Families, ranging from 5–15 members, reside in smaller houses, leaving children with no space to play or study and no privacy either. They are the most vulnerable and voiceless in the family, often unable to articulate their demands adequately. Young girls, especially, face more issues from lack of privacy, especially during the time of menstruation. (Youth for Unity and Voluntary Action, 2019)

The current project is located in Lallubhai Compound (Mankhurd, Mumbai) and covers a gross area of about 18700 sq.m., with 9 buildings. However, nature based solutions (NbS) and other interventions are planned for smaller area of 6,656 sqm covering Lal Maidan, three buildings (5 wings), pathways along the perimeter of the maidan and the circulation space shown in purple in Figure 3.3.

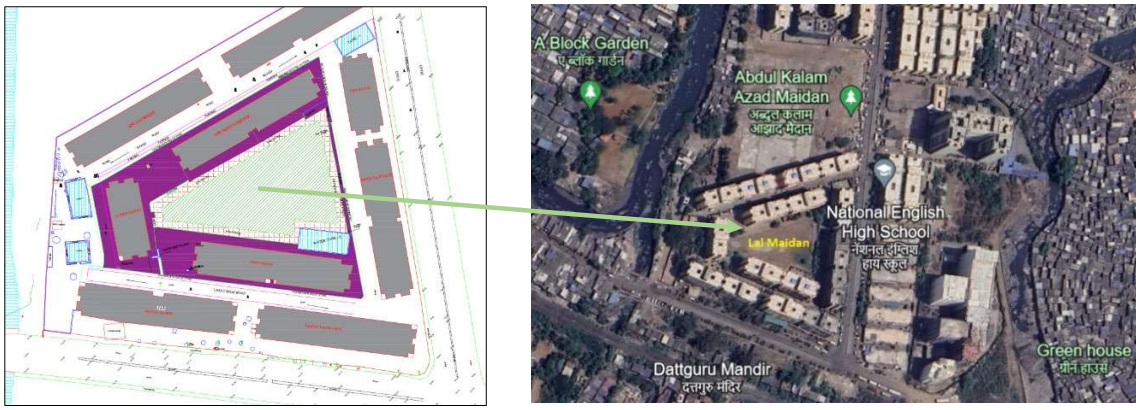

Figure 3.3 Top view of Lal Maidan in Lallubhai compound (Project scope)

B. Infrastructure and services

Topography and catchment analysis:

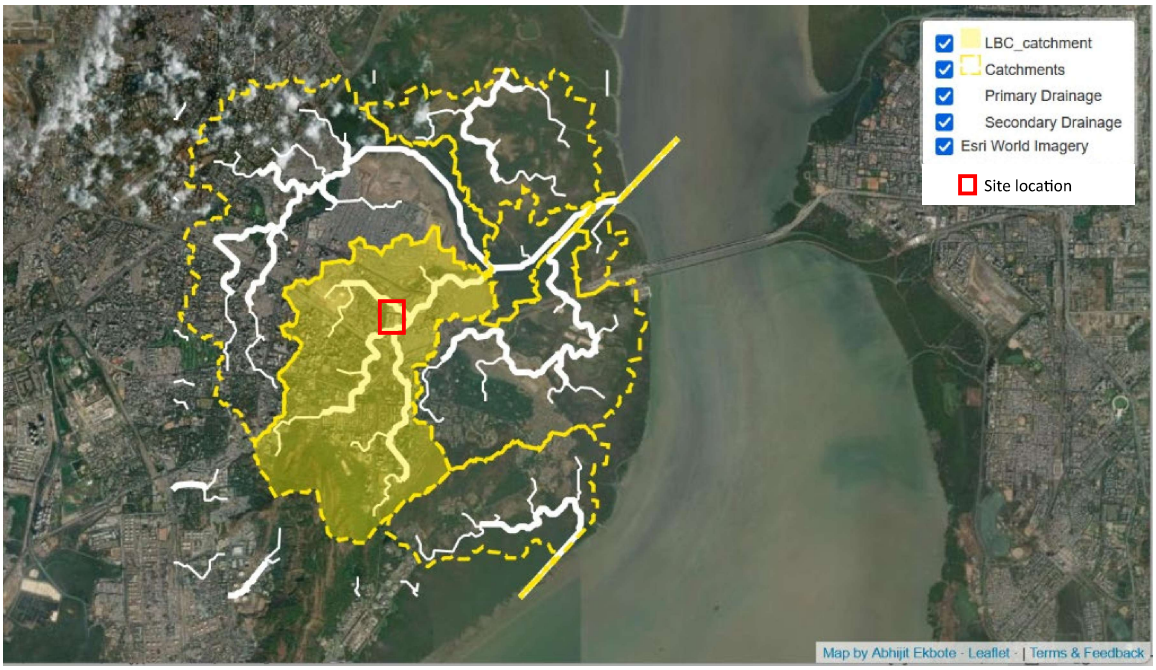

Figure 3.4 Catchment analysis for Lal maidan context by Abhijeet Ekbote.
Please see the following link for further information: Source: Ekbote Abhijit 2023, CityResource website, accessed 11 December 2023, https://cityresource.in/deonar

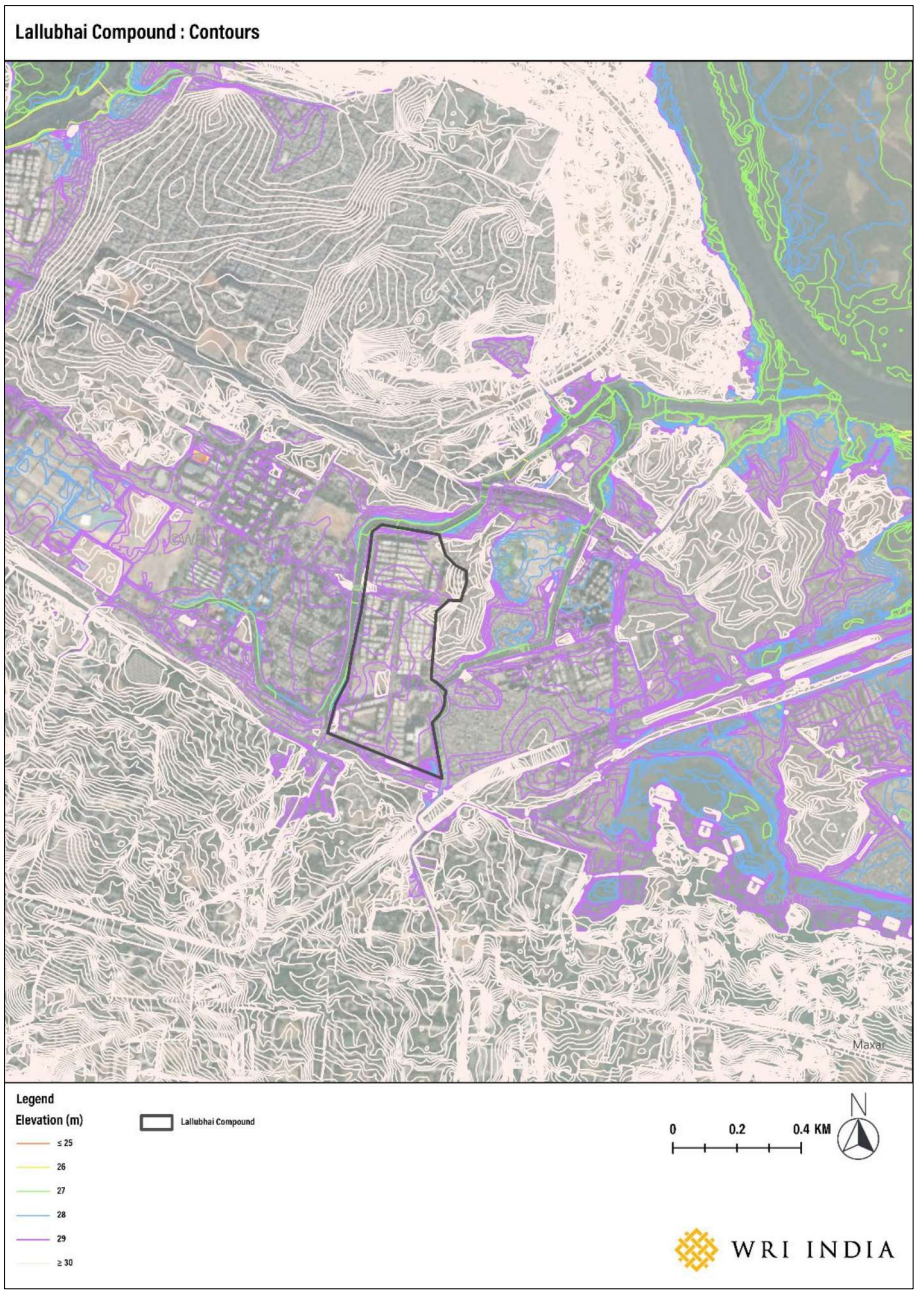

Figure 3.5 Contour map by WRI India.

The elevation of Lal Maidan, Lallubhai compound is approximately 29.2 m. The nallas to the east and west of Lal Maidan also have an average elevation of 27.2 m (water level top). Thus, the elevation difference between Lal Maidan and the adjoining nallas is just 2 meters, which is a small buffer in case of sea-level rise and consequent flood-lift in the nallas. The DP road to the east of Lal Maidan is at a lower elevation of 28.4 m and is highly prone to flooding. The current project does not address the flood risks associated with the larger Mankhurd catchment nor sea level rise since that would require much larger interventions at the Ward or catchment level, which is beyond the mandate of this project. **However, the nature based solutions proposed by the project are expected to reduce and/or eliminate the water retention time in case of temporary flooding under extreme rainfall scenarios within the area of Lal Maidan.**

Figure 3.6 Project scope- Area demarcation

Figure 3.7 Lal maidan context- in between creek tidal channels.

Figure 3.8 Nearest Tidal creek channel (nala) on west side of site.

Observation and inference:

- As seen in figure 3.7 Lallubhai compound and the developed area around it has spread till the edge of Thane creek, which once were drainage areas of Thane creek and were possibly covered with mangroves which used to act as absorptive sponges of rainwater and tidal water.
- Due to current development done by destructing these mangroves and tidal basin has reduced the absorption of water.
- Figure 3.8 showcases concretized edges of tidal channels which results into no absorption or no natural drainage of storm water from surrounding area into these channels.

Analysis at the site scale- Waterlogging

Lal maidan itself, experiences a high amount of waterlogging during monsoon months. This is primarily due to the concretization of the maidan; flow of rootftop and surface rain water from the surrounding 3 buildings into the maidan; and possible backflow during high rainfall events, from the SWD network. Mosquito breeding due to waterlogging in the available common open spaces has also led to vector-borne diseases (YUVA 2019). The Lal maidan project is a potential site for increasing multi-use open spaces and prioritizing the creation of green areas.

Figure 3.9 Water logging in maidan during monsoon reducing usability of maidan and causing health issues due to contamination of water and spread of water borne diseases.

Observations recorded during monsoon:

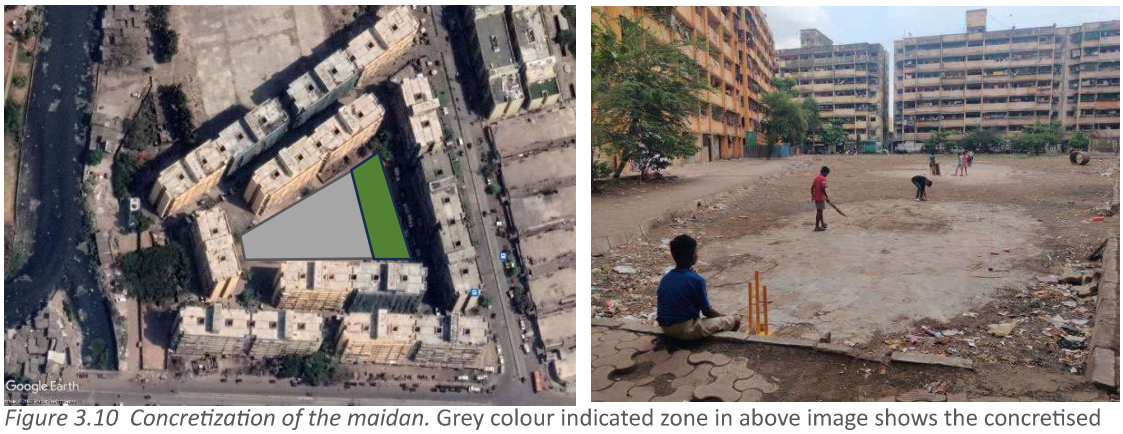

Figure 3.10 Concretization of the maidan. Grey colour indicated zone in above image shows the concretised portion of maidan. Image highlighting the concretised areas of maidan. This is a 6" slab of previously existing structure which is kept as it is and not demolished, leading to a lack of water absorptive surface area in this part.

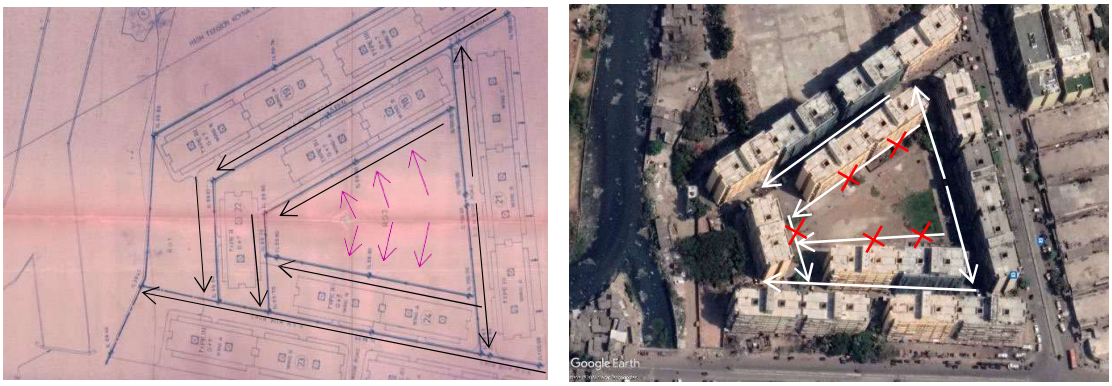

Figure 3.11 Image highlighting the currents status of SWD channels. Where cross marked drain channels along the edges of maidan has been completely closed by locals.

Figure 3.12 Block drain pipes under pathways around the maidan. (Right) Crossed lines indicate previously functional drainagae lines closed by residents. Blue is the flow of rooftop rainwater

Inferences:

- Due to the concretised base of maidan absorption of water in the ground is almost nil. Hence there is need of de-concretizing the base for rain water infiltration in the ground.
- As shown in Figure 3.11 the drain channels on 3 sides of maidan are blocked, hence do not drain the water away from the site. Also as shown in Figure 3.12 drain pipes under the pathways are blocked, hence there is need of new channels to infiltrate and drain the access water away from site to prevent water logging.
- Here, systems like the bioswale can be proposed to allow infiltration and to carry away excess water from the ground.

Existing storm water drainage & water supply (Refer to folder 6 for SWD drawings)

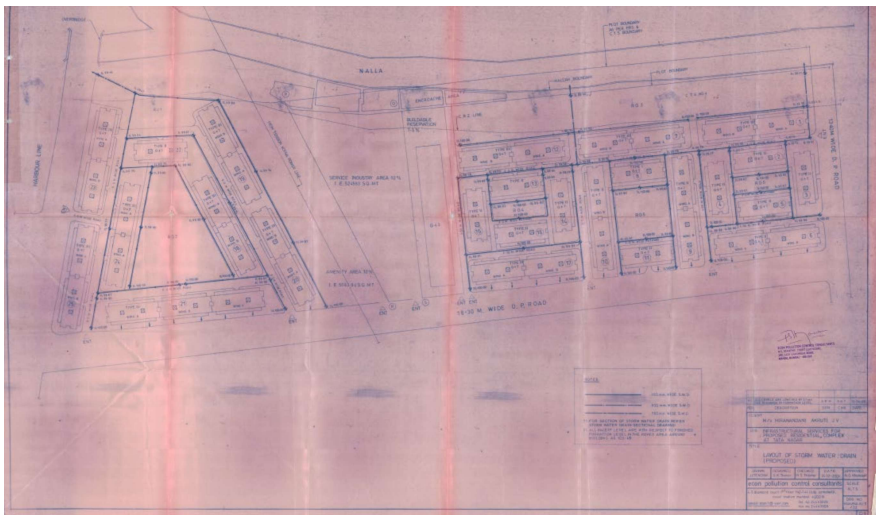

Figure 3.13 Existing storm water drainage network map (MMRDA). Access the completed drawing here.

Observations and inferences:

- There are three underground drainage channels in the Lal Maidan Area. The average width of the drainage channels is 0.86 m, average depth is 0.60 m, and the average slope is 0.26%. The width and depth of the drainage channels is acceptable, however, the slope is highly inadequate.
  - Using Manning's Equation, the velocity of water flowing through the drainage channels was calculated as 0.19 m/sec. This velocity is extremely low. It is recommended to increase the slope of the existing drainage channels to 2%, which will achieve a velocity of 1.50 m/sec.