforcement for the area. Several parking areas could require fees to discourage using motor vehicles. Parking phone apps, cameras and meters could also be introduced.

INFORMAL HOUSING

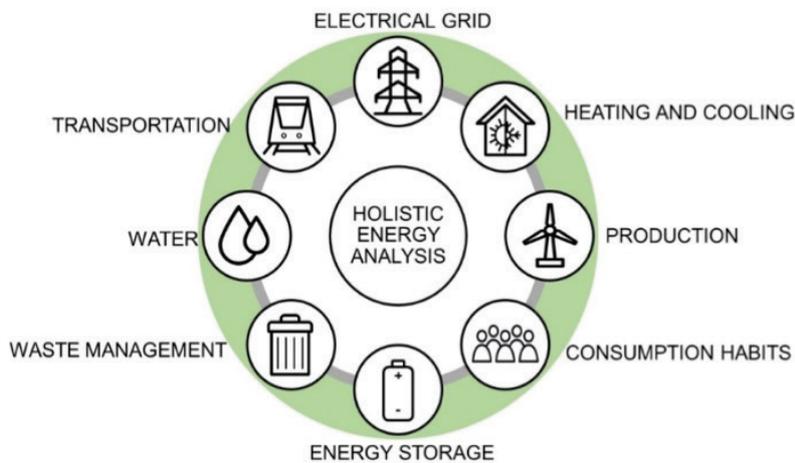
A team from Sweco will review existing plans for the slum redevelopments with support from the Pune Slum Rehabilitation Authority. Sweco will produce a plan for the Sidhartha Nagar Slum that follows the rational cost saving principles of current plans, while at the same time increasing liveability, enabling social mobility and sustainability.

ENVIRONMENT

A clean and healthy environment is a vital component of a liveable sustainable city. Minimising pollution and carbon emissions from city operations supports the conservation and sustainable use of natural resources. Sustainable infrastructure contributes to resilience. Cities will increasingly need to withstand climate change impacts and extreme weather events such as floods, droughts and extreme heat – and help protect us from these impacts. Meaning the city needs to be “climate-proofed”, and climate risks need to be considered in the design of new infrastructure – natural and built. Tackling climate risks through infrastructure design, maintenance and operation will benefit all and is essential to reduce poverty and protect the most vulnerable. The need and possibilities of incorporating innovative technology and solutions into the design of the Sweden Nagar area is part of this; a review of future environmental plans and developments is required. In addition, feasibility studies to review and upgrade the existing facilities is required.

ENERGY

A holistic energy analysis is required and will demonstrate how this can be achieved. As part of the analysis, current energy demands will be analysed, including demands from industries and residential areas. Future, predicted demands will be assessed, and expected changes may stem from city planning for the area, trends in energy use, needs for transportation, street-lighting and public charging facilities. The potential for installing a district cooling network in the Sweden Nagar area will be investigated. The energy analysis will be aligned with other analyses and plans for e.g. transportation and could include dialogue with the local utility regarding load shedding and local power production.



The holistic energy analysis complements existing ideas and is used to better understand the co-dependence between stakeholders. A better understanding of the co-dependencies between the different stakeholders in the energy system makes it easier to plan for better and more efficient use of digital and telecommunication technologies, e.g. smart meters and smart lighting. By examining the current and predicted future energy needs of the community combined with the community's possibilities to contribute to its own energy needs, several future and current challenges, such as bottle-necks and load-shedding, can be handled effectively at an early stage.

COMMERCIAL VIABILITY

Pimpri Chinchwad Municipal Corporation is one of the wealthier municipal corporations and one of the wealthiest municipalities in India. PCMC has committed 15 million euros towards a capital export (CapEx) for the Sweden Nagar area.

During our pre-feasibility site visit it was determined that careful planning and initial execution by PCMC are likely to lead to further commercial projects that could be private, public–private partnership (PPP) or even lead by PCMC.

In the project life cycle, at the municipality level in India, the next step following the pre-feasibility is the Detailed Project Report (DPR) or full feasibility study. The DPR will outline the clear revenue models for the area to be developed, with an understanding of possible vendors with required expertise and technology.

The DPR will then be developed into a Request for Proposals (RfP) or tender document. If the DPR is undertaken, Swedish know-how would focus on life cycle, sustainability, maintainability which is what is needed on the ground. This would offer a prime opportunity for Swedish technology companies to tender.

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